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Pattern and frequency of involuntary movements: hospital-based study

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Abstract

Background This study aims to detect pattern and frequency and risk factors of movement disorders in Assiut university hospital.

Methods This is a hospital-based study, all patients with involuntary movements, attending Assiut university hospital; inpatient and outpatient clinics.

Results Most of cases were males (58.5%), within the age group between 20 and 60 years (59.2%) and illiterate (62.8%). In our study parkinsonism was the most common movement disorder (32.1%), followed by chorea (22.5%), then dystonia (17.8%).

Conclusions Movement disorders are common cause of disability of patients in our study, with high frequency attending our hospital inpatient department and outpatient clinic, highlighting the need for future specialized movement disorder clinic in our hospital, promoting health care and management of patients. With the need of further studies regarding management of such patients.

Keywords Movement disorders, Parkinson's disease, Hospital-based

Introduction

Movement disorders are divided to either hyperkinesias such as chorea, athetosis, dystonia and others, or hypokinesias such as Parkinson's disease (PD), atypical and acquired parkinsonism [1].

The increase in life expectancy and decrease in fertility rates resulted in increasing elderly population. Neurological disorders, specially movement disorders, are gaining increasing attention, as age is the most important risk factor. They are also associated with psychiatric disorders with bad quality of life and high economy burden.

This increase in costs challenges societies and health care systems [2].

Previous studies in Upper Egypt of variable methodologies and population discussed movement disorders; as In Kandil et al. [3], Badry et al. [4]. They discussed dystonia, chorea and athetosis. Some other studies discussed Parkinson's disease as in El-Tallawy et al. [5] and Khedr et al. [6].

The hospital-based studies of involuntary movements are important, not only to detect pattern and frequency of different disorders, but also for health services future planning such as the construction of specialized movement disorder clinic which could provide data about its possible risk factors, and primary causes in our population.

This study aims to detect frequency, pattern and clinical characteristics of patients with different forms of movement disorders attending Assiut University neurology outpatient clinic and internal department.

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Methods

This study was carried out in Assiut university hospital, Egypt.

The study included 140 patients with movement disorders attending Assiut University neurology outpatient clinic and inpatient department, from the 1st of July 2020 to 1st of Jan 2021.

The protocol of this study was approved by ethics committee of Faculty of Medicine, Assiut University, number of approval 17100942. Confidentiality of all participants was protected to the fullest extent possible; they will not be identified by name in any report or publication resulting from data collected in this study. Consent from all participants was obtained after description of aim of the study and methods before participation in the study.

All patients (140) with different types of movement disorders (parkinsonism, dystonia, tremor, chorea, athetosis, tics, stereotypies and ataxia) were assessed by full medical, therapeutic and family history, full clinical evaluation; general, systematic, neurological and psychiatric, and the diagnosis of movement disorder was assessed by two specialists of neurology each separately and assurance of diagnosis by video record, based on clinical assessment, brain imaging or other needed investigations, and clinical diagnostic criteria. Duration of the study was 6 months.

Severity and clinical features was evaluated by related scales, including:

MDS–Unified Parkinson's Disease Rating Scale (MDS–UPDRS) [7] for Parkinson's disease (parts 1, 2, 3, 4) [8]. The Hoehn and Yahr staging (HY) [8]. Tremor assessment form (TAF) for tremor: for patients with ET [9] and Fahn–Marsden rating scale (FMRS), for dystonia [10].

Data analysis was carried out using SPSS version 25 (SPSS Inc., Chicago, IL, USA), Excel (Microsoft Corporation, Redmond, WA, USA). This study is a descriptive observational study; in which demographic and other qualitative data were expressed in terms of means and standard deviations. Qualitative data were described in frequencies and percentages.

Results

The present study demonstrated that among 140 studied patients with involuntary movements, 82 (58.5%) cases were males, and 83 (59.2%) cases were between age group 20 and 60. These results also reported that 39 (27.8%) patients with involuntary movements stopped their work because of their illness (Table 1).

Sixty-nine (47.9%) patients had onset of involuntary movements before the age of 40 years. Positive family history and consanguinity were reported among 28 (20%), 44 (31.4%) patients, respectively. Furthermore,

Table 1 Demographic data among the studied patients

| | <i>n</i> (140) | % |
|-------------------------|----------------|------|
| Sex | | |
| Female | 58 | 41.4 |
| Male | 82 | 58.5 |
| Age: (years) | | |
| < 20 | 20 | 14.2 |
| 20 to < 40 | 42 | 30 |
| 40 to < 60 | 41 | 29.2 |
| ≥ 60 | 37 | 26.4 |
| Mean ± SD (range) | 42.32 ± 20.72 | |
| Education | | |
| Illiterate | 88 | 62.8 |
| Literate | 50 | 35.7 |
| Below school age | 2 | 1.4 |
| Occupation ^a | | |
| Not working | 29 | 20.7 |
| Working | 31 | 22.1 |
| Stopped working | 39 | 27.8 |
| Residence | | |
| Rural | 92 | 65.7 |
| Urban | 48 | 33.3 |
| Marital status | | |
| Single | 39 | 27.8 |
| Married | 87 | 62.1 |
| Under age | 14 | 10 |

SD standard deviation

^a The remaining 29.2% are housewives or children

medical comorbidities were recorded among 69 (49.3%) patients (Table 2).

Parkinsonism was the most common movement disorder (32.1%), followed by chorea (22.5%), then dystonia (17.8%) (Fig. 1).

Among 140 cases, 45 cases (32.1%) were presented with parkinsonism, Parkinson's disease was the most common aetiology followed by secondary parkinsonism (Table 3). Drug induced Parkinsonism as a cause of secondary parkinsonism was reported among six cases (13.4%) all of them received antipsychotic medications (risperidone and/or long acting antipsychotic).

Most of PD patients 24 (70.5%) were males and 29 (85.2%) of them were above the age of 40 years. The mean of MDS–UPDRS total score was 62 ± 43.66, as shown in Table 4.

The most of PD cases (70.59%) were in Hoehn and Yahr stages 1 and 2. As regards PD non motor symptoms, sleep problems were the most reported symptoms among patients (70.5%), followed by depressed (67.6%) and anxious mood (64.7%).

Table 2 Clinical data of patients with different types of involuntary movements

| | n (140) | % |
|---|---------------|------|
| Onset age: (years) | | |
| <20 | 37 | 25.7 |
| 20 to <40 | 32 | 22.2 |
| 40 to <60 | 49 | 34 |
| ≥60 | 26 | 18.1 |
| Mean ± SD (range) | 37.45 ± 21.95 | |
| Side of onset | | |
| Limb onset: left | 40 | 28.5 |
| Right | 47 | 33.5 |
| Both | 46 | 32.8 |
| Axial (no limb onset) | 7 | 5 |
| Referred from | | |
| Neurologist | 116 | 82.8 |
| Other specialty | 24 | 17.1 |
| History from patient or caregiver or both | | |
| Patient only | 29 | 20.7 |
| Patient and caregiver | 87 | 62.1 |
| Caregiver only | 24 | 17.1 |
| Family history | | |
| No | 112 | 80 |
| Present | 28 | 20 |
| Consanguinity | | |
| No | 96 | 68.5 |
| Present | 44 | 31.4 |
| Medical comorbidity | | |
| No comorbidities | 71 | 50.7 |
| Present | 69 | 49.3 |
| Time of diagnosis | | |
| Old diagnosis | 88 | 62.8 |
| Newly diagnosed | 52 | 37.1 |

SD standard deviation

Regarding to tremor, the major cause of tremor was parkinsonian (38.6%), followed by drug induced (20.4%) (16 cases (84%) due to antipsychotic, while three cases (16%) were Depakine induced), while essential tremor was reported in 11 (12.5%) cases.

Essential tremors were recorded among male (55.5%) more than females except for the age group 20–40 years. As regards the age predilection, the frequency of essential tremors was increased with the increase in age with mean age of onset and diagnosis were 52.4 ± 10.7 , 54.6 ± 10.4 years, respectively.

As regards to the type of dystonia, secondary dystonias were more common. Dystonia due to cerebral palsy was the most common cause of secondary dystonia (24%), followed by drug induced (20%) (due to antipsychotics: risperidone) and post encephalitic (16%).

The most of dystonic cases 17 (68%) were males, (13 of the secondary dystonias and 4 of primary cases). Ten cases had generalized dystonia (40), 8 had focal dystonia (32%), and 5 had multifocal (20%) and only 2 cases with segmental dystonias (8%), most of cases were males. Primary dystonia reported in 20% of cases with dystonia mean 35 ± 24.53 by Fahn–Marsden rating scale (FMRS) (Table 4).

Regarding to chorea, 61.2% of the cases were males, 8 cases (16.2%) were with primary chorea, and the rest were with secondary causes. Half (50%) of primary chorea cases were males, and 65% of secondary chorea cases were males. Ten cases were with secondary to vascular etiology due to cerebral infarction (32.2%) which presented with unilateral hemichorea, 9 patients of them associated with athetosis. Five cases were due to cerebral palsy (16.2%), 4 started with unilateral onset and only one with bilateral chorea, and 4 of them had associated athetosis. Six cases were with inflammatory origin, 4 were post encephalitic (12.9%) all of them were unilateral and had associated athetosis.

Discussion

In the present study, the most frequent movement disorder was parkinsonism; in agreement with previous hospital-based study by Bhidayasiri et al. in Thailand, who reported that most of patients had a diagnosis of parkinsonism (72%), followed by tremor (9.6%), and dystonia (8.4%) [11], and in a Brazilian study by Balestrassi et al., 680 medical records were analysed. The most frequent diagnosis was PD (40.7%), followed by essential tremor (15.4%) and dystonia (13.1%) [12].

Disagreeing with Kwon et al., in South Korea, who reported that the most common involuntary movement was tremor or tremor-like phenomenon (56.9%), followed by parkinsonism (16.8%) [13]. This difference could be attributed to different methodology, and ethnic differences between the studies. Furthermore, most patients with essential tremors in our populations seeks to receive health service in private clinic, not hospitals, and the time of the study was during COVID pandemic which decreased frequency of outpatient medical consultations.

In the present study, Parkinson's disease was the most frequent diagnosis as it was presented among 23.6% of patients, in agreement with previous hospital-based studies [11, 12, 14]. This is explained by the fact that Parkinson's disease is the most common neurodegenerative movement disorder and it's the most common cause of parkinsonism, as stated by Balestrino and Schapira [15].

Regarding to sex distribution, the present study reported that 70% of cases were males, which was in agreement with population-based studies [5, 6, 16].

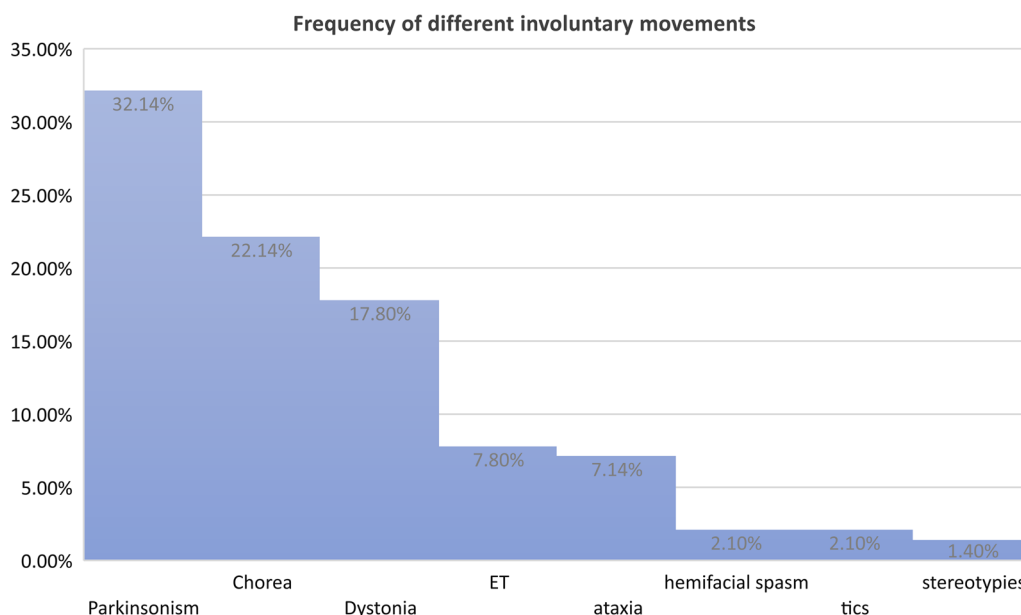


Fig. 1 Frequency of different involuntary movements

In addition, A systematic review and meta-analysis by Pringsheim et al., reported that a significant difference in prevalence of Parkinson's disease by sex was found, with a prevalence of 41 in females and 134 in males ($P < 0.05$) [17]. In comparable with the demographic factors in a study in Brazil by Balestrassi and Silva, showed that there was slight predominance among females, this could be attributed to genetic differences between different ethnic groups [12].

Non motor symptoms in the current study were strongly affected as in Shalash et al., who stated that all patients (100%) suffered from one or more NMSs. The most common and severely affected domains were sleep/fatigue (91.3%), mood/cognition (87%), miscellaneous symptoms (78.2%), urinary symptoms (75.9%), and memory/attention impairment (72.4%) [18]. This supports the importance of non-motor symptoms and their impact on daily life activities, as stated by Pfeiffe, who reported that non-motor symptoms in Parkinson's disease are not only common, but also may have a greater impact on quality of life than motor features [19].

Regarding to essential tremor, gender distribution in this study was more commonly in males with no significant difference, in agreement with other studies as Shalash et al. and Elhassanien et al. [20, 21]. This male predominance might be attributable to clinical and pathological associations between essential tremor and Parkinson's disease, which is also more prevalent in men, high levels of heterogeneity in methodology, diagnostic criteria, clinical assessment and ethnicity among the

available studies might partly account for the observed discrepancies in male:female prevalence ratios [22].

Regarding to tremor distribution in essential tremor, Elhassanien et al., reported that, all patients had bilateral nearly symmetrical hands tremor, 16.7% had head tremor, 13.9% had voice tremor, and 11.1% had lower limbs tremor [21].

These results are similar to the present study, and that is consistent with the fact that essential tremor patients seek medical advice when the condition is progressive and disabling to the patient in his daily activities.

Dystonia cases in the present study were in agreement with Balestrassi and Silva, where dystonia represented 13.1% [12]. While the frequency of dystonia in this hospital-based study was higher than the previous one in Korea by Kwon et al., who studied the clinical characteristics of involuntary movements in hospitalized patients, and they found that the frequency of dystonia was (4.5%) [13]. This difference may be attributed to methodological difference as in the present study the inpatient and outpatient cases were included, while Kwon et al. [13] included only inpatient cases, and this reflects that most of dystonia patients in Egypt are treated as outpatient, also could be explained by the fact that the prevalence of dystonia reported in the population-based studies appears higher than that reported in the service-based studies as stated in Steeves et al. [23].

Regarding to causes of dystonia, Badry et al. revealed that primary type of dystonia was described in 23% of cases, while 77% of cases had secondary type either due

Table 3 Classification of different movement disorders aetiology

| Type of movement disorder | n | Percent |
|---|------------|-----------------|
| 1. Parkinsonism | Total = 45 | Total = 32.1% |
| Idiopathic Parkinson disease | 34 | 75.6% |
| Progressive supranuclear palsy ^a | 1 | 2.2% |
| Secondary parkinsonism | 10 | 22.2% |
| Drug induced | 6 | 13.4% |
| Vascular parkinsonism | 4 | 8.8% |
| 2. Tremor | 88 | Total 62.8% |
| Parkinson's tremor | 34 | 38.6% |
| Drug induced tremor | 18 | 20.4% |
| Essential tremor | 11 | 12.5% |
| Cerebellar tremors | 9 | 10.2% |
| Metabolic ^a | 6 | 6.8% |
| Dystonic tremors | 5 | 5.6% |
| Rubral tremors ^a | 3 | 3.4% |
| Bizzare (functional) | 2 | 2.2% |
| 3. Dystonia | Total = 25 | (Total = 17.8%) |
| Primary dystonia | 5 | 20% |
| Secondary dystonia | | |
| Cerebral palsy | 6 | 24% |
| Drug induced | 5 | 20% |
| Inflammatory (post-encephalitic) | 4 | 16% |
| Vascular (post stroke) | 2 | 8% |
| Functional | 2 | 8% |
| Wilson disease | 1 | 4% |
| 4. Chorea | 31 | Total 22.5% |
| Primary | 5 | 16.2% |
| Huntington's disease | | |
| Neuroacanthocytosis | 2 | 6.4% |
| Neuroferritinopathy and acerulo-plasminemia | 1 | 3.2% |
| Secondary chorea | | |
| Vascular | 10 | 32.2% |
| Cerebral palsy | 5 | 16.2% |
| Inflammatory | | |
| Post-encephalitic | 4 | 12.9% |
| Rheumatic chorea | 1 | 3.2% |
| Chorea gravidarum | 1 | 3.2% |
| Functional | 1 | 3.2% |
| Hemifacial spasm | 3 | 2.1% |
| Tics disorder | 3 | 2.1% |
| Stereotypies | 2 | 1.4% |
| Ataxia | 10 | 7.1% |
| Multiple sclerosis | 4 | |
| Vascular (small vessel disease) | 2 | |
| Cerebral palsy | 1 | |
| Ataxia for genetic testing ^a | 1 | |
| Vasculitis | 1 | |
| Post encephalitic | 1 | |

^a Due to vasculitis; 2 hypocalcemic, 2 hepatic, 1 hyperthyroidism, 1 ureamic; Case suggestive of refsum disease, ataxia with visual and hearing impairment

Table 4 Scores according to scales

| | Mean ± Std. deviation | Median |
|--|-----------------------|--------|
| Mean MDS-UPDRS total score | 62 ± 43.66 | 50.5 |
| Mean MDS-UPDRS part I | 9.03 ± 6.53 | 8 |
| Mean MDS-UPDRS part II | 12.7 ± 10.6 | 8 |
| Mean MDS-UPDRS part III | 38.18 ± 28.14 | 30.5 |
| Mean MDS-UPDRS part IV | 2.12 ± 3.79 | 0 |
| H&Y scale | 2.06 ± 1.07 | 2 |
| Fahn-Marsden rating scale (FMRS), for dystonia | 35 ± 24.53 | 33 |

MDS-UPDRS movement disorders society unified Parkinson disease rating scale, H&Y Hoehn and Yahr

to cerebral palsy (69.2%) or post-encephalitic (7.6%) [4]. This was in consistency with this study, where secondary dystonia was also more common.

Regarding to distribution of dystonia, this study was in consistency with, Badry et al., who stated that 15.4% of patients had focal dystonia and 84.6% of patients had generalized dystonia, taking into consideration that two-thirds of cases of dystonia are attributed to cerebral palsy [4].

In addition, Meoni et al., described that the most common type of dystonia being the adult-onset focal dystonias (AOFDs). Focal task-specific dystonias (FTSDs) were more frequent in men than in women; however, typist's cramp had been described more often in women. These discrepancies in FTSD prevalence could be linked to differences in daily life activities, including jobs and hobbies, between women and men [22].

Regarding to chorea, Badry et al., demonstrated that 28% of cases had chorea, it was the second by order of frequency, all secondary in aetiology, 57% were due to cerebral palsy and the rest was inflammatory, mostly rheumatic chorea [4], this difference in aetiology could be attributed to better socioeconomic state and health services in Assiut City than Al-Quseir, and better medical treatment of rheumatic chorea.

There were no cases of restless leg syndrome, that could be attributed to the fact that the study was during COVID pandemic which lead to decrease outpatient medical consultations.

Conclusion

Parkinsonism was the most common movement disorder, followed by chorea, dystonia, Essential tremors then ataxia. Parkinson's disease is the most common diagnosis, followed by drug induced movement disorders.

Involuntary movements are common cause of hand-capping as 39% of cases stopped working due to their involuntary movement.

The study showed that there is a need for A specialized movement disorder clinic with a specialized team of neurologists with formal training in movement disorders that balance clinical practice with academic and research activities, lab facilitations, and advanced investigatory tools, promoting genetic studies and investigations for environmental causes and further analysis of patients' follow-up, assessment for management.

Points of strengths of this study were the different patterns of movement disorders included as parkinsonism, tremors, dystonia, chorea, tics, stereotypies and ataxia, data collection was cost efficient and the verified scales used on different movement disorders as parkinsonism, dystonia, tremors.

Limitations were that findings cannot be generalized to population or community (hospital-based study) and the period of the study was during the peak of COVID pandemic which greatly influence the pattern of patients seeking medical advice especially non-emergency symptoms, for example, less number of patients of essential tremors, no cases of restless leg syndrome.

Abbreviations

| | |
|-----------|---|
| AOFDs | Adult-onset focal dystonias |
| ET | Essential tremor |
| FMRS | Fahn–Marsden rating scale |
| FTSDs | Focal task-specific dystonias |
| HY | Hoehn and Yahr staging |
| MDS–UPDRS | Movement Disorders Society–Unified Parkinson's Disease Rating Scale |
| PD | Parkinson's disease |
| TAF | Tremor assessment form |

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Author contributions

All authors contributed equally to study design, data collection, statistical analysis and writing manuscript.

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Availability of data and materials

Data and materials supporting the results of this article are available with the authors on reasonable request.

Declarations

Ethics approval and consent to participate

The protocol of this study was approved by ethics committee of Faculty of Medicine, Assiut University, number of approval 17100942. In addition, all subjects (or their parents or legal guardians) have given their written informed consent. The written informed consent was clear and indicated the purpose of the study, and their freedom to participate or withdraw at any time without

any obligation. Furthermore, participants' confidentiality and anonymity were assured by assigning each participant with a code number for the purpose of analysis only. The study was not based on any incentives or rewards for the participants.

Consent for publication

Not applicable in this section.

Competing interests

The authors have no competing interests to declare.

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