

## Role of Physical Activity, Genetics and Chronic Diseases in Neuromuscular Disorders: A Cross Sectional Study

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### Abstract

**Introduction:** A recent report published by the World Health organization “Neurological disorders, public health challenges” stated that about one billion people worldwide suffer from neurological disorders & 6.8 million people die annually from these disorders. In India the burden of neurological and musculoskeletal disorders is ever increasing and keeping that in mind there is an urgent need to plan services in a socio-culturally appropriate and cost effective manner so that the existing services can be optimally utilized.

**Aim:** Identify the risk factors associated with neurological and musculoskeletal disorders. Physical activity of the patients with neurological and musculoskeletal disorders was compared. Disease wise disability caused was also compared.

**Methodology:** This was a hospital based cross sectional study conducted at Geetanjali College of Physiotherapy located in Geetanjali Medicity with institute of Geetanjali Hospital and College, Udaipur. Consisted cases of ND & MSD attending GCP and the referral calls for ND & MSD from GMCH to GCP.

**Result:** Majority of study subjects were from risk factor HTN (58.5%) had maximum stroke (37.4%) followed by head injury (12.9%) peripheral neuropathy (2.0%) facial palsy, diabetic neuropathy, paraplegia and GBS each (1.4%) and Parkinson’s disease (0.7%). Among physically active subjects, 37% had tuberculosis infection.

**Conclusion:** Hypertension, stroke, head injury are the major risk factors for neurological disorders. Hypertension and smoking were the major risk factors for musculo-skeletal disorders.

**Keywords:** Musculo Skeletal Disorders, Neurological Disorders, Risk Factors, Disability Grades.

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## Introduction

Non-communicable diseases are underestimated and often overlooked in developing countries. In developing countries communicable diseases have always been in focus of the health care sector as they had a very large contribution towards a country's quality of life and mortality rates.

But as newer drugs, investigative techniques, vaccines, etc. develop, morbidity and mortality from communicable diseases has been greatly reduced.

So the focus now shifts to non-communicable diseases. Two major components the non-communicable diseases can be divided into are neurological disorders and musculoskeletal disorders. They constitute a significant proportion of non-communicable diseases affecting morbidity, mortality, disability and quality of life.

A recent report published by the World Health organization "Neurological disorders, public health challenges" stated that about one billion people worldwide suffer from neurological disorders & 6.8 million people die annually from these disorders. A neurological disorder is any disorder of the body's nervous system. Structural, biochemical or electrical abnormalities in the brain, spinal cord or other nerves can result in a range of symptoms. Examples of symptoms include paralysis, muscle weakness, poor coordination, loss of sensation, seizures, confusion, pain and altered levels of consciousness. There are many recognized neurological disorders, some relatively common, but many rare. They may be assessed by neurological examination and studied & treated within the specialties of neurology and clinical neuropsychology. [1]

Musculoskeletal disorders are injuries or pain in the body's joints, ligaments,

muscles, nerves, tendons & structures that support limbs neck & back. Musculoskeletal disorders are degenerative diseases and inflammatory conditions that cause pain & impair normal activities. They can affect different parts of the body including upper & lower back, neck, shoulder & extremities (arms, legs, feet & hands). Musculoskeletal disorders can arise from a sudden exertion or they can arise from making the same motions repeatedly or from repeated exposure to force, vibration or awkward posture.

In India the burden of neurological and musculoskeletal disorders is ever increasing and keeping that in mind there is an urgent need to plan services in a socio-culturally appropriate and cost effective manner so that the existing services can be optimally utilized.

The index study was conducted to identify the risk factors associated with neurological and musculoskeletal disorders. Physical activity of the patients with neurological and musculoskeletal disorders was compared. Disease wise disability caused was also compared.

## Methodology

This was a hospital based cross sectional study conducted at Geetanjali College of Physiotherapy located in Geetanjali Medicity with institute of Geetanjali Hospital and College, Udaipur. Consisted cases of ND & MSD attending GCP and the referral calls for ND & MSD from GMCH to GCP.

### Inclusion Criteria:

1. Cases of ND & MSD attending GCP.
2. Referral calls of ND & MSD from GMCH to GCP.

### Exclusion Criteria:

1. Post operative patient for next 24 – 48 hrs.
2. Patient having psychiatric problem.

After obtaining the written consent, the demographic data which included name, age, sex, marital status, religion, caste, place of residence, education, occupation, SES, personal habits including common health practices such as diet, addiction, average day schedule etc. and detailed history of past and present illnesses along

with ND & MSD was also recorded. Physical measurements, weight and height of all subjects were recorded. Data was entered into Microsoft excel sheet and analyzed using SPSS/ Epi info software.

## Results

**Table 1: Risk factor wise distribution of patients with Neurological disorders**

Risk factors	Neurological disorder n=147									
	Stroke No. (%)	Parkinson's Disease No. (%)	Facial Palsy No. (%)	Diabetic Neuropathy No. (%)	TBI No. (%)	Acute Myelitis No. (%)	Peripheral Neuropathy No. (%)	Paraplegia No. (%)	GBS No. (%)	Total No. (%)
Genetic	5(3.4)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0)	0(0.0)	0(0)	0(0)	5(3.4)
HTN	55(37.4)	1(0.7)	2(1.4)	2(1.4)	19(12.9)	0(0)	3(2.0)	2(1.4)	2(1.4)	86(58.5)
DM	32(21.8)	0(0)	0(0)	3(2.0)	7(4.8)	0(0)	2(1.4)	1(0.7)	1(0.7)	46(31.3)
IHD	12(8.2)	1(0.7)	0(0)	1(0.7)	5(3.4)	0(0)	1(0.7)	0(0)	0(0)	20(13.6)
RHD	7(4.8)	0(0)	0(0)	0(0)	6(4.1)	0(0)	0(0.0)	2(1.4)	0(0)	15(10.2)
H/o Trauma	0(0.0)	0(0)	0(0)	0(0)	15(10.2)	0(0)	0(0.0)	2(1.4)	0(0)	17(11.6)
Smoking	25(17.0)	0(0)	1(0.7)	0(0)	29(19.7)	0(0)	3(2.0)	0(0)	1(0.7)	59(40.1)
Alcohol	8(5.4)	0(0)	0(0)	0(0)	15(10.2)	0(0)	1(0.7)	0(0)	0(0)	24(16.3)
Drugs Add.	2(1.4)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0.0)	0(0)	0(0)	2(1.4)

\*Multiple problem total not additive

F value (8,65)=2.08 p = 0.005 & F value (8,65)=7.54 there was significant difference between risk factor and neurological disorders.

Majority of study subjects were from risk factor HTN (58.5%) had maximum stroke (37.4%) followed by head injury (12.9%) peripheral neuropathy (2.0%) facial palsy, diabetic neuropathy, paraplegia and GBS each (1.4%) and Parkinson's disease (0.7%)

Subjects who were smoking (40.1%) had maximum head injury (19.7%) followed by stroke (17.0%) peripheral neuropathy (2.0%), facial palsy and GBS each (0.7%)

**Table 2: Physical activity wise distribution of patients with Neurological disorders**

Physical Activity	Neurological disorder n=147									
	Stroke No. (%)	Parkinson's disease No. (%)	Facial palsy No. (%)	Diabetic Neuropathy No. (%)	TBI No. (%)	Acute myelitis No. (%)	Peripheral Neuropathy No. (%)	Paraplegia No. (%)	GBS No. (%)	Total No. (%)
Sedentary	31(21.1)	1(0.7)	1(0.7)	1(0.7)	12(8.2)	0(0.0)	1(0.7)	3(2.0)	0(0.0)	46(31.1)
Active	27(18.4)	1(0.7)	3(2.1)	2(1.3)	55(37.4)	2(1.3)	2(1.4)	1(0.7)	4(2.7)	101(68.9)
Total	58(39.5)	2(1.4)	4(2.8)	3(2.0)	67(45.6)	2(1.3)	3(2.0)	4(2.7)	4(2.7)	147(100.0)

Majority of study subjects were active (68.9%) had TBI(37.4%) followed by stroke (18.4%) GBS (2.7%) facial palsy (2.0%) diabetic neuropathy, acute myelitis, peripheral neuropathy each (1.3%) Parkinson's disease and paraplegia each (0.7%).

Among sedentary maximum had stroke (21.1%) followed by TBI(8.2%).

**Table 3: Disability grades wise distribution of patients with Neurological disorders**

Grade of disability	Neurological disorders n=147									
	Stroke No. (%)	Parkinson's Disease No. (%)	Facial palsy No. (%)	Diabetic Neuropathy No. (%)	TBI No. (%)	Acute myelitis No. (%)	Peripheral Neuropathy No. (%)	Paraplegia No. (%)	GBS No. (%)	Total No. (%)
No disability	-	-	4(2.7)	-	-	-	-	-	-	4 (2.7)
Mild	2(1.4)	0(0.0)	-	2(1.4)	8(5.4)	1(0.7)	0(0.0)	0(0.0)	4(2.7)	17(11.6)
Moderate	9(6.1)	1(0.7)	-	1(0.7)	9(6.1)	1(0.7)	1(0.7)	4(2.7)	0(0.0)	26(17.7)
Severe	47(31.9)	1(0.7)	-	0(0.0)	50(34.0)	0(0.0)	2(1.4)	0(0.0)	0(0.0)	100(68.0)
Total	58(39.4)	2(1.4)	4(2.7)	3(2.1)	67(45.5)	2(1.4)	3(2.1)	4(2.7)	4(2.7)	147(100.0)

Majority subjects were severe (68.0%) had TBI (34.0%) followed by stroke (31.9%) peripheral neuropathy (1.4%) and Parkinson (0.7%)

In moderate grade of disability maximum had stroke and TBI each (6.1%) followed by paraplegia (2.7%), Parkinson's disease diabetic neuropathy, acute myelitis, peripheral neuropathy each (0.7%)

**Table 4: Risk factors wise distribution of patients with Musculoskeletal disorders**

Risk factors	Musculoskeletal disorders								
	Osteo Arthritis No. (%)	Osteo Porosis No. (%)	Fracture No. (%)	Frozen Shoulder No. (%)	Low Back pain No. (%)	Contracture No. (%)	Tennis Elbow No. (%)	Cervical Pain No. (%)	Total No. (%)
Genetic	7(4.6)	2(1.3)	0(0.0)	0(0.0)	0(0.0)	1(0.7)	2(1.3)	5(3.3)	17(11.1)
HTN	11(7.2)	8(5.2)	14(9.2)	1(0.7)	13(8.5)	0(0.0)	0(0.0)	10(6.5)	57(37.3)
DM	6(3.9)	3(2.0)	7(4.6)	2(1.3)	7(4.6)	0(0.0)	0(0.0)	5(3.3)	30(19.6)
IHD	2(1.3)	1(0.7)	5(3.3)	1(0.7)	3(2.0)	0(0.0)	0(0.0)	0(0.0)	12(7.8)
RHD	3(2.0)	1(0.7)	2(1.3)	1(0.7)	3(2.0)	0(0.0)	0(0.0)	4(2.6)	14(9.3)
H/o Trauma	0(.0)	1(0.7)	35(22.9)	0(0.0)	2(1.3)	0(0.0)	0(0.0)	6(3.9)	44(28.8)
Smoking	6(3.9)	4(2.6)	11(7.2)	2(1.3)	12(7.8)	1(0.7)	0(0.0)	9(5.9)	45(29.4)
Alcohol	0(0.0)	2(1.3)	7(4.6)	1(0.7)	6(4.0)	1(0.7)	0(0.0)	4(2.6)	21(13.9)
Drugs Add.	0(0.0)	1(0.7)	2(1.4)	1(0.7)	2(1.4)	0(0.0)	0(0.0)	1(0.7)	7(4.7)

\*Multiple problems, total not additive.

F value (8,57)=3.975 p = 0.005 & F value (7,57) = 12.567.

There was significant difference between risk factor and musculoskeletal disorder. The maximum risk factor was HTN (37.3%) had majority fracture (9.2%), followed by low backache (8.5%), osteoarthritis (7.2%), cervical spondylosis (6.5%). Among smoking subjects (29.4%) majority had low backache (7.8%) followed by fracture (7.2%) in history of trauma subjects had maximum fracture (22.9%) and only (3.9%) had cervical spondylosis. Among genetic risk factor (11.1%) majority had osteoarthritis (4.6%), followed by cervical spondylosis (3.3%) and tennis elbow (1.3%).

**Table 5: Physical activity wise distribution of patients with Musculoskeletal disorders**

Physical Activity	Musculoskeletal disorders n=153								
	Osteo arthritis No. (%)	Osteo Porosis No. (%)	Fracture No. (%)	Frozen Shoulder No. (%)	Low Back pain No. (%)	Contracture No. (%)	Tennis Elbow No. (%)	Cervical Pain No. (%)	Total No. (%)
Sedentary	8(5.2)	3(2.0)	5(3.3)	0(.0)	6(3.9)	0(0.0)	0(0.0)	5 (3.3)	27(17.7)
Active	17(11.1)	6(3.9)	30(19.6)	4(2.6)	36(23.5)	2(1.3)	3(2.0)	28(18.3)	126(82.3)
Total	25(16.3)	9(5.8)	35(22.9)	4(2.6)	42(27.4)	2(1.3)	3(2.0)	33(21.6)	153(100.0)

Majority of study subjects were active (82.3%) had maximum low back pain (23.5%) followed by fracture (19.6%), cervical pain (18.3%), osteoarthritis (11.1%) and osteoporosis (3.9%). Only (17.7%) subjects were sedentary and had majority osteoarthritis (5.2%)

**Table 6: Grades of disability wise distribution of patient with Musculoskeletal disorders**

Grade of Disability	Musculoskeletal disorders (n=153)								
	Osteo arthritis No. (%)	Osteo porosis No. (%)	Fracture No. (%)	Frozen Shoulder No. (%)	Low Back pain No. (%)	Contracture No. (%)	Tennis Elbow No. (%)	Cervical Pain No. (%)	Total No. (%)
Mild	2(1.3)	0(0.0)	15(9.8)	4(2.6)	19(12.4)	2(1.3)	2(1.3)	13(8.5)	57(37.2)
Moderate	20(13.0)	5(3.3)	19(12.4)	0(0.0)	23(15.0)	0(0.0)	0(0.0)	19(12.4)	86(56.1)
Severe	3(2.0)	4(2.6)	1(0.7)	0(0.0)	0(0.0)	0(0.0)	1(0.7)	1(0.7)	10(6.7)
Total	25(16.3)	9(5.9)	35(22.9)	4(2.6)	42(27.4)	2(1.3)	3(2.0)	33(21.6)	153(100.0)

Majority subjects (56.1%) has moderate grade of disability with maximum low back pain (15.0%), followed by osteoarthritis (13.0%), fracture and cervical pain (12.4%) each.

In mild grade of disability, maximum musculoskeletal disorders has low back pain (12.4%), followed by fracture (9.8%) and cervical pain (8.5%) Among the severe grade of disability, osteoporosis (2.6%) followed by osteoarthritis (2.0%).

## Discussion

Here is a brief discussion of our results and the results obtained by the researchers on the same subject.

Gupta R (2004) studied on hypertension shows that stroke shares many risk factors with other neurological disorders. Studies on hypertension also point to the greater burden of stroke in India. In our study 37.4% stroke subjects were observed with risk factor hypertension. [2]

Ritz et al. (2007) found that smoking had been rather consistently associated with decreased risk of Parkinson disease in reported reviews and in individual studies. Similar findings were observed in our study, no subjects of Parkinson's disease

were observed with smoking as a risk factor. [3]

Abdus salaam (2001) observed the risk factors of smoking (60.3%) in the majority of males, hypertension 81.0% in stroke subjects. [4]

D Nagaraja et. al.(2009) revealed that in stroke, with regard to risk factors, 13% reported a previous history of stroke, 48% were HTN, 23% were reported to be diabetic, 33% used tobacco, and 25% consumed alcohol. Nearly one in five patients has both hypertension and diabetes (18.5%). A family history of stroke was reported by 7.3% of patients, while 23% did not have any risk factor, 29% had 1 risk

factor & 30% and 11.6 had 3 or more than 3 risk factors respectively. [5]

Mendis et.al. (2005) reported that in middle and low income countries one in two patients of stroke had at least two or more risk factors. [6]

Nagar S et.al. (2001) in their studies found that a small proportion of genetic risk factors have been identified in hospital based studies in India, In our study the risk factor genetic 3.4% were observed only in stroke subjects. [7]

Fargol Booya et. al. BMC neurology (2005) diabetic neuro-risk factor, HTN 41.8%, cigarette non smoking 78.2% Less than 10 cigarettes/day 7.3 The Ashok Study (14) showed significant relation only with age & duration of disease. No other association was detected. [8]

Ashok et. al. (2002) showed association of neuropathy with age, Moser R E et.al. (1989) with cigarette smoking. [9]

D Nagaraja et.al. (2009) reported in their study on hospital patients, the 28 day follow-up showed that 55% had moderate to severe disability among the stroke survivors. [5]

Sapna E Sridharan et.al. (2009) observed that the stroke subjects 42.3% urban, 43.2% rural were mild, 42.3% urban, 47.7% rural of moderate and 15.4% urban, 9.1% rural were severe disability. [10]

Monteiro et.al. (2009) observed in their study that there was no difference in the distribution of musculoskeletal disorders in relation to smoking habits and physical exercise. [11]

Gilgil et.al. (2005) observed that cigarette smoking has been found in many studies to be associated with an increased risk in urban Turkey, cigarette smoking was related to the occurrence of low back pain. [12]

Jennifer LK. and Marian T.H. (2009) stated that heredity is an important determinant of bone mass in childhood, adolescents, and

early adulthood but the role of genetics in loss of bone mass at older age is less certain, multiple genes are probably involved, each with a small effect. [13]

Margreth G et.al. (2008) found that knee OA 5.3% is associated with leisure time physical activity more than four hours per week against 6.8% of subjects working with less than 2 hours per week. [14]

Monteiro et.al. (2009) in their study did not find any association between MSD and Physical or leisure time activity. [15]

### Conclusion

Hypertension, stroke, head injury are the major risk factors for neurological disorders. Hypertension and smoking were the major risk factors for musculo-skeletal disorders.

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