Psychometric features of temporomandibular disorders patients in relation to pain diffusion, location, intensity and duration

L. GUARDA-NARDINI*, C. PAVAN[†], N. ARVEDA[‡], G. FERRONATO* & D. MANFREDINI* *TMD Clinic, Department of Maxillofacial Surgery, University of Padova, Padova, [†]Department of Psychiatry, University of Padova, Padova and [‡]TMD Clinic, University of Pavia, Pavia, Italy

SUMMARY The aim of the present investigation was to assess the psychological profile of a sample of patients with temporomandibular disorders (TMD) and to compare the psychometric scores between patients with pain of different diffusion, location, intensity and duration. One hundred and ten ($N = 110$) patients with painful TMD fulfilled three psychometric instruments. Pain features were assessed as categorical variables as concerns its diffusion, viz., diffuse or localised, duration, viz., more or <6 months, and location, viz., joint and/or muscles. Pain intensity was scored on a 0–100 Visual Analog Scale (VAS) rating. Patients with diffuse pain showed higher psychometric scores than patients with localised pain. No significant differences were detected between patients with pain lasting from more or equal than 6 months and those with pain lasting from <6 months as well as between patients with pain localised in the jaw muscles, joints or both, even if a trend for lower scores for patients with joint pain alone was observed. Pain intensity was significantly related with anxiety (ANX), depression (DEP) and somatisation(SOM) scores. In conclusion, pain diffusion and intensity were strongly related with high levels of SOM, ANX and DEP, while no differences in psychometric scores were detected between patients with pain of different duration and location.

KEYWORDS: temporomandibular disorders, pain, depression, somatisation, anxiety, research diagnostic criteria for TMD

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Introduction

The term temporomandibular disorders (TMD) refers to a heterogeneous group of disorders involving the temporomandibular joint, the masticatory muscles and their related structures (1). Current theories on TMD etiopathogenesis support the existence of a multifactorial model with a number of risk factors and neurobiological pathogenetic pathways that contribute to the onset of symptoms (2).

Over the years, with the emerging evidence supporting the biopsychosocial model for TMD, increasing attention has been put on the study of psychological and psychosocial issues of the TMD pain experience, with focus on the presence of somatisation(SOM), depression (DEP) and anxiety (ANX) symptoms (3–6), personality traits, coping strategies (7, 8) and pain-related impairment (9). In general, the available knowledge supports the importance of performing a reliable psychosocial diagnosis in patients with TMD (10–12), also in the light of its influence on treatment outcome (13). To get deeper into the knowledge on the role of psychosocial factors, it should be interesting to assess the relationship of psychological disorders symptoms with the clinical features of pain diffusion, location, intensity and duration. Indeed, it could be hypothesised that pain diffusion to other districts with respect to the facial area, high levels of pain intensity as

well as long-lasting pain duration represents factors associated with increased psychological symptoms. Also, further information with respect to available data on the psychometric differences between patients with different pain location, viz., temporomandibular joint (TMJ) and/or jaw muscles, is needed.

With these premises, the present investigation assessed the psychological profile of a sample of patients with TMD, with the aim to compare the scores in the psychometric instruments' scales between patients with pain of different diffusion, intensity, duration and location, the null hypothesis being that no differences exist between the subpopulations of patients with TMD.

Materials and methods

Study sample

One hundred and ten ($n = 110$) patients (mean age, $42 \cdot 7 \pm 15 \cdot 3$ years; 81% women) seeking for TMD treatment at the TMD Clinic, Department of Maxillo-facial Surgery, University of Padova, Italy, participated in the study. Criteria for inclusion were the presence of at least one Research Diagnostic Criteria for TMD (RDC/TMD) (10) painful axis I diagnosis, viz., group I muscle disorders and/or group IIIa arthralgia and/or IIIb osteoarthritis, and the absence of any systemic rheumatological and/or psychiatric diseases. All patients gave their informed consent before the start of the study. The clinical and psychosocial diagnostic procedures performed in this investigation were within the protocols usually adopted and authorised by the TMD Clinics, so formal waiver from the local ethic committee was not needed.

Clinical assessment

All RDC/TMD examinations for the study sample's selection were performed by a trained investigator according to the official Italian version of the diagnostic guidelines (RDC website). The following variables were considered as additional items and used to split the study sample for a comparison of psychometric findings:

1 Pain diffusion: the presence of pain in other musculoskeletal sites with respect to the temporomandibular joint and/or the jaw muscles was assessed by the question: 'Do you frequently feel pain in other muscles and/or joints?' Patients answering 'yes' were categorised as having 'diffuse' pain, while those answering 'no' were categorised as having 'localised' pain;

2 pain location: patients were diagnosed as having either a muscle (group I), a joint (group IIIa, IIIb), or a combined disorder;

3 pain intensity: a Visual Analog Scale (VAS) with the extremes of '0, no pain' and '100, worst pain ever' was used as a measure of pain intensity;

4 pain duration: the temporal feature of pain was assessed by means of the question: 'How long have you been experiencing pain?', and patients were categorised as having 'chronic', viz., lasting from more or equal than 6 months, or 'non-chronic' pain, viz., lasting from <6 months.

Psychometric evaluation

The Hamilton Depression Rating Scale (HDRS), Hamilton Anxiety Rating Scale (HARS) and SCL-90-R (Symptom Check List 90 Revised) were administered for the evaluation.

The HDRS is commonly used to assess depressive symptoms in adult patients. Scores below 8 are considered normal, those between 8 and 15 indicate mild, between 16 and 24 moderate and over 25 serious symptoms (14). The HARS is a scale frequently used in psychiatry. Scores below 6 are considered to indicate normality, those between 7 and 14 a state of low-moderate ANX and higher ones indicate severe ANX (15).

The SCL-90-R is widely used for self-assessment of psychological distress and multiple psychopathological dimensions. It consists of a total of 90 items, with 83 items that investigate 9 psychopathological dimensions: SOM, obsessiveness-compulsiveness (O-C), interpersonal sensitivity (INT), DEP, ANX, hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR) and psychoticism (PSY). In addition to these nine symptomatological dimensions, the SCL-90-R contains 7 more items relating to appetite and sleep disorders. It also uses three global distress indices: the Global Severity Index (GSI), Positive Symptom Total (PST) and Positive Symptom Distress Index (PSDI) (16). As for specific scales, cut-off values were adopted according to the TMD literature suggestions for DEP and SOM scales (10). On the DEP subscale, scores below 0·535 were considered normal, between 0·535 and 1·105 indicated moderate DEP and above 1·105 the presence of severe

ongoing depressive disorder. On the SOM subscale, including the pain items, scores lower than 0·5 were considered normal, values between 0·5 and 1 indicated moderate SOM and above 1 severe SOM.

Statistical analyses

The mean scores in the HDRS, HARS and SCL-90-R were assessed. Also, the percentage of patients with moderate or severe DEP and/or SOM according to the DEP and SOM scales were described for comparison with different findings from the literature. For the statistical comparisons, all the psychometric instruments were tested for normal distribution and were managed as parametric values. A *t*-test for unpaired samples was performed to compare the average scores of 'chronic vs. non-chronic pain' and of 'diffuse versus localised pain' patients in all the psychometric scores. Analysis of variance with Bonferroni's *post hoc* test, if needed, was performed to compare the average scores of patients with muscle, joint or combined disorder. Pearson's correlation test was used to assess the existence of correlation between the intensity of pain (VAS scores) and psychometric scores. For all statistical analyses, levels of significance was set at *P*<0·05. All statistical procedures were performed with the Statistical Package for Social Sciences 19.0*.

Results

Clinical assessment showed that 29% of patients received a muscle disorders diagnosis alone, 44% a painful group III diagnosis alone and 26% a combined diagnosis. Seventy-four per cent (74%) of patients referred the presence of diffuse pain, as previously described, and 53% had pain lasting from at least 6 months. Mean VAS score was 53·5 (±32·1).

Mean scores in the psychometric scales are shown in Table 1. Severe and moderate DEP levels were detected in 18% and 30% of patients, respectively. Severe and moderate SOM levels were shown in 37% and 33% of patients, respectively.

Patients with diffuse pain showed, on average, higher scores than patients with localised pain in all psychometric scales (Figs 1 and 2). Significant differences were detected in HARS (*P* < 0·001), HDRS (*P* < 0·001), SOM

Table 1. Mean scores of the study population (*n* = 110) in the psychometric instruments' scales adopted in this investigation

Scale	Mean score ± s.d.
HARS	14·2 ± 8·54
HDRS	12·0 ± 6·86
SOM	0·90 ± 0·66
O-C	0·77 ± 0·63
INT	0·59 ± 0·61
PAR	0·66 ± 0·71
PHOB	0·25 ± 0·35
HOS	0·56 ± 0·50
ANX	0·67 ± 0·57
DEP	0·69 ± 0·64
PSY	0·33 ± 0·43
GSI	0·62 ± 0·47
PSDI	1·43 ± 0·40

HARS, Hamilton Anxiety Rating Scale; HDRS, Hamilton Depression Rating Scale; SOM, somatisation scale (SCL-90R); O-C, obsessiveness-compulsiveness (SCL-90R); INT, interpersonal sensitivity (SCL-90R); DEP, depression (SCL-90R); ANX, anxiety (SCL-90R); HOS, hostility (SCL-90R); PHOB, phobic anxiety (SCL-90R); PAR, paranoid ideation (SCL-90R); PSY, psychoticism (CL-90R); GSI, Global Severity Index (SCL-90R); PSDI, Positive Symptom Distress Index (SCL-90R).

(*P* < 0·01), O-C (*P* < 0·01), ANX (*P* < 0·01), GSI (*P* < 0·01), DEP (*P* < 0·05), PSDI (*P* < 0·05) scores.

As for pain duration, no significant differences were detected between patients with pain lasting from more or equal than 6 months and those with pain lasting from <6 months (Figs 3 and 4). Also, no significant differences were detected between patients with pain localised in the jaw muscles, joints or both, even if a trend for lower scores for patients with joint pain alone was observed (Figs 5 and 6).
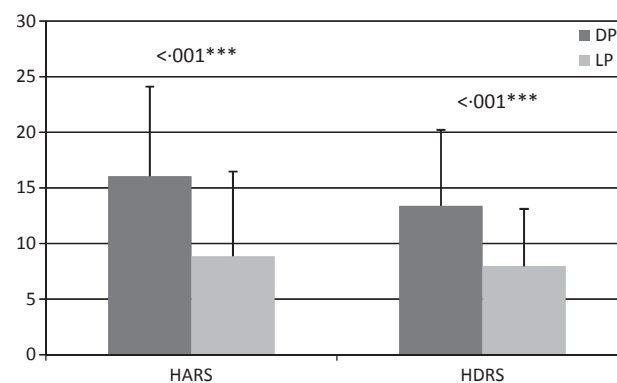

Fig. 1. Comparison of mean scores (plus standard deviations in the error bars) of patients with diffuse and localised pain in Hamilton Anxiety Rating Scale and Hamilton Depression Rating Scale. **P < 0·001.
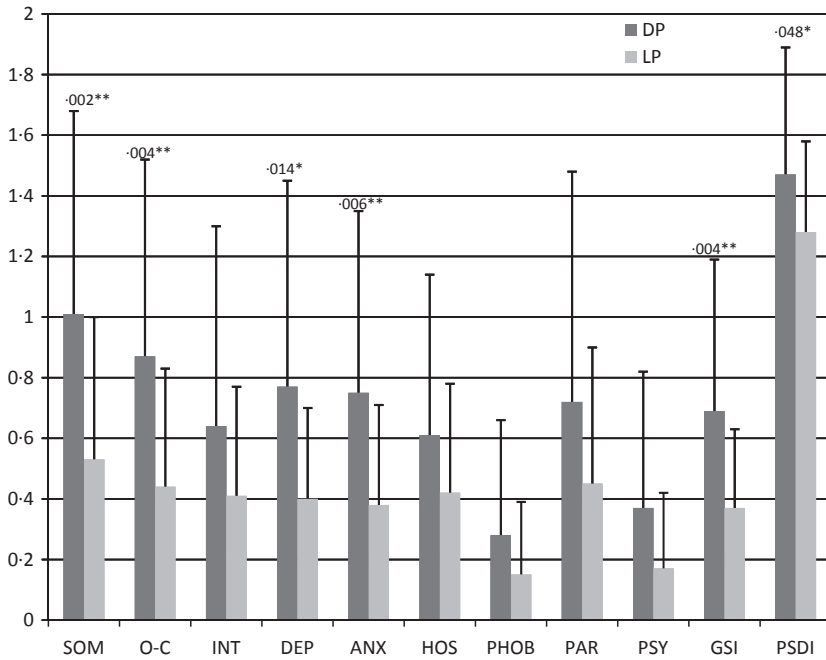
Fig. 2. Comparison of mean scores (plus standard deviations in the error bars) of patients with diffuse and localised pain in all Symptom Check List 90 Revised (SCL-90-R) scales and indexes. $**P < 0.01$; $*P < 0.05$.
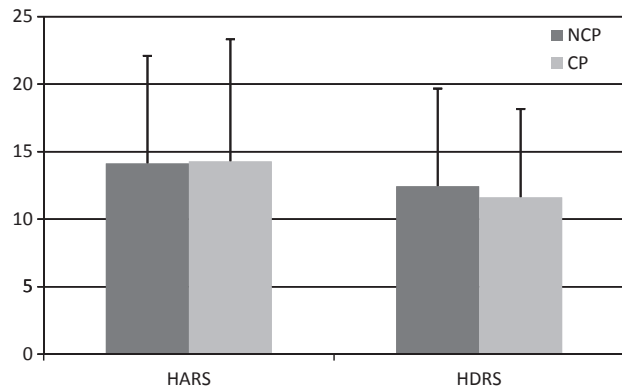

Fig. 3. Comparison of mean scores (plus standard deviations in the error bars) of patients with chronic and non-chronic pain in Hamilton Anxiety Rating Scale and Hamilton Depression Rating Scale.

Correlation analysis showed that intensity of pain, as measured with VAS scores, was significantly related with HARS ($r = 0.248$; $P < 0.01$), HRDS ($r = 0.213$; $P < 0.05$), SOM ($r = 0.262$; $P < 0.01$) scores.

Discussion

The present investigation showed that, on average, patients affected by painful temporomandibular disorders presented symptoms of mild ANX and DEP, as diagnosed with the Hamilton rating scales. Depression levels higher than normal values were also detected by means of the SCL-90-R instrument, which also showed SOM scores higher than the average of normal populations.

In particular, 48% of the study sample showed symptoms of moderate to severe DEP, and up to 71% of patients reported moderate to severe SOM. These findings are comparable with the prevalence reported in other studies, which was about 39–65% (17–19) for DEP and about 45–66% (5, 18) for SOM. Also, they are in line with findings from the largest multicenter study conducted so far by means of the RDC/TMD axis II (20).

The presence of psychological and psychosocial disorders in a large percentage of patients with temporomandibular disorders was described several decades ago (21), and it gained importance over the years owing to its potential influence as a prognostic factor and predictor of treatment effectiveness. Nonetheless, despite the many efforts performed in the attempt to improve knowledge on the relationship of psychological disorders with clinical symptoms, findings have been often frustrating, and emerging evidence suggested that axis I physical and axis II psychosocial diagnoses are mostly unrelated (22). Literature findings suggested that pain location is not an important predictor for psychological disorders, and early suggestions that patients affected by painful muscle and/or

Fig. 4. Comparison of mean scores (plus standard deviations in the error bars) of patients with chronic and non-chronic pain in all Symptom Check List 90 Revised (SCL-90-R) scales and indexes.
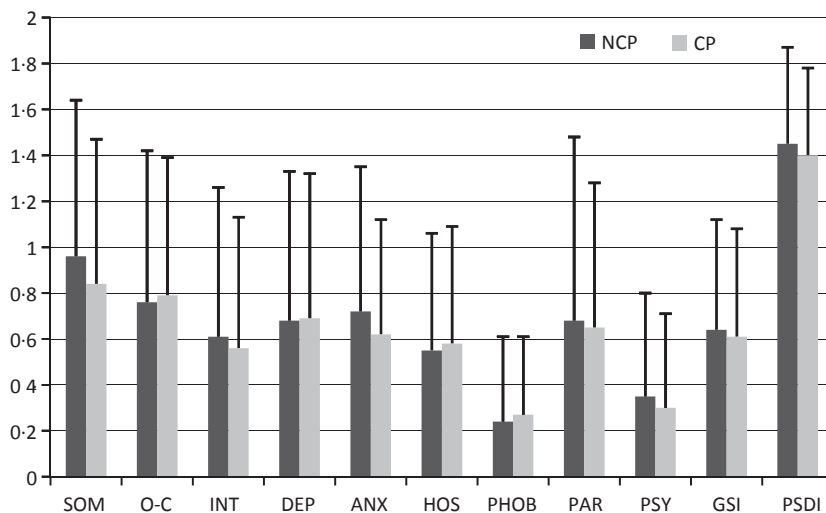
joint disorders share similar levels of DEP scores (23) were recently extended to SOM levels (5, 6). This means that, contrarily to some preliminary suggestions that myofascial pain patients have more psychological distress than patients with joint disorders (24, 25), pain location, viz., pain that is referred either to the jaw muscles or to the joints, does not seem to be an important factor to explain the presence of psychological disorders. Some investigations suggested that pain chronicity and its presence in other body district may be related to an increased psychological distress (26, 27), also influencing treatment effectiveness (28).

The present investigation suggested that the presence of high scores in psychometric instruments evaluating, among the others, the presence of ANX, DEP and SOM is associated with the presence of pain also in other body districts and, to some extent, with pain intensity. Pain location and the presence of pain lasting from more than 6 months were not associated with the above high levels of psychological distress.

These findings are open to several interpretations. First, this investigation supported the increasing evidence that the complex relationship between psychopathology and TMD does not depend upon the location of the disorder. Also, it can be confirmed that, despite the absence of significant differences, myofascial pain patients endorsed higher psychometric scores than patients with joint pain, in line with similar other papers in the literature (3, 5). Second, the presence of pain in other musculoskeletal districts can be considered an important marker of high psychological impairment and can be viewed as a confirmation of the much
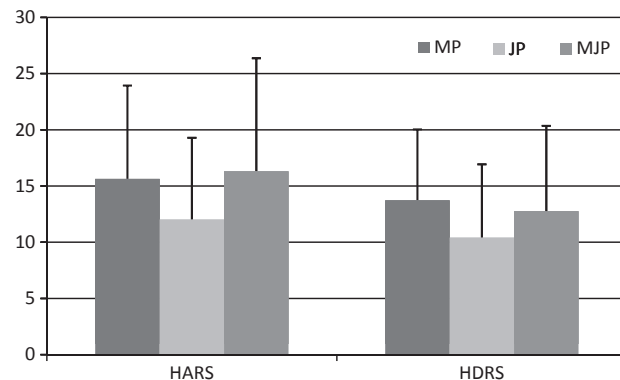

Fig. 5. Comparison of mean scores (plus standard deviations in the error bars) of patients with muscle, joint, and muscle+joint pain in Hamilton Anxiety Rating Scale and Hamilton Depression Rating Scale.

complex relationship between the pain experience and high levels of psychological disorders (29). The single question aiming to detect self-referred pain to other body districts is likely to be an imperfect approach to diagnosing widespread pain. Within the framework of this investigation, it must be borne in mind that this approach was chosen in the attempt to simplify the complex issue of the musculoskeletal pain experience and that future investigations should get deeper into the assessment of the relationship between local TMD pain, TMD pain referred in near districts and concurrent pain located in distant districts. Third, high levels of ANX, DEP and SOM were related with the intensity of pain; there were no other similar studies for comparison, and there is a need to get deeper into this issue in future studies, also in the light of the quite low
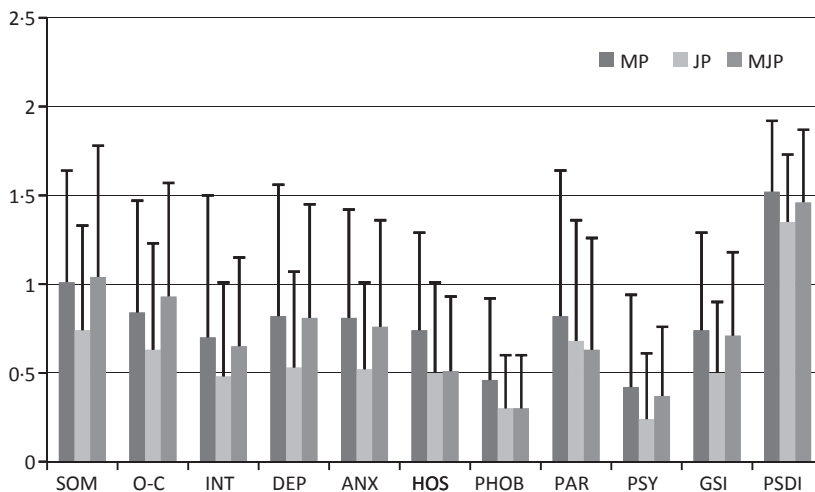
Fig. 6. Comparison of mean scores (plus standard deviations in the error bars) of patients with muscle, joint, and muscle+joint pain in all Symptom Check List 90 Revised (SCL-90-R) scales and indexes.

correlation coefficients described for the significant correlations in this investigation. Fourth, the fact that pain duration was not found to be associated with psychological distress is not in line with current suggestions from the literature, pointing out that chronic pain is much more related with psychosocial impairment than acute pain (30). This may suggest that the simple temporal criterion here adopted to identify patients with chronic pain, viz., the presence of pain lasting from more or equal than 6 months, is not the most suitable to detect those patients who are actually more psychologically distressed. So, it may be suggested that there is a need to define better chronic pain by taking into account for all the aspects of the complex pain experience, with particular focus on the combination of intensity and duration as predictors of the impact of pain in one individual's psychosocial sphere.

The clinical implications of these findings lie in their usefulness to identify pain-related features that are associated with psychological distress of patients with TMD. Data drawn from this study could be added to the amount of papers describing the importance to assess the presence of psychosocial disorders in TMD, especially in the light of recent suggestions that the so-called axis II assessments may provide information on the predictors of treatment effectiveness.

Conclusions

The present investigation attempted to get deeper into the assessment of pain features related with the presence of psychological disorders. It can be suggested that pain diffusion and intensity are strongly related

with high levels of SOM, ANX and DEP. No differences in psychometric scores were detected between patients with pain of different duration, viz., more or <6 months, and location, viz., joint and/or muscle disorders. These findings should be taken into account on the way towards a better definition of chronic pain and its relationship with psychological disorders.

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Correspondence: Daniele Manfredini, DDS, PhD, Viale XX Settembre 298, 54033 Marina di Carrara (MS), Italy.
E-mail: daniele.manfredini@tin.it