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Prevalence of Tardive Dyskinesia and Its Association with Antipsychotic Drug and Depression in Geriatric Population in Lahore, Pakistan

Maria Mustafa[1*], Kanzul Kamal[1], Irsa[1], Minahil[1], Laiba Azam[1] and Aira Eman[1]

[1]Department of Physical Medicine and Rehabilitation, School of Health Sciences, University of Management and Technology, Lahore, Pakistan

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***Corresponding Author:**
Maria Mustafa
Department of Physical Medicine and Rehabilitation, School of Health Sciences, University of Management and Technology, Lahore, Pakistan
maria.mustafa@umt.edu.pk

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ABSTRACT

Tardive Dyskinesia" is the subtle onset of rhythmic, stereotype, repetitive movement of the face, mouth, and tongue. The basic pathology behind this disease is hypersensitization of dopamine receptors. **Objective:** To find out the prevalence of tardive dyskinesia and its association with depression and antipsychotic drug administration in the geriatric population. **Methods:** A cross-sectional descriptive study was conducted for a period of four months from February 2023 to May 2023. The data were collected from different hospital settings in Lahore. A sample size of 150 elderly individuals aged 55-80 years were included. Depression was evaluated through Geriatric Depression Scale whereas abnormal involuntary movement Tardive Dyskinesia is evaluated through AIMS scale. Chi square test was used to determine the association between variables Depression, Antipsychotic drug and Tardive Dyskinesia. Informed consent and ethical approval were taken from all participants. **Results:** Out of 150 respondents, 78(52%) male and 72 (48%) were female. Mean age was 65 years ± 7.21 SD. Among all individuals 20% experienced mild, 42.7% with moderate and 37.3% experienced severe depression.27.3% of the population taking antipsychotic drug experienced Tardive dyskinesia while it was absent in 22.67% of the individuals who were taking antipsychotic drug.20.67% of old individuals with severe depression were with Tardive dyskinesia. **Conclusions:** It is concluded from above study depression is common among geriatric population. Antidepressant drugs used to treat depression for longer duration because abnormal movement called tardive dyskinesia. There is significant relation of Tardive Dyskinesia with depression and antipsychotic drugs.

INTRODUCTION

Tardive syndrome is a vast term and includes different categories of movement disorders. It majorly encompasses tardive dyskinesia and tardive dystonia [1]. The Term "Tardive Dyskinesia" was first introduced by Faurbye in 1964. Tardive means arriving or coming late. Dyskinesia means abnormal involuntary movements which are more prominent around the mouth, and jaw and later can be developed in the upper limb, lower limb, and pelvis. The first case of Tardive Dyskinesia was reported in 1957 by Joseph while the first anti-psychotic chlorpromazine was introduced in 1952 [2]. "Tardive Dyskinesia" is the subtle onset of rhythmic, stereotype, repetitive movement of the face, mouth, and tongue (frowning of the forehead, puckering of lips, abnormal chewing, tongue protrusion) and also frequently involves the trunk and lower extremities (like piano playing a movement of fingers and in the trunk like pelvic gyration shrugging of shoulders, etc.) resulting from prolonged used of antipsychotic drugs [3]. Vesicular Monoamine transporter type 2 is responsible for wrapping dopamine present in the cytoplasm of presynaptic neurons in vesicular form. After stimulation of dopaminergic neurons, dopamine is discharged from presynaptic neurons and binds to postsynaptic D2 receptors and generates the response but when the patient uses dopaminergic blocking agents, dopamine can't bind to D2 receptors. In feedback response, there are

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more expressions of D2 receptors on postsynaptic neurons. Because of this more dopamine is released and there is hypersensitization of D2 receptors producing Dyskinesia (abnormal movements) which is the clinical presentation of Tardive Dyskinesia. While considering antipsychotics, second-generation has fewer adverse effects as compared to first-generation drugs of high potency with higher dopamine receptor activity [4]. Risk factors for tardive dyskinesia are broadly classified into two major categories i.e. modifiable and non-modifiable. Major modifiable risk factors include class of dopamine receptor blocking agent (either first generation or second generation), duration of illness, the dosage of the drug, length of exposure to DARBs, alcohol consumption, and smoking. Non-modifiable risk factor comprises of elderly population, female gender, African ethnicity, patients suffering from schizophrenia, and having neurological problems or mood disorders [5]. Tardive dyskinesia is rarely reported in the Asian population or there may be inadequate published research available for this ethnicity [6]. The rating tool to assess TD which is most frequently used is the "Abnormal Involuntary Movement Scale" (AIMS). According to the Schooler-Kane standard to diagnose TD is, a) Involuntary movement or symptoms of TD appear after at least 3 months of therapy with antipsychotic drugs, b) Abnormal, uncontrolled movement present in almost 2 or more body parts in case of mild but should be present in at least 1 body region with moderate severity, c) There should be no other cognitive impairment that can cause abnormal uncontrolled movement [4]. Tardive dyskinesia is not a rare disease. Its incidence rate is increasing by 3%-5% per annum and recently its prevalence is found to be about 20-30% [7]. 15-40% lifetime prevalence of tardive dyskinesia is reported among patients who are taking antipsychotic drugs and it is more prevalent in the elderly aged>55 and in postmenopausal women [8]. Patients taking first-generation antipsychotics are more prone to develop tardive dyskinesia than second-generation antipsychotics. A meta-analysis review showed that TD is 30% prevalent in patients taking first-generation antipsychotics and 21% prevalent in patients who are being treated with second-generation antipsychotics [9]. According to the guidelines from the American Psychiatric Association, patients should be checked for symptoms of TD before starting DRBA treatment. For patients on DRBAs, examinations should be conducted at least twice a year. Additionally, assessments should be done whenever there's a change in the DRBA dosage or type, or if new movement symptoms are noticed [10]. Pharmacological therapy for tardive dyskinesia includes VAMT2 (vesicular monoamine transporter 2) inhibitors which majorly include drugs like trabenazine, valbenazine, and tetrabenazine [11]. Substitution of antipsychotics with low potency DARBS and the use of amantadine may also prove effective in treating TD [12]. Deep brain stimulation has proven effective in the treatment of tardive dyskinesia [13]. The Tardive Dyskinesia Impact Scale (11-item questionnaire) is formulated to assess the impact of disease on a patient's quality of life [14]. Tardive dyskinesia affects a person's mental well-being, and professional life, and also interferes with their social activities [15]. Patients suffering from tardive dyskinesia may experience the exacerbation of psychological problems, increased incidence of chronic illness, and problems with speech, gait, respiration, etc. [16].

METHODS

It was cross-sectional descriptive study that was conducted on geriatric population from different hospital settings of Lahore, i.e. General Hospital, Jinnah Hospital, Fountain House, and Mayo Hospital. The study was of 4 months' duration after approval of the Ethical committee of university and respected HOD i.e. 16th January, 2023 with Reference no. RE-010-2023. After approval of Ethical Committee, it was started from January 2023 to May 2023. The information was collected from the geriatric population aimed to determine the prevalence of Tardive Dyskinesia in the geriatric population and its association with depression and antipsychotic drugs. Non probability purposive sampling technique was used for data collection. A sample of 150 geriatric individuals aged 55-80 years both male and female were included in the study. The sample size was calculated by using WHO calculator with 11% population proportion, 95% confidence level, and 5% margin error. Individuals taking antipsychotics were either diagnosed with schizophrenia, bipolar disorder or substance abuse were screened. However, only those patients who scored greater than 5 on Geriatric depression scale and antipsychotic drug was prescribed in their medical records, were included. Before participation, the consent of patients was taken after giving a comprehensive understanding of the survey. Depression was assessed by the Geriatric depression scale which was filled after asking the questions from patients. Cutoff score for Geriatric depression scale was 0-4 considered normal and 12-15 indicate severe depression. The Geriatric depression scale is a 15-questionnaire scale, depending on age, education, and complaints; with 5-8 indicate mild depression; 9-11 indicate moderate depression; and 12-15 indicate severe depression. Tardive Dyskinesia was assessed by AIMS (Abnormal Involuntary Movement Scale) by observing involuntary movements in participants. Patients taking antipsychotic medications are doing so as prescribed by their doctors and are suffering from severe depression. Data were analyzed using SPSS version 24.0. Mean and standard deviation was calculated of quantitative

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variables and qualitative measures are presented in the form of frequency and pie or bar charts. Chi Square test was applied to see association between qualitative variables Tardive dyskinesia, depression and antipsychotic drug.

RESULTS

Tardive Dyskinesia was assessed in 150 geriatric populations using the AIMS (Abnormal Involuntary Movement Scale) and its association with depression using the Geriatric depression scale for measuring depression and those who were taking antipsychotic drugs. Table 1 showed the demographic values of the participants. The research study had a total of 150 participants, among them 56 percent of the participants were of 55-65 years of age and 44 percent of the participants were of 66-80 years of age. The study groups include participants of both genders 52 percent of participants were male and 48 percent were female. Among them 76.7% of the participants were married, 16.7% were widows, and 6.7% of divorced. Socioeconomic status of the study group where 7 participants belonged to the upper class, 112 participants belonged to the middle class and 31 participants were of the lower class. The total number of participants was 150, among them 50 percent of the participants had been taking antipsychotic drugs for many years and 50% of the participants were not taking any antipsychotic drug.

Table 1: Demographic Characteristics of the Study Participants

Variables	Frequency (%)
Age (Years)	
55-65 Years	84 (56%)
66-80 Years	66 (44%)
Gender	
Male	78 (52%)
Female	72 (48%)
Marital Status	
Married	115 (76.7%)
Widow	25 (16.7%)
Divorced	10 (6.7%)
Socioeconomic Status	
Upper	7 (4.7%)
Middle	112 or 74%
Lower	31 or 20.7%
Family Status of The Study Group	
Nuclear	64 (42%)
Joint	86 (57.2%)
Patient Taking Antipsychotic Drugs	
Yes	75 (50%)
No	75 (50%)

Table 2 showed the frequency of tardive dyskinesia and depression in geriatric individuals. The research findings indicate that among 150 participants 36.7% of participants 55 in numbers were aware of involuntary movement in their body Tardive dyskinesia and 63.3% of the participants 95 in numbers were not with Tardive dyskinesia and Among 150 participants 30 participants were present with mild depression, 64 participants were with moderate depression and 56 were with severe depression.

Table 2: Frequency of Tardive Dyskinesia in the Geriatric Population

Conditions	Subcategory		Frequency (%)
Tardive Dyskinesia	Present		55 (36.7%)
	Absent		95 (63.3%)
Depression	Mild	5-8	30 or 20%
	Moderate	9-11	64 (42.7%)
	Severe	12-15	56 (37.3 %)

Table 3 showed that there were 41 participants taking antipsychotic drug were with Tardive dyskinesia and 34 participants were not developed Tardive dyskinesia. A chi-square tests was applied between variable Tardive dyskinesia and with antipsychotic drug. According to chi-square tests, the p-value for tardive dyskinesia with antipsychotic drug was <0.05, which showed that there is a significant relation between tardive dyskinesia antipsychotic drugs.

Table 3: Association of Tardive Dyskinesia with Anti-Psychotic Drugs in Geriatric Population

The Patient Taking the Antipsychotic Drug	Frequency of Tardive Dyskinesia Frequency (%)		p-Value
	Present	Absent	
Yes	41 (27.3%)	34 (22.67%)	<0.05
No	14 (9.33%)	61 (40.67%)	
Total	55 (36.67%)	95 (63.3%)	

Table 4 showed that there are highest number of participants developed moderate depression and Tardive dyskinesia was more observed in participants having moderate to severe depression. A chi-square tests was applied between Tardive Dyskinesia and Geriatric Depression Scale to see association between them. According to chi-square tests, the p-value for tardive dyskinesia with depression was <0.05, which showed there is a significant association of tardive dyskinesia with depression.

Table 4: Association of Tardive Dyskinesia with Depression in Geriatric Population

Tardive Dyskinesia	Geriatric Depression Scale Frequency (%)			p-Value
	Mild	Moderate	Severe	
Present	0	24 (16%)	31 (20.67%)	<0.05
Absent	40 (26.67%)	30 (20%)	25 (16.67%)	
Total	40 (26.67%)	54 (36%)	56 (37.33%)	

DISCUSSION

In a study conducted in Ethiopia in 2022, they found the Prevalence of TD, and the results show that 15.4% of patients had TD who were taking antipsychotic drugs [17]. In this study, the calculated prevalence of TD is 36.67%

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which may suggest that tardive dyskinesia is more prevalent in Pakistan. In a study conducted in 2023, tardive dyskinesia was assessed by Impact-TD Scale and guided the treatment plan but we used the AIMS scale and GDS scale to assess Tardive Dyskinesia so the disease can be diagnosed either by using AIMS scale or TIDS scale [18]. A retrospective analysis was conducted whose results showed that there were higher chances of developing TD in patients those who were taking antipsychotic drugs for more than 1 year. The participants included in the retrospective analysis were adult patients with schizophrenia, major depressive disorder, and bipolar [19]. This study's results also showed that the geriatric participants who have been taking anti-psychotic medication for years are at high risk of developing TD and the prevalence of TD in these patients was 22% which is higher than those taking anti-psychotic for months this proposed that TD can develop either in adults or geriatric but the main factor is taking anti-psychotic drugs for more than 3 months. Another study showed that the diagnosis and treatment of TD are important as it is highly disrupting for both patients and their families and affects their quality of life. To differentiate TD from other diseases, they notice the use of DRBA, their duration of use, and any other neurodegenerative disease [9]. We also assessed TD based on the duration of antipsychotic administration but we excluded the patients having any other neurodegenerative disease. In 2023 it was discovered not only psychotic problems and Antipsychotic drug consumption but Traumatic brain injury can also be a cause of Tardive Dyskinesia. A case study of chronic mandibular Tardive Dyskinesia was presented which is caused by concussion with no history of Anti-Psychotic Drugs [20]. We find the prevalence of Tardive Dyskinesia in people who are old, diagnosed as depressive, or are taking antipsychotic drugs. These findings suggest that tardive dyskinesia can develop if the patient is suffering from any neurodegenerative condition with no history of antipsychotic drugs.

CONCLUSIONS

Tardive Dyskinesia is more prevalent in the geriatric population, particularly among those who were with severe depression and have been on long-term antipsychotic medications. These involuntary movements are highly distressing and can significantly impact a person's quality of life, often leading to isolation and worsening depression. There is a strong association between tardive dyskinesia, depression, and the use of antipsychotic drugs.

Authors Contribution

Conceptualization: MM
Methodology: MM, KK, I, M, LA, AE
Formal analysis: MM
Writing, review and editing: MM, KK, I, M, LA, AE

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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