

REPRODUCTION RESEARCH AND HEALTH: PART III FERTILITY HEALTH

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INTRODUCTION

IN the two preceding papers (Sinnathuray, Med. J. Malaysia, 1979), which represent the first two parts of my inaugural address, the impacts of reproductive research on Maternal Health (Part I) and on Fetal Health (Part II) have been presented at some length. In this paper is presented the impact of reproductive research on Fertility Health, and it covers the last two areas of my inaugural address, namely fertility regulation (family planning) and fertility augmentation (infertility management).

FERTILITY REGULATION [FAMILY PLANNING]

The scientific appreciation of the anatomy, physiology, biochemistry, pharmacology, bacteriology, pathology and sociology of human reproduction has led to considerable advances in the development and application of contraceptive technology for the desired control of the "quantity" of life, and thereby seek to enhance the existent and subsequent "quality" of life.

At the World Health Organisation level, as a result of series of World Health Assembly resolutions reflecting the increasing demands placed on the health sector to provide services for family planning, the W.H.O. Programme of

Research in Human Reproduction was launched some 14 years ago in 1965, to bridge the many gaps in knowledge and technology that hampered the provision of appropriate services in this field (W.H.O. Report HRP/78.3, 1978). The W.H.O. was requested to initiate research in this area of health. Large sources of funding have been made available to researchers in fertility regulation by not only the W.H.O., but also other international agencies, such as United Nations Fund for Population Activities (UNFPA), Ford Foundation, Population Council of New York, International Development Research Centre (I.D.R.C.) and Rockefeller Foundation.

In Malaysia, although the first organised family planning services were provided by the Family Planning Association of Selangor in 1953, full governmental commitment in family planning became a reality when the Family Planning Act was passed by Parliament and received Royal Assent in April 1966. The National Family Planning Board (NFPB) was established in June 1966 as an inter-ministerial organisation having statutory powers and a certain degree of autonomy. The programme was incorporated into the First Malaysia Plan (1966-1970) and all subsequent Malaysia Plans. Now, we have the happy situation of a lady, Datin (Dr.) Nor Laily, as head of our National Family Planning Board in Malaysia, and hence dispelling any fears that family planning is being "thrust down the throats" of our women by "unsympathetic male chauvinists!".

In my address on the Fertility Regulation aspects of reproduction, I will confine my presentation to three areas where there have been tremendous advances in research in the recent decades, with considerable health benefits to the women in the community.

1. Hormonal Steroidal Contraception

The commonest form of the hormonal steroidal

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* Inaugural Lecture (Part) that was delivered on the 2nd March 1979 at the Faculty of Medicine, University of Malaya, Pantai Valley, Kuala Lumpur, Malaysia, under the Chairmanship of the Royal Professor Ungku A. Aziz, Vice-Chancellor of University of Malaya.

contraceptive preparation, that all of us are familiar with, is the "contraceptive pill" or briefly the "pill". The other preparations of hormonal steroidal contraception are the "injectables" and the "paper" pills.

The advent of hormonal steroidal contraceptives has been generally acclaimed as one of the most widely used, major discoveries of modern medicine. The first hormonal steroidal contraceptive preparations were field-tested some 25 years ago in the 1950s, and the first contraceptive pill, containing a combined female hormonal composition of oestrogen and progesterone, was commercially made available in U.S.A. in 1960. Since then, it is estimated that about 200 million women, the world over, have used hormonal steroid contraception, namely the "pill", and that currently about 80 million women are regularly using the hormonal steroidal contraceptive pill (Connell, 1975; Population Council Reports, 1979; and W.H.O. 7th Annual Report HRP/78.3, 1978).

When the contraceptive "pill" initially came into general use, it was received with great enthusiasm as the first contraceptive agent in history that was safe, virtually 100% effective, simple to use, reversible, and all in all, an ideal agent to prevent unplanned and unwanted pregnancies. "Experience has tempered the initial enthusiasm, however; for now it is understood that the ingestion of these "hormones" may exert a price: the "pill" is not entirely safe for all women; it may not always be reversible, it is not always effective; it is not even simple for all women to use. In short, with the "pill" as with every medication, its benefits must always be weighed against its risks" (Connell, 1975).

Over the years, the major research advances in hormonal steroidal contraception have been directed towards the introduction of new formulations and towards the monitoring and evaluation of undesirable side-effects of "pill" consumption. In the realm of new formulations of steroidal contraceptives, the research advances have resulted in the progressive reduction in the hormonal contents of the pills, and thereby minimising the undesirable side-effects, and, also in the process reducing the costs of the pills to the consumer. It is my considered view that the modern steroidal contraceptive pill has been made reasonably safe

for the family planning acceptor; and it is now the responsibility of the family planning worker to ensure that the family planning acceptor is made "safe" for the pill, by the proper initial screening and continued monitoring of the acceptor on the pill, so as to ensure the avoidance of health hazards or undesirable side-effects.

I will now summarise the current status of hormonal steroidal contraceptives, by quoting from my invited Review Paper that was published, some three years ago, in the journals circulating in South East Asia (Sinnathuray, 1976a) and in the Australian-New Zealand regions (Sinnathuray, 1976b):

"Hormonal steroid contraceptives are the most widely used and beneficial therapeutic agents in modern medicine. Their role in the prevention of unwanted pregnancies is unquestionable. The benefits, accruing from the world-wide distribution and usage of hormonal steroid contraceptives extend not only to the individual but also indirectly to her family and ultimately to the nation-at-large. The health benefits of hormonal steroid contraceptives are immeasurable, and on balance, are far in excess of the disadvantages and dangers arising from their side-effects and complications" (Sinnathuray, 1976a and 1976b).

"A comprehensive and balanced assessment of the hormonal steroid contraceptives was undertaken by the Royal College of General Practitioners of the United Kingdom. In their report (1974), entitled Oral Contraceptives and Health, they concluded as follows: "While it is evident that there are disadvantages associated with the use of oral contraceptives, risk of serious effects is small and the benefits to be expected from the associated reduction in menstrual disorders, iron deficiency anaemia, and fibro-adenosis of the breast, are worthy of careful consideration. Bearing in mind the additional evidence that the pill is unlikely to affect adversely the outcome of a subsequent pregnancy, nor to seriously diminish future fertility, it seems that the estimated risk at the present time of using the pill is one that a properly informed woman would be happy to take".

Finally, it must be accepted that the "contraceptive" pill, be it hormonal or non-hormonal,

will continue to remain as the most aesthetically acceptable form of contraception in most communities throughout the world, as "pill" taking is accepted, as a social norm for attaining optimal human health. We have now reached the happy state in which the old dictum: "An apple a day will keep the doctor away", can be modified to state: "A pill a day will keep the pregnancy away!"

2. Sterilisation

Sterilisation, both female and male sterilisation, now constitutes an important component of many national family planning programmes, throughout the world. In the recent decades, the concept of human sterilisation as a health-benefit measure has gained considerable acceptance and popularity by communities in most countries of the world. The better appreciation of human sexuality and reproductive physiology has contributed considerably towards the reduction of medical, social, ethical, moral and even religious prejudices regarding human sterilisation. This has, further, led to a smooth evolution of the legislation governing human sterilisation by the governments of most countries. The misconception that sterilisation is equivalent to or results in castration, particularly a misconception of male sterilisation, must be put aside, once and for all. The sterilisation procedure performed by a competent operator, be he/she a doctor or a lower level of health worker, should, for all intents and purposes, not result in gonadal (ovary or testis) injury, and hence in the loss of gonadal endocrinal functions. In fact, there are numerous instances, when following upon sterilisation, there have been improved human sexual performance and satisfaction; and this has been attributed to the elimination of anxiety and fear of unwanted conceptions, that can follow upon coitus without contraception. It is interesting to note that sterilisation was the method of contraception used by approximately 80 million couples throughout the world in the year 1977 (Population Reports, March, 1978).

In recent years, there have been tremendous strides in the field of sterilisation technology, particularly in female sterilisation. The advent of fibre optic endoscopy equipments, namely laparoscopes, culdoscopes and laprocaters, and the "cold" light sources, have helped to make female sterilisation a less elaborate procedure with a

considerably shortened period of convalescence. However, endoscopic sterilisation programmes require not only the services of skilled surgical operators, but also the backing of adequate hospital facilities to cope with the infrequent and inadvertent major surgical complications. Therein lie the limitations of this innovative method of female sterilisation.

Further, there still remain many questions, relating to human sterilisation and health, that are unanswered. The W.H.O. multi-centred research programmes (W.H.O. 7th Annual Report HRP/78.3, 1978) in this field are addressing themselves to some of these, and they are as follows: which procedure is the safest and most appropriate for use in developing countries? Do longer term sequelae occur to a significant extent? If so, what is their nature, are they related to a particular technique of sterilisation and how can their incidence be reduced? Is it safer to perform sterilisation concurrently with abortion or later after a prescribed time interval? The Obstetrical & Gynaecological Unit of the University Hospital is also undertaking some of these problem-orientated research studies under a regional Inter-University Collaborative Research Programme, involving the Departments of Obstetrics & Gynaecology of the Universities of Malaya, Medan and Singapore, which is funded generously by the International Development Research Centre (I.D.R.C.) of Ottawa, Canada.

3. Legal Abortion

During the past two decades, there have been dramatic changes towards the liberal availability of legalised induced abortion services in many countries of the world. In most of these situations, particularly in the Asian countries of South Korea, Japan, India and Singapore, the major reason for legalising induced abortion practice has been to augment the existent family planning services, as well as to reduce the problems of illegal clandestine abortion practices. In other situations, such as in the United Kingdom, in many countries of Europe and in some states of U.S.A., legalised induced abortion services are being provided as a necessary socio-medical service to better the "social" well-being of the community as well as to eradicate the social and health hazards of the alternative illegal clandestine abortion practices.

Although precise statistical data are lacking, it is estimated that between 30 and 55 million abortions are induced each year throughout the world (W.H.O. 7th Annual Report HRP/78.3, 1978). This number is equivalent to 3 to 4 times the present total population of Malaysia! It is of note that, currently, about one-third of the world's women are living in countries where legalised abortion services are freely available. Further, it is estimated that another third of the world's women are living in countries where unwanted pregnancies may be terminated for broadly interpreted medical, psychological and socio-economic reasons. In the light of such a world-wide prevalence of the practice of induced abortion, the World Health Organisation, in response to requests from member countries, has embarked on an extensive special programme of research activities in the field of induced abortion, not only to assess the epidemiological and health services problems of induced abortion practice, but also to develop improved technological resources and manpower skills to render the practice of induced abortion safer for the women.

From a socio-medical viewpoint, the major advance in legal abortion has been the general all-round appreciation that the earlier the abortion is performed in pregnancy, the easier it is for the medical attendant and the safer it is for the woman. Thus an abortion induced in the second trimester of pregnancy (4th to 6 months of pregnancy) is technically more difficult and carries a greater health hazard to the woman than a similar procedure undertaken in the first trimester of the pregnancy (1st 3 months of pregnancy). Further, a very early abortion, induced within 14 days of the woman having missed her menstrual periods, is technically very easy and carries practically no health hazards to the woman. Such a procedure is now available, and is referred to under an aesthetically and socially acceptable terminology of "Menstrual Regulation".

From a technological viewpoint, the recent major advances in legal abortion have been many, of which I intend to highlight only the important few.

(a) Menstrual Regulation

"Menstrual regulation" is, as stated, a socially accepted terminology which is also referred to as

"mini-suction" or "mini-abortion". It is a procedure that can be successfully performed within 14 days of the woman, having missed her menstrual periods. It is a technically simple procedure, which can be undertaken by a medical attendant (doctor or even a trained nurse-midwife) with minimal training. All that is required is the standard equipment for a gynaecological examination, a syringe for suction, and sterile cannulae. The procedure can be performed with minimal analgesia or no anaesthesia, requires no cervical dilatation, and can be undertaken, outside the hospital precincts, in the most peripheral health service setting of developing countries. Furthermore, the entire procedure is an outpatient procedure, which is quick, taking less than 10-15 minutes to complete.

[b] Dilatation-Suction Cannulae

In response to the demand for safer induced abortion equipment, there has emerged the development of hollow dilatation-suction cannulae for the safe evacuation of the uterine contents. Flexible plastic cannulae which can be disposable, have replaced the rigid expensive metal dilators and cannulae, which are also more traumatic to the mother's womb. Further the use of suction-curettage, in place of manual curettage, has considerably enhanced the safety of the procedure and the speed of evacuation of the uterine contents.

[c] Late Abortion Safety

The health hazards to the woman from late abortions, induced in the second trimester of pregnancy (4th to 6th months of pregnancy), are still a concern to the medical profession. Such late abortion practices are to be strongly discouraged by health education of both the public and the medical profession. When such abortions become unavoidably necessary, their safety has been enhanced, in recent years, by the use of prostaglandins to pharmacologically stimulate the uterus to evacuate its contents, in preference to the elaborate and more hazardous surgical evacuation.

FERTILITY AUGMENTATION [INFERTILITY MANAGEMENT]

Fertility augmentation or infertility management, when placed in its proper perspective and viewed from the health costs-benefits study,

contributes only towards a very small component of the total picture of Reproduction and Health in any given community or nation, as compared to the fields of maternal health, fetal health and fertility regulation (family planning). However, it is currently a topic of medical sensation, and hence has attracted much publicity with the achievements of Steptoe and Edwards of the United Kingdom.

The major advances in the field of infertility management, in recent decades, have been contributed largely by the better understanding in the various areas of reproductive endocrinology. With the better understanding of the physiology, biochemistry and pharmacology of both female and male reproductive endocrinology, great strides have been made in the scientific and rational approach to the diagnostic and management aspects of human infertility.

Advances in the field of steroidal hormonal biochemistry have been accelerated by the use of radio-immunoassay techniques, and they have contributed considerably to a better understanding and elucidation of the endocrinal causes of human infertility. Pharmaceutical biochemistry has reached a degree of sophistication, which has resulted in the availability of a whole array of reproductive hormones and hormone-related therapeutic agents, for use in the management of the endocrinological causes of human infertility. Thus, there are numerous preparations of oestrogens, progesterones and testosterone available for such deficiency states in the field of human infertility and sub-fertility. Further, in women who do not ovulate satisfactorily, despite a normal state of the ovaries, ovulation-induction can be effected by the use of chemical substances, such as clomiphene or Bromo-ergocryptine, or by the administration of potent natural hormones of the human pituitary gland, namely the gonadotrophins.

Obstruction in the lumen of the Fallopian tubes continues to remain as a single major cause of human infertility. Success rates from the conventional plastic surgery on the tubes have shown little appreciation in recent years. Currently, studies are in progress, to improve the fertility results in tuboplasty by improved surgical technique with the application of micro-surgery, using the operating microscope, which provides for very high magnifications; and there are also some

studies on the feasibility of tubal transplants from other human donors, similar to the kidney transplant operations. Results of success in this field are yet to be evaluated from the long term aspect of success in fertility restoration.

In view of the extent of the contributory role of tubal obstruction in human infertility and the limitations of success with tubal reconstructive surgery and tubal transplant operations, expensive and sophisticated research has been in progress in a few world centres in the research arena of "test-tube babies", which have also been referred to as "embryo transfers" or "ovum transfers". It consists of recovering the ova from the human ovaries, after stimulating the ovaries to ovulate or superovulate using gonadotrophins and clomiphene, and fertilising them with the sperms extracorporeally, i.e. outside the human parturient canal. The fertilized embryo, in a very early stage of its development, is placed within the maternal womb, which has been so prepared by hormonal stimulations for optimal reception of the fertilised embryo (Lopata, et al, 1978 and 1979).

Although "embryo transfers" have been practised with considerable success, in recent years, by veterinary scientists for selective animal breeding; the programme has eluded success in the human female, until very recently in 1978, when Steptoe and Edwards in the United Kingdom revealed their success to the world, with the birth of Baby Brown. This success of an interdisciplinary team of British medical scientists led by Patrick Steptoe and Robert Edwards, has been acclaimed world-wide, as a great medical achievement indeed! However, it must be remembered that these two British doctors and their team had been working on the project for no less than 10 years, before obtaining their first successful baby (Steptoe and Edwards, 1978). Further, their project has entailed the expending of a relatively large quantity of specialised and sophisticated human and technical resources, which the developing countries can ill-afford at the present stages of their development; and when such human, technical and monetary resources are available, their utilisation can be more beneficially channelled towards other pressing health priorities which will aim to benefit much larger segments of the populations of these countries.

THE FUTURE

In the area of fertility regulation (family planning), there will be further improvements of the oral contraceptive pill, and, may be, there may emerge a non-steroidal contraceptive pill. Such a contraceptive pill may exert its efficacy only by impairing the integrity of the endometrial lining of the womb to receive the fertilised embryo. If this was, at all, possible then the numerous side-effects, disadvantages and health risks of the popular currently available steroidal contraceptive pill will be done away with! The innovation of such a contraceptive pill may have to take into consideration the understanding in-depth of the cellular physiology and biochemistry of the uterine endometrial lining. Looking at further developments in the field of fertility regulation, there is every possibility, in the near future, of the emergence of a "vaccine" to immunise women against the risks of becoming pregnant, and also the availability of a safe male contraceptive pill. So cheer up female partners!

Finally, it will not be too long before women have in their possession, a safe and almost 100% effective "menstrual regulating" agent, which they will be able to self-administer when they wish to rid themselves of an unwanted early pregnancy. Already, such a menstrual regulating agent, in the form of vaginal prostaglandin pessary is being "field" tested for its efficacy and safety! The emergence of oral preparations, containing prostaglandins or other chemical agents, and capable of exerting similar "menstrual regulating" effects, is becoming a real possibility.

CONCLUSIONS

In my inaugural address, I have attempted to comprehensively cover the extensive benefits accruing to human health and human welfare from research in human reproduction in this 20th century. The ultimate objectives of research in human reproduction are firstly, to ensure that the society in general, the family as a unit, or the woman as an individual, is assisted in her or its endeavour to successfully have the desired number of children, at the desired pregnancy intervals, and further to ensure that every pregnancy progresses from conception to childbirth, as uneventfully as possible, with the minimal of health hazards to mother and child.

It is thus, apparent to all of you that those of us, practising in field of obstetrics & gynaecology, are intimately concerned not only with the quantity of life at conception, but also with the quality and quantity of both maternal and fetal life throughout pregnancy, childbirth and thereafter!

The sum-total message of my inaugural address, entitled Reproduction, Research and Health, is a healthy woman conceiving at the desired times of her reproductive life, and having, on each occasion, a healthy pregnancy status, culminating in a normal childbirth; and the final return to the society of a happy and healthy mother and child.

SUMMARY

The tremendous research advances in recent decades in the three widely used methods of fertility regulation (family planning), namely hormonal steroidal contraception, sterilisation and legal abortion, have been presented and discussed. The considerable health benefits accruing to the woman, in particular, and to the society, in general, from the practice of these fertility regulation methods, especially in the context of developing countries, have been reviewed.

Recent research advances in the area of fertility augmentation (infertility management) have been presented and discussed. The manner in which some of the future trends in fertility regulation are likely to develop has been briefly stated.

ACKNOWLEDGEMENTS

To the Honourable Vice-Chancellor, Royal Professor Ungku A. Aziz, I wish to extend my very sincere gratitude for having graciously presided at the meeting of my inaugural address, and for having introduced me with such laudable and kind remarks about my department and myself to a large audience, consisting of staff and students of the University of Malaya and University Hospital, the members of the medical profession and the public. I also wish to thank the Honourable Vice-Chancellor for giving me the honour and distinction of delivering the first inaugural address in this Medical Faculty, in its current resumed series, after a long lapse of over 12 years.

My very sincere appreciation and thanks to Mrs. Ivy Phang of my department for her excellent secretarial assistance rendered on the preparations of the manuscript of my inaugural address, for the presentation and the subsequent publications.

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