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ORIGINAL ARTICLE

ANATOMICAL PROFILE OF MUSCULOSKELETAL AND NEUROLOGICAL DISORDERS AMONG PATIENTS ATTENDING PHYSIOTHERAPY UNIT AT TIKUR ANBESSA SPECALIZED HOSPITAL

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ABSTRACT

Introduction*: Musculoskeletal and neurological disorders can affect different body parts and anatomical structures. Physiotherapy (physical therapy) is one branch of rehabilitative medicine that deals in rehabilitating patients with musculoskeletal and neurological disorders.*
Objective*: To assess the anatomical profile of neurological and musculoskeletal disorders among patients attending services given by the hospital.*
Methods*: Institution based cross sectional study was carried out at Tikur Anbessa Specialized Hospital (TASH). The sample size was 355 and the data were obtained from charts of patients who presented to physiotherapy unit. The study participants were neurological and musculoskeletal patients visiting physiotherapy unit of TASH. The data were analyzed using SPSS 21 and statically significant association was declared at p-values <0.05.*
Result*: There were 342 participants and among them, 192 (56.1 %) were male and 150 (43.9 %) were female. Most 84 (24.6%) were between 45 and 59 years of age. The prevalence of neurological disorders and musculoskeletal disorders were 55.3% and 38.6%, respectively. Lower limb, 109 (31.9%), the back, 67 (19.6%), and upper limb, 59 (17.3 %) were the most affected anatomical regions. Inter-vertebral disc (IVD), 88 (27.9%), the bone 66 (19.3 %), and the joint 55 (17.5%) were the most affected structures. Among traumatic causes of disorders, road traffic accident (RTA) (45%) was the leading cause, followed by falling (19%).*
Conclusion*: Lower limb, the back, upper limb and central nervous system (CNS) were the most affected anatomical regions. IVD and the bone were the most affected anatomical structures. RTA and accidental fall were among the common traumatic causes of musculoskeletal and neurologic disorders.*
Keywords*: Musculoskeletal, Neurological disorder, TASH, physiotherapy, CLBP, back pain, DDD, RTI*

INTRODUCTION

Physiotherapy is a health profession that focuses on the science of movement and helps people to restore, maintain and maximize movement, functional ability and overall well-being by addressing the underlying physical issues. Physiotherapists offer treatments related to Cardiopulmonary conditions Cancer, Women's health and Incontinence, Musculoskeletal, Neurological, Pediatric problems, sport related injuries ,pre and post-operative care ,palliative care, vestibular rehabilitation, integumentary conditions ,geriatric problems and Pain disorders (1).

Neurological disorders are diseases of the central and peripheral nervous system. Now a day's hundreds of millions of people worldwide are affected by neurological disorder (2). Musculoskeletal disorders are disease conditions that affect: joints, bones, the spine, and muscles (3). Neurological and musculoskeletal disorders are among the leading cause of disability worldwide.

According to the Global Burden of Disease study of the 2018-2020 musculoskeletal conditions were the second highest contributor to global disability, and lower back pain remained the single leading cause of disability (4). In Iran, multiple traumas were observed in about 25% of the victims among this leg (tibia and fibula) (37.6%) and forearm (radius and ulna) (19.3%) had the most frequent fractures (5).

According to a population-based neuro epidemiological survey of 102,557 individuals in India; 3,206 individuals were diagnosed with neurological disorders (6). A Community based cross sectional study done in Uganda over 3000 study subjects also reported a total of 98 (7.2 %) neurological cases were observed (7). In Saudi Arabia spinal cord disorder was common disorder among this the most commonly affected were lumbar spine (53.1%) and cervical spine (27.1) (8).

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In case of Ethiopia road traffic collisions were the main cause of spine (36.4%) and spinal cord (32.9%) injuries. Most often the cervical spine was involved (33%) and 103 (26.7%) patients had paraplegia (9). In order to give attention and design preventive mechanism of these disorders, identifying the anatomical profile of these disorders is help full for training professionals, qualifying instrument and proper organization of physiotherapy centers. However, there are no studies conducted that identifies the anatomical profile of this disorder. The data obtained from this study, could help to develop counter measures that could reduce the number and severity of these disorders. In addition the study may provide baseline information to carry out further research on related topics.

PATIENTS AND METHODS

A hospital-based cross-sectional study was conducted involving retrospective collection of data during May 1-June 30, 2018. The data was collected form clinical records of neurological and musculoskeletal patients who visited both adult and pediatric physiotherapy units of TASH from January 1 - December 31, 2017.

The total sample size required for the study was 355 and it was calculated by using a single population proportion formula. Systematic random sampling technique was employed to select the sample by using medical record numbers in the health management information system (HMIS) of physiotherapy record room as a sampling frame. Anatomical profile of neurological and musculoskeletal disorders was the outcome measure and the independent variables included age, sex ,address, affected anatomical region, affected anatomical structure and causes of the disorders.

Operational definitions

Anatomical profile*:* description of the anatomical characteristics of disease condition by anatomical region or structure.

Musculoskeletal disorder: disease condition which affects the musculoskeletal system.

Neurological disorder: disease condition which affects the nervous system.

Data was collected using structured checklist which was adapted from previous literatures. The selected sample MRN's chart was searched by card room staffs and data was recorded by data collectors. To maintain data quality, training was given for data collectors and for supervisors for two days.

The data was entered into EPI-Data version 4.2 and analyzed using SPSS version 21. For categorical data, descriptive statistics like frequency and percentage were computed and presented in tables, bar graphs and pie chart. Continuous variables were summarized using mean (±standard deviation), median, and the mode. Chi-square ($\chi 2$) test was applied to assess the association between the different categorical variables. A statically significant association was declared at p-value<.05.

Ethical clearance was obtained from the Departments of Orthopedics and Anatomy Research and Ethics Review Committee (DRERC) of School of medicine, Addis Ababa University.

RESULT

Data obtained from 342 charts were analyzed. Of these, 192 (56.1%) were male and 150 (43.9 %) were female, a male to female ratio of 1.3:1. Their age ranged from two months to 85 years with a mean (SD) age of 34.7 (±21. 2) years. The median age and mode of the participant's were 35 and 50 years, respectively. Eighty (24.6%) of the patients were between 45 and 59 years. Most, 249 (72.8%), of the patients were from Addis Ababa and 65 (19%) were from Oromia region (Table 1).

Table 1: Socio-demographic characteristics of neurological and musculoskeletal patients, physiotherapy unit, TASH, January 1 - December 31, 2017.

Variable		Frequency	Percentage
Sex	Male	192	56.10%
	Female	150	43.90%
Age	0-14	78	22.80%
	15-29	55	16.10%
	30-44	81	23.70%
	45-59	84	24.60%
	60-74	35	10.20%
	≥ 75	9	2.60%
Address	Addis Ababa	249	72.80%
	Oromia	65	19.00%
	Amhara	13	3.80%
	SNNP	10	2.90%
	Dire Dawa	2	0.60%
	Harari	3	0.90%

In this study, the prevalence of neurologic disorders were 55.3% and among these 61% were males and 39% were female patients and musculoskeletal disorders were the second most prevalent, accounting for 38.6% of total patients. Among these, 51% were male and 49.2% were female and the rest of disorders were Growth and developmental delay.

Affected anatomical regions and structure

Regarding the affected anatomical region in the present study, among studied anatomical regions, the most affected region was lower limb 109 (31.9%), out of which 55 (28.6%) were male and 56 (37.3%) were female. And the second most affected was back 67 (19.6%) out of which 26.0% were male and 19.3% were female.

The third commonly affected body part was the upper limb 59 (17.3%) and neck, pelvis and perineum 5 (1.5%) and Head 1 (0.3 %) were among the least affected body regions (Table 2).

Central nervous system was the commonly affected anatomical region in all age groups; However, The CNS was, specially, the most affected region in 0-14 years age group 28%. The lower limb was another commonly affected region and it was most common in the 30-44 years age group (51%). Back problem was more in older age groups.

Table 2: The magnitude affected anatomical region of neurological and Musculoskeletal patients who visited Physiotherapy unit of TASH

variables	Frequency	Percent
head	1	0.3
neck	5	1.5
upper limb	59	17.3
lower limb	109	31.9
Pelvis and perineum	5	1.5
CNS	55	16.1
back	67	19.6
PNS	14	4.1
mixed	27	7.9
Total	342	100

IVD (commonly Lumbo-Sacral region DDD) was commonly affected anatomical structure among most of the age group, especially; it was the most commonly affected anatomical structures among the age group of 60-74 (47%).

Table 3: Magnitude of the affected structure of neurological and musculoskeletal patients who Visited Physiotherapy unit of TASH

Structures affected	**Frequency**	**Percent**
Bone	65	20.6
Joint	55	17.5
Nerve	47	14.9
Brain	41	13
IVD	88	27.9
Spinal cord	15	4.8
Muscle	4	1.3
Total	315	100

Table 4: The magnitude of the affected bone of musculoskeletal and neurological patients who visited Physiotherapy unit of TASH.

Affected bone	Frequency	Percent
Clavicle	1	1.50%
Humerus	3	4.50%
Radius	8	12.10%
Ulna	3	4.50%
Metacarpal	5	7.60%
Hand phalanges	2	3.00%
Femur	13	19.70%
Patella	5	7.60%
Tibia	16	24.20%
Fibula	6	9.10%
Tarsal	1	1.50%
Metatarsal	1	1.50%
Sacrum	1	1.50%
Vertebrae	1	1.50%
Total	66	100.00%

Among the affected joint studied in this study the knee joint (50.9%) was the mainly affected joint; while elbow joint and shoulder joint (18.2%) each were the second most affected and ankle joint (5.5%) was the least affected (Figure 1).

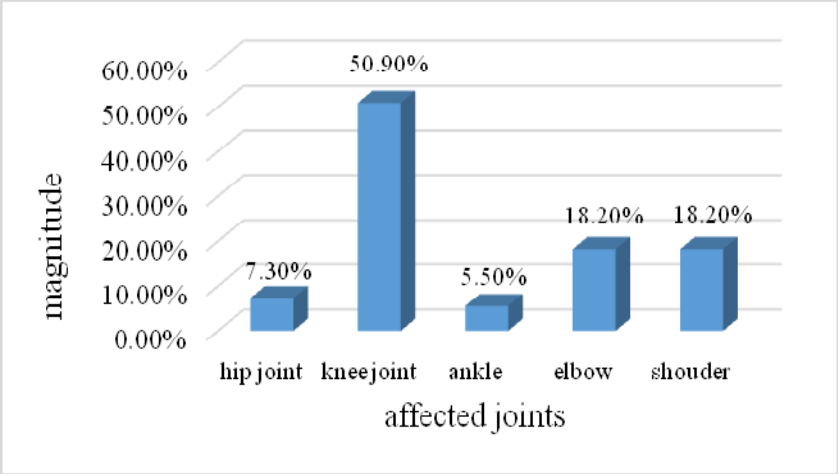

Figure 1: The magnitude the affected joint of neurological and musculoskeletal patients who visited Physiotherapy unit of TASH.

Table 5: The distribution of clinicaly affected nerve of neurological patients who visited Physiotherapy unit of TASH

Affected nerve	Frequency	Percent
Facial(cranial)	11	24.40%
Radial	3	6.70%
Sciatic	4	8.90%
Femoral	1	2.20%
Tibial	2	4.40%
Fibular	4	8.90%
Brachial plexus	8	17.80%
Multiple Peripheral nerves	12	26.70%
Total	45	100.00%

Regarding the causes of neurological and musculoskeletal disorders 85 (24.9%) of disorders were caused by trauma and 257 (75.1%) of the disorders were non traumatic cause. Most of musculoskeletal disorders were caused by 85.9% traumatic and most 77.0% of neurologic disorders were caused by non-traumatic causes.

Among traumatic cause of disorder RTA (45%) was the leading cause and falling (19%) was the second most common traumatic cause, penetrating injury (10%) and stick injury 18.1. While bullet injury (4%) and sport related (2%) activities were the least causes (Figure 2).

Causes of neurological and musculoskeletal disorder

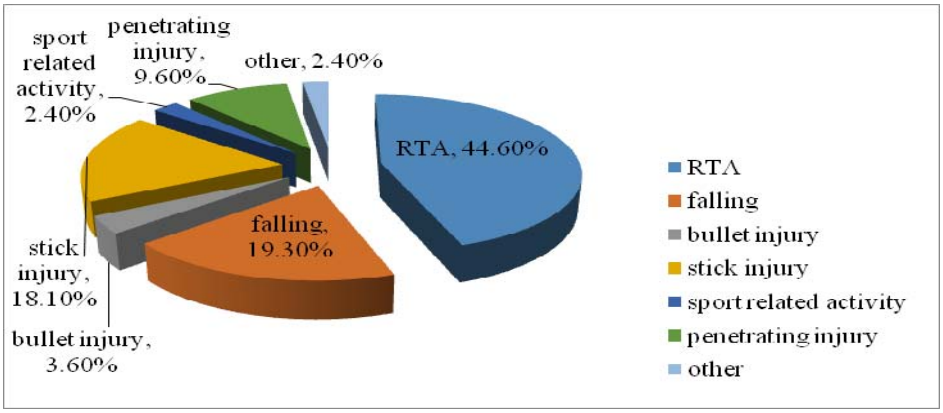

Figure 2: The distribution of traumatic causes of the disorders among neurological and musculoskeletal patients who visited Physiotherapy unit of TASH

Regarding non-traumatic causes of neurologic and musculoskeletal disorders Degenerative Disc Disease (DDD) 93 Osteoarthritis (OA) 31 and stroke 15 were the three most common non traumatic cause's disorders in a physiotherapy unit of TASH.

And Growth and Developmental Delay (GDD) 25 GBS 11 and CP 8 were the first three most common non traumatic causes of disorders among pediatric patients. Joint stiffness, frozen shoulder and cord compression were among the least common causes in both age categories (Table 6).

Table 6: The distribution of non-traumatic cause of the disorders among neurological and musculoskeletal patients who visited Physiotherapy unit of TASH

	Age group		Total
None traumatic cause	**0-21**	**>21**	
Stroke	6	15	21
GBS	11	1	12
PD	0	1	1
MS	2	0	2
OA	1	31	32
GDD	25	2	27
DDD	1	93	94
Frozen shoulder	1	3	4
Neuropathy	5*	7	12
Joint stiffness	3	3	6
Joint contracture	0	3	3
CP	8	0	8
Myelopathy	2	3	5
Nerve palsy	3	7	10
Movement d/o	0	5	5
Cord compression	1	1	2
Infection	3	3	6
Total	72	178	250

*Note: * Symbol represents brachial plexopathy for pediatrics.*

As shown in the Table 7 there was a statistically significant difference between the causes of disorders and age group and affected body part with p-value of 0.045 and <0.001 respectively, and some anatomical structures like bone, joint, brain and IVD with p value of <0.001, 0.019, <0.001 and <0.001 respectively.

Table 7: Association (X^2) of selected variable of neurological and musculoskeletal patients who visited Physiotherapy unit of TASH

Variables		Causes of disorder		Total	p-value
		Trauma	Non trauma		
Sex	Male	44 (22.9%)	148 (77.1%)	192(100%)	0.348
	Female	41(27.3%)	109 (72.1%)	150(100%)	
Age group	≤21	16(17.2%)	77(82.8%)	93(100%)	0.045
	>21	69(27.7%)	180(72.3%)	249(100%)	
body part	Extremity	79(47%)	89(53%)	168(100%)	0.000
	Non-extremity	6(3.4%)	168(96.6%)	174(100%)	
Affected anatomical structure					
Bone	Yes	64 (97%)	2 (3%)	66 (100%)	0.000
	No	21 (7.6%)	255(92.4%)	276(100%)	
Joint	Yes	7(12.5%)	49(87.5)	56(100%)	0.019
	No	78(27.3%)	208(72.7%)	286(100%)	
Nerve	Yes	10(20.8%)	38(79.2%)	48(100%)	0.487
	No	75(25.5%)	219(74.5%)	294(100%)	
Muscle	Yes	1(25%)	3(75%)	4(100%)	0.995
	No	84(24.9%)	254(75.1%)	338(100%)	
Brain	Yes	1(2.5%)	40(97.5%)	41(100%)	0.000
	No	84(30.6%)	190(69.3%)	274(100%)	
IVD	Yes	1(1.1%)	87(98.9%)	89(100%)	0.000
	No	84(33.1%)	170(66.9%)	254(100%)	

Note: Extremity –upper and lower limb
Non extremity - body parts other than upper and lower limb

DISCUSSION

Among the affected anatomical regions in this study, the most affected anatomical region was lower limb (31.9 %) while the second and the third were back (19.6 %) and upper limb 17.3% respectively. This finding is in line with the study conducted in Nigeria, which reported that, lower extremity injury was most commonly affected, with the femur being the most fractured bone accounting for (22.69%) followed by the tibia/fibula (17.13%) (10).

The possible justification for this similarity may be due to the similarity in study design which is cross sectional retrospective and RTI was the leading cause of injury for the study conducted in Nigeria and also for the Present study. In addition, both studies were conducted in the general population. However the finding of this study contradicts with the findings of the study conducted in the UK and India, which reported that, back was the most affected anatomical region (11,12).

The possible explanation for this inconsistency may be the large sample size included in their study compared to the present study.

Among anatomical structure affected by musculoskeletal and neurologic disorder the present study identify that, the most affected structure was IVD 27.9% it was also the commonest cause of back pain. This was followed by Bone 19.3 % and joint 17.5% which were the second and the third respectively. This finding is in agreement with a retrospective study conducted King Fahd Hospital of the University, Dammam, Saudi Arabia, which stated that (28.1%) of patients (5,929) had spinal disorders (8). The possible reason for the similarity may be since both of the studies were conducted retrospectively and were institution-based study based study.

In the present study, among the studied affected bones the first three commonly affected were tibia (24.2 %), femur (19.7 %) and radius (12.1 %). Clavicle, tarsal, metatarsal, sacrum and vertebral bone were among the least affected (1.5%). This finding is in line with the finding of A retrospective descriptive hospital- based study in Iran, which indicate Tibial fracture was most common (37.6%) (6); the possible reason for this similarity may be, since both studies were hospital based and were conducted in the general population.

On the other hand the finding of the present study is inconsistent with the finding of retrospective study conducted in Nigeria, which showed that, femur is the most affected bone with a magnitude of 22.69%(13). The possible explanation for this difference may be, due to the study in Nigeria include only fracture cases compared to our study which include non-fracture cases. In the present study out of the patients with joint disorder, the knee joint was the most affected (50.9%) and osteoarthritis was common cause of disorder while elbow joint and shoulder joint (18.2%) each were next to the knee joint. In addition to this ankle joint (5.5%) was the least affected joint.

The finding of the current study is in agreement with Cross sectional study conducted on 858 people in the West of Scotland whose report indicate that knee joint was the most affected joint (14). The possible justification for this similarity may be due to the similarity in the study design. Among the spinal nerve injuries assessed in this study brachial plexus (17.8 %) was the most affected and brachial plexopathy was the common cause. The sciatic nerve and its division fibular nerve (8.9 %) each were also commonly affected next to it. Radial nerve (6.7 %), Tibial nerve (4.4 %) and femoral nerve (2.2 %) were among the least affected nerve.

The findings of this study contradict with the study conducted in Massachusetts, which reported that Radial and ulnar nerve1.03% were the most affected nerves (15). The possible explanation for this contradiction may be due to inclusion of pediatric patients in the present study. Out of all causes of musculoskeletal and neurologic disorder, the findings of this study identified that RTI (45%) was the leading cause among traumatic causes of disorder followed by falling (19%), penetrating injury (10%) and stick injury.

This finding is in agreement with the findings of retrospective study conducted in Nigeria, which reported that RTI was the leading cause of injury (13). The possible justification for this similarity may be due to the similarity in study design which is cross sectional retrospective and RTI was the leading cause of injury for the study conducted in Nigeria and also for the present study.

Concerning the non-traumatic cause of neurologic and musculoskeletal disorder the current study identified that degenerative disc disease (DDD) 93(37.6 %) Osteoarthritis 31(12.8 %) and stroke 15 were the three most common non traumatic causes adult patient disorders in physiotherapy unit of TASH.

This finding is against to the finding of Community based cross sectional study conducted in Uganda which reported that peripheral neuropathy was the most common cause (7). It also contradicts with the finding of Cross sectional study conducted in the UK whose finding indicate that diabetic poly neuropathy was the common cause these disorders (16). The possible reason for this contradiction may be due to the difference in socioeconomic status and environmental factors in the present study and in the study done in the UK and Uganda.

Conclusion

The findings of this study showed that neurological and musculoskeletal disorders were common among patients attending physiotherapy unit (adult & Pediatric) of TASH. Among the affected anatomical regions, lower limb and back were the most affected. Inter vertebral discs and bones were the most affected anatomical structures. Road traffic injuries and fall injury were also among the common traumatic causes of musculoskeletal disorders. On the other hand, Degenerative disc disorders, Osteoarthritis and stroke from hypertension were top among the non-traumatic causes.

Stroke and degenerative conditions need due attention as many patients are presenting at the unit. As the both wings of the unit (Adult and Pediatric) are handling many patients with diverse conditions, strengthening the unit in terms of equipment, trainings and further professional advancement.

ACKNOWLEDGEMENT

We thank the Mother Department of Orthopedics and appreciate the dedicated physiotherapists who were treating and rehabilitating huge number of patients presented across years. We thank the data clerks who kept the documents safe, even during the years when the current electronic (i-Care) system of TSH was not there.

Competing Interest

The authors declare that this manuscript was approved by all authors in its current form and that no competing interest exists.

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