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Original Research Article

Clinical profile of neurological gait ataxia: a hospital based study

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ABSTRACT

Background: Gait disorders are major causes of functional impairment and morbidity especially in the elderly. Most gait disorders in older person are multifactorial, including neurological and non -neurological components. The aim of the study was to determine different neurological causes of gait disorders in elderly as well as in young adults.
Methods: A total of 155 patients with gait ataxia were included and studied for demographic profile, clinical features, mode of presentation and aetiology of neurological gait ataxia.
Results: Of the 155 patients enrolled in the study for gait disability, the most common cause of gait disability was cerebrovascular accidents 48 (31%) followed by lower motor neuron (LMN) paraparesis20 (12.9%), compressive myelopathy 17 (11%) and infectious causes were reported in 13 (8.4%) patients. Other causes were non-compressive myelopathy 8 (5.2%), Parkinsonism 8 (5.2%), degenerative diseases 6 (3.9%), diabetic amyotrophy 5 (3.2%), sensory neuropathy, hydrocephalus, myopathy and space occupying lesions in 4 (2.6%) patients each.
Conclusions: The two most common causes of gait instability in Sub-Himalayan region are cerebrovascular accidents and LMN paraparesis. The LMN parapersis is associated with significant falls.

Keywords: Cerebrovascular accidents, Gait instability, LMN paraparesis, Sub-Himalayan region

INTRODUCTION

Ataxia, a medical term originated from Greek language, meaning "without order" refers to 'disturbances in the control of body posture and motor coordination'.

Gait disorders are major causes of functional impairment and morbidity especially in the elderly. Most gait disorders in older person are multifactorial, including neurological and non-neurological components. Further gait disorders in elderly are risk factor for future cardiovascular diseases and dementia.[1]

Gait disorder affect up to 15 percent of people age 60 years older, and 80 percent or more of those who are age 85 and older. The impact of gait disorder ranges from serious to devastating. As many as 30% of people age 65 years and older fall each year.[2,3] Up to 17% of falls in the elderly can be attributed to balance or gait disorders, or to leg weakness.[4]

A decline of cognitive function is accompanied by a reduction of walking speed. The control of gait and posture is multifactorial, and a defect at any level of control can result in a gait disorder. Three distinct types of systems appear to be involved in the control of locomotion. The motor system produces propulsive movements.[5] The postural system maintains appropriate body orientation and balance. Goal direct aspect of locomotive behaviour bring organism to the designated goal of the locomotor episode.

Different causes of gait abnormalities are- weakness and spasticity, differentiation, extra pyramidal disorders,

cerebellar ataxia, vestibular dysfunction, frontal lobe dysfunction, cerebellar ataxia, vestibular dysfunction, orthostatsis, myoclonus, psychogenic gait disorder, confusional states and idiopathic gait disorder.[6]

As gait ataxia are important causes of falls especially in elderly population and very few studies with different causes of gait abnormalities have been reported in India. This study is oriented towards providing the etiological aspect of gait disorder and related demographic profile in sub-Himalayan region of India which is a hilly area and have the potential to recurrent falls of an ataxic patient.

METHODS

The study was conducted at Indira Gandhi Medical College, Shimla which is one of the tertiary care centres in sub-Himalayan region, located in the north- west of India in Asian continent. Most of the population of the state report to our institution for tertiary medical care. It was a hospital based prospective, observational study conducted from July 2012 to June 2013. In total 155 patients were recruited in the study during this study period.

All patients with gait abnormality attending casualty, medicine and neurology OPD or admitted to ward were recruited for this study. Only those patients who were native of the state and who consented to take part in the study were included. Patients with non-neurological cause of gait abnormality and age less than 18 years were excluded. A pretested structured performa was used for data collection. The study participants were subjected to relevant investigations for the diagnosis. A written informed consent was taken from the patients or their near relative for the participation in the study. Institutional ethical committee clearance was also taken.

Statistical analysis

Data was recorded on a Microsoft Excel spreadsheet. All discrete variables were expressed as percentages. Statistical analysis was performed using Epi Info2000 and SPS student version 16.0 (SPSS Inc, Chicago, USA). All discrete variables were expressed as percentages.

RESULTS

In the current study, out of 155 patients with gait instability, 98 (63.2%) were males and 57 (36.8%) were females. The age of the participants ranged from 18-86 years. 42 (27.1%) and 41 (26.5%) study subjects had history of hypertension and diabetes respectively. History of alcohol use was present among 57 (36.8%) patients and 22 (14.2%) had history of tuberculosis. Of all the patients examined 58 (37.4%) had systolic blood pressure >140mmHg.

Onset of gait instability was acute in 84 (54.2%) patients and gradual in others. History of fall was present in 50 patients (32.3%) after instability of gait. It was seen that patients with age ≥70 years had higher odds of fall as compared to patients aged <70 years. [Chi- square 2.04, Odds ratio 1.9 4 (C.I.=0.77-4.84); p value=0.15].

Table 1: Type of gait observed among Study population (n= 155).

Gait type	Cases (%)
Hemiparetic	39 (25.2%)
Spastic	29 (18.7%)
Cerebellar	29 (18.7%)
LMN	22 (14.2%)
Myopathic	09 (5.8%)
Parkinsonian	08 (5.2%)
Sensory	06 (3.9%)
March petis pas	03 (1.9%)
Others	17 (11.0%)

Spastic gait was present in 29 (18.7%) patients. Cerebellar type gait was present in total 22 (14.2%) patients. LMN (lower motor neuron) type gait was present in 22 (14.2%) of patients, while frontal type gait was present in 9 (5.8%) of patients. Myopathic gait was seen in 9 (5.8%) patients. Parkinsonian gait was present in 8 (5.2%) patients. Sensory type ataxia was present in6 (3.9%) patients. Gait non-specified by the type above mentioned were present in 17 (11%) of patients (Table 1).

On imaging studies infarct was present in 40 (25.8%) patients and haemorrhage in 27 (27.6%). Finding suggestive of compressive myelopathy were seen in 18 (11.6%) of subjects. Non-compressive myelopathy was seen among 8 (5.2%) patients. Parkinsonism was present in 8 (5.2%), while cerebellar degeneration was seen in 3 (1.3%). Hydrocephalus was seen in 4 (2.6%) and metabolic changes in 3 (1.9%) of subjects. Changes associated with other causes were present in 16 (10.3%) of patients (Table 2).

Table 2: Imaging findings in the study population (n=155).

Findings	Number (%)
Normal	03 (2.5%)
Infarct	40 (33.3%)
Haemorrhage	08 (6.7%)
Compressive myelopathy	18 (15.0%)
Non-compressive Myelopathy	08 (6.7%)
Parkinson	08 (6.7%)
Cerebellar degeneration	03 (2.5%)
Hydrocephalus	04 (3.3%)
Metabolic	03 (2.5%)
Infection	09 (7.5%)
Others	16 (13.3%)

In this study, most common cause of gait disability was cerebrovascular accident (CVA) (31%). LMN paraparesis

among 12.9%, compressive myelopathy in 11%, non-compressive myelopathy in 8.4%.

The history of falls was significantly higher in patients with lower motor neuron disorders as compared to patients with upper motor neuron diseases or disorders (p<0.007) (Table 3).

Impaired higher mental status was seen in 37 (23.9%) of patients and most common disorder associated with impaired mental status were infections and cerebrovascular accidents (CVA).

Table 3: Aetiology of falls in the study population.

Aetiology	Disorder	Cases with falls (%age) (Total cases= 155)	Odds ratio (95% Confidence interval)	P value*
Lower motor neuron	LMN Paraparesis	20 (12.9%)	2.61 (1.29- 5.29)	0.007
	Compressive myeloneuropathy	17 (11.0%)		
	NCM	08 (5.2%)		
	Diabetic amyotrophy	05 (3.2%)		
	Sensory neuropathy	04 (2.6%)		
	Myopathy	04 (2.6%)		
	Diabetic neuropathy	02 (1.3%)		
Upper motor neuron	CVA	48 (31.0%)		
	Parkinsonism	08 (5.2%)		
	Degenerative diseases	06 (3.9%)		
	Hydrocephalus	04 (2.6%)		
	SOL	04 (2.6%)		
	SDH	02 (1.3%)		
	CVT	02 (1.3%)		
	NCC	01 (0.65%)		

*p value <0.05 is taken as significant.

DISCUSSION

Gait disorders are common and significant causes of reduced quality of life and independence. Falls are one of the most important consequences of gait disorders.

We surveyed 155 patients in study duration of one year. Of these 98 (63.2%) patients were males and 57 (36.8%) patients were females. In this observational study which included patients from younger age group 13.3% patients were below age 30 years and 11% patients between 30-39 years of age, 38.1% patients between 40-70 years of age and 7.7% of age 70 years or above. There were less number of patients of age 70 years or older in this study as in India less number of elderly seek medical advice due to social problems or looked after well at home.

In a study by Ostchega Y, Harris TB, Hirsh R et al, at least 20% of older adults admit having trouble walking or require the assistance of another person.[7] In some samples of adults age 85 and older, the prevalence of limitations in walking can be over 54%. While age-related changes such as gait speed are most apparent after age 75 or 80, most gait disorders appear in connection with underlying diseases, particularly as disease severity increases. For example, age over 85, three or more chronic conditions, and the occurrence of stroke, hip fracture, or cancer predict "catastrophic" loss of walking.[4]

According to different studies gait disorders affect up to 15 % of people age 60 years and older, and 80 % or more of those who are age 85 and older.

While older adults may maintain a relatively normal gait pattern well into their 80s, some slowing occurs, and decreased stride length becomes a common feature described in gait disorders in elderly.[8] In older patients, attributing a gait disorder to a single disease is particularly difficult and is often not advisable. In the Bruneck study cohort, 24% patients had a neurological gait problem, 17.4% suffered from non-neurological gait disorder and 9.2% had both.[9] In another study by Sundarsky L, 60% of hospitalised patients had gait disorders.[10]

In present study 50 (32.7%) patients had falls after weakness or ataxia. Among males history of fall was present in 32.7% and among females in 31.6% patients. Compared to previous studies the high prevalence of fall in this study was probably due to hilly terrain of the study population. It was seen that patients with age ≥70 years had higher odds (Odds ratio 1.94) of fall as compared to patients aged <70 years. In a study by Phillip et al among neurological gait disorders the Parkinsonian, sensory ataxic, spastic, higher level gait, and particularly multiple neurological gait disorders were significantly associated with recurrent falls.[11] In US a survey of over 90000

population aged more than 65years, history of fall was present in only 16% of patients.[12] In this study most common cause of gait disability was CVA followed by LMN paralysis. Compressive myelopathy, infections and non-compressive myelopathy were other causes in chronological order. These finding were comparable in previous studies. The increased prevalence of CVA as a cause of gait disability in this study was because of high prevalence of risk factor like smoking, alcohol, hypertension and diabetes. Infections as a cause of gait disability were as important cause because of high prevalence of CNS infections in developing country in India which is not consistent with previous studies.

The common imaging findings in our study were infarcts present in 40 (25.2%) patients, haemorrhage present in 5.2% patients and findings suggestive of compressive myelo/myelo-radiculopathy in 18 (11.6%) patients which is consistent with our clinical impression. Sensory ataxia was more in male gender which may be due to increased frequency of alcoholism and associated nutritional deficiencies.

In this study the common disorder associated with history of falls were LMN paraparesis (35%), compressive myelopathy (35.3%), Parkinsonism (75%), sensory neuropathy (100%), hydrocephalus (100%), space occupying lesion (100%), degenerative disease (66.7%) and myopathy (75%) patients. These findings were consistent with most previous studies.[12] The history of falls was significantly higher in patients with lower motor neuron disorders as compared to patients with upper motor neuron diseases or disorders ($p<0.007$).

Higher mental status was found to be impaired in 37 (23.9%) patients. The most common disease associated with impaired mental status was infectious diseases, cerebrovascular accidents, Parkinsonism and degenerative diseases.

Alcohol intoxication was common among male patients and was associated with gait disability due to direct toxic effect, nutritional deficiency and associated neuropathies. In this prospective observational study history of alcohol intake was present in 57 (36.8%) patients. The relationship between fall and alcohol consumed depend upon the amount. In one study of 6000 elderly men aged 65years and above light drinkers (less than 14 drinks/week) had decreased risk of two or more fall in one year in comparison to abstainers. However, men with problem drinking had a higher risk of two or more falls then those without problem drinking.[13]

In this hospital based observational study 89 (57.4%) patients were smoker. Among patients of CVA, 39 (81.3%) were smoker. History of hypertension was present in total of 42 (27.1%) patients out of which 25 (25.5%) had CVA. A total of 41 (26.5%) patients were diabetic out of which 20 (41.7%) patients had gait disability due to CVA. In a study by Sacco RL, Wolf PA and Gorelick et al, risk factor for stroke were found to be hypertension, cardiac morbidity, cigarette smoking, diabetes, physical inactivity and high level of alcohol consumption and is similar to present study.[14]

It is estimated that total number of people with diabetic in 2010 to be around 50.8 million in India, rising to 87 million by 2030.[15] The prevalence of hypertension in last 6 decades has increased from 2% to 15% among rural india.[16] The increased prevalence of diabetes and hypertension in India and their strong association with CVA explains CVA as a major cause of gait disability.

CONCLUSION

From this study we conclude that prevalence of gait disability is also common in younger age. However, the incidence of fall increases with the increasing age especially more in elderly. As the elderly population is increasing worldwide, it is necessary to formulate policies and implement them for better geriatric care. A protocol focusing on improving balance and diminishing the fall risk may be advantageous for preventing falls among elderly patients.

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