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Research Article

QUALITY OF LIFE IN ELDERLY TYPE 2 DIABETES MELLITUS PATIENTS WITH MILD COGNITIVE IMPAIRMENT

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ABSTRACT

Introduction: Type 2 Diabetes mellitus is associated with higher risk of cognitive dysfunction, dementia, and depression in the elderly. Type 2 diabetes has been associated with decrease in verbal memory, working memory, immediate recall, verbal fluency and attention. Mild cognitive impairment is believed to be a high-risk condition for the development of clinically probable Alzheimer disease. These patients also have an increased need for personal care and increased rates of hospitalization. Screening and detecting the elderly diabetics at this stage is of utmost importance for prevention of Alzheimer disease.

Materials and Methods: The cross sectional study was conducted at RL JALAPPA hospital, Kolar for a period of 3 months. 52 elderly type 2 diabetes mellitus who met the inclusion and exclusion criteria were included, and MMSE was done and patients with mild cognitive impairment were given WHOQOL-BREF questionnaire. Quality of life (QOL) was assessed based on 4 domains- Physical health, Psychological, Social relationships, Environment domain.

Observation: Fifty two elderly type 2 diabetes patients with mild cognitive impairment were included in the study, with mean age 65.79 ± 4.53 years. 48% of them had duration of diabetes of less than 5 years. Most of them were treated with oral hypoglycemic drugs. They had a FBS of 179.69 ± 80.71 and PPBS 250.78 ± 98.13 . 52.3% patients had a coexisting hypertension. Mean MMSE Score in subjects was 20.94 ± 2.04 . The most affected domain was the psychological and social relationship domain with mean score of 50.73 and 46.48 respectively. Negative correlation was observed for QOL domains with respect to MMSE scores. This indicated that there is a decrease in QOL with respect to mild qualitative impairment.

Conclusion: QOL was decreased among diabetic patients with mild cognitive impairment. Good family support, screening programs and active intervention for patients with mild cognitive impairment tend to improve the QOL and reduce the further worsening of QOL.

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INTRODUCTION

Diabetes mellitus is a common chronic condition worldwide, India alone having 40 million diabetics and this is expected to rise to 79.4 million by the year 2030. In 2011 census, 5.3% of the Indian population was > 65 years of age¹. Healthcare burden of elderly diabetics is immense and proper diagnosis and treatment alone can prevent further complications. Of all the diseases, type 2 diabetes mellitus (T2DM) is the single most disease affecting a large number of elderly populations along with Hypertension. Diabetes and its complications take a major toll on the quality of life of the elderly and the healthcare costs of the society. Recent studies suggested that T2DM is associated with higher risk of cognitive dysfunction, dementia, and depression in the elderly². Recent research has identified a transitional state between the cognitive changes of normal

aging and Alzheimer's disease (AD), known as mild cognitive impairment (MCI). When these persons are observed longitudinally, they progress to clinically probable AD at a considerably accelerated rate compared with healthy age-matched individuals. Mild cognitive impairment is believed to be a high-risk condition for the development of clinically probable AD³. Quality of life and glycemic control are now recognized as independent and achievable outcomes in diabetes management.

Multiple investigations of patients with impaired glucose tolerance have shown them to have lower mini-mental status exam and long-term memory scores, impaired verbal fluency, increased Alzheimer's dementia, and increased vascular dementia. The community-living older diabetic subjects have high rates of cognitive impairment, deficits in physical function

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and depressive symptomatology suggesting that screening programs for functional impairments and depression may be beneficial in health care systems that manage older diabetic patients⁴. Therefore this study aims to study the health related quality of life in elderly patients with type 2 diabetes mellitus with mild cognitive impairment.

MATERIALS AND METHODS

The study was conducted at RL Jalappa hospital, Kolar by the Department of General Medicine. Elderly diabetic patients presenting to the outpatient department were included into the study. Type 1 Diabetes patients, patients with past history of CVA, epilepsy, chronic neuroinfections were excluded from the study.

FBS, PPBS, HbA1c were done for the patients at the visit to the OPD. MMSE scoring was calculated after taking informed consent. Patients with MMSE between 18-23 (Mild cognitive impairment) were included in the study group. WHOQOL-BREF questionnaire was given to the subjects and the quality of life was assessed based on 4 domain scores.

WHOQOL-BREF questionnaire included 26 questions based on 4 domains. Physical health, psychological, social relationship and environment domain.

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Continuous data was represented as mean and standard deviation. ANOVA (Analysis of Variance) was the test of significance to identify the mean difference between more than two groups. Pearson’s correlation was done to find the correlation between two quantitative variables. p value <0.05 was considered as statistically significant.

RESULTS

Fifty two elderly type 2 diabetes patients with mild cognitive impairment were included in the study, with mean age 65.79 ±4.53 years. 57.7% were females and 42.3% diabetics were males. 48% of the subjects had duration of diabetes of less than 5 years. Most of them were on oral hypoglycemic drugs for the blood glucose control. Mean FBS of the subjects was 179.69 ± 80.71 mg/dl and PPBS was 250.78 ± 98.13 mg/dl. 52.3% of the subjects had a co-existing hypertension.

Mean MMSE Score in subjects was 20.94 ± 2.04. The most affected domain was the psychological domain (50.73) and social relationship domain (46.48) (figure 1).

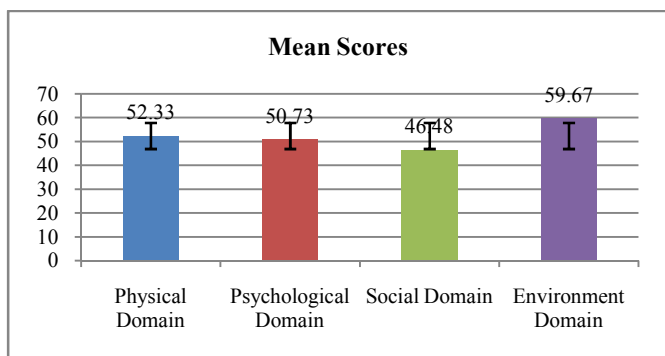


Figure 1 Bar diagram showing mean QoL Scores

There was significant correlation between MMSE and all the four domains in this study.i.e with increase in MMSE there was increase in domains scores-quality of life was better even though there was increasing MMSE i.e in Mild cognitive impairment QoL was still not affected among diabetic patients (table 1).

Table 1 Correlation between MMSE and Domains of QoL

	MMSE	Physical Domain	Psychological Domain	Social relationships Domain	Environment Domain
Pearson Correlation	1	0.354**	0.434**	0.358**	0.426**
P value		0.010	0.001	0.009	0.002
N	52	52	52	52	52

** Correlation is significant at the 0.01 level (2-tailed).

It showed there was decrease in Quality of Life among diabetic patients. Negative correlation was observed between Duration of Diabetes (in days) with all the Quality of Life domains (table 2) (i.e. with increase in Duration of DM decrease in QoL was observed). But significant decrease was not observed. In our study there was no statistically significant difference in mean QoL values with duration of diabetes.

Table 2 Correlation between Duration of Diabetes and QoL Domains

	Duration of DM	Physical Domain	Psychological Domain	Social relationships	Environment Domain
Pearson Correlation	1	-0.010	-0.043	-0.076	-0.107
Sig. (2-tailed)		0.943	0.760	0.592	0.448
N	52	52	52	52	52

** Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

Due to the increasing life expectancy, an aging population and rapid urbanization, it has been predicted that by the year 2025, majority of world diabetes population will be living in developing population. WHO defines Quality of life as individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. "Quality of life" in old age can be characterized as a complex, multidimensional, and holistic concept that includes social, environmental, structural, and healthrelated aspects⁶. Quality of life and glycemic control are now recognized as independent and achievable outcomes in diabetes management⁵ It affects the quality of life of demented patients and their caregivers. It also imposes a huge economic burden on countries.

MCI is defined by a cognitive performance below that expected for age and educational attainment, but above a pathologic level as in early dementia. Winblad *et al*⁷ classified the clinical presentations of MCI into subtypes according to the impaired cognitive domains, such as memory, orientation, intellectual abilities, and higher cortical functioning. There is strong evidence that T2D increases the risk of dementia in the form of multi-infarct dementia, AD and mixed type dementia. There are some close associations between diabetes and vascular dementia of above 100%-160% compared to AD which is about 45% to 90%. Even in pre-diabetic state; there is an increased risk of AD and dementia which are not related to the future development of diabetes⁸. There is also a faster deterioration of cognition in diabetic patients rather than non-

diabetic elderly ones⁹. Complicating the impact of mild neurocognitive dysfunction secondary to diabetes on daily living is the observation that patients with diabetes are twice as likely to have depression, which will also negatively affect cognitive function and daily activities.¹⁰

Neuronal changes as a result of advanced glycosylated end-product production and oxidative stress have been cited as directly-related factors in the process by which hyperglycemia causes functional damage. Among other mechanisms under consideration is one in which damage to neurons and vascular endothelium as a result of high osmotic stress induced by hyperglycemia disrupts the blood-brain barrier causing local leakage of vascular substances, which leads to further neuronal damage.

Diabetes mellitus is related to 40% higher rate of MCI; both amnesic and non-amnesic¹¹. This is especially true when diabetes starts before the age of 65, or when the disease is more than 10 years. Treatment with insulin and the presence of diabetes complications such as retinopathy are other risk factors¹². Elderly diabetics show poor physical health and cognitive function in community health settings¹³, particularly when associated with geriatric syndromes, hypoglycemia or diabetes complications¹⁴, and when living in care homes they have reduced independence QoL scores¹⁵.

WHOQOL assessments will assist clinicians in making judgments about the areas in which a patient is most affected by disease, and in making treatment decisions. India being a developing country, where resources for health care are limited, and treatments aimed at improving quality of life through effective and inexpensive treatments. Follow up of diabetics with WHOQOL-BREF will enable health professionals to assess changes in quality of life over the course of treatment.

In one study, the relationship between T2DM and cognitive impairment had been evaluated and the subjects with diabetes had lower MMSE score than those without diabetes ($P < 0.01$)¹⁶. Diabetes was also associated with increased odds of cognitive decline as determined by MMSE scores [odds ratio (OR), 1.9; 95%CI: 1.01-3.6]. Also, a statistically significant correlation between the duration of the disease and cognitive dysfunction was observed ($P = 0.001$). The same correlation was also found for the quality of diabetes control ($P = 0.002$).

Recently, Bruce *et al.*⁴ found that 17.5% of elderly patients with type 2 diabetes had moderate to severe deficits in activities of daily living, 11.3% had cognitive impairment, and 14.2% had depression. In a population of nearly 2000 postmenopausal women, Yaffe *et al.*¹⁷ found that those with a HbA1c of more than 7.0% had a 4-fold increase in developing mild cognitive impairment. Multiple investigations of patients with impaired glucose tolerance have shown them to have lower mini-mental status exam and long-term memory scores, impaired verbal fluency, increased Alzheimer's dementia, and increased vascular dementia. Neurocognitive testing in which an examiner administers a battery of tests to assess different aspects of cerebral function has long been the gold standard for the assessment of neurocognitive function.

In our study 48% of them had duration of diabetes of less than 5 years. Negative correlation was observed for QOL domains with respect to MMSE scores. With increase in MMSE there

was increase in domains scores (Quality of Life was better even though there was increasing MMSE. Mild cognitive impairment QoL was still not affected among diabetic patients. Negative correlation was observed between Duration of Diabetes (in days) with all the Quality of Life domains. With increase in Duration of DM decrease in QoL was observed. But significant decrease was not observed in our study.

Although HbA1c below 7% is recommended for the general diabetic population, this value has been questioned for the elderly diabetics and those with comorbidities^{18,19}. It is advisable, therefore, that an individualized, less rigorous maintenance of low levels of HbA1c should be pursued in these patients^{20,21}. Hence it is important to treat diabetes at the earliest and maintenance of good glycemic control and improve the QoL with increase in the duration of diabetes.

CONCLUSION

QOL was decreased among diabetic patients with mild cognitive impairment. Good family support and active intervention for mild cognitive impairment patients will improve the QOL and reduce the further worsening of QoL.

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