

ORIGINAL ARTICLE

QUALITY OF LIFE AND GLYCAEMIC CONTROL AMONG OLDER POPULATION WITH DIABETES IN THREE DISTRICTS OF PENINSULAR MALAYSIA

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ABSTRACT

The older population is increasing in numbers worldwide. Most of them have multiple comorbidities including diabetes. The diabetic control in elderly is usually challenging. Their quality of life and socioeconomic condition either in rural or urban area could affect their disease progress. This study aims to measure the diabetic control and its associated factors, including quality of life among the older population with diabetes in three different districts of Malaysia. The patients' health and background details were recorded. Validated Malay version of diabetes quality of life questionnaire was used. 485 elderly diabetic patients were recruited based on two proportion formula comprising all clinics in those districts representing urban vs rural area. Data were analyzed using simple and multiple logistic regression for the association. Only 30.5% of the patients have good diabetic control with patients in Kuala Terengganu district achieved better sugar control ($p < 0.001$). However, the only significant diabetic control predictor is the quality of life of the elderly patients (OR = 1.32, CI 1.047 - 1.224). Level of diabetes control in these three districts are poor, concomitant with the poor control of the elderly non-communicable disease profiles. It is essential to embark on holistic approach in dealing with the elderly diabetic management and identify measures to improve quality of life in those with poor glycaemic control in order to have better disease outcome.

INTRODUCTION

The ageing population of the globe is increasing at an unprecedented rate. Nearly 10% of the world's population is over 65 years old which is the geriatric age definition for Malaysia.¹ This scenario is reflected in the Malaysian population, with men's life expectancies increasing to 73 years and females' life expectancies increasing to 77 years.² As a result, the difficulties and challenges of Malaysia's ageing population must be addressed. This includes the issues in managing non-communicable diseases such as diabetes mellitus among our geriatric population.

There are several factors associated with diabetes control, such as age, treatment modalities, education background, obesity status, social support, comorbidities, and clinic and care factors.^{3,4} A few aspects need to be considered in determining the targets and therapeutic

approaches for diabetes management, including the assessment of medical, psychological, functional, and social geriatric domains in older adults.^{4,5} Age-associated alteration in metabolism and excretion of medication is also a concern in the selection of antidiabetic treatment.⁵ Furthermore, clinic and medication resources, patient perception, diet, and other lifestyle factors in different areas may contribute to the level of control. The surrounding home and environment, whether in rural, suburban, or urban areas, make a significant difference in influencing diabetes control and quality of life in diabetic patients.⁶⁻¹⁰ Health awareness and education, financial income, and family support, healthy lifestyle compliance, and clinic resources, including budget, are among the important factors that are always overlooked.¹¹⁻²¹

Quality of life is one of the important spectrums in everyone that signifies the success of the

treatment outcome.⁹ It is especially important in the elderly population with chronic diseases such as diabetes, due to the concomitant elements of psychological and social issues that also influence the disease progression. For the past ten years, most guidelines focus on the holistic approach of managing a disease by looking at the patient-centered approach rather than constricting the scope to the disease itself.^{10,11} Most researchers believe that there is always a linear relationship between quality of life and diabetes control.¹⁰⁻¹⁷ Therefore, we need to remember that in the process of controlling diabetes, some measures might deteriorate the quality of life, such as treatment burdens, strict monitoring, and frequent clinic appointments.⁹⁻¹² At the end of the day, complications might occur secondary to the treatment, which further lowers the quality of life.

Therefore, this study will look at diabetes control and its comorbid control as well as their associated factors in the geriatric age group in three different locations of elderly diabetes patients. Having three different districts representing different areas in the country would allow us to review different management styles all centers, review confounding factors that might not have been highlighted, and come up with new recommendations for managing diabetes and its comorbidities for the elderly at a primary care level suitable for our local settings.

METHODS

This study involved 485 elderly diabetic patients who were followed up at all health clinics within three districts, namely Kuantan, Kuala Terengganu and Gombak. Inclusion criteria includes those age 65 years and above, Malaysian and actively follow up in the local health clinics within the selected districts. Those patients who are cognitively impaired or unstable were excluded from this study. The sample size was calculated based on hypotheses testing for two population proportion formulas using the highest sample size calculated from all objectives (diabetic control and variables control) as described by Lemeshow and Lwanga in 1991,²¹ with a confidence level of 95% and power of 80%, which is 221 for each urban and rural area. Therefore, the final minimal sample size required is 442. In this study, we managed to receive 485 respondents.

A multistage stratified sampling was used in this study. First, three convenient districts (Kuala Terengganu, Kuantan, and Gombak) were chosen to represent three different mixtures of urban-suburban and rural areas. Second, all 21 clinics were identified and listed. They were grouped into

urban-suburban and rural areas clinics based on the location of the clinic either located within population less than 10,000 people (rural) or more than that (urban). The total number of elderly diabetes patients in each clinic were analyzed based on the national diabetes registry. Third, the number of patients required per clinic were based on the ratio of elderly diabetes patients in comparison to the total diabetes patients per clinic based on a proportion calculation to achieve minimum 221 patients from each rural and suburban-urban area. Fourth, based on the total number of patients required per clinic, random samplings were executed based on excel software which had selected randomly from the lists of patients in each clinic in excel format. This measure ensured random sampling represents each clinic with an adequate ratio and amount to add up to equal numbers of rural, suburban, and urban patients.

The instruments used in this study were divided into three sections. The first section consists of questionnaires related to sociodemographic characteristics and a validated questionnaire on quality of life in adults with diabetes by Bujang et al in 2018.²² This questionnaire consists of 13 items that contains the domain of "satisfaction", "impact" and "worry". It is the revised version from the original 46-item Diabetes Quality of Life (DQoL) instrument validated by the same researchers.²² The questionnaire's items and Pearson's reliability was excellent with 0.92 and 0.84 for "satisfaction" domain, 0.98 and 0.60 for "impact" domain, and 0.99 and 0.57 for "worry" domain, respectively.²² The satisfaction domain has a maximum score of 30, the impact domain has a maximum score of 20, and the worry domain has a maximum score of 15. The maximum DQoL score will be 65 in total. The higher the score for each domain and the overall DQoL score, the lower the DQoL score in terms of satisfaction, worry and impact on their quality of life.²²

The second section of the form consists of clinical data of height, weight, and blood pressure. Lastly, the third section contains the most recent laboratory investigation results for fasting plasma glucose (FPG), HbA1c, and comorbid control from the diabetes record book (lipid profile, renal profile and other blood parameters) within the previous one year. Good diabetes control for the elderly is based on HbA1c level of less than 7.5%.¹⁰ Good control is also achieved if the reading is less than 140/90 mmHg for blood pressure and LDL is less than 2.6 mmol/l for cholesterol respectively.¹⁰ All the information was recorded in the data collection forms. SPSS version 21 was used for data entry and analysis. Univariate analysis and multiple logistic regression were used to identify the significant factors for the diabetes

control among elderly. This study was approved by Medical Research and Ethics Committee (MREC) NMRR-18-2894-44033 as well as local health

authorities.

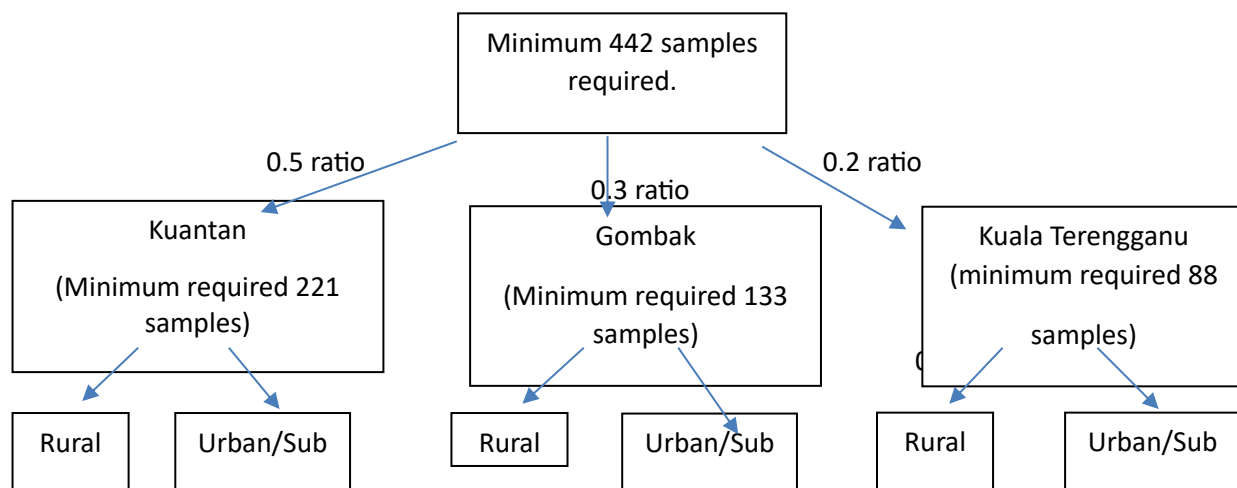


Figure 1: Distributions of patients required in the multistage stratified random sampling (based on elderly ratio patients in the district and clinic).

RESULTS

The median age of the elderly population is 67 years old. There is almost an equal distribution of male and female respondents, with most of them being Muslim, Malay, and pensioners. They fall into the B40 income group and are independent in terms of activities of daily living and staying with family members. More than half of the clinics have family medicine specialists (FMS) regularly in the clinic. The median level of quality of life is 22.0 as shown in Table I below.

Only 30.5% of the elderly had achieved good diabetic control (Table II). Most of them are obese (50.7%) and hypertensive (81.9%). Most of the geriatrics require two types of oral anti-diabetes (OAD) (43.7%) and two anti-hypertensive medications (34.6%). 34% of them are on insulin as

reflected in Table III.

Table IV showed that a higher percentage of elderly patients in Kuala Terengganu can achieve good diabetic control in comparison to other districts. Based on simple logistic regression, good diabetic control is significantly associated with male gender, ex-smoker status, and normal abdominal circumference. Those who have a higher quality of life, with good support from family members and stay in Kuala Terengganu, achieve good diabetic control. In terms of medications, those on one form of medication administration (oral) and those on insulin can control their diabetes well (Table V). However, based on multiple logistic regression, only good quality of life would predict good diabetic control among the elderly population (p = 0.002) as shown in Table VI

Table 1a: Demographic characteristics of Older Population and Clinics

Variables	Median (Range)	Frequency (n)	Percent (%)
Age (years)	67.0 (43.0)		
Gender			
	Female	282	58.1
	Male	203	41.9
Ethnicity			
	Malay	411	84.7
	Chinese	41	8.5
	Indian	30	6.2
	Others	3	0.6
Religion			
	Muslim	410	84.5
	Non-Muslim	75	15.5
Job status			
	Pensioner	307	63.3
	Not working	111	22.9
	Still working	67	13.8
Income group			
	B40 (household income < RM4850)	450	92.8
	M40 (household income RM4850 - RM10959)	35	7.2

Table 1b: Demographic characteristics of older Population and Clinics

Variables		Median (Range)	Frequency (n)	Percent (%)
Age (years)		67.0 (43.0)		
Education	Nil		48	9.9
	Primary		216	44.5
	Secondary		175	35.1
	Tertiary		46	9.5
Family support	Stay with family		457	94.2
	Stay alone		28	5.8
Family accompanies	Yes		253	52.2
	No		232	47.8
Smoking status	Smoker		39	8.0
	Ex-smoker (at least 1 year quit)		91	18.8
	Non-smoker		355	73.2
District	Kuantan		269	55.5
	Gombak		127	26.1
	Kuala Terengganu		89	18.4
Location	Urbanized area		259	53.4
	Rural area		226	46.6
FMS Presence	Yes		276	56.9
	No		209	43.1
Hospital follow up	Yes		137	28.2
	No		348	71.8
ADL status	Independent		436	89.9
	Semidependent		39	8.0
	Dependent		10	2.1
Quality of Life		22.0 (34.0)		

Table 2: Diabetes and comorbid control status of the older Population

Variables		Frequency (n)	Percent (%)
Diabetes control	Yes (< 7.5% HbA1c)	148	30.5
	No (> 7.5% HbA1c)	337	69.5
Hypertension status	Yes	397	81.9
	No	88	18.1
BP control on visit	Yes (BP < 140/90 mmHg)	237	48.9
	No (BP ≥ 140/90 mmHg)	248	51.1
Lipid control	Yes (LDL ≤ 2.6 mmol/l)	156	63.2
	No (LDL > 2.6 mmol/l)	329	22.8
Abdominal circumference	Normal	94	19.4
	Abnormal	391	80.6
BMI	Underweight	9	1.9
	Normal	102	21.0
	Overweight	128	26.4
	Obese 1	199	41.1
	Obese 2	39	8.0
	Morbid obese	8	1.6
CKD status	Normal / Level I	184	38.1
	Level II	126	26.0
	Stage IIIa	96	19.8
	Stage IIIb	52	10.7
	Stage IV	23	4.8
	Stage V	3	0.6

Table 3: Medications Characteristics of the Older Population

Variables		Frequency (n)	Percent (%)
Insulin	Yes	165	34.0
	No	320	66.0
Types of antidiabetics	Lifestyle only	12	2.5
	Oral only	309	63.7
	Insulin only	25	5.1
	Oral and insulin	139	28.7
Number of oral ODA	0	21	4.3
	1	185	38.2
	2	212	43.7
	3	66	13.6
	4	1	0.2
Statin Use	Yes	412	84.9
	No	73	15.1
Number of anti-HPT	0	49	10.1
	1	132	27.2
	2	168	34.6
	3	93	19.2
	4	38	7.8
	5	5	1.1

Table 4: Diabetes control among Three Districts

	Diabetes Control			P value
	Control (N, %)	Not controlled (N)	Total	
DistrictKuantan	76 (28.25%)	193 (71.75%)	269	< 0.001*
Kuala Terengganu	48 (53.93%)	41 (46.07%)	89	
Gombak	24(18.90%)	103 (81.10%)	127	

*Chi square test, P value significant if < 0.05

Table 5: Significant association via Simple logistic regression

	P value	Crude odd ratio (OR)	95.0% C.I. for OR	
			Lower	Upper
Gender (male)	0.029	1.563	1.046	2.334
Smoking status (ex-smoker)	0.007	2.150	1.228	3.765
District (Kuala Terengganu)	< 0.001	0.199	0.108	0.366
Quality of Life	< 0.001	1.151	1.074	1.233
Abdominal circumference (normal)	0.039	0.611	0.382	0.976
Accompany by family	0.044	1.489	1.010	2.196
Insulin usage	< 0.001	4.512	2.710	7.512
Oral only	< 0.001	0.193	0.108	0.346

Table 6: Multivariate logistic regression

	P value	Crude Odd Ratio (OR) 95.0% C.I. for OR		
		Lower	Upper	
Gender (Male)	0.662	1.224	0.496	3.021
Ex-smoker	0.643	1.277	0.454	3.592
Quality of Life	0.002*	1.132	1.047	1.224
Accompany by family members	0.266	1.481	0.741	2.958
Abd Circumference (normal)	0.101	0.493	0.212	1.148
Insulin Usage	0.999	1.488	< 0.001	.
Oral only	0.999	7.942	< 0.001	.
Injection only	0.999	5.537	< 0.001	.
Oral and injection	0.862	1.217	0.133	11.110
Constant	0.999	< 0.001		

a Variable(s) entered on step 1: Gender, Smoking status, QOL, Accompany, Abd Status, Insulin and Oral.

DISCUSSION

A quality of life is a subjective component reflected by a person in comparison to the standard setting and expectations from the surrounding.^{8,9} It is indeed a multidimensional construct that can be influenced by physical capability, psychological capacity and social functioning.^{22,25} All these three pillars are basically affected by the health status of the person. Therefore, in a chronic disease spectrum especially in diabetes mellitus, the quality of life of a person can be disturbed if the sugar and other clinical parameters are not optimally controlled. Similarly, if a person lives in a low quality of life, the outcome of the disease would also deteriorate.^{8,9,22,25} This complex association would be more essential and able to be reflected in older population whereby their bodily functions are already in suboptimal condition and in order to optimize their health outcome, the quality of life should be protected and sustained.^{8,9,22,25} Therefore, this study are looking at this causality and would like to identify the evidence of this connection which is quite difficult to be measured by one single question.

This study identified that majority of the older population stays with family members, which is typical in Malaysian culture and South East Asia countries.²³ In Eastern traditions, this finding may indicate a harmony relationship between parents and children.²⁴ This could lead to a better quality of life in this population (score 22) which is better compared to other group of population.²⁵ In terms of income, the majority of the respondents fall in the B40 income group. This is similar with our national statistical data whereby B40 is highly prevalent among Malays and in east coast region as well as rural area compared to another ethnicity and region in Malaysia.²⁶ Based on previous study, being an elderly and coming from

B40 group are the risk factors for having poor diabetes control.²⁷ However, this study unable to prove this theory. In fact, based on Table 5, the district with higher numbers from B40 income group, which is Kuala Terengganu, has significantly higher percentage of respondents with good diabetic control compared to other districts and urban area with better income level (P value < 0.001). This could signify that low socioeconomic status does not always equal low health status. This is because, even though they might be highly associated with low health literacy,²⁸ they might also physically active due to the needs to work physically harder compared to the high socioeconomic status group.²⁹ Physically active would be one of the strong factors in promoting good sugar control which is not explored in this study.³⁰

The level of quality of life of the older population in this study is noted to be in poor level with a median score of 22, which is lower than half of the total maximum score of 65. This value is indeed inferior compared to other similar studies assessing the level of quality of life among the older population with diabetes.^{8,9,22,25} The reason possible includes high number of persons with lower incomes in this group together with high prevalence of comorbidities. As in other populations, most elderly people have other comorbidities besides diabetes. These include uncontrolled hypertension, obesity, dyslipidaemia and chronic kidney disease (Table 2). These could be significant challenges for them to achieve good disease control in view of the issue of polypharmacy and drug-drug interaction risks. Nevertheless, this study proved that all these comorbidities are not significantly associated with good diabetic control. This can be possibly explained by understanding that regardless of the comorbidities, if the person had good motivation and determination, they will success in controlling

their health status.³¹

The misconception of injection causing physical and psychological burden is able to be corrected in this study as it does not affect the quality of life of this patient. In fact, those patients on insulin have higher level of diabetes control (Table 5).³² This is probably due to satisfaction and less worries that they received indirectly by observing the sugar results after on insulin for long time. Based on simple logistic regression, it is noted that male had higher diabetes control compared to female (Table 5). It is probably due to later onset of diabetes among male as compared to female in the elderly group.³³ Ex-smokers also significantly have better diabetes control in view of better body physiological function and high motivational level to maintain compliance with diabetes management as they are able to be recovered from nicotine addiction.³⁴ Insulin, known as the effective drug in lowering HbA1c is also proven to control sugar in elderly age group as in this study (Table 5). This is proven in other studies as well as described in the superiority of insulin in lowering sugar compared to any oral antidiabetic agent alone.³⁵ Furthermore, this study also proves that monotherapy (oral agent alone) is justifiable enough to lower the sugar level significantly compared to those on combination therapy. The possible reason is probably because those on combination therapy had underlying pre-existing insulin resistance such as obesity in which would definitely require more medications.

Nevertheless, based on multiple logistic regression, the only proven factor able to predict the level of sugar control among the elderly diabetic patients is the level of quality of life, regardless of the location of the patients and other patient or disease factors. The patients' mental status and their level of happiness will influence the patient's response to treatment and directly able to control the sugar control effectively.³⁶ This is similar in other studies as well either involving the elderly patients or young patients.³⁶ Quality of life is in fact determined by the will power of the patients to persistently follow the treatment plan and followup.^{8,9,22,25} It is often overlooked but has tremendously give huge impact to the disease management. Even though it is difficult to be measured quantitatively, nevertheless this study identifies a strong relationship between individualized quality of life and its disease outcomes. Surprisingly, in reality, many clinicians do not assess the patient's satisfaction and quality of life but focus on the disease progress and pharmacological compliance. This mindset and old style of practice should be upgraded with soft skills and compassion in communicating with the patient, so that the quality-of-life information can be

extracted in the consultation process. It is also the best time now to incorporate quality of life questionnaire in the follow up book as part of parameters that should be filled in regularly during clinic visits, especially those with underlying diabetes.

Limitations

There are several limitations in this study. Diabetes control in this study is defined to be less than or equal to 7.5% which could be targeted at a lower level and should be individualized in elderly patients. Furthermore, diabetes control based on HbA1c alone maybe not be accurate in patients with advanced CKD that is also present in this elderly population.

CONCLUSION

Level of diabetes control in these three districts are poor, concomitant with the poor control of the elderly non-communicable disease profiles and poor quality of life. The only predictor proven to produce good diabetes control in elderly is the level of quality of life of the patients. Therefore, it is not too late to start incorporating a holistic approach in dealing with any patient's management including full attention towards the quality-of-life improvement. The assessment of quality of life should be highlighted in each chronic disease, not only by the medical doctors but also the supportive staff. More study should be conducted in future to identify factors governing quality of life in order to tackle the disease appropriately.

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