Original Article

Socio-demographic Characteristics and Cognitive Function in Adults with Type 2 Diabetes Mellitus

Rahman MM[1], Islam MZ[2]

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Abstract

Introduction: Diabetes is a very common disease all over the world nowadays. Cognitive function impairment is closely related with socio-demographic characteristics of the diabetic patients.

Objective: To assess the association between socio-demographic characteristics and cognitive function in adult type 2 diabetic (T2DM) patients.

Materials and Methods: This cross sectional study was conducted among purposively selected 210 adult T2DM patients from July 2018 to June 2019 in two tertiary level hospital of Dhaka city. Data were collected by face to face interview using pretested semi-structured questionnaire and review of check list.

Results: Mean age of the patients was 50.5 ± SD 7.4 years with male dominance (61.5%). The mean age of onset of diabetes was 41.6 ± SD 6.9. Most of the patients had normal cognitive function (71.4%) and had a mean MMSE (mini mental state examination scale) score of 25.2± SD 2.3. Statistically significant association was revealed between impaired cognitive function with age, monthly income, education, occupation, number of family members and types of residents of the respondents ($p<0.05$). There was statistically significant negative correlation of cognitive function score with age ($r = -.398$, p.001) and number of family members of the respondents ($r = -.429$, $p<.001$). The study also revealed a positive correlation between cognitive function score and total monthly family income of the respondents ($r = .078$, $p<.001$) which was also statistically significant.

Conclusion: Policy makers should take necessary measures to increase the educational and working facilities to improve the standard of life so that people can live better in a better housing condition.

Key-words*:* Adult type 2 diabetic patients, Cognitive function, Sociodemographic characteristics.

Introduction

Diabetes Mellitus is a global epidemic which affects nearly 382 million people worldwide, a number that will increase by 55% and is predicted to reach more than 592 million by the year 2035. Three-fourths of all patients with diabetes live in China, India, and the USA[1]. Epidemiological data indicate that the prevalence of diabetes has been raising in the South East Asian (SEA) countries for at least two decades and current estimates have surpassed all previous predictions. According to the 2013 estimates[2] by the IDF, the highest prevalence in the SEA region is found in Mauritius 14.8% followed by India 9.1%. Bangladesh has a disproportionately high diabetes population with more than 7.1 million, 8.4% or 10 million according to research published in WHO bulletin in 2013. The number will be 13.6 million in 2040. Nearly half of the populations (51.2%) with diabetes don't know that they have diabetes and don't receive any treatment[3].

Cognition is the set of mental abilities or processes that are part of nearly every human action while we are awake. With age, some cognitive abilities tend to decline, especially the executive functions and those cognitive abilities that are not used regularly[4]. Cognitive function includes a variety of mental processes such as perception, attention, memory, decision making and language comprehension. Cognitive functions improve from childhood to young adulthood. Some cognitive functions such as executive functions and working memory reach a peak during 20s or 30s. A decline in the cognitive abilities of older people has been shown difficulty in performing basic activities of daily living[5]. Mild cognitive impairment is an important part on the way from normal cognitive function to dementia. Affected individuals have measurable deficits in cognitive function that may affect their ability to master complex behaviours such as those required for diabetes self-care. Moreover, as mild cognitive impairment is more common than frank dementia. T2DM is associated with premature mortality and is a risk factor for mild cognitive impairment and both vascular dementia and Alzheimer's disease (AD). Indeed, individuals with diabetes are 1.5 times more likely to have cognitive decline and frank dementia than individuals without diabetes. For example, in a cross-sectional analysis of 378 high-functioning individuals with diabetes, higher hemoglobin A1C levels were consistently associated with lower scores on two cognitive tests[6].

In Bangladesh, very few studies were conducted on cognitive functions among diabetic adults. The study will provide information about how much sociodemographic characteristics of diabetic adults affects their cognitive functions. Therefore, this study will be an important step in the field of preventive and social medicine. This study will also provide a clue to the policy makers to take appropriate measures to tackle this emerging public health

1. **Col Md Masudur Rahman**, MBBS, MPH, MPhil (PSM), Assistant Director of Medical Services, 24 Infantry Division, Chattogram (*E-mail*: mdmasudurrahman0405@gmail.com) 2. **Professor Dr Md. Ziaul Islam**, MBBS, MPH, PhD, Professor & Head, Department of Community Medicine, NIPSOM, Mohakhali, Dhaka.

problem. The objective of this study is to assess the association between sociodemographic characteristics and cognitive functions in adults with type 2 diabetes mellitus.

Materials and Methods

This cross sectional study was conducted from July 2018 to June 2019 among 210 conveniently selected T2DM patients in Combined Military Hospital (CMH), Dhaka and Bangladesh Institute of Health Science (BIHS) General Hospital, Dhaka to assess the relationship between cognitive function and sociodemographic characteristics. Data were collected through face to face interview with a pretested semi-structured questionnaire. Prior to initiation of the study, ethical clearance was taken from competent authority. Neither any intervention nor any invasive procedure was undertaken. However, prior to initiation of the study ethical clearance was taken from Ethical Committee of NIPSOM. Cognitive functions were measured by using Mini Mental State Examination (MMSE) scale previously used by Malekian et al[7] which consists of 11 questions and total mark is 30. Any mark above 23 is considered as normal cognitive function. Irrespective of sex, all T2DM patients of 30-59 years of age were included in this study. Data processing and analyses were done using SPSS version 23.0.

Results

Majority (62.9%) of the respondents were in the age group of 50-59 years. Mean ± SD age of the respondents was 50.5±7.4 years with a range of 31 to 59 years. About 61.4% were male and 43.8% of the respondents gave history of monthly family income of 51000-100000 Taka with average income of 34304.8 Taka. About 25.2% were educated up to SSC level which was followed by primary level (18.6%). Majority of them (8.1%) were Muslims and 38.6% were housewives. About 97.6% lived in nuclear family. Around 52.9% of the respondents had the family size of 5-6 and average family size was 5±1.3 persons (Table-I). The mean ± SD age of onset of diabetes was 41.6±6.9 years. Majority of the respondents had the onset at 45 years of age with a minimum at 23 and maximum at 54 years. The mean ± SD duration of diabetes was 8.6±5.2 years. Majority had the duration of 5 years with a minimum of 1 year and maximum of 20 years (Table-II). Majority of the respondents (71.4%) had normal cognitive function. On the other hand 28.6% had mildly impaired cognitive function. The mean ± SD score was 25.2±2.3 with minimum score was 20 and maximum was 29 (Table-III). In socio-demographic characteristics, the association between age group, gender, educational qualification, occupation, monthly income and family size with cognitive function revealed statistically significant (Table-IV). The study revealed that there was a negative correlation of age (r= -.398, p<.001) and number of family members (r= -.429, p<.001) with cognitive function score which was statistically significant. There was a positive correlation between cognitive function score and total monthly family income of the respondents (r= .078, p<.001) which was statistically significant (Table-V).

Table-I: Socio-demographic characteristics of respondents (n=210)

Characteristics	Frequency	Percentage
Age (years)		
30-39	22	10.5
40-49	56	26.7
50-59	132	62.9
Mean (SD)	50.5 ± 7.4 years	
Min-Max	31-59 years	
Gender		
Male	129	61.4
female	81	38.6
Religion		
Islam	206	98.1
Hindu	4	1.9
Educational level		
Illiterate	11	5.2
Primary	39	18.6
Secondary	45	21.4
SSC	53	25.2
HSC	33	15.7
Graduation and Above	11	5.2
Family income (Taka)		
7,000 -20,000 Taka	30	14.3
21,000 -50,000 Taka	88	41.9
51,000-1,00,000 Taka	92	43.8
Mean (SD)	34304.8 ± 19609.2 taka	
Min-Max	7000-100000 Taka	
Occupational status		
Service	63	30
Retired	46	21.9
Business	20	9.5
Housewife	81	38.6
Family type		
Nuclear	205	97.6
Joint	5	2.4
Number of family members		
2-4	79	37.6
5-6	111	52.9
7-10	20	9.6
Mean (SD)	5 ± 1.3	
Min-Max	2-10	

Table-II: Distribution of respondents by age of onset and duration of diabetes (n=210)

Attributes	Onset of Diabetes (Years)	Duration of Diabetes (Years)
Mean	41.6	8.6
Median	42.0	7.0
Mode	45	5
Std. Deviation	6.9	5.2
Minimum	23	1
Maximum	54	20

Table-III: Distribution of respondents by cognitive function score (n=210)

Cognitive Function Score	Frequency	Percentage
20	3	1.4
21	9	4.3
22	22	10.5
23	26	12.4
24	25	11.9
25	23	11.0
26	26	12.4
27	35	16.7
28	31	14.8
29	10	4.8
Total	210	100
Mean Score ± SD: 25.2 ± 2.3; Minimum-20, Maximum-29		

Table-IV: Association between various socio-demographic characteristics with cognitive function (n = 210)

Socio demographic factors		Cognitive Function		Statistics
		Normal	Mild impaired	
Age in years	**30 – 39**	22	0	χ^2 =15.72 df = 2 p < 0.001
	40 – 49	45	11	
	50 – 59	83	49	
Gender	**Male**	102	27	χ^2 =9.57 df = 1 p < 0.01
	Female	48	33	
Education status	**Illiterate**	4	7	χ^2 =50.86 df = 5 p < 0.001
	Primary	14	25	
	Secondary	30	15	
	SSC	43	10	
	HSC	31	2	
	Graduate & above	28	1	
Occupation	**Service**	56	7	χ^2 =15.39 df = 3 p < 0.01
	Retired	32	14	
	Business	14	6	
	House wife	48	33	
Income in Taka	**7000 – 20000**	16	14	χ^2 =5.86 df = 2 p < 0.05
	21000 – 50000	64	24	
	510000 – 100000	70	22	
Family size	**2 – 4**	69	10	χ^2 =16.25 df = 2 p < 0.001
	5 – 6	70	41	
	7 – 10	11	9	

Table-V: Correlation of cognitive function score with age, number of family members and monthly family income

Dependent Variable	Predictors	r	R2	p value
Cognitive Function Score	Age	-.398	.158	< 0.001
	Number of Family Member	-.429	.184	< 0.001
	Total Monthly Income	.078	.006	< 0.001

Discussion

This research was conducted to find out the cognitive function impairment among the type 2 Diabetes Mellitus patient in two tertiary level health care facilities in Dhaka city. Age, income, religion, family size showed similarity sometimes with national findings of Bangladesh Health and Demographic Survey[8,9] (BDHS) of 2011 and in few cases differed due to regional variation or due to the study process. It has been revealed that the mean MMSE score among the respondents were 25.2 ± SD 2.3. Minimum score was 20 and maximum was 29. The finding was almost similar to the study conducted by Yaffeet al[6], 2009 and Barzilay et al[10]. In this study the mean age of onset of DM was 41.6±6.9 years with minimum age 23 and maximum 54 years which is similar to the study conducted by Hasan et al[11]. Study conducted by Yaffeet al[6] and Akrivos et al[12] showed that the mean duration of diabetes was 10.4 ± SD 7.3 years. Further study conducted by Barzilay et al[10] found almost similar mean duration which was were dissimilar to this study. These studies were conducted among the elderly people and for this reason the duration of diabetes is not similar to this study.

It was found that about 28.6% respondents had mildly impaired cognitive functions that were managed by diet, oral hypoglycemic agents and insulin. This finding was almost similar to the study conducted by Roy et al[1]. It had been found that, there was statistically significant (p<.05) association between level of cognitive function and age of the respondents. It is revealed that cognitive impairment increased with increase in age which is similar to the study conducted by Onat SS[13]. It was also found that, there was statistically significant association with gender where the cognitive function is more impaired in female (p = 0.002) which is dissimilar to the study conducted by Ferreira et al[14].

It was found that cognitive impairment was associated with the number of family members. The more was the family member the more impaired was the cognitive function (p < 0.001). It was also found that cognitive impairment was more among less income group (p < 0.05) which was similar to a study conducted by Ferreira et al[14] in 2009. It was revealed that there was statistically significant association between impaired cognitive function with level of education (r = -0.589, p <0.05) which was similar to the study conducted by Lee et al[15] whom revealed a strong trends of increasing mean cognitive performance with increasing level of education (p<0.001). Some other studies conducted by Zahodne et al[16] and Roy et al[1] who found that more years of education was associated with higher cognitive level and slower cognitive decline in individuals with low or high educational attainment.

In regards to the occupation, it was revealed that the cognitive impairment was more among housewife (0.002) which was similar to the study conducted by Ferreira et al[14]. We found statistically significant association between impaired cognitive function and place of residence where rural patients had more impairment than urban patients (0.03). We also found a statistically significant negative correlation between impaired cognitive function with age of the respondents (r = -0.398, p <0.001) and family members (r = -0.429, p <0.001). Again there was a positive correlation between cognitive function score and total monthly family income of the respondents (r = 0.078, p <0.001) which was statistically significant.

Conclusion

The results reveal that care should be taken with increase of age to prevent cognitive impairment, persons should be educated and family should be small. Policy makers should take necessary measures to increase the educational and working facilities to improve the standard of life so that people can live in a better place and will have a better housing condition.

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