



## ORIGINAL ARTICLE

**Epidemiological Profile of Patients Presented with Traumatic Brachial Plexus Injury in a Tertiary Care Center: A Descriptive Cross-sectional Study**Santosh Batajoo<sup>1</sup>, Niresh Shrestha<sup>1</sup>, Om Prasad Shrestha<sup>1</sup><sup>1</sup>Department of Orthopedics, B&B Hospital, Gwarko, Lalitpur

## ABSTRACT

**BACKGROUND**

Traumatic brachial plexus injuries are devastating injuries often resulting from high velocity road traffic accidents that may lead to severe functional disability. Despite continuous evolution in the surgical technique, the clinical outcomes following these injuries remain poor, especially in developing countries due to a lack of enough information in the literature regarding patients and injury characteristics. This study aims to evaluate epidemiological profile of the patients presented with traumatic brachial plexus injury in a tertiary care center.

**METHODS**

A descriptive cross-sectional study was conducted at B.&B. Hospital, Gwarko, Lalitpur, Nepal, between January 1, 2020, and December 31, 2023. Hospital in-patient electronic data record was screened using keyword “brachial plexus injury”. Adult patients (Age>18 years) with traumatic brachial plexus injury were included. Patients with missing information on demographic parameters, admission for other reasons, and who did not receive surgical treatment were excluded. The data were collected between March 1, 2024, and March 31, 2024. Convenient sampling technique was used and all eligible participants within the study period were included. Descriptive statistics were used, and continuous data were reported in mean and categorical data were expressed in numbers and percentage.

**RESULTS**

A total of 38 patients were included in the study. The mean age of the patients was 27.6 years, ranging from 18 to 59 years. There were 31 (81.6%) were male and 7 (18.4%) were female. 36 (94.7%) were due to road traffic accidents. Out of 36, 34 (94.5%) were of two-wheelers. 28 (73.7%) were part of polytrauma and 10 (26.3%) were isolated. Twenty-one (51.2%) had global pattern. 13 (34.2%) received nerve transfer and 6 (15.8%) received nerve transfer with graft.

**CONCLUSION**

Traumatic BPI is common among young males riding two-wheelers. C5-T1 is the most common injury pattern. Neurotization remains the gold standard primary treatment, with SAN to SSN transfer is the most performed surgery

**KEYWORDS**

Epidemiology, posttraumatic brachial plexus injury, Nepal

## INTRODUCTION

Traumatic brachial plexus injuries (BPI) are devastating injuries often resulting from high velocity road traffic accidents (RTA) that may lead to severe functional disability.<sup>1</sup> Narakas rule of seventies stated that 70% of these injuries occurred secondary to RTA, 70%

involve motorcycles, 70% of these riders have multiple injuries, 70% having multiple injuries had supraclavicular lesions and at least one of the roots avulsed. 70% involve C7, C8, T1 avulsion and 70% avulsed roots had chronic pain.<sup>2</sup> The diagnosis often requires thorough medical history, comprehensive physical exam, and adequate imaging and electrodiagnostic tests.<sup>3</sup> The management is challenging, and a team-based approach including surgeons, neuro-physicians, pain management specialists, hand therapists, and mental health experts are required to obtain better outcomes.<sup>4</sup> Recent studies have advocated highly on early surgical intervention for better clinical outcomes.<sup>3,4</sup> The timing of the surgery depends on the injury mechanisms, and types and extent of the injury.<sup>2,5</sup> Despite continuous evolution in the surgical technique, the clinical outcomes following these injuries remain

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poor, especially in developing countries.<sup>6</sup> This is due to a lack of enough information in the literature regarding patients and injury characteristics following traumatic BPI.<sup>6,7</sup> There are few epidemiological studies of traumatic brachial plexus injuries. We did not find any study of prevalence of BPI injury in Nepal. This will give information of incidence, mode of injury, age of patient, pattern of involvement, associated injuries, treatment received, recovery in our population.

This study aims to evaluate epidemiological profile of the patients presented with traumatic brachial plexus injury in a tertiary care center.

## METHODS

A descriptive cross-sectional study was conducted involving adult patients with traumatic BPI presented at tertiary hospital in Nepal, between January 1, 2020, and December 31, 2023. The study was conducted following the guidelines of local institutional review committee (IRC). Hospital in-patient electronic data record was screened using keyword "brachial plexus injury". All patients with traumatic BPI were included in the study. Patients with missing information on demographic parameters, were excluded. The data were collected between March 1, 2024, and March 31, 2024. Convenient sampling technique was used and all eligible participants within the study period were included.

Following data were extracted: Patient's age, sex, affected side, mode of injury, types of injury, associated injuries, type of treatment, and distribution of neurotization procedure were collected.

Data was entered in Microsoft excel version 2010, and continuous data were reported in mean and categorical data were expressed in numbers and percentage

## RESULTS

A total of 38 patients were included in the study. The mean age of the patients was 27.6 years, ranging from 18 to 59 years. There were 31 (81.6%) were male and 7 (18.4%) were female. Out of 38, 36 (94.7%) were due to road traffic accidents (RTA) and 2 (5.3%) were due to fall from height. Out of 36 RTA, 34 (94.5%) were of two-wheelers and 2 (5.5%) were of four-wheelers. (Table 1)

**Table 1: Age-wise distribution (N=38)**

Age in years	Number	Percentage
10-20	7	18.4%
21-30	18	47.4%
31-40	10	26.3%
41-50	2	5.3%
51-60	1	2.6%

Out of 38, 28 (73.7%) were part of polytrauma and 10 (26.3%) were isolated BPI. Twenty-one (51.2%) had C5-T1 BPI. 13 (34.2%) received nerve transfer and 6 (15.8%) received nerve transfer with graft. Out of 16 neurotization procedures, 7 (43.8%) had

spinal accessory nerve (SAN) to suprascapular nerve (SSN) transfer and 4 (25%) had intercostal to musculocutaneous nerve (MCN) transfer (Table 2-4)

**Table 2: Type of brachial plexus injury (N=38)**

Pattern	Number	Percentage
C5	2	5.3%
C5, C6	9	23.7%
C5, C6, C7	6	15.8%
C5-T1	21	55.2%

**Table 3: Type of treatment (N=38)**

Procedure	Number	Percentage
Nerve transfer	13	34.2%
Nerve transfer with nerve graft	6	15.8%
Trapezius transfer	4	10.5%
Conservative treatment	5	13.2%
Lost to follow-up	10	26.3%

**Table 4: Neurotization Procedures (N=16)**

	Procedure	Frequency, n(%)
Shoulder	SAN to SSN	7 (43.8%)
	Somsak procedure	2 (12.5%)
Elbow	Intercostal to MCN	4 (25%)
	Phrenic to MCN	2 (12.5%)
	Oberline procedure	1 (6.2%)

## DISCUSSION

This study identified that BPI is common among young males, as the mean age was 27.6 years, majority (47.4%) were 21-30 years, and 81.6% were males. The reported male prevalence in the literature is around 80-93%.<sup>8,9</sup> The commonest mechanism of injury in this study was RTA, with the prevalence of 94.7%, and the majority (94.5%) were due to two-wheeler accidents. Songcharoen (1995), in a case series conducted in Thailand including 520 patients with BPI reported that 91% were due to RTA, among which 82% were due to two-wheeler accidents.<sup>8</sup> Similarly, Dubuisson and Kline (2002), in a single-center experience in Belgium including 99 patients with BPI, reported that majority (60%) were due to RTA and 31% were due to two-wheeler accidents.<sup>8</sup> Furthermore, Kandenwein et al. (2005), in a retrospective study conducted in Germany, reported that 81% were due to RTA and 65% were due to two-wheeler accidents.<sup>10</sup> This suggests that young males in their 3<sup>rd</sup> decade of life riding two-wheeler vehicles are more prone to these injuries.

This study also identified that the most common type was C5-T1 BPI with prevalence of 55.2% followed by C5, C6. The findings were similar to what reported in the literature.<sup>6,9</sup> Suroto et al. (2022) observed 70% C5-T1 BPI. Similarly, 73.5% cases were the part of polytrauma, suggesting that traumatic BPI has higher prevalence of

associated injuries. The findings were similar to what reported in the literature, with reported prevalence of 52-63%.<sup>6,7</sup> The most commonly performed surgery was nerve transfer, with prevalence of 34.2%, and the most common nerve transferred was SAN to SSN, with prevalence of 43.8%. Sumarwoto et al. (2022) in a series of 374 surgically treated BPI, majority were neurotization procedures, including nerve transfer.<sup>7</sup> Another series reported that, out of 350 surgically treated patients, 314 were neurotization, 38 were neurolyses, 23 were nerve grafting, 16 were free muscle transfers combined with neurotizations, and 30 were musculotendinous transfers.<sup>8</sup> This suggests that primarily, neurotization procedures remains the gold standard treatment for traumatic BPI.

This study has some limitations. It is a descriptive study evaluating epidemiological parameters and outcome analysis was not conducted. Small sample size with few lost to follow-up for definitive surgical treatment which may have influence the overall prevalence. However, the findings were similar to what reported in the literature and study findings can be used as a background for future studies.

## CONCLUSION

Traumatic BPI is common among young males riding two-wheelers. C5-T1 is the most common injury pattern. Neurotization remains the primary surgical treatment, with SAN to SSN transfer being the most commonly performed procedure. However, small sample size and single center study limits the generalization of the findings.

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