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DEMENTIA SUBTYPES: A STUDY FROM DEMENTIA CLINIC IN A REFERRAL NEUROSCIENCE HOSPITAL, BANGLADESH

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Abstract

Background: *Dementia is one of the major causes of disability and dependency among older people globally but still it is not explored very well in most parts of the world particularly for low-income and middle-income countries. The aim of study was to explore the subtypes of dementia among patients attending the outdoor dementia clinic at a referral tertiary care hospital in Bangladesh.* ***Methods:*** *This cross-sectional study was carried out in weekly dementia clinic of Department of Neurology at National Institute of Neurosciences and Hospital (NINS&H), Dhaka, Bangladesh from January 2020 to December 2023 for a period of 4 years. Consecutive patients attending this clinic with history suggestive of dementia were enrolled in this study. Data were collected through a predesigned questionnaire containing information about demography, clinical features, brain imaging and laboratory findings of patients. This study included all patients aged ≥18 years, both male and female, who attended with subjective memory and other cognitive impairment complaints.* ***Results:*** *The age range was from 25 to 100 years with mean age of 66.04 (±SD 10.61) years with a male-to female ratio of 1.54: 1. There was urban (67.4%) predominance. In 435 patients, the commonest subtype of dementia was Alzheimer's disease (n= 219, 50.3%). The second most common subtype was vascular dementia (n= 75, 17.2%) followed by mixed dementia (n= 60, 13.8%). Frontotemporal dementia, Parkinson's disease dementia, and dementia with Lewy bodies were diagnosed in 22 (5.1%), 13 (3 %) and 6 (1.4%) cases respectively. Most of the patients (n= 141, 32.9%) had mild dementia whereas 121 (27.8%) patients had moderate dementia. Only 35 (8%) patients had severe dementia, 72 (16.6%) patients had mild cognitive impairment (MCI).* ***Conclusion:*** *Dementia is a major morbidity with a higher prevalence among elderly males. Alzheimer's disease is the most common subtype of dementia in Bangladesh.*

Keywords: *Dementia, Bangladesh.*

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Introduction:

Dementia is a syndrome characterized by decline in cognitive abilities, such as memory, thinking, and reasoning that is severe enough to interfere with daily functioning.[1] It is not a specific disease but rather a group of symptoms associated with underlying conditions.[2] Dementia is one of the leading causes of death worldwide and has 10 million new cases reported every year.[3] Until 2018, the global number of people living with dementia has been estimated at 50 million, and the number will triple by 2050.[4]

Early signs and symptoms are forgetting things or recent events, losing or misplacing things, getting lost when walking or driving, being confused even in familiar places, losing track of time, difficulties solving problems or making decisions, problems following conversations or trouble finding words, difficulties performing familiar tasks, misjudging distances to objects visually.[2] Apart from memory loss, people with dementia may experience difficulty with language and communication, impaired judgment, changes in mood and behavior and a decline in the ability to perform basic day to day tasks.[2]

The cognitive symptoms of dementia relate to the area of the brain affected.[5] The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) defines six key domains of cognitive function: complex attention, executive function, learning and memory, language, perceptual-motor control, and social cognition.[6]

Normally, symptoms must be present for at least six months to support a diagnosis.[7] Cognitive dysfunction of shorter duration is called delirium. In comparison, dementia has typically a long, slow onset, slow decline of mental functioning, as well as a longer trajectory from months to years.[7]

Causes of dementia can be broadly classified as reversible causes and Irreversible causes. The most common irreversible types of dementia are Alzheimer's disease, vascular dementia, Lewy body dementia, Parkinson's disease, Frontotemporal dementia, Huntington's disease, Creutzfeldt-Jakob disease, Chronic traumatic encephalopathy, Pick's disease. The coexistence of more than one type of dementia is known as mixed dementia.[8,9] Alzheimer disease is the most common form of dementia and may contribute to 60–70% of cases.[4] Though reversible causes are less frequent, they carry good prognosis with prompt treatment of the underlying condition. The most frequently observed potentially reversible conditions are depression, adverse effects of drugs, alcohol abuse, space-occupying lesions, normal pressure hydrocephalus, and metabolic conditions land endocrine conditions like hypothyroidism and nutritional conditions like vitamin B-12 deficiency. Depression is by far the most common of the potentially reversible conditions.

Diagnosis of dementia is usually based on history, clinical examination and cognitive testing laboratory testing and imaging. Various brief cognitive tests have reasonable reliability to screen for dementia.[10] While many tests have been studied, presently the mini mental state examination (MMSE) is the best studied and most commonly used.[11,12] The MMSE is a useful tool for helping to diagnose dementia if the results are interpreted along with an assessment of a person's personality, their ability to perform activities of daily living, and their behaviour.[13]

A CT scan or MRI scan is commonly performed to find structural lesions of brain such as stroke, normal pressure hydrocephalus, subdural hematoma or tumor.[14] Imaging also helps to identify different degenerative causes of dementia.

Methods:

This cross-sectional study was carried out in weekly dementia clinic of Department of Neurology at National Institute of Neurosciences and Hospital (NINS&H), Dhaka, Bangladesh from January 2020 to December 2023 for a period of 4 years. Consecutive patients in dementia clinic during this study period were enrolled. Patients unwilling to give consent and patients without cognitive impairment were excluded from the study.

A preformed questionnaire was used containing information on age, sex, habitat, clinical history from patients and observers, examination findings, previous and current medications, result of laboratory and imaging studies for data collection.

This study included all patients aged ≥18 years, both male and female, who attended with subjective memory and other cognitive impairment complaints. The patients were recruited purposively, and consecutive patients were included in this study reporting to the dementia clinic.

The demographic profile details were recorded and evaluated per standard procedure in the dementia clinic, and the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) criteria were applied to diagnose dementia and to subtype dementia.[6] In DSM-5, dementia is referred to as Major Neurocognitive Disorder. The core criteria involve significant cognitive decline from a previous level of performance in one or more cognitive domains (like memory, language, or executive function) that interferes with independence in everyday activities.[6] This decline must be substantial and documented through both subjective complaints and objective cognitive testing.

The DSM-5 criteria for Alzheimer's disease, now categorized under "Major or Mild Neurocognitive Disorder due to Alzheimer's Disease," require evidence of cognitive decline from a previous level of performance in one or more cognitive domains (like memory, language, or executive function), alongside interference with independence in daily living.[6] A diagnosis also necessitates that the cognitive deficits are not better explained by another mental disorder or delirium and that there's evidence of either probable or possible Alzheimer's disease based on clinical criteria.

The DSM-5 criteria for Dementia with Lewy bodies diagnosis requires insidious onset and gradual symptom progression, along with the presence of core features (fluctuating cognition, recurrent visual hallucinations, and parkinsonism) or a combination of core and suggestive features.[6] The cognitive deficits should not be better explained by another mental disorder (e.g., major depressive disorder, schizophrenia), other medical conditions (e.g., stroke, traumatic brain injury) or another neurodegenerative disorder (e.g., Alzheimer's disease, Parkinson's disease).

The DSM-5 diagnostic criteria for Frontotemporal Dementia (FTD) primarily focus on behavioral variant FTD (bvFTD) and require a progressive decline in behavior and social cognition, or executive function, with relative sparing of memory and perceptual-motor function.[6] A diagnosis of possible bvFTD necessitates at least three out of six specific behavioral symptoms, while probable bvFTD adds neuroimaging evidence or a known FTD pathogenic mutation. The core feature is prominent decline in social cognition and/or executive function with at least three of the following: behavioral disinhibition , apathy, loss of sympathy/ empathy, perseverative, stereotyped, or compulsive/ ritualistic behaviors, hyperorality and dietary changes. Memory and perceptual-motor functions are relatively spared, at least in the early stages of the disease.

The DSM-5 criteria for dementia in Parkinson's disease (PDD) require meeting the criteria for either major or mild neurocognitive disorder, occurring in the context of established Parkinson's disease, with an insidious onset and gradual progression. [6] The cognitive decline must not be better explained by another medical condition or mental disorder, and there should be no evidence of mixed etiology.

In DSM-5, vascular dementia is categorized under Major or Mild Neurocognitive Disorder due to Vascular Disease. The criteria include evidence of cognitive decline from a previous level of performance in one or more cognitive domains (attention, executive function, memory, language, perceptual-motor, or social cognition).[6] This decline must be significant enough to interfere with independence in daily activities. Additionally, there must be evidence of cerebrovascular disease (through imaging or other means) and a causal link between the vascular disease and the cognitive deficits.

The DSM-5 does not have specific diagnostic criteria for "mixed dementia" as a distinct category. Instead, it focuses on the broader concept of Major Neurocognitive Disorder (which encompasses dementia) and allows for the specification of underlying etiologies. Mixed dementia, in the context of DSM-5, would be diagnosed when a patient exhibits cognitive decline that interferes with daily functioning and is attributed to more than one underlying neuro-degenerative or cerebrovascular disease. [6]

Reversible causes of dementia, while not specifically listed as diagnostic criteria, are considered during the evaluation process. To exclude the reversible causes of dementia, we utilised different routine blood tests like blood sugar, serum creatinine, complete blood count, peripheral blood film, vitamin D, and thyroid function tests (Thyroid stimulating hormone, free triiodothyronine 3 and 4 levels), liver function test (LFT), Venereal Disease Research Laboratory (VDRL), serum vitamin B12, serum calcium, and chest X-ray. A neuroimaging test, like a computed tomography (CT) and MRI scan, was performed to find out infarct, hematoma, tumour, hydrocephalus, neuro-degenerative causes of dementia. All these imaging tests were conducted in the Department of Neuroradiology and Imaging at the same institute using the same standard protocol.

Further, a MMSE was performed to score the severity of cognitive domains.[13] Scores range from 0 to 30 points, with lower scores indicating more significant impairment. When the MMSE score is below 23, the patients are regarded as a case of dementia. MMSE scores of 19 to 22 are consistent with mild dementia, 10 to 18 with moderate dementia, and <10 with severe dementia. A score of 27 or higher classified as normal. If the score is 23 to 26, patients are considered to have mild cognitive impairment (MCI).

Statistical analysis was performed by Windows based software named as Statistical Package for Social Science (SPSS), versions 22.0 (IBM SPSS Statistics forWindows, Version 22.0. Armonk, NY: IBM Corp.). Continuous data were expressed as mean, standard deviation, minimum andmaximum. Categorical data were summarized in terms of frequency counts and percentages. All consecutive dementia patients attended in this time period, were included in this study after fulfilling the inclusion and exclusion criteria.

Results:

A total number of 435 patients were recruited. The age range was from 25 to 100 years with a median of 66 years. The mean age was 66.04 years with Standard Deviation (SD) of 10.61 years (Table I). Out of 435 patients, 264 were male and 171 were female with a male-to female ratio of 1.54: 1. There was a male (60.7%) predominance (Table I).

Urban patients were residing in cities and in municipal corporations. All patients other than urban areas were labeled as rural patients. There was urban (67.4%) predominance (Table I).

Table I

Demographic Characteristics of patients

Characteristics	Values
Age in years (mean ± SD)	66.05±10.61
Sex- N (%)	
Male	264(60.7%)
Female	171(39.3%)
Residence- N (%)	
Urban	293(67.4%)
Rural	142(32.6%)

Among the 435 patients, the commonest subtype of dementia was Alzheimer's disease (AD) (n= 219, 50.3%). The second most common subtype of dementia was Vascular Dementia (n= 75, 17.2%) followed by mixed dementia (n= 60, 13.8%). Parkinson's Disease Dementia was diagnosed in 13 (3%) cases. Frontotemporal Dementia was diagnosed in 22 (5.1 %) cases whereas Dementia with Lewy bodies was diagnosed in 6 (1.4%) cases. Reversible causes of dementia were identified in 40 (9.2%) cases. (Figure I)

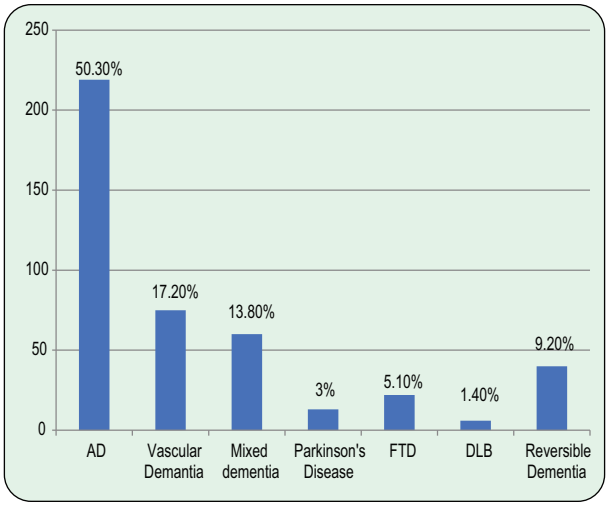

Fig.- 1: *Types of Dementia (AD=Alzheimer's disease, DLB= Dementia with Lewy bodies, FTD= Frontotemporal Dementia, PDD=Parkinson's Disease Dementia)*

Out of 40 cases of reversible dementia, depression was most commonly identified (n=17). Other reversible causeswere Normal Pressure Hydrocephalus (NPH) (n=8), chronic kidney disease (CKD) (n=5), Vitamin B12 deficiency (n=3), brain tumor (n=3), hypothyroidism (n=2), paraneoplastic condition (n=1) and chronic liver disease (CLD) (n=1). (Figure 2)

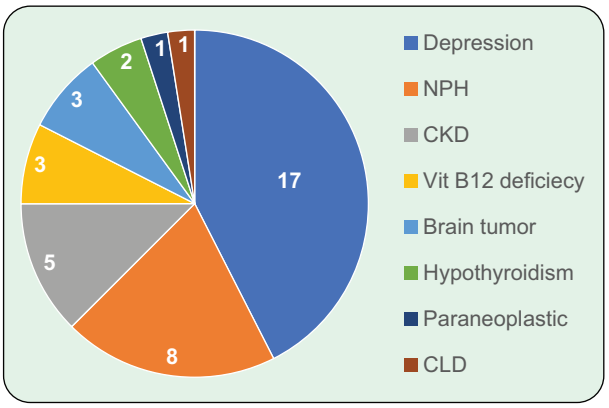

Figure 2: *Reversible causes of Dementia (CKD= chronic kidney disease, CLD= chronic liver disease, NPH= Normal Pressure Hydrocephalus)*

Among 435 patients, 64 (14.7%) patients had normal MMSE. 72 (16.6%) patients had mild cognitive impairment (MCI). Most of the patients had mild dementia (n=143, 32.9%) whereas 121 (27.8%) patients had moderate dementia. Only 35 (8%) patients had severe dementia. (Figure 3)

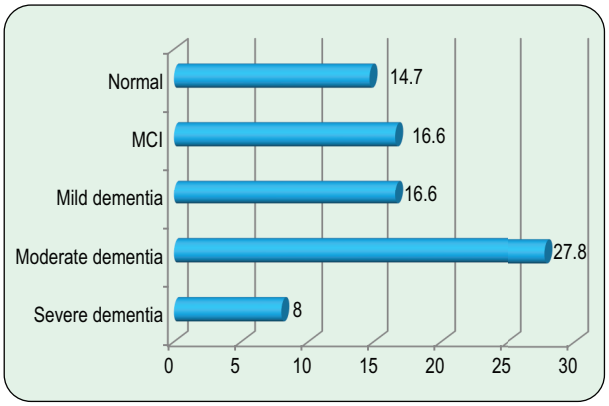

Figure 3: *Severity of Dementia based on MMSE Score (27-30: No Dementia; 23-26: mild cognitive impairment (MCI); 18-22: Mild dementia; 10-17: Moderate dementia; < 9: Severe dementia)*

Discussion

Dementia is a syndrome, characterized by a general decline in cognitive abilities that affects a person's ability to perform everyday activities.[1] This typically involves problems with memory, thinking, behavior, and motor control. [1]

Things that increase the risk of developing dementia include age; more common in those 65 years or older.[15] Although the greatest risk factor for developing dementia is aging, dementia is not a normal part of the aging process.[16]In this study, the median age of patients was 66 years. The mean age was 66.04 years with Standard Deviation (SD) of 10.61 years. In a study in India among 347 consecutive dementia patients, the mean age of the group at presentation was 66.3 years, which is similar to our finding but nearly a decade younger than in developed countries.[17]

Women are disproportionately affected by dementia. Women experience higher disability-adjusted life years and mortality due to dementia.[15] In this study, there was a male (60.7%) predominance with a male-to female ratio of 1.54: 1 which is contrary to previous study which demonstrated that dementia prevalence was higher in females compared to males.[18,19]

Alzheimer disease is the most common form of dementia and may contribute to 60–70% of cases.[3,15]In this study, the commonest type of dementia was Alzheimer's disease (n= 219, 50.3%) followed by vascular dementia (n= 75, 17.2%) and mixed dementia (n= 60, 13.8%) respectively. So, our finding is similar to previous studies. In a study in India among 347 consecutive dementia patients, Alzheimer's disease was the most common subtype of dementia (38.3%), followed by a high proportion of vascular dementia (25.4%); Frontotemporal dementia syndromes were not uncommon (18.7%) and Dementia with Lewy bodies was encountered in 8.9% of the patients, and mixed dementia was found in 8.6%. [17]

Many neurocognitive disorders may be caused by another medical condition or disorder, including brain tumors and subdural hematoma, endocrine disorders, nutritional deficiencies, infections, immune disorders, liver or kidney failure.[6] Some of the neurocognitive deficits may sometimes show improvement with treatment of the causative medical condition.[6]These are reversible causes of dementia. In this study, 40 (9.2%) patients had reversible causes of dementia.

When compared to other countries, the prevalence of dementia reported in Bangladesh (8.0%) is like that reported across the world (range 5.5–11.3%).[20] The projected number of people living with dementia is expected to more than double by 2051.[21]So early diagnosis and subtypes of dementia is warranted to tackle the vast number of current and future dementia cases in Bangladesh.

There are some limitations of the study. We looked for only a few reversible causes of dementia. Risk factors for dementia were not evaluated. Genetic tests were not done.

Conclusion:

Dementia is more prevalent among elderly people. Alzheimer's disease is the most common subtype of dementia in Bangladesh. More effort is needed for early accurate diagnosis of dementia. Searching for reversible causes of dementia and appropriate treatment is also warranted.

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Conflict of Interest:

No author has any conflict of interest to disclose for this manuscript. The authors themselves are responsible for their ideas and views expressed in this article, which do not necessarily represent the views, decisions or policies of the institutions with which they are affiliated.

Ethical Consideration:

All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration 2013) and also with the ethical guidelines of the Institutional research ethics. Formal ethics approval was granted by the local ethics committee (Ref: IRB/NINS/2020/393). Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and were analyzed using the coding system.

Authors' contributions:

Hakim M, Hassan MS and Uddin MN contributed to the concept and design. Uddin MN, Shams S, Hossain S, Sarkar M performed data collection and compilation. Hassan MS, Sonia SF, Mehrab R, Yusuf A and Rahman M contributed in data analysis and manuscript writing. All author revised and approved the manuscript.

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