

# Variations in the Length of Facial Nerve in Temporal Bone of Male Cadavers of North Karnataka

Gazala Shaireen<sup>1</sup>, Sarita Sylvia<sup>2</sup>

<sup>1</sup>Assistant Professor, Department of Anatomy, Khaja Banda Nawaz Institute of Medical Sciences, <sup>2</sup>Associate Professor, Department of Anatomy, MR Medical College, Gulbarga, Karnataka, India

## Abstract

**Background:** The variation in the length of facial nerve (FN) has surgical importance, during parotidectomy, maxillofacial, and otology surgeries.

**Method:** Fifty male cadaveric temporal bones were taken out by removing soft parts attached to it. The FN was exposed. The length of FN in different segments of temporal bone was measured by tailors tape (mm)

**Results:** Length of facial nerve 7.92 (SD ± 1.22) in petrous part, 3.5 (SD ± 0.42) in labyrinthine part, 12.14 (SD ± 0.38) tympanic part, 12.26 (SD ± 1.88) mastoid part, 15.78 (SD ± 0.52) nerve to stapedius, 19.08 (SD ± 0.68) chorda tympani branch.

**Conclusion:** This cadaveric study will be tool for maxillofacial, ENT, and neurosurgeon to access require surgical parts without injury to FN.

**Key words:** Petrous, Labyrinthine, Mastoid, Tympanic, Tailors tape

## INTRODUCTION

Facial nerve (FN) is the 7<sup>th</sup> cranial nerve that controls mimic muscles and is responsible for facial expression. The trunk of FN emerges from stylomastoid foramen and passes through the parotid upper (temporofacial) and lower (cervicofacial) divisions both of which further give to rise to five terminal branches temporal, zygomatic, buccal, marginal mandibular, and cervical.

The branching of FN was described by Davis *et al.* in 1056. They outlined six FN types with their recurrence based on the presence or absence of anastomosis between terminal branches.<sup>[1]</sup> However, Katz and Catalane, 1987, classified as nine types of branching pattern and were based on anastomosis between terminal branches, the origin of the buccal branch, and number of FN trunks.<sup>[2]</sup> Kopuz *et al.* (1994) described FN with three addition double trunk.<sup>[3]</sup>

Parotidectomy is unavoidable in benign or malignant tumors. Neoplasm located in the superficial lobe. However, post-operative partial parotidectomy involves weakness of FN.<sup>[4]</sup> The identification of trunks and branches of FN is essential during parotidectomy to avoid complications since paralysis of FN remains an issue in maxillofacial surgery. Hence, various branches of FN with its length are evaluated to know the anatomical land marks to the surgery.

## MATERIAL AND METHOD

Thirty male cadavers (temporal bones) from anatomy dissection theater of KBN Institute of Medical Sciences, Kalaburagi, Karnataka, were studied.

### Inclusion Criteria

Non-pathological, intact temporal bones were selected for the study.

### Exclusion Criteria

Pathological, cut, or torn facial of nerve in any part or segment of temporal bone was excluded from the study.

### Method

Temporal bones taken out by removing soft parts attached to it. The FN was exposed as per the method given in

### Access this article online



www.surgeryijss.com

Month of Submission : 05-2021

Month of Peer Review: 05-2021

Month of Acceptance : 06-2021

Month of Publishing : 07-2021

**Corresponding Author:** Dr. Gazala Shaireen, 6/43 Rahmat Manzil, Chacha Hotel, Muslim Chowk, Gulbarga, Karnataka, India.  
E-mail: drghazalashaireen@gmail.com

Cunningham manual Vol. III<sup>rd</sup>. The length of the FN measured by tailor’s tape (mm).

- a) Length of FN at petrosal segment of temporal bone was measured at the entry into internal auditory Mead us to the superior semicircular canal.
- b) Length was measured from geniculate ganglia to processes cochlearformis
- c) Length was measured from geniculate ganglia processes cochlearformis.
- d) Length was measured from medical wall of tympanic cavity where nerve runs vertically down words in the posterior wall if tympanic cavity to stylomastoid foramen.
- e) Length of nerve stapedius (distance was measured from geniculate ganglia)
- f) Length of nerve at the level of branching of chorda tympani

Duration of study was from June 2016 to March 2021.

**Statistical Analysis**

Mean values of various segments were calculated by measurement. The statistical data was carried out in SPSS software.

**OBSERVATION AND RESULTS**

Table 1 shows mean values of FN at different segments of temporal bone: 7.92 (standard deviation [SD] ± 1.22) petrous part, 3.5 (SD ± 0.42) at labyrinthine part, 12.14 (SD ± 0.38) tympanic part, 12.26 (SD ± 1.88) at mastoid part, 15.78 (SD ± 0.52) nerve to stapedius, and 19.08 (SD ± 0.68) chorda tympanic branch.

In Table 2, present findings of variations of FN are compared with the previous studies.

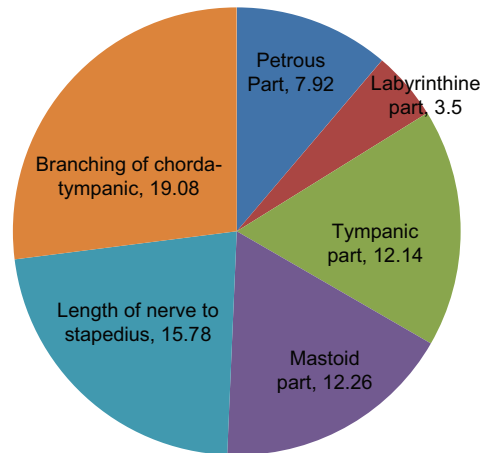
**DISCUSSION**

The present study of variations in the length of FN 7.92 (SD ± 1.22) was in petrous part, 3.5 (SD ± 0.42) in labyrinthine part, 12.14 (SD ± 0.38) in tympanic part, 12.26 (SD ± 1.88) in mastoid part, 15.78 (SD ± 0.52) was nerve to stapedius, 19.08 (SD ± 0.68) chorda tympani branch [Table 1]. These finding are more or less in agreement with the previous studies.<sup>[5-7]</sup>

The probable reason for these variations in FN could be different morphological elements of temporal bone, namely, petromastoid, tympanic, squamous, and styloid process, FN being the nerve of II<sup>nd</sup> pharyngeal arch runs behind the cartilaginous bars of I<sup>st</sup> and II<sup>nd</sup> arch (which are typically arranged) to innervate muscles of facial expression.<sup>[8]</sup> Moreover during development, motor axons

**Table 1: Mean values of facial nerve in various segmental of temporal bone**

Segments	Mean value (in mm)
Petrous part	7.92 (SD±1.22)
Labyrinthine part	3.5 (SD±0.42)
Tympanic part	12.14 (SD±0.38)
Mastoid part	12.26 (SD±1.88)
Length of nerve to stapedius	15.78 (SD±0.52)
Branching of chorda tympanic	19.08 (SD±0.68)

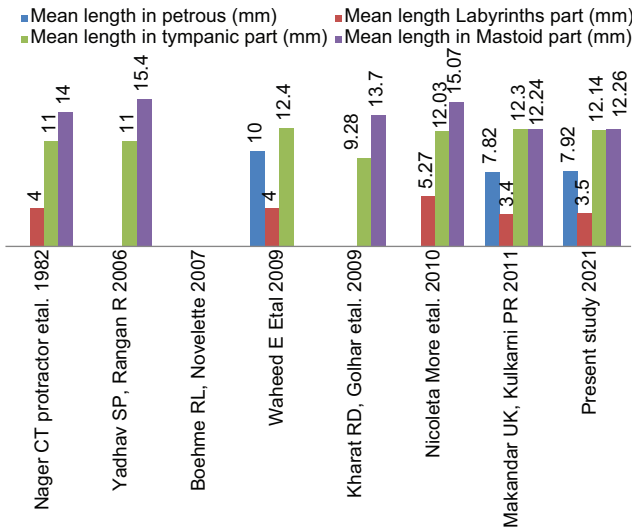


of the arches undergo an intricate feat of path findings to reach their target muscles. These pathways are regulated by some chemoattractants and chemorepulsants produced by mesenchyme. If there is any altered expression of these agents it may lead to variations in length of FN.<sup>[9]</sup>

Developmentally chondrified otic capsule stops its ossification and forms a canal to give space for FN and vestibule cochlear nerve which will later ossified into petrosal part on temporal bone vestibule cochlear nerve has limited distribution but FN has to innervate muscles of facial expression by torturous journey. Moreover, the variation of FN in temporal bone is due to dual ossification of temporal bone, that is, partly cartilaginous and partly membranous. Rate of bone growth and maturation is influenced not only by age and sex but also from socioeconomic status, individual body weight plays a key role in the maturation of bone growth by varying its length. Regional and racial factors also play contributory role in the maturation of bony elements. Hence, morphometric values of mesodermal derivatives are uncertain. Thus, uncertainty leads to variations in the length of FN in gorilla and man. In gorilla, it is rudimentary and medially placed but in human, it is shifted laterally filled prominent process which is filled with more amount of pneumatization to act against antigravity movements of skull and to adopt erect posture by displacing the course of FN,<sup>[10]</sup> which resulted into variations in length. Hence, these values of variations

**Table 2: Comparison of the present study with the previous studies at different places**

Name of the worker with year	Place of study	Mean length in petrous (mm)	Mean length in labyrinths part (mm)	Mean length in tympanic part (mm)	Mean length in mastoid part (mm)
Nager CT protractor <i>et al.</i> , 1982	European	--	3-4	8-11	10-14
Yadhav SP, Rangan R, 2006	North India	--	--	11-1 (SD±0.8)	15.4 (SD±2.34)
Boehme RL, Novelette, 2007	Spain	--	--	--	13.3 (SD±1.43)
Waheed <i>et al.</i> , 2009	Iraq	5-10	3.5-4	12.4 (SD±0.45)	--
Kharat <i>et al.</i> , 2009	Maharashtra	--	--	9.28	13.7
Nicoleta <i>et al.</i> , 2010	Roman	--	3.74-5.27	9.15-12.03	11.23-15.07
Makandar and Kulkarni, 2011	South India	7.82 (SD±0.27)	3.4 (SD±0.9)	12.3 (SD±0.7)	12.24 (SD±0.38)
Present study, 2021	North Karnataka	7.92 (SD±1.22)	3.5 (SD±0.42)	12.14 (SD±0.38)	12.26 (SD±1.88)



of FN in the different regions of India and abroad might be rooted back to their ancestors.<sup>[11]</sup> However, these variations in the length of FN have surgical anatomical and anthropological importance.

### SUMMARY AND CONCLUSION

The variations in the length of FN will be useful for maxillofacial, ENT, neurosurgeon, radiologist, clinician, anatomist, and anthropologist because these variations indicate the regional significance apart from surgical importance but this study demands further embryological, genetic, nutritional, and environmental studies because exact mechanism and factors which cause variations in length of FN are still unclear.

The highest branch is 19.08 (SD±0.68) chorda tympani and the least branch was given 3.5 (SD±0.42) at labyrinthine part of temporal bone.

### REFERENCES

- Davis RA, Anson BJ. Surgical anatomy of the facial and parotid gland based upon a study of 350 cervico-facial halves. *Surg Gynaecol Obstet* 1956;102:385-412.
- Katz AD, Catalano P. The clinical of the various anastomotic of facial nerve report of 100 patients. *Arch Otolaryngol Head Neck Surg* 1987;113:959-62.
- Kopuz C, Targut S. Distribution of facial nerve in parotid gland: Analysis of 50 cases. *Ocujimas Folio Anat Jpn* 1994;70: 295-9.
- Larian B. Parotidectomy for benign parotid tumours otolarang. *Clin North Am* 2016;49:395-413.
- Yadhav SP, Ranga A. Intra temporal facial nerve. *Indian J Otolaryngol Head Neck Surg* 2006;58:27-30.
- Nager GT, Protractor B. Facial canal normal anatomy variation and anomalies. *Ann Otol Rhinol Laryngeal Suppl* 1982;97:45-61.
- Makandar UK, Kulkarni PR. Variations in length of facial Nerve in the segments of temporal bone of male cadavers in South Indian Region. *Ind J Forensic Med Toxicol* 2012;6: 86-9.
- Frazer JE. Development of earthen bone. In: *Anatomy of Human Skeleton*. 3<sup>rd</sup> ed., Vol. 40. Gloucester Place Port Man Square: London Publication, Churchill; 1933. p. 212-7.
- Larsen WJ. *Human Embryology Innervations of Developing Limb Bud and Arches*. 4<sup>th</sup> ed. Philadelphia, PA: Churchill Living Stone; 1993. p. 640-3.
- Luca AP. A re-examination of presumed Neanderthals like fossils. *J Human Eval* 1979;7:619-36.
- Raghavan P, Sethi K. Invasion of Aryans Presumption Expert Chitlee. *Tribunae News Service*; 2021. Available from: <http://www.tribnaeindia.com/2004-1103/chd.html>. [Last accessed on 2021 Feb 24].

**How to cite this article:** Shaheen G, Sylvia S. Variations in the Length of Facial Nerve in Temporal Bone of Male Cadavers of North Karnataka. *IJSS Journal of Surgery* 2021;7(5):33-35.

**Source of Support:** Nil, **Conflict of Interest:** None declared.