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ORIGINAL ARTICLE

Frequency of Dementia in Type II Diabetes Mellitus

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ABSTRACT

Background: Diabetes mellitus is the most prevailing non- communicable diseases worldwide. It is the main reason of morbidity and mortality. Cognitive dysfunction is one of the major complications associated with diabetes. It is a risk factor for cognitive decline as the duration of diabetes progress and if accompanied by hypoglycemic attacks.
Aim: To determine the frequency of dementia in patients suffering from type II diabetes mellitus.
Study design: Descriptive cross-sectional study
Place and duration of study: Medical Department, Khyber Teaching Hospital, Peshawar from 1st March 2019 to 30th September 2019
Methodology: Two hundred and thirty five male and female patients suffering from diabetes mellitus from past 2 years were enrolled. The subjects were clinically assessed through history and physical examination.
Results: The mean age was 60±10.26 years with 42% male patients and 58% female patients. 12% of patients had dementia where as in 88% of patients it was not observed.
Conclusion: The frequency of dementia in patients suffering from type II diabetes mellitus is 12%.
Key words: Diabetes, Dementia, Hypoglycemia

INTRODUCTION

Chronic non-communicable diseases account for more than 60% of morbidity and mortality worldwide, diabetes mellitus being one of the commonest among them[1]. According to World Health Organization more than 422 million people suffer from diabetes particularly in underprivileged and middle income countries[2]. Statistics by WHO show that diabetes accounts for 1.5 million deaths each year[3]. In the urban areas of Pakistan, 6% of males and 3.5% of females suffer from diabetes. This further elevates in the rural areas of Pakistan where estimated prevalence in males in 6.9% and in females it is 3.5%[4].

Diabetes mellitus consist of an array of dysfunctions characterized by hyperglycemia resulting from either decreased insulin production, insulin resistance or increased secretion of glucagon by the pancreas[5]. Diabetes mellitus is further divided into type I, type II and gestational DM. Type I is the juvenile or insulin dependent DM, which occurs due to loss of pancreatic beta cells[6]. Type II DM accounts for 90-95% of the total patients suffering from DM. It was formerly called non- insulin dependent DM or adult onset DM. These individuals have either insulin resistance or deficiency in insulin production.[7] Gestational DM develops at any time in the pregnancy of a women without existing diabetes at the start of the pregnancy[8].

Poorly controlled DM is associated with macro-vascular, micro-vascular and neuropathic complications[9]. Diabetes is associated with neuronal slowing, cortical atrophy and changes in the brain metabolites.[10] Cognitive dysfunction is also one of the complication associated with DM[11]. A proper glycemic control has been suggested as a possible mechanism to improve cognitive effects amongst those with DM[12]. Diabetes increases the risk of cognitive impairment in a person by 19%. The most common cognitive disorder associated with diabetes is dementia[13].

There maybe be specific subgroup of patients having dementia with diabetes as its root cause[14]. Diabetes and dementia share many common causes like risk factors, age, impaired glucose metabolism, inflammation and chronic oxidative stress.[15] An important early change in dementia is the decreased uptake and utilization of glucose by the brain. Greater insulin resistance is associated with decrease in memory and learning capabilities[16].

The current study is aimed to determine frequency of dementia in diabetic patients. Doing a detailed literature study, we found that very exceptional data exists regarding the frequency of dementia in DM patients and not even a single study exists from Pakistani population. This study will be an effort to determine the frequency of dementia in our local diabetic population and describe diabetes as a risk factor for cognitive decline.

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MATERIALS AND METHODS

This descriptive cross-sectional study was carried out in the Medical Department of Khyber Teaching Hospital, Peshawar from 1st March 2019 to 30th September 2019. The study was conducted after the ethical approval from the hospital and CPSP research committee. The sample size was calculated using World Health Organization (WHO) sample size calculator, using 11% proportion of dementia in patients with DM with 95% confidence level and 4% margin of error. Using the non-probability consecutive sampling technique, 235 patients were recruited. The inclusion criterion was both male and female patients of 40 to 70 years age who were suffering from DM from at least last 2 years. Whereas patients with hepatic failure, or on multivitamins especially thiamine supplements or those with focal or global neurological deficit were excluded.

Patients visiting the OPD of medical department of Khyber Teaching Hospital Peshawar, with known DM with a history of anti-diabetic drugs from last two years were enrolled in the study. The purpose and benefits of the study were explained to the patients and a written informed consent was obtained. A detailed history along with clinical examination was carried out of all the patients. This was followed by routine baseline investigations. All the procedures were done by a single experienced radiologist having an experience of more than five years. The patient's demographics (age, gender, residence and socio-economic status) along with education level, history of hypoglycemic attacks and duration of diabetes were recorded. The exclusion criteria were strictly followed to control cofounders and bias in the study.

The data was analyzed using SPSS-22. Dementia in patients was further stratified among age, gender, history of hypoglycemic attacks, duration of diabetes, residence, education level, socioeconomic status to see the effect modifications using chi square test with *p* value of ≤0.05 as significant.

RESULTS

The overall population consisted of elderly (60±10.26 years) female patients (58%) suffering from DM. Most of the diabetic patients were from the urban populations (57%), illiterate (45%) with poor socio-economic status (53%). Most of the patients had diabetes from 16-20 years (42%) with mean duration of 12±5.77 years. 8% of the patients suffered from hypoglycemic attacks. Twenty eight (12%) patients had dementia while 207 (88%) patients didn't dementia (Table 1).

The significant results were found in patients without history of hypoglycemia who didn't developed dementia (p<0.0004) [Table 2].

Table 1: Demographic information of the patients associated with diabetes mellitus (n= 235)

Variable	No.	%
Age (years)		
40 – 50	47	20.0
51 - 60	85	36.0
61 – 70	103	44%
Gender		
Male	99	42.0
Female	136	58.0
Residence		
Rural	101	43.0
Urban	134	57.0
Education level		
Illiterate	106	45.0
Primary to secondary	89	38.0
Above secondary	40	17.0
Socio-economic status		
Poor	125	53.0
Middle class	82	35.0
Rich	28	12.0
Duration of diabetes (years)		
5 - 10	47	20.0
11 – 15	89	38.0
16 – 20	99	42.0
Hypoglycemic attacks		
Yes	19	8.0
No	216	92.0
Dementia		
Yes	28	12.0
No	207	88.0

Table 2: Stratification of dementia according to demographics and diabetic characteristics (n=235)

Variable	Dementia		P value
	Yes	No	
Age (years)			
40- 50	6	41	0.9796
51 - 60	10	75	
61 - 70	12	91	
Gender			
Male	12	87	0.9336
Female	16	120	
Residence			
Rural	12	89	0.9889
Urban	16	118	
Education level			
Illiterate	13	93	0.9190
Primary to secondary	11	78	
Above secondary	4	36	
Socio-economic status			
Poor	15	110	0.9775
Middle class	10	72	
Rich	3	25	
Duration of diabetes			
5- 10 years	5	42	0.9542
11-15 years	11	78	
16- 20 years	12	87	
Hypoglycemic attacks			
Yes	7	12	0.0004
No	21	195	

DISCUSSION

The results of our study show that mean age of patients with diabetes mellitus was 60±10.26 years. 42% of patients were male and 58% patients were female. Similar demographics were found by Asiimwe et al[17] that diabetes is more in elderly female patients. In our study we found that diabetes is more in the urban population (57%) as compared to the rural population (43%). We also observed that diabetes was more common in illiterate (45%) with poor socio-economic status (53%). Similar study was conducted in India by Chauhan et al[18], who also observed more diabetes in females with low socio-economic status and less education. Nearly 42% of our study population had diabetes for 16 to 20 years, although only 8% had hypoglycemic spells. More over 12% patients had dementia while 88% patients didn't have dementia. Similar findings were observed in another study led by Yaffe et al[19], in which 783 DM patients followed over a period of 12 years. They observed that during the period of 12 years, 61 participants (7.8%) had suffered from hypoglycemic event and 148 (18.9%) advanced in to dementia.

In our study we found that dementia is more in elderly patients of 61 to 70 years of age (12%) as compared to younger patients. Similar study was conducted by Cao et al[20], reported that the incidence of dementia increase every 5 years and it is highest in patients above 100 years of age. They also found that dementia is more common in females as compared to males. This also supports our finding where 16% of females where suffering from dementia as compared to 12% of male patients. The incidence of dementia is more among urban population (16%) than rural population (12%). Similar study was conducted by Wu et al[21] in China who observed that dementia free life expectancy is more in urban population than rural population. We also found that dementia was more common in poor, literate people with diabetes more than 16 years. Significant results were found in people who didn't suffer from hypoglycemic spells and in them dementia was observed as lowest. A meta-analysis conducted by Pal et al[22] demonstrated that cognitive impairment increases with diabetes and metabolic syndrome.

The results of our study can vary due to different cultural, socioeconomic status and education level of the patients in our population. Furthermore, the results of this study will be a guideline for developing future research strategies and categorizing mechanisms of preventing cognitive abnormalities in patients with type 2 DM.

CONCLUSION

There was no significant association of dementia with age or socio-economic status. However, uncontrolled type II diabetic patients showed a significant increase in dementia.

Conflict of interest: Nil

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