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Etiological factors of traumatic peripheral nerve injuries

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ABSTRACT: ***Background:*** Traumatic peripheral nerve injury (PNI) is a worldwide problem which can cause significant disability. Early evaluation of patients with trauma enhance potential outcome and treatment are of great importance in avoiding the nerve injury-related disability. ***Aim:*** To find the etiological factors and observation of type and pattern of peripheral nerve injured in trauma. ***Materials and Methods:*** This is a descriptive type of observational study. We collect data from a tertiary referral hospital during the period of study from July 2023 to December 2023. Sample size was 50 which were selected by purposive sampling method & data collected included demographic data, the nerve injured, cause of injury, and the site & type of injury used semi structured questionnaire. ***Result:*** It was observed that 41% patients had Road traffic accident (RTA) mostly of them (22%) were driver. Most of the Patients injured their ulnar nerve (40%), median nerve (14%) & 10% on lumber plexus. It was found that 62% PNIs located on upper limb that's partial in type. In my study report 60% patients were male and maximum of them within the age range 31-45 years. ***Conclusion:*** This study can serve as a guide to determine the epidemiology that enhance potential outcome to develop awareness & early treatment are of great importance in avoiding the nerve injury-related disability.

Keywords: Peripheral Nerve Injury (PNI), Trauma, Electromyography (EMG).

INTRODUCTION

Traumatic peripheral nerve injury (PNI) is a worldwide problem which can cause significant disability. Injury to peripheral nerves can be devastating and often leads to failure of complete recovery. PNI defined as an injury to a major nerve in either upper or lower extremity or also brachial or lumbar plexus. Many patients face long-term consequences as a result, such as chronic pain, weakness, or loss of sensation. Chronic pain, impaired mobility, and mental stress with long sick leaves are just a few of the significant health and psychological effects of this condition. Ultimately, patients, doctors, and society as a whole bear the burden.[1] This makes early profound diagnosis and adequate treatment of peripheral nerve lesions— tailored to the underlying pathophysiology, essential due to prolonged regeneration periods coupled with a very limited 18-month window for full re innervation — paramount. Traumatic nerve injuries are believed to be highly under recognized at initial clinical presentation, particularly in close and multi-compartmentalized injuries.[1] To date, only a limited number of specialized centers provide comprehensive

care for patients with nerve lesions from the time of initial management guaranteeing accurate diagnostics, timing and therapy according to each individual case. This leads to a large proportion of inadequately treated patients experiencing the aforementioned severe long-term outcomes.[1] This review addresses the epidemiological and neurotechnologic classification of traumatic peripheral nerve injuries, identifies common interest outcomes related to muscle and/or nerves affected by injury, as well as details the utility thta electrodiagnosis aids in exteriorizing such an objective. Peripheral nerve injuries due to trauma have caused a lot of morbidity throughout the world. During times of peace, peripheral nerve injuries result predominantly from the motor vehicle accidents trauma and to a lesser extent blunt or penetrative agents such as falls or industrial accidents. When plexus and root injuries are included, the incidence is approximately 5%. The radial nerve is most often involved in the upper limb, followed by ulnar and median nerves. Lower limb peripheral nerve injuries are rare, the sciatic being most frequently injured, followed by cranial peroneal and rarely tibial or femoral nerves.

It can be isolated but is frequently combined with central nervous system (CNS) trauma. There is a significant morbidity associated with peripheral nerve injury as function and work can be hindered. There is also the risk of secondary disability due to fall, fractures or injury. [2] The etiological and epidemiological factors of peripheral nerve injuries (PNIs) may vary according to person's perception about accident& its consequences, knowledge about traffic law, occupation, age trauma and iatrogenic interventions. This traumatic peripheral nerve injury can lead to structural and/or functional impairment of body which also produces physical disability, and neuropathic pain, partial or complete loss of motor and sensory functions that in turn can affect the quality of life. PNIs generally result from road traffic accidents (RTAs), sharp cutting trauma, penetrating trauma, Blunt injury and fractures, and iatrogenic injury.[2] PNIs knowledge mostly developed during wartimes. Nerve injuries occur as a consequence of trauma and lead to considerable neurological dysfunction. PNIs are usually caused by motor vehicle accidents (MVAs), lacerations with sharp objects, penetrating trauma, stretching or crushing forces and fractures in general as well as gunshot wounds during peacetime. In the trauma population, Philip-Tuli et al. reported a PNI incidence rate of 2% to 2.8%, increasing up to 5 % when plexus and root lesions were accounted for. [3] Electromyography (EMG) is the most important method for diagnosis of PINs. This study helps early diagnosis; evaluation of the lesion and also in assessing the severity of the lesion, thus facilitating the treatment options & reducing disability.[3]

MATERIALS AND METHODS

This is a descriptive type of observational study. Data were collected at a tertiary hospital during the study period, from July 2023 to December 2023. The study group included all patients from the National Institute of Neurosciences and Bangladesh Hospital. The sample size was 50 people selected through purposive sampling from both outpatients and inpatients at the National Institute of Neuroscience and Bangladesh Hospital. Data collected included demographics, nerve injury, and cause of injury, location and type of injury using a semi-structured questionnaire. All patients underwent a detailed neurological examination. PNI was defined as injury to the major nerves of the upper or lower extremities, the brachial plexus, or the lumbar plexus. Absence of recruited motor unit potentials on needle examination of the affected muscle was considered complete nerve damage, and partial nerve damage was considered when EMG studies showed complete conduction block.[5] Descriptive statistics included means and frequencies. Proportion statistics used Pearson chi-square test, Fisher's exact test, and p value.

RESULT

During the period of my study 50 patients were found with peripheral nerve injury (PNI). It was observed that 60% patients were male and maximum of them within the age range 31-45 years (figure-1). Again 40% female patients with nerve injury and maximum of them within the age range 46-60 years (Figure 1). It was observed that maximum RTA patients injured their ulnar and median nerve. Again, Blunt injury involved their sciatic and lumber plexus (Figure 2). It was observed that 62% PNIs located on upper limb that's partial in type. Otherwise, 8% head injuries observed mostly (75%) were complete in type (Figure-3). It was found that 41% patients had Road traffic accident (RTA) and 35% had cut injury (Table-I). From the distribution of nerve injury, it was observed that 40% involved on ulnar nerve than chronologically 14%, 12%, involved in median and sciatic nerve and 10%

observed in radial & also in lumber plexus (Table-II). Of the PNIs patients who had RTA mostly of them (22%) were driver and cut injured patients were scattered in occupation like business, farmer etc. Out of blunt injured patients' maximum were house makers (Table-3).

Table 1: Distribution of Patients According to Etiology of Injury. (N=50)

Cause of Injury	Frequency	Percent
RTA	22	41.0
Cut Injury	17	35.0
Blunt Injury	6	14.0
Iatrogenic	5	10.0
Total	50	100.0

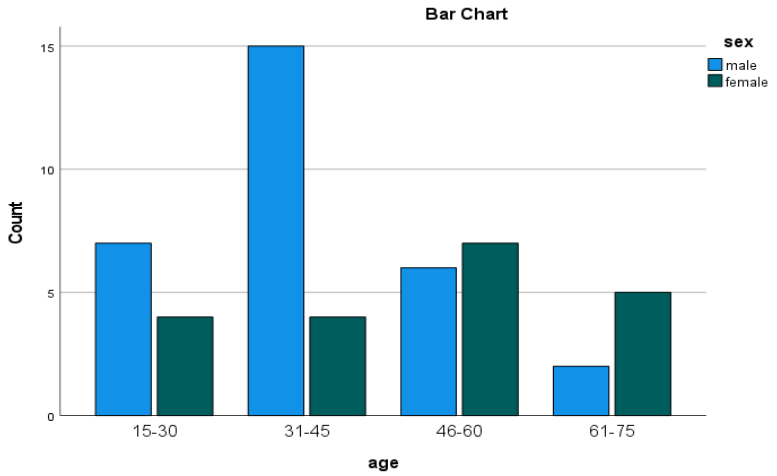

Figure 1: Age And Sex Distribution of Peripheral Nerve Injury (PNI) Patients (N=50)

Table 2: Distribution of Patients According to Injured Nerve (N=50)

Injured Nerve	Frequency	Percent
Ulnar	20	40.0
Median	7	14.0
Radial	5	10.0
Sciatic	6	12.0
Brachial Plexus	4	8.0
Lumber Plexus	5	10.0
Others	3	6.0
Total	50	100.0

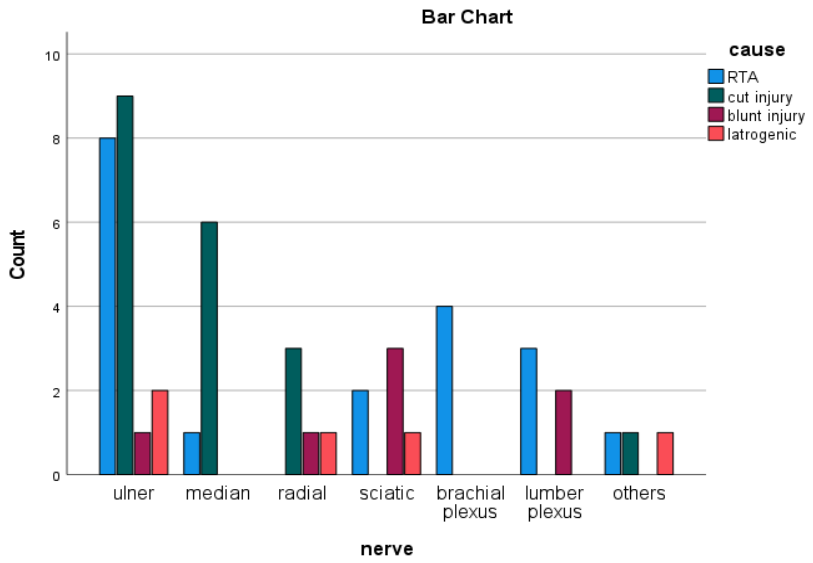

Figure 2: Cause & Location of PNI Patients.

Fisher's exact test =.003(p< .005)

Table 3: Relation Between Cause of Nerve Injury with Occupation of Patients. (N=50)

		Occupation						Total
		Driver	Job	Farmer	Student	Business	House Maker	
Cause	RTA	12	3	2	4	1	0	22
	Cut Injury	1	3	4	3	4	2	17
	Blunt Injury	0	1	0	0	0	5	6
	Iatrogenic	0	1	0	1	2	1	5
Total		13	8	6	8	7	8	50

Pearson Chi-Square test value= 36.86 (P < .001)

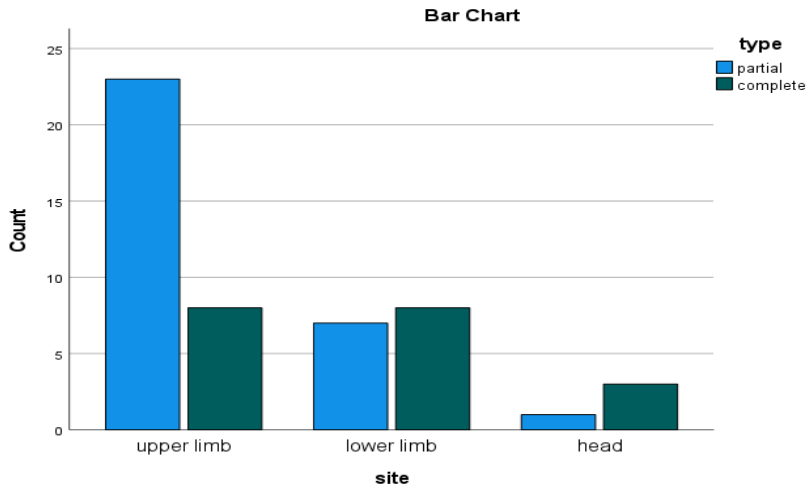

Figure3: Relation Between Body Location & Type of Injury.

$\chi^2 = 5.77$, df =2, $p < 0.05$

DISCUSSION

During the study period it was observed that 60% patients were male and maximum of them within the age range 31-45 years. The similar findings reported by Noble, James 1998 where mean patient age of PNIs was 34.6 years (SEM +/- 1.1 year), and 83% of patients were male.[4] It was found that 41% patients had Road traffic accident (RTA) and 35% had cut injury in my study that finding is controversy to the previous study obtained by Uzun, Nurten MD 2006 where RTA injury was only 23.77%.[5-7] It was observed in my study that maximum RTA patients injured their ulnar and median nerve (accordingly 40% & 14%). Again, blunt lacerated injury involved their sciatic and lumber plexus. Similar findings also found in another study where most patients were men (74%) and the mean age was 32.4 years where Upper-limb PNIs occurred in 73.5% of cases; combined nerve injury most commonly involved the ulnar and median nerves.[8, 9] Of the PNIs patients who had RTA mostly of them (22%) were driver and cut injured patients were scattered in occupation like business, farmer etc. Out of blunt injured patients' maximum was house maker. It was also observed in my study that 62% PNIs located on upper limb that's partial in type.[10-12] Another study shows the similar findings where 162 patients out of 200 sustained peripheral nerve injuries, 121 of which were in the upper extremity.[5] Another study shows that RTA was the most common cause of Peripheral nerve injury two-thirds of them were partial.[13,3]

CONCLUSION

PNIs most frequently occurred from road traffic accidents and predominately young, male patients with Injuries to the ulnar nerve, median nerve were the most prevalent ones in our study. The main limitation of this study is that was a small-scale research work and sample size was taken only from one hospital, so actual situation of the problem may not be reflected. Nevertheless, further studies on other samples will be needed in order to confirm and generalize these results. PNIs generally occur in the most productive age group, the young population that will impact on major social and economic burden. Structural & functional disability associated with nerve injuries can be devastating. This study can serve as a guide to determine the epidemiology that enhance potential outcome to develop awareness & early treatment are of great importance in avoiding the nerve injury-related disability.

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