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Depressive symptoms in Asian TMD patients and their association with non-specific physical symptoms reporting

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BACKGROUND: The expression of depression in Asian temporomandibular disorder (TMD) patients may differ from that of their Caucasian counterparts. This study examined the prevalence of depressive symptoms and their association with non-specific physical symptoms (NPSs) reporting in Asian patients.

METHODS: Two hundred and fifty-five Asian TMD patients (68 males; 187 females) with a mean age of 33.0 years were selected for this study. Research diagnostic criteria (RDC)/TMD history questionnaire was input directly into computers by patients using the NUS TMDv.1.1 software. Symptom Checklist 90 (SCL-90) depression and NPS scales were generated online and automatically archived for statistical analysis. Data were subjected to ANOVA/Scheffe's test and Pearson's correlation at significance level 0.05 and 0.01, respectively.

RESULTS: 43.1 and 50.6% of the patients scored moderate-to-severe on the depression and NPS scales, respectively. The percentage of patients with diffuse physical symptoms remained high (45.5%), even after pain items were excluded from the computation. NPS scores ranged from 0.34 to 1.64, while depression scores ranged from 0.27 to 1.21. A significant and positive correlation ($r = 0.74$) was observed between depression and NPS scores.

CONCLUSIONS: The prevalence of depressive symptoms and NPSs was lower in Asian TMD patients. Psychological distress experienced by female Asian TMD patients was comparable to their male counterparts. Results also suggest that depressive symptomatology is associated with the reporting of multiple NPSs.

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Introduction

Temporomandibular disorders (TMDs) are a major cause of non-dental pain in the orofacial region, and are considered to be a subclass of musculoskeletal disorders (1, 2). They refer to a collection of medical and dental conditions affecting the temporomandibular joint (TMJ) and/or the muscles of mastication, as well as contiguous tissue components. For many years, the etiology of TMD was conceptualized within a biomedical model that focused on somatic diseases and structural dysfunction (1). The majority of patients were perceived to represent two relatively homogenous set of physical disorders involving problems of the TMJ and muscles of mastication. Because of the frequent overlap between joint-related and muscle-related symptoms, the task of distinguishing between the two broad categories of physical disorders was usually not straightforward (3, 4). Findings from epidemiological and experimental intervention studies indicate that TMD is a chronic pain condition that shares the major characteristics of other common chronic pain conditions, notably headache and back pain (5, 6). As chronic pain conditions are associated with psychological, behavioral, and social factors, in addition to physical pathology, these factors must be considered if an accurate understanding of the etiology and course of TMD is to be developed (7).

The importance of psychosocial issues was highlighted in the development of the research diagnostic criteria (RDC) for TMDs (8). Developers of this diagnostic taxonomy proposed a dual-axis approach that placed physical diagnosis based on pathophysiology on one axis (Axis I) and psychosocial assessment on the other (Axis II). RDC/TMD Axis II measures include the depression and somatization scales of the Symptom Checklist 90 (SCL-90; 9). Depression is the psychological mood characterized by feelings of sadness, helplessness, hopelessness, guilt, despair, and futility, while somatization is the process whereby a mental condition is experienced as a bodily symptom (1). Depression is a common symptom of many psychiatric syndromes, including the clinical syndrome of depressive disorder. The central feature of the latter is a depressive mode state with pervasive loss of interest or pleasure. In the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV diagnostic system, depressive disorder is classified under major

depressive episode (10), and a structured psychiatric interview is required for this diagnosis. Characteristically, the physical symptoms reported in somatization reflect disruptions in multiple organ systems, including gastrointestinal, cardiopulmonary, pain and pseudoneurologic symptoms, and psychosexual complaints, like impotence or sexual indifference (10). The SCL-90 is a simple self-report inventory that is scored on a 5-point scale of distress (0–4). Its depression and somatization scales have been widely used with chronic pain patients (11). The term somatization was not incorporated into the RDC as the SCL-90 somatization scale measures the number and severity of non-specific physical symptoms (NPSs) without identifying the cause of the symptoms. As diffuse NPSs may be associated with an underlying disease, the effects of a pain condition *per se*, and/or psychological distress, it was felt that the term somatization was not accurate within the context of the RDC. The SCL-90 somatization scale was, however, included to facilitate assessment of how persons with and without diffuse physical symptoms differ in terms of Axis I TMD status, response to TMD pain/disability, and psychological status, including depression. Normative data defining cut-off scores for normal, moderate, and severe levels of depression and NPS (Table 1) were provided by a large population-based study (8). The majority of TMD studies had been conducted on Caucasian populations, and little is known about the psychological status of Asian TMD patients. A study comparing American and Swedish TMD cohorts revealed a high prevalence of depressive symptoms and NPSs (12). When data from the two cohorts were pooled, approximately 50% of Caucasian patients had symptoms of depression and 60% scored moderate-to-severe on the NPS scale. Another interesting observation was the dominance of women in seeking treatment. These observations were consistent with those of previous studies on psychiatric morbidity in TMD patients (13, 14) and gender-related differences in treatment seeking behavior (15, 16).

Research reporting the association between depression and somatization is generally limited in the dental and medical literature. Taken together, these studies suggest that there is a high prevalence of depression or depressive symptomatology in patients who experience somatization (17). The relationship between depressive symptoms and NPSs reporting in Asian TMD patients has not been fully explored, and may differ from their Caucasian counterparts because of disparities in cultural background, context of care, and other ethnophysiological factors. Gender-related differences in psychological distress in Asian TMD patients also warrant investigation. We hypothesize that a link between depressive symptoms and NPSs exists. Specifically, patients with depressive symptomatology are potential 'somatizers' and patients with greater NPS scores tend to exhibit more depressive symptoms. We also hypothesize that female patients may experience greater psychological distress compared to their male counterparts. The objectives of this study were to investigate depressive symptoms and their association with NPSs in Asian TMD patients as defined by RDC/TMD Axis II psychological measures, and to determine gender-related differences in depressive symptoms and NPSs reporting.

Table 1 Classification of depression and NPS scores according to population norms

	Normal	*Moderate*	*Severe*
Depression scale	<0.535	0.535 to <1.105	1.105+
NPS scale (with pain items)	<0.500	0.500 to <1.000	1.000+
NPS scale (without pain items)	<0.428	0.418 to <0.857	0.857+

Moderate, above 70th percentile on population norms; severe, above 90th percentile on populations norms.

Materials and methods

Data were collected on 284 consecutive patients referred to the TMD clinics at the National Dental Centre and National University Hospital, Singapore. The patients were referred from general and specialist medical or dental practitioners in the community to the TMD clinics, which were the only institutionalized resources for the diagnosis and management of TMD in Singapore. Patients who were younger than 18 years (because several questions were difficult to understand or inappropriate) and patients with medically diagnosed polyarthritides were excluded from the study. The mean age of the 255 patients selected was 33 years (range 18–65 years); 187 (73.3%) were females and 68 (27.7%) were males. The patients were predominantly Chinese (82.4%), with Malays and Indians making up the bulk of the remaining patients. At the initial appointment before undergoing treatment, patients used the NUS TMD v.1.1 to answer the RDC/TMD history questionnaire. NUS TMD v.1.1 is a computerized diagnostic tool based on the RDC/TMD (18). It allows for direct data input by patients/clinicians, chair-side generation of Axis I and II findings, and automatic archiving of data in SPSS or other tab-delineated format for data-mining and global exchange. The RDC/TMD history questionnaire, which was modified for the Asian population, includes 31 questions covering information devoted to demographics and Axis II domains. Modifications involved only patient demographics (race, origin of ancestry, education, and household income), and did not affect RDC/TMD diagnostic algorithms. Depression and NPS scores were measured with the depression and somatization subscales of the SCL-90.

Frequency distribution and description statistics were obtained through the use of SPSS v.11.5 for Windows (SPSS, Chicago, IL, USA). Mean NPS and depression scores were computed with depression and NPS scales as main effects. Differences in mean NPS/depression scores between patients scoring normal, moderate, and severe in the two SCL-90 subscales were determined using one-way ANOVA and Scheffe's post-hoc test at significance level 0.05. Correlation between depression and NPS scores was established using Pearson's correlation at significance level 0.01. Independent sample *t*-test and Mann–Whitney *U*-statistical analysis were performed ($P < 0.05$) to determine gender differences in depression/NPS scores and scales, respectively.

Results

The mean NPS and depression scores (and 95% confidence limits) for patients scoring normal, moderate, and severe on the depression/NPS scales are shown in Tables 2 and 3.

Table 2 Mean depression scores for patients scoring normal, moderate, and severe on NPS scales

	n	*Mean depression score*	*SE*	*95% CI*	*F*	*P*
NPS scale (with pain items)						
Normal	126	0.27	0.03	0.21–0.33	11.97	0.001
Moderate	62	0.68	0.05	0.57–0.78		
Severe	67	1.21	0.08	1.04–1.38		
NPS scale (without pain items)						
Normal	139	0.30	0.03	0.25–0.35	10.93	0.001
Moderate	54	0.75	0.07	0.61–0.88		
Severe	62	1.21	0.09	1.03–1.38		

Table 3 Mean NPS scores for patients scoring normal, moderate, and severe on depression scale

Depression scale	*n*	*Mean NPS score*	*SE*	*95% CI*	*F*	*P*
With pain items						
Normal	145	0.34	0.03	0.28–0.40	5.44	0.001
Moderate	72	0.88	0.06	0.76–1.00		
Severe	38	1.64	0.14	1.36–1.93		
Without pain items						
Normal	145	0.21	0.02	0.16–0.26	5.44	0.001
Moderate	72	0.74	0.07	0.60–0.87		
Severe	38	1.52	0.16	1.21–1.85		

Table 4 Correlation between depression and NPS scores

		NPS score	
	Depression score	*With pain items*	*Without pain items*
Depression score	1	0.74*	0.72*
NPS score (with pain items)	0.74*	1	0.96*
NPS score (without pain items)	0.72*	0.96*	1

Results of Pearson's correlation: *correlation is significant at the 0.01 level (two-tailed).

Correlation analysis between depression and NPS scores is reflected in Table 4. Mean depression/NPS scores by gender are shown in Table 5, while the distribution of patients scoring normal, moderate, and severe on the depression/NPS scales is reflected in Table 6. 43.1 and 50.6% of the patients scored moderate-to-severe on the depression and NPS scales, respectively. The percentage of patients who scored moderate and severe on the NPS scale remained high (45.5%), even after pain items were removed from the computation. The percentage of male and female patients with moderate and severe depression scores was approximately equal (males, 42.6%; females, 43.3%). The percentage of female patients who scored moderate-to-severe on the NPS scale (54.0%) was greater than that observed with male patients (41.2%). When pain items were excluded from the computation of NPS scores, 39.7% of male patients and 47.6% of female patients scored moderate-to-severe on the NPS scale.

Table 5 Mean depression/NPS scores for male and female patients

Gender	*n*	*SE*	*95% CI*	*P*
Mean depression score				
Male (0.63)	68	0.08	0.47–0.79	0.79
Female (0.61)	187	0.04	0.53–0.69	
NPS score (with pain items)				
Male (0.62)	68	0.09	0.45–0.80	0.36
Female (0.71)	187	0.05	0.61–0.81	
NPS score (without pain items)				
Male (0.51)	68	0.09	0.33–0.69	0.52
Female (0.57)	187	0.05	0.47–0.67	

Depression scores ranged from 0.27 to 1.21, while NPS scores ranged from 0.34 to 1.64 when pain items (headaches, heart/chest pain, lower back pain, nausea/upset stomach, and soreness of muscles) were included. When pain items were excluded from the computation of NPS, depression scores ranged from 0.30 to 1.21 and NPS scores ranged from 0.21 to 1.52. Patients who scored severe on the depression scale had significantly higher NPS scores (with and without pain items) than those with moderate scores. Those who scored moderate on the depression scale had significantly higher NPS scores than normal patients. A similar trend was observed for depression scores among the three groups of NPS scales (with and without pain items). Patients who scored severe on the NPS scale had significantly greater depression scores than those with moderate NPS, while patients with moderate NPS had significantly greater depression scores than normal patients. A significant, strong, and positive correlation was observed between depression and NPS scores with ($r = 0.74$) and without pain items ($r = 0.72$).

Mean depression scores for male and female patients were 0.63 and 0.61, respectively. Male patients had a mean NPS score of 0.62 with pain items and 0.51 without pain items. Mean scores for female patients were slightly higher (0.71 with pain items and 0.57 without pain items). No significant difference in mean scores was observed between male and female patients. The difference in distribution of people scoring normal, moderate, and severe in the depression and NPS scales was also not significant.

Discussion

The depression scale of the SCL-90 is not a diagnostic instrument for depressive disorder. It is, however, useful for alerting clinicians to potentially noteworthy depressive symptomatology in TMD patients (19). The prevalence of depressive symptoms and NPSs reporting in the Asian TMD cohort was lower than their Caucasian counterparts. There is evidence that patients affected by chronic illnesses, including TMD, have a higher risk for depression compared to the general population. Similarly, depressed patients have substantial rates of comorbidity with chronic medical conditions (20). Patients who suffer from depressive disorder typically present with a constellation of psychological, behavioral, and physical symptoms (Table 7). Some of the physical symptoms associated with depression overlap those observed in somatization disorders, but these were not

Table 6 Cross-tabulations between gender and depression/NPS scales

	Depression scale					*NPS scale with pain items*					*NPS scale without pain items*				
Gender	*Normal*	*Moderate*	*Severe*	*Total*	*P*	*Normal*	*Moderate*	*Severe*	*Total*	*P*	*Normal*	*Moderate*	*Severe*	*Total*	*P*
Male	39	16	13	68	0.79	40	15	13	68	0.06	41	15	12	68	0.17
Female	106	56	25	187		86	47	54	187		98	39	50	187	
Total	145	72	38	255		126	62	67	255		139	54	62	255	

Results of Mann–Whitney test (two-tailed).

Table 7 Common symptoms of unipolar depression

Psychological symptoms
1. Depressed mood
2. Irritability
3. Anxiety/nervousness
4. Reduced concentration
5. Lack of interest/motivation
6. Inability to enjoy things
7. Lack of pleasure
8. Reduced libido
9. Hypersensitivity to rejection/criticism
10. Perfectionism/obsessiveness
11. Indecisiveness
12. Pessimism/hopelessness
13. Feelings of helplessness
14. Cognitive distortions
15. Preoccupation with oneself
16. Low self-esteem
17. Feelings of worthlessness
18. Thoughts of death or suicide
19. Thoughts of hurting other people

Behavioral symptoms
1. Crying spells
2. Interpersonal friction/confrontation
3. Anger attacks/outburst
4. Avoidance of anxiety-provoking situations
5. Reduced productivity
6. Social withdrawal
7. Avoidance of emotional and sexual intimacy
8. Reduced leisure-time activities
9. Development of rituals or compulsions
10. Workaholic behaviors
11. Substance use/abuse
12. Self-sacrifice/victimization
13. Self-curing/mutilation
14. Suicide attempts/gestures
15. Violet/assaultative behaviors

Physical symptoms
1. Fatigue
2. Leaden feelings in arms or legs
3. Sleeping too little/insomnia
4. Sleeping too much/hypersomnia
5. Decreased appetite
6. Weight loss
7. Increased appetite
8. Weight gain
9. Sexual arousal difficulties
10. Erectile dysfunction
11. Delayed orgasm/inability to achieve orgasm
12. Pains and aches
13. Headaches
14. Muscle tension
15. Gastrointestinal upset
16. Hear palpitations
17. Burning or tingling sensations

Adapted from Cassano & Fava (20).

incorporated in the computation of SCL-90 depression scores.

Somatization disorders reflect a maladaptive preoccupation with diverse physical symptoms that are long-standing and poorly associated with confirmable physical abnormality (21). When symptom preoccupation is limited to just pain, it is termed as somatoform pain disorder. Characteristically, somatoform pain disorder reflects preoccupation with a pain in a single pain site (e.g. back pain or headache), while sharing with other somatization disorders an inappropriate intensity of preoccupation and poor correlation with physical findings (22). As pain may be experienced in almost every organ system and at almost every anatomic site, Dworkin et al. suggested the possibility of a form of maladaptive somatization, where the symptom report is limited to pain, as in a somatoform pain disorder, but where multiple pain conditions are identified in diverse regions or organ systems, as in somatization disorders (22). Although a cause-and-effect relation has not been demonstrated, the presence of chronic widespread pain has been associated with depression and mental disorders (22–24). To minimize the effects of pain comorbidity, computation of NPS scores and scales without pain items were also included in the current analysis.

No overlap in distribution of mean depression/NPS scores for patients scoring normal, moderate, and severe in the NPS and depression scales was observed. As the extent of NPS (both with and without pain items) increased, so did the degree of depression. Simon (25) has distinguished four levels of analyzing somatization as a concept for engaging the presence of poorly understood physical symptoms. They are: (i) non-specific amplification of distress; (ii) psychological defense; (iii) tendency to seek care; and (iv) consequences of health care utilization. Somatization as a psychological defense involves appraisal–emotional factors, and is exemplified by the view of chronic pain as a 'masked' version of depression (i.e. pain is experienced and expressed instead of depression; 26). The psychological defense theory was supported by the strong and highly significant association between NPS and depression in the present study. Results corroborated those of a population-based survey of psychiatric morbidity among more than 18 000 residents of five US communities (27). Increasing number of somatic symptoms was strongly associated with overt expression of psychological distress and psychiatric symptoms, especially anxiety and depression. Spinhoven & Kooiman (28) found that depression scores were positively correlated to immature and neurotic, and negatively to mature defense style. A recent study by Sheehan et al. (29) found that somatic

symptoms were significantly reduced in depressed patients after medical treatment for psychiatric illness. Both these studies lend additional support to the psychological defense theory. The exact biological mechanism by which depression is translated to the sensation of pain and other NPSs is still not known. The main stress hormone system, the hypothalamic–pituitary–adrenal (HPA) axis, which has a wide range of central and peripheral actions, is an obvious candidate (20). Banks & Kerns (30) suggested that depression develops secondary to chronic pain, and that the experience of pain predisposes individuals to depression. Their view was supported by Zwaigenbaum et al. (31), who reported that high levels of somatic symptoms represent a significant risk factor for major depression 4 years later. Whether diffuse physical symptoms result from depression, or somatic symptoms predispose patients to depression could not be determined in the present study. Further prospective studies are warranted.

With obvious anatomic and genetic differences between males and females, it is a common belief that both the sexes differ in their predisposition toward and responses to pain. This belief has been perpetuated by the disproportionate representation of women receiving treatment for many pain conditions, and by studies that suggest that women report more severe pain, more frequent pain, and pain of longer duration than men (16, 32, 33). The forementioned representation has also lead to the common belief that females somatize more than males. The female-to-male gender ratio of TMD patients ranges from 3.1 : 1 to 5.0 : 1, depending on patient cohort (12). Despite the higher female representation, no significant difference in mean NPS scores and distribution of patients scoring normal, moderate, and severe in the NPS scale was observed between genders. Results were in agreement with that of Piccinelli & Simon (34), who investigated gender and cross-cultural differences in the association between somatic symptoms and psychological distress. Their data did not support the belief that females somatize more than males. Although the prevalence of depression among females is higher than among males in the community (35), no significant difference in depression scores and distribution of depression scale was observed between genders for the Asian TMD cohort. Findings substantiated those of Hildebrandt et al. (36), who found no gender difference in severity or symptomatology in a highly representative sample of patients with depression. Causes of the higher female-to-male prevalence ratio for TMD may be better sort in the biological rather than psychological realm.

The results of the present study suggest that TMD patients with depressive symptomatology may also be somatizers, and TMD patients with multiple diffuse physical symptoms tend to have depressive symptoms. Depression and somatization may contribute to the maintenance of TMD and/or interfere with smooth acceptance of and compliance with treatment (37, 38). Clinicians should be aware of the societal stigma of depression and of the reluctance of some patients in reporting their psychological distress, with consequent greater focus on physical symptoms than on psychological/behavioral symptoms. This bias may vary in relation to cultural and ethnic background of patients (39). The significant and strong correlation between depression and NPS scores without pain items ($r = 0.72$) suggests that TMD-related pain experienced by some patients may also be somatic expressions of psychiatric disturbance (22). If this is true, the presence of TMD in these patients can be generalized to a class of negative physical symptoms that are not associated with any progressive or measurable pathophysiology (7). For TMD patients who manifest considerable psychosocial impairment, biomedical therapies aimed at alleviation of physical symptoms alone may be limited. This approach may perpetuate an unsatisfying search for dental, medical, surgical, and other types of symptom management. It is therefore prudent that these patients are identified at the initial visit, if possible. Cognitive–behavioral intervention has been found to be effective for this subgroup of TMD patients (40, 41).

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