

Original Research Article

Prevalence of post-traumatic trigeminal neuralgia (PTTN) in Dental OPD at tertiary care center, Bihar: A retrospective cross-sectional epidemiological study**Dr. Sanjay Kumar¹, Dr. Ashok Kumar², Dr. Vibha Rani³, Dr. N.R Biswas⁴, Dr. Shishir Kumar⁵, Dr. A.K. Sharma⁶**¹Associate Professor, Division of orthodontics, Deptt. of Dentistry, IGIMS, Patna-14, Bihar,²Professor, Deptt. of Neurology, IGIMS, Patna-14, Bihar³Assistant Professor, Deptt. of Physiology, PMCH, Patna-14, Bihar.⁴Director, Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna-14, Bihar⁵Assistant Professor (Bio-statistics), Department of Community Medicine, IGIMS, Patna-14, Bihar⁶Prof., Deptt. of Dentistry, IGIMS, Patna-14, Bihar***Corresponding author**

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Abstract: The 5th cranial nerve i.e. trigeminal nerve is a mixed nerve performing both sensory and motor functions. This nerve supplies the orbit, the maxilla and the mandible, and any trauma whether accidental or iatrogenic is one of the most common causes of trigeminal neuropathy. Most cases of post-traumatic trigeminal neuralgia are the result of oral surgical operations especially extraction of tooth, root canal treatment and any kind of jaw fracture affecting the crown -root of a tooth. The sensory defects are located mainly in territory innervated by Inferior alveolar nerve, Lingual nerve and branches of maxillary nerves. The objectives are to know the prevalence of post- traumatic trigeminal neuralgia in dental OPD, at tertiary care center, Patna. and to know the relation between traumatic dental extraction of teeth and occurrence of post- traumatic trigeminal neuralgia. A retrospective cross-sectional study was done involving 5300 new cases (patients) reported to the Division of Orthodontics, Department of Dentistry, IGIMS, and Patna. The data collected from the record available from dental OPD record from October 2011 to March 2016. The case were selected based on the criteria of inclusion and exclusion factors. The total new cases reported to the dental OPD were 5300 patients, out of those 112 cases of post-traumatic trigeminal neuralgia (PTTTN) were recorded. In this study the prevalence of PTTN case were 2.11%. The female were more affected than male. Post- traumatic trigeminal neuralgia is most often secondary to iatrogenic trauma during dental extractions and other surgical procedures of oral cavity with localized sensory defects to inferior alveolar nerve, lingual nerve and branches of maxillary nerves.

Keywords: Dental extraction, Epidemiology of PTTN patient, Post-traumatic trigeminal neuralgia

INTRODUCTION:

The International association for the study of pain (IASP) defines the trigeminal neuralgia as sudden, recurrent, intense pain along one or more branches of the fifth cranial nerve [1, 2]. The International headache society defines trigeminal neuralgia (TN) as "Painful unilateral affliction of the face, characterized by brief electric shock like pain limited to the distribution of one or more divisions of the trigeminal nerve. Though the etiology based classification is very few, TN could result with multiple etiologies. More over due to paucity of Asian data on this disorder [4-5], a retrospective cross-sectional study on epidemiology was carried out at Division of Orthodontics, Department of Dentistry, Indira Gandhi Institutes of Medical Sciences, Patna, and Bihar. Objectives: 1. To know the

prevalence of post-traumatic trigeminal neuralgia in dental OPD, at tertiary care center, Patna, Bihar. 2. To know the relation between traumatic dental extraction of teeth and occurrence of post- traumatic trigeminal neuralgia.

Epidemiology: [1, 3] The disease is rare and thus there is few data available in the literature. Incidence increases with age and peak age is between 60-70 years of age. There is no known ethnic or racial variation reordered. Patient with multiple sclerosis are more vulnerable and their percentage is as low as 1.0%. The annual incidence of trigeminal neuralgia has been reported in U.S.A. as 4.3 per 100,000 populations, with a slight female predominance (age-adjusted ratio of 1.74:1). The peak incidence is at 60 to 70 years of age,

and classical trigeminal neuralgia is unusual before age forty (40) years. The right side of the face is affected more commonly than the left (ratio of 1.5:1), which may be because of the narrower foramen rotundum and foramen ovale on the right side [12]. The condition occurs more often in the middle aged and is twice as common in females as in males. In most of the patients the pain is strictly unilateral; multiple sclerosis patients constitute the majority of the 2% patients with bilateral disease [7]. Most commonly patients present with pain maximum either in maxillary or mandibular divisions. It is estimated that 1 in 15,000 or 20,000 people suffer from TN, although the actual figure may be significantly higher due to frequent misdiagnosis [12]. As per one literature 80-90% cases are of idiopathic/classical trigeminal neuralgia and rest 10% is due to symptomatic trigeminal neuralgia.

CLASSIFICATIONS: The International headache society (I.H.S) [1] has published criteria for the diagnosis of classical and symptomatic trigeminal neuralgia.

1. In classical trigeminal neuralgia, no cause of the symptoms can be identified other than vascular compression.
2. Symptomatic trigeminal neuralgia has the same clinical criteria of pain as above, but another underlying cause is responsible for the symptoms.

1. Classical

A. Paroxysmal attacks of pain lasting from a fraction of a second to two minutes, affecting one or more divisions of the trigeminal nerve, and fulfilling criteria **B** and **C**.

B. Pain has at least one of the following characteristics:

1. Intense, sharp, superficial, or stabbing in nature.
2. Pain precipitated from trigger zones and or by trigger factors.

C. Attacks are stereotyped in the individual patient.

D. There is no clinically evident neurologic deficit

E. Not attributed to another disorder.

2. Symptomatic:

A. Paroxysmal attacks of pain lasting from a fraction of a second to two minutes, with or without persistence of aching between paroxysms, affecting one or more divisions of the trigeminal nerve, and fulfilling criteria **B** and **C**

1. Intense, sharp, superficial, or stabbing
2. Precipitated from trigger zones or by trigger factors and attacks are stereotyped in the individual patient.

D. A causative lesion, other than vascular compression, has been demonstrated by special investigations and/or by posterior fossa exploration.

E. Under local anesthesia the pain subsides.

B. Based on A.F Kaufmann and M. Patel, Centre for cranial nerve disorders, Winnipeg, Manitoba, Canada, 2001 [6].

According to this center, trigeminal neuralgia is defined into seven forms.

They are as : typical TN, atypical TN, pre-TN, multiple-sclerosis-related TN, secondary TN, post-traumatic TN (trigeminal neuropathy), and failed TN. These forms of TN should be distinguished from idiopathic (atypical) facial pain, as well as other disorders causing cranio-facial pain.

1. Typical trigeminal neuralgia (*Tic-Douloureux*):

This is the most common form of TN that has previously been termed classical, idiopathic and essential trigeminal neuralgia. All cases of typical TN are caused by blood vessels compressing the trigeminal nerve root as it enters the brain stem. This neurovascular or microvascular compression at the trigeminal nerve root entry zone may be caused by arteries or veins, large or small, that may simply contact or indent the trigeminal nerve. In people without TN, blood vessels are usually not in contact with the trigeminal nerve root entry zone.

Patho-physiology of classical trigeminal neuralgia:

Pulsations of vessels upon the trigeminal nerve root do not visibly damage the nerve. However, irritation from repeated pulsations may lead to changes of nerve function, and delivery of abnormal signals to the trigeminal nerve nucleus. Over time, this is thought to cause hyperactivity of the trigeminal nerve nucleus, resulting in the generation of TN pain. In most sufferers of typical trigeminal neuralgia, vessels compress the trigeminal nerve root. The generation of TN pain is thought to result from peripheral pathology (i.e. neurovascular compression) and central pathophysiology (i.e. hyperactivity of the trigeminal nerve nucleus). The superior cerebellar artery is the vessel most often responsible for neurovascular compression upon the trigeminal nerve root, although other arteries or veins may be the culprit vessels.

2. Atypical trigeminal neuralgia:

Atypical TN is characterized by a unilateral, prominent constant and severe aching, boring or burning pain superimposed upon otherwise typical TN symptoms. This should be differentiated from cases of typical TN that develop a minor aching or burning pain within the affected distribution of the trigeminal nerve.

3. Pre-trigeminal neuralgia:

Days to years before the first attack of TN pain, some sufferers experience odd sensations in the trigeminal nerve distributions destined to become affected by TN. These odd sensations of pain, (such as a toothache) or discomfort (like "pins and needles", paresthesia), may be symptoms of pre-trigeminal neuralgia. Pre-TN is most effectively treated with medical therapy used for typical TN. When the first

attack of true TN occurs, it is very distinct from pre-TN symptoms.

4. Multiple Sclerosis-related trigeminal neuralgia:

The symptoms and characteristics of multiple sclerosis (MS)-related TN is identical to those for typical TN. Two to four percent of patients with TN have evidence of multiple sclerosis and about 1% of patients suffering from multiple sclerosis develop TN. Those with MS-related TN tend to be younger patients when they experience their first attack of pain and the pain progresses over a shorter amount of time than in those with typical TN.

5. Secondary or tumor related trigeminal neuralgia:

Trigeminal neuralgia pain caused by a lesion, such as a tumor etc. is referred to as secondary trigeminal neuralgia.

6. Trigeminal neuropathy or Post-Traumatic trigeminal neuralgia:

Injury to the trigeminal nerve may cause this severe pain condition. Trigeminal neuropathy or post-traumatic TN may develop following cranio-facial trauma, dental trauma, lower molars extraction, impacted teeth, sinus trauma (such as following Caldwell Luc procedures) but most commonly following destructive procedures (rhizotomy) used for treatment of TN. Following TN injury, numbness may become associated with bothersome sensations or pain, sometimes called *phantom pain* or *deafferentation pain*. These pain conditions are caused by irreparable damage to the trigeminal nerve and secondary hyperactivity of the trigeminal nerve nucleus. The pain of trigeminal neuropathy or post-traumatic TN is usually constant, aching or burning, but may be worsened by exposure to triggers such as wind and cold. Such deafferentation pain can start immediately or days to years following injury to the trigeminal nerve. In the most extreme form, called *anesthesia dolorosa*, there is continuous severe pain in areas of complete numbness [8-10]. Traumatic accidents, unsuccessful dental surgery and infections are also reasons for post-traumatic trigeminal neuralgia. As per this hypothesis is that multiple micro-abscess forms that demineralizes bone of the maxillary and mandible irritates the nerve pain results.

7. Failed trigeminal neuralgia:

Not all cases of TN may be effectively controlled with any one form of medications or surgical innervations. When medications are no longer effective, surgical interventions are considered. If pain recurs or persists following surgery, medications are tried again and may then work more effectively.

MATERIAL AND METHOD:

Patient will be selected as per inclusion and exclusion criteria given below.

Criteria for selection of patients were as follows: The patients had given the history of extraction between past 6 months to five years retrospectively.

2. The patients were reported with the history of pain started of six months after the dental extraction.
3. Paroxysmal attacks of pain (electric/pricking type in nature) lasting from a fraction of a second to two minutes, affecting one or more divisions of the trigeminal nerve.
4. Neuralgic pain criteria based on the classification on A.F Kaufmann and M. Patel: Centre for cranial nerve disorders, Winnipeg, Manitoba, Canada (2001) and International headache society guidelines for symptomatic trigeminal neuralgia signs and symptoms were followed in patient's selection.

Exclusion criteria:

1. Patient with known past history of trigeminal neuralgia.
3. Patient doesn't give sign and symptoms criteria as laid down by A. F Kaufman criteria and International headache society.
4. The subjects below twenty years of age were not considered.
5. The pain ensues in the subjects before six months of extraction were not included.
6. Patients with severely ill diseases and atypical features of pain suggesting symptomatic trigeminal neuralgia or an alternative diagnosis.

Data of selected patient were recorded from record available from Dental Department of Indira Gandhi Institutes of Medical Sciences, Patna, and Bihar from month of October 2011 to March 2016. The data collected was tabulated, analyzed and were correlated with poor surgical protocol followed in dental extraction, resulted in post-traumatic trigeminal neuralgia and frequency of PTTN cases prevalence at tertiary care center, Patna.

RESULTS:

The total new cases reported to the dental OPD were 5300 patients; out of those 112 cases of post-traumatic trigeminal neuralgia (PTTN) cases were recorded. In this study the prevalence of PTTN is 2.11% (referring to table no.01). Most of the cases were reported in the age groups of 40-59 years and 20-39 years. Are as 56.3% and 29.5% respectively, where female patients were 56.3% in comparison to male 43.8%. (refer to table no.2). Patients with all age groups shows lower jaw was more affected i.e. 96 PTTN patients i.e (85.7%) out of 112 in comparison to upper jaw 15 cases i.e (13.4%) (Refer to table no.03). The right side quadrant of the jaw were more

affected in all age groups patients were 64 in number i; e (57.1%) in comparison to left side quadrant patients 48 patients (42.9%).(refer to table no.04).The distribution of PTTN cases recorded were more in lower jaw 85.7% in comparison to upper jaw 13.4% only. When combined to both sex including both the

quadrant, the female cases of PTTN were 63 in number i; e (56.3%) in comparison to male 49 i; e cases (43.8%) (Refer to table no.05). Figure no.01 explains the frequency of distribution of PTTN cases in various age groups in various quadrants of upper and lower jaws.

Table 1: Data collected from Dental -OPD IGIMS, Patna-14

AGE (years)	(20-39)	(39-59)	(60-79)	Sub- total	Grand total
Number of patients in various age groups	33	60	19	-----	112
SEX					
MALE :-	7	26	16	49 (43.8%)	112
FEMALE:-	26	34	03	63 (56.3%)	
QUADRANT-WISE					
LEFT	17	22	09	48 (42.9%)	112
RIGHT	16	38	10	64 (57.1)	
UPPER JAW	2	9	4	15 (8.9%)	
LOWER JAW	31	50	15	96 (85.7)	112
BOTH THE JAW	nil	01	nil	01 (0.9%)	

1. Total number of patients (new cases) reported:5300
2. Total number of PTTN patients reported at Dental OPD of IGIMS, Patna:112
3. Prevalence of PTTN Patients at Dental OPD OF IGIMS, Patna, recorded as : 2.11%
4. Distribution of Patients in terms of Age, Sex, Site, Upper –Lower Jaw and quadrant wise.

Table 2: distribution of post –traumatic trigeminal neuralgia (PTTN) patients in both sex groups (Male /female %)

		Age Groups			Total	
		20-39 Years	40-59 Years	60-79 Years		
Sex	Male	Count	7	26	16	49
		% of Total	6.3%	23.2%	14.3%	43.8%
	Female	Count	26	34	3	63
		% of Total	23.2%	30.4%	2.7%	56.3%
Total		Count	33	60	19	112
		% of Total	29.5%	53.6%	17.0%	100.0%

Table 3: distribution of PTTN patients in jaw wise (upper/lower jaw) in various age groups

			Age Groups			Total
			20-39 Years	40-59 Years	60-79 Years	
JAW	LOWER JAW(L)	Count	31	50	15	96
		% of Total	27.7%	44.6%	13.4%	85.7%
	UPPER JAW(U)	Count	2	9	4	15
		% of Total	1.8%	8.0%	3.6%	13.4%
	Both Jaw (L&U)	Count	0	1	0	01
		% of Total	.0%	.9%	.0%	.9%
Total		Count	33	60	19	112
		% of Total	29.5%	53.6%	17.0%	100.0%

Table 4: Distribution of PTTN patients in quadrant wise

			Age Groups			Total
			20-39 Years	40-59 Years	60-79 Years	
QUADRANT wise	LEFT QUADRANT (LQ)	Count	17	22	9	48
		% of Total	15.2%	19.6%	8.0%	42.9%
	RIGHT QUADRANT(RQ)	Count	16	38	10	64
		% of Total	14.3%	33.9%	8.9%	57.1%
Total		Count	33	60	19	112
		% of Total	29.5%	53.6%	17.0%	100.0%

Table 5: Distribution of PTTN Patients in Quadrant Wise in Male and Female Sex

			Sex		Total
			Male	Female	
QUADRANT	LEFT QUADRANT (LQ)	Count	21	27	48
		% of Total	18.8%	24.1%	42.9%
	RIGHT QUADRANT(RQ)	Count	28	36	64
		% of Total	25.0%	32.1%	57.1%
Total		Count	49	63	112
		% of Total	43.8%	56.3%	100.0%

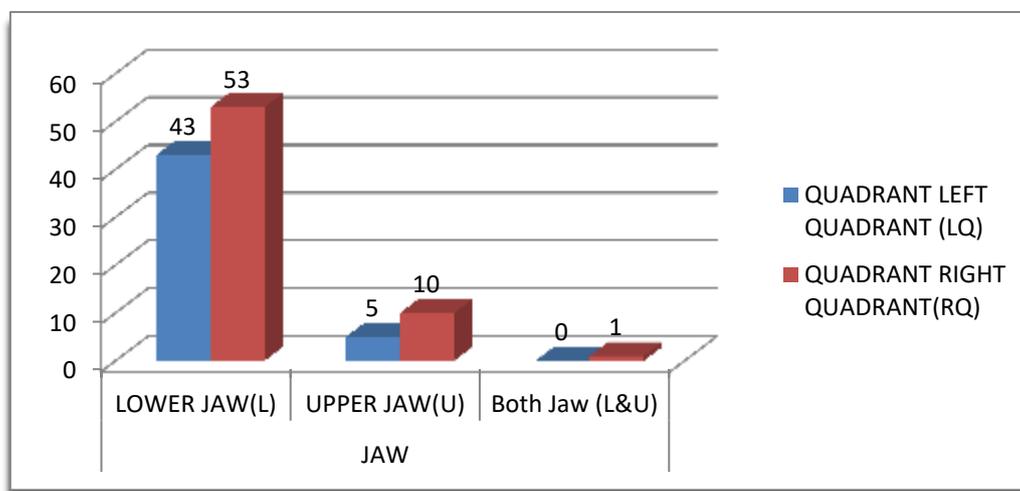


Fig 1: Distribution of PTTN Patients in Upper and Lower Jaw

DISCUSSION:

Post- traumatic trigeminal neuralgia is most often secondary to iatrogenic trauma during oral surgical procedures, with incidence close to 40% of all the cases. Most common underlying cause is dental extractions with localized sensory defects to inferior alveolar nerve, lingual nerve and branches of maxillary nerve [4, 8, 10]. This study aims to highlight the separate entity of post-traumatic trigeminal neuralgia i.e. one of the variant of trigeminal neuralgia and at the

same time its association with iatrogenic damage to the nerve in the vicinity of oral surgery performed [3, 6, 8, 10]. Most of the literatures related to epidemiological data shows very poor prevalence of cases of trigeminal neuralgia. In this study the prevalence of PTTN cases were more i.e. 2.11% in relation to other studies, reasons may be due to poor surgical protocols were followed during dental extraction and also may be due to poor local anaesthetic technique followed during injecting local anaesthetic solution [8]. In this study

sensory impairment in relation to post-traumatic trigeminal neuralgia were more among women 56.3% in comparison to 43.8% in male in the age groups of 20-39 years and 40-59 years of age. This finding was more towards usual as per many literatures. Most of the patients in respective of sex and in all age groups shows occurrence of PTTN cases 96 i; e (85.7%) in lower jaw in comparison to upper jaw 15 cases of PTTN i; e (13.4%) reason may be due to lower molars frequently impacted and in close proximity to lower nerves, like lingual nerve, inferior alveolar nerve etc. branches of mandibular nerve. Most of the cases are detected in the right side quadrant of the jaw in respective to left quadrant of the jaw. Reasons may be due small foramen presents in the right side of the skull through which branches of mandibular nerve passes, as few literature claims [4, 12]. As this study is unicentric, the gravity of situation it seems more grave than it appears, when data will be collected from many centres. The finding in this study may be result of poor surgical protocols were followed for dental extractions and or patients were reported to the unqualified person (quack) for treatment due to low-socio-economic background. This study also concludes with unilateral site of occurrence than the bilateral jaw. In this study also shows that more predilections for female sex than male and lower jaw are more affected in both the sex than the upper jaw. These findings were in concordance with findings of most of the studies done in the literature [3-6, 12]. Most of the literatures available pertaining to epidemiology of trigeminal neuralgia cases doesn't differentiate whether it is classical or symptomatic trigeminal neuralgia.

CONCLUSION:

Post traumatic trigeminal neuralgia is most often secondary to iatrogenic trauma mainly due to dental extractions with localized sensory defects to inferior alveolar nerve and lingual nerve. This study also necessities to clinicians for further research for poor surgical protocols followed in dental extraction resulted in PTTN and also new medicinal regimes or therapies to alleviate the pain of trigeminal neuralgia that adversely affect the quality of life in many patients. The study also requires involving the multi-centric approach for better research outcome.

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