



The Medical Journal of Malaysia

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CONTENTS

	Page
1. Editorial: Some thoughts on health planning and development ... Abdul Khalid bin Sahan	1
2. Nutritional status of primary school children: a comparative rural and urban study 1976 by ... Lekhraj Rampal	6
3. Longitudinal study on physical growth of primary school children in Malaysia by ... S. T. Chen	17
4. Breast-feeding in Kelantan by S. Balakrishnan and Hasbullah bin Haji Hussein	22
5. Plasma volumes in a group of healthy Malaysians by ... Sharifah Hapsah Shahabudin	25
6. Survey of medical personnel engaged in occupational health service in West Malaysia by ... Harold S. Jorgensen and Amar Singh	28
7. An analysis of consultation cases in sexually transmitted diseases to the Department of Dermatology, General Hospital, Kota Bharu, Kelantan by ... T. Ganesapillai	33
8. Central retinal artery occlusion following haemorrhage by ... M. Vijendran and K. Suppiah	37
9. A study of the aetiology of vertigo in Malaysia by ... R. D. Ponniah	41
10. Preventive ophthalmology by ... Amar Singh	45
11. Studies on parasitic infections in orang asli (aborigines) in Peninsular Malaysia by ... A. S. Dissanaiké, Vijayamma Thomas and S. P. Kan	48
12. Laboratory needs in general practice by ... Penang Chapter, College of General Practitioners, Malaysia	56
13. Pentastomid infection in the house ceckoes from Sarawak, Malaysia by ... Lim Boo Liat and Yong Hoi Sen	59
14. Management of coarctation of the aorta in a neonate by ... H. S. Saw, A. W. Grieve, K. T. Singham and A. E. Delilkan	63
15. Cardiac valve replacement - a brief review by ... K. O. Lim	67
16. Bone in anal canal causing acute anal pain by ... Diong Ko Ing	71
17. Structural features of mammalian muscle spindles by ... Gurmit Singh	75
18. Membranous glomerulonephritis and chronic hepatitis by ... F. Wang, A. Menon, R. Murugasu and K. Prathap	78
19. Prompt pointers to the aetiology of male urethritis by ... P. S. Nathan, M. Jegathesan and S. Ramalingam	82
20. In-use testing of disinfectants in Malaysian Government hospitals by ... S. Y. Khor and M. Jegathesan	85
21. Twin Pregnancy - a study of the local pattern by ... S. K. Teoh and W. P. Wong	90
22. A clinician looks at the placenta by D. K. Sen	96

Editorial

Some Thoughts on Health Planning and Development

by ABDUL KHALID BIN SAHAN

"He who will not reason is a bigot; he who cannot is a fool; and he who dares not is a slave" – SIR WILLIAM DRUMMOND.

A health service must benefit all the people. Health problems are numerous and have many facets. Needs and expectations differ from place to place and from group to group. A health plan needs therefore to be comprehensive and pragmatic, and the services well co-ordinated. Leaving pockets of population unserved or underserved is morally objectionable and socially unacceptable. To some this may sound egalitarian. But in the provision of a social service, one should be egalitarian, because this is the ultimate goal. What is intended here is not a polyclinic or a hospital at every village or a radiotherapy unit at every hospital, but rather equal opportunities to stay healthy and, when ill, equal opportunities to get treatment.

In the *Gerakan Maju* movement initiated by the government ill-health had been identified as one of the four major problems faced by the country; the other three being ignorance, poverty and apathy. Development of the health sector, during the past twenty years, had formed an important component of the government effort to improve the socio-economic status of the people.

There has been progress; the most significant perhaps being the provision of medical and health services in the rural areas, and control of major communicable diseases. Over the years there inevitably had been changes in emphasis and direction. The present service structure can be said to have taken its present form as a result of the following developments:

(a) Expansion of facilities and services in a regular, modular fashion, reflecting basic concepts;

- (b) Sophistication and diversification of basic services resulting from changing technology;
- (c) Development of vertical programs to tackle specific health problems, with varying degrees of integration with the basic service; and
- (d) Adding new functions to existing facilities and staff.

If falling morbidity and mortality rates and lengthening of life span can be considered as indicators of health status, then it can be said development of the health services had contributed towards its improvement. The operative word is "contributed". There are many other agencies whose activities directly or indirectly contributed towards this achievement.

Could we have done better?

The question is not whether we could have built more hospitals or health centres; but whether with the same quantum of investment in health, we could have obtained better results. With the country going through a crucial stage of development, it is not out of place to the situation.

Matters of life and death are always emotionally charged, and one tends to be carried away by isolated incident or chance association with the sick. But when dealing with the health of a nation one cannot allow personal feeling or emotion cloud far reaching decisions. One has to look at the issue

objectively and in proper perspective. Promise of "nothing but the best" may benefit a few, but leaves untouched the vast, more often than not, inarticulate majority who may be in more need of consideration and assistance.

A country faces multifarious health problems, some more acute than others. For some the underlying causes can be removed by available technology. Others have only partially removable or non-removable causes. Certain health problems may be considered by the community to be of great importance; whilst for some the cost of solving may be beyond the reach of the country or out of proportion to the benefit that can be expected from the measures taken.

As a matter of principle a health service must be based on a country's need, and its ability to pay for and sustain such a service. Developing countries are in the fortunate (or unfortunate) situation of being able to develop their health services merely by technology transfer from advanced countries through imported skill or staff trained overseas. With the current rapid international dissemination of information, it does not take long for even the most remote underdeveloped countries to come to know about the latest thinking, scientific discoveries and advancement in medicine developed or detected in the laboratories of some distant land. The danger is that there may be attempts at wholesale importation of techniques or strategies spawned in quite different circumstances from those prevalent locally, with the resulting possibility of quite irrelevant and inappropriate service development. It has been said that the poor health services of certain countries are caused not so much by the lack of technology as its non-or wrong application. Huge, modern institutions equipped with the newest gadgets, supplied with the most up-to-date and expensive drugs, and staffed by the most highly trained and an abnormally high proportion of a country's available manpower in the town, the contrasting with the picture of neonates dying from preventable neonatal tetanus, children dying of bronchopneumonia in the rural areas because of non-availability of service, bear stark testimony to the lopsided and unbalanced planning that goes on in certain countries.

How can such a situation be prevented?

It can be prevented through proper health planning. Planning starts with an awareness of problems and their causes. It is essentially deciding in advance: (a) What to do; (b) How to do it; (c) When to do it; and (d) Who is to do it. It is fundamentally a process of choosing between alternative courses of action.

Health planning

Perhaps the most critical issue in health planning and also that which is likely to be most discussed about is priority setting. Given an array of health problems, how would one choose the health problems to be tackled first not only in terms of sequencing but also from the point of view of resource allocation?

Logically one would view each problem from the following angles:

- (a) *Magnitude of the problem.* To what extent does the problem contribute to morbidity and mortality?
- (b) *Social concern.* Is the problem distressing certain areas, groups etc., and hence the community is concerned about it?
- (c) *Technology.* Are there technologies available to alleviate the problem?
- (d) *Existing health policy.* Since priorities will have to be politically endorsed, is the prevalent health policy conducive to the solution of this problem?

This would be the rational approach to priority setting. But unfortunately this is not always the case. Personal impressions and unvalidated data had been allowed to cloud the whole planning process.

For accurate planning, one requires reliable information and data. But more often than not, data are not available, incomplete, unrepresentative or just not analysable. It is ironical that countries most in need of correct health planning to maximise benefits from the meagre investment in health are the ones without reliable medical and health data.

Data collected routinely for day to day health administration, for compiling annual returns, or reports often cannot be used as the basis of health planning. Hospital statistics are notoriously unrepresentative and misleading. So also are returns of attendances at polyclinics, health centres and similar institutions.

There are many statistical techniques which can provide reliable information. Surveys and sampling techniques properly designed can simplify data collection and processing and at the same time avoid the laborious, routine submission of returns which can be unreliable anyway. It is advisable for a health administration to make more use of these statistical tools; and develop an effective information or data bank.

Strategies

Having identified the problems, and the priority in which they are going to be tackled, the next stage in the planning process is determining strategies to be used. In deciding, one needs to consider technology available and resources in hand. Examples of strategies are the following:

- (a) Control water-borne diseases, and parasitism by providing safe, adequate and easily accessible water supply and promotion of the use of toilets;
- (b) Control communicable diseases by increasing individual and herd immunity through immunisation;
- (c) Improve nutritional status and reduce toddler mortality rates through a multi-agency food and nutrition program;
- (d) Use community development principles to promote community participation in and use of services provided.

Strategies thus can be considered as broad statement of approaches in solving problems, and can therefore be called derivative plans.

There are a number of assumptions implicit in a strategy. Firstly the overall goal or objective is clear, though targets i.e. expected achievement over a time frame are not stated. Secondly, there is a general indication of approach. Thirdly, before adopting the approach to be used, it is assumed that all possible alternatives have been thoroughly studied and the one which is most logical and rational in all respects had been decided on. Strategy formulation is an important step in the planning process. On it will depend whether a program will achieve its ultimate objective. It requires a clear balancing of pros and cons, a complete analytical review of resources as well as an understanding of socio-cultural forces operating in the community. Many a program has failed not because of non-availability of technology, but for organisational and operational reasons.

When confronted with a number of health problems, different techniques of intervention can be adopted. One is the broad frontal attack, tackling a number of basic or related problems at the same time, typified by the rural health service of this country, wherein the government attempts to give preventive and curative primary care through a multiplicity of staff and techniques. The other is through vertical programs to solve health problems causing large scale morbidity or mortality, typified by the malaria eradication, tuberculosis, yaws and

filariasis control programs. This strategy utilises special organisation, staff and techniques to reduce sickness or mortality to acceptable and manageable proportions; at which stage the program will be integrated with the basic health service. Health services of many developing countries have in fact started as vertical programs, the unification organisation gradually taking on the added responsibility of providing a more comprehensive health service. In this country both techniques have been used.

Transition from a vertical to a more frontal approach or integration of a one disease program with the basic health service requires an elaborate re-organisation, restructuring, re-training and re-orientation of staff and resources. Lack of adequate planning and proper preparation create many administrative or operational problems, or even resurgence of diseases.

Integration of the health service means different things to different people. Broadly it can take any of the following forms:

- (a) All the services are under one administration;
- (b) All the services are provided under one roof, with personnel working quite independently;
- (c) All the services are provided under one roof or by one organisation, with the personnel working as a well-coordinated team;
- (d) All the services are provided by one multipurpose worker.

I suppose all these definitions are valid at different times and under differing circumstances. But it must be made abundantly clear that administrative integration does not necessarily result in service integration. Merely placing people under the same roof or in the same organisation will not integrate services, unless they are trained, organised and facilitated to work as a team.

How one can provide an integrated service depends upon circumstances. Problems requiring a high level of diagnostic, therapeutic and control technology from many different disciplines are best tackled under one administration, one roof and one team to bring about a oneness of purpose. On the other hand, a relatively simple problem which can be solved by relatively simple procedures can be handled by suitably trained multipurpose workers. In this country a good example is the jururawat desa (community nurse). Originally she was a midwife providing care to the mother and the newly born child. With retraining, she has taken on added

responsibilities in providing simple medicare, family planning, health education, child health care including immunisation and a host of other related duties. In this way she can deliver a wider range of services. In the remote rural area, she is the frontline worker servicing practically the whole family, though admittedly at a relatively low level of care.

The standard of care

The medical profession is justifiably concerned with the standard of care given to the public. A falling standard must be viewed with concern. But sometimes we tend to confuse "standard" with "level" of care. A "standard" is determined by the technology available. "Levels" are decided by the ability to provide. If we may borrow an analogy from air-conditioning, we may set the thermostat high or low. The heating or cooling mechanism and insulation can be said of a high standard if it is possible to maintain room temperature at the desired level. The health planner would be interested in the level as well as the standard of care. What is important is to set and maintain a standard of service for a particular level of development.

What do we do when a country is short of professional workers? A doctor takes six years to train, a specialist a decade. Do we have to wait that long to provide a modicum of service? Cannot this be provided by less qualified people? If it can, what would be the role of the few fully trained professional worker? Should he continue to provide service only? Or should not he, in addition, try to increase work output through less trained people by training them; whilst at the same time maintaining standard through effective supervision of sub ordinate officers and by giving the necessary consultative support?

Similar consideration must also be given when determining the type of instrumentation to carry out the various procedures. Much expensive equipment lies unused because there are no people who can use them, or because they are in a state of disrepair through lack of maintenance personnel or non-availability of spare parts.

Target setting

Target setting is one of the most difficult exercise in health planning. This is because health or ill health is an amorphous entity, outcome of intervention cannot be accurately predicted and rapid technological changes may invalidate planning assumptions. We tend to measure health status by the absence or reduction of ill health (falling morbidities and mortalities) and longer life span; and expansion of the health services by the number of new hospital beds added or the number of new

health centres or midwife clinics built, assuming that the facilities provided will meet with public response. And yet without specific targets it is difficult to evaluate effectiveness and efficiency of programs. There are, albeit, elaborate methods of quantifying services, if not in all, in the majority of areas. It is necessary to explore these possibilities to bring about a more realistic planning. The targets set should be in terms of coverage, levels of care and standards of service.

"Who should do what?"

In other words what type of manpower pattern should we have.

Many health programs have floundered because manpower planning had been unrealistic or inadequate. Poorly staffed programs or bad service are evidence of flaws in manpower planning. One tends to be too pre-occupied just with numbers of staff; without at the same time considering the appropriateness of type and mixture of manpower. Traditional staffing patterns have been accepted totally, without analysing the roles and functions of each worker in the health delivery system.

Experience in this country and studies in others have clearly shown how effective paramedicals and auxiliaries can be in the delivery of health service. We use them extensively. In the Ministry of Health, for every professional worker there are about 8-9 paramedicals/auxiliaries. Every year we are adding between 2,000 and 2,500 new workers to the existing pool. The use of paramedicals/auxiliaries is not a stop gap measure, because there are many simple, routine procedures which they can do. What is needed is a recognition of their roles by the profession, and the structuring of the service which will facilitate and maximise their contribution.

The role of the doctor nowadays goes beyond the direct providing of service. He has to be a planner, manager, supervisor and a team leader. Unfortunately most medical education does not equip him with this expertise.

Any training program must satisfy local needs. But many had been based on foreign experiences or are virtually copied from abroad. Local officers take foreign examinations, or are actually sent abroad because local facilities are absent or inadequate. So long as a country continues to depend on externally trained manpower, or bases its training on alien models and thus engages in manpower production for the world market rather its own needs,

it is difficult to see how it can ever satisfy its own requirement. Here the health planner and administrator may be against people who are morbidly concerned with up so called standard, foreign recognition, opportunities for further training abroad and a host of other reason for keeping the status quo. Recognition by others is most welcome and sometimes even sought; but let it not drown our primary objective and replace pragmatism of approach with a servile glorification of and identification with things which are beyond our reach or even irrelevant to our circumstances.

There is a great need to build up our own training capability both for professional and the non-professional categories.

Evaluation

Every plan, whether health, education, or agriculture must be evaluated. The evaluation can be continuous, periodic or both. This means every plan must have a built in assessment component

and machinery which must be structured before the plan is implemented. Unfortunately many plans have no such built in evaluation techniques, or plans have been implemented without purposeful evaluation being done. This can be quite understandable as many plans have no specific measurable targets either. This lack of evaluation is one of the weaknesses of many programs, and one of the causes of ineffective and inefficient services. More serious thought should be directed to evaluation, as it is only through such exercise that one can detect weaknesses and flaws in planning to be cycled back into the system for rectification in order to obtain a better service.

It has not been my intention to touch on every aspect of health planning and development. The field is extensive, and cannot be dealt with in a few pages. Numerous references on this subject are available. What has been highlighted are merely certain important issues relevant to a pragmatic and rational approach in health planning and development.



Nutritional status of primary school children: A comparative rural & urban study 1976

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Introduction

MALNUTRITION is one of the most serious public health problems affecting the developing countries today. Infants and toddlers are mostly affected followed closely by pre-school and primary school children. Their daily diet is poorly balanced, inadequate in calories, lacking in proteins, minerals and vitamins. Faulty feeding in the weaning and post weaning period due to lack of nutritional education, poor socio-economic status, poor environmental sanitation, parasitic infection, cultural beliefs and taboos, food customs and tradition are the pillars of malnutrition.

There is an increased awareness now than ever before, of the need to combat nutritional problems facing the developing countries. Various programmes, schemes and projects have been started by Governments, societies and organisations all over the world. There is an urgency for effective co-ordination in national and international work.

This comparative study was carried out with the object of assessing the nutritional status of primary school children of the major ethnic groups both in the rural and in the urban areas.

Materials and methods

A total of 5,360 students were involved in this study. 3,107 were from the rural areas and 2,253 from urban areas. Out of the 17 rural schools, six were Malay medium schools, five Chinese medium and six Tamil medium schools. The Malay and Chinese medium schools were situated in villages and the Tamil schools were situated in Estates in

rural areas. The student from the urban areas were taken from two primary schools (English medium). The students in these two urban schools came mainly from upper income group. The students in the seventeen rural schools came mainly from the lower and middle income group, with same climatic conditions. Tables 1 and 2 show the age and sex distribution of the rural and urban school children investigated.

A team consisting of a Medical Officer of Health, a Public Health Inspector, 2 Probationer Public Health Inspectors visited the schools involved and took measurements of weights and heights of the primary school children.

Weights were taken using a "Detecto-Medic" platform beam type weighing machine (U.N.I.C.E.F.) made by Detecto Scales Inclusive Brooklyn, N.Y., U.S.A. This weighing machine had scales marked in kilograms and was checked frequently by the use of a known weight. The weight was recorded to the nearest 0.1 kilogram. Height measurements were read from a scale fixed along with the weighing machine, marked in centimeters up to a height of 2 meters and capable of measuring to an accuracy of 0.5 c.m. In recording the height measurement, the child was requested to stand barefeet on the centre of the platform fully erect with heels together. The Horizontal lever was lowered so as to rest firmly on the crown of the head. In recording the weight measurement the school child was asked to stand barefeet with minimum clothing (light shorts for boys, light dresses for girls) in the middle of the weighing scale.

The ages of the children were determined from Birth Registration Certificates. Age was recorded to the nearest year e.g. 6 yrs. and 5 months had been recorded as 6 yrs. and 7 yrs. and 9 months as 8 yrs. Ages at halfway point was recorded to the next higher unit (e.g. 8 yrs. and 6 months was recorded as 9 yrs.) The methods of measurements of weight and the heights and recording of age were those suggested by Jelliffe (1966).

Caution was taken to ensure accuracy in recording the weights and heights measurements. My assessment of nutritional status of primary school children is based on treating the data by 3 methods i.e. percentage prevalence with deficit weight for age, deficit height for age ("stunting") and deficit weight for height ("wasting") as suggested by

Waterlow (1973) and W.H.O. (1976). "Wasting" in this study has been taken as those children with less than 80% expected weight for height of Nelson standards. "Stunting" has been taken as percentage prevalence with less than 85% expected height for age. Protein energy malnutrition has been classified as suggested by Welcome working party. "Underweight" those with 80-60% expected weight for age with no oedema, "Marasmus" - those with <60% weight for age with no oedema. Kwashiorkor - those with 80-60% weight for age with oedema.

Results and discussion

The mean weight and height trend lines of the 3 ethnic groups i.e. Malay, Chinese and Indian are shown separately for Males and Females in Figures 1 to 4. These trend lines are compared with the

Table I

The Number of Subject by Age and Ethnic Groups in Kuala Lumpur (Urban Areas) in 1976

AGE IN YEARS	ETHNIC GROUPS						TOTAL
	MALAY		CHINESE		INDIAN		
	Male	Female	Male	Female	Male	Female	
7	99	95	79	51	46	28	398
8	86	59	96	47	46	33	367
9	86	91	98	51	43	41	410
10	67	78	109	74	42	31	401
11	86	64	78	50	46	37	361
12	63	41	81	68	35	28	316
Total	487	428	541	341	258	198	2253

Table II

The Number of Subjects by Age and Ethnic Groups in Rural Areas in Klang District in 1976

AGE IN YEARS	ETHNIC GROUPS						TOTAL
	MALAY		CHINESE		INDIAN		
	Male	Female	Male	Female	Male	Female	
7	78	62	158	128	75	78	579
8	62	72	136	137	78	93	578
9	76	71	141	151	76	69	584
10	76	80	131	140	73	73	573
11	55	68	109	114	41	40	427
12	62	74	88	98	28	16	366
Total	409	427	763	768	371	369	3107

80% and the 60% of the Nelson standard Trend line. These have been taken as trend lines for growth between 7 and 12 years age group rather than the actual curve growth rates to simplify comparison.

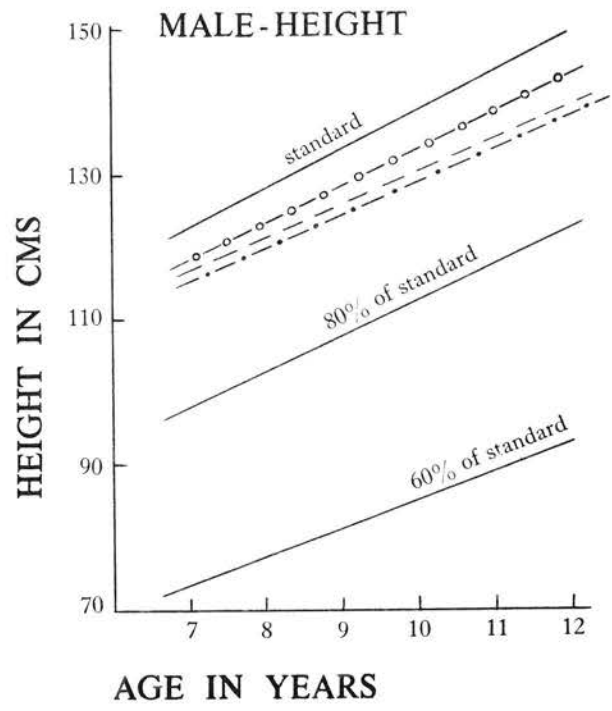
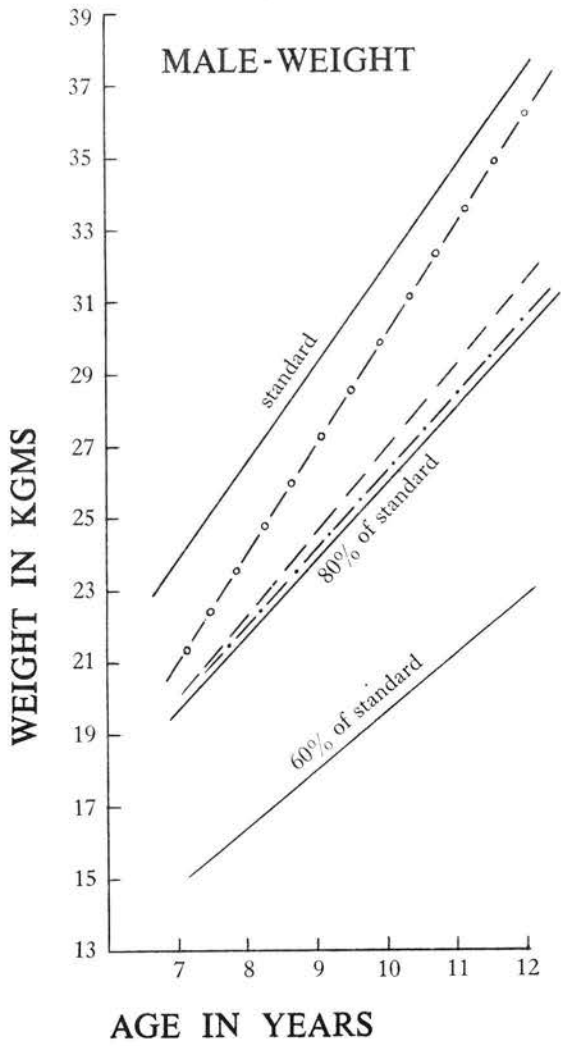
Weights & Heights of Urban Boys

Urban Malay primary school children between the ages of 7 and 12 had the shortest stature and were generally lighter in weight than their Chinese and Indian counterparts.

Chinese urban primary school children were clearly heavier and taller than either the Malays or the Indians; the latter's growth achievement was intermediate between that of the Chinese and Malay.

Weights & Heights of Urban Girls

Urban Malay girls like the boys had the least satisfactory growth achievement compared to the Chinese and the Indians; they were lighter and shorter than their Chinese and Indian counterparts. Chinese girls had the best weight achievement; with



Malay: -.-.-.-
 Key: Chinese: -o-o-o-o-
 Indian: - - - - -

Fig: 1 Weight and Height trends of male primary school children by ethnic groups in the urban areas in Kuala Lumpur 1976

Indian girls lying intermediate. Although Indian girls were lighter than the Chinese girls, there was very little difference between their heights.

the most satisfactory growth achievement in terms of weight and height.

Weights & Heights of Rural Boys

The weight of the rural Indian boys were the lowest recorded but their heights were no inferior to the Malays who were heavier than the Indians at all age groups between 7 and 12 years. Compared to the Indians and Malays, rural Chinese boys have

Weights & Heights of Rural Girls

The weights and heights of the rural Indian girls were lower than their Chinese and Malay counterparts. However rural Chinese and Malay girls were almost identical in weight and height achievement.

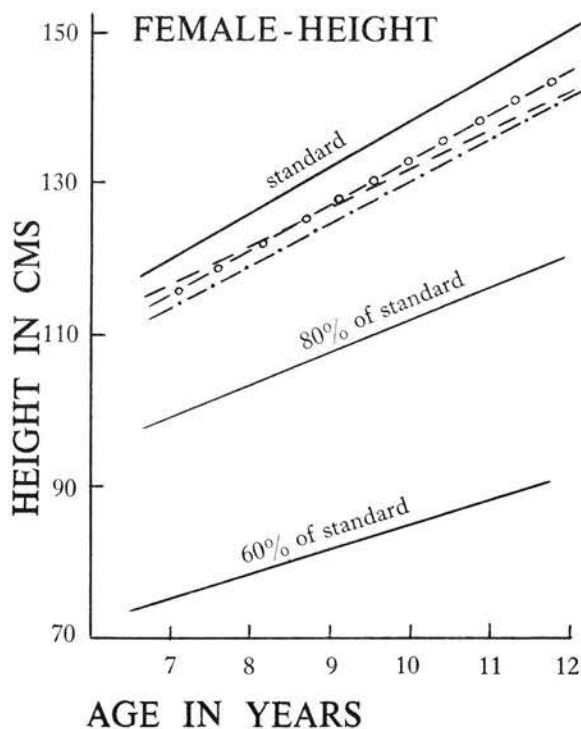
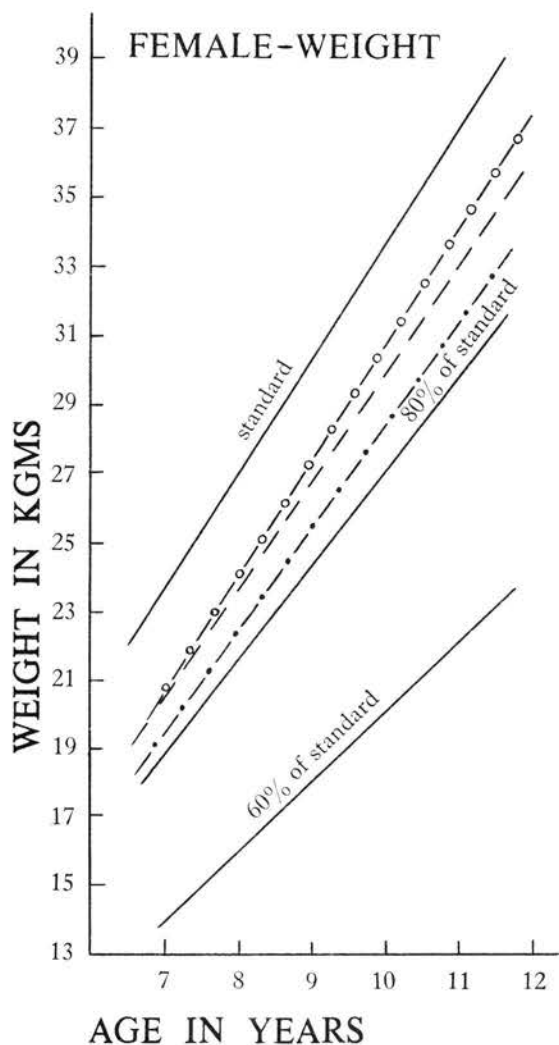


Fig: 2 Weight and Height trends of female primary school children by ethnic groups in the urban areas in Kuala Lumpur 1976

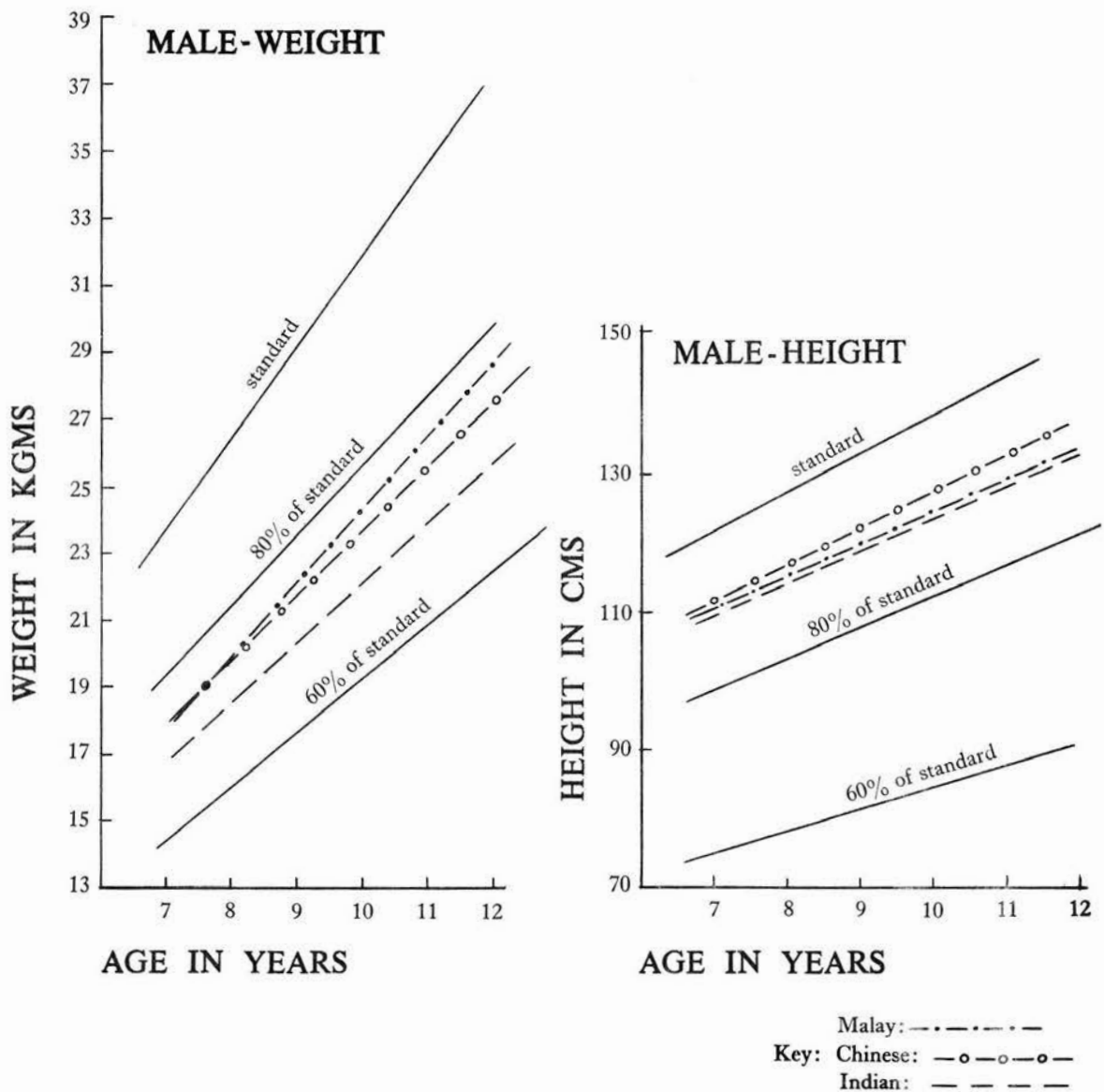


Fig: 3 Weight and Height trends of male primary school children by ethnic groups in the rural areas in Klang District 1976

Comparative Growth Achievement - Rural and Urban children

Whereas in the urban area, Malay primary school children of both sexes had the least satisfactory growth, in the rural schools, the Indian were the worse off, compared either with the Malay or the Chinese.

Chen (1976) reported on the weights and heights of 3,312 urban primary school boys and girls around Kuala Lumpur and found that Chinese children

were taller than Malays and Indian children. This observation is similar to the present finding, based on 2,253 urban children. However, while Chen found that the urban Indian children had the least satisfactory growth achievement compared to the Chinese and Malay, this report can confirm this for the rural Indian. An explanation for this discrepancy may be due to sampling differences as the urban Indian children reported by Chen were in fact more similar in their growth pattern to the present rural Indian series.

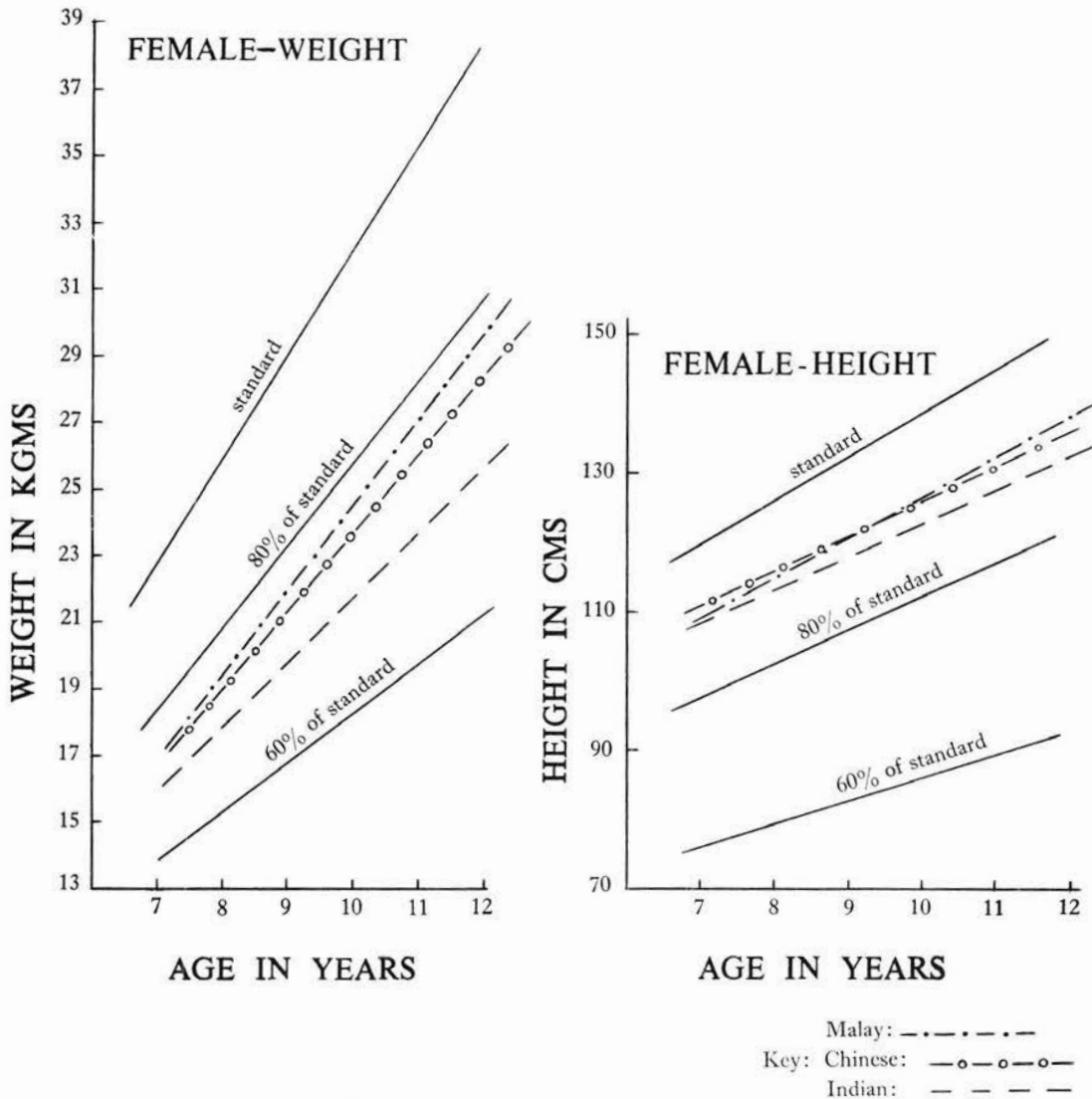


Fig: 4 Weight and Height trends of female primary school children by ethnic groups in the rural areas in Klang District 1976

Prevalence of malnutrition by "Wasting and Stunting"

Tables III and IV show that irrespective of race and sex, rural primary school children between the ages of 7 and 12, have significantly higher prevalence rates for "Wasting" and "Stunting" than urban children. "Wasting" which indicates the presence of current acute malnutrition was particularly high amongst rural Indian boys (4-13%) and girls (6-16%), while "Stunting" which may reflect a chronic malnutrition or a previous history of malnutrition, was also highest amongst rural Indian children (6-17%) in boys and (7-18%) in girls.

The inferior growth of rural Indian primary school children confirms a similar previous observation made in Kuala Langat by R. Lim and I. Coenigraht in 1972 (Chong 1976).

Prevalence of protein energy malnutrition

Tables V and VI show that primary school children in the rural areas have significantly higher prevalence of protein energy malnutrition than those in urban areas. None of the 5,360 primary school children examined had kwashiorkor nor marasmic kwashiorkor. Marasmus was highest amongst rural Indian boys (6-19%) and girls (5-37%) followed

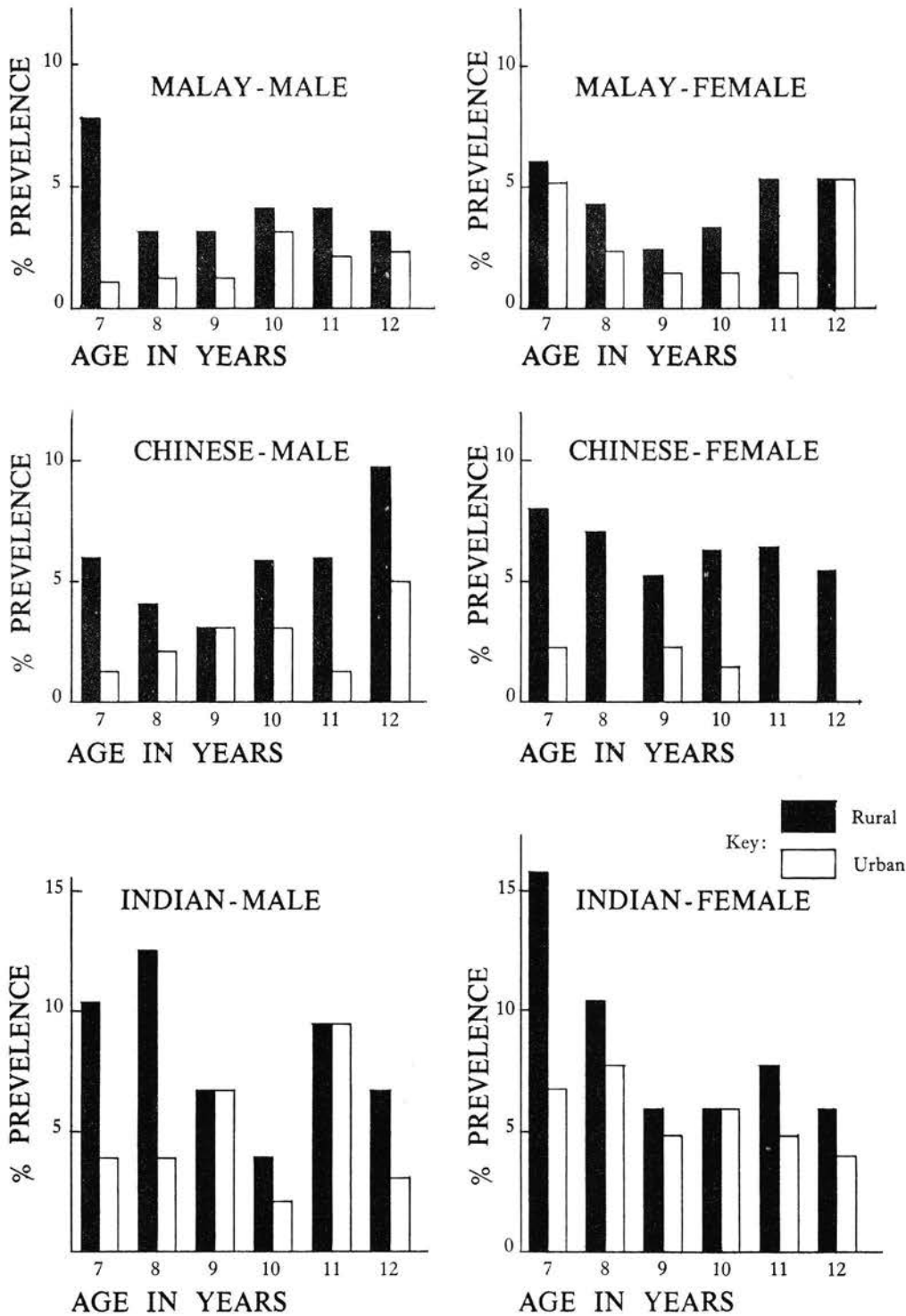


Fig. 5 Prevalence of Severe Acute Mal-nutrition - "Wasting" ($< 80\%$ weight for height) in primary school children according to deficit weight for height by age and ethnic group in Rural and Urban areas 1976

Table III

Prevalence of chronic malnutrition "Stunting" in primary school children according to deficit height for age by age, sex and ethnic groups in Kuala Lumpur, 1976

AGE IN YEARS	ETHNIC GROUPS					
	MALAY		INDIAN		CHINESE	
	% of children with <85% height for age		% of children with <85% height for age		% of children with <85% height for age	
	Male	Female	Male	Female	Male	Female
7	2.0	1.1	0	0	0	0
8	5.8	0	0	0	0	0
9	5.6	0	6.8	0	2	1.9
10	1.5	2.5	2.4	6.5	1.8	0
11	2.2	2.9	0	0	0	0
12	3.2	2.3	0	3.3	0	1.3

Table IV

Prevalence of "stunting" malnutrition in primary school children according to deficit height for age by age, sex and ethnic groups in rural areas in Klang District, 1976

AGE IN YEARS	ETHNIC GROUPS					
	MALAY		INDIAN		CHINESE	
	% of children with <85% height for age "stunting"		% of children with <85% height for age "stunting"		% of children with <85% height for age "stunting"	
	Male	Female	Male	Female	Male	Female
7	8	3	6	15	3.8	2.3
8	14	11	15	13	6.6	3.6
9	14	6	15	7	9.2	6.5
10	14	10	16	8	5.8	2.1
11	12	5	9	18	3.6	5.1
12	21	13	17	9	3.4	15

by rural Malay boys (3-11%) and girls (1-6%) the rural Indian boys and girls had the highest prevalence of under-weight.

Conclusion and summary

Weight and height measurements are accepted as reliable indicators of growth and development and can be easily seen in a study group.

The weights and heights of 3,107 primary school children from the rural areas and 2,253 from

the urban areas, aged 7 to 12 years, belonging to the three main ethnic groups in Malaysia (namely Malay, Chinese and Indian) have been measured. The Chinese children were taller and heavier than the Malay and Indian children both in rural and urban areas. The rural Indian children had the least satisfactory growth achievement. The urban Malay children were shorter and less heavy than the urban Indian children.

Table V

Prevalence of protein energy malnutrition in primary school children by age, sex and ethnic groups in Kuala Lumpur (Urban Areas) in 1976

AGE IN YEARS	ETHNIC GROUPS																		
	MALAY						INDIAN						CHINESE						
	% of children with 80-60% weight for age (underweight)		% of children with <60% weight for age with no oedema (marasmus)		% of children with 80-60% weight for age with oedema (kwashiorkor)		% of children with 80-60% weight for age with oedema (kwashiorkor)		% of children with <60% weight for age with no oedema (marasmus)		% of children with 80-60% weight for age (underweight)		% of children with <60% weight for age with no oedema (marasmus)		% of children with 80-60% weight for age with oedema (kwashiorkor)				
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
7	50.0	49.5	2.0	0	0	0	0	45.1	28.6	0	0	0	0	28.4	29.4	0	0	0	0
8	48.8	50.9	2.3	0	0	0	0	37.0	24.2	0	0	0	0	29.6	23.4	0	2.1	0	0
9	58.4	50.6	1.1	0	0	0	0	46.5	26.2	9.3	2.4	0	0	45.0	30.2	0	0	0	0
10	49.3	38.5	2.9	0	0	0	0	52.4	54.8	0	3.2	0	0	34.5	34.7	0	0	0	0
11	48.9	21.4	4.4	0	0	0	0	35.4	26.8	2.1	0	0	0	30.2	22.2	0	0	0	0
12	50.8	40.9	1.6	4.6	0	0	0	26.7	30.0	6.7	10.0	0	0	30.1	20.0	0	1.3	0	0

Table VI

Prevalence of protein energy malnutrition in primary school children by age, sex and ethnic groups in Klang District, 1976

AGE IN YEARS	ETHNIC GROUPS																	
	MALAY				INDIAN				CHINESE									
	Male	Female	% of children with <60% weight for age with no oedema (marasmus)	% of children with 80-60% weight for age with oedema (kwashiorkor)	% of children with <60% weight for age with no oedema (marasmus)	% of children with 80-60% weight for age with oedema (kwashiorkor)	% of children with <60% weight for age with no oedema (marasmus)	% of children with 80-60% weight for age with oedema (underweight)	% of children with <60% weight for age with no oedema (marasmus)	% of children with 80-60% weight for age with oedema (underweight)	Male	Female						
7	76.9	58	3.8	4	0	0	84	67	6	15	0	0	71.5	61.7	1.3	2.3	0	0
8	77	76	4	1	0	0	82	73	6	15	0	0	67.6	62.8	2.9	3.7	0	0
9	68	69	5	1	0	0	78	73	13	5	0	0	73	67.5	2.1	3.3	0	0
10	81	75	3	6	0	0	73	79	19	8	0	0	69.5	67.1	3.8	1.4	0	0
11	76	63	5	1	0	0	78	72	7	17	0	0	70	48	3	10	0	0
12	61	64	11	1	0	0	67	50	17	37	0	0	54	53	1	12	0	0

“Wasting and stunting” were more prevalent in the primary school children from the rural areas in Klang District compared with urban areas in Kuala Lumpur, particularly in the Indian and Malay ethnic groups. The poor growth achievement in the rural areas could be attributed to poor nutrition and relatively poor family income. The differences in the growth achievements for the various ethnic groups are probably due to socio-economic differences rather than the genetic differences.

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Longitudinal study on physical growth of primary school children in Malaysia

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Introduction

A CHILD'S growth achievement is a useful indicator of his well being and nutritional status, and can most easily be assessed by comparing his height and weight changes with the norms or standards derived from a relatively healthy population. Such standards are thus essential to professionals working with children, for example paediatricians, general practitioners, school health officers, nurses and teachers.

However standards of different countries may not be applicable to one another, because of differences in race and environment (Ashcroft et al 1964 and 1968, Dugdale 1972 and Tanner 1976). Further, even standards of an earlier generation may not be applicable to a later generation because of secular changes in the growth of children (Bakwin 1964). Each community must, therefore, work out its own up-to-date standards. Such standards are best derived from longitudinal growth studies. A search of the literature has shown that up to now, there has not been any longitudinal growth study of Malaysian school children. To fill this gap the longitudinal study reported below was conducted by following 686 Malaysian school children from 1969 to 1975.

Material and Methods

A group of children comprising Malays, Chinese and Indians were examined as part of the school health service examination. The children were attending four schools in Petaling Jaya. Those children with gross physical abnormalities, such as post poliomyelitis deformities, congenital heart disease and active chronic suppurative otitis media,

were excluded from the study leaving a total of 686 children, who were followed yearly from 1969 to 1975. The dates of birth of the children were obtained from birth certificates and the age of each child was calculated therefrom. The household incomes and occupations of the parents were obtained by interviewing parents or obtained from questionnaires and the school registers. Weights, heights, left triceps skinfold thicknesses, left mid-arm circumferences were measured at yearly intervals. However only the results of weights and heights will be presented in this paper.

In general, the methods of measurements used were those suggested by Jelliffe (1966). Each child was weighed on an Avery beam balance accurate to one ounce, and was lightly clad with a standard thin cotton school uniform. Measurements were read to the last complete ounce. The height was measured by means of a Microtoise of French manufacture. The child, without shoes, was positioned in the standard manner (Jelliffe 1966) below the Microtoise. The head piece was then brought to rest on top of the head and the reading taken direct at the visio hairline and to the last complete 0.1 cm.

The weight and height values at the 3rd, 10th, 25th, 50th, 75th and 90th percentiles at the various age groups for boys and girls separately were obtained with the aid of a computer.

Growth curves were drawn with a minimum of visual smoothing.

Results

The frequency distribution of children according to ethnic group, sex and income is shown in Table I.

Table I
Frequency distribution of children by ethnic group, sex and income

Monthly household income (M\$)	Malay		Chinese		Indian		Grand Total	
	Male	Female	Male	Female	Male	Female	Male	Female
0 - 199	14	35	32	45	70	92	116	172
		49 (53.8)*		77 (19.5)*		162 (80.6)*		288 (42.0)*
200 - 399	7	18	93	101	10	12	110	131
		25 (27.5)		194 (49.2)		22 (10.9)		241 (35.1)
400 and above	9	8	60	63	5	12	74	83
		17 (18.7)		123 (31.2)		17 (8.5)		157 (22.9)
All income group	30	61	185	209	85	116	300	386
		91 (100%)		394 (100%)		201 (100%)		686 (100%)

* Numbers in parentheses are percentages.

The weight and height curves for boys and girls are shown separately in figures 1, 2, 3 and 4. For both weight and height, the Boston 50th percentile (Nelson 1964) approximates to the Malaysian 90th percentile. For weight 80% of the Boston 50th percentile lies approximately at the Malaysian 50th percentile weight curve, while for height 95% of the Boston 50th percentile lies at the Malaysian 50th percentile height curve. The Wellcome Working Party (1970) classified malnutrition according to body weight. The point at which malnutrition begins was defined as a reduction in body weight below 80% of the Boston 50th percentile. Waterlow (1972 & 1974) classified malnutrition according to height for age. The point at which malnutrition (stunting) begins was defined as a reduction in height below 95% of the Boston 50th percentile. Thus

according to the above classifications, children whose weights or heights fall below the Malaysian 50th percentile would be classified as malnourished.

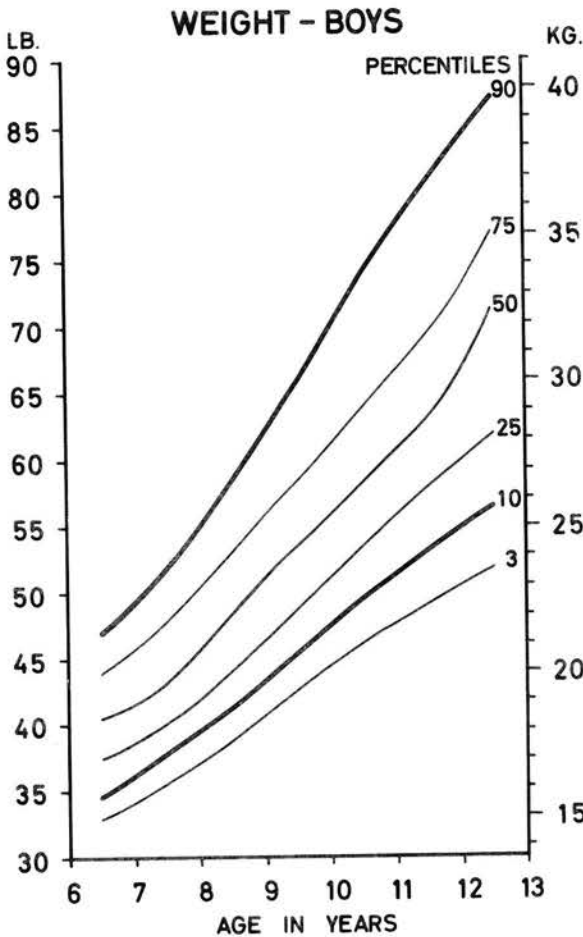


Fig. 1. The percentile chart for weight of Malaysian boys from 6 to 12 years.

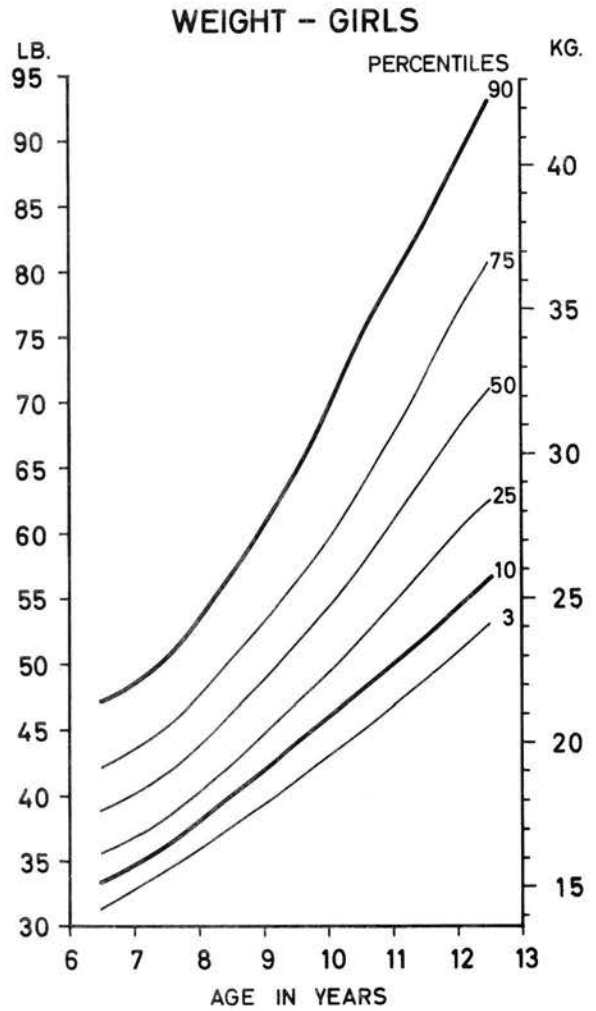


Fig. 2. The percentile chart for weight of Malaysian girls from 6 to 12 years.

Discussion

The population, from which the present growth curves were derived, consisted of children from 3 ethnic groups namely Malays, Chinese and Indians. In a previous cross-sectional study (Chen 1976) it has been shown that, although the growth achievement of the three ethnic groups differed as a whole, the growth achievement of higher income group children among the three ethnic groups did not differ significantly. On this basis the growth data of the three ethnic groups have been combined together in the preparation of the standard Malaysian

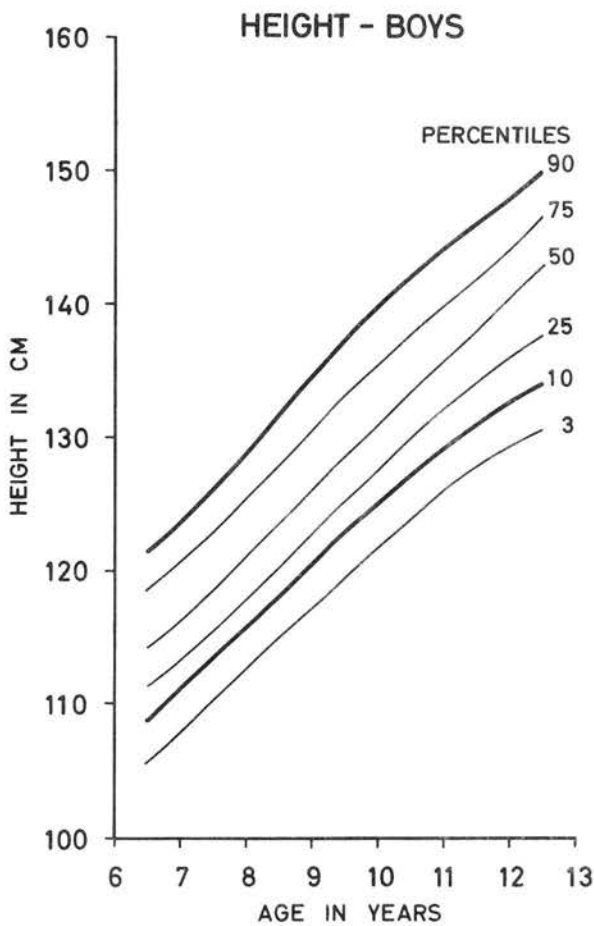


Fig. 3. The percentile chart for height of Malaysian boys from 6 to 12 years.

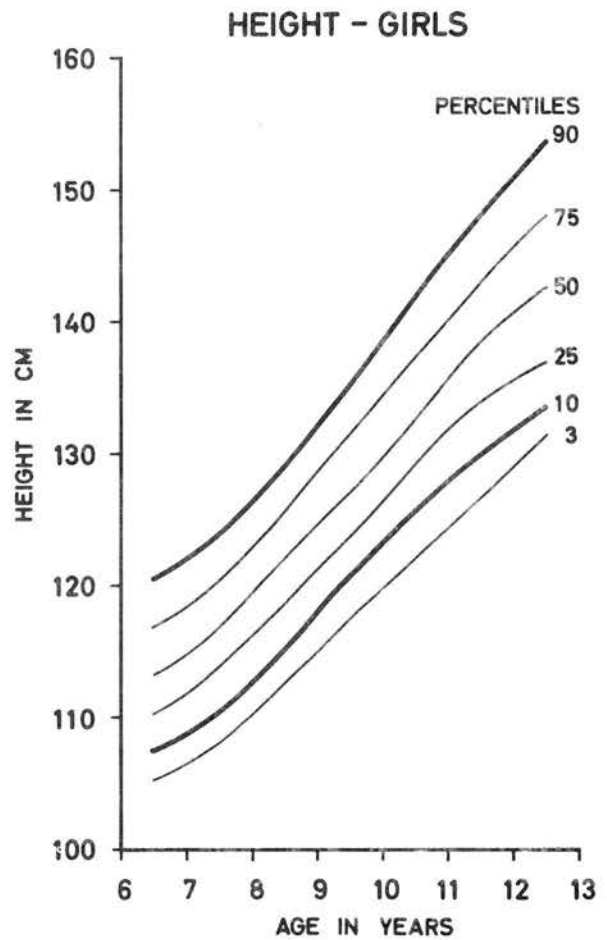


Fig. 4. The percentile chart for height of Malaysian girls from 6 to 12 years.

growth charts shown in figures 1, 2, 3 and 4. However since the study population consists of children from different socio-economic backgrounds, the norms shown here do not represent the ideal growth but the average growth.

In developing countries, such as Malaysia, where malnutrition is common, disease load is high, and the available medical and health services are limited, it is important to be able to separate out those with ill health and in need of care from those who are relatively healthy. This can be rapidly achieved by means of growth measurements e.g. weights and heights. The value of growth charts is illustrated from a previous cross-sectional study of Malaysian primary school children (Chen submitted for publication). In this study one third of the children were found to have a significant degree

of deficit in weight for age (underweight) and height for age (stunting), but only 9% were found to have a significant degree of deficit in weight for height (wasting), that is were suffering from current malnutrition. According to Waterlow's criteria (1974) only 9% of these children require treatment. Thus in Malaysia, children whose measurements (weight and height) are below the 10th percentile should be considered at risk of significant malnutrition or growth retarding pathology and require active treatment. Values plotted between the 10th and 50th percentiles, indicate "below average growth" and children consistently in this intermediate range may be in a state of marginal malnutrition or have suffered from malnutrition in the past. Children whose measurements are between the 50th and the 90th percentiles are unlikely to be in nutritional difficulty.

These growth charts are designed primarily for the use of those who care for primary school children e.g. teachers, school health doctors and nurses, paediatricians and general medical practitioners, whereby children with significant growth retardation may be identified and treatment instituted. As the growth charts are not based on ideal growth but on "average growth", they are useful in screening the "sick" from the relatively healthy. When the state of health and nutrition of the population improve, these growth charts will need to be revised.

Summary

Standards for weight and height charts for Malaysian primary school boys and girls are presented. These allow for the ready identification of children at risk of significant malnutrition or growth retarding pathology and for the institution of appropriate treatment.

Acknowledgement

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Breast feeding in Kelantan

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Introduction

THE IMPORTANCE OF breast feeding especially in a developing country has been emphasised by many authors (Addy - 1976) (Gerrard - 1974). In these developing countries the trend is towards artificial feeding because of the ignorance of the advantages of breast feeding as well as the influence of advertisement through the mass media and the Mothercraft Nurse. The incidence of breast feeding in the urban population has been studied in Kuala Lumpur (Dugdale - 1970) and Singapore (Wong - 1971). There has been only one paper on Breast feeding in a rural area (Teoh - 1975) in which the incidence of Breast feeding was studied in relation to age, race, parity, income and education of the mother. In our paper we have studied the incidence of Breast feeding in relation to duration of breast feeding without added compliments, the age when solids were introduced and to assess the awareness of the mothers of some of the advantages of breast milk.

Material and method

All mothers with infants attending the Maternal and Child Health Clinics at the Main Health Centres in North Kelantan were interviewed using a questionnaire consisting of 12 questions. The interview was conducted in the month of May, 1976 by three doctors including the authors. A total of 461 mothers were interviewed during this period. Insufficient information were obtained from three questions and hence were not analysed.

Analysis of the data

Incidence of Breast Feeding - Table I

A total of 438 mothers or 95% were found to breastfeed their children at least once or twice a day.

But only 86 mothers or 18% were breast feeding fully up to three months and 45 mothers or 9% were breast feeding without added solids up to six months. Our figure of 95% compares well with those in Perlis (Teoh 1975) where 84% of all mothers were breast feeding.

Table I
Incidence of Breast Feeding

Breast feeding only up to 3/12	86
Artificial formula only up to 3/12	6
Breastfeeding and Artificial formula up to 3/12	18
Breast feeding + Artificial Formula + solids before 3/12	334
Artificial formula + Solids before 3/12	17
Total mothers interviewed	461

Introduction of Solids

It was disappointing to note that as many as 351 mothers or 78% introduced solids before the end of the third month. Of these 117 or 26% have introduced the solids as early as the first month.

Artificial Formula

As expected only 23 mothers or 5% were giving artificial formula and of these 75% or 17 of them introducing solid before the child is three months. The reasons for not breastfeeding are shown in Table II.

Table II
Reasons for Not Breastfeeding

		23
No Milk	11	
Bottle milk is better	0	
Not enough milk	3	
Working mother	1	
Others – Baby refuses	6	
– Fever in mother	1	
– Child in Hospital	1	

Awareness of the Advantages of Breast Milk:

We used the following four questions which we thought were appropriate for a rural population to assess the awareness of the advantages of breast milk.

Table III: It is interesting to note that 399 mothers or 86% agreed that Breast milk was the best milk for their children but only 275 mothers or 59% agreed that breastfed children get infection less frequently than bottlefed children. 302 mothers or 65% were aware that after 6 months, the infants should be given solid foods like cereals along with the milk. However only 222 or 48% of all mothers were aware that a well balanced diet is essential for an adequate supply of breast milk.

Advice on Breast Feeding

It is encouraging to note that as many as 232 mothers or 50% said that they were advised by nurses and bidans to breastfed their children.

Table III
Awareness of the Advantages of Breast Milk

	Yes		No
Do you know breast milk is the best milk for your child?	399	59%	59
Do you know breast milk helps to keep your child free from infection in the first 6/12 of life?	275	59%	183
Do you know it is important to give your child other foods after the age of 6/12?	302	65%	157
Are you aware that an adequate milk supply depends on a well balanced diet?	222	48%	234

Table IV: However only 172 mothers or 37% had any instruction on the technique of breast feeding.

Table IV
Advice to Breast Feed

Breast feeding advised by Doctors	11
Nurses & Bidans	232
Friends and Relatives	17
Others (Mothers and Tradition)	193

Table V
Instruction on Technique of Breastfeeding

Nurses	153
Mothers	10
Doctors	4
Books	2
Unspecified	3
Total:	172 (37%)

Discussion

A number of studies have shown that breast feeding not only supplies the infant with nourishment but gives him immunologic protection against infection as well. Breast-fed infants are less likely to develop respiratory and gastro-intestinal infections and allergic reactions. Infants slowly develop their immunologic defenses in the months after birth, and breast feeding is a hygienic, gradual method of protection during the transition to immunologic independence. Best protection is achieved when the infant receives breast milk alone for at least the first six months of life. This is particularly important in areas where contamination of cow's milk and other foods is likely and where medical facilities are inadequate.

The area under study has relatively more health facilities than other parts of Kelantan. The sample in this study reflects only those mothers who come to the clinics. A total of 95% were breastfeeding but only 18% up to six months. This is extremely low for a rural population and we feel that adequate steps should be taken in the Breast Feeding Campaign due to be launched soon by the Ministry of Health, to promote breast feeding at least for 4-6 months.

78% of the mothers were found to introduce solids before the third month and of these one third as early as the first month. This is not only uneconomical for a poor rural population like Kelantan but also significantly contributes to the high morbidity and mortality of infants. Solids should

be introduced after the 4th month and preferably after six months and this should be stressed in the health talks in our Maternal and Child Health Clinics.

Even though 86% of mothers agreed that breast milk was the best milk for their children less than half appeared to understand the real advantages of breast milk and this could be a useful area to stress during the campaign. It was satisfying to find that 50% of the mothers said that they were motivated by health staff to breast feed their children.

Summary

The incidence of breast feeding in a rural community was studied in relation to duration of breast feeding without added compliments, the age when solids were introduced into their feeds and to assess the awareness of the mothers of some of the advantages of breast milk. It is recommended that when the Ministry of Health launches on the breast feeding programme, special attention should be given to discourage early compliment feeding and introduction of solids especially in the East Coast States.

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Plasma volumes in a group of healthy Malaysians

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BLOOD VOLUME STUDIES have reached a state where they are no longer restricted to academic physiology. Its importance is now well established. As a monitoring device, accurate measurements of circulating blood volume have often meant the difference between success and failure, in the management of the problem patient (Behling *et al.*, 1952). The indications for blood volume measurements are numerous and encompass all medical specialities (3, 10, 11, 13, 15)

The importance of blood volume measurements in surgery has been shown by the reduction of 50 percent in mortality in the geriatric patient (Albert S.N., 1971) and the low morbidity when patients were monitored with pre and post operative blood volume estimations (6, 12, 14, 16). In infants and children, any blood loss, although minute in terms of size and weight of the patients may well be excessive, in proportion to their circulating volume (Davenport *et al.*, 1963).

Before such estimation can have clinical use, it is mandatory to have a reasonable estimate of the mean volume of normal individuals in a country. Such a data is not available in this country. Hence this study was undertaken to obtain this basic data among healthy normal male Malaysian medical students.

Material

Ten disease free male medical students between the ages of 20 and 25 years volunteered for the measurement. Their height and weight were recorded and surface area calculated. ^{125}I -albumin, a weak and pure gamma emitting isotope was used

as the tracer material (27.3 and 35.4 ke V, half-life, 60 days). ^{125}I HSA (iodinated human serum albumin) takes about 10 – 15 minutes for equilibration in the blood stream when injected and the rate of loss of activity during this period is almost negligible. The radio iodinated albumin used for this study was obtained from the Radiochemical Center, Amersham, England (Lot 201AA).

Method

Plasma volume was measured by the in-vivo dilution method. Approximately 5 microcuries (5 uCi) of an aqueous solution of labelled albumin was prepared and a known volume was injected as a bolus intravenously from a calibrated syringe. Care was taken to check that the tip of the needle was completely inserted within the vein throughout the period of injection. 5 ml blood samples were taken in pre-heparinised syringes without stasis after 15, 30 and 45 minutes of injection from a distant vein away from the site into which the labelled albumin was injected so as to exclude contamination from the injection area.

Hematocrit estimation by the microcapillary method was done on all blood samples. The blood was then centrifuged to separate the plasma. A standard of known dilution was also prepared from the same aqueous solution and the percentage of free iodine was determined. Radioactivity in duplicate aliquots of the diluted standard (corrected for free iodine) and the plasma sample was measured in a gamma scintillation counter adjusted for maximum efficiency for the measurement of ^{125}I .

The plasma radioactivity observed, expressed as a linear function on a semilogarithmic paper against time was extrapolated to zero time. The slope of the graph indicated a rate of disappearance of activity between 6 to 10 percent/hour. With this procedure the theoretical radioactivity which would have been achieved had mixing taken place instantaneously and without loss of the tracer from the intravascular space could be obtained. All counting rates were corrected for background count.

The plasma volume (PV) was calculated as follows:

$$PV = \frac{VDn_s}{n_o}$$

where V = volume of labelled albumin injected
 D = dilution factor of the standard (100)
 n_s = the counting rate of the standard
 n_o = the counting rate of the plasma at 0 time

Total blood volume was calculated using the formula,

$$\text{Total blood volume} = \frac{\text{Plasma volume}}{1 - \text{Hematocrit}}$$

Total blood volume and red cell volumes were calculated after correction had been made for trapped plasma and for differences between large vessels hematocrit (LVH) and whole body hematocrit (WBH).

Table 2

Plasma Volumes Measured With ^{125}I -albumin (Mean \pm S.E.M.)

Present Study	Tarazi et al 1969	Ibsen & Leth 1973
10 subjects	11 subjects	18 subjects
1526 \pm 17.8 ml/M ²	1562 \pm 38 ml/M ²	1891 \pm 44 ml/M ²

Discussion

From the data presented, it can be seen that plasma volume measured by this method and corrected for surface area gave a reproducible result (S.E.M. \pm 17.8%), the greatest deviation from the mean being 99 c.c/M². The results were lower than those reported by Tarazi *et al.* (1976) but the technique employed differed slightly although the tracer material was the same.

Total blood volume (TBV) and red cell volume (RCV) were only estimates as they depended on how truly the hematocrit reflected the red cell distribution. The results showed a standard error of mean of \pm 45.3 for TBV, the greatest deviation from the mean being 250 c.c/M² and \pm 32.5 for RCV, the greatest deviation being 188 c.c/M². It seemed that the error was greater for the calculated values.

Table I

Plasma volume and estimated total blood volume and red cell volume of healthy Malaysian males age 20 - 25 years of average height 166 cm and weight 57.13 kg.

Student no.	BSA sq M	Plasma Vol.		WBH %	Total Blood Vol.		Red Cell Vol.	
		ml	ml/M ²		ml	ml/M ²	ml	ml/M ²
1.	1.78	2784	1564	38.9	4556	2560	1772	996
2.	1.58	2486	1573	42.6	4331	2741	1845	1168
3.	1.68	2504	1490	40.9	4237	2522	1733	1032
4.	1.55	2430	1568	43.5	4301	2775	1871	1207
5.	1.61	2386	1482	43.8	4245	2637	1859	1155
6.	1.52	2413	1588	45.5	4428	2913	2015	1326
7.	1.65	2355	1427	43.0	4132	2504	1777	1077
8.	1.74	2666	1532	43.0	4677	2688	2011	1156
9.	1.57	2469	1573	43.8	2393	2798	1924	1225
10.	1.62	2370	1463	41.4	4044	2496	1674	1033
Average \pm S.E.M.		2486 \pm 43.6	1526 \pm 17.8	42.6	4334	2663 \pm 45.3	1848	1138 \pm 32.5

The fundamental usefulness of blood volume determinations lies in situations where measurements of hematocrit or hemoglobin levels do not necessarily reflect the level of red cell or plasma volume, as for example, after the loss of whole blood by hemorrhage or the loss of both plasma and red cells at different rates in patients with burns. The hematocrit and hemoglobin estimations in such cases only denote the concentration and not volume. Hence, component replacement of deficits in blood volume can only be achieved by its actual measurement.

The ^{125}I -albumin used in this study causes less irradiation of tissues and its energy can be easily discriminated from higher energy emitting isotopes. Therefore, this can also be used for simultaneous measurement of both components of blood - ^{125}I HSA for plasma volume and ^{51}Cr labelled cells for red cells volume. Simultaneous measurement of plasma and red cell volumes (Grable *et al.*, 1968) give greater accuracy in blood volume but for routine measurements in clinical practice and for the sake of convenience, one tracer is commonly used and the other compartment calculated.

On the average, the dilution volume measured with protein-bound tracers overestimates blood volume by approximately 10 percent because the volume measured with these tracers comprises both the plasma volume and an undetermined portion of the extravascular space.

Plasma volumes measured by using radioactive iodine tagged albumin have compared favourably with those found with T1824 (Crispell *et al.*, 1950) and without the disadvantage of tissue discolorations and colorimetric problems.

Conclusion

A simple technique of plasma volume measurement had been employed in this study. The results obtained are comparable to other series. It is believed that the results presented for the average Malaysian males have not been recorded before. These data should now offer a firm basis for the usefulness of blood volume measurement in the management of medical and surgical problems in this country.

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Survey of medical personnel engaged in occupational health service in West Malaysia

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Introduction

ONE of the recommendations at the ILO sponsored seminar on Occupational Health, for small industries held in Kuala Lumpur in 1974, was that the present resources in occupational health services should be studied. The present survey has had this objective.

Method

The survey has been planned as a mail survey and questionnaires were sent out in June 1976 to all general practitioners, registered with the Ministry of Health. Reminders were sent out once. Several doctors were also in addition contacted by telephone or personal letters for further clarification of the answers. The Social Security Organization's (SOCSCO)'s list of panel doctors was used as a reference. There are at present a total of 721 doctors on the SOCSCO panel in Malaysia. The figures published by SOCSCO in its statistical summary for Sept. 1976 and showing the total number of factories and employees in peninsular Malaysia were used for comparison.

Material

A total of 1002 questionnaires were initially sent out to the corresponding number of doctors representing all practising general practitioners in Peninsular Malaysia. 540 answers (54%) came back initially. Following the reminders an additional 45 (4.5%) were returned, making the total returns 585 (58%). The highest response was in Selangor State where 259 out of 400 answered (65%). The lowest response was in Negeri Sembilan where only 20 out of 48 answered (42%).

304 doctors were not working with industry on a permanent basis. 125 of these were on the SOCSCO panel but did not receive any patients from industry. 65 answers did not clearly indicate whether the doctor was working as a SOCSCO panel doctor or working with industry or not. However, it was assumed that this was not the case and they were therefore not included in the analysis. The final analysis of the survey was limited to those doctors working with industry on a permanent basis. 281 doctors were classified as such, out of which 160 (62%) were residing in Selangor State. These 281 doctors constituted 33% of the doctors on the SOCSCO panel.

Results

The participants in the survey were initially asked the following questions:

- A. Do you visit the factory to see the patients?
- B. Are the patients referred to your clinic outside the factory?
- C. Are you paid by the number of patients seen by you?
- D. Are you paid by the number of employees in the factory?
- E. Are you paid by the number of hours you spend at the factory?
- F. Do you ever visit the workshops?
- G. Do you approve of the idea of starting an occupational health association under the MMA?

The answers to questions A – G were as follows:

- A. 81 (30%) indicated that they visit clinics at the industries.

- B. 264 (95%) indicated that they have patients from industries referred to clinics, outside the industries.
- C. 246 doctors (88%) answered that they were paid by each patient visit.
- D. 64 (23%) answered that they were paid by the number of employees in the respective industry.
- E. 31 (11%) answered that they were paid by the time they spent in the clinic at the industry.
- F. 65 (23%) doctors indicated that they visited the workshops and gave advice to the management. Only 19 doctors (7%) visited the workshops on a regular basis.
- G. 251 (89%) doctors answered favourably to the suggestion of establishing an association of doctors working with Occupational Health. 10 disapproved of the idea. 20 did not answer this question.

Size of activity per doctor

The most common number of factories served by individual doctors was 1-4 (87%). Some doctors served considerably more factories and a few even more than 20. (In these figures estates are not included but only factories)

Some of the doctors did not initially answer how many employees they were taking care of. They indicated that they did not know the size of the industrial population or they simply did not want to give the information. In some of these cases it was possible, through a personal contact with the doctor, to obtain approximate figures whereby a frequency distribution could be made. (Table 1).

The number of doctors in this table is therefore less than the total and the number of employees served by each doctor may represent an underestimate. Most doctors served 500-999 employees (25%); many served 200-499 employees. 35 doctors (16%) served less than 100 employees.

The number of industries which according to the doctors employ auxiliary medical personnel: (Nurse/Hosp. assistant/Sister) were 101. 59 were in Selangor State. The majority of these were employing nurses (63), in general on full time duty during daytime, from Monday to Saturday. 22

industries had nurses on duty round the clock. 21 industries employed hospital assistants and 16 sisters.

Table 2 shows the distribution of the total number of factories included in the survey according to the approximate number of employees. 430 (63%) of the factories are in Selangor State. 622 (91%) are in the four states Selangor, Penang, Perak and Johore. 571 (83%) are factories with less than 300 employees. 53% of the factories have less than 100 employees. The most frequent size of factory served by doctors is the one with 25-49 employees (22% of all the factories). Factories with less than 25 employees only contribute towards 13% of the total.

To be able to estimate the proportion of all industries in West Malaysia which are served by doctors on a regular basis the above mentioned figures have been compared with the number of factories and employees covered under the SOCSO scheme; September 1976 (Table 3)*.

This comparison shows that 24% of the employees covered by SOCSO are included in the survey, but only 4% of the industries.

Discussions

The return rate for the whole of Peninsular Malaysia was 58%. For Selangor it was 65%.

Selangor is by far the most industrialized state in Malaysia with the largest number of doctors. A satisfactory representation in this State therefore is more important than the lower response in some of the much less industrialized States.

A decisive factor in influencing the response rate has been the participants motivation to answer the questionnaire. It may therefore be assumed that the great majority of the doctors who did not respond at all were those who did not have any contacts with industry and in particular no interest in occupational health. For these reasons it is assumed that the answers, from the 281 doctors in the survey, that were studied, are representative of those doctors, who are delivering medical care to employees in industries in Peninsular Malaysia.

Table 1

Frequency distribution of the average number of employees served by each doctor.

No. of employees	<100	100-199	200-499	500-999	1000-1999	2000-2999	3000+
No. of doctors	35	19	57	70	29	8	1

Table 2
Frequency distribution according to size of factories served by the doctors in the survey

	<25	25-49	50-99	100-199	200-299	300-399	400-499	500-999	1000-1499	1500-1999	2000+	Total
Selangor	67	90	90	75	39	19	16	17	10	2	6	430
Penang	7	38	4	6	11	2	4					72
Johore	2	7	15	16	4	2		1	1	1		48
Perak	7	11	12	7	17	7	4	6			1	72
Melaka	1	1	1	6	8	1	1	4				23
N. Sembilan			2	6	5	1	1					15
Kelantan			1					4				5
Pahang	1	1							1			3
Trengganu			1									1
Perlis	1		1				1	1				4
Kedah	2	3	1	3	1		1	1		1	1	14
Total	88	151	128	119	85	32	28	34	12	3	8	688

Table 3

No. of employers and employees under SOCSO (September 1976) and in Survey (Peninsular Malaysia)

	No. of factories under SOCSO	No. of factories in Survey	No. of workers under SOCSO	No. of workers in Survey
Selangor	8,078	472 (5.8%)	326,442	95,202 (29%)
Remainder Peninsular Malaysia	11,636	326 (2.9%)	384,935	77,337 (20%)
Total	19,714	798 (4.1%)	711,377	172,539 (24%)

One of the objectives of the survey was to determine to what extent the industries in Peninsular Malaysia are covered by doctors offering medical care to the employees, on a regular or a permanent basis. In general, patients from one individual industry are referred to one specific panel doctor who has agreed to take care of the employees from that industry. In some instances, the same industry may have made arrangements with several doctors. This may offer the employees a choice of doctors. However, when making a total compilation of factories and employees served by all doctors, this situation may in some cases create a risk of "overlapping", i.e. by doctors reporting separately but serving the same industries. This complication has been anticipated and to a large extent avoided by comparing the names of the factories on the individual doctor's list of factories. However, it may not have been possible to totally avoid duplication. Especially among the small industries (less than 50 employees) where in some cases the names of the factories have not been listed. Therefore, the number of factories, and the number of employees, especially among the small factories, may represent a slight overestimate.

Only 4% of the industries in Peninsular Malaysia and 24% of the workers, covered by the SOCSO scheme, have permanent arrangements for medical care by G.P's.

This discrepancy between the proportions of industries and employees is probably due, to the smaller industries being under-represented in the survey i.e. they are not covered by doctors on a permanent basis. On the other hand it is worth noticing that 24% of the employees are covered by arrangements between industries and doctors. This has been accomplished on a voluntary basis and without any invitations to the industries to do so.

The majority of Industrial workers in urban areas are now covered by SOCSO. The scheme applies only to industries with more than 4 employees and workers earning less than \$500/-. Self employed are not covered.

It is estimated that SOCSO at present covers 15% of the total working population in Malaysia. On this basis the coverage of occupational health services by doctors on a permanent and regular basis is of course very limited. However, the great majority of workers in Malaysia are rural workers in the estates. These are to some extent covered through the Rump Labour Code by MOH's and also in many instances by general practitioners. These contributions are not included in the present survey. Workers in the rural areas which are not covered under the SOCSO scheme also include mine workers, agriculture workers and fishermen.

The primary aim of the survey has been to describe the size and extent of medical service delivered to industry. The survey has not dealt in detail with the content of the type of service delivered by the individual doctors; mainly because it was already evident from many visits to individual industries, that no occupational health service in it's real meaning, was delivered, but only essentially medical care.

Summary and Conclusions

A mail survey has been carried out to describe the present resources for medical care in industry in Peninsular Malaysia.

All registered general practitioners, 1002 doctors, received a questionnaire and 58% answered. The response rate in Selangor State, where the majority of the industries and the doctors are located, was 65%. The final analysis was made on 281 GP's working with industry on a regular and permanent basis. This constituted 28% of all general practitioners and 33% of the doctors on the SOCSO panel.

The results showed that 4% of the industries and 24% of the employees, included in the SOCSO scheme (1976), are covered by doctors on a more or less permanent basis. The larger industries are covered by doctors much more frequently than the smaller industries. However, approximately one

fourth of the employees covered by SOCSO (1976) receive regular medical care based on agreements between the employers and the doctors.

In most cases the patients are referred to the doctors clinics outside the industries but 30% of the doctors also visited clinics at the industries. The majority of doctors are paid by each patient visit; 23% said they visited the workshops but only 7% did this on a regular basis. 101 factories (15%) had auxiliary medical personnel employed, mostly nurses on daytime duty.

The survey showed the need for occupational health services, especially in the small industries. It also showed a need for a closer liaison between the industries and the doctors. The doctors should be able to visit the workshops on a regular and frequent basis and they should be able to advise the management on occupational health matters. At present this is probably not expected by most employers. Many doctors may also feel uncertain as to their qualifications in occupational health and possibilities of influencing the working environment. The industries should be enlightened about the advantages of occupational health services and the doctors and nurses should receive training and support.

Instead of having a large number of factories divided up among many doctors it would probably be advantageous if groups of industries would join and share occupational health services. Agreements could then be made with a limited number of doctors, with special interest in occupational health who could receive training in occupational health.

Preventive efforts should be incorporated in the occupational health services together with medical

care. This would include preemployment and and preplacement examinations, regular health examinations of workers in hazardous trades (e.g. exposure to lead fumes, silica dust, radiation) and monitoring of the working environment.

Ergonomic and rehabilitation aspects should also be considered as an important part of occupational health services.

Occupational health services should, in principle, be catered for by the industries themselves. Advice and guidance as to the content and implementation should be available through the Occupational Health Unit, Ministry of Health and the Factory and Machinery Department jointly.

Occupational health services for the many small industries may have to be incorporated with the public health services. Health Clinics in industrialized areas should be orientated towards this problem. Medical officers of health and public health nurses should receive in-service training in occupational health, especially when they are employed in industrialized areas.

Acknowledgement

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An analysis of consultation cases in sexually transmitted diseases to the Department of Dermatology, General Hospital, Kota Bharu, Kelantan.

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Introduction:

KOTA BHARU is the capital of the State of Kelantan, which is sited North East of Peninsular Malaysia adjacent to South Thailand. The easy accessibility to the popular tourist spot in South Thailand plus the obscurity of movements and sexual habits of tourists and visitors raises the very strong possibility of the presence of an iceberg of sexually transmitted illness in this part of the world.

The objective of this analysis is to indicate the poor surveillance on sexually transmitted illness.

While dermatology is still at its infancy of development, venereology as an organised speciality is yet to be born in this part of the world. At the moment two or three practising venereologists exist in isolation. The majority of sexually transmitted diseases are seen by the private doctors.

Methods and Materials:

Information was collected on standard cards without divulging the identity of the patient. A consultation case was defined as a new case with the disease referred to the Department of Dermatology during the specified period, 1st February, 1976 - 31st July, 1976.

New cases notified in the State of Kelantan for the same period by government and private doctors were also noted down.

All cases recorded usually had a history of exposure, Clinical diagnosis was confirmed by direct microscopy, serology and histopathology whenever necessary.

Comment:

Altogether 30 cases were referred to the Department of Dermatology during the specified period. As shown in Table I these were problems in diagnosis, failure to respond to treatment, allergy to penicillin and suspected cases of syphilis picked up by routine serology. The latter can be a problem because of recrudescence of yaws and also presence of diseases, which can produce the same serological picture.

Table I

Nature of Consultation Cases

Type of Consultations	Number of cases
1. Problems in Diagnosis	14
2. Allergy to penicillin	2
3. Failure to respond to treatment	10 + problems in diagnosis
4. Suspected cases - detected by routine serology	4
TOTAL:	30

I hasten to add that the referrals are an extremely small number and hence do not reflect the true pattern of diseases in this State of Kelantan. However certain conclusions can be made.

The rate of misdiagnosis is very high and therapy for most of these ailments is blunderbust. It is not uncommon for patients to be treated without any clinical examination. Further, doctors are poorly equipped with diagnostic facilities.

Failure to respond is usually the result of either inappropriate or inadequate treatment.

Table II shows that syphilis is still a problem in this part of the world and as in Singapore it appears to be on the increase. The existing medico-legal phobia to penicillin plus the inadequate dosage regimes can increase the incidence of syphilis and gonorrhoea.

Table II

Cases of sexually transmitted diseases recorded at the Skin Department from 1.2.1976 – 31.7.1976

Aetiological Classification	
Diseases	Number of cases
Gonorrhoea	10
Early syphilis	8
Genital viral warts	4
Herpes progenitalis	4
Scabies	1
Non-specific uretheritis	1
Total:	<u>30</u>

Genital viral warts and herpes progenitalis are not uncommon. Scabies can occur in epidemic proportions in our setting though only one was recorded in my survey.

The diagnosis of non-specific uretheritis is by the exclusion of all the other possible differential diagnosis. The single case of NSU responded to two courses of vibramycin, each course lasting for two weeks.

The two cases of chancroid were diagnosed by histopathology and responded to one month course of tetracyclines.

Table III shows the number of cases notified by doctors in the State of Kelantan during the same period. The low figures may be due to under-reporting by the local doctors. This is expected because of the social stigma against venereal disease is still strong.

Table III

Cases of sexually transmitted diseases recorded in the State of Kelantan from 1.2.1976 – 31.7.1976

Aetiological Classification	
Diseases	Number of cases
Gonorrhoea	95
Syphilis	20
Total:	<u>115</u>
Total population of Kelantan approx.	850,000
Total number of doctors in Kelantan approx.	100

Table IV gives a breakdown of the 30 cases in age, sex, occupation, marital status, residence and possible source of infection.

The disease rate appears to be higher in the younger age groups. The group aged 20 – 24 years as in other populations appears to be particularly at risk.

Prostitutes comprise of a heterogenous group, difficult to define because definition depends partly on the attitudes and tolerance of the society concerned. Traffic of traditional prostitution to and fro from the town of Golok in South Thailand appears to be the main source of infection. The local females usually contact the disease from their regular partners.

The jet age taps unexpected sources of infection such as the case from Singapore and another from Kuala Lumpur.

Like in all other countries, the cities harbour the big majority of the cases. In the State of Kelantan the city harbouring the majority of cases is Kota Bharu.

Conclusion:

There seems to be an iceberg of sexually transmitted ailments in the State of Kelantan. There is an urgent need to determine the size of this infective pool and steps be taken to reduce its size.

However the following preliminary measures need to be taken before launching an effective STD-control programme in the State (Table V).

There is a need to educate doctors and hospital staff before exposing the community to a control programme. Clinical acumen must be supplemented by adequate laboratory facilities. The pool

Table IV

Breakdown of figures in terms of age, sex, occupation, marital status, residence and source of infection

No.	Age	Sex	Occupation	Marital Status	Residence	Source of infection
1.	28 yrs.	Female	Teacher	Married	Kota Bharu	Kota Bharu - ? regular partner
2.	31 yrs.	Female	Housewife	Married	Kuala Krai	Kota Bharu - ? regular partner
3.	19 yrs.	Female	Housewife	Married	Kota Bharu	Kota Bharu - ? regular partner
4.	33 yrs.	Female	Unemployed	Divorced	Kota Bharu	Kota Bharu - ? regular partner
5.	17 yrs.	Female	Housewife	Married	Kota Bharu	Kota Bharu - ? regular partner
6.	45 yrs.	Female	Housewife	Married	Kota Bharu	Kota Bharu - ? regular partner
7.	34 yrs.	Male	Gardener	Married	Tumpat	Golok Prostitute
8.	23 yrs.	Male	Teacher	Bachelor	Tanah Merah	Golok Prostitute
9.	17 yrs.	Male	Student	Bachelor	Kota Bharu	Golok Prostitute
10.	21 yrs.	Male	Mechanic	Bachelor	Kota Bharu	Golok Prostitute
11.	39 yrs.	Male	Clerk	Married	Kuala Krai	Golok Prostitute
12.	21 yrs.	Male	Geologist	Bachelor	Kota Bharu	Singapore Prostitute
13.	32 yrs.	Male	Fireman	Married	Kota Bharu	Golok Prostitute
14.	24 yrs.	Male	Farmer (Felda)	Married	Kota Bharu	Golok Prostitute
15.	22 yrs.	Male	Soldier	Bachelor	Kota Bharu	Kuala Lumpur Prostitute
16.	23 yrs.	Male	Carpenter	Bachelor	Tumpat	Golok Prostitute
17.	32 yrs.	Male	Trishawman	Married	Sabak	Golok Prostitute
18.	23 yrs.	Male	Site Clerk	Bachelor	Jerteh	Golok Prostitute
19.	23 yrs.	Male	Student	Bachelor	Tumpat	Kota Bharu Casual
20.	22 yrs.	Male	Warder	Bachelor	Kota Bharu	Kota Bharu Casual
21.	24 yrs.	Male	Health Inspector	Bachelor	Bachok	Kota Bharu Casual
22.	34 yrs.	Male	Captain	Married	Kota Bharu	Kota Bharu Casual
23.	21 yrs.	Male	Unemployed	Bachelor	Kota Bharu	Kota Bharu Casual
24.	29 yrs.	Male	Clerk	Bachelor	Kota Bharu	Kota Bharu Casual
25.	28 yrs.	Male	Unemployed	Bachelor	Kota Bharu	Golok Prostitute
26.	21 yrs.	Male	Welding Labourer	Bachelor	Kota Bharu	Golok Prostitute
27.	24 yrs.	Male	Aborigine Officer	Bachelor	Kuala Krai	Kuala Krai Casual
28.	25 yrs.	Male	Student	Bachelor	Nilam Puri	Kota Bharu Casual
29.	26 yrs.	Male	Businessman	Married	Kota Bharu	Golok Prostitute
30.	23 yrs.	Male	Clerk	Bachelor	Kota Bharu	Kota Bharu Casual

of asymptomatic carriers cannot be determined without adequate laboratory services and cooperation from the public.

It is important for the government to dispel existing fears about penicillin and doctors must learn to use this drug once again judiciously. There is a need to tell doctors and patients that for treatment to be effective and regular partner or partners must be investigated. The cycle of re-exposure and re-infection should be broken.

Notification by all concerned will continue to be the source of our statistics on venereal infections. Accuracy depends on the cooperation and clinical acumen of doctors.

The easy accessibility and widespread abuse of drugs amongst patients will continue to be a problem as long as there is no control of drug trafficking in the border areas. There is a need to emphasise personal hygiene and to encourage the use of condom as the best forms of prophylaxis available.

Table V

Important factors in the control of sexually transmitted diseases in the State of Kelantan

- Education :** Doctors - undergraduate and postgraduate level, hospital staff, schools and the community.
- Laboratory Facilities :** all hospitals, and main health centres in the State - freely accessible to all doctors - improved services to detect asymptomatic carriers.
- Treatment :** early, effective and efficient with specific antibiotics. Phobia against the use of penicillin be dispelled by the Government. Treatment is always two or more.
- Notification :** cooperation of all doctors by regular notification, also both cooperation of patient and contacts required.
- Prophylaxis :** personal hygiene and the use of condom, chemotherapy - dangerous and of limited value.
- Border Conference :** Golok an important source of infection. Drug - trafficking.
- S.T.D. Control Programme :** to reduce the infective pool.

Lastly there is a need for border conferences and well-balanced STD control programmes to curb venereal diseases. The problems of Kota Bharu and Kelantan cannot be divorced from Golok and South Thailand.

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Central retinal Artery occlusion following haemorrhage

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Introduction

OCCLUSION OF the central retinal artery, is usually associated with arteriosclerosis, hypertension, diabetes and giant cell arteritis. Occasionally it may be due to an embolus, lodged at the level of the lamina cribrosa, arising most commonly from the heart or diseased carotid arteries. Rarely central retinal artery occlusion (C.R.A.O.) may be seen in carotid stenosis, migraine, connective tissue disease, polyarteritis, blood dyscrasia or following massive haemorrhage. The clinical picture seen in the fundus is one of retinal infarction with whitening of the retina mainly due to cloudy swelling in the ganglion cells, narrowing of the retinal arteries and a cherry red-spot at the macula. To date, the various therapeutic measures undertaken in the treatment of this condition have brought about little success and vision is invariably lost with this episode.

This paper reports a case of C.R.A.O. due to prolonged repeated hypotensive episodes in a patient following massive blood loss.

Case Report

T.L.N., 33 year old Chinese male, on 1.7.75 while working in a steel mill caught his right upper limb in a roller machine. He was admitted into hospital in hypovolaemic shock with a BP 70/40, and a pulse rate of 120/min. There was complete loss of skin over the hand and forearm up to the elbow, together with laceration and contusion of the muscles.

Radiological examination revealed no fracture of the forearm bones. The hand showed comminuted fracture of all the phalanges with avulsion of the bones.

Immediate toilet and suture was undertaken and the multiple lacerations were sutured even though the tissue appeared non-viable. He was transfused with 3 pints of blood followed by an intravenous regime of Dextrose and normal saline for 24 hours. In spite of the I/v regime the blood pressure remained low (systolic 60-100; diastolic 40-70) for about 12 hours following the accident.

On the 2nd post-operative day, slough from the wound was excised and again 3 pints of blood were transfused because of hypotension due to generalised oozing following surgery.

The right upper limb was amputated (Fig. 1) on the 4th post-operative day and 2 pints of blood were infused during surgery.

2 days later, after dressings were changed, he had another episode of hypotension and again had 2 pints each of packed cells and whole blood transfused. Following this he gradually improved.

Eleven days after the accident he complained of blurring of vision in both eyes; more so in the right eye, following amputation of his limb. Examination showed that the visual acuity in the right eye was hand movement only and in the left 6/9. The right pupil was dilated with an afferent pupillary defect (Marcus-Gunn pupil). The fundus showed mild optic disc pallor with very narrow retinal arteries together with some whitening of the vessels in the peripapillary region. (Fig. 2). The retinal veins were normal. The retina was greyish-white in colour and the macula oedematous. No cherry red-spot was seen. The left eye was normal.

(Fig. 3). A diagnosis of C.R.A.O. was made and as the fundus appearance was that of a retinal vascular accident some days previously no active treatment was undertaken. His visual acuity has remained unchanged during a follow-up period of over 6 months.



Fig. 1
The patient, after mid-arm amputation.

Discussion

Sudden loss of vision following haemorrhage may be due to a retinal vascular accident, ischaemic optic neuropathy (ischaemic papillopathy) or to visual cortex ischaemia.

Retinal arterial accidents are a well known entity. The classical picture of C.R.A.O. as described by von Graefe (1859) is one of mild disc pallor, retinal arterial narrowing with occasional segmentation of the blood column, (boxcar appearance) greyness of the retina together with a cherry-red spot at the macula. Occasionally a different picture of retinal ischaemia with widespread cotton-wool spots in the posterior pole and slight narrowing of the retinal arteries may be seen together with easily elicited pulsation of the central retinal artery at the disc on minimal digital pressure on the globe.

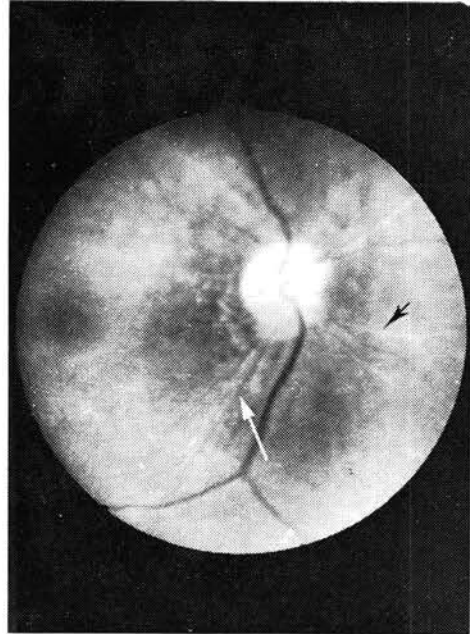


Fig. 2
Right Fundus
Optic disc pallor and marked narrowing of the retinal arteries is evident (white arrow) with some sheathing of the peri-papillary retinal arteries (black arrow). Retinal veins are of normal calibre. Pigmentary mottling is seen around the macula.

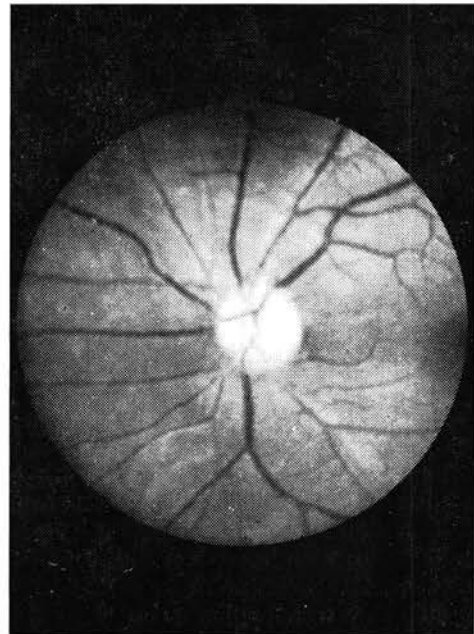


Fig. 3
Normal Left Fundus

With blood loss, ischaemic papillopathy is more common than C.R.A.O. This was well documented by Gowers (1879). A pale swollen disc usually associated with superficial haemorrhages at the disc margin together with loss of vision and an altitudinal field defect is pathognomonic. The retinal arteries are of normal calibre but the veins may be fuller due to impedance of blood flow caused by an oedematous disc or rarely segmental superficial haemorrhages resembling a branch vein occlusion may be seen. This is an acute infarction of the optic nerve head (Hayreh 1974) due to occlusion of the small branches of the posterior ciliary arteries which supply the terminal portion of the optic nerve.

C.R.A.O. following haemorrhage is rare considering the frequency of hypotension due to blood loss. Recurrent haemorrhages associated with profound hypotension are more prone to affect vision and this is usually lost between the 3rd and 5th day. (Duke-Elder 1967). In Terson's series nearly 40% of cases had visual loss between the 3rd and 16th day (1922). In our patient this occurred sometime after the 5th day.

Treatment

If vision is to be saved, treatment must be instituted immediately or at least within a few hours, if not irreversible damage to the retina occurs. Numerous agents have been used or suggested in the active treatment of this condition. Vasodilators, ocular massage, paracentesis, stellate ganglion blocks, retrobulbar tolazoline (Priscol), I/v dextran, inhalation of carbon dioxide and hyperbaric oxygen have all been tried and some improvement has been claimed (Simmonds, 1962) but up to the present no simple effective therapy has merited much success. All these measures have been undertaken to increase the perfusion pressure of the retinal circulation by lowering the intraocular pressure, increasing oxygenation of the blood and by dilatation of the arteries.

Retinal arteries do not possess a sympathetic nerve supply (Latics, 1967) so that stellate ganglion blocks, which prevent sympathetic neuro transmission, have no action in increasing the calibre of these arteries but may alleviate the condition by dilating the ophthalmic artery and so increase blood flow into the eye. Oxygen breathing causes narrowing of the retinal vessels; this vaso constriction being probably regulated by the accumulation of local metabolic products within the retina. Hyperbaric oxygen at 2.5 atmosphere has also been tried but retinal arteries undergo vaso constriction. Choroidal

blood flow and oxygenation, on the other hand, is increased and this can provide nearly the total oxygen requirement of the retina. (Anderson *et al*, 1965).

Inhalation of 7% carbon dioxide, which is the recommended concentration, again has maximal effect on cerebral blood vessels. Frayser and Hickam (1964) showed an increase in retinal blood flow but failed to show any significant increase in the calibre of retinal arteries, following inhalation of 10% carbon dioxide. Glyceryl trinitrate (GTN) which is a powerful coronary vaso dilator acts mainly on retinal veins and dilates them by about 5%. Intravenous hydralazine, a potent hypotensive and vasodilator, in a recumbent patient, produces a fall in blood pressure and an increase in calibre of retinal arteries but this mainly affects the smaller retinal vessels (Pickering, 1969). Paracentesis of the anterior chamber done as an immediate procedure in an acute C.R.A.O. of a few minutes duration, increases retinal blood flow and may "unblock" the artery. fytche *et al*. (1974) has shown that this procedure only increases retinal blood flow by 20% and that firm digital massage of the globe can through reactive hyperaemia, increase retinal blood flow by more than 80%; this being achieved by sudden lowering of the intraocular pressure following short periods of elevation.

With all the drugs and procedures available to us the most simple and effective immediate measures which should be instituted within 24 hours of the acute episode and can be carried out by any doctor, is to lie the patient flat, massage his eyeball and administer intravenous acetazolamide 500 mgm. (Diamox). Massaging of the globe should be done firmly with the index fingers and should be continued by the patient himself while the injection is being prepared. This technique may produce a drop in intraocular pressure of between 6 and 15 mm Hg. Further active measures can be carried out in hospital and every effort should be made to lower the intraocular pressure using intravenous osmotic diuretics e.g. 20% mannitol. If no improvement in the retinal circulation is seen after 24 hours of active treatment this should then be discontinued and treatment directed towards any associated systemic disease.

Summary

A case of central retinal artery occlusion following haemorrhage is described. Visual loss was total in the affected eye. The various emergency measures in the treatment of this condition are discussed.

Acknowledgement

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A study of the aetiology of vertigo in Malaysia

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GOWERS (1893) defined vertigo as any movement or sense of movement either in the individual himself or in the external objects that involves a defect real or seeming in the equilibrium of the body.

Vertigo is a distressing symptom and has been the subject of much investigation as it occurs in both the fields of otology and neurology.

The following is a study of 200 cases of vertigo who were referred to the vertigo clinic of the E.N.T. Unit at the University Hospital, Kuala Lumpur, during the period of two years. The majority of cases were referred from hospitals in the different states of Malaysia, by general practitioners, neurologists and other units of the University Hospital.

The diagnosis was established in each case on the basis of a comprehensive history which included a detailed questionnaire on vertigo as outlined by Busis (1965), otolaryngological examination, audiogram and other audiological tests when indicated including a neurological examination. In addition radiological examination of the temporal bone, the cranium and the vertebral column in its cervical part was done. Examination of the optic fundi and the fields of vision was carried out when this was indicated. Several cases needed referral to other specialities to exclude non vestibular disorders.

Patients were also submitted to a complete electronystagmographic (E.N.G.) examination, consisting of the recording of the following indices.

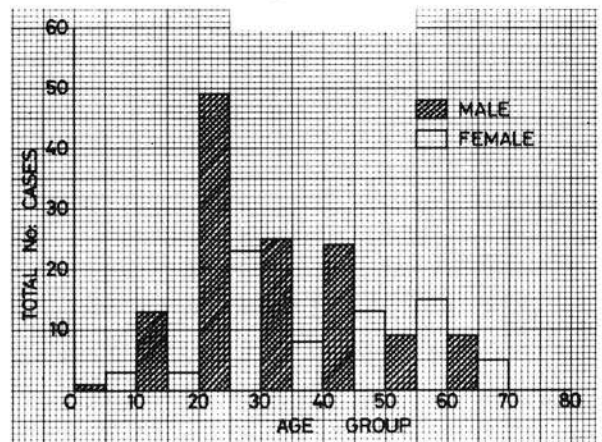
1. Spontaneous nystagmus.
2. Positional nystagmus.

3. Eye tracking tests.
4. Optokinetic nystagmus.
5. Caloric tests.

6. A modified Barany's test which consisted of a rotatory movement first to one side and then to the other, with acceleration $0.5^\circ/\text{Sec.}^2$ to a constant speed of $90^\circ/\text{Sec.}$ and then rotation with a constant speed for 60 seconds subsequently slowing to a stop within 1 second.

Table I shows the frequency distribution of patients according to age and sex. It can be seen that the majority of patients are in the 20-30 age group, a fact also noted by Nsamba (1972) in his study of 100 cases of vertigo in the African.

Table I
Vertigo Causes



Tables II and III give an analysis of the causes of vertigo which have been divided into central and peripheral. The number of cases in each group and the condition of the labyrinth have also been mentioned.

Table II
Central Causes of Vertigo

Central Causes	Number	Labyrinthine Response
1. Epilepsy	3	Normal
2. Functional (Psychogenic)	70	Normal
3. Syringobulbia	2	Normal
4. Cerebro Vascular Accidents	2	Normal
5. Vertebro Basilar Syndrome	15	Normal
6. Intracranial space occupying lesion	2	Normal
7. Migraine	7	Normal
8. Diabetes (Controlled)	3	Normal
9. Heart Block	1	Normal

Table III
Peripheral Causes of Vertigo

Peripheral Causes of Vertigo	Number	Labyrinthine Response
1. Menière's Disease	17	7 - Unilateral canal paresis 5 - Bilateral canal paresis 5 - Unilateral canal paresis
2. Vestibular Neuronitis	36	30 - Unilateral canal paresis 6 - Bilateral asymmetrical response
3. Ototoxicity (Salicylate)	3	Bilateral asymmetrical labyrinthine responses
4. Benign Positional Vertigo	28	Normal

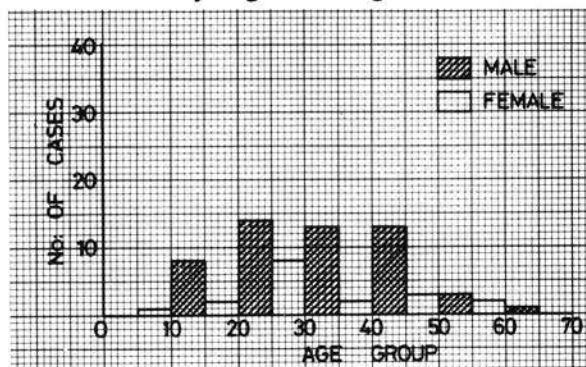
CENTRAL GROUP

In the central group the commonest cause of vertigo was functional followed by Vertebro Basilar Syndrome.

Functional Vertigo

Table III shows the distribution of patients according to age and sex in this section. Majority of these patients gave a history of stress or emotional disturbance just prior to the onset of vertigo. The four university students, in this group stated that attacks of dizziness occurred just before their examinations. One housewife complained that the onset was after her house was burgled and another after her only child was admitted to hospital with febrile convulsions. It is important that in order to obtain a good history more time should be spent with the patient. It must be emphasised, however, that some of the patients with functional vertigo (dizziness) did not relate their condition to any emotional conflict. However, it is a known fact that many psychological conflicts take place at the unconscious level. Wolff (1963) in his discussion on psychosomatic symptoms states that the striking feature with these patients is that at first they all resist to a greater or lesser degree on suggestion that their physical symptoms could be emotional in origin. In all these patients the vestibular and audiological tests were normal.

Table IV
Psychogenic Vertigo



Vertebro Basilar Syndrome

There were 15 cases of vertebro basilar syndrome presenting with vertigo. All the patients were over 50 years and had atherosclerosis with evidence of arterial disease in other parts of the body. The symptoms were characteristically produced by focal neurological abnormalities. They were episodic in nature, lasting a short time and clearing up completely without any residual effect. These patients had blurring of vision, paraesthesia of the extremities and sometimes black outs in addition to their vertigo. Some complained of difficulty in swallowing and articulation. In 5 cases between the ages of 55 years to 65 years, a vertebral angiogram confirmed the diagnosis.

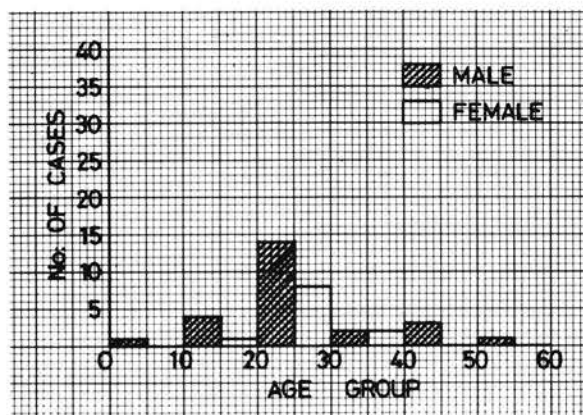
PERIPHERAL GROUP

In the peripheral group the commonest cause of vertigo was vestibular neuronitis followed by Menière's disease.

Vestibular Neuronitis

Table V shows the frequency distribution of the cases in this group according to age and sex.

Table V
Vestibular Neuronitis



It is a disease characterised by sudden and severe vertigo accompanied by nausea and vomiting but without cochlear symptoms such as hearing impairment, a feeling of fullness or pressure in the ear or tinnitus (Dix & Hallpike, 1952).

In this series, the peak incidence was in the age group 20-30 years. Harrison (1962) in his series of 108 patients with vertigo found it most common in the fourth decade in the Caucasians.

Of the 36 cases in this series, 25 had a single attack, the rest of them had multiple episodes, each episode lasting a few seconds and occurring in crops over a period of two years. Single attacks of vertigo occurred in the younger age group (20-30 years) and multiple attacks in the older age group (30-50 years). Coates (1969) in his study of 76 patients who had vestibular deficit only, as compared with a group of normal patients and a group of patients with both vestibular and auditory deficits, found that the single attack subgroup was the youngest, with an age range of 30-39 years, while the group that had multiple attacks consisted significantly of older people than those who had a single attack of severe vestibular disturbance.

A common feature noted in our cases was antecedent infection. Sinusitis was commonest among patients who gave a history of multiple episodes of vertigo. One patient volunteered that his vertigo occurred whenever there was an exacerbation of his sinusitis. Many other medical investigators too, have reported a high incidence of sinusitis in patients with vestibular deficit and normal hearing.

Dix & Hallpike (1952) found that antral infection was frequently encountered in his patients. Coates (1969) in his study of the relative incidence of sinusitis in patients with multiple and single attacks of dizziness, showed a much higher incidence of antral infection in patients with multiple attacks of vertigo. Hinchcliff (1967) observed that 30-50% of patients with vestibular neuronitis had roentgenographic evidence of sinusitis.

Benign Positional Vertigo

The majority of these patients gave a history of head injury at least six months prior to investigations. The incidence was greater in the males. These tended to get better with progress of time.

Menière's Disease

This disease is not as common in the Asians as in the Caucasians. In the Malaysian, its incidence was only 8% of the total number of cases of vertigo in this series. In the African it is also rare, Nsamba (1972) accounting for only 2% of total patients with vertigo. However, it is the commonest cause of vertigo in the Caucasians. Cawthorne and Hewlett (1954) in their study reported an incidence of 61%.

Though many predisposing factors have been associated with the aetiology of Menière's disease yet it has been suggested that it may be a fundamental physiologic, disorganisation, probably significantly influenced by personality factors.

Hinchcliff (1967e) noted the increased prevalence of psychosomatic type personality profile in patients with Menière's disease as compared to a control population and concluded that this was further evidence in favour of the psychosomatic nature of this condition.

SUMMARY

A study of the aetiology of vertigo in 200 Malaysians has been presented. The most common causes of central and peripheral vertigo have been discussed. The differences noticed in the aetiology pattern in the Asians and Africans as compared with the Caucasians are briefly considered.

ACKNOWLEDGEMENT

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Preventive ophthalmology*

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THIS is a relatively new field, with a wide scope. It needs to be rapidly developed in order to take away some of the heavy load, that is already overburdening our short-staffed eye units, in the hospitals. The public health division can play a vital role, in the implementation of the programmes related to preventive ophthalmology.

This subject can be divided into two broad categories. The first, looks at the subject from the public health angle while the second deals with it from the occupational health angle. In my opinion the latter should be a part and parcel of the former, before it could be called a completely balanced service.

I. Ophthalmological Problems in Public Health and their Prevention:

(i) Vitamin A Deficiency:

This is by no means a problem of the past. It is with us even to-day, in most of the states in Malaysia, especially in the rural areas. A survey, done in Kelantan between 1969-72, disclosed an average of 60 cases of Vitamin A Deficiency reported annually. During one of my recent visits to the Kuala Brang area, there were reports of 18 cases of Vitamin A Deficiency from January to October 1976. Many of them had xerophthalmia and some developed keratomalacia. It is imperative that the public health teams aggressively assault this problem, if they are to prevent a child from

loosing his sight. Fortunately, the mobile health teams and the school health teams are picking up some children with Bitot spots or with complaints of night blindness. My recommendations to solve, this problem are:

- (a) Vitamin A Injections should be given as a prophylactic dose, to the young infants along with other immunizations, especially in the rural areas.
 - (b) The eating of Vitamin A & D capsules or taking cod liver oil.
 - (c) In encouraging the policy of "Buku Hijau", advice on the planting of backyard gardens to grow more green vegetables. Carrots are a good source of Vitamin A. Fruits like the papaya can be grown easily and should be eaten.
 - (d) Poultry should be reared and children encouraged to eat more eggs and a balanced diet.
 - (e) Health Education should be carried out to change their attitude and their priorities, for example not to sell their complete home produce for the sake of buying a radio or television. This is often at the cost of their own health.
- (ii) Infections of the Eyes:

The eyes can be affected with many forms of conjunctivitis, like acute conjunctivitis, purulent conjunctivitis, gonococcal

*Read before the Malaysian Ophthalmological Society.

conjunctivitis and most of these are bacterial in origin; or viral infections like Herpes Zoster. Whatever the cause of the infection, the public should be advised to seek early treatment. If the infections are neglected, many serious sequelae can develop and these can seriously threaten the sight of the eyes.

(iii) Physical Injuries to the Eyes:

Lacerations can easily occur in the eye, for example from foreign bodies. If these are not treated promptly, they can undergo superimposed bacterial infection, resulting in lesions like kerato - conjunctivitis, hypopyon ulcers and so forth. Sharp objects can cause penetrating injuries, which can affect the globe of the eye and even cause cataract of the lens. Explosive injuries, for example, from fire crackers or other penetrating accidental injuries, can easily cause pthisis bulbi, especially if early treatment is ignored, or even sympathetic ophthalmitis of the other eye. Many padi planters come up with punctate keratitis. Removing of scrap rubber before tapping, if done carelessly, can cause eye injuries like corneal ulceration, resulting in opacities.

(iv) Growth in the Eyes:

The commonest example is a pterygium. This should not be allowed to grow over the corneal area as it can form chronic adhesions and even post-operatively leave scars, which hinder a clear vision. This condition is allowed to progress, either due to ignorance or from fear of undergoing surgery. The patient can be convinced that it is a very simple operational procedure, with no danger.

(v) Other Patho-physiological Conditions:

The two good examples of these conditions are cataract and glaucoma. Cataract comes on with advancing age. Very often the rural people do not come to the hospital till they have virtually lost their eyesight. They may be only having light perception left or be able to count fingers. It is the serious handicapping that resorts them to seek advice. They should be told that these conditions need early treatment, through surgery, in which case the eyesight can be restored to normalcy.

Similarly cases of diabetes and hypertension are to be advised that, if they do

not undergo early treatment to control the above diseases, they can easily suffer from retinopathy and defective vision.

II. Ophthalmological Problems Related to Industry and their Prevention:

(i) Dusts: Most dust particles or chips of metal can easily be lodged in the eyes, if no protective eye-wear is used. They can cause irritation and lacrimation. The normal tendency is to rub the eyes. This is more damaging, as a sharp foreign body can cause lacerations, which opens them to infection. As examples, we have granite stone, quarry workers or tomb-stone makers who chip the metal. Similarly machines which are used for metal cutting will have chips of metal flying into the eyes. This can be prevented by using an oil or water jet stream, to wash down the chips, or using protective goggles.

(ii) Splashes of Chemicals in the Eyes:

Many chrome-plating industries use acid baths. Others use alkalis and other chemicals. Splashes are easily liable to occur and if the eyes are not protected, either with goggles or face shields, severe corrosive burns of the eyes can occur. Lesions like kerato-conjunctivitis and severe scarring may also occur.

Many of the rural agricultural workers who spray trees with insecticides get the fine spray into their eyes, when the wind blows it onto them. They should be advised to use protective eye-wear and spray, in the direction, whereby the wind carries the spray away from them.

(iii) Light Rays which are Harmful to the Eye in Industry:

The infrared or the ultraviolet rays of the light spectrum can cause superficial burns in the cornea or deeper lesions, like the cataract of the lens. The laser, which is a sharp collimated beam of light, is finding extensive use now in industry; for example, in welding, communications, diathermy. It is dangerous, if viewed with the naked eye and it can cause retinal burns. The area using lasers or radar should be 'out of bounds' for non-workers, with adequate warning signs. All workers should be compelled to use suitable eye protection. Many a welder complains of severe, pains in the eyes especially at night,

which occurs from 'arc burns' of the cornea. Workers who work with red-hot furnaces, like in steel plants or glass-works, are affected by the radiant heat and develop cataract. They should be advised to wear suitable goggles or use face shields, to protect their eyes from the harmful rays.

Summary of Preventive Aspects:

The chemical environment especially and to a lesser extent the physical, are of major concern in industry, in relation to eye problems. Every effort must be made to make the industrial processes safe. Suitable goggles, which fit well, are ventilated and have side shields, should be provided. Alternatively, face shields may be provided. The areas, where the hazards exist should be demarcated. It should be made mandatory to wear eye protection, before entering these areas. Enough people should be trained in first aid to provide early treatment, in emergencies. Sufficient eye washing facilities, in the form of fountains or bottles containing sterile water should be available at strategic points, in the plants.

Conclusion:

All health officers, doctors and other staff or eye departments can participate actively in eyesight conservation programmes, through health education. Even, if a person cannot be convinced totally to avoid his first eye injury, he would be very receptive to advice while undergoing treatment like removal of a painful foreign body. He would at least observe preventive care, for the future. Early treatment, would also prevent damaging sequelae. Surely, anyone can be made to understand that normal eyesight, is perhaps, one of man's best possessions.

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Studies on parasitic infections in Orang Asli (Aborigines) in Peninsular Malaysia

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Introduction

A REVIEW OF the literature on parasitic infections in Orang Asli revealed that much work has been done on various parasites. Among them, malaria (Polunin 1953; Wharton *et al.*, 1963; Sandosham *et al.*, 1966; Bolton, 1972), intestinal parasites (Polunin, 1963; Sandosham, 1953; Dunn and Bolton, 1963; Bolton, 1968; Gilman and Prathap, 1971; Dunn, 1972; Gilman *et al.*, 1976a; 1976b), filarial infections (Wilson and Reid, 1951; Polunin, 1951, 1953; Laing and Wharton, 1960; Wharton *et al.*, 1963; Ramachandran *et al.*, 1964; Itam, 1967; Mak, 1974), and Pentastomid infection (Ramachandran and Prathap, 1967; Prathap *et al.*, 1968, 1969) seem to be the commonest. However, very little information was available on other blood and tissue parasites. The food and other habits of Orang Asli suggest that they would be infected with some of the rarer parasites not usually seen in the rest of the local population. In the course of this study, it was necessary to examine faeces and other excretions and secretions of a number of Orang Asli, in addition to their blood. This communication therefore summarises the prevalence and distribution of all parasites detected in this study, which commenced in 1973. No attempt has been made to compare the prevalence of parasites according to tribe, age or sex. Similarly, no attempt was made to study the parasite density of any of the infections.

Materials and methods

A total of 140 thick and thin blood films was made around midnight from patients and their relatives in the Gombak Hospital as well as in a few Orang Asli villages, whenever possible. In addition, the millipore concentration technique was used on night blood to screen patients for filarial infections.

Each of 126 stool samples was examined by direct smear, brine flotation, formol ether and sedimentation techniques. In the latter technique, 5% glycerol was used as a routine to prevent hatching of any *Schistosoma japonicum* type eggs which may have been present. This was deemed necessary in view of the report of *S. japonicum* like infection of an Orang Asli (Murugasu and Dissanaike, 1973). Where indicated, sputum samples, after treatment with 2 percent KOH, were examined for eggs of *Paragonimus* and other parasites.

Intradermal skin tests were performed on a few people for schistosomiasis and paragonimiasis. *S. japonicum* and *P. westermani* antigens were kindly supplied by Professors M. Yokogawa, T. Oshima and Shigeo Hayashi.

Sera from 271 donors were tested for antibodies to various protozoan infections. The IFA technique was employed for all except for *Entamoeba histolytica* for which the IHA technique was employed. Antigens for the IFA tests were kindly supplied by Dr. A. Sulzer, Center for Disease Control, Atlanta, USA. The antigens and other reagents used for the IHA tests were commercial preparations bought from Hoechst (Amoebiasis IHA Reagent test kit (OTMO 11)).

* Present address: Su Beng Dispensary, 104 Jalan Prangin, Penang.

In all the tests where IFA techniques were used, only sera that showed reactivity at 1:64 or higher dilutions were considered positive, although reactivity at 1:16 dilutions was recorded for information. In the IHA tests for *E. histolytica* antibodies, those sera that were reactive at 1:128 or higher dilutions were considered positive.

Results

1. Intestinal Parasites.

a. Protozoa.

Table I gives the prevalence of intestinal protozoa as diagnosed by stool examination compared with results of Dunn (1972) and Bisseru and Aziz (1970). *Entamoeba coli* (21.4%) was the most common protozoan, followed by *E. histolytica* (8.7%) and *Giardia lamblia* (4.8%). No *Balantidium coli* or *Isospora* sp. were detected during this study.

b. Helminths.

The prevalence of common soil-transmitted nematodes compared with previous studies is given in Table II. The prevalence of all the common soil-transmitted helminths was high as shown in Table III. The most prevalent infection was hookworm (95.2%) followed by *Trichuris* (80.9%), *Ascaris* was present only in 47.6% people examined. A large number (23.0%) of them had mixed infection with all three soil-transmitted helminths. Double infections in all possible combinations were also detected. Single infections with these nematodes were rare (Table III). Although other intestinal nematodes like *Strongyloides* and *Enterobius* were present, these were understandably low due to the techniques used. It was interesting to note that out of the 126 stool samples examined, only one was completely free of helminthic infection.

Table I

Prevalence of Intestinal Protozoa among Orang Asli compared with Bisseru & Aziz (1970) and Dunn (1972)

Protozoa	Present authors (Total 126) %	Bisseru & Aziz (1970) (Total 100) %	Dunn (1972) (Total 1273) %
<i>Entamoeba histolytica</i>	8.7	1	5.1
<i>E. hartmanni</i>	0.8		3.5
<i>E. coli</i>	21.4	4	28.1
<i>Endolimax nana</i>	6.3		6.2
<i>Iodamoeba butschlii</i>	2.4		2.8
<i>Giardia lamblia</i>	4.8	25	10.8
<i>Chilomastix mesnili</i>	1.6		2.1
<i>Trichomonas hominis</i>	1.6	7	0.4

Table II

Prevalence of commoner soil-transmitted nematodes among Orang Asli - comparison with previous studies

Author (year)	No. examined	Percent Infection			Method Used
		<i>Ascaris</i>	<i>Trichuris</i>	Hookworm	
Nevin (1938)	104	70	14	16	?
Sandosham (1953)	117	79.6	24.0	48.7	DS, BF
Polunin (1953)	131	4.6	3.1	90.8	BF
Bisseru & Aziz (1970)	100	69	80	51	DS
Dunn (1972)	1273	39.1	57.2	68.7	DS, TIF
Dissanaike et al (present paper)	126	47.6	80.9	95.2	BS, FE, BF, Sed.

DS = Direct smear; BF = Brine flotation; FE = Formol ether; Sed. = Sedimentation; TIF = Thiomersal-Iodine-Formol.

Table III

Prevalence of Intestinal helminths among Orang Asli

Helminths	No. positive (%) (from total of 126)
<i>Ascaris lumbricoides</i>	60 (47.6)
<i>Trichuris trichiura</i>	102 (80.9)
Hookworm	120 (95.2)
<i>Strongyloides stercoralis</i>	1 (0.8)
<i>Enterobius vermicularis</i>	1 (0.8)
Hookworm <i>Trichuris</i> and <i>Ascaris</i>	29 (23)
Hookworm and <i>Trichuris</i>	19 (15.1)
Hookworm and <i>Ascaris</i>	4 (3.2)
<i>Trichuris</i> and <i>Ascaris</i>	1 (0.8)
Hookworm alone	4 (3.2)
<i>Trichuris</i> alone	3 (2.4)
<i>Ascaris</i> alone	nil
Persons negative for all intestinal helminths	1 (0.8)

2. Blood and Tissue Parasites.

a. *Protozoa.*

(i) *Malaria.*

Examination of 140 single thick and thin smears showed the presence of *P. falciparum* infection in 16 Orang Asli. Two of these had mixed infections with *P. vivax*. Nine showed infections with *P. malariae*. None of the slide-

positive cases were children below the age of 10. Only 1, a 2 year old child, showed clinical malaria at the time of blood examination.

(ii) *Trypanosomiasis.*

Low grade infections with trypanosomes have already been reported in 2 Orang Asli (Dissanaike *et al.*, 1974).

b. *Helminths.*

(i) *Microfilariae.*

Out of a total of 140 blood smears examined, 8 were positive for *Wuchereria bancrofti* and 12 for *Brugia*. There was no mixed infection. The distribution of the 2 species in various states of Peninsular Malaysia are given in Table IV: Orang Asli from Johore, Kelantan and Malacca did not show microfilariae. However, as the total numbers tested were below 10 for Selangor, Negri Sembilan, Johore, Kelantan, Trengganu and Malacca, this may not give a true picture of the microfilaria rates in Orang Asli populations in the various states. The prevalence of microfilaria is compared with the results of previous workers in Table V.

(ii) *Other Helminths.*

No other blood and tissue helminths were detected in this study, but skin tests carried out for *Schistosoma japonicum* and *Paragonimus westermani* have shown positive reactions in a few cases. The results of the tests are shown in Table VI.

3. Serological studies

The results of the serological studies on the protozoan infections are summarised in Table VII.

Table IV

Prevalence of microfilariae among Orang Asli from 8 states

State	Number examined	Number positive with		Total Positive
		<i>Brugia</i>	<i>Wuchereria</i>	
Selangor	7	1	—	1
Negri Sembilan	8	—	1	1
Johore	7	—	—	—
Perak	37	5	1	6
Pahang	75	6	5	11
Kelantan	4	—	—	—
Trengganu	1	—	1	1
Malacca	1	—	—	—
TOTAL	140	12	8	20

Table V
Prevalence of microfilariae – comparison with previous published studies

Author (date)	Number examined	Number positive	% infection	% <i>Brugia</i> (of total positives)	% <i>Wuchereria</i> positives)	% mixed
Polunin (1953)	278	60	21.6	–	–	–
Wharton <i>et al</i> (1963)	1,099	212	19.3	62.3	30.2	7.5
Ramachandran <i>et al</i> (1964)	167	29	17.4	51.7	34.5	13.8
Itam (1967)	1,964	223	11.4	75.1	25.0	–
Mak (1974)	68	5	7.4	100	–	–
Dissanaike <i>et al</i> (present paper)	140	20	14.3	60	40	–

a. *Amoebiasis.*

Of the 16 sera tested for *E. histolytica* by IHA technique 25% showed reactivity. However, the stools of those who were positive were not examined. In the general stool survey, 8.7% infection was revealed.

b. *Malaria.*

The results obtained on the serological tests on the Orang Asli donors have already been published elsewhere (Thomas and Dissanaike, 1977).

Table VI

Results of skin tests performed on Orang Asli with *Schistosoma japonicum* and *Paragonimus westermani* antigens

Skin test with	No. tested	Positive	Doubtful positive
<i>S. japonicum</i>	130	2	9
<i>P. westermani</i>	132	1	16

Table VII

Titres obtained for sera from Orang Asli donors with various blood and tissue protozoan parasite antigens

Antigen used	Type of test	Total No. of sera tested	No. of sera that showed end-point titres of						Total No. and % +ve at 1:64 and higher titres	
			1:16	1:64	1:256	1:1024	1:4096	1:8192		
<i>E. histolytica</i>	IHA	16	–	–	–	3	–	1	4	25.0
<i>Plasmodium falciparum</i> *	IFA	271	–	80	90	67	4	–	241	88.9
<i>P. malariae</i>	IFA	271	–	114	34	17	–	–	165	60.9
<i>Toxoplasma gondii</i>	IFA	226	36	27	5	4	–	–	36	16.0
<i>Trypanosome gambiense</i>	IFA	93	17	3	–	–	–	–	3	3.2
<i>T. rhodesiense</i>	IFA	93	28	5	1	–	–	–	6	6.5
<i>T. cruzi</i>	IFA	93	8	–	–	–	–	–	–	–
<i>T. cyclops</i>	IFA	48	–	–	–	–	–	–	–	–
<i>T. lewisi</i> *	IFA	29	12	7	3	–	–	–	10	34.5
<i>Sarcocystis fusiformis</i>	IFA	71	20	22	6	–	–	–	28	39.4

* Tests at CDC, Atlanta, USA by the kind courtesy of Dr. A.J. Sulzer.

c. *Trypanosomiasis.*

Serological survey on 93 sera (Table VII) with 3 human *Trypanosoma* antigens showed that 6 of these sera reacted with *T. rhodesiense*, and 3 with *T. gambiense* antigen at significant titres. None of the sera reacted with *T. cruzi* at titres higher than 1:16. Similarly, none of the 48 sera that were tested with *T. cyclops* gave positive reaction, although 10 of 29 sera reacted with *T. lewisi* antigen at significant titres.

d. *Toxoplasmosis.*

Two hundred and twenty six sera were tested and the results are shown in Table VII. A total of 36 sera (16%) were positive at 1:64 and higher titres. An equal number reacted at 1:16 showing that a good percentage of the Orang Asli population of this country has experienced infection with *Toxoplasma gondii*.

c. *Sarcosporidiosis.*

The results of the serological tests using zoites isolated from *S. fusiformis* sarcocysts from the water-buffalo muscle showed the presence of *Sarcocystis* antibodies in 39.4% of Orang Asli donors. Further details of this work will be published in a separate communication.

Discussion

The present study revealed that the prevalence of parasitic infections like amoebiasis, soil-transmitted helminths, malaria and filariasis is quite high among Orang Asli. Many of them still lead a semi-nomadic life under poor sanitary conditions and are normally barefooted. These factors may account for such a high prevalence of these infections. A comparison of the prevalence of these parasites with those obtained by Dunn (1972) and other workers showed a higher prevalence of hookworm and *Trichuris* infections (Table II). This could be because several techniques (4) were employed for each stool sample in the present study. The previous workers have used only 1 or 2 techniques to detect the eggs. The brine flotation and sedimentation techniques which were used in the present study would have brought out even the scanty infections.

The high levels of malaria antibody in a large number of people tested indicate that the transmission rate is higher than what is apparent by slide examination. This has been discussed in an earlier paper (Thomas and Dissanaiké, 1977) and is in agreement with the report of Bolton (1972).

In addition to parasites, which have already been recognised, 2 cases of trypanosome infection were detected during the study and have been reported (Dissanaiké *et al.*, 1974). The sera from these two persons were not very reactive with any of the trypanosome antigens tested (Else *et al.*, 1976). Dr. A. J. Sulzer (personal communication) tested a number of Orang Asli sera at the Center for Disease Control, Atlanta, USA, with *T. rhodesiense* and *T. cruzi* antigens. He obtained very similar results. When he tested 29 of those sera with *T. lewisi* antigen (Table VII), 10 samples reacted at 1:64 or higher dilutions and 3 samples reacted at 1:286. It was clear from these results that there was reactivity in a few sera at lower titres showing possible infections among Orang Asli with some species of trypanosome. However, the sera were not too reactive with any antigens tested, and this may have been due to the absence of homologous antigens for testing. It was interesting to note that the sera were most reactive with *T. lewisi* antigen.

In an earlier survey done with sera collected from Southeast Asia, Sulzer (personal communication) noted that one serum sample reacted with an African trypanosome antigen at 1:256. All these findings suggest the possible existence of a small focus of trypanosome infection among Orang Asli.

Serological tests for *Toxoplasma* antibodies indicated that infection was present although obvious clinical manifestations of the disease were not recognised. According to Tan and Zaman (1973); Cheah *et al.*, (1975); Thomas *et al.*, (unpublished data) the prevalence of *Toxoplasma* antibodies was highest among the Malays and lowest in Chinese. The present studies show that the prevalence of antibodies among Orang Asli is higher than that among Chinese (Table VIII) but lower than in Indians. This may be due to the fact that, being semi-nomadic, they do not have very close association with pet cats like the Malays. In fact their association is more with dogs.

Table VIII

Comparison of antibody titres of different ethnic groups (*Toxoplasma*)

	Tan & Zaman, 1973 IHA %	Bisseru (1974) Dye Test %	Cheah et al (1975) IFA %	Thomas et al* IFA %
Malays	25.4 (59)	—	38.8 (431)	33.9 (118)
Indians	19.6 (51)	—	25.2 (373)	23.9 (138)
Chinese	5.0 (20)	—	20.7 (635)	14.6 (212)
O. Asli	—	4.6 (44)	—	19 (268)
Others	—	—	12.5 (40)	—

Numbers of parasites — total number examined.

* Unpublished data.

Kutty *et al* (1975) reported a case of infection with *Sarcocystis* sp. in an Orang Asli girl at autopsy. Two other cases of *Sarcocystis* infection in Malaysia, one in a Malay (Kutty and Dissanaiké 1975) and the other in a Chinese (Prathap and Dissanaiké 1976) have also been reported from Peninsular Malaysia. The present serological findings show a number of Orang Asli donors (39.4%) have detectable levels of *Sarcocystis* antibodies. This indicates that the infection with *Sarcocystis* may be more common and only a more thorough study including muscle biopsy would reveal the true situation.

Thick film examination for filarial infection confirmed the earlier findings that filariasis is still prevalent among Orang Asli and that *Brugia* is the predominant species. However, mixed infections were not found in the present study.

Eggs of a *Schistosoma japonicum*-like parasite were earlier found in the liver and other tissues of the Orang Asli (Murugasu and Dissanaiké, 1973 and Murugasu and Por, 1973). Subsequently, Leong *et al.* (1975) reported 8 additional cases at autopsy. The smaller size of the eggs suggests that this was probably a different strain to the classical *S. japonicum* and may be related to the Mekong strain. Recently, Murugasu (personal communication) detected eggs in a needle liver biopsy from an Orang Asli patient at the University Hospital, whose stools were negative. Through the courtesy of Professor Benjamin Cabrera, the Circum Oval Precipitation Test (COPT) was done on seven Orang Asli sera which included the case with the positive needle biopsy. Only the latter was positive. It would therefore be worthwhile carrying out this test and doing liver biopsies whenever the skin test and the COPT are found positives in future.

Paragonimus westermani is known to be a common parasite of the wild carnivores in Malaysia (Rohde, 1965 and Groves *et al.*, 1967). It is also known in fresh water crabs (Rohde, 1966 and Lee and Miyazaki 1965).

In the skin tests, although a single positive case was detected, no eggs were present in the sputum or the faeces nor was there any radiological evidence of the infection in the lungs. A more thorough search might reveal this infection too in the Orang Asli.

In conclusion, the present study which confirms the high prevalence of malaria, soil-transmitted nematodiasis, amoebiasis and filariasis in the aborigines, focuses attention on the likelihood that blood and tissue infections like *Sarcocystis*, *Paragonimus* and perhaps other hitherto undetermined parasites would be detected with better and more thorough procedures.

Summary

During a brief study of the blood and tissue parasites of Orang Asli aborigines, the prevalence of intestinal infections, malaria and filariasis was noted and compared with results of previous authors. A higher prevalence of Hookworm and *Trichuris* infections in this study is attributed to the more comprehensive methods of examination used.

Reference is made to cases of trypanosomiasis and sarcosporidiosis reported earlier and serological studies have suggested a higher prevalence of these parasites, necessitating further detailed investigations. In view of reports of *Schistosoma japonicum*-like infections in these aborigines, a detailed search for eggs of these parasites was made but with negative results although, of two skin test positives, one case was that of a patient with *Schistosoma* eggs seen in a needle biopsy.

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Laboratory needs in General Practice

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Introduction

PATIENTS admitted to hospitals are assured of getting thoroughly investigated. The general practitioner too, though mainly a clinician, is expected to do at least some basic investigations on his patients. Sometimes the patient himself demands laboratory confirmation of the clinical diagnosis. Various General Practitioner Associations have expressed the view that the Government charges for laboratory investigations are too high. They have made representations to the Government to get concession rates for laboratory investigations, without success. The alternative suggested, is for general practitioners to start their own co-operative laboratories.

Before starting such General Practitioner laboratories we should look into:

- (1) Whether there is a need for another set of laboratories to supplement existing facilities.
- (2) How many of our patients need laboratory investigations.
- (3) What percentage of our patients are deprived of laboratory facilities because of cost.
- (4) What types of investigations are commonly needed by the patients.

We have not been able to find any figures or statistics on this subject. Most of the arguments on laboratory needs of the general practitioner were based on impressions and opinions. It was to provide a solid base of statistics that we began this study.

Method

This study is based on urban practices in the State of Penang. 13 members of the Penang Chapter of the College of General Practitioners, Malaysia took part in this study. Each doctor collected data from 500 consecutive patients, starting on the same date. The types of investigations were grouped into:

- (1) Haematology and/or Clinical Chemistry.
- (2) Microbiology including Serology.
- (3) X ray and E.C.G.

The need for investigations was judged to be *Essential* or *Desirable*. An *Essential* investigation is one which must be done before one can reach a diagnosis, e.g. sputum for acid-fast bacilli in tuberculosis or an X ray in a fracture. A *Desirable* investigation is one which helps in the management of the patient but which is not necessary to arrive at the diagnosis e.g. Sputum culture in bronchitis, liver function tests in hepatitis or stool culture in gastro-enteritis. The place where investigations

Table I

The Number of Investigations Considered Necessary

Type of Investigation	Number of Investigations	%
Essential	267	37.4
Desirable	447	62.6
Total	714	100

Table II
Types of Investigation

Kind of Investigation	Essential	Desirable	Total	%
Haematology/clinical chemistry	122	216	338	47.3
Microbiology/serology	76	81	157	22.0
X-ray/E.C.G.	69	150	219	30.7
Total	267	447	714	100

were done was recorded. The patients could also have been sent to a hospital for further management. When a patient was judged to require investigations but it was not done, this was classified into (1) patient refusal (2) cannot afford and (3) facilities not available.

Results

The total number of patients seen was 6524 (due to mistakes in numbering, some doctors collected more than 500 cases) of which 3264 were male and 3260 were female.

Table III
Number of Patients who needed Investigation

Number of patients who had investigations	428	65.7%
Number of patients who could not be investigated	223	34.3%
Total patients who needed investigations	651	100%

It must be noted that some patients required more than one category of investigation. Thus there is a difference in the number of investigations done (714) in Tables I and II and the number of patients who needed investigations (651) in Table III. It is seen that 651 of the total patients seen (6524) or 10% needed investigations.

Table IV
Where Investigations Were Done

Where Investigations Done	No. of Patients	% of 651 pts.
1 Own clinic	294	45.2
2 Private laboratory	32	4.9
3 Govt. laboratory	40	6.1
4 Govt. hospital referral	58	8.9
5 Private hospital referral	4	0.6
Total	428	65.7

Discussion

Ten percent of the patients in this series required investigations. Of these 45.2% were investigated in the doctors' own clinics. 11% were investigated in Government or private laboratories. 9.5% were referred to hospitals for further management. The remaining 34.3% did not have investigations done. 28.7% could not afford it. The remainder mainly refused investigations. On looking at these figures we note that two thirds of those who needed investigations were able to get them done through existing facilities. Two thirds of these were done in the doctors' own clinics. Thus, it is seen that most of the clinics were able to investigate their patients in their own clinics or with the help

Table V
Why Investigation Were Not Done

Reason	No. of Patients	% of 651 pts.
6 Patient refusal	29	4.5
7 Cost	187	28.7
8 Facilities not available	7	1.1
Total	223	34.3

of existing facilities. 28.7% of those who needed investigations were unable to afford the cost. This forms 2.9% of the total patients in the series. Thus any new laboratory set-up would have to reduce costs below existing charges if they were to benefit this poorer class of patients.

Conclusion

Laboratory aids were considered necessary in 10% of patients in this series. We feel that the General practitioners taking part in this survey were able to provide sufficient laboratory service (4.5%) in their own clinics. Government and private laboratories have a small (1.1%) but definite place especially for the more complex tests. Another group (0.9%) were referred to hospitals for further management. 2.9% of the patients in this series were deprived of laboratory help because of the

cost. Any cheap, new laboratory set-up for General Practitioners would supplement the general practitioners' own clinic laboratories (4.5%) and be of immediate benefit to this 2.9% of the patients. It would serve from about 2.9% to a maximum of 5.5% of the patients who are now being investigated by Government and private laboratories or are being deprived of any laboratory aid.

Summary

13 General practitioners in Penang made a study to assess the need for laboratory investigations among their patients. 10% of their patients needed laboratory investigations. 4.5% had investigations done in their own doctors' clinics. 2% needed Government or private laboratory aids. 2.9% could not afford laboratory fees.

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Pentastomid infection in the house geckoes from Sarawak, Malaysia

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Introduction

THE HOUSE GECKOES or chichaks are the most familiar of our lizards. As their common name suggests, they are commensal of Man. There are some five species of house geckoes:- the Common House Gecko (*Hemidactylus frenatus*), the Flat-tailed Gecko (*Platyurus platyurus*), the Four-clawed Gecko (*Gehyra mutilata*), the Tokay (*Gecko gecko*), and the Spotted Gecko (*Gecko monarchus*). These house geckoes, particularly *Hemidactylus frenatus* and *Platyurus platyurus*, have been found to be infected with the pentastomid *Railietiella hemidactyli* (Lavoipierre and Lavoipierre, 1966). It has also been demonstrated that the coprophagous blattids (e.g. *Periplaneta americana* and *P. australasiae*) serve as intermediate hosts (Lavoipierre and Lavoipierre, 1965 & 1966; Lavoipierre and Rajamanickam, 1973; Rajamanickam and Lavoipierre, 1965). As house geckoes and cockroaches are common and closely associated with human dwellings their potential importance in public health cannot be overlooked. For instance, we do not know for certain whether these house geckoes carry any diseases that are transmissible to Man.

Materials and methods

Collection of house geckoes were made in three different localities in Kuching, Sarawak during April-May, 1964. Samples were taken from Chinese shop-houses in the centre of the city in Kuching, a Malay Kampong (Kampong Pangkalan Kuap), 12 miles south of Kuching, and a Dayak Long House, 22 miles south of Kuching.

A total of 990 individuals were examined. Each specimen was dissected and searched for pentastomids under a dissecting microscope. The parasites were preserved in 5% formalin, subsequently stained with Alum Carmine, and mounted with Hoyer's mounting medium.

Results

The proportions of the house geckoes naturally infected with *Railietiella hemidactyli* are summarised in Table I according to localities where these lizards were caught. Table 2 summarises the comparisons between any two localities for the prevalence of *R. hemidactyli* in a given species of house gecko. The proportions of infected *G. mutilata* and *G. monarchus* appear to be not significantly different for all three localities. With the exception of the village and long house samples for *P. platyurus*, the proportions of infected *H. frenatus* and *P. platyurus* are significantly different for different localities.

Table I. The proportion of house-geckoes naturally infected with pentastomid

	Kuching Town	Malay Village	Long House
<i>Hemidactylus frenatus</i>	55/100	15/100	29/100
<i>Platyurus platyurus</i>	68/100	28/100	17/100
<i>Gehyra mutilata</i>	21/100	11/100	12/100
<i>Gecko monarchus</i>	6/30	3/30	1/30

Table 2: 2 × 2 contingency-table and Fisher's Exact Test for the prevalence of pentastomid in four species of house geckoes from three different localities

	Town vs Village	Town vs Long House	Village vs Long House
<i>Hemidactylus frenatus</i>	X ² = 33.43 p < 0.001	X ² = 12.83 p < 0.001	X ² = 4.92 0.05 > p > 0.02
<i>Platyurus platyurus</i>	X ² = 30.47 p < 0.001	X ² = 51.15 p < 0.001	X ² = 2.87 0.1 > p > 0.05
<i>Gehyra mutilata</i>	X ² = 3.01 0.1 > p > 0.05	X ² = 2.32 0.2 > p > 0.1	X ² = 0.05 0.9 > p > 0.8
<i>Gecko monarchus</i>	p = 0.16	p = 0.05	p = 0.25

Table 3 summarises the comparisons of the prevalence of *R. hemidactyli* in different species of the house geckoes in a given locality. For the town, the proportions of infected *H. frenatus* is not significantly different from *P. platyurus*, that of *G. mutilata* not different from *G. monarchus*. For the village, there are no significant difference between the proportions of infected *H. frenatus*, *G. mutilata*, and *G. monarchus*. For the long house, the proportion of infected *P. platyurus* is not significantly different

from *H. frenatus*, and *G. mutilata* is not different from *G. monarchus*.

The number of pentastomids present in various species of house geckoes from the three localities is summarised in Table 4. The majority of the geckoes studied does not harboured more than 5 pentastomids per individual, the mean being around 2.

Table 3. A comparison of the proportions of various species of house geckoes in different localities naturally infected with pentastomids (2 × 2 contingency-table or Fisher's Exact Test on figures given in Table 1)

	Town	Village	Long House
1. <i>Hemidactylus frenatus</i> vs. <i>Platyurus platyurus</i>	X ² = 3.04 0.1 > p > 0.05	X ² = 4.27 0.05 > p > 0.03	X ² = 3.42 0.1 > p > 0.05
2. <i>H. frenatus</i> vs. <i>Gehyra mutilata</i>	X ² = 23.11 p < 0.001	X ² = 0.40 0.7 > p > 0.5	X ² = 7.85 0.01 > p > 0.001
3. <i>H. frenatus</i> vs. <i>Gecko monarchus</i>	X ² = 9.99 0.01 > p > 0.001	p = 0.20	p < 0.001
4. <i>P. platyurus</i> vs. <i>G. mutilata</i>	X ² = 42.84 p < 0.001	X ² = 9.16 0.1 > p > 0.001	X ² = 0.65 0.5 > p > 0.3
5. <i>P. platyurus</i> vs. <i>G. monarchus</i>	X ² = 19.77 p < 0.001	p = 0.02	p = 0.04
6. <i>G. mutilata</i> vs. <i>G. monarchus</i>	X ² = 0.02 0.9 > p > 0.8	p = 0.26	p = 0.12

Table 4. Pentastomids found in various species of house geckoes caught in three different localities

	No. of infected geckoes	No. of worms recovered		No. of infected geckoes	No. of worms recovered		No. of infected geckoes	No. of worms recovered	
		x ± SD	Range		x ± SD	Range		x ± SD	Range
<i>Hemidactylus frenatus</i>	55	3.83 ± 2.56	1-11	15	2.45 ± 1.43	1-5	29	2.34 ± 1.32	1-5
<i>Platyurus platyurus</i>	68	2.11 ± 1.28	1-6	28	1.75 ± 0.84	1-4	17	1.94 ± 1.24	1-5
<i>Gehyra mutilata</i>	21	1.52 ± 0.68	1-3	11	1.45 ± 0.70	1-3	12	1.66 ± 0.67	1-3
<i>Gecko monarchus</i>	6	2.5 ± 0.98	1-5	3	1.67 ± 1.45	1-3	1	1	1

Discussion

Of the house geckoes, *H. frenatus* and *P. platyurus*, are found in houses but each has its own niche in the house and seldom occur together. They feed on moths, flies and other insects attracted by light to the ceilings and walls of houses. *G. mutilata* lives in darker places of the house and is more often found on the walls and ceilings outside houses. Whether this is due to niche exclusion remains to be affirmed. *G. monarchus* is common but less abundant. This gecko is found in the stores and in dark corners of kitchen inside houses. Unlike the other three species it seldom comes out in the open. Although it feeds on insects, it has also been found to be cannibalistic, feeding on other smaller geckoes.

It is obvious from the present study that the overall natural infections with pentastomid in *H. frenatus* and *P. platyurus* were higher than that of *G. mutilata* and *G. monarchus*. However, the fact that the latter two species were found naturally infected indicates that they are also susceptible hosts of the parasite. Although not stated specifically, Lavoipierre and Lavoipierre (1966) also found that of the 31 infected geckoes out of a sample of 100 in Singapore, the majority were *H. frenatus* and *P. platyurus*.

It is also significant that high prevalence of the parasite was found in *H. frenatus* and *P. platyurus* from the shop houses among the Chinese community. Whereas, the incidence of natural infection was relatively low in geckoes among the Malay and Dayak communities (see Table 2). The high prevalence in the shop houses may be attributed to the presence of favourable intermediate insect hosts, particularly the cockroaches which are abundant in these shop houses probably because of available food and probably also due to poor sanitation in these places. There is also no control of the insects infesting these shop houses. In the Malay Kampong and Dayak Long House, being dwelling places, there is a certain amount of sanitation taken by residents in these places and also that insect control are checked periodically by the Health Authorities. It is expected that the density of insects in these latter places is being kept at a low level, and may thus support the finding of low prevalence of the parasite among the geckoes in these two localities.

In contrast to *H. frenatus* and *P. platyurus*, no statistically significant difference has been demonstrated in the prevalence of pentastomid in *G. mutilata* and *G. monarchus* from different localities (see Table 2). Nonetheless, it is obvious from the raw data (Table 1) that the proportions of infected

geckoes are relatively higher in the Kuching Town compared with the two rural habitats. Whether this may be due to the greater abundance of potential intermediate insect hosts in the town area, and hence a greater chance of being parasitized, remains to be confirmed. It has only so far been established that the blattids serve as intermediate hosts of *R. hemidactyli* (Rajamanickam and Lavoipierre, 1965). It is not known whether there are other coprophagous insects serving as intermediate hosts. Nonetheless good sanitation will help cut down the spread of this pentastomid.

The important question arising from the infestation of geckoes with pentastomid and the cockroaches serving as the intermediate hosts, is: Is man susceptible to the pentastomid *R. hemidactyli*? As geckoes and cockroaches are intimately associated with Man, there is every possibility of these animals contaminating his food and other supplies. Existing literature shows that Man and other non-human primates can become infected by pentastomids, although so far limited to the genera *Porocephalus*, *Armillifer* and *Linguatula* (Self and Cosgrove, 1972). In Peninsular Malaysia, the Orang Asli (Malayan aborigines) have been found to be infected with *Porocephalus* nymphs (Prathap, Lau and Bolton, 1969). 10 out of 22 consecutive autopsies on adult Orang Asli above 20 years of age were found to be infected. A further 8 autopsies on Orang Asli below 20 years of age were free of the pentastomid. This report indicates that possibly food habit and multiple exposures are responsible for pentastomid infection. Both males and females are equally susceptible to infection. Further, Orang Asli living in jungle-fringe habitats shows higher incidence of infection probably due to food habit and occurrence of other animals (such as reptiles) which are parasitized by pentastomids. As Man takes other living organisms for food and many animals are commensals, it may prove fruitful to carry out a more detailed investigation concerning the relationships of pentastomids with Man.

Summary

990 house geckoes, belonging to 4 species from 3 localities in Sarawak, East Malaysia, were examined for pentastomid infection. The proportions of infected *Gehyra mutilata* and *Gecko monarchus* appear to be not significantly different for all three localities. With the exception of the village and long house samples for *Platyurus platyurus*, the proportions of infected *Hemidactylus frenatus* and *P. platyurus* are significantly different for different localities. The overall natural infections with pentastomid in *H. frenatus* and *P. platyurus* are higher than that of *G. mutilata* and *G. monarchus*.

These findings are discussed with respect to public health. The occurrence of pentastomid infection in Man is also discussed.

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Management of coarctation of the aorta in a neonate

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Introduction

Coarctation of the aorta which is a constriction that may vary from slight to complete occlusion and which can be located at any site, was first noted by Morgagni (Keith, Rowe and Vlad, 1966) in the 18th century. Since the first successfully treated cases by Gross (1945) and later by Crafoord (1945) resection in older children and adults have become the standard treatment. It's recognition in early infancy and the reluctance to operate on these sick infants, in non-cardiac and non-paediatric oriented centres still remain a significant contributor to the high mortality rate of this serious condition.

We wish here to present a typical case presenting in the neonatal period.

Case Report

M.S. is a 32-day old male child who presented with complaints of difficulty in respiration of 1 day's duration. 3 days previously he was noticed to have a mild cough. There was no other history of note.

At initial evaluation, he was found to be mildly febrile with a temperature of 37.4°C. There was marked tachypnoea: the respiratory rate was about 80-100/min. This was associated with intercostal and subcostal recession and nasal flaring. Examination of the chest revealed fine crepitations in both lung bases.

He had a pulse rate of 180/min. No differential cyanosis was noted. The heart was enlarged and there was an obvious heave. No thrills were palpable. Although his radial pulses were readily

palpable, the femoral pulses were either absent or very weak. Blood pressure measurement using the flush technique showed an upper limb systolic pressure of 110 mm Hg. while that in the lower limb was only 20 Hg. There was no obvious murmur heard in the precordium or back. The liver was about 1 cm. below the subcostal margin.

With these findings, a clinical diagnosis of coarctation of the thoracic aorta with associated congestive heart failure and pneumonia was made.

Arterial blood gas analysis showed the patient to be markedly acidotic. The chest x-ray done confirmed the cardiomegaly and pneumonia; there was no pulmonary oedema. Electrocardiograms showed marked right axis deviation and right ventricular hypertrophy.

The patient was started on crystalline penicillin, Digoxin and Lasix. He showed slight improvement initially but about 36 hours after admission, his condition deteriorated. More intensive therapy was instituted and when his vital signs stabilised, cardiac catheterization and angiography were performed. This revealed a right ventricular and pulmonary artery pressure of 56/8 and 55/28 mm of Hg. respectively. A size 5 NIH catheter was then passed from the right atrium through a patent foramen ovale into the left atrium and a left ventricular injection was done. This excluded the possibility of a VSD, PDA or hypoplastic left heart syndrome and confirmed the presence of the coarctation (Figs. 1 & 2).

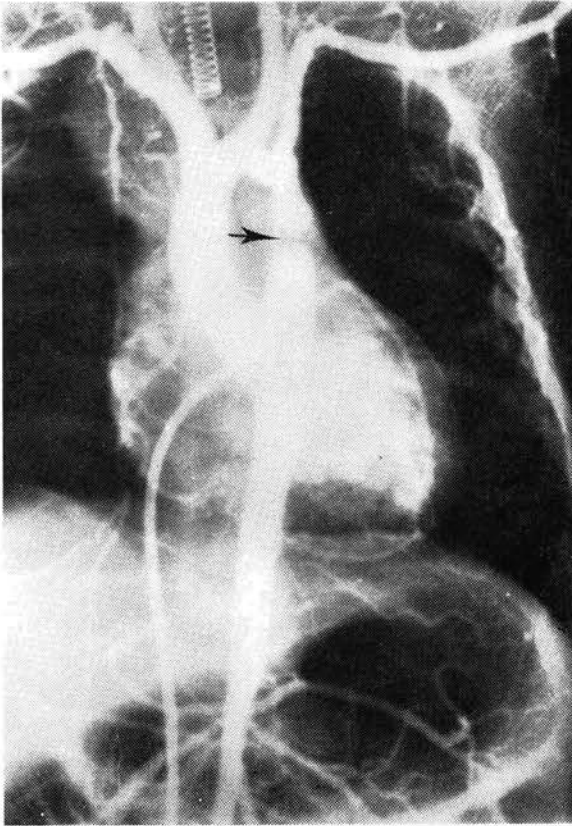


Figure 1: Aortogram AP view showing coarcted segment.

Under the same general anaesthetic, the patient was wheeled into the Operating Theatre where a left thoracotomy and a resection of the coarcted segment was carried out. The coarctation was found to be a preductal (infantile) type.

Post-operatively, he was electively ventilated for 36 hours, after which he was extubated and nursed in a head box. His post-operative course was uneventful and he was discharged well on the 14th post-operative day with no medications.

Discussion

The classical clinical features are easily elucidated if a high level of suspicion is present.

Congestive heart failure is the commonest feature in coarctation. Interestingly, coarctation is also the commonest congenital heart lesion to present with congestive heart failure; other conditions that may present with heart failure in infancy include large patent ductus arteriosus, ventricular

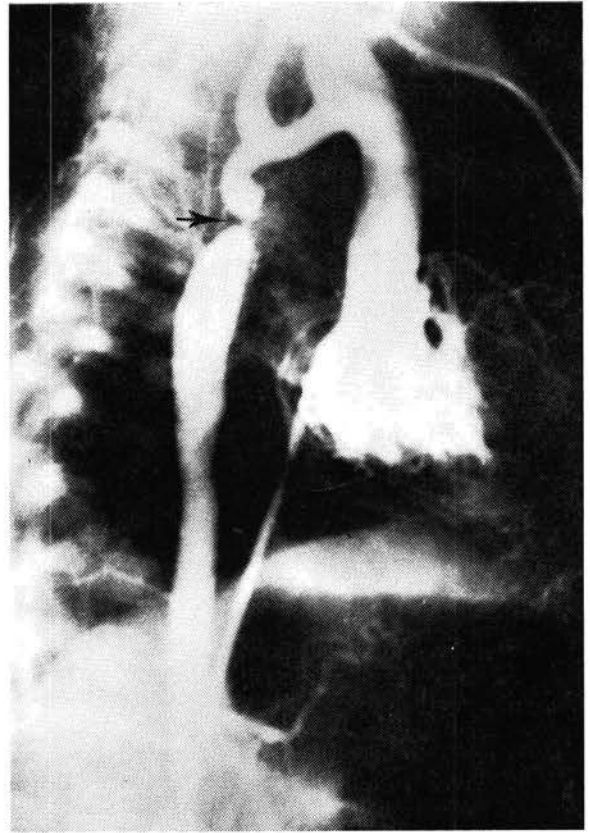


Figure 2: Aortogram: Lateral view.

septal defects, closed septum pulmonary stenosis or atresia, total anomalous pulmonary venous drainage and endocardial fibroelastosis.

In 75% of patients there is a blood pressure difference between the upper and lower limbs (Waldhausen, *et al.*, 1964). This can often be elicited by the "flush technique". A difference of 20 mm of Hg. has been accepted as suggestive of coarctation. This difference may not be evident when the child is in overt heart failure but as congestive heart failure improves, the pressure difference will become more obvious, hence the importance of a high level of suspicion and the value of repeated blood pressure measurements.

Apart from the blood pressure difference in the upper and lower limbs, examination of the cardiovascular system in these young infants is very unrewarding in lending support to the diagnosis of coarctation. A murmur across the coarctation and murmurs of collaterals in the back are often absent. In addition, the so-called classical differential cyanosis, is invariably non-existent.

Cardiomegaly as confirmed by electrocardiograms and chest x-rays is frequently present but is not specific to coarctation alone.

Infections, especially of the respiratory system is a common feature and one should be very wary of making the diagnosis of congestive heart failure secondary to pneumonia.

The most useful investigation is cardiac catheterization and angiography. Although the clinical diagnosis may be obvious, the surgeon must convince himself that he is not dealing with a hypoplastic left heart syndrome, which to this day is considered inoperable in many centres. He should also know if there is any other intracardiac anomaly, especially a ventricular septal defect which may require an initial temporary banding of the pulmonary artery before the aorta is cross-clamped for resection of the coarctation.

Anaesthesia is a tricky proposition in coarctation of the aorta in infancy. The management involves two stages – first for the emergency cardiac catheterization and angiography and then for the emergency surgical correction.

Pre-operative assessment of the patient is vital to assess the left heart failure and the respiratory status. Digitalization and diuretic therapy are usually necessary (Keith, Rowe and Vlad, 1966) and pre-anaesthetic IPPV might be necessary depending on the respiratory state. With the exception of Hyoscine, no other pre-anaesthetic medication is given. Conscious intubation is the safest procedure and non-depolarizing neuro-muscular blocking drugs e.g. curare can be administered intravenously.

The neonate is known to be sensitive to non-depolarizing agents and titrating, incremental doses of 0.25 mgm d-tubocurarine should be given; it is our impression that after two such intravenous doses (0.5 mgm total dose) 50-70% of all neonates are paralysed while all neonates should be paralysed after a third dose (0.75 mgm total dose). The N₂O/O₂/Relaxant controlled ventilation technique is the technique of choice.

During angiography, 5 mEq of Sodium Bicarbonate is given when the contrast is injected to cater for the metabolic acidosis which arises.

Operation is performed via a left postero-lateral thoracotomy through the 4th intercostal space. Rib resection is often unnecessary. The lung is displaced anteriorly and an incision is made in the mediastinal pleura over the upper descending

extended superiorly over the left subclavian artery. The superior intercostal vein is ligated and transected in the process.

The aorta is mobilised circumferentially, proximally and distally for as long a distance as is possible taking care not to injure the intercostal arteries, which are usually large and delicate.

Traction on umbilical tapes passed about the coarctation, elevates the aorta and allows placement of vascular clamps proximal and distal to the coarctation. The ligamentum arteriosus or ductus arteriosus is then ligated and the coarcted segment excised.

Primary anastomosis is then carried out using 5-0 prolene as a continuous posterior layer. A few interrupted sutures are used for the anterior surface. This combination of continuous and interrupted sutures facilitates rapid anastomosis with some reduction of the risks of re-coarctation as the child grows. Very infrequently, the coarctation involves a very long segment and primary anastomosis without tension may not be feasible. Under such circumstances, the use of a short segment of woven dacron graft, the use of the left subclavian artery or patch aortoplasty (or isthmoplasty) may have to be resorted to.

During thoracotomy the problems which may be encountered are as for any thoracotomy in a neonate, namely, haemorrhage (the incision tends to be more bloody because of collaterals) and hypothermia. Deliberate hypothermia can lead to problems in the neonate unless the team is tuned to, and experienced in, its use. If collaterals are not well developed clamping of the aorta can endanger thoracic aorta posterior to the vagus nerve and the spinal cord and kidneys, necessitating the use of hypothermia or even left atrio-femoral bypass. The use of deliberate hypotension to lessen haemorrhage can be a problem in the neonate.

Monitoring the neonate during anaesthesia is always a technical problem because of the small size of the patient. An oesophageal stethoscope is invaluable as evidenced in this case. At one stage after the resection of the coarcted segment and end-to-end anastomosis of the aorta, pressure was put on the suture line for haemostasis. A marked bradycardia was picked up by the oesophageal stethoscope indicating interference with the vagus nerve. On removing the gauze, the bradycardia promptly disappeared confirming the vagal problem.

The results of larger series (Waldhausen *et al.*, 1964, Hallman and Cooley, 1975) show that apart from the complications of a standard thoracotomy

of the prostheses are also major setbacks in their use (Kaltman, 1971; Hysten, 1972; Shaw *et al.*, 1974). These problems were found to be more pronounced in some disc-type valves (Lee *et al.*, 1974), when compared to the ball type. This led Roberts (Roberts, 1976) to conclude that the caged-disc type prostheses are the least desirable to use. In addition other incidences of postoperative complications have also been documented. Hemolysis, usually caused by paravalvular insufficiency is still a problem especially in the aortic position (Kaltman, 1971). Hemolysis though controllable in many cases can sometimes be serious as has been observed in some disc-type substitutes (Roberts *et al.*, 1975; Nitter-Hauge *et al.*, 1974). All mechanical prostheses are mildly stenotic and show appreciable transvalvular pressure gradients especially during exercise (Bristow and Kremkau, 1975). However this problem is least in the tilting-disc type though its hemodynamic superiority has not yet been fully established. Problems of sepsis, leak, dislodgement, infections and annular injuries have also been associated with mechanical prosthetic use (Kaltman, 1971; Bowes *et al.*, 1974).

More recent improvements in material and structural design have resulted in so called cloth-covered prostheses. These were first used in 1967 and allow endothelialisation. This markedly reduces the occurrence of thromboembolism (Bonchek and Starr, 1975). However other complications still exist. They include hemolysis (Lefemine *et al.*, 1974), obstruction across the prosthesis due to the added fabric material, higher infection rate and strut cloth wear (Wukasch *et al.*, 1975). The last of the above problems is now prevented in new models which contain a narrow metal track on the inner surface of each strut.

Hence though significant advances have been made in the development of mechanical prostheses, the major problems of thromboembolism and mechanical malfunction have yet to be eliminated. Thromboembolism is the most frequent and serious complication and it occurs in 5% to 30% of patients, depending on the type of prosthesis used and whether or not anticoagulant was adequately utilised.

Tissue Valves

Whereas mechanical prostheses have been used with a certain degree of success, the desire to develop an artificial valve that will simulate much of the in vivo functioning and flow conditions led to experiments with leaflet type tissue valve substitutes. Valves fashioned from biological tissues such as fascia lata, dura mater and parietal pericardium were tried. Aortic homografts, aortic heterografts and autologous pulmonary valve grafts were also used.

All of these tissue valve substitutes provide a central blood flow.

The use of fascia lata in the construction of a valve substitute was prompted by the initial work of McArthur (1901) and Gallie (1948) who demonstrated histologically that autologous fascia transplants resembled normal fascia even several years after transplantation.

Senning (1967) began the use of unsupported autologous fascia lata in aortic valve replacements in 1967 and subsequently others have experimented with either mounted or unsupported valves fashioned from fascia lata in the mitral, aortic and tricuspid areas (Ionescu and Ross, 1967; Joseph *et al.*, 1974; Petch *et al.*, 1974). The immediate results of the fascia valve substitutes were good and incidences of thromboembolism were low even in the absence of anticoagulant therapy. However long term follow up studies have demonstrated a high rate of valve failure resulting from the thickening and stiffening of the valve cusps. This is especially common in the posterior cusp of the mitral position (Petch *et al.*, 1974; Ross and Johnson, 1974). Hence fascia lata valves were found to be unsatisfactory after 1 to 2 years of use (Joseph *et al.*, 1974; Petch *et al.*, 1974). In fact a great number of surgeons have abandoned the use of fascia lata valves. Reports on the viability of autologous fascia lata valves after use have indicated that tissue changes do occur and this could result in the observed valve failure (Lincoln *et al.*, 1971; Silver and Trimble, 1972).

Recently preserved bovine pericardium has been tried as a material for the construction of an artificial tissue valve. Ionescu *et al.* (1974) reported reasonable results after a 3 year follow up study, and suggested that preserved pericardium has the potential qualities for use in a heart valve substitute. The apparent success of the latter and the almost complete failure of fascia lata led some clinicians and scientists to suspect that the tissue mechanical properties might be an important factor in determining the success or failure of the material used for constructing a tissue valve substitute. On this, a series of papers have been published by Lim and Boughner (1975, 1976, 1977) on the elasticity of normal natural valvular tissues. Their findings might be of use to those interested in the fabrication of tissue or leaflet type valve substitutes from different materials, be they of biological or synthetic origin.

The clinical application of aortic valve homografts was initiated by Ross (1962) and Barratt-Boyes (1964) in the subcoronary position after Murray (1956) demonstrated the long term function of the aortic homograft in the descending thoracic aorta of

dogs. Since these early attempts, surgeons in different medical centres have tried using the same grafting technique with fresh as well as preserved and sterilised aortic valve homografts and heterografts obtained from pigs, calves and sheep. (Ross and Johnson, 1974; Wallace, 1975). Hospital mortality and incidences of thromboembolism were low and good performance was observed in the early postoperative period. However with a longer follow-up, the incidence of valve failure resulting from rupture and tearing of cusps increased. In some, the cusps became stiff and relatively immobile. Calcification of the aortic wall was also common (Wallace, 1975). Use of mounted aortic homografts for replacement in the mitral position has also been disappointing (Ross and Johnson, 1974). One group reported that only 50% of patients were alive with a well functioning valve at the end of 5 years. (Graham *et al.*, 1971). Hence at present little enthusiasm exist for using aortic homografts in the atrioventricular positions.

Though Kosek *et al.* (1969) have reported the presence of viable cells 5 years after implantation of fresh valve grafts, the difficulty in procuring fresh and sterile tissue, limits the wide application of fresh valve grafts; therefore valves sterilised and stored in various types of antibiotics are used. A recent study of these treated valves (McGregor *et al.*, 1976) indicated that of the 23 human aortic valves studied, only 3 showed any evidence of viability. These valves were antibiotic sterilised and stored for varying periods of time before examination. This report therefore casts doubts regarding the viability of the homograft valves used. Hence it appears that tissue deterioration will occur and this will lead to eventual valve dysfunction, the major problem in the use of tissue valves. In spite of this, tissue valves are still in use because of the advantage of the very low incidences of thromboembolism. Of all the valve grafts tried, porcine xenografts appear at present to have the least problem and hence its use is now increasing (Roberts, 1976). The porcine xenograft is attached to a semiflexible stent and preserved by a glutaraldehyde process.

The presence of degenerative changes in aortic homografts prompted Ross (1967) to use the patient's own pulmonary valve for replacing the diseased aortic valve. The removed pulmonary valve was replaced by an aortic homograft. The use of autologous pulmonary graft has also been tried in the mitral position (Ross, 1967). This procedure however has been associated with a higher operative mortality rate and hence is not popular. Mounted pulmonary homograft has also been tried in the mitral position without success (Ross and Johnson, 1974).

Hence, though all tissue valve substitutes are associated with low incidences of thromboembolism, are atraumatic to blood cells and have good hemodynamic performance, the greatest problem of eventual tissue failure is still unresolved and hence their long term fate is uncertain.

Conclusion

At present it is apparent that an ideal valve substitute is still not available, and there is still no general consensus as to which of the currently available cardiac valve prostheses is the best. They all give comparable survival rates and while one prosthesis might be superior in certain characteristics, it is also inferior in others. The different types of prostheses all have problems associated with their use and solutions to these problems are not in sight, though progress is good.

Before a defective heart valve is replaced with an artificial device, it is pertinent for the clinician to evaluate the chances and duration of survival if the diseased valve be allowed to take its natural course against the risk and complications associated with a prosthetic valve replacement. Present evidences certainly do not warrant valve replacement for all detected defective valves.

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Bone in anal canal causing acute anal pain

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Introduction

BONE stuck in the anal canal causing acute anal pain is not an uncommon occurrence seen in general practice, especially among the Chinese, whose dietary habit and customary use of chopsticks in eating require the chopping up of meat and fish into small pieces together with bones, which are often fragmented pieces, easily swallowed by accident. However, so far as is known to the author, it is surprising that it has not been documented or mentioned anywhere in available literature to make it seem such a rarity. References and reports of unusual foreign bodies in the rectum have been made but not of bones in the anal canal (Mohan Lal 1975, Rains and Capper 1965).

In this paper, the author takes the opportunity to illustrate the condition by reporting 3 cases which he encountered recently in his general practice within a period of about 3 months.

Case 1.

L.P.S., a 19-year-old Chinese school boy, came with the complaint of a severe anal pain following an early morning diarrhoeal bowel motion. The pain was aggravated by walking and sitting. In fact, when the patient was invited to sit in the author's consulting room, he sat slowly and carefully down on to the edge of the chair, adopting a posture commonly seen in patients with prolapsed haemorrhoids or perianal abscess. There was no history of haemorrhoids or similar pain previously. A digital examination per rectum revealed a piece of bone (Fig. 1a), the size and shape of a match-stick and measuring about $1\frac{1}{2}$ inches long, stuck transversely across the anal canal about $\frac{1}{2}$ inch above the anal verge. It was removed by hooking the index finger around it and breaking it in the middle. On ques-

tioning, the patient admitted to have swallowed a piece of fish bone by accident the previous night.

Case 2.

W.S.O., a 45 year-old Chinese labourer, who had been to a wedding dinner the previous night, presented with an acute anal pain following defaecation and asked to be treated for piles which he thought he had. Like Case 1, the pain was aggravated by movement and he could not sit squarely on his chair. Though he had a history of piles he had been free from it for the last couple of years. His stools was loose and soft. On examination, an irregular piece of bone (Fig. 1b), about $\frac{1}{2}$ inch thick and $1\frac{1}{4}$ inches long, was felt striding across the anal canal at the level of the dentate line. Removal of the bone was achieved by stretching the anal wall sideway at one end of the bone with a finger, thus releasing it, and turning it longitudinally, it was extracted.

Case 3.

K.E.B., a 50 year-old Chinese labourer, had a history of acute onset of severe anal pain following defaecation, thought it was due to piles and self-treated himself as such. He only came on the second day, when the pain became unbearable. Walking, sitting, and even lying down was a torture. The stools had been soft and normal, and there was no history of anorectal disease. Per rectum examination showed a piece of bone (Fig. 1c), pointed at both ends, measuring about $\frac{1}{3}$ inch thick and $1\frac{1}{3}$ inches long, stuck across the lower portion of the anal canal. Removal was difficult because of pain and anal spasm. It was dislodged digitally into the rectum, picked up and removed with a pair of forceps through a protoscope.

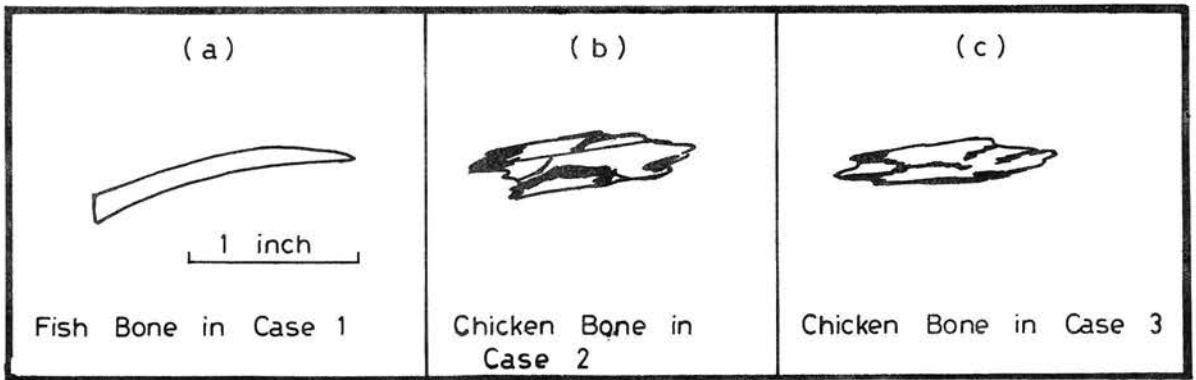


Figure 1

Discussion:

It is astonishing to realise how a piece a bone swallowed by accident could survive journeying through over 30 feet of the alimentary canal and has to get stuck at its last inch or so of its journey in the anal canal. Nevertheless, it does happen and not infrequently too, and in the author's experience, it ranks with prolapsed haemorrhoids, perianal abscess, thrombotic piles, fissure-in-ano, and acute proctitis as one of the commonest causes of acute anal pain seen in general practice, in a Chinese dominated rural community. Needless to say it must always be considered in any acute anal pain especially when the patient is a Chinese.

Usually the history is suggestive — the acuteness of the onset of the anal pain during or following defaecation, the nature of pain being aggravated by

movements, the loose, soft, or diarrhoeal stools, and the absence of previous history of anorectal diseases. In fact the author diagnosed the 3 cases from history alone, and in each case he told the patient the diagnosis before the PR examination.

A study of the anatomy and function of the anal canal will perhaps help to understand how the bone can get stuck in the anal canal.

The anal canal is the last inch or so of the alimentary canal and functions as an important gateway for the control and regulation of defaecation. It is equipped with a powerful set of sphincteric apparatus (Fig. 2) which consists of the anorectal ring, the internal anal sphincter, and the external anal sphincter.

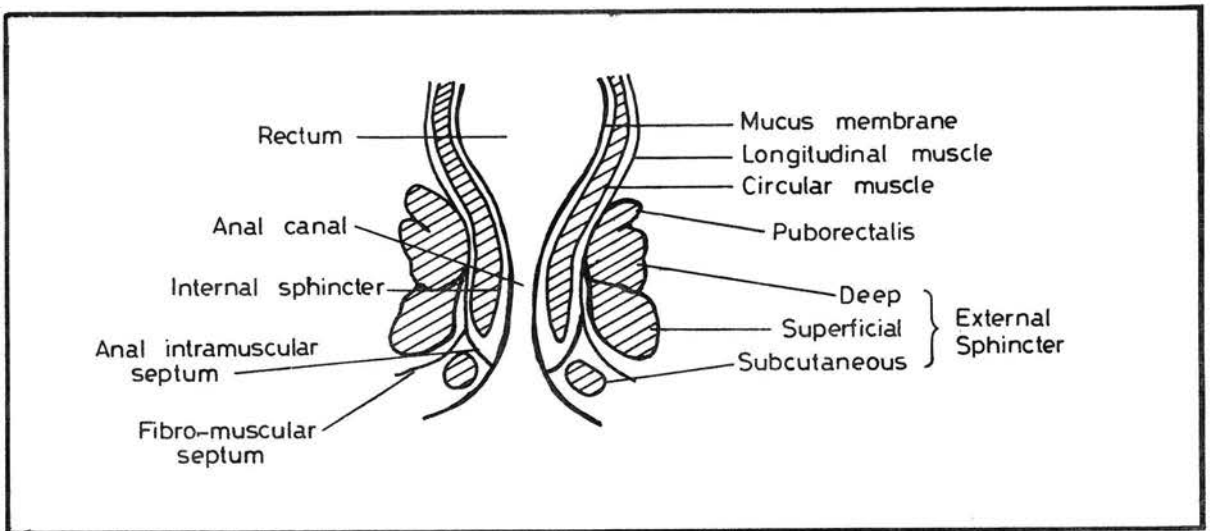


Figure 2: The Anatomy of the Anal Sphincteric Apparatus.

The anorectal ring is formed mainly by the pubo-rectalis which slings the upper end of the anal canal forward in its attachment to the pubic symphysis anteriorly (Fig. 3) thereby angulating and narrowing the anal rectal junction which serves as an efficient bottle-neck stop-gap in faecal movement until defaecation is necessary. This function of the pubo-rectalis forming the anorectal ring is fortified by the fusion to it of the internal anal sphincter, the external anal sphincter and the conjoined longitudinal muscle. It is supplied by the sacral nerves 3 and 4.

The internal anal sphincter is the thickened continuation of the rectal circular muscle. It is supplied by the autonomic nervous system and its action is involuntary.

The external anal sphincter (with its 3 portions- deep, superficial, and subcutaneous) forms like an umbrella around the anal canal. It is supplied by the sacral nerves 3 and 4 and is subjected to voluntary conscious control.

The anorectal ring, the internal anal sphincter, and the external anal sphincter are all braced together by the longitudinal muscle, which traverses through and sends fibres to them on its way to its attachment to the perineal and anal skin.

Normally the anal canal stays closed by the angulation of the anorectal junction and the tonic contraction of the sphincters. When the pressure in the rectum increases as faeces accumulates in it, the internal anal sphincter involuntarily relaxes and there is an impelling urge to defecate. However, defaecation can be controlled and delayed at will by the contraction of the external anal sphincter.

In the act of defaecation, a squatting or sitting position is adopted, and an increased intra-abdominal pressure is developed by the closure of the epiglottis, lowering and fixing of the diaphragm, and the contraction of the abdominal muscles giving the "bearing down" action. This relaxes the anorectal ring and the external anal sphincter, and the faeces is expelled by the enormous intra-abdominal pressure. As the "bearing down" action ceases, when one stops to catch his breath, the sphincters (particularly the external anal sphincter) either contract by themselves or are caused to contract voluntarily to chop off a column of the faeces. The "bearing down" starts again and the whole process is repeated until all the faeces is evacuated from the rectum.

Thus during the act of defaecation, the bone in its final journey out of the anal gateway can get stuck in the anal canal through two chanced occurrences.

1. In between the periods of "bearing down" in the expulsion of the faeces, the chopping off of the column of faeces by the contraction of the sphincters could by chance catch the bone in its transverse position as it travels out of the anus and thus cause the bone to get stuck.
2. The mucus membrane of the anal canal above the dentate line is supplied by the sympathetic nerves and is relatively insensitive. The mucus membrane below the dentate line, the anoderm, is supplied by the cerebrospinal nerves (the inferior haemorrhoidal nerves) and is exquisitely sensitive. It is possible and probable that the bone travelling through the anal canal during defaecation may prick the sensitive

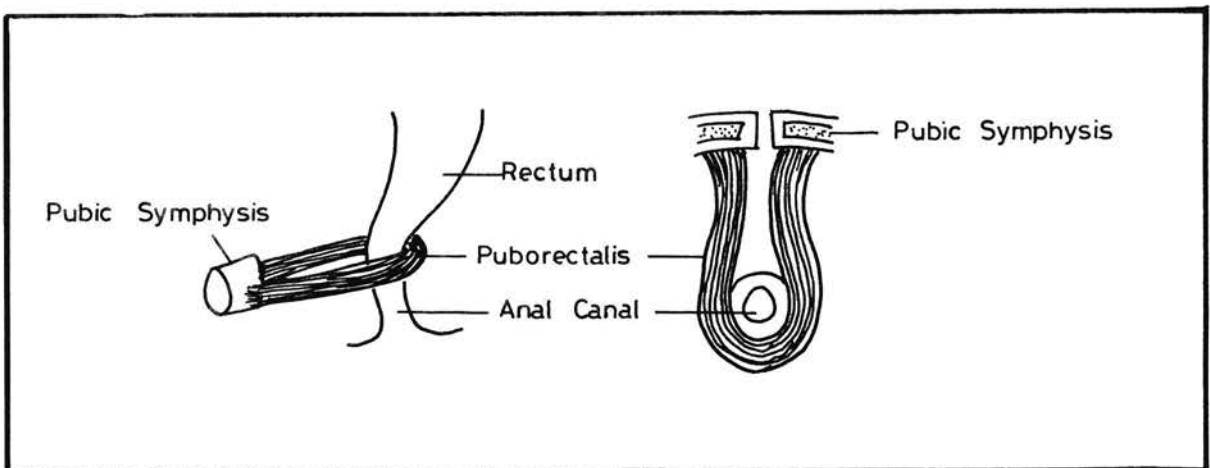


Figure 3: Puborectalis Muscle Sling.

anoderm causing spontaneous involuntary spasm of the internal sphincter which may catch the bone in its transverse position.

In either occurrence, pain causes more muscle spasm, and more muscle spasm causes more pain, thus starting the vicious cycle, and the bone becomes firmly stuck in the anal canal, gripped by the powerful muscle contraction.

It is observed that bone stuck in the anal canal usually occurs when the stool is loose, soft, or diarrhoeal. It is likely that when the stool is firm or hard, the bone, enveloped in it, is protected from the muscle contraction. It is also likely that the firm or hard faeces can propel the bone out, even if it gets stuck, during the forceful act of defaecation. It is deduced from this that perhaps many cases of anal tears and fissures-in-ano could be caused by this forceful expulsion of stuck bone in the anal canal.

Conclusion.

A knowledge that acute pain can often be caused by a piece of bone stuck in the anal canal will make one alert to the possibility in every case of acute

anal pain especially when the patient is a Chinese. A general practitioner practising for several years in a Chinese dominated community, who has never seen a case of acute anal pain caused by a piece of bone in the anal canal, has probably never known or thought of it as possibility and has probably never ever done a PR examination. The diagnosis of bone stuck in the anal canal and the almost instant relief of pain in its removal can be so satisfying not only to the patient but also to the doctor, considering the amount of praises and thanks he usually receives.

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Structural features of mammalian muscle spindles

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Introduction

MUSCLE SPINDLES are proprioceptors found within skeletal muscle. They serve to perceive the tension of the muscle in order to regulate the tone, posture, and accuracy of fine movements of the muscle. They consist of intrafusal muscle fibres, which are smaller than extrafusal or ordinary muscle fibres, enclosed by a sheath of connective tissue known as the capsule, and are supplied by afferent (sensory) and efferent (motor) nerve fibres.

Historical aspects

Muscle spindles have attracted the attention of many investigators for more than one hundred years. Kuhne (1863) was the first investigator who labelled this structure as "Muskelspindeln" because of its fusiform shape. Sherrington (1894) referred to muscle fibres within spindles as intrafusal fibres, possessing equatorial and polar regions, towards the centre and periphery of these fibres respectively. The periaxial space of Sherrington was the term used to describe the space separating the axial bundle of intrafusal fibres from the capsule of the spindle.

Ruffini's elegant descriptions (1893-1897) of the innervation of muscle spindles still stand out as valid observations till today. He described three types of nerve endings - namely primary or annulo-spiral endings at the mid-equatorial region; secondary or flower-spray endings away from the equatorial region; and plate endings towards the extreme ends of the fibres. He considered all these three nerve-endings to be sensory in function. It was later shown that the first two were sensory endings, but plate endings were motor in function. To the latter has been added trail endings - another ending with

a motor function. Boyd (1956), and Cooper and Daniel (1956), separated the intrafusal fibres into two types, based on their morphological features, and labelled them as nuclear-bag and nuclear-chain fibres. More recent investigators have focussed their attention on the ultra-structural features of the muscle spindle, and this paper summarises the present-day understanding of these features.

Terminology

The terms used to orientate the intrafusal fibres are the equatorial region in the centre, and the polar region towards the periphery. The equatorial region is sub-divided into the mid-equatorial region at the centre of the equatorial zone, and the myotubular region which is the distal equatorial zone. The polar region is sub-divided into the juxta-equatorial or the proximal polar zone, and the polar or distal polar zone.

Capsule

a. Outer or External Capsule

This is the connective tissue covering of the spindle. It stands away from the intrafusal fibres, and the space thus formed is the periaxial space of Sherrington which is rich in hyaluronic acid. The capsule is pierced by blood vessels and nerves. The capsule has been described to be composed of collagen fibres, and concentric sheets of cells which are regarded as specialised fibroblasts by Merrileas (1957, 1960). Landen (1966) believes that these cells are thin, flattened, pavement epithelial cells. The nerves entering the spindle pierce the capsule almost at a right angle, and the perineurium of these nerves

blends with the capsule. The capsular cells show a prominence of micropinocytic vesicles of varying size, thus implicating the capsule in the major role of transport and providing nutrition to the spindle fibres.

b. **Inner or Internal Capsule**

Each intrafusal fibre is enclosed by a delicate tube known as the internal capsule or the internal axial sheath. This sheath has sparse fibrous material, but an abundance of cells of various types. The internal capsular cells are, however, smaller than those of the external capsule. The main cell type is the fibroblast. The internal capsule forms a link between the outer capsule and the intrafusal muscle fibres.

Intrafusal fibres

The number of intrafusal muscle fibres varies from one to fourteen. The nuclear-chain fibres outnumber the nuclear-bag fibres. However, the author has reported muscle spindles in the lumbrical muscles of the Malaysian long-tailed monkey (proceedings of the Fourth All-Indonesian Congress of Anatomy in Jakarta – Dec. 1976) possessing well over twenty-four intrafusal muscle fibres. The features of the nuclear-bag and nuclear-chain fibres are outlined below.

Nuclear-bag fibres

These fibres were labelled as nuclear-bag fibres because they contain several closely-packed nuclei in the equatorial region. The fibre shows a swelling where this "bag" of nuclei is found. They are larger in diameter, and longer than nuclear-chain fibres, and at the poles of the spindle, they pass out of the capsule to lie among extrafusal muscle fibres, being attached to the endomysium or perimysium of the muscle. Some, or all, of the nuclear-bag fibres may be re-encapsulated, after passing out the capsule, so that two or more spindles in tandem occur.

At higher magnifications, the contractile elements, at the polar region, resemble those of extrafusal fibres, possessing A bands, I bands, and Z bands. As the myotubular region is approached, no discrete myofibrils are seen, and instead a single bundle or a sheet-like arrangement of myofilaments is observed. The I bands become difficult to distinguish, and the Z band thins out. At the equatorial region, only A bands and Z bands are seen. There are no M bands, and the H bands are indistinct. At the mid-equatorial region, the striations are replaced by dense bodies. Thus, these fibres show a transition of contractile units to only A, Z, and I bands, and then to A bands and dense bodies only.

Nuclear-bag fibres also possess specialised junctional complexes which are comparable to the nexus found in smooth muscle, or the intercalated disc found in cardiac muscle. These trilaminar membranous structures are found at the junction of polar and equatorial regions.

The sarcoplasm of nuclear-bag fibres contains glycogen granules, which occur as larger sized alpha granules arranged in rosettes, and Beta granules occurring singly. The sarcoplasmic reticulum and transverse tubular system is not conspicuous.

Nuclear-chain fibres

These fibres were so-named because they contained a single longitudinal row of nuclei in the centre of the fibre. They are smaller in diameter when compared to nuclear-bag fibres, shorter in length, and tend to be entirely intracapsular, being attached at the poles of the spindle to the capsule or the sheath of nuclear-bag fibres. They also outnumber the nuclear-bag fibres.

At higher magnifications, the myofilaments are seen to be closely-packed and well-defined. A, I, Z, H, and M bands are clearly defined at both polar and equatorial regions. They tend to have larger and more numerous mitochondria when compared to nuclear-bag fibres. Intercellular bridges are seen where adjacent nuclear-chain fibres touch each other. Micro-ladders, which are believed to arise from nuclear activity, and indicate the beginning of fibre growth in width, and length, are found only in nuclear-chain fibres.

The sarcoplasmic reticulum and transverse tubular system are well-formed, and a variety of couplings like dyade, triads, tetrad, etc. are seen. The sarcoplasmic reticulum also displays dilated cisternae in the centre of sarcomeres. Glycogen particles are also seen abundantly in the vicinity of the sarcoplasmic reticulum dilatations, where mitochondria are also observed intimately related to these terminal cisternae or dilatations.

Conclusion

It can be seen that nuclear-bag and nuclear-chain fibres in muscle spindles have profound differences in structure – both at the light and electron microscopic level. This structural dichotomy of intrafusal muscle fibres must necessarily be a reflection of the different physiological roles, each type of fibre has to play in the functioning of the muscle spindle as sensitive stretch receptors.

SUMMARY OF STRUCTURAL FEATURES

Feature	Nuclear-Bag Fibre	Nuclear-Chain Fibre
Number	Fewer	More
Diameter (at mid-point)	Greater diameter-average 20 – 30 microns	Smaller diameter-average 10 – 15 microns
Length	Greater length-average 4 – 8 mm. – extend beyond capsule	Shorter length-average 2 – 4 mm. – entirely intracapsular
Nuclei	Arranged in a cluster or “bag” in equatorial region	Single longitudinal row in centre of fibre
Contractile elements	Transition of contractile units to only A, I, and Z bands, and then to A bands and dense bodies Sheet like arrangement of myofilaments	Well-defined A, I, Z, and H bands. Dis- crete arrangement of myofilaments
H bands	Ill-defined	Well-defined
M bands	Absent or ill-defined	Present
Sarcoplasmic reticulum and transverse tubular system	Poorly-developed	Well-formed, variety of couplings like dyads, and triads
Triads	If present, at junction of A and I bands	Within A bands
Mitochondria and oxidative enzyme levels	Lower content of mitochondria and oxida- tive enzymes	Larger and more numerous mitochondria High oxidative enzyme content e.g. Succinic dehydrogenase and mitochondrial ATP-ase
Type of contraction	Contract slowly	Contract rapidly
Function	Dynamic response (position and velocity sense of a rapidly adapting nature)	Static response
Junctional complexes	Present	Absent
Intercellular bridges	Absent	Present
Microladders	Absent	Present
Myoglobin	Myoglobin-rich	Myoglobin-poor

Acknowledgement

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Membranous glomerulonephritis and chronic hepatitis

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Introduction

THE ASSOCIATION between chronic hepatitis and glomerulonephritis (GN) has recently been described¹⁻⁴. We report two Malay patients with chronic hepatitis and membranous glomerulonephritis.

Case 1

M.F. a 47 year old Malay man was admitted to University Hospital after 7 months of intermittent swelling of the body. He had absolutely no other symptoms and no other previous illness. He had been a newscaster for 20 years in the Middle East and returned to Malaysia 4 years before his illness.

On admission, he had marked oedema of the legs up to the groins and gross ascites. There was no facial oedema, jaundice or spider naevus. He was afebrile, pulse was 92/minute and BP was 140/110. Soft small lymph nodes were palpable in the neck and both axillae.

The blood count was normal. ESR was 110 mm in the first hour, prothrombin time was 100%. Urine microscopy showed a few granular, hyaline and fat casts. 24 hour urine contained 15.3 grams protein. Serum albumin was 1.2 gram/100 ml, globulin 3.2 gram/100 ml. SGPT was 10 IU/100 ml, SGOT 10 IU/100 ml, alkaline phosphatase 87 IU/100 ml, total bilirubin was 0.3 mg/100 ml, cholesterol 860 mg/100 ml, urea 22 mg/100 ml, serum creatinine 0.8 mg/100 ml. Electrolytes were normal, LE cells were negative on 3 occasions. Serum hepatitis B surface antigen and antibody were positive. Rectal biopsy was negative for schistosoma and amyloid.

Stools contained no ova. Intravenous urogram showed that the left and right kidneys were 14.5 cm and 14.0 cm respectively. There was notching of the left ureter and left renal vein thrombosis was confirmed by venography. Renal biopsy showed diffuse thickening of glomerular capillary walls, without increase in cellularity. Spike-like epimembranous projections of the basement membrane were present in sections stained with periodic acid silver methenamine and there were epimembranous deposits in sections stained with Masson's trichrome stain. Electron microscopy showed widespread epithelial foot-process fusion and many epimembranous electron dense deposits beneath the epithelial cell cytoplasm with extension of basement membrane material between the deposits (Fig. 1). Immunofluorescence showed IgG, IgM, IgA, IgD and IgE in a granular pattern along the glomerular basement membrane, and in the mesangium. In addition there were granular deposits of hepatitis B surface antigen (HBs Ag). (Fig. 2).

After the ascites subsided, a firm smooth liver could be felt 4 cm below the right costal margin and the spleen was palpable (1 cm) below the left costal margin. Needle biopsy of the liver revealed a macronodular cirrhosis with chronic active hepatitis. Some of the hepatocytes showed "ground glass cytoplasm" and these cells were positive to Shikata's orcein stain. Immunofluorescence studies confirmed the presence of HBs Ag in the cytoplasm of hepatocytes (Fig. 3).

Case 2

K.S. was a 24 year old Malay woman who was referred with a diagnosis of lupus nephropathy.



Fig. 1. Case 1. Electron micrograph of glomerular capillary wall showing thickening of the basement membrane and epimembranous electron dense deposits. $\times 10,000$.

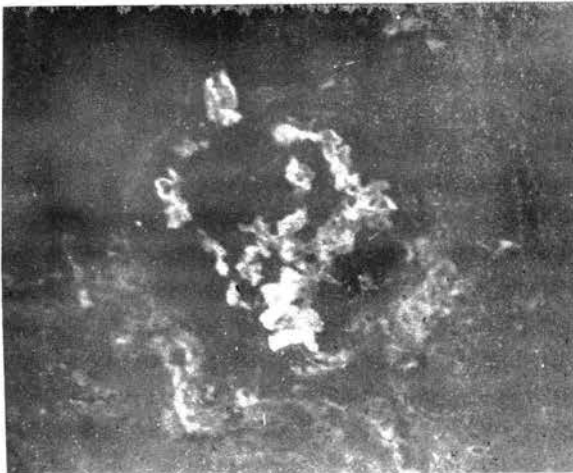


Fig. 2. Case 1. Indirect immunofluorescent staining for HBs Ag shows granular to lumpy deposits along the glomerular capillary wall. $\times 300$.

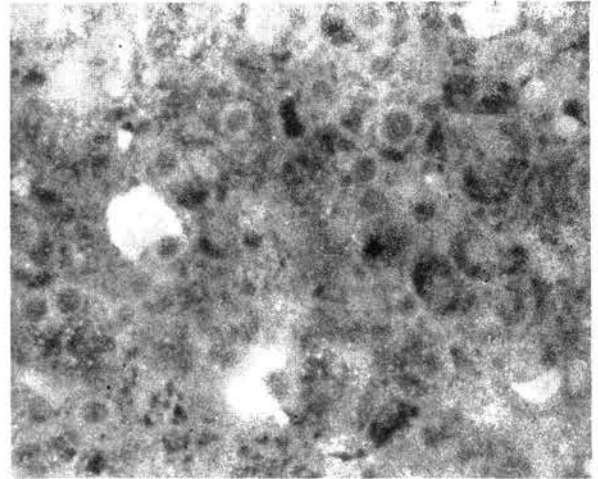


Fig. 3. Immunofluorescence of liver showing hepatocytes with HBs Ag in cytoplasm. ($\times 100$).

The illness began with a short episode of fever and painful swelling of both elbows and the left knee, with an erythematous rash on the skin. This was followed, 10 weeks before admission, by progressive swelling of the legs and abdomen. She also had non-productive cough, increasing alopecia, loss of axillary and pubic hair and amenorrhoea for 4 months.

On admission the temperature was 37.5°C , pulse 86/minute and BP 140/85. She looked ill and was edematous and pale. There was no rash or jaundice. There was alopecia, the axillary and pubic hair was absent and the breasts were small. Heart and lungs were normal. The abdomen was distended with ascites and the liver had a span of 19 cm. It was firm but not tender. The spleen was just felt. Rectal examination was negative. She had 1-3 cm soft axillary and cervical lymph nodes. Central nervous system and the joints were normal.

Haemoglobin was 8.6 gm/100 ml, haematocrit 27%, total white $7,500/\text{mm}^3$ with normal differential count. Platelet count was 298×10^3 per mm^3 , reticulocyte count 1.9%. ESR was 25 mm in the first hour. LE cells was negative repeatedly. Serum C_3 was 20 mg/100 ml and C_4 was 10 mg/100 ml. Prothrombin time was 100%. There was no abnormal haemoglobin on electrophoresis. Blood film for malarial parasite was negative three times. Coombs test was negative. Urine contained 3 red blood cells and 20 white cells with an occasional granular and hyaline cast in each high power field. 24 hour urine protein was 4.4 gm. Serum protein was 6.0 gm/100 ml and albumin 1.5 gm/

100 ml. SGOT was 66 IU/100 ml, SGPT 2 IU/100 ml and alkaline phosphatase was 280 IU/100 ml. Bromsulphthalein test showed a retention of 14% in 45 minutes. Serum cholesterol was 220 mg/100 ml, urea 32 mg/100 ml, creatinine 0.7-0.9 mg/100 ml, fasting glucose 100 mg/100 ml, uric acid 9.5 mg/100 ml and electrolytes were normal. Plasma estrogen, protein bound iodine and cortisol levels were normal. Widal and Weil-Felix and VDRL were negative. Serum for HBs Ag and antibody were negative by counter immunoelectrophoresis. Chest and skull x-ray, blood and urine cultures were normal.

Needle biopsy of liver revealed chronic active hepatitis with progression to cirrhosis. The liver cell plates were hyperplastic and showed acinar formation. Some of the hepatocytes showed giant cell transformation. Orcein positive hepatocytes were not found in sections stained with Shikata's stain.

As in patient 1, the renal biopsy showed features of epimembranous nephropathy on light microscopy and this was confirmed by electron microscopy. In addition some of the endothelial cells contained virus-like microtubular structures (Fig. 4). Immunofluorescent studies were not done.

Comments

Alpert et al showed that the circulation of viral hepatitis antigen antibody complexes may give rise to fever, rash, joint pains and variable proteinuria as in serum sickness⁵. In some patients, this phase passes unnoticed and they present with the characteristic features of viral hepatitis. Others only present with cirrhosis and its complications⁶. Our first patient had no clinical sign or symptom of the liver disease and only presented with nephrotic syndrome. The other patient developed serum sickness like illness and membranous glomerulonephritis, probably from Hepatitis B infection.

It is now well accepted that membranous GN and the various forms of proliferative GN are the result of inflammatory changes associated with the deposition of immune complexes in the kidney. Since HBs Ag and antibody circulate as immune complexes it is not surprising that this can result in the development of membranous GN, as in our two patients. Indeed Brzosko et al found that only membranous GN and proliferative GN stained positive for HBs Ag whereas minimal change GN which is not associated with immune deposits, did not⁷.

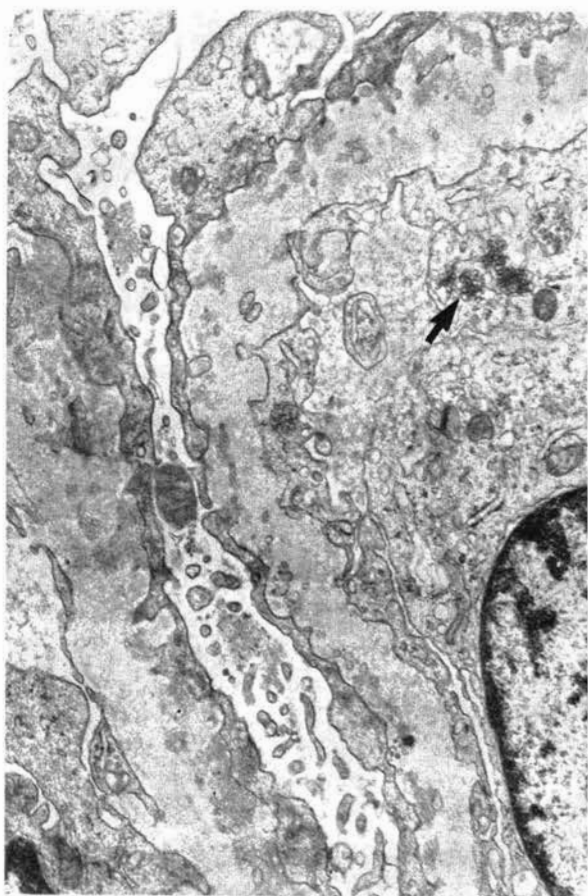


Fig. 4. Case 2. Electron micrograph of glomerular capillary wall showing irregular thickening of basement membrane and electron dense deposits. Virus-like microtubular structures are present in an endothelial cell (arrow). $\times 11,200$.

It is now realised that the prevalence of positive hepatitis B surface antigen and antibody serum is high in the tropics⁸ and orient^{9,10} and if this reflects the incidence of chronic hepatitis viral infection, one would expect that HB or non-HB viral infection would be a more common cause of GN in our community than has been hitherto recognised.

Summary

Two Malay patients presented with ascites and proteinuria and were found to have membranous glomerulonephritis and chronic active hepatitis. In countries where the prevalence of viral B hepatitis is high, this may be an important cause of glomerulonephritis.

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Prompt Pointers to the aetiology of male urethritis

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Introduction

GENERAL PRACTICE is perhaps the only discipline in the practice of modern medicine that expects its Practitioner to make a prompt and reasonably accurate diagnosis after each Clinical Examination. Oddly enough this expectation is not only from the unenlightened general public but also from his colleagues in Institutional Practice. When a patient enters Hospital he does not expect an immediate diagnosis, but when he alights from a General Practitioner's couch, however, he expects one. How these double standards (indeed rightly a reversal of standards) of expectation evolved and have come to stay, are as much an enigma as are the constellation of questions that a General Practitioner has to answer after a consultation, especially as he is already considered "only a General Practitioner" and to compound it, he normally does not have any microbiological services in his Clinic in most instances. Short of being a "Bionic Doctor" with x-ray eyes and oil immersion lenses, he has to, in honesty, say most of the time, "I really don't know but I think" It is in this unfortunate milieu that the General Practitioner works in developing Countries, and this study was launched with the twin objectives of evaluating prompt pointers to an early and reasonably accurate diagnosis of the aetiology of male urethritis as well as to examine the age old concept of the General Practitioner, that all urethral discharges are gonococcal unless treatment fails or they recur.

Urethritis, characterised by symptoms of dysuria and or urethral discharge is a condition seen not uncommonly in General Practice. The differential diagnosis of this condition would include gonococcal

urethritis, Non Specific Urethritis, candidiasis, trichomoniasis, traumatic urethritis, chemical urethritis, urethral syphilis and chancroid. Whilst culture of suitable specimens is the unequivocal answer to a proper diagnosis, this is often impossible if not impracticable. Furthermore, as treatment for each of the above conditions is different it is important that a diagnosis, as accurate as possible, be made on clinical grounds alone, so that prompt treatment can be given in a rational, effective and safe manner.

It was also the purpose of this study to see if some correlation could be obtained between the clinical features and proper laboratory diagnosis and whether a fairly reasonable prediction of the definitive diagnosis of urethritis could be based on clinical features alone.

Materials and Methods

Study Population

Forty eight male patients with urethritis were studied in the clinic by the senior author. A careful history was taken with regard to symptoms, the discharge was examined and classified according to whether it was frankly purulent, or merely mucoid, scanty and whether there was only staining of under-pants. All patients who had had previous antibiotic therapy were excluded from the study.

Laboratory Studies

A sterile bacteriological loop was used to collect urethral discharge. In instances where this was scanty or not readily visible the loop was introduced about $\frac{1}{2}$ - 1 cm into the urethral meatus and the

urethra scraped. The loop was immediately rolled on to a Thayer-Martin plate (Thayer and Martin, 1966), a plain chocolate agar plate and smeared onto two glass slides. One slide was Gram stained by the clinician and examined for pus cells and intra and extra cellular gram negative diplococci morphologically resembling gonococci. The culture plates were placed in a biscuit tin, a candle lighted and the lid closed. Consumption of oxygen by the lighted candle provides an atmosphere of about 3% CO₂ which is suitable for growth of gonococci. The tin and the slide were then despatched to the IMR., Bacteriology Division. On arrival the tin was opened, the plates cross-streaked and reincubated in a CO₂ atmosphere at 36.5°C overnight. The slide was gram stained and examined for gram negative diplococci. Following incubation, the T-M plates were examined for colonies resembling those of *N. gonorrhoeae*. These were then tested for the oxidase reaction. Oxidase positive colonies were gram stained and subjected to carbohydrate fermentation tests. Colonies which were oxidase positive, consisted of gram negative diplococci and fermented glucose but not maltose and sucrose, were confirmed to be *Neisseria gonorrhoeae*. The chocolate agar plates were processed similarly and were also examined for the presence of other colonies notably *Candida albicans*. Negative plates were reincubated for another 24 hours.

A sample of the discharge was collected on a swab and placed in a tube containing a slant of Locke's media. This was dispatched to the Department of Parasitology, University of Malaya, for examining and culturing. A smear of the discharge was examined immediately for trophozoites of *Trichomonas vaginalis*. Free oxygen was removed and the culture tubes placed in an incubator at 37°C. The culture was examined microscopically daily, for three consecutive days.

Results

The results are summarised in Table I. Of the 48 cases examined 37 had frank purulent discharge, and 11 had either mucoid or scanty discharge, or had merely staining of underwear.

Using the criteria that typical gram negative intracellular diplococci were sufficient evidence for gonococcal infection in males, 39 cases were found to have gonococcal urethritis. Of these 36 had frank purulent discharge and 3 had minimal discharge which was mucoid or merely stained underpants. Of the 8 cases which were diagnosed as non specific urethritis 7 had clinical findings of only mucoid, minimal discharge or staining only. One case had frank pus. In one instance of a case with slight discharge, *Candida albicans* was isolated.

Table I

Clinico-pathological correlation of urethritis cases

Diagnosis	Table	Number of cases	
		Frank purulent discharge	Mucoid minimal or staining only
Cases diagnosed as G.C. by smear examination	39	36	3
Cases positive for G.C. on culture	21	21	—
Cases diagnosed as NSU	8	1	7
<i>Candida albicans</i>	1	—	1
<i>Trichomonas vaginalis</i>	0	—	—
Total number of cases studied	48	37	11

Cultures for *Trichomonas vaginalis* were consistently negative.

Of the 39 cases which showed characteristic intracellular gram negative diplococci on smear examinations, 21 produced positive cultures. The remaining 18 gave negative culture results and they were mainly attributed to poor specimens resulting from usage of old media which had dried up or due to delay in sending the plates to the laboratory.

Discussion

From the 48 cases of urethritis studied it is seen that 39 or 81.3% were due to gonorrhoea on the basis of smear examination, 54% of these were also positive on culture. A higher culture positivity rate could certainly have been obtained if all the specimens had been suitably inoculated and transported. In a study done elsewhere (Jacobs & Kraus, 1975) it was found that smear examination was 98% reliable when compared with culture results. In the same study gonorrhoea accounted for only 46% of the 400 cases studied and 54% were deemed to have non specific urethritis. Similarly statistics from Great Britain indicate that almost two thirds of cases of urethritis among men in that country are due to non specific urethritis. (Dept. of Hlth and Social Security, 1974). In Australia more than 50% of urethritis in men is attributed to non specific urethritis (Davis et al., 1973). In our study Non Specific Urethritis was diagnosed only in 16.7% of the cases, the single case of candidiasis accounting for 2.1%.

What appears striking in our study is that all cases except one showing frank purulent discharge turned out on smear/culture examination to be gonococcal in origin (21 of them by culture and an additional 15 by smear examination) and there was only one with purulent discharge which did not show gonococci either on smear or culture. On the other hand of the 11 cases with minimal or mucoid staining, 3 were found to be gonococcal, while 7 were Non Specific Urethritis, and one due to *Candida albicans*.

The above findings would suggest that in urethritis, gonorrhoea can never be ruled out purely on the nature and quantity of the discharge. This was also commented on by Jelinek (1972). However, from the above study it appears that if the discharge is frankly purulent, then one is almost always (81.3% of the time) dealing with a gonococcal infection and is highly unlikely to be Non Specific Urethritis. This finding is of "Bionic" Value to the General Practitioner, who without the back up of a Laboratory, can fairly safely assume that a patient with frank discharge is having gonorrhoea and treat him accordingly. (This, of course, is in the context of the Malaysian scenario of 1975/76). He should, however, at least try to confirm this by doing a gram stain of the discharge. On the other hand, if the patient has only minimal or mucoid discharge he can, with reasonable assurance presume, that he is dealing with Non Specific Urethritis and put the patient on a regime of Tetracycline (Holmes et al., 1967).

The other striking feature in this study was that *Trichomonas* was not isolated in any of the cases, either alone or in addition to gonococci or *Candida*. This implies that the incidence of *Trichomonas* infection in males represented by this study group is low. The one case of candidiasis seen was clinically suspected on the basis of balanopostitis, and the wife of the patient was also found to have vaginal candidiasis. The point is emphasised that in cases with scanty urethral discharge, candidiasis should be excluded by culture.

Jacob & Kraus (1975) came to a similar conclusion and these recommendations are being put forward as an aid to general practitioners. It is not the intention of the authors, however, to detract from the value of proper laboratory backup with culture in the management of such cases. In females culture is the only method of diagnosing gonococcal urethritis and in males culture is indispensable as a test of cure.

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In-use testing of disinfectants in Malaysian government hospitals

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Introduction

THE CONCENTRATIONS of disinfectants recommended for use in hospitals are calculated from the results of tests under controlled laboratory conditions. However, a laboratory test cannot reproduce the wide range of conditions which exist when the disinfectant is in use. It is therefore advisable to carry out in-use tests for bacterial contamination (Kelsey & Maurer, 1966; Prince & Ayliffe, 1972) when a new disinfectant is introduced into a hospital and at intervals afterwards.

In this study, samples of disinfectants from various discard jars in four Malaysian Government Hospitals were assessed for bacterial contamination by an "in-use" test.

Method

"In-use" testing was carried out by the method of Kelsey and Maurer (1966). One ml of the disinfectant in the discard jars or bowls was pipetted into 9 ml of diluent. The diluent for alcohols, aldehydes, hypochlorites & phenolics was Nutrient Broth, while Nutrient Broth + Tween 80 (3% W/V) was used for diguanides, hypochlorites + detergents, phenolics + detergents, quaternary ammonia compounds (QAC's) and iodophors (Maurer, 1974). The diluted disinfectant was plated out within one hour by dropping 10 drops with a 40-dropper (40 drops per ml) Pasteur pipette onto a Nutrient Agar plate and incubated at 37°C for 2 days. Samples showing more than 6 colonies from the 10 drops, that is, more than 240 live bacteria per ml, were considered to be contaminated. In the original method of Kelsey and Maurer (1966), 5 colonies

from 10 drops of a 50-dropper pipette or 250 live bacteria per ml, was used as a criterion for contamination. The contaminating bacteria were then picked and subcultured for identification. Identification was done using the manuals for the identification of Enterobacteriaceae (Cowan & Steel, 1965; Edwards & Ewing, 1962) and several schemes for the identification of Gram-negative non-fermenting bacteria (Pickett & Pedersen, 1970; Gilardi, 1971; Sandlin, 1974; Kantor *et al.*, 1975).

The resistance of the bacterial isolates to disinfectants was assessed by subculturing the isolates in solutions of the original disinfectant as well as other disinfectants. Dilutions of the disinfectants were made in tap water and one drop (of a 40-dropper) of an overnight broth culture of the isolate was added to the disinfectant solution. After 3 days and 7 days, the solution was tested for survivors by plating drops from a 40-dropper onto Nutrient Agar. A very rough estimate of the number of survivors was given by recording the results thus: CF = confluent growth, SC = semi-confluent growth, or as the number of organisms/drop.

Results

Bacterial contamination of discard jars:

The results of "in-use" testing of the discard jars are shown in Table I. Table I shows that in Hospital A, two out of eight samples taken were contaminated (more than 240 organisms/ml) and both were from the same ward; one from a thermometer jar filled with Dettol and another from a forceps jar, also filled with Dettol. Both jars were contaminated with *Moraxella* sp.

Table I Results of "in-use" testing

Hospital	No. contaminated No. sampled	Article in contaminated jars	Disinfectant & Conc.	Degree of contamina- tion (per ml)	Bacteria isolated	Isolate No.
A	2/8	Thermometer	Dettol	$> 10^5$	<i>Moraxella</i> sp.	1
		Forceps	Dettol	16×10^3	<i>Moraxella</i> sp.	2
B	3/10	Thermometer	Dettol 1/20	$> 10^5$	<i>Moraxella</i> sp.	3
		Forceps	Dettol 1/10	14×10^3	<i>Moraxella</i> sp.	4
		Trolley mop	Dettol 1/20	4×10^4	<i>Moraxella</i> sp.	5
C	6/32	Forceps	Dettol	$> 10^5$	<i>Alcaligenes</i> sp.	6
		Thermometer	Dettol	$> 10^5$	<i>Moraxella</i> sp.	7
		Trolley mop	Dettol	$> 10^5$	<i>Moraxella</i> sp.	8
		Trolley mop	Hibitane 1/2000	$> 10^5$	<i>Flavobacterium</i> sp.	9
		Thermometer	Hibitane 1/200	$> 10^5$	<i>Moraxella</i> sp.	10
		Cheatle forcep	Hibitane 1/200	$> 10^5$	<i>Moraxella</i> sp.	11
D	5/17	Thermometer	Water	$> 10^5$	<i>Pseudomonas aeruginosa</i>	12
		Thermometer	Water	$> 10^5$	<i>Klebsiella aerogenes</i>	13
		Thermometer	Water	$> 10^5$	<i>Acinetobacter</i> sp.	14
		Cheatle forcep	Dettol	$> 10^5$	<i>Moraxella</i> sp.	15
		Scrubbing brush	Dettol 1/10	8×10^3	<i>Moraxella</i> sp.	16
		Thermometer	Dettol 1/10	$> 10^5$	<i>Pseudomonas</i> sp.	17
		Cheatle forcep	Hibitane 1/200	$> 10^5$	<i>Pseudomonas</i> sp.	18

In Hospital B, three out of ten samples were contaminated. Two of them were from a trolley mop and forcep jars from one ward and the other from a thermometer jar in the labour room. All three samples were found to be contaminated with *Moraxella* sp. and all contained Dettol.

Six out of thirty two samples from Hospital C involving three wards were contaminated. From the 1st ward, a forceps jar with Dettol was contaminated with *Alcaligenes* sp., and *Moraxella* sp. were isolated from the thermometer and trolley mop jars filled with Dettol. In the 2nd ward, *Flavobacterium* sp. was isolated from a trolley mop jar filled with Hibitane 1/2000. *Moraxella* sp. was isolated from thermometer and Cheatle forcep jars filled with Hibitane 1/200 in the 3rd Ward.

In Hospital D, contamination of five out of seventeen samples was shown involving four wards. In the 1st ward *Pseudomonas aeruginosa*, *Klebsiella*

aerogenes and *Acinetobacter* species were isolated from a thermometer jar filled with water alone. From the 2nd ward a Cheatle's forceps jar filled with Dettol was contaminated with *Moraxella* sp. A scrubbing brush jar and thermometer jar filled with Dettol 1/10 from the 3rd ward were found to be contaminated with *Moraxella* sp. and *Pseudomonas* sp. respectively. Finally, a Cheatle's forceps jar filled with Hibitane in the 4th ward was contaminated with *Pseudomonas* sp.

Resistance of the Bacterial Isolates:

The results of the experiments to determine the resistance of the isolates to disinfectants are given in Table II. Isolates 1, 2, 4, 5, 6, 8, 15 & 16 were resistant to Dettol 1/10. All were originally isolated from Dettol Solutions in the hospitals. Isolates 3 & 7 were killed by Dettol 1/10 but grew in Dettol 1/20. The isolates from the Hibitane containing jars, 9, 10, 11 & 18 were sensitive to Hibitane 1/2000 but 10, 11 & 18 flourished in

Hibitane 1/4000 and Zephiran 1/1000. Isolates 12, 13 & 14 (from the thermometer jar filled with water) were sensitive to all disinfectants with the exception of Isolate 12 (*Pseudomonas aeruginosa*) which grew in Dettol 1/80.

Discussion

The choice of the "in-use" test diluent is very important. The use of an unsuitable diluent gives misleadingly good results and a false sense of security. Simple dilution is usually satisfactory for bactericidal disinfectants; but bacteriostatic disinfectants must be diluted in fluids that inactivate the bacteriostatic effect without inhibiting bacterial growth. The diluents used for in-use testing must be checked before the test results can be considered valid. A method for checking the diluent (Maurer, 1974) was followed in our study. Many inactivators have been recommended (Mackinnon, 1974; Bergan &

Lystad, 1972), but in our study, an attempt was made to simplify matters by using the diluents recommended by the Disinfection Reference Laboratory of the Central Public Health Laboratory, London (Maurer, 1974).

Out of a total of 67 disinfectant solutions (26 of Dettol, 36 of Hibitane, 2 of Cetavlon, 2 of Milton, 1 of water) tested, 16 (24%) were found to be contaminated; 12 (18%) with greater than 10^5 organisms/ml and 4 (6%) with greater than 10^3 organisms/ml. 11 of the contaminated jars were filled with Dettol, that is, 11/26 (42%) of the jars filled with Dettol were contaminated. Out of 36 jars of Hibitane, 4 or 11% were contaminated.

Dettol is well documented as a disinfectant that is easily inactivated by organic matter and allows growth of *Pseudomonas* sp. and other Gram-

Table II Results of the resistance of the isolates to disinfectants

Isolate Number	Isolated from:	No. of survivors per drop after 3 days*							
		Dettol 1/10	Dettol 1/20	Dettol 1/80	Hibitane 1/2000	Hibitane 1/4000	Zephiran 1/1000	Lysol 1/100	Cetavlon 1/200
1	Dettol	100 (CF)	CF	NT	NT	0 (0)	0 (0)	0 (0)	NT
2	Dettol	SC (SC)	SC	NT	NT	0 (0)	0 (0)	0 (0)	0 (0)
3	Dettol 1/20	0	100 (CF)	NT	NT	0 (0)	0 (0)	0 (0)	NT
4	Dettol 1/20	30 (CF)	CF	NT	NT	0 (0)	0 (0)	0 (0)	NT
5	Dettol 1/10	37 (CF)	NT	NT	NT	0 (0)	0 (0)	0 (0)	NT
6	Dettol	35 (CF)	NT	NT	NT	0 (0)	0 (0)	0 (0)	NT
7	Dettol	CF	SC (CF)	NT	NT	0 (0)	0 (0)	0 (0)	0 (0)
8	Dettol	25 (CF)	NT	NT	NT	0 (0)	0 (0)	0 (0)	NT
9	Hibitane 1/2000	NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	NT
10	Hibitane 1/200	NT	0 (0)	0 (0)	0 (0)	5 (0)	CF (CF)	0 (0)	NT
11	Hibitane 1/200	NT	0 (0)	0 (0)	0 (0)	CF (0)	CF (CF)	0 (0)	NT
12	Water	NT	0 (0)	CF (CF)	0 (0)	0 (0)	0 (0)	0 (0)	NT
13	Water	NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	NT
14	Water	NT	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	NT
15	Dettol	CF (SC)	CF	SC	NT	0 (0)	0 (0)	0 (0)	NT
16	Dettol 1/10	CF (CF)	CF	NT	NT	0 (0)	0 (0)	0 (0)	0 (0)
17	Dettol 1/10	0 (0)	0 (0)	CF (CF)	0 (0)	0 (0)	0 (0)	0 (0)	NT
18	Hibitane 1/200	0 (0)	0 (0)	0 (0)	0 (0)	SC (CF)	CF (CF)	0 (0)	NT

* Figures in parenthesis give the number of survivors after 7 days.

NT = not tested

CF = confluent growth

SC = semiconfluent growth

negative organisms (Public Health Laboratory Service Report, 1965; Maurer, 1974). In view of all the documented evidence plus the results of the "in-use" tests, it must be strongly emphasized that the widespread practise of using Dettol in discard jars be discontinued. Results of Capacity Tests (Khor & Jegathesan, unpublished data) showed that while 10% Dettol passes the test for both "clean" & "dirty" conditions, 8% Dettol fails the test for "dirty" situations. Thus it can be seen that if Dettol is to be used, the concentrations must be at least 10%, which is expensively high.

Contamination of the disinfectant solutions could possibly be due to the following:-

- (i) inaccurate measurement of the disinfectant concentrations
- (ii) infrequent changing of the solutions
- (iii) refilling or topping up discard jars without cleaning the jars
- (iv) the presence of inactivating material or soiling
- (v) an inappropriate choice of disinfectant

Most of the contaminating bacteria isolated were Gram-negative non-fermenters with the exception of one *Klebsiella* sp. They include *Moraxella* sp. (11), *Pseudomonas* sp. (3), *Acinetobacter* sp. (1), *Alcaligenes* sp. (1) and *Flavobacterium* sp. (1). Although these bacteria are ubiquitous in nature and to some extent are indigenous to man, they may be opportunistic pathogens under appropriate conditions. Many non-fermenting bacteria have generally been accepted as secondary invaders but a growing number of literature have implicated these bacteria as a primary cause of infection especially in infants and old people (Snell, 1973; Pederson et al, 1970).

There have been reports of bacteria isolated from disinfectant solutions but these bacteria were subsequently killed on subculture in the same disinfectant solutions (Prince & Ayliffe, 1972; Basset et al, 1970). However, some workers have isolated bacteria from disinfectant solutions which subsequently grow on subculture in the same disinfectant solution (Palmer & McCracken, 1970; Burdon & Whitby, 1967).

Most of the isolates were shown to have some degree of resistance to the disinfectant from which they were isolated. Nine of the isolates, originally from Dettol, were resistant to Dettol at a concentration 1/10. These tests were carried out with no

addition of nutrient broth or organic matter. Clearly these organisms have adapted to survival at concentrations which are usually bactericidal. Prince and Ayliffe (1972) have reported adaptation of a *Pseudomonas* sp. to increasing concentrations of a phenolic disinfectant by continual subculture in increasing phenolic concentrations.

Five other isolates grew in reduced concentrations of the disinfectants, and three isolates were killed by all disinfectants. Possibly these organisms had adapted to the higher concentrations but this property was rapidly lost on subculture. Another possibility was that these organisms could have been protected by a layer of organic material in the original solutions which was lost on subculture. Support for the theory that the organisms have adapted to resistance to the disinfectants by exposure to the disinfectants, is shown by the finding that the organisms isolated from the thermometer standing in water were sensitive to most of the disinfectants.

In all 4 hospitals surveyed, "in-use" testing was not carried out routinely or even when the disinfectant was first introduced. The results obtained in this study show the usefulness of "in-use" testing in the surveillance of disinfectant usage in hospitals.

Summary

Sixty seven samples of disinfectants were obtained from various discard jars in the wards of four Malaysian Hospitals. Bacterial contamination was assessed by an "in-use" test. 16/67 (24%) samples were found to be contaminated with Gram-negative bacilli. Further experiments showed that most of these bacteria had some degree of resistance to the disinfectants from which they were originally isolated.

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Twin Pregnancy – A study of the local pattern

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Introduction

THE STUDY OF twin pregnancies has assumed greater importance for several reasons. The higher incidence of prematurity contributes to the perinatal mortality which has otherwise been decreasing. Multiple pregnancies are likely to become more frequent with the wider use of drugs for induction of ovulation. The practice of organ transplants leads to the importance of distinction between monozygotic and dizygotic twins. It has also been established recently that there are epidemiological differences in twin pregnancies in different geographical and ethnic groups. In fact an international congress on twin studies would be held in the latter part of 1977.

Thus the local pattern of twin pregnancies should be known and the differences from textbook descriptions be noted.

Material and Method

This is a retrospective study of the case records of all the twin pregnancies in the University Hospital from the establishment of the maternity unit in March 1968 till June 1975. The University Hospital serves the urban areas of Petaling Jaya and parts of Kuala Lumpur as well as the surrounding villages and squatter areas.

Incidence of Twin Pregnancies

In the period covered, there were 193 twin pregnancies out of a total of 19,189 deliveries, thus giving an incidence of 1:99. This is lower than Western figures which range from 1:66 to 1:80 but is similar to those in Asian populations (Table I).

Twin pregnancies are known to be more common in African races, fairly common in Caucasians and rarer in Oriental races.

Table I

Incidence of Twin Pregnancy

Malaysia (Kuala Lumpur)	1 : 99	Present study
Singapore (K.K. Hospital)	1 : 121	Foong, 1970
Japan	1 : 156	Ihda, 1965
China	1 : 294	Gates, 1959
Philippines	1 : 85	Palagia, 1967
India (Calcutta)	1 : 59	Dass, 1934
England and Wales	1 : 84	Registrar-General, 1959
Nigeria	1 : 20	Cox, 1963
USA	1 : 89	Guttmacher, 1953

Incidence according to ethnic groups (Table II)

Although the three main ethnic groups exist in Malaysia in the proportions of about 50 per cent Malays, 35 per cent Chinese and 10 per cent Indians, analysis of the University Hospital deliveries revealed that they were in the proportions of 26 per cent Malays, 43 per cent Chinese and 28 per cent Indians. Taking this into consideration, the incidence of twin pregnancy is 1:92 in Malays, 1:117 in Chinese and 1:109 in Indians.

Table II

Incidence of Twin Pregnancy according to Ethnic Groups

Ethnic group	No. of Twins	Percentage of obstetric patients	Incidence of twins
Malays	54	26	1: 92
Chinese	71	43	1:117
Indians	50	28	1:109
Others	18	2	-

Table IV

Incidence of Twin Pregnancy According to Parity

Parity	No. of Twins	Percentage of obstetric pts.	Incidence of Twins
Para 0	37	33	1:171
Para 1 and 2	79	38	1: 92
Para 3 and 4	47	19	1: 76
Para 5+	30	10	1: 64

Incidence according to Age (Table III)

From our study, it is seen that the frequency of twinning increases with age. While the incidence is only 1: 259 in those mothers below 19 years old, it is 1: 36 in those mothers above the age of 40.

Table III

Incidence of Twin Pregnancy According to Age-Groups

Age-group	No. of Twins	Percentage of Obstetric pts.	Incidence of Twins
Below 20 years	8	11	1:263
21 - 25 years	51	30	1:100
26 - 30 years	65	31	1: 93
31 - 35 years	29	20	1:114
36 - 40 years	31	7	1: 65
41+ years	9	1.5	1: 36

Anderson (1956) and Seksi and Miller (1963) noticed that age and parity increased the twinning rate. Law (1967) in London calculated that the incidence in grandmultipara to be 1: 52 and that in elderly primigravida to be 1: 50.

Incidence according to Parity (Table IV)

The number of deliveries in each parity group was roughly calculated from a random sampling of 500 deliveries in 1972 (from January to December). From these proportions, the incidence of twin pregnancies in each parity group was calculated. It followed a trend of greater frequency in the more parous mothers, from 1:171 in primigravida to 1: 64 in grandmultipara.

Sex of the Infants

The sex of the infants delivered were as follows:

Male	:	Male	=	81
Male	:	Female	=	20
Female	:	Female	=	17
Female	:	Male	=	75
				total
				193

The sex ratio of 106 males to 100 females is similar to that in singletons. However Standskov *et al.* (1946) believed that there were more females in higher orders of multiple pregnancies. Law (1967) in his study of triplets showed a ratio of 100 males to 150 females.

Family History of Twins

Out of 152 twin pregnancies which had adequately completed notes, 29 of these had a history of twins in the family which included parents, siblings and siblings of the parents. Thus 19 per cent of the twins delivered had a family history of twins.

Out of 2000 random cases delivered in the hospital, 395 patients had a family history of twins. Thus in the general obstetric population 19.5 per cent of them had a family history of twins. In these 395 deliveries, there were nine twin deliveries, giving an incidence of 1:44. Thus the chances of a Malaysian patient with a family history of twins is two and a half times that of the general Malaysian obstetric patient.

Foong (1971) in Singapore also found the tendency of twinning to be increased by two and a half times. However Western authors have noted higher tendency in those with family history. Gedda (1961) found that there was an additional twin pregnancy in 77 per cent of families who had previously delivered twins. In a control study of 100 families, only 23 per cent had twins. Davenport estimated that the twinning rate was increased by four to seven times in twinning families.

Monozygous: Dizygous Ratio

It has been said that the familial trait influences mainly the dizygous twins. The chance of delivering monozygotic twins is constant throughout the world and has been estimated to be about 4 per 1000.

The monozygotic:dizygotic (MZ:DZ) ratio has been used by several authors to explain the differences in the incidence of twins in different populations. However it is not easy to identify correctly the monozygous twins as even microscopic examination of the membranes can be misleading. No planned attempt had been made in our study to identify the zygosity of our twins. However, following the method by Law (1967), all unlike-sex twins were considered dizygotic and assuming that the proportion of dizygotic twins in the like-sex is similar to that of the unlike-sex, the incidence of monozygotic twins can then be calculated.

From Table V, it is seen that the MZ:DZ ratio in the Malays, Chinese and Indians are 1.7, 2.2 and 1.3 respectively and the ratio in the three races is 1.6 on an average. Thus there is a much lower proportion of dizygous twins compared to that in Caucasians and Africans.

Antenatal Complications in Twin Pregnancy

Generally the antenatal complications in the mother are exaggerated in twin pregnancy. It is thought that the side-effects arise from the greater distensibility of the uterus and the increased requirements from the multiple fetuses.

Excluding unbooked or late booking cases, 150 cases were studied. There was no maternal death in our series. In spite of more antenatal complications, no author has reported any increase in maternal mortality. From Table VI, about 20 per cent of the patients complained of breathlessness, 33 per cent with swelling of the feet, 18 per cent with varicose veins and 10 per cent with haemorrhoids. Ten per cent of the patients did mention that their abdomen seemed to be growing too fast but this symptom seemed to be a common complaint in our patients.

Anaemia was the most common complication (hemoglobin taken as less than 10 g/100 ml). From the serum assays, about 22 per cent were found to be iron-deficiency anaemia while another seven per cent had a dimorphic picture. There was no isolated folic acid deficiency anaemia. About 10 per cent of the booked twin carrying mothers had total dose infusion of Imferon.

Toxemia of pregnancy was more common in twin pregnancies. About 30 per cent of them had a blood pressure of 130/90 mm Hg or more with oedema but without albuminuria. There was one case of eclampsia. Other authors (Bender, 1952; MacDonald, 1962) had also found the incidence to be raised to about 25 per cent. Scholtes (1971) attributed this increase to the larger placental size and the relative circulatory deficiency in twin pregnancy.

In our series, 17 per cent had hydramnios detected clinically. This figure is higher than others reported, which ranged from 12.5 per cent (Brown

Table V

Monozygous:Dizygous Ratio (MZ:DZ) According to Ethnic Groups						
Ethnic Group	No. of Twins	No. of like-sex	No. of unlike-sex	No. of MZ	No. of DZ	MZ:DZ Ratio
Malays	54	44	10	34	20	1.7
Chinese	71	60	11	49	22	2.2
Indians	50	40	11	29	22	1.3
Others	18	—	—	—	—	—
Total	193	156	37	119	74	1.6
Caucasians (Strandkov, 1946)						0.5
Negroes in USA (Strandkov, 1946)						0.1
Japan (Ihda, 1965)						1.9
Nigeria (Cox, 1963)						0.3
England and Wales (Cox, 1963)						0.25

Table VI
Antenatal Complications in Twin Pregnancy
(150 cases)

Symptoms complained by patients

	No. of pts.	Percentage
Breathlessness	29	20
Oedema feet	51	33
Varicose veins	23	18
Haemorrhoids	15	10
Abdomen abnormally large	15	10
Frequency of micturition	10	7
<i>Complications</i>		
Iron-deficiency Anaemia	34	22
Combined iron-deficiency and folic acid deficiency anaemia	10	7
Toxemia of Pregnancy	45	30
Clinical Hydramnios	25	17
Threatened abortion	8	5
Hyperemesis gravidarum	8	5
Urinary tract infection	7	5
Placenta previa	3	2
Abruptio placentae	1	—

and Dixon, 1963) to 1.6 per cent (Seksi and Miller, 1963) the average figure quoted being 4 per cent (Danielson, 1960). The incidence in singleton pregnancies is about 0.5 per cent. Hydramnios is thought to be associated more commonly with uniovular twins (Donald, 1972) and this might explain the higher incidence in our series.

There were three cases of placenta previa and one case of abruptio placentae which presented by antepartum haemorrhage. There was five per cent each in the incidence of threatened abortion, hyperemesis, and urinary tract infection.

Postpartum Haemorrhage

The third stage is a critical stage in twin delivery as far as the mother is concerned. From Table VII, it is seen that 16 per cent of our twin deliveries had a blood loss of 500 ml or more, half of which occurred in premature deliveries. The incidence reported in the literature varies greatly from four per cent (Zuckermann, 1961) to 40 per cent (Danielson, 1960). Bender (1952) found it to be 10 per cent (compared to 5.3 per cent in singleton deliveries)

when ergometrine was not given and five per cent (compared with 1.5 per cent in singletons) when ergometrine was given. Law (1967) found it to be more common in primigravida (14.2 per cent) compared with multigravida (8 per cent). He also noted that although postpartum haemorrhage was more common in twin deliveries, very few (0.3 per cent) had severe haemorrhage of more than 60 ounces. In our series, only three patients had a loss of more than a litre and only one had loss of more than two litres.

Table VII
Postpartum Blood Loss in Twin Deliveries (143 cases)

Blood loss	No. of pts.	Percentage
190 ml or less	71	50
200 to 490 ml	48	34
500 to 990 ml	20	} 16
1000 to 1990 ml	3	
2000 ml or more	1	

Presentations at Delivery

One of the causes of the higher perinatal mortality in twins is the higher incidence of abnormal presentations. Table VIII shows that the twins presented both as vertex in 41 per cent of cases, vertex followed by breech in 33 per cent, breech followed by vertex in 12.8 per cent, and both as breech in 9.0 per cent of cases.

Table VIII
Mode of Presentation of Twin Fetuses at onset of Labour

Presentation	No. of pts.	Percentage
Vertex/Vertex	77	41
Vertex/Breech	62	33
Breech/Vertex	24	13
Breech/Breech	17	9
Vertex/Transverse	5	4
Breech/Transverse	3	
Not mentioned	5	
No. of breeches in first twins = 43 (23 per cent)		
No. of breeches in second twins = 79 (42 per cent)		

The number of breeches in the first twin is 43 (23 per cent) and in the second twin is 79 (42 per cent) out of 193 pregnancies. Thus the total number

of breeches of 123, giving an incidence of 32 per cent, is ten times the incidence of breech deliveries in singletons in our hospital (3.1 per cent). In addition there were nine fetuses which presented as transverse lie at delivery. Most authors have reported similar figures.

Mode of Delivery

Table IX shows that 56 per cent of the first twins had spontaneous vertex delivery as compared to 44 per cent of the second twins. The difference was mainly due to the incidence of breech deliveries in the second twins. The rates of forceps and ventouse deliveries were similar. There were 11 caesarean operations (rate of 5.6 per cent). In addition, two more caesarean operations were performed for the second twin alone which was retained for more than one hour in both cases. It is to be noted that there were 23 deliveries where the first twin was delivered normally while their second twin had complicated deliveries.

Table IX

Mode of Delivery in Twin Pregnancies

Mode of delivery	First Twin	Second Twin
Spontaneous Vertex	105 (56%)	82 (43.5%)
Forceps	25 (12.5%)	20 (10%)
Ventouse	8	10
Assisted Breech	42	64
Breech Extraction	2	14
Cesarean section	11	13
Total abnormal deliveries	88 (44%)	111 (56.5%)

Duration of Pregnancy

About three-quarters of the pregnancies were delivered spontaneously before term. It is a practice in our hospital to induce only at term. Thus twenty pregnancies were induced at term for twins as the only indication while another 16 were induced for twins complicated by pre-eclamptic toxemia. There were only four pregnancies which went beyond 40 weeks and had to be induced.

Birthweights

Table X shows the comparative weights of both twins at birth. In our series there was no significant difference in the birthweight distribution in the two twins. Some authors showed that there was a shift to the lower birthweights in the second twin.

The total number of babies below 2500 grams was 59 per cent. Even considering those below 2270 grams as a better prognostic minimum weight in Asian babies (Wong, 1965) there were still 46.9 per cent below this birthweight.

Perinatal Mortality

From our series of 193 twin deliveries, there were 34 perinatal deaths out of 20 pregnancies. In 14 pregnancies, both twins died; in four pregnancies, only the second twin died; and in two pregnancies, only the first twin died. Thus the perinatal mortality rate was 8.3 per cent for the first twin, 9.3 per cent for the second twin, and 8.8 per cent for both twins. This compares unfavourably with the overall perinatal mortality rate of 3.3 per cent in the University Hospital during the same period.

Out of the 34 deaths, 13 were macerated stillbirths, five were fresh stillbirths and 16 were early neonatal deaths. Other authors have quoted similar figures: 12.4 per cent (Sinnathuray, 1967), 13.3 per cent (Guttmacher, 1953), 9.4 per cent (Law, 1967).

Out of the 34 perinatal deaths, 20 babies out of 10 pregnancies were delivered before 32 weeks; nine babies out of six pregnancies between 32 and 36 weeks; and five babies out of four pregnancies were delivered after 36 weeks. The perinatal mortality rate calculated was 60 per cent before 32 weeks, 23 per cent between 32 and 36 weeks and only 4 per cent in the mature twins. (Table XI).

As for birthweights, there were 11 below 1001 grams, 12 babies between 1001 and 2270 grams and 11 babies were more than 2271 grams.

Summary

A retrospective study of 193 twin pregnancies in the University Hospital showed that the incidence was 1:92 in Malays, 1:117 in Chinese and 1:109 in Indians. The incidence increases with age and parity and is more in those with family history of twins by more than two and half times. The monozygous: dizygous ratio was 1.6. Common complications were anemia (29%), toxemia of pregnancy (30%), hydramnios (17%) and postpartum haemorrhage (16%). The perinatal mortality of 8.8% was explained by the higher incidence of abnormal presentations (32%), operative deliveries (50%) and lower birth weights (59% being less than 2500 grams).

It is noted that certain features of twin pregnancies in our Malaysian population differ from those quoted in textbooks based on Caucasian populations. In particular, the incidence of twinning

Table X
Comparative Birthweights of the First and Second Twins

		SECOND TWIN				Total for 1st Twin
		Less than 1000 g	1010 to 2500 g	2510 to 3000 g	2510 to 3000 g	
FIRST TWINS	Less than 1000 g	8	1	0	0	9
	1010 to 2500 g	3	84	16	2	105
	2510 to 3000 g	0	19	29	2	50
	More than 3000 g	0	3	10	6	19
Total for 2nd Twin		11	107	55	10	183

(Weight not recorded in 10 pregnancies)

Table XI
Perinatal Mortality according to Period of Gestation

Maturity	No. of Pregnancies	No. of Babies	Percentage of Deliveries	Perinatal Mortality
Before 32 weeks	10	20	8	60%
32 to 36 weeks	6	9	20	23%
More than 36 weeks	4	5	72	4%
Total	20	34	100	

is lower, the proportions of monozygous and dizygous twins are reversed and the family history has lesser influence on the twinning tendency.

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A clinician looks at the placenta

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THE PLACENTA has long been the Cinderella organ of the obstetricians. He has learned over the years and taught his midwives to glance at it in cupped hands, stroke the membranes, and pronounce the magic word "complete" before tossing it away into the bin.

The more modern obstetrician has taken it home to fertilise his rose garden, or has arranged for his hospital to sell it to those purveyors of beauty who believe in adding other people's hormones to their beauty creams.

But in fact, a closer study of the placenta is not necessarily something useful just for those interested in the biology of pregnancy or for those whose business it is to perform post-mortem studies. It can be of practical value in the management of the patient. It is therefore our purpose today to explore how useful it is to study the placenta in the management of the mother and child.

Examination of the Placenta - Technique

Let us begin first by looking in more detail at that cursory glance at the placenta. In a significant proportion of patients with postpartum haemorrhage, exploration of the uterus produces placental tissue, sometimes remarkable in amount. How could it be missed? Firstly that cursory glance may have been really cursory. There is no place for a careless examination. Postpartum haemorrhage from retained cotyledons has been known to kill.

Fallacies

Secondly, it is possible to make a genuine mistake. If the placenta is cupped too strongly,

the neighbouring cotyledons maybe made to crowd over the area of the missing cotyledon, making the placenta appear complete.

Thirdly, the area of the missing cotyledon may be obscured by blood clot. It is therefore good practice to wash or brush away blood clot adherent to the placenta before examining the placenta for completeness.

There is yet another way in which the lost cotyledon maybe missed: this is when the membranes are not carefully examined and blood vessels leading into them are missed, as also the succenturiate lobe which the vessels supplied.

Finally, in the prevention of post partum haemorrhage, the membranes: parts of these are quite easily missed, and the easiest way to check them is by turning the placental sac "inside out", letting the membranes hang. They have also been examined under water - but that is another story.

Placental Shape

We next come to the shape of the placenta. The circumvallate and circummarginate placenta is more common than is generally recognised (Fox & Sen, 1972), but while its association with several conditions have been noted (for instance, ante-partum haemorrhage), this only "explains" what has happened, and not being of immediate practical importance, does not concern us here.

Placental Size

Of more relevance is placental size. Again, there is a great deal of controversy over the accuracy

and usefulness of weighing the placenta (Fox, 1966). The small placenta may explain a small baby, or it may not. Suffice it to say that a lot is made of foeto-placental weight ratios, and useful as this maybe for studying the biology and the pathology of pregnancy, its practical value is strictly limited. If this measure is desired, it should be performed under standard conditions; ideally, within a few minutes of delivery, after cutting the cord short of its insertion, and trimming the membranes off.

I will come back later to the trimmed cord and membranes, as there is important information to be gleaned from these.

Going back to placental size, the important placenta is the large placenta. Arbitrarily placed at 1 kg., any placenta that is over 1/3 the weight of the fetus near term, should be looked at with suspicion. The pale, bulky placenta has traditionally been considered as associated with syphilis and with rhesus incompatibility, and is a good warning sign for these conditions if they have been missed during the antenatal period. The rhesus incompatible baby born with this kind of placenta is likely to be critically ill. There are other conditions which may cause a large placenta. These include triploidy (Hecht, 1963), diabetes mellitus (Benirschke & Driscoll, 1967), thalassaemia (Lie-Injo, 1967), congenital nephrosis (Kouvalainen, 1962), toxoplasmosis (Benirschke and Driscoll, 1967), and chorangioma, whether diffuse (Potter, 1961) or localised (Sen, 1970).

In this latter condition the shunting of the fetal circulation and the presence of fetal artery thrombosis is often associated with a neonate in heart failure. The oedematous baby maybe mistaken for a hydropic one, or the cause of cardiac failure assumed to be due to a congenital cardiac lesion, and one may fail to take the necessary steps in therapy which would lead to a rapid recovery of the baby. Hydramnios is common.

Thus it is seen that when a placenta is pale and large, there is good reason to examine the placenta histologically, and to check the mother in detail for a number of conditions which may require either mother or baby to be placed under special care.

Membranes

We have already discussed examining the membranes for completeness. I mentioned that blood vessels running across to end blindly on the membranes indicate retained cotyledons. But if you see the blood vessels ending blindly, or torn, at the edge of the hole through which the baby was delivered, get back to that baby fast, for it is in grave danger of dying of fetal exanguination if it has not died already.

This danger also exists if there is velamentous insertion of the cord and the blood vessels running across the membranes may be torn or compressed. Another not well recognised danger associated with a velamentous insertion of the cord is placental insufficiency causing foetal death, but as this is a diagnosis made only in retrospect it will not be considered here except to note that this is not usually a recurrent cause of stillbirth, and the mother may be reassured accordingly.

Another warning sign of fetal exanguination is the sharing of the circulation between twins. While the suspicion of "twin transfusion syndrome" – with one baby overloaded and the other baby exanguinated should be roused by the appearance of the babies at birth, occasionally injection studies showing a "common villous district" or arterial anastomosis point out to the cause of failure to thrive of a set of twins: the one needs venesection and digitalis, the other a blood transfusion. The association of hydramnios with this has been remarked upon by many workers (Benirschke & Driscoll, 1967).

The membranes should be bright and shiny. Dull membranes should have (i) a strip cut off and put into fixative for histology, and (ii) a swab taken and plated for bacteriology. This is of course for the amnion, lining the fetal side of the placenta and membranes. The chorion is naturally dull.

While the occasional scattering of white cells across the membranes is often seen, this usually indicates that the membranes have been ruptured for some time: even labours induced by artificial rupture of membranes can, to some extent, be spotted in this way. The significant case is one where the membranes are dull and the liquor dirty looking. This associated with an intense polymorphonuclear leucocytic infiltration of the membranes would make it imperative to check the condition of the neonate. If it is not thriving, this maybe due to intrauterine pneumonia, septicaemia, or incipient meningitis.

Umbilical Cord

Another site which can be examined for evidence of infection in the newborn is the umbilical cord. Sections of this showing polymorpho-nuclear leucocytic infiltration indicates intra-uterine infection (Pryse-Davies *et al.*, 1973; Meyer *et al.*, 1968). Unfortunately there is seldom an indication to send a section of cord for histology at birth, and so this usually becomes a post-mortem diagnosis in institutions which do examine placenta and fetus together at postmortem, rather than being a pointer during life to why a baby is not doing well.

The cord is however, often ritually examined macroscopically at birth: while looking for such things as true or false knots, cord round the neck, etc., many units do look at the cut section for the presence of a single umbilical artery. This has for a long time been recognised as being associated with a higher incidence of congenital malformations. Recent studies (Froelich & Fujikura, 1966; Bryan & Kohler, 1974) have indicated a high stillbirth and perinatal loss even where there were no detectable congenital malformations. If babies survive the neonatal period, Froehlich and Fujikura (1973) found only an increased incidence of inguinal herniae of 1 in 20: no other significant defect.

Histology

So far we have called upon the use of histology primarily for confirmation of intrauterine infection and the presence of chorangioma; is there any more *practical* information that can be obtained by histological examination?

To continue the question of intrauterine infection, the presence of endarteritis in villous blood vessels would be a warning sign to look for syphilis. A characteristic histologic picture microabscesses with clusters of polymorphonuclear leucocytes in typical clusters and characteristic small gram positive organisms seen in the placenta is almost certain to be indicative also of fetal infection – by listeria monocytogenes.

Similar lesions are seen with congenital vaccinia. However, in these, focal villous necrosis is also to be seen, round which the polymorphonuclear leucocytes aggregate.

Placentitis is also to be seen with rubella, toxoplasmosis, and in the very rare occasions when the fetus is affected by candidiasis.

Diseases and infections which have been diagnosed because the pathologist has examined the maternal cells in the intervillous space include malaria, trypanosomiasis and sickle cell disease.

Benirschke & Driscoll (1967) review extensively this topic and the literature thereof.

Electron Microscopy

As an example of pure speculation, it has been suggested (Sen, 1974) that it may become possible to predict malignant potential of placental trophoblast (especially molar) by examining under the electron microscope.

As I have pointed out, it is not the purpose of this paper to discuss all the knowledge available on

the placenta: in the last decade, at least six books published on the subject do not overlap in anyway in the formation offered. Nor is it the purpose of this paper to discuss the information obtainable from the placenta which may explain the mode of death of either a stillborn baby or a neonatal death: I have therefore chosen not to discuss those placental lesions, gross or microscopic, which have been so extensively described elsewhere (Fox, 1971, among others) though some of these changes are being studied in "biopsy" specimens from the pregnant women (Aladjem, 1969), and I have not explained how it is that half the placentae labelled "infarcted" are not infarcted: there are half a dozen other lesions which mimic an "infarct" and need histological confirmation. Nor why placental "calcification" is usually a very healthy sign.

It should however be noted that this kind of information can be of intense practical value: it may indicate whether the cause of death is a recurrent one or not, and thus give the clinician information which is of use either to reassure the sorrowing couple or help in the management of the next pregnancy. It is thus mandatory to realise that when a neonate dies, the postmortem study is not complete without a study of the placenta.

If, after reading this article, when you next cup the placenta in your hands, murmur the magic word "complete" and aim it for the bin labelled "for the roses", you hesitate a moment, the purpose of this paper will have been served.

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