

Association of Cognitive Impairment with Essential Tremor Patients

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Abstract:

Background: Tremor is the most common involuntary movement disorder. Among all causes, Essential tremor (ET) is the most common action tremor. It is a monosymptomatic disease. However, many studies in different countries have shown that ET is associated with cognitive deficits, mainly in attention, memory, and visuospatial processes. So, exploration of all cognitive impairments of ET may help in setting the management plan. **Methodology:** This cross-sectional observational study was conducted in the Department of Neurology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from November 2021 to August 2022. All patients aged more than 18 years who were diagnosed with essential tremors by a movement disorder specialist, fulfilling the inclusion and exclusion criteria, were taken as the study population. The same number of age and sex-matched healthy subjects were enrolled as controls in this study. Then the cognitive function of essential tremor patients and healthy controls was evaluated by the Montreal Cognitive Assessment (MoCA) scale. **Result:** A total number of 120 subjects were recruited for this study, of which 60 patients were in the case group presenting with essential tremor and the rest of 60 subjects were healthy controls. The mean visuospatial score with SD among the case and control groups was 2.98 ± 1.228 and 3.43 ± 0.647 , respectively (p value=0.014). The mean naming score with SD among the case and control groups was 2.78 ± 0.415 and 2.90 ± 0.303 , respectively (p value=0.082). The mean score of attention variables of the MoCA scale with SD among the case and control groups was 3.33 ± 1.100 and 3.72 ± 0.691 , respectively (p value=0.024). The mean score of language variables of the MoCA scale with SD among the case and control groups was 2.05 ± 0.910 and 2.48 ± 0.504 , respectively (p value=0.002). The mean score of abstraction variables of the MoCA scale with SD among the case and control groups was 1.45 ± 0.622 and 1.48 ± 0.504 , respectively (p value=0.748). The mean score of delayed recall variables of the MoCA scale with SD among the case and control groups was 1.76 ± 0.817 and 2.97 ± 0.663 , respectively (p value=0.000). The mean score of orientation variables of the MoCA scale with SD among the case and control groups was 5.17 ± 0.847 and 5.68 ± 0.469 , respectively (p value=0). The mean score of the total MoCA score with SD among the case and control groups was 20.18 ± 3.301 and 22.67 ± 2.137 , respectively (p value=0.000). **Conclusion:** In conclusion, cognitive impairment, including visuospatial function, attention, language, delayed recall, orientation variable as well as total MoCA score are significantly associated with essential tremor patients.

Key words: Essential Tremor, cognitive function test, MoCA

Introduction

Tremor is an involuntary, rhythmic, oscillatory movement of a body part.¹ It is the most prevalent disorder in clinical medicine. It is differentiated from other involuntary movements like chorea, athetosis, ballism, ticks, and myoclonus by its rhythmic quality and oscillatory nature.²

Tremor can be classified as resting and action tremor.¹ The most common form of action tremor is essential tremor (ET), which is either postural or kinetic, mainly affecting the hands. It is usually bilateral with a frequency of 4 Hz to 12 Hz and symmetrical. Men and women are equally affected. Like other tremors, essential tremor worsens with emotion, exercise and fatigue.²

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Traditionally, essential tremor has been considered a benign and monosymptomatic disorder characterized primarily by kinetic tremor in the arms. It is a family of diseases unified by the presence of kinetic tremor, while also displaying etiological, pathologic, and clinical heterogeneity.³ In addition to motor manifestations, essential tremor is also associated with many non-motor manifestations, including depressive symptoms, changes in sleep patterns, mild cognitive deficits, mainly in attention and frontal executive function, verbal memory, and visuospatial processes.⁴

Essential tremor is a clinical diagnosis. The history and examination are the sole components needed for diagnosis. However, a magnetic resonance imaging (MRI) scan of the brain could be considered to exclude a secondary source of onset of tremor, especially when additional neurologic symptoms are present.⁵

In a population-based study, lower cognitive test scores in essential tremor were associated with more self-reported functional difficulty, indicating cognitive deficits in essential tremor.⁶ These cognitive deficits in essential tremor might not be static and appear to progress at a faster rate than those seen in normal older people. Furthermore, patients with essential tremor, especially late-onset essential tremor, appear to have an increased prevalence of mild cognitive impairment and dementia and have a higher risk of incident dementia.³ Therefore, the present study was undertaken to evaluate the status of cognitive function in essential tremor patients.

Materials and Methods

This cross-sectional observational study was conducted in the Department of Neurology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh from November 2021 to August 2022. After ethical clearance from the Institutional Review Board (IRB), patients who were diagnosed with essential tremors by a movement disorder specialist were selected purposively as cases. Investigations like FT4, TSH and MRI of brain were done for exclusion of other secondary causes. Patients taking any drugs that might cause tremor or cognitive impairment, patients with thyrotoxicosis and other metabolic diseases causing tremor, tremor associated with other neurological signs or essential tremor patients with educational qualification below class V were excluded from the study. Age and sex matched healthy persons were taken as control. Before proceeding to data collection, the details of the study were explained to each and written informed consent was obtained. Data collection sheets were fulfilled by face-to-face interviews. Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.).

Result

A total of 120 subjects were recruited for this study, of which 60 patients were the case group presenting with essential tremor and the rest of 60 subjects were healthy controls. In the case group, the most common age group was 40 to 60

Table-1
Demographic distribution of study participants

Variable	Case Group n=60(%)	Control Group n=60(%)	Total n=120(%)	p-value
Age group (years)				0.838*
<20	6(10.0)	4(6.7)	10(8.3)	
20-39	9(15.0)	9(15.0)	18(15)	
40-59	25(41.7)	23(38.3)	48(40)	
>60	20(33.3)	24(40.0)	44(36.7)	
Mean(±SD)	50.15±17.27	51.65±16.40		0.627*
Gender				0.703**
Male	40(66.7%)	37(61.7%)	43(69.4)	
Female	20(33.3%)	23(38.3%)	19(30.6)	
Educational Status				0.997**
Primary	26(43.3%)	28(46.7%)	54(45)	
SSC	21(35.0%)	22(36.7%)	43(35.8)	
HSC	6(10.0%)	6(10.0%)	12(10)	
Graduate	7 (11.7%)	4(6.7%)	11(9.2)	

*Student t test was performed to see the level of significance. **Chi-Square was performed to see the level of significance. p-value less than 0.05 was taken as statistically significant

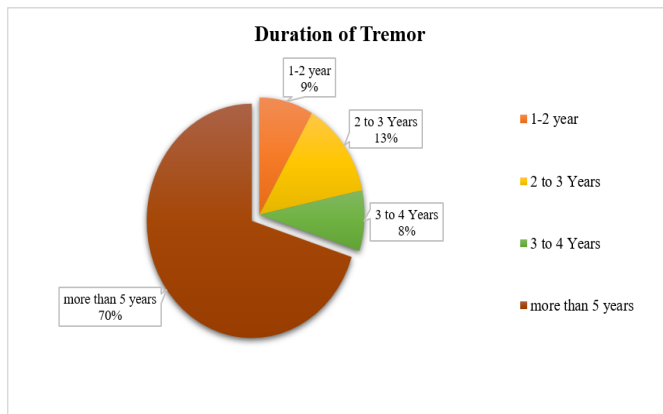


Figure 1: Pie chart showing duration of tremor in case group

years [25(41.7%)] and in the control group, the most common age group was more than 60 years [24(40.0%)]. The mean age of the total study population was 50.90 ± 16.789 years with a range of 18 to 85 years. However, the mean ages in case and control groups were 50.15 ± 17.27 years and 51.65 ± 16.40 years, respectively. Table 1 shows the demographic distribution of the study participants. Most of the patients had a duration of tremor for ≥ 5 years [42(70.0%)]. Eight (13.%) patients had a duration of tremor for 2 to 3 years (Figure 1).

On analysis of the different domains of the MoCA scale between case and control groups, the mean visuospatial scores of the case and control groups were 2.98 ± 1.228 and 3.43 ± 0.647 , respectively (p value=0.014). The mean naming scores of the case and control groups were 2.78 ± 0.415 and 2.90 ± 0.303 , respectively (p value=0.082). The mean attention variables scores of the case and control groups were 3.33 ± 1.100 and 3.72 ± 0.691 , respectively (p value=0.024). The mean scores of language variables of the

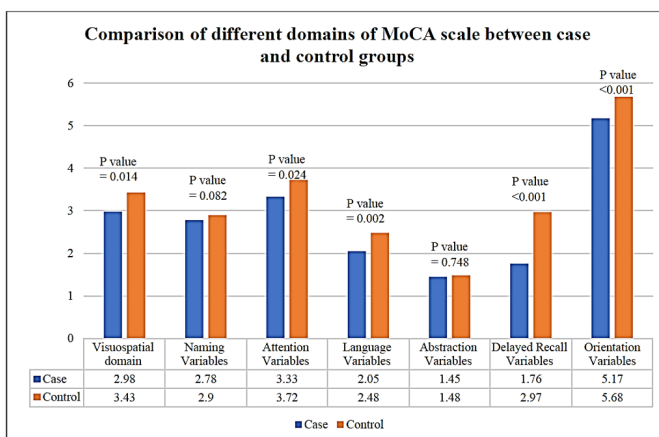


Figure 2: Bar diagram showing comparison of different domains of MoCA scale between case and control groups

Student t test was performed to see the level of significance; p value less than 0.05 was taken as statistically significant

case and control groups were 2.05 ± 0.910 and 2.48 ± 0.504 , respectively (p value=0.002). The mean scores of abstraction variables of the case and control groups were 1.45 ± 0.622 and 1.48 ± 0.504 , respectively (p value=0.748). The mean scores of delayed recall variables of the case and control groups were 1.76 ± 0.817 and 2.97 ± 0.663 , respectively (p value<0.001). The mean scores of orientation

Table-2

Comparison of Total MoCA score between Case and Control Groups

Groups	N	Mean± Std. Deviation	P value
Case	60	19.52±3.25	<0.001
Control	60	22.67±2.137	

Student t test was performed to see the level of significance; p value less than 0.05 was taken as statistically significant

variables of the case and control groups were 5.17 ± 0.847 and 5.68 ± 0.469 , respectively (p value<0.001) (Figure 2). Table 2 shows the comparison of the total MoCA score between the case and control groups. The mean scores of the total MoCA score between the case and control groups were 19.52 ± 3.25 and 22.67 ± 2.137 , respectively. The difference in the total MoCA scores between the case and control group was statistically significant (p value<0.001).

Discussion

Essential tremor (ET) is the most common type of movement disorder, although its etiology and neurophysiological substrates remain unclear. While thought to be a benign condition, it has yet to be studied from a neuropsychological perspective. Different studies have examined the neurocognitive functioning of non-demented subjects with severe ET, including aspects of memory, cognitive flexibility, and attention. The pattern of findings is suggestive of relative dysfunction of frontal-mediated processes.⁷ These deficits were found in subjects irrespective of the presence of cognitive complaints, depression, or the existence of other potential neurocognitive risk factors. These findings suggest that mild cognitive deficits are not uncommon in association with severe ET and may be related to subcortical systems, which is inconsistent with the present study results.

In our study, the most common age group for the cases was 40 to 60 years, which was 25(41.7%) patients. A previous study revealed that the prevalence of essential tremor increases markedly with age.⁸ This is easily understandable given the fact that the incidence of essential tremor increases with age. Although results vary across studies, most report a crude prevalence of 4% or higher in persons age 60 and older, with some reporting values considerably higher.⁹

In the present study, males [40(66.7%)] were more predominant than females [20(33.3%)]. Similar to this present study, a previous study mentioned that males were predominantly affected by essential tremor.⁹ In another study stated that males commonly suffer from essential tremor, which is consistent with the present study.⁹ Our study found that most (70.0%) of the patients had tremor duration for ≥ 5 years. A previous study has reported that most of the patients come to the hospital with a long-term history of tremor.¹¹

The current study revealed different domains of MoCA, i.e., visuospatial domain, naming variables, attention variables, language variables, delayed recall variables, and orientation variables were more affected in the case group as compared to the control group, which was statistically significant. Although we did not find a statistically significant difference in the abstraction variables of the MoCA domain between the two groups. The difference in the total MoCA scores between the case and control group was also statistically significant (P value < 0.001).

Similarly, another previous study assessed the cognitive and affective functioning in patients with essential tremor.¹¹ The patients with ET were found to have deficits on tests of verbal fluency, naming, mental set-shifting, verbal memory, and working memory, as well as higher levels of depression.¹¹

Conclusion

Cognitive impairment, including visuospatial function, attention, language, delayed recall, orientation as well as total MoCA score, is statistically significantly associated with essential tremor patients. However, the difference in naming and abstraction score of MoCA scale between the case and control group is not statistically significant. Males are more predominantly affected by ET than females.

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Conflicts of Interest

The authors declare that they have no conflicts of interest related to this work.

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