

# Self-Reported Symptoms of Stress in Finnish Patients With Craniomandibular Disorders

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*This study compared the stress reports of Finnish craniomandibular disorder patients and nonpatients by using the Symptoms of Stress Inventory as a screening device. A comparison of Finnish and American craniomandibular disorder patients' stress reports was made in the same manner. The overall stress level of craniomandibular disorder patients was higher than that of nonpatients. The patients had elevated scores on somatic subscales, with muscle tension symptoms being the most characteristic. These results are in accordance with American results. However, statistically significant differences were not found for emotional symptoms.*

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During recent years, the multifactorial etiology concept of craniomandibular disorders (CMD), which includes occlusal factors, psychological profiles, and musculoskeletal injuries, has been widely accepted. Several authors emphasize the importance of occlusal factors,<sup>1-5</sup> while others stress the importance of psychophysiological aspects.<sup>6-10</sup>

Subsequently, the role of life stress and symptoms of anxiety, anger, and depression have been the focus of research.<sup>11-16</sup> Craniomandibular disorder patients have difficulties in coping with increased life stress and respond with experiences of pain associated with anxiety, anger or depression, and elevated muscle tension.<sup>12,16,17</sup> Symptoms of anxiety and aggression can be seen as resulting from continuous pain and the need to find relief from it.<sup>13</sup> The psychological factors may interact with underlying structural disorders. However, not everyone with a structural disorder will respond to increased stress with increased muscle tension, pain, or emotional symptoms.<sup>18,19</sup> Some authors suggest that there are subgroups of patients with different psychophysiological response patterns.<sup>11,20</sup> Patients with elevated levels of anxiety and poor response to conventional treatment may be those who need to be screened more carefully to estimate the need for psychological intervention.

Beaton et al<sup>16</sup> used the Symptoms of Stress (SOS) self-report instrument to measure somatic and emotional stress symptoms on 10 subscales. The SOS inventory has been employed routinely for several years at the TMJ Research Clinic at the University of Washington in Seattle where it has proved to be a useful screening device in the identification of stress-related psychological and somatic disorders. The SOS inventory has adequate internal consistency and test-retest reliability,<sup>16,21</sup> and its concurrent validity has been found to be adequate when another stress inventory and psychophysiological stress response measures have been used as external criteria.<sup>16,21,22</sup> Accordingly, the questionnaire has been validated as a

screening instrument in these earlier studies. Beaton et al<sup>16</sup> found that most of the subscales of the CMD patients' scores were elevated when compared to those in a healthy sample. In clinical practice, a cut-off point of 100 points of the total SOS score has been used, ie, patients reporting higher scores received psychological consultation along with conventional conservative therapy.

Standardized measures of stress symptoms of CMD patients have not so far been systematically used at the Institute of Dentistry at the University of Turku. The purpose of this study is to compare the somatic, behavioral, and emotional symptoms of stress between CMD patients and nonCMD patients in a sample of Finnish patients using the SOS inventory. The Finnish stress reports were compared with those found by Beaton et al<sup>16</sup> in American patients.

## Materials and Methods

### Patients

The CMD patient group consisted of a total of 52 consecutive, unselected (40 women, 12 men; age range 21 to 65 years; mean age 37 years) patients referred to the Institute of Dentistry, University of Turku, Finland for evaluation and possible treatment of CMD. All patients had a history of temporomandibular joint (TMJ) sounds, stiffness, and tiredness or pain in the jaws and the region around the TMJ. The clinical examination included recording the range of movement of the mandible, palpatory tenderness in the TMJ and masticatory musculature, pain on movement of the mandible, and occlusal interferences. Clinically, 24 patients had tender masticatory muscles without involvement of TMJ, and 28 others had masticatory muscle tenderness with some kind of TMJ involvement such as disc displacement or osteoarthritis.

The nonpatient group consisted of 72 healthy volunteers with no chronic illness (58 women and 14 men; age range 23 to 66 years; mean age 35 years) who were recruited from a class at the University Center for Extension Studies, dental students, and administrative and clerical staff members from the Institute of Dentistry.

### Measurement of Symptoms of Stress

The SOS inventory, derived from the Cornell Medical Index by Beaton et al<sup>16</sup> and Nagakawa-Kogan and Betrus,<sup>21</sup> was used to measure physical,

behavioral, and psychological symptoms of stress. During their first visit, the individuals were asked to rate the frequency with which they may have recently been bothered by a particular stress symptom using a 0 to 4-point scale (0 = never and 4 = very often). A total score of 94 items and 10 subscale scores were counted. The subscales were: peripheral, cardiopulmonary, neurologic, muscle tension, gastrointestinal, habit patterns, depression, anxiety, anger, and cognitive disorganization.

The scores of the above-mentioned subscales correlated highly and positively with the total score of the SOS inventory ( $r = .57$  to  $.83$ ). The intercorrelations varied from  $.32$  to  $.60$  among the physical subscale scores and from  $.49$  to  $.70$  among the emotional subscale scores. The associations between physical and emotional scores were somewhat lower, but also positive. These associations, therefore, indicated the reasonable internal homogeneity of the scale in a Finnish sample, thus supporting earlier results on the psychometric properties of the SOS inventory.<sup>21</sup>

The patient and nonpatient groups were compared on the total score and subscale scores of the SOS inventory by *t* test and two-way analysis of variance (GLM-procedure, SAS/STAT).<sup>23</sup>

## Results

The associations of age and education to stress reports were calculated to estimate the potential effects of background factors on the stress reports. The level of patient education (eg, high school) had no significant association with the stress scores. The level of vocational training correlated negatively with the scores of peripheral symptoms ( $r = -.246^{**}$ ) and cognitive disorganization ( $r = -.209^*$ ), ie, the lower a patient's level of training, the higher the patient's stress scores. This association, however, had no major significance, because the patient and the nonpatient group did not differ in their levels of vocational training. Age correlated negatively with the symptoms of anger ( $r = -.218^*$ ), although patient and nonpatient groups did not differ in terms of age. Thus, these minor associations need not be considered in this study.

The profile of the mean SOS subscale scores (average subscale score divided by the number of items) clearly shows the highest peak on the muscle tension scale for the CMD patients (Fig 1).

Table 1 shows the SOS scores for the patient and nonpatient samples. The total score and the cardiopulmonary, neurologic, and muscle tension subscale scores were significantly higher in the

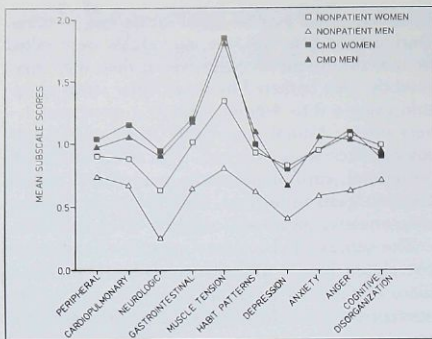


Fig 1 Mean SOS subscale scores (average subscale score/number of items).

patient sample. The differences in the total SOS score between the patient and nonpatient groups were also clear when the medians (patients 108 points, nonpatients 80 points) were calculated.

Table 2 presents comparisons between female and male patients and nonpatients. Female patients scored higher on the cardiopulmonary, neurologic, and muscle tension subscales than did the female nonpatients. Male patients had a higher total score and higher neurologic, gastrointestinal, and muscle tension subscale scores than did the male nonpatients. There were no significant groups by gender interactions. It is also noteworthy that the male and female patients did not significantly differ in their reports of stress symptoms. Neither were there any significant differences between the diagnostic subgroups of the

Table 1 Stress Scores for Nonpatients and CMD Patients

SOS subscale	Nonpatients (n = 72)		CMD patients (n = 52)		t
	Mean	(SD)	Mean	(SD)	
Peripheral	6.07	(3.14)	7.13	(4.13)	1.56
Cardiopulmonary	12.25	(5.77)	17.10	(7.07)	4.20**
Neurologic	2.81	(2.37)	4.73	(2.98)	4.00**
Gastrointestinal	8.54	(4.97)	10.85	(5.49)	2.44
Muscle tension	11.22	(6.04)	16.63	(7.50)	4.45***
Habit patterns	12.96	(7.77)	15.38	(8.53)	1.65
Depression	5.97	(4.92)	6.21	(5.45)	0.26
Anxiety	9.72	(5.28)	10.71	(5.92)	0.98
Anger	8.04	(4.58)	8.76	(4.47)	0.87
Cognitive disorganization	6.56	(4.15)	6.25	(3.71)	0.41
SOS Total	84.14	(35.56)	103.56	(39.49)	2.86*

Using Bonferroni's correction, *P* value associated with a particular *t* value is statistically significant only if *P* ≤ .0045; \**P* < .0045; \*\**P* < .001; \*\*\**P* < .0001.

Table 2 Mean Stress Scores (SD) for Female and Male Nonpatients and CMD Patients

SOS subscale	Nonpatients		CMD patients		Nonpatient vs patient differences ( <i>t</i> )	
	Women (n = 58)	Men (n = 14)	Women (n = 40)	Men (n = 12)	Women	Men
Peripheral	6.29 (2.91)	5.14 (3.96)	7.25 (4.22)	6.75 (3.98)	1.25	1.03
Cardiopulmonary	12.74 (5.98)	10.21 (4.42)	17.45 (7.52)	15.92 (5.42)	3.45**	2.96
Neurologic	3.17 (2.45)	1.29 (1.14)	4.78 (2.98)	4.58 (3.12)	2.91*	3.47*
Gastrointestinal	9.17 (5.06)	5.93 (3.69)	10.88 (5.98)	10.75 (3.57)	1.52	3.37*
Muscle tension	12.14 (5.94)	7.43 (5.05)	16.70 (7.55)	16.42 (7.66)	3.34*	3.58*
Habit patterns	13.18 (7.95)	9.42 (6.03)	15.05 (8.91)	16.50 (7.35)	0.72	2.69
Depression	6.62 (5.11)	3.29 (2.81)	6.43 (5.86)	5.50 (3.92)	0.18	1.67
Anxiety	10.50 (5.39)	6.50 (3.32)	10.43 (5.78)	11.67 (6.54)	0.07	2.48
Anger	8.75 (4.55)	5.07 (3.47)	8.87 (4.69)	8.42 (3.87)	0.12	2.32
Cognitive disorganization	6.91 (4.16)	5.07 (3.89)	6.10 (3.60)	6.75 (4.16)	0.99	1.06
SOS Total	90.12 (35.38)	59.36 (24.42)	103.65 (40.76)	103.25 (36.64)	1.75	3.64*

Using Bonferroni's correction, *P* value associated with a particular *t* value is statistically significant only if *P* ≤ .0045; \**P* < .0045; \*\**P* < .001; \*\*\**P* < .0001.

patients (muscle symptoms only vs muscle and TMJ symptoms) in terms of stress reports.

## Discussion

The SOS inventory differentiated between the stress levels of CMD patients and nonpatients in the present sample of Finnish individuals, and the results are in accordance with the results of Beaton et al.<sup>16</sup> Finnish individuals, taken as a whole, report more frequent symptoms than do Americans.<sup>16</sup> This result may, of course, reflect true differences in the samples. For example, the Finns' state of health may be poorer and they are also more anxious about their health than, for example, their Scandinavian neighbors.<sup>24</sup> Another explanation may be that in the American sample, Beaton and coworkers<sup>16</sup> use rigorous criteria for defining the health status of the control group while in the present study no physical or laboratory examinations of controls was undertaken.

It is suggested that the screening point of 100 used to determine which American CMD patients needed further consultation should be raised to 120 for Finnish patients, though further studies with more representative and controlled samples are needed.

The Finnish CMD patients scored high on the SOS inventory, especially for the somatic stress symptoms such as muscle tension, neurologic, and cardiopulmonary symptoms. Muscle tension is the most central somatic problem of these symptoms in Finns as well as in Americans.<sup>16</sup> The male and female patients did not differ from each other in this respect.

On the emotional scales, however, the differences between patients and nonpatients were not statistically significant, as was the case in the American sample.<sup>16</sup> One explanation for this result may be the general tendency of female controls to report frequent stress symptoms, a tendency that has also been identified in other Finnish nonpatient studies.<sup>25</sup>

The overall high level of diverse symptoms reflects the nonspecificity of the stress reports, ie, there are numerous subjective symptoms of different quality. It is plausible to suggest that the SOS inventory identifies somatizing people. Accordingly, it has been argued that psychological inventories and symptom lists of this type mainly tap an overall subjective report of psychological distress.<sup>20</sup> Consequently, more thorough studies on daily stress and individual coping responses to it are needed to identify possible subgroups or indi-

vidual stress profiles among CMD patients. The role of life stress and mediating cognitive variables, eg, a feeling of control over one's own life situation, may be important in the etiology and individual progression of CMD.<sup>19</sup> Furthermore, a follow-up of stress symptoms could shed light on the development of somatic, as well as emotional, symptoms from the onset of the problems and their treatment. The ultimate goal should be the identification of people at risk of CMD during early adolescence and their treatment and counselling so that they never become CMD patients. Naturally, this approach does not exclude the important role of structural factors in the etiology. On the contrary, screening questionnaires should be used to help the dentist to predict whether conventional treatment alone will be sufficient or whether additional psychological consultation should be used to increase the likelihood of more permanent improvement in the patient's condition.

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## Resumen

### Síntomas de Stress Auto-reportados en Pacientes Finlandeses con Desórdenes Craneomandibulares

Este estudio evaluó la termografía electrónica en las caracterización de imágenes térmicas de pacientes afectados por osteoartritis de la articulación temporomandibular (ATM), las cuales fueron comprobadas por medio de la detección radiográfica de las erosiones óseas. Las evaluaciones térmicas fueron las siguientes: reconocimiento del patron, simetría del patron, temperatura absoluta, medidas de la  $\Delta T$ , y la media de las medidas de temperatura y las diferencias entre cinco zonas anatómicas designadas. Los resultados indicaron algunos patrones térmicos característicamente anormales; niveles bajos de simetría térmica; y niveles substancialmente elevados en cuanto a las medidas de temperatura absoluta, las medidas de la temperatura media de la zona, y los valores  $\Delta T$ . Estas observaciones indican que la termografía electrónica puede ser útil clínicamente como método de diagnóstico para evaluar los desórdenes temporomandibulares, particularmente la osteoartritis. Sin embargo, se necesitan estudios más extensos antes de que la evaluación termográfica de la ATM sea aceptada clínicamente.

## Zusammenfassung

### Selbstbeurteilung von Stresssymptomen durch finnische Patienten mit Myoarthropathien des Kausystems (MAP)

Diese Studie verglich die Stresssymptome in der Selbstbeurteilung von finnischen Patienten mit und ohne MAP mit Hilfe eines Stress-Fragebogens. In gleicher Weise wurden finnische und amerikanische Patienten mit MAP verglichen. Insgesamt waren die Patienten mit MAP einem höheren Grad von Stress ausgesetzt als diejenigen ohne. Die Patienten mit MAP wiesen höhere Werte der sogenannten somatischen Symptome auf, insbesondere was die — erhöhte — Muskelspannung anbelangt. Diese Resultate stimmen mit amerikanischen Ergebnissen überein. Was emotionale Symptome betrifft, konnten keine signifikanten Unterschiede ermittelt werden.

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