Salivary nerve growth factor related to painful temporomandibular disorders: a case-control study

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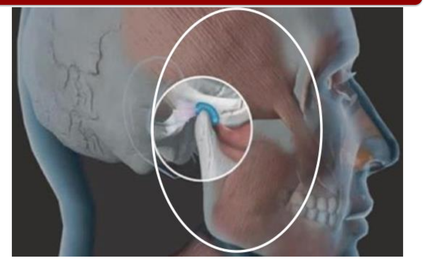
Introduction

Temporomandibular disorders (TMDs) are the second most commonly occurring musculoskeletal disorders. Approximately 5-12% of the United States population is thought to be affected by painful TMDs.[1] Painful TMDs are characterized by pain in the muscles of mastication, the temporomandibular joint (TMJ), or both.[2]



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Aim

The aim of this study was to identify salivary NGF as a marker of TMD-related pain. More specifically the aim was: 1) Assess whether there is a significant difference between NGF levels between TMD-related pain cases and controls; and 2) Evaluate whether pain severity is associated with NGF levels.

Methods

Study Design and Population. 129 TMD-related pain cases and 102 controls without TMD were recruited from the National Institute of Dental and Craniofacial Research's TMJ Implant Registry and Repository (NIDCR's TIRR).

NIDCR's TIRR Database. This database includes clinical data, biological specimens and historical information of participants with TMD and controls. Trained examiners performed a comprehensive diagnostic examination. The diagnosis of TMD pain was determined by clinical examination using a modified Craniomandibular Index (CMI)[3] wherein the CMI exam items were redesigned to conform precisely to those specified for the Research Diagnostic Criteria.[4] Individuals completed a few questionnaires to assess pain intensity, pain duration, pain frequency, and demographics. Five ml of unstimulated whole saliva was collected from individuals. Samples were assayed for biochemical content using commercially available ELISA kits (NGF Emax® ImmunoAssay System, Promega, Madison, USA).

Statistical Analysis. ANOVA, Student's t-test, chi-square, Pearson correlation and multivariate linear regression analyses were used to compare the continuous and categorical variables between study groups and to determine the degree of association between NGF and TMD-related pain (SAS version 9.2).

Results

Among the total population most of the 129 TMD participants (49%) and 102 controls (29%) were females. TMD cases were older (mean=42) compared to controls (mean=34, $P < 0.0001$). The mean worst pain intensity in the last 6 months was 3.6 (NRS: 0-10, SD= 3.91) and unpleasantness was 4.4 (SD=3.06) (Figure 1).

TMD pain (TMD mean=280.98 vs. controls mean=290.97 pg/ml, P=0.79), disc displacement (DD)/osteoarthritis (P=0.48) and myofascial pain (P=0.93) were not related to salivary levels of NGF (Figure 2). Pain frequency (P = 0.45) was also unrelated to NGF levels (Figure 3).

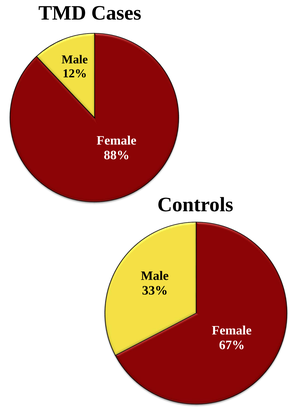


Figure 1.

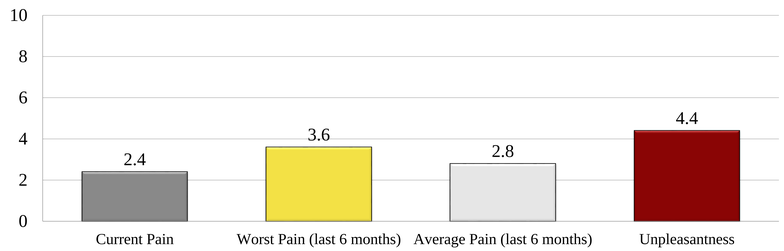
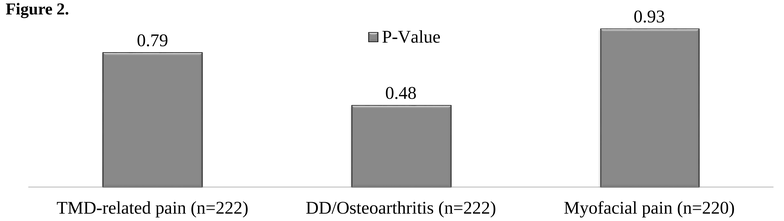
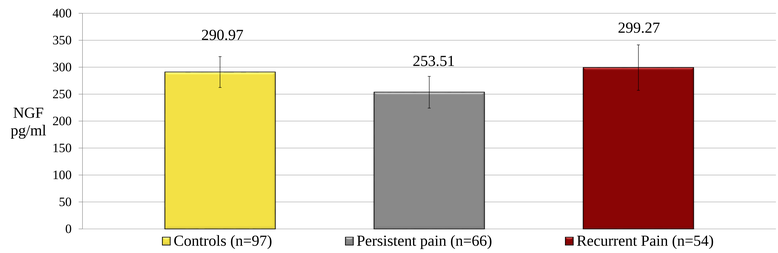


Figure 2.



* $P < 0.05$

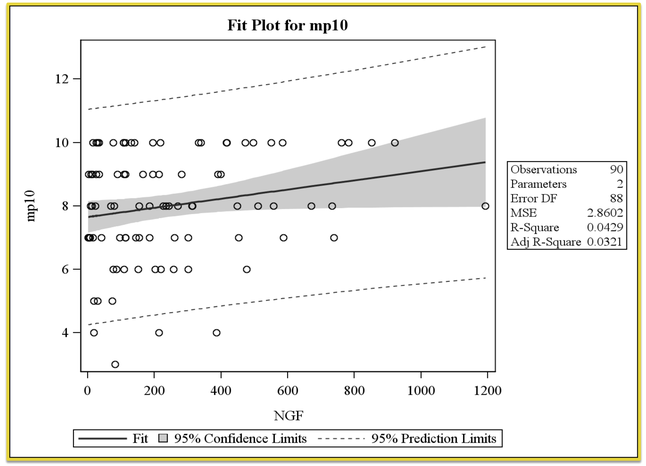
Figure 3.



Results

In the linear regression analysis, we assessed whether NGF levels are related to pain intensity (mp10 – "How would you rate the worst pain in the past 6 months?"). Our results show that moderate to severe chronic pain intensity (≥4, 0–10 NRS) was positively associated with NGF levels (β=0.001, r= 0.21, P= 0.05), among TMD cases with moderate to severe pain (n=90) (Figure 4).

Figure 4.



Conclusion

The current study demonstrates that high levels of NGF are associated with moderate to severe TMD-related pain, regardless of patients' age, gender, and diagnosis. Identifying the relationship between painful TMD and biomarkers may lead to a better understanding and management of TMD-related pain.

References

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NIDCR National Institute of Dental and Craniofacial Research