

Recurrent headaches in relation to temporomandibular joint pain-dysfunction

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Magnusson, T. & Carlsson, G.E. Recurrent headache in relation to temporomandibular joint pain-dysfunction. *Acta Odontol Scand* 36, 333–338

Two groups of 80 patients, one referred because of mandibular dysfunction and one seeking dental treatment, completed questionnaires concerning recurrent headaches. The function of the masticatory system of all patients was afterwards examined clinically.

The investigation showed that clenching of teeth was correlated to the severity of headache. The frequency and severity of headache varied also with the severity of mandibular dysfunction. Of the variables included in the dysfunction index, only masticatory musculature painful to palpation was found to have a distinct relationship to headaches. This implies that functional treatment is indicated in patients with headaches and tenderness of the masticatory musculature. Functional examination of the masticatory system should therefore be included in investigations of recurrent headaches.

Key-words: Temporomandibular joint syndrome; bruxism; headache

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Headaches are commonly experienced symptoms and the etiological factors are many. The existence of an association between functional disorders of the masticatory system and headaches have been documented in several clinical and epidemiological investigations (for review see 15). The association is reinforced by longitudinal studies, which have shown that the headache can be alleviated by treatment directed towards conditions within the stomatognathic system (2, 3, 5, 6).

This paper deals with a further analysis of data on two groups of patients examined

with respect to recurrent headaches and temporomandibular joint (TMJ) pain-dysfunction symptoms. The previously published results (15) showed that 70 % of the patients with TMJ disorders and 34 % of those seeking dental treatment had recurrent headaches. Of the dental patients, 36% had clinical signs of functional disturbances of the masticatory system. The purpose of this continued analysis was to elucidate the relation between headaches and self-reported symptoms and clinically registered findings of TMJ pain-dysfunction.

MATERIAL AND METHOD

Two groups of patients, each consisting of 80 patients, attending the Odontologic Clinic, University of Göteborg, were requested to fill in a questionnaire containing questions on recurrent headaches. One of the groups had been referred to the Department of Stomatognathic Physiology because of TMJ pain-dysfunction/mandibular dysfunction (hereafter called TMJ patients), while the other groups had sought advice at the Department of Oral Diagnosis for dental treatment (dental patients). In all the patients the functional state of the masticatory system was also examined by one and the same dentist, who was working at both departments during the period covered by the investigation. The composition of the clinical material, the design of the investigation and the methods used have been described previously (15). The functional state of the masticatory system was evaluated by recordings of reported symptoms according to the "anamnesic dysfunction index", A_i (9), and of *clinical* findings according to the "clinical dysfunction index", D_i (9). The state of the dentition was assessed according to the Eichner index (8) as well as to a modification of the Eichner index (19). The original Eichner index (8) is based upon occluding tooth contacts in the lateral segments of the upper and lower jaws which are divided in 4 supporting zones (one each for the left and right molar and premolar regions, respectively). The criteria for the index are presented in Table 1. The modification used (19) also incorporated fixed and removable prostheses in the index.

On the basis of the patients' answers about the frequency and severity of headaches an index, hereafter called the *headache index*, was constructed as follows.

1. headache $\geq$ twice a month: fairly severe – severe.
2. headache $<$ twice a month: fairly severe – severe

3. headache $\geq$ twice a month: moderate – mild
4. headache $<$ twice a month: moderate – mild
5. no headache

The index distribution is given in Table 2. Finally the material was divided into two groups according to the clinical dysfunction index, D_i (9): one group with an index value of 0 or I (little or no dysfunction) and one with an index value of II or III (moderate or severe dysfunction). The groups were studied for any differences as to the variables studied as were the variables for any interdependence.

Statistical methods

Non-parametric correlation analysis according to Spearman (r_s) and, in some cases, Fisher's and Pittman's permutation tests were used (17, 21). The levels of significance used were as follows:

- N.S. $0.05 \leq p$
 * $0.01 \leq p < 0.05$
 ** $0.001 \leq p < 0.01$
 *** $p < 0.001$

The numerical calculations were performed at Göteborg Computer Centre.

RESULTS

Patients with frequent headaches had a significantly higher clinical dysfunction index than did those who reported less frequent headaches ($p < 0.001$). No correlation was found between frequency of headache and age, nor between frequency of headache and state of dentition. The patients' opinions on the severity of their headaches agreed well with the clinical dysfunction index ($p < 0.001$).

Table 1. *Criteria for the Eichner index*

Index group	Criteria
A ₁₊₂₊₃	Occluding tooth contacts in all 4 supporting zones. Subgroups due to loss of teeth within supporting zones.
B ₁	Occluding tooth contacts in 3 supporting zones
B ₂	» » » 2 » »
B ₃	» » » 1 » zone
B ₄	Occluding tooth contacts only in the incisor region
C ₁	Teeth in both jaws but no occluding tooth contacts
C ₂	Teeth only in one jaw
C ₃	Edentulous in both jaws

The correlation between state of dentition and age was strong ($r_s = 0.73$; $p < 0.001$), but no correlation was found between state of dentition and clinical dysfunction index, nor between age and clinical dysfunction index.

The relation between the headache index and other variables studied is given in Table 3. A significant correlation was found with the clinical dysfunction index ($p < 0.001$). The TMJ patients reported more frequent and more severe headaches than did the dental patients ($p < 0.001$). In both groups the women reported more frequent and more severe headaches than did the men ($p < 0.05$).

The headache index correlated significantly with both the "anamnesic dysfunction index" and the habit of clenching the teeth ($p < 0.001$). No correlation was found between the headache index and grinding of teeth.

On division of the material into two groups according to the severity of the clinically recorded mandibular dysfunction — D₁O or I = little or no dysfunction, and D₁ II or III = moderate or severe dysfunction — headaches were more frequent, and both headache index and the "anamnesic dysfunction index" was higher, in the latter group ($p < 0.001$). The frequency of headaches in the dysfunction groups is given in Fig. 1. Clinical dysfunction index II or III was more

Table 2. *Percentage distribution of 160 patients according to frequency and severity of recurrent headaches. Headache index; 1: $\geq$ twice a month/fairly severe — severe; 2: $<$ twice a month/fairly severe — severe; 3: $\geq$ twice a month/moderate — mild; 4: $<$ twice a month/moderate — mild; 5: no headache*

Headache index	Men	Women	Total
1	11	16	13
2	1	5	3
3	9	17	14
4	21	23	22
5	58	39	49

Table 3. *Correlation between headache index and other variables studied. r_s = coefficient of rank correlation according to Spearman. p denotes level of significance*

Variable	r_s	p
Patients (TMJ group/dental care group)	0.38	***
Clinical dysfunction index, D _i	- 0.37	***
Anamnesic dysfunction index, A _i	- 0.29	***
Clenching of teeth	0.29	***
Sex (Men/Women)	- 0.20	•
State of dentition	0.14	N.S.
Grinding of teeth	0.08	N.S.

common among the TMJ patients than among the dental patients ($p < 0.001$). The frequency of women with a clinical dysfunction index of II or III was higher than that for the men ($0.01 \leq p < 0.05$). No correlation was found between any of the parafunctions (clenching or grinding of the teeth) and the degree of clinical dysfunction.

In order to ascertain whether any particular variable of the clinical dysfunction index was mainly responsible for the correlation between the frequency of headaches and functional disturbances of the masticatory system, each of the five components of the index was studied separately for any covariation with the frequency of headaches. The frequency distribution of the values found for the different components in the respective groups of patients and in the entire material is given in Table 4.

Statistical analysis showed that the frequency of muscle pain ($p < 0.001$) and that of TMJ pain ($0.01 \leq p < 0.05$) correlated significantly with that of headaches. None of the other three variables showed any significant correlation with the frequency of headaches. An analysis of the relation between muscle pain and headaches after elimination of the effect of TMJ pain gave the same high levels of significance. A corresponding analysis of TMJ pain after elimination of the effect of muscle pain showed no significant correlation with headaches.

DISCUSSION

A correlation between frequency of headaches and functional disturbances of the masticatory system has been shown by many authors. It was also found in the present material. This investigation also showed a significant correlation between the patients' opinion of the severity of the headache and the degree of clinically recorded TMJ pain-dysfunction. The correlation with

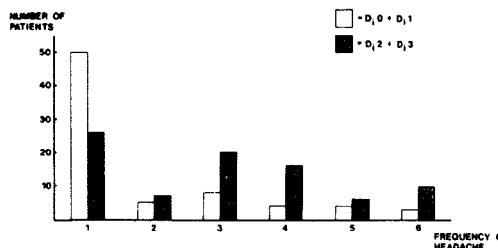


Fig. 1. Distribution of patients between two clinical dysfunction groups ($D_i 0 + I$ and $D_i II + III$) according to frequency of headache; 1 = never or hardly ever, 2 = occasionally or a few days a year; 3 = once or twice a month; 4 = several times a month; 5 = several times a week; 6 = daily.

TMJ pain-dysfunction remained unchanged when the severity of the headache was added to the frequency of the symptom. This may be explained by the assumption that the patient's opinion of the severity of the headache is substantially influenced by the frequency of the symptom, i.e. there is a close covariation between the patient's opinion of the severity and the frequency of a headache.

Opinions differ as to whether the prevalence of headaches increases or decreases with increasing age (4, 12). In the present material no correlation between these variables was demonstrable, neither was any correlation found between age and the clinical dysfunction index. Nor have epidemiological studies revealed any noteworthy variation of the frequency of symptoms of dysfunction with age (10).

The patients' state of dentition, judged according to Eichner's zones of support (Table 1) showed no correlation with the severity of TMJ pain-dysfunction or of headaches, which is surprising in the light of the importance generally attached to a stable occlusion. This might perhaps be explained by the wide range of interindividual variation of adaptability of the masticatory system. In one individual a trivial occlusal interference may be capable of causing symptoms of dysfunction, while in another

Table 4. *Percentage distribution of components of clinical dysfunction index, D_i , in the two groups of patients and in entire material*

Variable	TMJ patients			Dental patients			Total		
	Degree of dysfunction								
	none	mild	severe	none	mild	severe	none	mild	severe
Impaired mandibular mobility	73	25	3	65	26	9	69	26	6
Impaired TMJ function	18	73	10	31	66	3	24	69	6
Muscle pain	15	23	63	44	25	31	29	24	47
TMJ pain	71	15	14	91	6	3	81	11	8
Pain on movement	78	14	9	95	5	0	86	9	4

patient even considerable disturbances of the occlusion may produce no symptoms of dysfunction at all (7, 13). In population studies it has also been difficult to find a distinct influence of dental status on findings of TMJ dysfunction (10, 11).

The relation between the severity of headaches and clenching of teeth was significant, but no such correlation was found for grinding of teeth which thereby corroborated the conclusion of a recent paper (4). One explanation to the lack of correlation, as for the difference in frequency between grinding and clenching of the teeth reported in an earlier paper (15), may be that grinding often occurs during sleep. In the day-time clenching of the teeth is much more common than grinding (1). The patient is then less aware of the parafunction in the form of grinding than of clenching the teeth. It should be noted that the variables clenching and grinding of teeth only refer to self-reported symptoms. No attempts were made in the present investigation to include any clinical registration of and distinguish between clenching and grinding.

The significance of bruxism in the cause of functional disturbances of the masticatory system has been pointed out by many authors (6, 18, 20). A patient with a clinical dysfunction index of II or III would be expected to have severe functional disturbances of the masticatory system. A comparison

between these patients and patients with a clinical dysfunction index value of 0 or I showed that the former had more severe headaches. On the other hand, no differences were found between these groups in grinding or clenching of the teeth. Similar observation was made in a group of young Swedish men (16). This is surprising since pain and dysfunction are often described as consequences of bruxism. But as people are not always aware of these parafunctions it is difficult to analyse their influence on the stomatognathic system.

Three of the five components of the clinical dysfunction index (mandibular mobility, function of TMJ and pain on movement of the mandible) showed no correlation with the frequency of headaches. There was a correlation between TMJ pain and headaches, but only in combination with muscle pain. When the influence of muscle pain was eliminated the correlation was no longer identifiable. Of the components of the dysfunction index, tenderness of the masticatory musculature to palpation was thus the most reliable indicator of headaches being related to functional disturbances of the masticatory system. Tenderness of the m. temporalis has also been found to be associated with muscular hyperactivity (14).

Headaches are very common symptoms and, as pointed out above, they are caused

by various reasons. As in previous investigations, a correlation was, however, found between headaches and TMJ pain-dysfunction. Examination of the masticatory system particularly for tenderness of masticatory muscles to palpation, should therefore be included in all investigations of headaches. If such tenderness is found in a patient with recurrent headaches, functional treatment of the masticatory system is indicated. Tension and hyperactivity of the muscles in the face and the head can contribute both to tension headache and to functional disturbances of the masticatory system. And pain in the masticatory muscles and the TMJs can be conceived by the patient as headache. In both cases adequate functional therapy of the masticatory system may contribute to alleviation or disappearance of the pain.

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