

# Sensibility threshold in patients with masticatory muscle pain

Qiufei Xie and Göran Hampf

School of Stomatology, Beijing Medical University, Beijing, People's Republic of China, and Facial Pain Clinic, Institutes of Dentistry, University of Helsinki, Helsinki, Finland

Xie Q, Hampf G. Sensibility threshold in patients with masticatory muscle pain. *Acta Odontol Scand* 1994;52:33-35. Oslo. ISSN 0001-6357.

Sensibility and pain thresholds were measured in 27 patients with myofascial pain and craniomandibular disorders and in 19 controls. A monopolar electric stimulator with increasing direct current values was used to record pain and sensibility thresholds in the lower incisors. Patients with myofascial pain had a tendency towards lower sensibility and lower pain thresholds than the controls, although the differences were not statistically significant. □ *Facial pain; sensory thresholds; temporomandibular joint syndrome*

Qiufei Xie, Institute of Dentistry, Facial Pain Clinic, University of Helsinki, Mannerheimintie 172, SF-00300 Helsinki, Finland

One of the commonest disorders of the masticatory system is myofascial pain (1). Masticatory myofascial pain seems to have a complicated and multifactorial etiology, which sometimes has been supposed to be related to a decrease in sensibility threshold (2). Patients with chronic orofacial pain have been shown to have a pain-prone personality, to have depressive disorders more frequently, and to have a lower sensibility threshold than patients with no pain (3-6). Patients with pain in their masticatory muscles more often have different life stressors than patients with no pain (5). Stressful events may cause hyperalgesia even in non-pain patients (6). Animal models have also shown that stress can cause hyperalgesia (7-9).

The aim of this study was to determine whether patients with myofascial pain and craniomandibular disorders differ from controls with no pain in terms of their sensibility and pain thresholds.

## Materials and methods

Twenty-seven patients (3 men 24 women) aged between 23 and 76 years (mean age, 45.8 years) were examined in this study. They had pain in their masticatory muscles with or

without temporomandibular joint (TMJ) derangements. Nineteen controls (3 men and 16 women) aged between 27 and 81 years (mean age, 47 years) with no pain and no signs of internal TMJ derangements were randomly chosen and asked to participate voluntarily in a sensibility and pain threshold test.

The patients and the controls were clinically examined before the test by an oral surgeon specializing in TMJ dysfunction treatment. The patients were diagnosed on the basis of the following main criteria: masticatory muscle tenderness with or without palpable TMJ tenderness, limitation of maximum jaw opening or deviation on opening, and pain increased by mandibular function movement. Other factors affecting the pain situation of the patients, such as medication, were also recorded, and the patients had no ongoing treatment affecting pain. The degree of wear of the lower incisors as a matching factor, in addition to age and sex, was also recorded.

Monopolar stimulation was provided by a direct current tooth stimulator with increasing values (10-15). The duration of the electric pulse was 10 msec, and the stimulus intensity could be varied from 0 to 200  $\mu$ A. The resistance between the electrodes was

checked during each investigation to be between 0.5 and 5 M $\Omega$ . The negative electrode of the stimulator was placed on the incisal surface of a vital anterior lower incisor isolated with a celluloid strip. The other electrode was placed in the patient's hand. The sensibility threshold (the minimum current intensity producing a sensation) and the pain threshold (the current producing a pain sensation) were recorded. Measurements were made 10 times for each subject with an interval of more than 10 sec between; the mean value was calculated for each subject.

The statistical analysis was performed by using the *t* test at a significance level of 5%.

## Results

The differences in age and sex of the patients and the controls were not statistically significant. No subject in the two groups studied had advanced wear into the dentin of the lower incisors. The mean sensibility and pain thresholds for the patients were 5.1  $\mu$ A (SD, 2.7  $\mu$ A) and 9.0  $\mu$ A (SD, 5.9  $\mu$ A), respectively; the corresponding values for the controls were 5.8  $\mu$ A (SD, 2.5  $\mu$ A) and 9.3  $\mu$ A (SD, 4.5  $\mu$ A), respectively (Fig. 1). The mean sensibility and pain thresholds of pain

patients were lower than those of the controls, although the difference between the two groups did not reach statistical significance.

## Discussion

Patients with psychosomatic disorders and/or actual stress in their daily life may develop a decreased sensibility threshold, which is often seen in patients with depressive disorders; this general decrease seems to be of central origin (2, 5, 16–19).

In a normal population the pain threshold is usually stable. In the present study there was only a slight difference in the pain threshold level between the patients and controls, but the difference in sensibility threshold was greater. As not only the individual variation in terms of the sensibility threshold but also the standard deviation within the two groups showed a large variation, we can assume that this may be one of the reasons statistical significance was not reached. On the other hand, particularly when we deal with psychosomatic disorders we often find that statistical and clinical significance tend to be two different things.

Patients with well-defined myofascial facial pain usually have a slight mental disorder like the patients in this study, whereas patients with widespread diffuse pain frequently have more severe mental disorders, commonly depression (3). There have been investigations showing that the degree of mental disorder often correlates with a decreased sensibility threshold, the more mentally disturbed showing a lower sensibility threshold than the less mentally disturbed (3, 4).

Treatments aiming to reduce the stressful situation, like relaxation training, massage, or other 'soft' therapies, and therapies aiming to improve the coping strategies may contribute to a normalization of the thresholds. Short therapies with clonazepam or amitriptyline, which affect the total pain input, may also be useful in addition to the conventional dysfunction treatments. Careful assessment of the patients is, however, most important when planning the therapy.

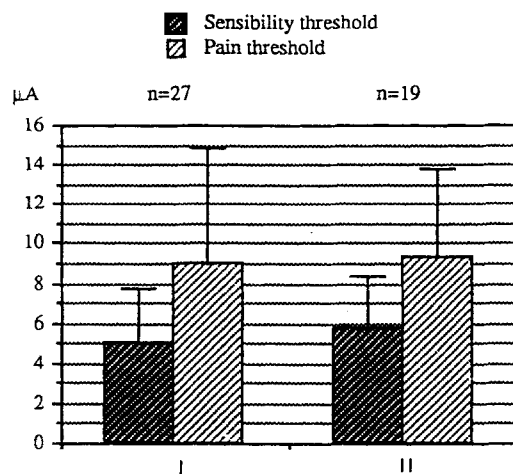


Fig. 1. Mean and SD for the two groups. I = patients with craniomandibular disorders; II = controls with no pain.

## References

1. Helkimo M. Epidemiological surveys of dysfunction in the masticatory system. *Oral Sci Rev* 1976;7:54-69.
2. Bush FM, Whitehill JM, Martelli MF. Pain assessment in temporomandibular disorders. *J Cranio-mandib Pract* 1989;7:137-43.
3. Hampf G, Aalberg V, Ekholm A, Vikkula J. Sensibility threshold in depressive and non-depressive patients with chronic pain. *Anesth Prog* 1988;35:152-4.
4. Hampf G, Ekholm A, Salo T. Sensibility threshold, mental health and endocrine markers in patients with chronic pain. *Int J Psychosom* 1989;36:37-40.
5. Olkinuora M. Bruxism as a psychosomatic phenomenon [thesis]. Helsinki: University of Helsinki, 1972.
6. Hampf G. Hypersensitivity due to stress. *Anesth Progr* 1989;36:265-7.
7. Vidal C, Jacob J. Stress hyperalgesia in rats: an experimental animal model of anxiogenic hyperalgesia in human. *Life Sci* 1982;31:1241-4.
8. Vidal C, Jacob J. Hyperalgesia induced by non-noxious stress in the rat. *Neurosci Lett* 1980;32:75-80.
9. Vidal C, Jacob J. Hyperalgesia induced by emotional stress in rat: an experimental animal model of human anxiogenic hyperalgesia. *Ann NY Acad Sci* 1986;467:73-81.
10. Chapman CR, Casey KL, Dubner R, Foley KM, Gracely RH, Reading AE. Pain measurement: an overview. *Pain* 1985;22:1-31.
11. Mumford JM. Pain threshold of normal human anterior teeth. *Arch Oral Biol* 1963;8:493-501.
12. Mumford JM, Bowsher D. Pain and protopathic sensibility. A review with particular reference to teeth. *Pain* 1976;2:223-43.
13. Mumford JM, Stanley SJ. Sensations on stimulating the pulps of human teeth, thresholds and tolerance ratio. *Pain* 1981;10:391-8.
14. Närhi M, Virtanen A, Kuhta J, Huopaniemi T. Electrical stimulation of teeth with a pulp tester in the cat. *Scand J Dent Res* 1979;87:32-8.
15. Virtanen ASJ. Electrical stimulation of pulp nerves—comparison of monopolar and bipolar electrode coupling. *Pain* 1985;23:279-88.
16. Charney DS, Heninger GR, Hafsted KM, Capelli S, Redmond DE Jr. Neurobiological mechanisms in human anxiety: recent clinical studies. *Psychopharm Bull* 1983;19:470-5.
17. Pertovaara A, Huopaniemi T, Aukee K. Tooth pulp-evoked jaw-opening reflex in the cat. Evidence for central facilitation induced by noxious discharge in the intradental nerve fibres. *Exp Neurol* 1986;92:207-21.
18. Lehtinen V, Väisänen E. Psykiatrisen sairastuvuus ja hoidon tarve Suomessa [Psychiatric morbidity and need for psychiatric treatment in Finland]. Helsinki: Kansaneläkelaitoksen julkaisuja (Social Insurance Institution of Finland); 1979. AL:12.
19. Väisänen E. Mielenterveyden häiriöt Suomessa [Psychiatric disorders in Finland]. Kansaneläkelaitoksen Julkaisuja (Social Insurance Institution of Finland); 1975. AL:2.

Received for publication 27 April 1992

Accepted 4 June 1993