

Cross-sectional study of Older Adults with Type 2 Diabetes Mellitus in Two Rural Public Primary Healthcare Facilities in Malaysia

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SUMMARY

Knowledge of the characteristics of older adults with type 2 diabetes mellitus (T2DM) is indispensable for improvement of their care. A cross-sectional study in two rural public primary healthcare centres in Malaysia identified 170 actively engaged older patients with T2DM, with suboptimal glycaemic control and frequent hypoglycaemia. The prevalence of multiple co-morbidities, complications of T2DM, high cardiovascular risk, neurological, musculoskeletal and visual deficits suggested high risk of disabilities and dependency but not yet disabled. This short window for interventions presents as an opportunity for development of a more comprehensive approach extending beyond glycaemia control to risk management, preventing functional loss and continuity of social participation.

KEY WORDS:

Aged; Diabetes complications; Diabetes Mellitus, Type 2; Malaysia; Hypoglycaemia

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a common chronic disabling disease affecting the older adults in Malaysia as well as worldwide¹. In 2006, 1 in 4 adults between 60 and 70 years were afflicted in this country. The resulting cognitive and functional disabilities as well as dependencies placed a significant burden to the healthcare and social care resources.

The confluence of the current epidemic in the young and middle-aged adults as well as the rapid increase of the ageing population means a further anticipated accelerated increase in the number of older adults with T2DM of alarming proportion. Magnifying this trend is the significant number who did not achieve the glycaemic target despite medical treatment^{2,3}. In addition, T2DM is associated with increased risk of cognitive impairment, dementia and mobility decline, selected geriatric conditions or geriatric syndromes associated with substantial morbidity and adverse outcomes⁴. This implies that the combination of disabling complications of T2DM, geriatric syndromes and issues specific to the older population such as depression, polypharmacy, nutritional risk or deficiency and injurious falls will lead to a high cumulative risk of dependency.

Furthermore, in developing countries, the evolution of economic and social infrastructures is not moving in step

with population ageing, compared to the developed countries⁵. If the health care and social needs of this specific group of older adults are not addressed, there will be continual pressure on the social and healthcare service support structure of the future⁶.

With the limited resources available, the measures that can be initiated to increase both the quality of life for these older adults and decrease the expenditure requirement for the more costly items of care need serious considerations. Fortunately, insight into the successes of developed countries with large ageing populations can be drawn to address the lagging pattern of changes in ageing population in developing countries⁷. Since many risk factors of disability are modifiable, there is an urgent need to identify this targeted population which is at risk of disabilities but not yet disabled within the short but important 'window of opportunity' currently available.

The increasing focus on the prevention of disability in the older individual and on the underlying physiological processes implies that the prevention of disabilities resulting from T2DM needs to be addressed at the subclinical or early stages of the disease⁸. To address these issues effectively, understanding of the characteristics of older adults with T2DM in the local community is required. Unfortunately, there is currently no baseline information on this targeted group of older adults with T2DM. The analysis in this article is part of a study of older adults with T2DM in two rural public healthcare facilities in Malaysia. The objective of this paper is to describe the characteristics of these older adults with Type 2 diabetes mellitus.

MATERIALS AND METHODS

Study Population

This is a cross-sectional study that took place in two public primary health care community clinics in rural Selangor, Malaysia. A consecutive sample of 170 older patients with T2DM, who attended routine diabetic care follow up between February 2008 and December 2008, were recruited.

Inclusion and exclusion criteria

All the subjects were 60 years and above, had been diagnosed with type 2 diabetes mellitus for more than 6 months, on management with diet, exercise and pharmacological agents based on clinical guidelines provided by the Ministry of

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Table I: Demographic and social characteristics of the patients with T2DM

Characteristics	Frequency	Percent
Age (years)	67.32 ± 5.45	
Gender:		
Male	70	41.2
Female	100	58.8
Ethnicity:		
Malay	66	38.8
Chinese	47	27.7
Indian	57	33.5
Education Level		
no formal education, n (%)	44	25.9
primary education, n (%)	94	55.3
secondary and above, n (%)	32	18.8
Marital Status*		
Married [1]	92	54.1
Single/Widowed [0]	78	45.9
Living arrangement*		
Living with others [1]	161	94.7
Living alone [0]	9	5.3
Availability of physical help when required in relation to diabetes care*		
Yes [1]	170	100
No [0]	0	0
Availability of confidant*		
Yes [1]	170	100
No [0]	0	0
Frequency of social contact*		
twice a week or more [1]	170	100
less than twice a week or rarely [0]	0	0

Note: *The five social variables added to give a composite social engagement score. The scores are either [1] or [0].

Table II: Medical characteristics, social engagement and nutritional risks of patients in this study

Characteristics	
Duration of T2DM, years, mean (SD)	9.00 (6.77)
Total medications, mean (SD)	2.93 (1.12)
Body mass index, kg/m ² , mean (SD)	26.21 (4.48)
Glycosylated haemoglobin, g%, mean (SD)	8.02 (2.09)
Fasting blood glucose, mmol/l, mean (SD)	8.96 (3.48)
Present: Absence of awareness of hypoglycaemia, (%)	22.4: 77.6
Present: Absence of microvascular complications of T2DM, (%)	54.7:45.3
Present: Absence of renal impairment, (%)	79.4:20.6
^a High social engagement level, (%)	95.9
^b Nutritional risk categories	
Malnutrition (0 - 7), n (%)	1 (1.2)
At risk of malnutrition (8-11), n (%)	22 (12.9)
Normal nutritional status (12-14), n (%)	147(85.9)

Note: ^aAdapted social engagement scores has a reliability coefficient, α , of 0.66. Social engagement scores: ≥ 4 = high social engagements, 3 = medium social engagement, < 2 = low social engagement. ^bMNA-SF adapted measure has a reliability coefficient, α , of 0.71. Nutritional risk score: 12-14 = normal nutritional status, 8-11 = risk of malnutrition and 0-7 = malnourished individuals.

Health, Malaysia. Those excluded had other active endocrine conditions, corticosteroid use, anaemia (Hb greater than 10 g/dl) and haemoglobinopathies. This project was approved by the institutional ethics review board as well as the Ministry of Health, Malaysia in accordance with current guidelines on Good Clinical Practice, the Declaration of Helsinki, and subsequent relevant versions.

Data Collection

Informed consent was sought from every patient. At recruitment, enquiries were made about symptoms of

previous hypoglycaemia, their awareness and responses to hypoglycaemia (fear of hypoglycaemia and their behaviour aimed at preventing it). The checklist of symptoms of hypoglycaemia, derived from previous studies, included confirmatory physiological study^{9,10}. Questions on awareness and responses to hypoglycaemia were translated to Bahasa Malaysia for use of the local community in this research¹¹. Information on socio-demographics, medical history and medical therapies was obtained from medical records. Secondary data captured from medical records were used to compile the information required for the 'Mini-nutritional

assessment – short form'. This tool was validated for screening of nutritional risk in the local community¹². Similarly, social variables gathered from the medical records were used to quantify the level of social engagement. This instrument was evaluated in the pilot study at the beginning of this research project, in a rural community in Selangor. The scoring was based on those used in previous epidemiological studies and included five social variables¹³ (Table I). These were added to give a composite social engagement score. Where information was missing, it was sought from the participants and their families.

Data analysis

Statistical analysis was performed using PASW 18 for Windows (SPSS Inc, Chicago, IL, USA). Descriptive statistics are presented as mean values (with standard deviation) and frequencies. Comparisons between the individual characteristics of the categorical variables and glycaemic control were performed with Mann-Whitney U tests and Kruskal-Wallis Tests as appropriate. Relationships between continuous independent variables and glycaemia control (non-parametric distribution) were explored using Spearman's Rank Order Correlations. $p < 0.05$ was set as the significant value for all these tests. In the final analysis, no statistical method was used to address the missing values of only 3.5% and 0.05% which were noted in the HbA1c and weight variables respectively.

RESULTS

A total of 170 patients, older than 60 years with T2DM, were included in the statistical analysis. Their demographic and medical characteristics are shown in Table I and II respectively. The majority of the patients were in the young-old category with 9.00 ± 6.77 years of T2DM. Despite the low education level, these patients were active socially with nutritional risk in only 14.1% of the patients (Table II).

Though the majority were physically active (95.3%) and monitor their diet, they were overweight (mean body mass index (BMI) 26.21 ± 4.48 kg/m²). Despite pharmacological treatment for all the subjects, the glycaemic control was suboptimal and above the recommended HbA1c target of 6.5 g%. Among the majority on oral hypoglycaemic agents (97.1%), 60.6% were on more than two kinds of pharmacological agent. Metformin was the most frequently prescribed agent (82.9%), followed by sulphonylureas (73.5%). Only 2.9% of patients were treated with insulin only or combination with oral hypoglycaemic agents.

Microvascular complications of retinopathy, neuropathy or overt proteinuria were found in 45.3% of the patients, while 18.8% had macrovascular complications (angina, myocardial infarction or stroke). In addition, 15.3% had microalbuminuria. Furthermore, a significant number of the patients had cardiovascular risks of hypertension (85.9%) and dyslipidemia (50.6%). Despite the use of angiotensin-converting enzyme inhibitors (ACEI) (48.8%), beta-blockers (37.1%), a combination of either medications or calcium channel blockers (17.1%), a significant number (53%) did not reach the goal of blood pressure control ($< 130/80$). Of those who had dyslipidemia, 81.4% took lipid lowering agents.

Hypoglycaemia symptoms over the past year was the most common acute complications reported (61.8%). Although the majority of the patients self-managed to prevent mild hypoglycaemia events (72.9%), a significant number had low awareness (77.2%) and absence of fear of hypoglycaemia (58.2%) of these events.

HbA1c correlated positively with fasting blood glucose. The calculated rho was 0.346, with a two-tailed P value of 0.000, which was statistically significant. The rho value of greater than 0.3 implied at least a moderate correlation. However, there is no association found with the categorical variables.

DISCUSSION

The result of this analysis clearly showed that a considerable number of older diabetic adults despite treatment had suboptimal glycaemic control. Micro- and macro-vascular complications and mild hypoglycaemia were prevalent. Cardiovascular risks were poorly controlled. This implied that this specific group of older adults has a significant predisposition to disability. However, the high social engagement scores indicate active participation in the community. Taken together, this means that this specific group is at high risk of disability and dependency but is not yet disabled. Thus, empirically, based on current evidence, there are opportunities to prevent disabilities.

The finding of 61.8% of the patients with mild hypoglycaemia in this study was consistent with previous findings from outpatient settings¹⁴. The vulnerability of the older adults with T2DM to hypoglycaemia and poor awareness of hypoglycaemic symptoms due to reduced sympathetic drive and medications means focussing on adequate rather than tight glycaemic control¹⁵. Along with the reduced long-term benefit compared to younger adults with T2DM, there is also the consideration of enhancing the quality of life. This suggests that management goals also need to include the maintenance of functional status, participation in social life and prevention of disabilities.

Even though these hypoglycaemia events may be mild, there is physiological blunting of the hormonal counter-regulatory system¹⁶. This in turn increases six to nine fold risk of progression to severe hypoglycaemia with consequent physical, cognitive injuries and disabilities (including the risk of dementia)¹⁷. Furthermore, the psychological impact of the fear of hypoglycaemia may disrupt daily routines, causing non-compliance with treatment regimes and restrictions in activities. Severe hypoglycaemia episodes may also trigger serious disabling and life-threatening events such as myocardial infarctions and strokes¹⁸. The resulting escalated cost of care will further burden the health and social care system¹⁹. Older adults with T2DM are a heterogeneous group, for the relatively healthy and functional ones, the long-term complications of T2DM and resulting geriatric syndrome may pose a larger threat⁴.

Since hypoglycaemia can be prevented, appropriate risk factor management can offset the concerns about hypoglycaemia, aiding better metabolic control. The findings of low awareness of hypoglycaemia symptoms (22.4%) was

consistent with previous studies on the older adults with T2DM¹. This can be rectified by incorporating knowledge of hypoglycaemia and T2DM among older adults into a diabetes education program^{20,21}.

Only 15.3% of the older adults with T2DM in this study documented microalbuminuria. Micro-albuminuria is not only a marker of increased cardiovascular risk and risk of progression to overt macro-albuminuria and renal failure, it is also implicated as a risk of cognitive decline²². In addition, epidemiological studies have also demonstrated the reversibility to normal cognition in 44% of subjects in controlling systolic hypertension as well as the reduction of cardiovascular events with lipid lowering therapy²³. Furthermore, numerous new studies are available, documenting that not only micro-albuminuria but also renal and cardiovascular complications as well cognitive decline in these patients are also far better controlled by early detection and treatment. To achieve these therapeutic goals of reduction of cognitive decline, cardiovascular and renal risk, it would be justified to propose that screening for micro-albuminuria in addition to other cardiovascular and renal risks should be intensified for all older adults with T2DM.

Therapeutic agents, such as angiotensin-converting enzymes inhibitors (ACEI) and angiotensin II receptor blockers (ARBs), facilitate better blood pressure control and reduce micro-albuminuria, have been shown to be an effective way to retard not only the progression of renal disease and cardiovascular disease but also may be protective against cognitive decline²⁴. Nonetheless, the underuse of these therapeutic strategies in patients in this study is consistent with older diabetics elsewhere²⁵.

The finding of 14.1% at nutritional risk or risk of malnutrition in this study is consistent with other older population with chronic diseases²⁶. Even though the patients with nutritional risk are only a minority, addressing the issue is important. This is because good nutrition has the potential to improve the function and quality of life of older adults, health, survival and independence, while subclinical and overt deficiencies have similar negative effects on health and function of older adults²⁷. When nutritional goals were focused on counting calories in glycaemic control rather than promoting a healthy, balanced food intake, poor health resulted. Adding to the combination of body composition as well as physiological changes with the ageing process, pathology, polypharmacy and psycho-social factors (e.g., depression), greatly accelerate the negative trajectory of ageing leading to increased frequency of falls, fractures and consequent disabilities. Furthermore, understanding the 'food as medicine' practice in the context of the various ethnic groups in the community may complement nutritional interventions to improve health.

The progressively changing social roles and relationships in the life-cycle make grasping the whole bio-psychosocial perspective in diabetes management become increasingly important²⁸. In situations where there is loss of hypoglycaemia awareness, spouses and family members are the ones who often recognise these events²⁹. Besides the protective effect of social interaction and the higher level of

social support for older adults, social support is also important in the behavioural changes and diminished cognitive function that limit participation in one's own care³⁰. Thus, the high social engagement among the patients in this study may contribute beneficial resources towards the well-being of the older adults with T2DM.

The major limitations of this study were the relatively small number of subjects and the cross-sectional design from which it was not possible to establish a causal relationship. However, to our knowledge, this is one of the first studies that investigated the characteristics of older Malaysian adults with T2DM. It is believed that our results will support future studies in the management of older adults with T2DM extending to the prevention of disabilities in this country.

CONCLUSION

The findings of this targeted group of older adults with T2DM who is at high risk of disability and dependency but not yet disabled indicates the presence of opportunities. However, this window for interventions may be short. Therefore, an optimised comprehensive approach in the management of older adults with T2DM, which extends beyond glycaemic control to the maintenance of their functional status, participation in social life and prevention of disabilities is required. Using such an approach may enable successful ageing from the patients' perspective as well as long term healthcare cost savings without increasing the burden of social care from society's perspective.

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