Signs and symptoms of mandibular dysfunction in patients with suspected oral galvanism

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Fifty-four consecutive patients were examined by means of a self-administered questionnaire with questions related to general health and subjective symptoms. In addition, a clinical stomatognathic evaluation was carried out including palpation of the temporomandibular joints (TMJ) and the masticatory muscles and functional analysis of occlusion and mandibular mobility. High frequencies of general diseases were reported. The dominant subjective symptom was headache (62%), which often appeared daily. Symptoms such as pain from the teeth, pain in the face/jaws, and burning sensations in the tongue or oral cavity all appeared in more than half of the sample. The patients were frequently aware of parafunctions such as clenching of the teeth and tongue press. None of the investigated persons were completely free of clinical signs of dysfunction. The most frequent clinical finding was palpation tenderness in the masticatory muscles (96%), generally located in the masseter, temporal, and lateral pterygoid muscles. In more than half of the material TMJ findings were recorded, and more than one-third had TMJ pain. In 35% mandibular mobility was reduced. Occlusal interferences on retrusion and on the mediotrusion side were frequent findings. Impaired general state of health and multiple signs and symptoms of mandibular dysfunction were thus frequent findings in these polysymptomatic patients. Three-fourths of the patients needed treatment for mandibular dysfunction, indicating that great consideration must be made for the functional status of the masticatory system in clinical evaluation of so-called 'oral galvanists'. □ *Clinical study; oral medicine; questionnaire; temporomandibular joint syndrome*

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The polysymptomatic description given by persons who believe they have 'oral galvanism' is often difficult to interpret and relate to the clinical signs of a specific disease. The description often includes both local symptoms from the oral cavity (1) and more distant symptoms from different parts of the whole human body (2–4).

The commonest local symptoms reported have been burning and smarting sensations in the mouth in approximately 70% (3, 5). Distant symptoms of various kinds have been claimed to appear in persons with 'oral galvanism' (6). Reported systemic symptoms have been fatigue, backache, numbness in the extremities, visual effects, and so forth (7). The frequency of such symptoms was 47% in the study of Axéll et al. (3).

The etiology of all these symptoms is still obscure and full of beliefs. The possibility that they are related to amalgam is at the moment one of the headlines of public debate in Sweden. In addition to the proposition that different metals or mercury poisoning is responsible, it has been suggested that hyperactivity of the tongue and other parafunctions could be responsible for the local symptoms. Oral parafunctions are frequent findings in patients with mandibular dysfunction referred to departments of stomatognathic physiology (8–10).

The aim of this study was to evaluate the general health and type and location of signs and symptoms of functional disturbances in the masticatory system in a group of patients referred under the suspicion of so-called oral galvanism.

Materials and methods

Patients

The subjects consisted of 54 patients (17 men, 37 women) consecutively referred to

the Faculty of Odontology, University of Umeå, for investigation of any occurrence of 'oral galvanism'. Forty-six patients were referred by dentists and the other eight by physicians. Their ages ranged from 30 to 70 years ($\bar{x} = 49$), with no statistically significant difference between the sexes.

Evaluation methods

All patients were examined during a period of 1 year. The examination comprised two parts. The first was a general oral investigation including registration of any mucous membrane affections and salivary tests, potential and polarization measurements (11, 12), and electrogustometric measurements (13). The results of this part have been reported in an earlier paper by Johansson et al. (5).

The last part was a stomatognathic investigation, which comprised a questionnaire, an interview, and a stomatognathic examination. This part was carried out by the author.

Questionnaire. When the patients came for the examination, each received a questionnaire. The questions were so constructed that they could be answered with a yes or a no. The first part of the questionnaire concerned the general state of health, specific diseases, allergic reactions, present medication, chewing ability, and chewing side. The second part included questions about current pain and symptoms of mandibular dysfunction, their severity, localization of the symptoms, general effects of these symptoms, and parafunctional habits such as bruxism. The third part comprised the subjectively evaluated magnitude of their own nervousness, their general comfort in working life, and their comfort at home. All these evaluations were made as pencil markings on a 10-cm-long line between extremes (VAS scale).

Stomatognathic examinations. The patients' masticatory system was examined in accordance with the routine methods used at the Department of Stomatognathic Physiology. The examination included palpation of the temporomandibular joints (TMJ) and masticatory muscles as described by Carlsson & Helkimo (14) and Wänman & Agerberg (15). Tenderness to palpation was noted if the patient gave a palpebral/grimacing reaction or a withdrawal reaction. Mandibular mobility was recorded as maximal opening and maximal horizontal mobility (to the right, left, and protrusion), as described by Agerberg (16). Mobility pain and deviations were also noted. The clinical data obtained were used to calculate the clinical dysfunction index (Di) of Helkimo (17), to estimate the total degree of dysfunction in the studied patients.

The morphology and function of the occlusion were examined clinically. The distance between the retruded position (RP) and intercuspal position (IP) was recorded in accordance with Droukas et al. (18). Occlusal contacts or occlusal interferences were noted in RP and on the nonworking side.

Statistical methods

The data were analyzed by use of nonparametric statistical methods such as the chi-square test for differences between sexes. Calculations were performed in a computer at Umeå University Computer Centre, using a standard program (SPSS). *P* values exceeding 0.05 were considered not to indicate significant differences.

Results

General health

Only 28% of the patients considered their general health to be good. Men significantly more often than women ($p < 0.05$) reported that they were in a poor state of health (Table 1). Of the specific diseases, joint-muscle dis-

Table 1. Distribution of the examined population in accordance with general state of health (%)

	Men	Women	Total
Good	17	33	28
Less good	39	53	48
Poor	44	14	24

Level of significant difference $p < 0.05$

Table 2. Distribution of reported general diseases (%)

	Men	Women	Total
Heart or vessel disease	17	6	9
Joint-muscle disease	33	47	43
Stomach disease	28	22	24
Skin disease	22	17	19
Allergic/sensitivity reaction	22	47	40
Other disease	6	17	13

eases were the most frequent (43%), followed by allergic/sensitive reactions (40%) (Table 2). Stomach and skin diseases were also frequently reported.

Thirty-seven per cent were taking medication, and they generally used analgesics; 19% used sedatives.

Masticatory system

Bilateral chewing was most frequently reported (44%), whereas 40% used one side and 11% the front. The chewing ability was reported as less good in 19% and bad in 4%, and 12% were not able to chew all kinds of food.

The commonest complaints from the head and masticatory system were headaches (62%) and sensitive teeth (59%) (Table 3). Pain in the face or jaws and burning/smarting sensations from the tongue or oral cavity both appeared in 57% of the individuals. Symptoms of mandibular dysfunction such as mobility pain, reduced mandibular mobility, and fatigue from the jaws were frequently reported. About one-third of the individuals thought that the most annoying symptom was pain in the face and jaws. Headache and smarting sensations in the mouth were the most troublesome symptoms for 15% and other complaints in 23%.

Table 3. Distribution of the type of symptoms (%)

Symptoms	Distribution
Headache	62
Sensitive teeth	59
Pain in the face or the jaws	57
Smarting sensation in tongue or mouth	57
TM joint sounds (clicking)	32
Fatigue in the jaws	30
Difficulties in opening wide	26
Pain on movements of the jaw	21
Difficulties in chewing	15
Luxation or locking of the joint	15
Toothache	15
Severely worn teeth	13
Other complaints	49

Table 4. Distribution of the general symptoms (A) and of headache (B) (%)

	A	B
Never/hardly ever	4	27
Once or twice a month	2	15
Once a week	11	15
Several times a week	13	14
Every day	70	29

The various subjective symptoms appeared frequently, and 70% reported daily problems (Table 4). Daily headaches were reported by 29%, and recurrent headaches (once a week or more often) by 58%. Sixty per cent had had headaches for more than 1 year.

The commonest type of pain was dull pain. This was experienced by half of the individuals, whereas 4% had sharp shooting pain, and 16% had some other type of pain. Twenty-two per cent had combinations of different types of pain. Almost two-thirds of the patients experienced their pain and symptoms as emanating from the back of the head (Table 5). Half of the patients had pains emanating from the teeth and temples. Other frequent sites were the forehead, in or near the ear, and in the cheeks. Women reported symptoms from the tongue significantly more often ($p < 0.05$) than men.

Table 5. Distribution of site of the symptoms among men and women (%)

	Men		Women	Total
Back of the head	59		67	64
Teeth	41		56	51
Temple	41		53	49
Forehead	35		47	43
In or near the ear	24		47	40
Cheek	24		44	38
Neck	35		31	32
Tongue	12	*	42	32
Top of the head	35		25	28

* $P < 0.05$.

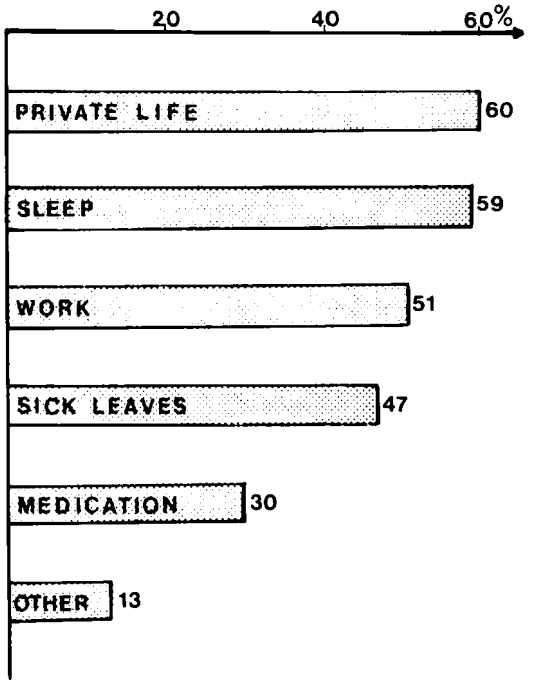

Fig. 1. Distribution of the general disturbing effects of the symptoms in the whole group of patients.

For more than half of the patients their private lives, sleep, and occupational activities were affected by the severity of the symptoms (Fig. 1).

The subjective evaluation of the severity of symptoms varied between the alternatives. Men reported severe symptoms significantly more often ($p < 0.05$) than women (Fig. 2).

When estimating their need for treatment, 38% thought they needed help immediately and 40% within the coming month. The rest were ready to wait for their turn within the forthcoming year.

Clenching was the most frequent parafunction (36%), and women were significantly ($p < 0.05$) more often aware of this than men (Table 6). Three-quarters of the individuals reported that parafunctions were more frequent when they were under stress.

On the 10-cm-long line about one-third of the patients marked that they felt various degrees of strain, nervousness, or discomfort at work or in their home life.

Clinical findings

Joints. The dominant finding at the examination of the TMJ was clicking sounds (28%); crepitation was found in 7%. Palpation tenderness over the joint appeared in 13%. The function of the joint was classified as disturbed in 57% (Table 7).

Muscles. Palpation tenderness from the

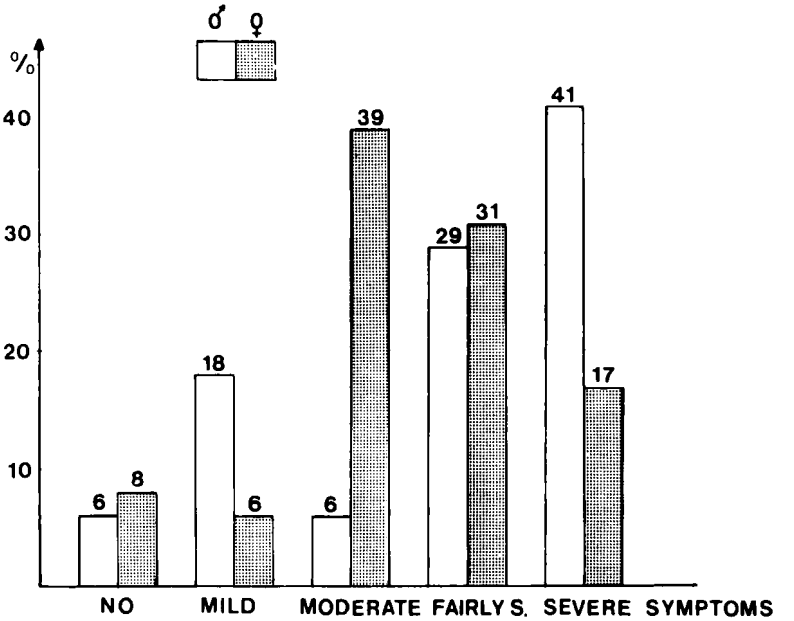

Fig. 2. Distribution of the severity of the symptoms for men and women on a 5-graded scale (alternatives: no, mild, moderate, fairly severe, or very severe symptoms).

Table 6. Distribution of oral parafunctions by sex (%)

	Men		Women	Total
Tooth clenching	18	*	44	36
Tooth grinding	6		11	9
Tongue pressing	24		14	17
Cheek-lip-tongue biting	18		14	15
Nail biting	12		17	15

* $P < 0.05$.

masticatory muscles was a frequent finding mainly related to the lateral pterygoid muscle (63%), the superficial layer of the masseter muscle (60%), and the insertion of the temporal muscle (57%). In 96% of the patients tenderness was recorded in one or more muscles (Table 7). Tenderness located to the trapezius and sternocleidomastoid muscle was found in 30% and 11%, respectively.

Mobility. The maximal vertical mobility of the mandible ranged from 33 mm to 73 mm, with a mean of 48.5 mm. Thirty-five per cent could open their mouth less than 40 mm. Mobility pain was recorded in 5% of the individuals. One-third of the patients had a horizontal deviation of more than 2 mm on vertical movements of the mandible.

On calculation of the clinical dysfunction index (Di) of Helkimo, nobody was found to be without signs of mandibular dysfunction (Fig. 3). More than half of the patients had at least one severe sign of dysfunction, and almost one-third had two or more severe signs of dysfunction.

Dental status. The dental conditions varied between complete dentitions and complete dentures. One complete and eight

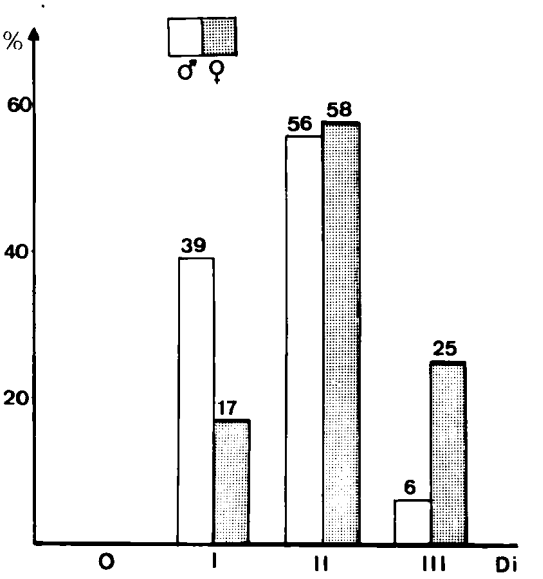

Fig. 3. Distribution by sex for the clinical dysfunction index (Di) of Helkimo.

partial dentures were recorded. Extensively worn teeth were noted in 22%. Unstable occlusion with interferences in the retruded position was found in 62%. Nonworking side interferences, mainly appearing on one side only, were found in 48%. When biting hard together on a specific tooth contact, one-third of the patients could provoke symptoms such as headache and pain. Tongue impressions were found among one third of the individuals.

Treatment. About three-quarters of the patients were judged to be in need of treatment for their symptoms and signs of mandibular dysfunction. In 56% selective grinding of the teeth was performed, and 48% were instructed in physiotherapy. Twenty-eight per cent received an occlusal splint. The results of these treatments will be followed up longitudinally and presented later.

Table 7. Percentage distribution of points for the five different signs constituting the clinical dysfunction index of Helkimo

Signs	Points		
	0	1	5
Impaired TMJ function	43	57	0
TMJ pain	61	22	17
Muscle pain	4	18	78
Impaired mandibular mobility	65	33	2
Pain on movement of the mandible	96	2	2

Discussion

The composition of the studied sample with the skew sex distribution, predominately female (ratio, 2:1), represents the normal

patient group examined and treated at stomatognathic clinics both throughout the world, as reviewed by Helkimo (19), and in the dental school in Umeå (20). A similar composition has also been found in populations with the 'burning mouth syndrome' (21).

The questionnaire used in this study has for some years been a part of the routine stomatognathic evaluation of patients referred to our clinic. It has proved to be a valuable instrument in screening their symptoms (20). The methods for functional examination of the masticatory system have long been in use as standard procedures at departments of stomatognathic physiology and in clinical research (14, 15, 22, 23).

The subjective evaluation of the severity of the symptoms and the estimation of the need for treatment and the effects on private life, sleep, and occupational activities clearly showed that the polysymptomatic patients considered themselves in a difficult situation. The anamnestic results also showed that the described polysymptomatic situation is difficult for those who should diagnose and cure it. Nearly all patients had consulted various other therapists before coming for the odontologic assessment. However, the complex symptoms of both local oral and more distant symptoms found in the present study agree with the findings in earlier studies (3, 21).

The general state of health of the present population was considerably more impaired than that found in an earlier epidemiologic study in the town of Umeå (24). Only 2% considered themselves to be in poor health in the latter study, compared with 24% in the present study. Men were in a poorer state of health than women. Correlations between general state of health and symptoms of mandibular dysfunction have been reported in both clinical and epidemiologic investigations (25).

Symptoms of specific illnesses were also found with remarkably high frequencies, indicating that there exists an overrepresentation of sick people with many symptoms in the studied group of 'oral galvanists'. The extremely high frequencies of joint/muscle disorder and allergic/hypersensitive reactions indicate that they represent a heterogeneous group of people with many different diseases and diagnostic problems. Similar findings have been reported earlier for persons with mandibular dysfunction (20, 26). The suggestion that a single factor could be responsible for all the symptoms in patients complaining of oral galvanism can therefore not be accepted.

The complex etiology is also demonstrated by the fact that the most frequent symptom recorded was headache, which can have various causes, of which muscular tension is considered to be the major one (27, 28). The frequent localization of the symptoms to the back of the head and the temples indicates that the origin could be neuromuscular and that there may be a tensional component behind many of the symptoms. An effort to evaluate psychogenic factors was made, and the results showed that not less than one-third of the sample felt strain for each of the variables nervousness and discomfort at work and at home. Several studies have provided evidence of an association between a stressed life and mandibular dysfunction (29) and somatic (30) and psychiatric disorders (31). A systematic physical evaluation of the general state of health and the psychological status therefore seems to be a necessary part of analyzing this polysymptomatic group of patients.

The most prominent oral symptoms were sensitive teeth and smarting sensations in the tongue and the mouth. As earlier presented by Johansson et al. (5), no significant differences between the studied sample and a control sample were found either for the calculated currents or the electrogustrometric threshold values or the salivary tests. Many clinical examinations of patients complaining of oral galvanism are negative, but the general oral investigation of this sample showed that 23 of the 54 patients had moderate to advanced periodontitis, which, together with the observed mucous membrane affections, may explain the relatively high frequency of burning and smarting sensations. The high frequencies of oral parafunctions such as clenching and tongue press, indicating hyperactivity in the muscles, could, in combination with wear of the lingual mucosa, also be responsible for

some of these symptoms. Axéll et al. (3) stated that hyperactivity of the tongue was a plausible explanation for the changes found at the tongue apex in 15% of their patients.

The dull type of pain generally described in combination with the frequent symptoms such as headache, sensitive teeth, pain and fatigue in the face and jaws, and opening difficulties, seen in relation to the localization of the symptoms to the temples, ear region, and the cheeks indicates that many of the patients did have a mandibular dysfunction.

The clinical findings of the stomatognathic examination showed an extraordinarily high frequency of signs of mandibular dysfunction among the studied patients. Palpation tenderness in the jaw muscles has been found to correlate with frequent headache and feeling of fatigue in the jaws (32–34). A positive effect of stomatognathic treatment in patients with mandibular dysfunction and recurrent headache has been observed in several studies (35–37).

The etiologic importance of the functional state of the occlusion for the symptoms of mandibular dysfunction is debated. Anyhow, 20% had an anterior slide of more than 1 mm, and a high frequency of non-working side interferences was found. Since one-third of the patients could provoke symptoms in the masticatory system by biting, and half the sample were unilateral chewers, it seems reasonable to adjust the occlusion by selective grinding and bite splints. Studies showing positive effects of occlusal treatment in 'galvanists' have also been presented (38, 39).

The stomatognathic treatment given to the present group of patients was primarily focused on reducing the dysfunction of the masticatory system. By relieving some of these disorders, however, it may also be possible to interpret and diagnose the remaining symptoms better. Clinical examination of the muscles, the temporomandibular joints, and the occlusion and performing the indicated stomatognathic treatment must be considered essential procedures in the diagnostic and therapeutic management of patients complaining of oral galvanism.

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