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PREVALENCE OF HEREDITARY SPASTIC PARAPLEGIA IN ADULTS

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ABSTRACT

INTRODUCTION: The hereditary spastic paraplegia (HSP) is a condition which includes different neurological diseases showing a genetically and heterogeneous clinically. HSP is a condition with different types, influence the lower extremity with advancement of disease shows spasticity or weakness, and some other symptoms of bowel and bladder dysfunctions involvement. HSP is hereditarily heterogeneous, and in excess of 20 hereditary types have been recognized. **OBJECTIVE:** The purpose of this study was to find the prevalence of hereditary spastic paraplegia in adults and association of other symptoms of disease like bowel and bladder dysfunctions, distal muscle atrophy, dystonia etc. **METHODS:** A cross-sectional observational study was conducted on 80 subjects presenting with different neurological diseases which fall in the criteria of hereditary spastic paraplegia. Data was collected from different hospital settings in Lahore through non-probability convenient sampling technique. Clinical questionnaire for hereditary spastic paraplegia was used for data collection. **RESULTS:** There were 43 (53.8%) male and 37 (46.3%) female patients. Total prevalence of hereditary spastic paraplegia in adults were 3.75%. The prevalence of adult males with hereditary spastic paraplegia were 2.50% and 1.25% in adult females. The most commonly reported symptoms in HSP patients were distal muscle atrophy of lower limb (28.75%) and dystonia (12.5%) according to the study. **CONCLUSION:** This study concluded that the total prevalence of hereditary spastic paraplegia was very low in adults and mostly male are affected according to this study

KEY WORDS: Prevalence, Hereditary Spastic Paraplegia, Bladder, Bowel, Dystonia, Atrophy, Cerebral Palsy.

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INTRODUCTION:

Hereditary spastic paraplegia (HSP) is a condition that includes different neurological diseases showing genetically and heterogeneous clinically. Influence the lower extremity with the advancement of the disease shows spasticity or weakness, and some other symptoms of bladder dysfunctions involvement. A complicated type of HSP isn't constrained to the lower furthest points and may incorporate extra neurological side effects, for example, ataxia, pyramidal signs, dementia in old age, epilepsy, mental retardation and peripheral neuropathy [1]. HSP is hereditarily heterogeneous, and more than 20 hereditary types have been recognized. Autosomal dominant HSP (ADHSP) is one of the most widely recognized hereditary types, representing over 80% of every single familial case. The prevalence is normal given an incentive for HSP near 1 out of 10,000 individuals, though the commonness go in the population from different source-based investigations is 4.8– 13.9/10^5 [2]. Uncomplicated ADHSPP has Six hereditary types and complicated ADHSP has two types that have been clearly defined [3, 4]. After examination of individual, the cases show MRI cross sections of the spine, more common regions of the spinal cord are thoracic than cervical which shows atrophy. In review, the different types of ADHSP during examination reported that atrophy of the spinal cord occurs [5].

The HSP is a hereditary disease which means the start of the disease is from an early age to almost 70 years and onwards. The patients of HSP are completely dependent as this is a continuous neuro-handicap condition. Customarily, it has been divided into two categories, complicated HSP and uncomplicated (pure) HSP, dependent upon spastic paralysis and other neurological symptoms [6]. The three symptoms, which originally made up the pure shape included symmetric respective lower limb spasticity, urinary urgency, and diminished lower limb vibratory sensation [7,8.] Other neurological signs and manifestations: peripheral neuropathy, epileps[y], and dementia [7, 9]. Norton C, et al. reported that in diseases like Alzheimer's and Multiple sclerosis among young patients, have more anxiety or stress due to the symptoms of bowel dysfunctions, and also their life quality is diminished [10].

Late-onset HSP all the more frequently prompts quick movement of indications, while early infection makes a big appearance and regularly proclaims slower progression [11]. In grown-ups with HSP, the more active neurogenic detrusor has been showing up by the increased repetitive voiding, also the stress and urge incontinence [12-14]. HSP patient with fecal incontinency is a critical issue to deal with [15]. Nusrat S, et al. conducted a precise survey on numerous sclerosis, the 40% announced constipation and fecal incontinency prevalence [16]. Amyotrophic sideways sclerosis patients in a study were asked about the bladder and bowel-related symptoms [17]. In a cohort study by Rossi 80% shows side effects of the urinary tract and bowel dysfunctions 64% [18]. The urinary symptoms are more common in patients with HSP while less fecal desire is depicted [19].

To the best of knowledge, most of the research work stated that the prevalence of hereditary spastic paraplegia was very low in different environments, cultures and countries. We aimed to find prevalence of hereditary spastic paraplegia from different hospital settings and data collection from pre-diagnosed patients of HSP of all ages. With the increasing age the symptoms related to bladder dysfunctions are also increases so we included the patients of all age groups. Our main research purpose was to find the prevalence of HSP in adults.

METHODOLOGY:

A cross-sectional study was conducted at Mayo hospital, Sheikh Zayed hospital Lahore, Jinnah hospital Lahore and general

hospital Lahore from January to April 2019 through non-probability convenient sampling technique. Sample size was calculated by using Daniel sample size formula:

$$\boldsymbol{n = \frac{Z^2 P(1-P)}{d^2}}$$

n= expected sample size = **80**, P=Estimated Proportion = **27.4%**, d=Desired precision of estimate = **90%**, $\boldsymbol{Z^2_{1-\alpha/2}}$ Confidence level = **95%**. 80 subjects were included in this study which fall into the criteria of hereditary spastic paraplegia and pre-diagnosed, both genders and all age groups. Recent injuries (Head Traum, psychotic disorders (Depression, Stress, and Anxiety), any inflammatory disease (Pneumonitis), narcotic use were excluded from the study. This study was approved by the institutional review board and all procedures were conducted on accordance with the declaration of university of Lahore. After taking informed written consent from the patient or their attendant, data was collected through Clinical Questionnaire Hereditary Spastic Paraplegia. Data was analyzed using on SPSS Version 23.0 (Statistical Procedure of Social Sciences) Software. For Quantitative variable Mean and Standard Deviation were calculated and for Qualitative variables Frequency and Percentage were calculated.

RESULTS:

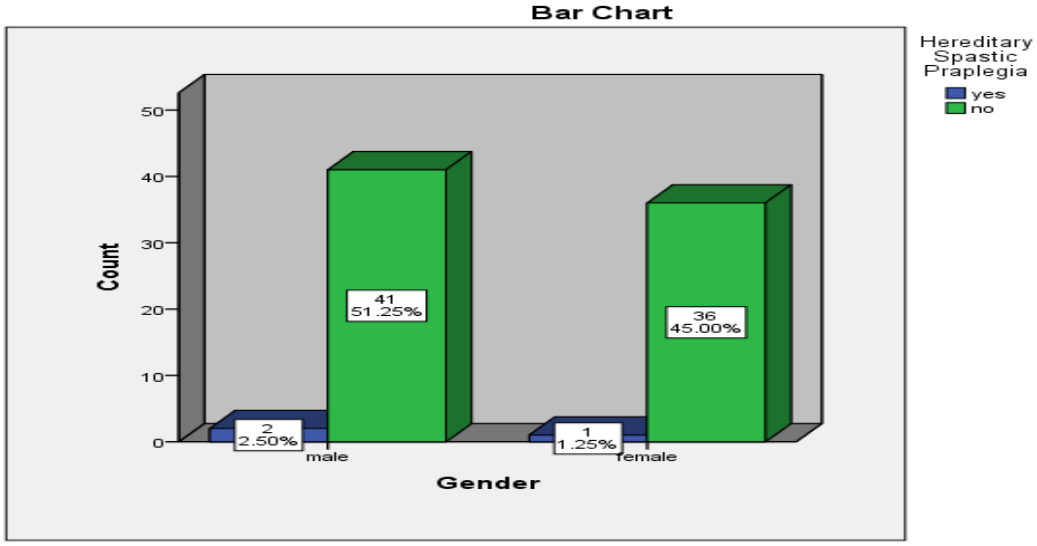
Total numbers of participants were 80 with mean age of the patient 24.0 years. There were male 43 (53.8%) and female 37(46.3%) patients. With poor hygiene conditions, there were 34 (42.5%) patients and good hygiene, 46 (57.5%) patients.

The total prevalence 3.75% (Male 2.5% and female 1.25%) in adults while majority were male 43(53.8%), females 37(43.2%) **(Graph-1)**

Both male and female genders were included, 43 (53.75%) and 37(46.25%) respectively. The onset of condition was 1-5years most commonly with 41 (51.25%) and most of the patients were diagnosed in their early ages with conditions like cerebral atrophy 6 (7.5%), dystonia 8 (10%), motor neuron disease 6 (7.5%), cerebral palsy 26 (32.5%), polio 0 (0%), muscular dystrophy 9 (11.25%), hydrocephalous 4 (5%), paraplegia 17 (21.25%), spine degenerative 4 (5%). The severity of symptoms and condition also indicated as most of the patients were wheelchair bound, showed results 44 (55%). There was also some indication which related to our study and results that lower limb was more affected, patients with lower limb atrophy were 35 (43.75%), with weakness 36 (45%) and normal 9 (11.25%). In comparison upper limb was in more normal mobility as results showed 65 (81.25%), weakness 13 (16.25%) and atrophy 2 (2.5%). **(Table-1)**

There were other associated symptoms which helped to find out the criteria for hereditary spastic paraplegia involves 4 (5.0%) patients with skin anomalies, 3 (3.75%) patient with short stature, 7 (8.75%) patients with scoliosis, 23 (28.75%) patients with distal atrophy lower limb, 4 (5.0%) patients with optic atrophy, 3 (3.75%) patients with deafness, 5 (6.25%) patients with dysarthria, 3 (3.75%) patients with dysphagia, 3 (3.75%)patients with cognitive impairment, 10 (12.5%) patients with dystonia, 6 (7.5%) patients with bladder dysfunction, 2 (2.5%) patients with bowel dysfunction, 7 (8.75%) patients with sensory abnormalities. **(Table-2)** shows that with a greater number of male participants, duration of onset of disease more common in the early ages and as we consider the diagnosis which fall in the criteria of hereditary spastic paraplegia, a greater number of participants of cerebral palsy, severity included more wheel chair bound and lower limbs atrophy and more normal number of participants with upper limbs. Table 2 shows that in this study most commonly occurring associated symptoms were lower limb atrophy and dystonia on other side less frequency of bowel and bladder dysfunctions which are the mostly

occurring symptoms in Hereditary Spastic Paraplegia.



Graph 1: Gender based prevalence Graph (n=80)

Hereditary spastic paraplegia in adults was 3.75% (Males 2.5 % and females 1.25%)

Table: 1 Descriptive Demographic Data

Description		**Frequency**	**Percentage**
Gender	Male	43	53.75%
	Female	37	46.25%
Duration onset	<1-5years	41	51.25%
	6-10years	16	20.0%
	11-20years	23	28.75%
Diagnosis	Cerebral atrophy	6	7.5%
	Dystonia	8	10%
	Motor neuron disease	6	7.5%
	Cerebral palsy	26	32.5%
	Polio	0	0%
	Muscular dystrophy	9	11.25%
	Hydrocephalous	4	5%
	Paraplegia	17	21.25%
	Spine Degenerative	4	5%
Severity	Wheelchair bound	44	55%
	Not bound	36	45%
Lower limb	Atrophy	35	43.75%
	Weakness	36	45%
	Normal	9	11.25%
Upper limb	Atrophy	2	2.5%
	Weakness	13	16.25%
	Normal	65	81.25%

Table: 2 Descriptive statistics of additional associated symptoms with Hereditary Spastic Paraplegia

Prevalence of Additional Symptoms		
Additional Features	**Frequency**	**Percentage**
Skin Anomalies	4	5.0%
Short stature	3	3.75%
Scoliosis	7	8.75%
Distal atrophy of lower limbs	23	28.75%
Optic atrophy	4	5.0%
Deafness	3	3.75%
Dysarthria	5	6.25%
Dysphagia	3	3.75%
Cognitive Impairment	3	3.75%
Dystonia	10	12.5%
Bladder dysfunction	6	7.5%
Bowel Dysfunction	2	2.5%
Sensory abnormalities (vibration, position, pain, touch, temperature)	7	8.75%

DISCUSSION:

In this study it was aimed to find the prevalence of hereditary spastic paraplegic in adults and also to find out frequency of other associated symptoms which concerned with this condition occurrence. Results showed as hereditary spastic paraplegia is a rare condition, the prevalence among adult population was also low 3.75%. In a systemic review, the prevalence HSP in which they concluded the overall average is around 1 out of 10,000 in general population, besides with the data collected from multiple sources showing range of prevalence was 4.8 to 13.9 out of 100,000 [2]. A series of studies in children population they estimated prevalence ranging 1.2- 9.6 / 100,000 [20]. In another study considering population from Portugal, calculated prevalence of Hereditary spastic paraplegia $2.8/10^5$ while in other dominant types of HSP it was $1.3/10^5$. In the north-east of Portugal, the recorded highest prevalence was also very low number (9 out of 100,000) (21). While another study which recorded very low prevalence for both sub-types of HSP with value 1.8 out of 100,000 [22]. Hereditary spastic paraplegia with prevalence of 2.4 out of 100,000 recorded nationwide, in which they excluded patients who suffer from different neurological disorders [23].

In current study, a greater number of male participants 43(53.8%) in comparison to females 37 (46.2%) and also in comparison to female (1.25%) more prevalence in male gender (2.5%). As with the population age range and their onset of symptoms widely vary but they also showed results regarding gender with a greater number of males were diagnosed in comparison to females with ratio 12:3 [20]. Hereditary spastic paraplegia with prevalence of 2.4 out of 100,000 recorded nationwide, in which more participants were male members 52.3% [23]. In Estonia, a study was performed to find out the prevalence rate for Hereditary Spastic Paraplegia which also showing males with 6.1 and females 3.2 out of 100,000 [24].

In current study, the frequency of additional associated symptoms was also observed that commonly occurs with hereditary spastic paraplegia. The results from this study indicated more patients were wheel chair bound due to atrophy of lower limb, while other symptoms including bladder and bowel dysfunction were not very frequent in current study. To define the

criteria for different types of HSP, the signs and symptoms were classified accordingly on the basis of genetics and mutation analysis [25]). In study regarding HSP, hesitancy and incontinency were not so common complaints, on the other side other symptoms concerned with bladder dysfunction have no association in total [13]. While finding for the prevalence of Urinary infections and urgency correlation found with age as urinary tract related problems were more common among the patients of elderly age. While bowel dysfunction including constipation more common while rare results for incontinence [17]. In the patients of older age with HSP, presence of spasticity indicating not good control of urinary tract. While mean count of bowel dysfunction reported minor in 64% of total and severity of bowel dysfunctions were not very common [18].

CONCLUSION: this study concluded that the total prevalence of hereditary spastic paraplegia was very low in adults and mostly male are affected. Results also revealed that associated factor like distal atrophy of lower limbs and dystonia are common in hereditary spastic paraplegia. In future studies, it should be extend to associated quality of life in HSP patients.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

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