THE UNIVERSITY OF
SYDNEY

A RETROSPECTIVE ANALYSIS OF OROFACIAL PAIN PATIENTS AT WESTMEAD CENTRE FOR ORAL HEALTH

SUHAS DESHPANDE

A treatise submitted in partial fulfillment of the requirements for the degree of Master of Dental Science (Prosthodontics)

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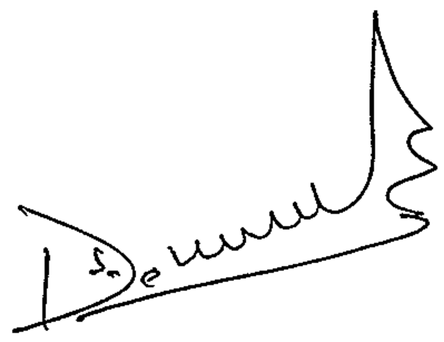
Statement of Authorship

I declare that all the work presented in this treatise is my own, unless otherwise stated. The work of colleagues is acknowledged in general terms within the acknowledgements and specifically within the body of the text, wherever it is appropriate.



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CONTENTS

ABSTRACT

Aim: A retrospective analytical study to investigate characteristic biological and psychological features in a group of patients referred to a hospital Orofacial Pain clinic at the Westmead Centre for Oral Health.

Hypothesis: Different diagnostic subgroups have characteristic demographic, physical, and psychological features.

Study Design: The study population consists of 194 consecutive patients referred for diagnosis and treatment to the Orofacial Pain clinic of Westmead Centre for Oral Health, University of Sydney. The period of initial assessment was February 2002 to December 2003. History and clinical examinations followed the protocol defined by Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). This information was completed by supervised and calibrated Master's students in Prosthodontics. The standardised Questionnaire, History and Clinical Examination forms were completed for each patient. The information has been systematically retrieved and analysed.

Results: This study shows the trends and correlations between demographic factors, and signs and symptoms of Temporomandibular Disorders (TMD) and orofacial pain patients in the Sydney metropolitan area. Our results are similar to other published findings with a greater representation of females (76%), maximum numbers in the middle age group, 30 to 40 years at 23.7%, and only 12% in the over 60 age group.

No significant differences were found between the **muscle pain** and the **joint pain** groups. Subjects within the **muscle and joint pain** group reported higher pain intensity, more dysfunctional pain, higher scores on graded chronic pain scale, severe somatisation and depression. Our findings are comparable with studies comparing TMD signs and symptoms in populations in Sweden and the United States of America (USA).

ABBREVIATIONS

GCP	Graded Chronic Pain
NIH	National Institutes of Health
RDC/TMD	Research Diagnostic Criteria for Temporomandibular Disorders
SCL-90-R	Sickness Check List-90-Revised
SPSS	Statistical Package for Social Sciences
TMD	Temporomandibular Disorders
TMJ	Temporomandibular Joint
VAS	Visual Analogue Scale

PREAMBLE

Retrospective Data: Data collected using subjects' recall or written documents about illnesses or exposures that occurred at some time in the past or collected by searching clinical records (adapted from Peat et al 2001).

Aim: A retrospective analytical study to investigate characteristic biological and psychological features in a group of patients referred to a hospital Orofacial Pain clinic at the Westmead Centre for Oral Health.

Hypothesis: Different diagnostic subgroups have characteristic demographic, physical, and psychological features.

LITERATURE REVIEW

Biopsychosocial model of pain

The conceptual basis for our understanding of chronic pain is provided by a biopsychosocial model, which has proven helpful in guiding epidemiological, health services, clinical dental and biobehavioural research. The model has been applied to illness behaviour in general, and is a dynamic, ecological one that views expression of pain and dysfunction as the interrelationship of intra and interpersonal factors as well as environmental forces operating over time.

The expression of individual pain, suffering and treatment-seeking behaviour, represents the outcome of a complex integration of these biological, psychological and social forces simultaneously at play which led to the concept of a biopsychosocial model. The model suggests that physiological activity in the form of nociceptive information in the pain transmission system is influenced by higher centres associated with perception, emotion, cognition and social role levels of psychosocial functioning (Dworkin et al 2002).

In 1996, the National Institutes of Health (NIH) held a Technology Assessment Conference to provide an "assessment of management approaches to TMD". Conference participants concluded that TMD is a collection of conditions affecting the temporomandibular joint and contiguous structures. These conditions are linked in their presentation by their common signs and symptoms. Given the lack of epidemiologic

information and the collection of as yet undefined aetiologies that are likely to be described as TMD, a conventional disease classification system has been difficult to describe. Although diagnostic classifications of TMD are based on signs and symptoms rather than on aetiology, these signs and symptoms should be classified in the context of muscle and joint disorders or in the category of pain disorders and further investigation of risk factors associated with TMD are needed (NIH Technology Assessment Conference statement, 1996).

Development of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) protocol

Many classifications for TMD have been proposed (Okeson 1997). The Helkimo Dysfunction Index was the first to be developed based on epidemiological studies for diagnosis and severity of TMD (Helkimo 1974) and is still in use (Carlsson and LeResche 1995).

The American Academy of Orofacial Pain established a classification system based on the International Headache Society (IHS) classification of head, neck, and neuralgic pain (Headache Classification Committee of the International Headache Society 1988).

Clinical diagnostic criteria are included for each diagnostic disorder. Although examination findings may vary widely, an essential starting point for diagnosing TMD is a thorough history and examination (Lund et al 1995).

Further complicating the diagnosis of TMD is the presence of negative or maladaptive behavioural, emotional, and psychosocial factors, which have been extensively documented in patients with TMD (Rugh et al 1995).

However, there have been few systematic attempts to integrate behavioural, emotional, and psychosocial findings into a coherent diagnostic or assessment scheme for TMD. Important and highly valuable exceptions are the multiaxial classification system for chronic pain developed by the International Association for the Study of Pain (IASP) (Merskey 1986) and the Multidimensional Pain Inventory (MPI) developed by (Turk and Rudy 1988). Although the IASP classification system accounts for physical and behavioural or psychosocial factors and pain on its separate axes, it lacks the specificity necessary to distinguish one type of TMD from another.

The Guidelines for Classification, Assessment, and Management (McNeill 1990), still lack suitable operational criteria to allow adequate evaluation of their reliability and validity when making comparisons across clinicians or across different treatment centers.

As an initial step to address these shortcomings, Research Diagnostic Criteria for Temporomandibular Disorders RDC/TMD (Dworkin and LeResche 1992) have been developed and made available to researchers and clinicians for scientific evaluation. The RDC/TMD uses clinical examination and history gathering methods with scientifically demonstrated reliability for gathering clinical signs of TMD, and it also includes assessment of behavioural, psychologic, and psychosocial factors. The RDC/TMD

protocol provides a systematic method for classifying the major subtypes of TMD along a physical disease axis (Axis 1) and psychosocial status of TMD patients (Axis 2). The RDC/TMD guidelines have been presented in detail including specific clinical examination procedures to ensure reliable assessment of TMD signs (Dworkin and LeResche 1992).

A study reported by Zaki et al (1994) provided an initial evaluation of the reliability of the RDC/TMD. Two hundred patients with TMD symptoms of at least 3 months duration and no prior TMJ surgery were comprehensively examined. Fifty patients had a second examination by a second trained and calibrated clinician performed one week later. The examination findings were scored according to the proposed Axis I RDC/TMD guidelines. Kappa and Yule's Y were computed to evaluate the inter-examiner reliability for Axis I diagnoses. Reliability coefficients ranged from 0.55 for TMJ osteoarthrosis, to 0.84 for TMJ osteoarthritis. Muscle disorders and disc displacement diagnosis had coefficients > 0.70 and > 0.73, respectively; 36% of the patients had 3 or more Axis I diagnoses, with myofascial pain with limited opening being the most frequent diagnosis (58%) and disc displacement without reduction without limited opening being the least frequent (0%). These preliminary findings suggest that at least some of the RDC/TMD guidelines can be used reliably and may help to improve communication among both TMD researchers and clinicians. Additional research, however is needed to evaluate the clinical utility of Axis I diagnosis.

A cross-sectional population-based study was reported by Huang et al (2002) to test the hypothesis that TMD encompasses several entities, with differing aetiologies. This study involved: (a) 261 participants enrolled as clinical cases from two TMD clinics; (b) community cases and community controls were identified through a screening questionnaire sent to an age stratified probability sample of 1265 adults. The following question, which distinguished community cases from controls, and used by Huang et al (2002), was originally proposed by (Dworkin et al 1990); "During the past six months, have you had a problem with facial ache or pain in the jaw muscles, the joint in front of the ear, or inside the ear (other than infection)?". 123 subjects answered positively and were classified as community cases. Out of 893, who answered negatively to the screening question, 264 were randomly chosen to serve as community controls. All participants underwent an interview and examination following the RDC/TMD criteria. Cases were classified into three groups: myofascial pain only, arthralgia only and myofascial pain and arthralgia together. Specific self-reported risk factors of interest were identified (Drangsholt and LeResche 1999). The chi-squared test was used for assessment of differences between the pain and control groups in distributions of exposures and potentially confounding variables. Statistical significance was assessed at the 0.05 level, and adjusted for multiple comparisons by the Bonferroni method. Adjusted odds ratios were calculated from multiple logistic regression models that included the relevant risk factors. Subjects were classified into one of the following four groups: pain free controls (n = 195), myofascial pain only (n = 97), arthralgia only (n = 20), and myofascial pain with arthralgia (n = 157). The TMD groups and controls were similar with respect to age, race, income group and marital status. Subjects with

myofascial pain (with or without arthralgia) reported clenching, facial trauma, third molar removal, somatisation, depression, and talking with the telephone resting on the shoulder. No significant associations were found for the arthralgia only group. However, those with myofascial pain or myofascial pain with arthralgia were more likely to be female. A high proportion of trauma, clenching, third molar removal, somatisation, and female gender were identified as risk factors for subjects with myofascial pain, as well as for subjects with concurrent myofascial pain and arthralgia. The strength of the study lies in the population-based sample of cases and controls; reliable, criterion-based examination of all subjects; and adjustment for potentially confounding variables.

Gender differences

A literature review by Dao and LeResche (2000) indicated that for endogenous pain, women tend to report higher pain levels and pain in more bodily regions than men. Several hypothesis concerning differential psychosocial influences on pain in women and men: notably, differences in perception, appraisal, pain related behaviour, and environmental influences have been reviewed. Cyclic fluctuations of various pain disorders across the menstrual cycle, the actions of estrogen on nerve growth factor and HPA axis, and difference in structural organisation and operation of the sympathetic nervous system and pain processing have been reported. Prevalence rates of chronic orofacial pain found in population-based epidemiologic studies range from 8% to 15% for women and from 3% to 10% for men. There is also evidence suggesting that for several diseases, the presentation of illness may differ significantly by gender, with

certain signs and symptoms being much more common in one gender than the other. Migraine without aura is twice as prevalent in women as migraine with aura, while the opposite is true for men (Rasmussen et al 1992). In patients diagnosed with acute myocardial infarction, men were significantly more likely than women to complain about neck, back, or jaw pains and nausea (Goldberg et al 1998). Different risk factors and predictors of diseases have also been observed. Risk of low back pain increases with height among men but not among women (Walsh et al 1991). Similarly chest pain is a much poorer predictor of coronary artery disease in women with abnormal angiography (Sullivan et al 1994). Disc degeneration has been reported to be associated with neck pain in men but not in women (Van Der Donk et al 1991).

As discussed by Filligim and Maixner (1995), it is possible that gender has a selective influence on multiple dimensions, in which the pain is influenced and in turn, may be differently affected by various methods of pain induction. An obvious gender difference is the characteristic temporal fluctuations of hormonal states in females and the frequent occurrence of pain associated with the reproductive cycle (ie, menstruation and ovulation). In 60% of migraine sufferers, headache worsens around the premenstrual phase of the menstrual cycle, and 14% of women with migraine experience headache only with menses (Marcus 1995). Oestrogen replacement therapy can exacerbate migraine during menopause, while oral contraceptives can change its character and frequency by inducing, changing or even alleviating the headache crisis (Kudrow 1975). Data (LeResche et al 1993, LeResche et al 1997, Brynhildsen et al 1998) suggests that the risk of TMD pain and low back pain increases with the use of exogenous hormones.

Although the exact mechanism by which the gonadal hormones modulate menstrual headaches is still unclear, their interactions with various neuroactive agents implicated in pain mechanisms have been described. Serotonin has been shown to play an important role in the pathology of headache, and its levels vary positively with plasma oestradiol, oestrone, and oestrogen (Guicheney et al 1988). The interaction of serotonin with female sex hormones is further illustrated by reports that the number of available serotonin receptors, their binding capacities and their functional status are all associated with changes in oestrogen levels (Maswood et al 1995, Gundlah et al 1998).

Heritage et al (1980) reported that brain stem catecholamine neurons, which contain primarily norepinephrine, are target sites for oestradiol, and the nerve terminals of these neurons are co-localized with steroid hormone target neurons in the midbrain and diencephelon. The association between oestrogen and nitric oxide has also been suggested as a possible source of gender differences in pain (Dao et al 1998). The increased levels of nitric oxide following administration of exogenous oestrogen has been reported. The nerve growth factor / oestrogen link has been proposed as a possible mechanism for masticatory myalgias. Nerve growth factor is actively involved in many aspects of nociception, including the development and maintenance of the pain system, inflammation, and hyperalgesia. Berkley (1997) pointed out the differences in afferent input from internal structures to the central nervous system could not only produce different forms of visceral pain in females and males, but could also result in different emotional consequences of pain experiences. Many functions of the sympathetic nervous system have been reported to be influenced by gender, including lower levels of resting

sympathetic activity to skeletal muscles in women than in men (Ng et al 1993, Ettinger et al 1996). As part of the neural mechanisms that modulate pain signalling and modify emotional reactions to pain, intrinsic descending pain inhibitory systems such as those inducing opioid and non-opioid analgesia also appear to be influenced by both gender and the action of oestrogen and other gonadal hormones.

In addition to the biologic factors, males and females differ in their sensitivity to physiological signals. Men and women are exposed to different types and levels of psychosocial stress. As summarised by Dao and LeResche (2000) despite continuing societal changes, men and women still tend to fulfil the traditionally separate occupational as well as social roles. These differences may be the link with different pain conditions which as a result would be more likely to occur in males or females. With these multiple roles, women may be more likely to regard pain as serious and seek treatment sooner, in an effort to minimise its intrusiveness (Unruh 1996).

Assessment of pain

Pain intensity scores are important measures in the assessment of patients in both clinical and research contexts. Visual analogue scales (VAS), in which the line length is the response continuum, have been reported as valid and reliable measures for the intensity of pain (Huskisson 1974, Scott and Huskisson 1976). Also, the verbal anchor points on a VAS can be modified to delineate different dimensions of pain, so that although subjects use the same type of scale, they may respond differentially to multiple pain dimensions.

To examine the validity and reliability of the VAS for assessing two dimensions of pain, a prospective study was carried out by Price et al (1983). The following questions were addressed: Is a simple VAS sufficient for discriminating between the intensity and affective dimensions of pain? Does a VAS provide valid and reliable measures of experimental and chronic pain? Does a VAS yield pain measures on ratio, rather than interval scales? In the study, 20 chronic pain patients and 15 healthy volunteers participated. Each subject was exposed to 6 different intensities of temperature ranging between 35 and 51 degrees Celsius on their ventral forearm. A VAS was used to rate the sensation intensity and affective magnitude of both experimental and chronic pain. VAS responses and direct temperature matches to different levels of chronic pain indicated that the method provides meaningful information about the magnitude of clinical, as well as experimental pain. Power functions derived by visual analogue scales of pain can predict accurately pain intensity and pain affective magnitude along ratio, not interval scales. Ratio scales are crucial in comparing levels of pain across different groups of patients or subjects and comparing different levels of pain within the same individual.

Given the widespread use of the VAS, a study by Turp et al (2000) was undertaken to determine whether the generic pain intensity rating of patients presenting for evaluation and management of persistent facial pain was influenced by pain in locations other than the face. The prospective study was based on data from 40 consecutive female patients who were referred to a university clinic for the management of facial pain. Before a detailed history was obtained, each patient was asked to mark a VAS that best

represented their present pain intensity. Pain maps were used and participants were then asked to rate on a VAS the pain intensity for each of the indicated pain sites, without having access to the generic (overall) pain intensity score. Pearson's correlation coefficient was used to correlate the generic VAS pain intensity score with the maximum VAS pain intensity score reported for any body location, the VAS score of the face, the average VAS pain intensity score (pain intensity averaged about the scores of all specific pain sites of a patient), and the number of pain sites. Results of the study by Turp et al (2000) indicated that there was a considerable potential for these patients to overestimate or underestimate their site-specific facial pain. This may relate to the patients' interpretation of their pain problem and their degree of vulnerability that the pain problem creates for them.

Pain maps have been used widely in the evaluation of pain patients. High intra and inter-observer agreement (Ohnmeiss et al 1995) and a good test-retest reliability (Margolis et al 1988) has been established for these instruments. A study reported by Turp et al (1998) recruited 200 consecutive female patients who were referred to a university based pain clinic for the diagnosis and management of persistent musculoskeletal facial pain. Mean age and duration of pain of the study group was 37.5 years and 6.5 years respectively before being referred to the clinic. Patients were asked to mark all painful sites on sketches showing the contours of a human body in the frontal and rear views. Transparent templates containing square cells of equal size were projected over the sketches. Whenever a part of the patient's drawing touched a square on the template, this cell was scored as positive. The Intraclass Correlation Coefficient was computed. An

analysis of the pain distribution according to the arrangements of dermatomes revealed three distinct clusters of patients: 1) pain restricted to the region innervated by the trigeminal dermatome (n = 37); 2) pain in the trigeminal and cervical dermatomes (n = 32); and 3) pain sites involving dermatomes in addition to the ones listed above (n = 131). Widespread pain existed for longer durations (median 4 years, P = .02).

Epidemiology

Yap et al (2002a) reported a prospective analytical study of 107 subjects with mean age of 30.8 years in a hospital based pain clinic. The study investigated clinical TMD, pain related disability and psychological status of TMD patients utilising RDC/TMD criteria. The data obtained was subjected to non-parametric analysis using Kruskal-Wallis and Mann-Whitney tests at significance level of 0.05. The data reported in this study was: 1) 20.6% of the patients had myofascial pain but only 7.5% experienced limited mandibular opening associated with myofascial pain; 2) for both joints, the frequency of disc displacement with reduction was higher than that of disc displacement without reduction; 3) the frequency of arthralgia was low (right joint 8.4%, left joint 7.5%); 4) 78.5% of the patients had low disability with almost equal distribution between low and high intensity pain; 5) about 27.1% of the patients were moderately depressed and 11.2% had severe depression; 6) the three most frequently reported jaw function disabilities were eating hard foods (77.6%), yawning (75.7%) and chewing (64.5%); 7) severely depressed patients were also more distressed by heart or chest and lower back pain than normal or moderately depressed pain. The overall conclusion was that patients with myofascial pain

with or without limited opening were significantly more distressed by headaches compared with patients with no Group 1 (muscle disorders) diagnosis.

A retrospective analytical study which included 117 subjects with a mean age of 33.3 years in a hospital-based TMD clinic was reported by Yap et al (2002b). This study compared the levels of depression and somatisation in patients in single and multiple RDC/TMD diagnostic subgroups. The patients under 18 years of age and with a diagnosis of polyarthritis were excluded. Axis 1 diagnostic subgroups were

1 Myofascial pain only
2 Disc displacement only
3 Other joint conditions such as arthralgia, osteoarthritis, and osteoarthrosis
4 Group 1 & Group 2
5 Group 1 & Group 3
6 Group 2 & Group 3
7 Group 1, 2 & 3

Myofascial pain, disc displacement, and other joint conditions were found in 26%, 30%, and 13% of patients respectively. The remaining 31% of patients were diagnosed with a combination of two or all of the diagnoses. SCL-90 scores between groups were compared by analysis of variance tests to contrast depression and somatisation levels between the various diagnostic subgroups at 0.05 significance level. This study stated that 39% of patients with TMD were clinically depressed, 55% had elevated somatisation

scores. Patients diagnosed with myofascial pain and other joint conditions had significantly higher levels of depression and somatisation.

A study reported by Epker et al (2000) was undertaken to identify potential differential predictive models for determining the risk factors associated with treatment-seeking behaviour in sub-groups of TMD patients; patients were diagnosed on the physical characteristics of their disorder. This is a cross-sectional analytical study. A total of 177 subjects with self-reported pain in the TMJ and/or associated muscle area were recruited. Each subject had either never sought treatment or was within 6 months of his/her initial visit to a physician's office for relief of symptoms. Mean age of the subjects was 34.7 years and mean duration of pain was 57.6 months. Patients were diagnosed according to the RDC/TMD criteria. In addition, Beck Depression Inventory, Multidimensional Pain Inventory, and Minnesota Multiphasic Personality Inventory, were used. After initial assessment, patients were contacted after 6 months regarding whether they had sought treatment. Axis 1 diagnoses were divided into 3 subgroups using the RDC/TMD data: 1) those with a Group 1 disorder (myofascial pain); 2) those with a Group 2 and/or Group 3 disorder (disc displacements and other joint conditions); 3) and those without an Axis 1 diagnosis on the RDC/TMD. Each of the diagnostic groups was analysed separately to determine significant differences on the dependent measures between those patients who continued to seek treatment and those who did not. Dependent measures consisted of…(age, gender, education, marital status, race, duration of pain, medication usage, pain intensity score, disability score, depression and somatisation) scores. Each of the diagnostic groups was analysed separately to determine significant differences on the

dependent measures. The data were interpreted with analysis of variance, Mann-Whitney U tests and Chi square analyses. This investigation clearly demonstrated that there were significant differences in an array of demographic and psychosocial variables between TMD patients who sought treatment and those who did not. In addition, the differences between these two groups varied depending on the physiologic characteristics of the TMD with which they were diagnosed. The risk factors that emerged for a diagnosis of myofascial pain were female gender, shorter duration of symptoms and higher scores on the affective distress scales. The risk factors for disc displacement or other joint conditions were intensity of pain, race, and high scores on an introversion scale. For those patients without the RDC diagnosis, the only risk factor was pain intensity.

A study reported by Lindroth et al (2002) identified differences between the myofascial pain and the intra-capsular pain groups of TMD and compared these differences on the behavioural and psychosocial domains. It is a retrospective analytical study. In this study 574 subjects seen at a pain clinic with a mean age of 36 years were analysed. All the subjects were examined following RDC/TMD criteria. Analysis of variance was used to analyse separately the differences between the two groups on pain severity, affective and sensory pain descriptors, life stressors and sleep quality. There was no significant difference between the two diagnostic groups in pain severity or pain duration. The masticatory muscle pain group was more psychologically distressed and revealed more dysfunctional adaptation than the intra-capsular pain group.

This limited literature review suggests that there is a complex and dynamic interaction between physiologic, psychologic, and social factors that often results in, or at least maintains chronic pain conditions. These variables seem to be associated characteristically with different diagnostic subgroups. Some of these associations could be risk factors and predictors of treatment-seeking behaviour.

AIM

A retrospective analytical study has been undertaken to investigate characteristic biological and psychological features in a group of patients referred to a hospital-based Orofacial Pain clinic at Westmead Centre for Oral Health.

HYPOTHESIS

Different diagnostic subgroups have characteristic demographic, physical, and psychological features.

STUDY DESIGN

Clinical examination

Axis I :History Questionnaire (see appendix 1)

Diagnostic classification of the most common TMD subtypes (see appendix 2)

Detailed specifications are provided for conducting a reliable clinical examination to yield RDC/TMD diagnoses of the most common types of TMD (Dworkin and LeResche 1992). The RDC/TMD clinical examination involves clinical assessment of TMD signs and symptoms, summarized as follows:

Pain site. Assessment of presenting pain as ipsilateral or contralateral to pain provoked by clinical examination of masticatory muscles and by tests of jaw function

Mandibular range of motion (in millimetres) and associated pain. Jaw opening patterns are assessed for corrected/uncorrected deviations in jaw excursions during vertical jaw opening. The vertical range of motion of the mandible (extent of unassisted opening without pain, maximum unassisted opening, maximum assisted opening) is measured together with the extent of mandibular excursive movements (extent of lateral and protrusive jaw excursions).

Temporomandibular joint (TMJ) sounds. Assessment by careful palpation of clicking, grating, and/or crepitus joint sounds during vertical, lateral, and protrusive jaw excursions.

Muscle and joint palpation for pain or tenderness. The extraoral masticatory and related muscles (n = 18 muscle sites) and the TMJ (n = 4 joint sites, 2 sites per joint).

The RDC/TMD protocol groups the most common forms of TMD into three diagnostic categories and allows multiple diagnoses to be made for a given patient.

The RDC/TMD diagnostic subgroups are:

Group I. Muscle disorders

a. Muscle pain

b. Muscle pain with limited opening

Group II. Disc displacements

a. Disc displacement with reduction

b. Disc displacement without reduction, with limited opening

c. Disc displacement without reduction without limited opening

Group III. Arthralgia, arthritis, arthrosis

a. Arthralgia

b. Osteoarthritis of the TMJ

c. Osteoarthrosis of the TMJ

Psychosocial assessment

Axis II

The history questionnaire includes 31 questions covering information devoted to demographics, pain characteristics and Axis II psychosocial assessment. Questions about age, gender, ethnicity, education level, marital status, and income level provide demographic information of the study population. Pain intensity and pain-related disability were measured on an 11 point visual analogue scale (VAS) ranking from 0 to 10. Oral habits and other possible risk factors, assessed as a summary score of limitations in ability to use the jaw, provided data on parafunctional behaviours and jaw disability.

Psychosocial functioning was assessed through the Graded Chronic Pain (GCP) scale (Von Korff et al 1992), which yields a score of 0 to IV (0 = no pain; IV = severe dysfunction), reflecting the severity and impact of TMD on interference with usual functioning at home, work, or school and incorporating disability days as a result of TMD pain. (see appendix 3). Psychological status was assessed through depression and non-specific physical symptom scores measured with subscales of the Symptom Checklist-90 Revised (SCL-90-R) (Derogatis 1983, see appendix 4).

Data collection

Systematic compilation of data from patient files was tabulated according to the following variables

1)	Age	Frequency
2)	Gender	Frequency Pain intensity
3)	Pain	Intensity Number of tender muscle sites
4)	Pain related disability	Daily activities Social and recreational activities Graded chronic pain status
5)	Functional disability	Chewing Drinking Exercising Eating hard foods Eating soft foods Smiling/Laughing Sexual activity Cleaning teeth or face Yawning Swallowing Talking Having your usual facial appearance Inter-incisal opening
6)	Parafunction	Awareness of sleep bruxism Daytime clenching Morning stiffness/soreness in jaw muscles
7)	Psychosocial	Depression Somatisation
8)	Diagnostic subgroups	**TMD group** o Muscle pain o Joint pain o Muscle and joint pain **Non-TMD group** o Other orofacial pain

DATA ANALYSIS

Study population

The study population consists of 194 consecutive patients referred from within the hospital and from private practice for diagnosis and management to the Orofacial Pain clinic of Westmead Centre for Oral Health, University of Sydney. The period of initial assessment was February 2002 to December 2003.

Prof. S Dworkin and Ms K Huggins visited Westmead Centre for Oral Health in 2000 to calibrate Prof. I Klineberg, Dr C Wallace and two specialists from Melbourne for RDC/TMD. Since then MDSc (Prosthodontics) post graduate students have been trained to record the data as per RDC/TMD criteria.

History and clinical examinations were conducted by the MDSc (prosthodontics) post graduate students. Standardized Questionnaire, Case history form, and Clinical Examination forms were used. The information has been systematically retrieved from the files of 194 patients.

Demographics

The age range of patients was 13 years to 78 years with a mean age of 42.5 years. The largest patient group was in the 4th decade of life. The data revealed that 76% of the patients were women. Nearly 46% of patients belonged to the lower income group (Fig.1 and Fig.2).

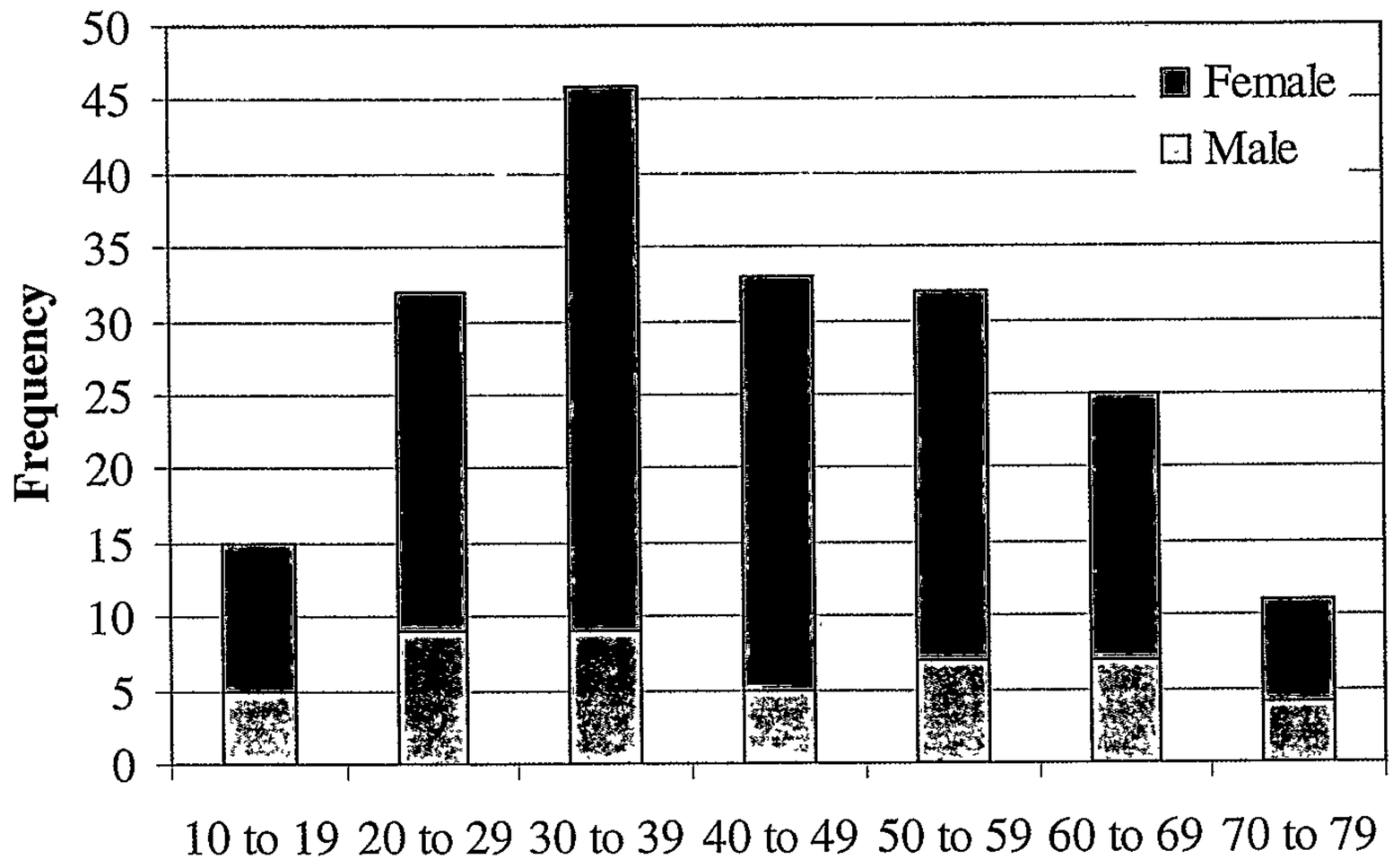
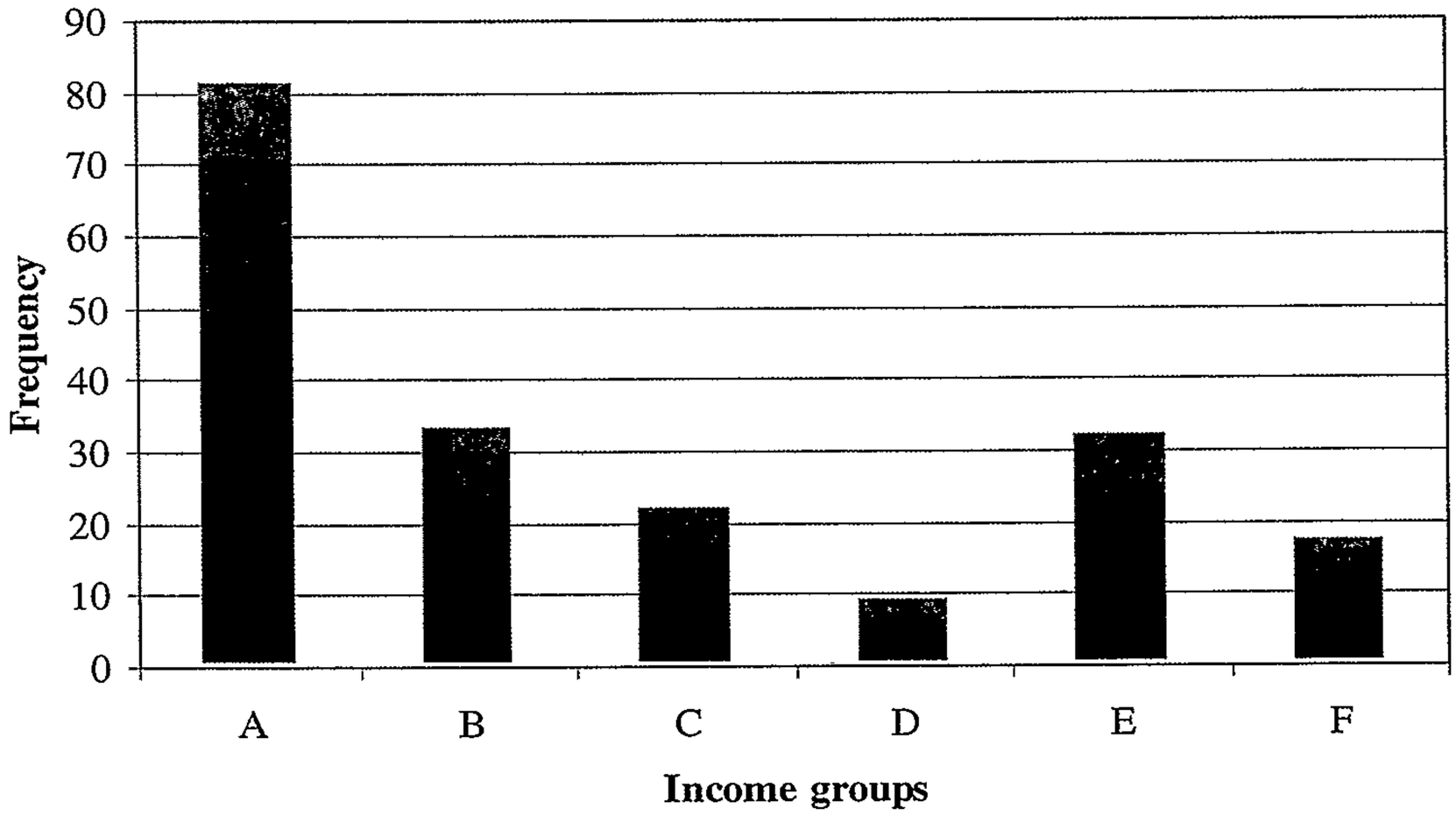


Figure 1. Illustrates graphic presentation of number of females, males and total subjects in each age group in decades.



Group A = $0 to $ 14999; Group B = $15000 to $ 24999; Group C = $25000 to $ 34999; Group D = $35000 to $ 49999; Group E = $50000 or more; Group F = Information regarding income was not disclosed.

Figure 2. Illustrates graphic presentation of distribution of total subjects amongst income groups.

Statistical analysis

The subjects were grouped into one of four diagnostic subgroups as described earlier, and further analysis was performed by grouping the TMD subgroups together.

A general linear model was used to analyse ranked data. Univariate procedure provides regression analysis and analysis of variance for one dependent variable by one or more factors and/or variables. An overall F test was performed to test the null hypotheses about the effects of other variables on the means of various groupings of a single dependent variable. Estimated marginal means were calculated to give estimates of predicted mean values for the cells in the model which allows ready visualisation of some of the relationships. To test the effects between the groups, pairwise comparisons were performed. Statistical significance was assessed at the 0.05 level, and then adjusted for multiple comparisons by the Bonferroni method.

Pearson's chi-square analysis was used for nominal and binomial data. Statistical significance was assessed at 0.05 level. Kruskal-Wallis test was performed to determine the significance of nonparametric data. Statistical package for Social Sciences (SPSS) version 11.5, SPSS Inc., Chicago was used for all the statistical analyses.

Data has been analysed and presented numerically as percentages, where appropriate, and in graphical form.

RESULTS

194 consecutive patients assessed between Feb 2002 and Dec 2003 were included in the study. The diagnostic subgroups were established as per RDC/TMD criteria.

The diagnostic subgroups were:

Diagnostic group	Frequency	Percentage
1) Muscle pain only	46	24%
2) Joint pain only	26	13%
3) Muscle and joint pain	85	44%
4) Other orofacial pain	37	19%
Total	194	100%

In the **other orofacial pain** group, 10 patients reported no pain.

Graphical presentation of diagnostic subgroups

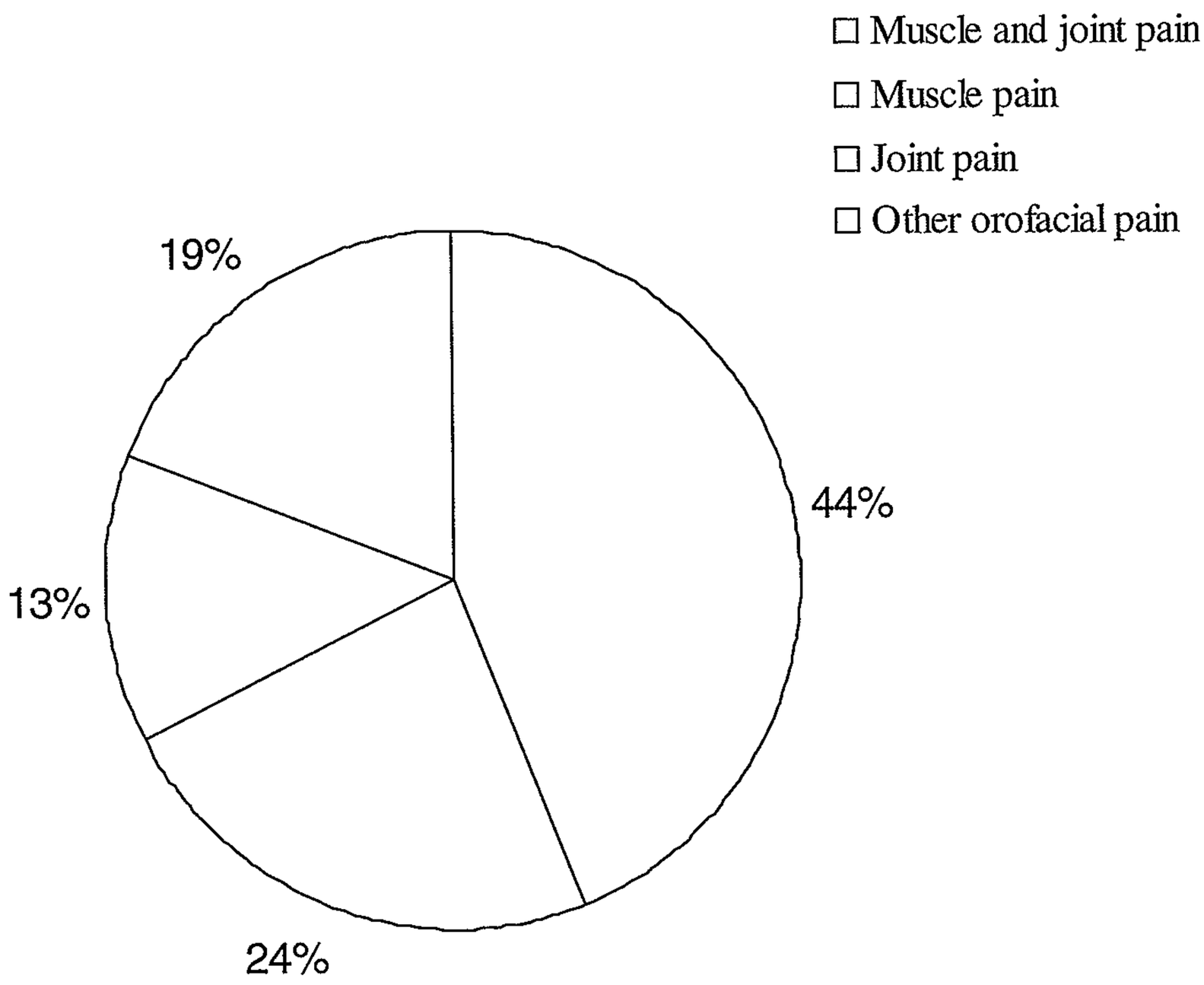


Figure 3. Pie chart illustrating diagnostic subgroups

Pain intensity

Q. How many years ago did your facial pain begin for the first time?

Diagnostic group	Mean duration Years	Frequency N	Standard deviation	Median
Muscle pain	4.07	43	4.74	2.00
Muscle and joint pain	4.01	80	4.49	2.50
Joint pain	3.69	21	5.48	1.00
Other orofacial pain	2.36	35	3.90	1.00
	3.66	179	4.58	2.00

Q. How would you rate your facial pain on a 0 to 10 scale at the present time; that is right now?

Tests of between subjects effects show present pain intensity is significantly affected by diagnostic group membership ($F(3,179) = 2.91$, $P<.05$).

Diagnostic group	Mean pain intensity	Frequency N	Standard deviation	Median
Muscle and joint pain	5.12	85	2.66	5.00
Muscle pain	4.72	46	3.45	4.50
Joint pain	3.86	22	2.29	4.50
Other orofacial pain	3.44	27	2.76	3.00
	4.61	180	2.90	5.00

Pairwise comparisons between groups indicate that pain intensity is significantly different between diagnostic subgroup **muscle and joint pain and other orofacial pain.** ($P< .05$)

Q. In the past six months, how intense was your worst pain?

Tests of between subjects effects show pain intensity of the worst pain over the past six months is significantly affected by diagnostic group membership (F (3,179) = 2.66, P = .05).

Diagnostic group	**Mean value**
Muscle and joint pain	7.86
Joint pain	7.25
Muscle pain	7.02
Other orofacial pain	6.48

Pairwise comparison between the groups indicate that pain intensity is not statistically significant.

Q. In the past six months, on the average, how intense was your pain?

Tests of between subject effects show pain intensity over past six months is not affected by diagnostic group membership (F (3, 177) = 2.13, P > .05).

Diagnostic group	**Mean value**
Muscle pain	6.44
Muscle and joint pain	6.22
Joint pain	6.14
Other orofacial pain	4.96

Pairwise comparison between the groups indicate that pain intensity is not statistically significant.

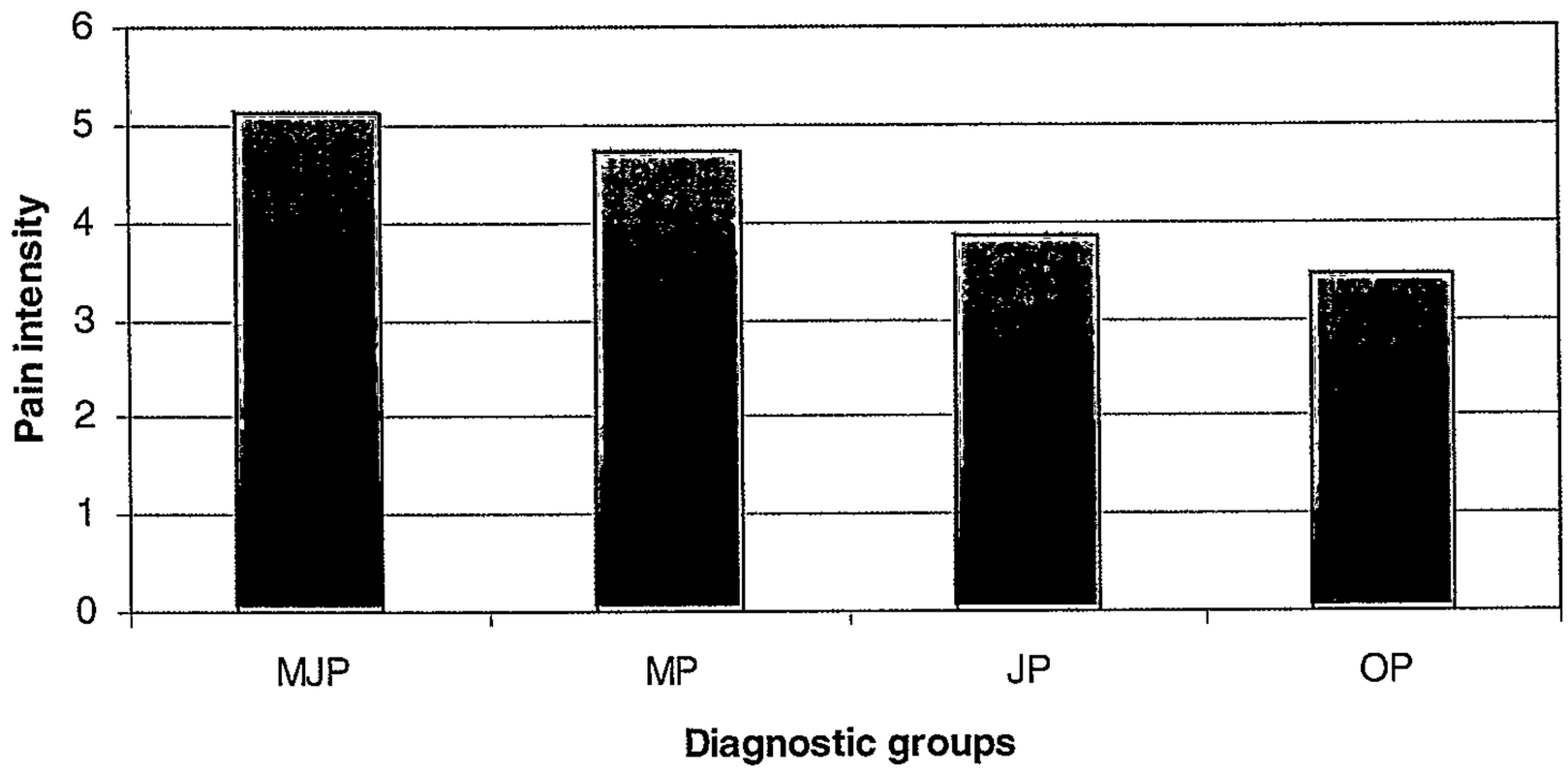


Figure 4. Graphic presentation of pain intensity within diagnostic subgroups at initial presentation. (MJP = Muscle and joint pain; MP = Muscle pain; JP = Joint pain; OP = Other orofacial pain)

Q. Is the reported pain intensity higher in women than men?

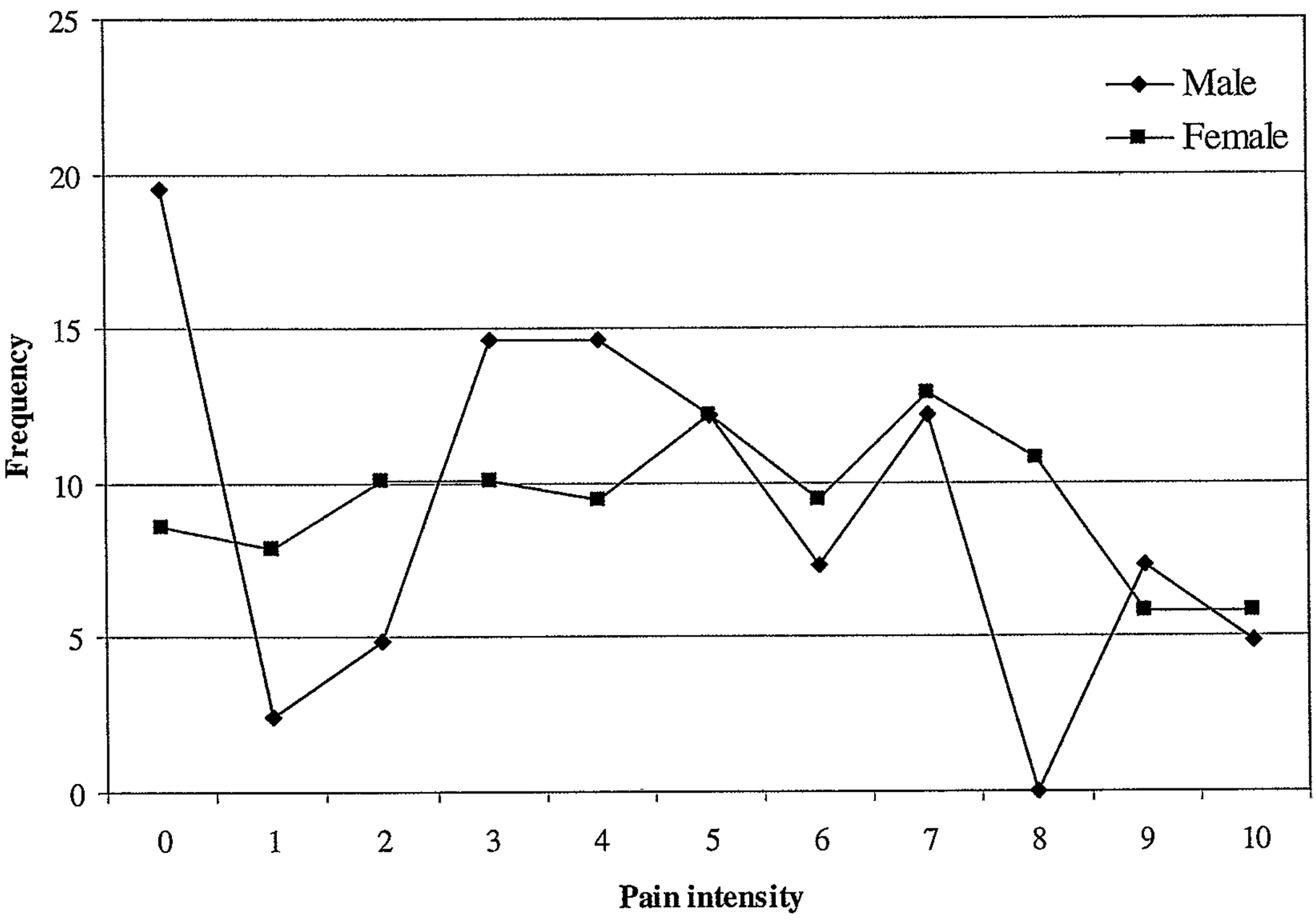


Figure 5. Graphic presentation of reported pain intensity within gender

Pain intensity was scored on a VAS scale (where 0 is no pain, and 10 is "pain as bad as could be"). Mean pain intensity at the time of initial assessment was 4.61 and mean duration was 3.66 years. Pain intensity at the time of initial assessment was reported higher in the **muscle and joint pain** group followed by **muscle pain, joint pain and other orofacial pain** groups in descending order (Figure 4). Pain intensity was significantly higher in the **TMD group** than the **other orofacial pain** group. Higher percentage of women have reported greater pain intensity than men. Chi square and Pearson's correlation test were not statistically significant for pain intensity within gender.

Average pain intensity over the past six months was consistently reported higher in the **TMD** group than the **other orofacial pain** group; however it was not statistically significant.

Pain related disability

Q. In the past six months, how much has facial pain interfered with your daily activities?

Tests of between subjects effect show effect on daily activities is statistically significant for diagnostic group membership ($F(3, 177) = 3.77$, $P < .05$).

Diagnostic group	**Mean value**
Muscle and joint pain	4.49
Joint pain	4.00
Muscle pain	3.16
Other orofacial pain	2.46

In comparison between the groups, the significance is noted between

muscle and joint pain and other orofacial pain P< .05

Q. In the past six months, how much has facial pain changed your ability to take part in recreational, social and family activities?

Tests of between subjects effect show effect on ability to take part in social activities is statistically significant for the diagnostic group membership (F (3, 179) = 5.41, P< .01).

Dignostic group	**Mean value**
Muscle and joint pain	3.94
Joint pain	3.64
Other orofacial pain	2.22
Muscle pain	1.98

Comparison within the groups is significant between

muscle and joint pain and muscle pain P< .01

Q. In the past six months, how much has facial pain changed your ability to work including housework?

Tests of between subjects effect shows effect on ability to work is statistically significant for the diagnostic group membership (F (3, 178) = 7.195, P<.001).

Diagnostic group	**Mean value**
Muscle and joint pain	3.91
Joint pain	3.46
Muscle pain	2.07
Other orofacial pain	1.30

Comparison between the groups is significant between

muscle and joint pain and muscle pain P< .01

muscle & joint pain and other orofacial pain P< .01

The effect of pain on daily activities including household work and the ability to take part in social and recreational activities was assessed on a VAS scale (where 0 is"no interference/no change" and 10 is "unable to carry on any activities/extreme change")

The effect was pronounced in the **muscle and joint pain** group. Comparison between the groups revealed patients in the **muscle and joint pain** group were affected more than patients within the **muscle pain** and **other orofacial pain** groups.

Impact on daily activities was more significant in the **TMD** group than **other orofacial pain** group, however social activities were affected in the **other orofacial pain** group also.

Graded chronic pain status

Q. Does the diagnostic subgroup have an effect on graded chronic pain status?

Diagnostic group	**Mean ranking**
Muscle and joint pain	118.59
Muscle pain	93.60
Joint pain	90.25
Other orofacial pain	58.99

Non parametric Kruskal-Wallis test shows graded chronic pain status is significant for diagnostic group membership P< .001.

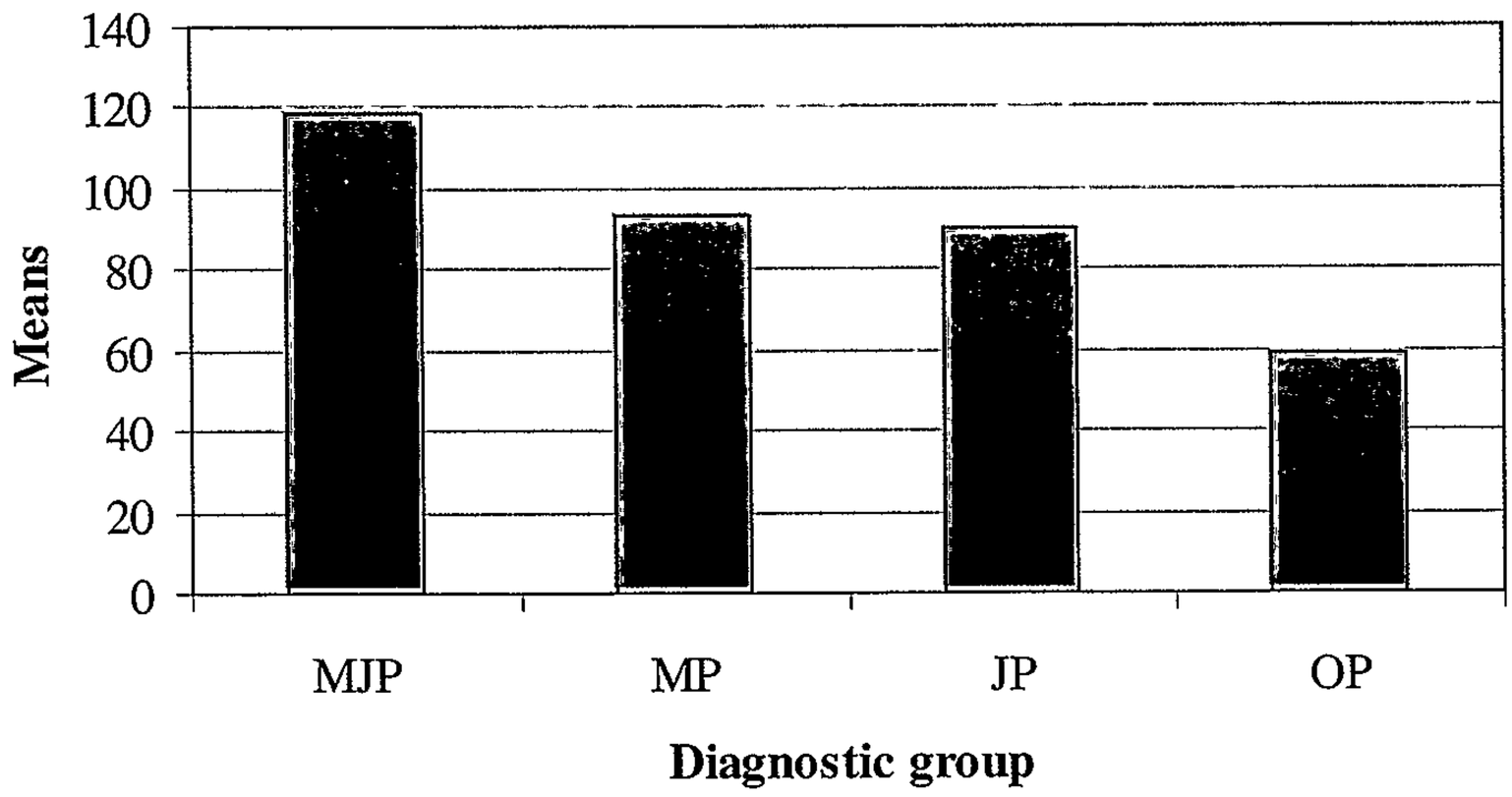


Figure 6. Graphic presentation of distribution of graded chronic pain status within diagnostic subgroups. (MJP = Muscle and joint pain; MP = Muscle pain; JP = Joint pain; OP = Other orofacial pain).

Frequency of graded chronic pain status within diagnostic subgroups

Pearson's chi-square P< .01

	Muscle and joint pain	**Muscle pain**	**Joint pain**	**Other orofacial pain**	**N=194 100%**
Grade 0	1.2%	4.3%	15.4%	29.7%	18 (9.3%)
Grade 1	20%	21.7%	19.2%	32.4%	44 (22.7%)
Grade 2	41.2%	60.9%	53.8%	32.4%	89 (45.9%)
Grade 3	18.8%	2.2%	7.7%	2.7%	20 (10.3%)
Grade 4	17.6%	6.5%	3.8%	.0%	19 (9.8%)

Table 1. Shows percentage of graded chronic pain status within the different diagnostic subgroups.

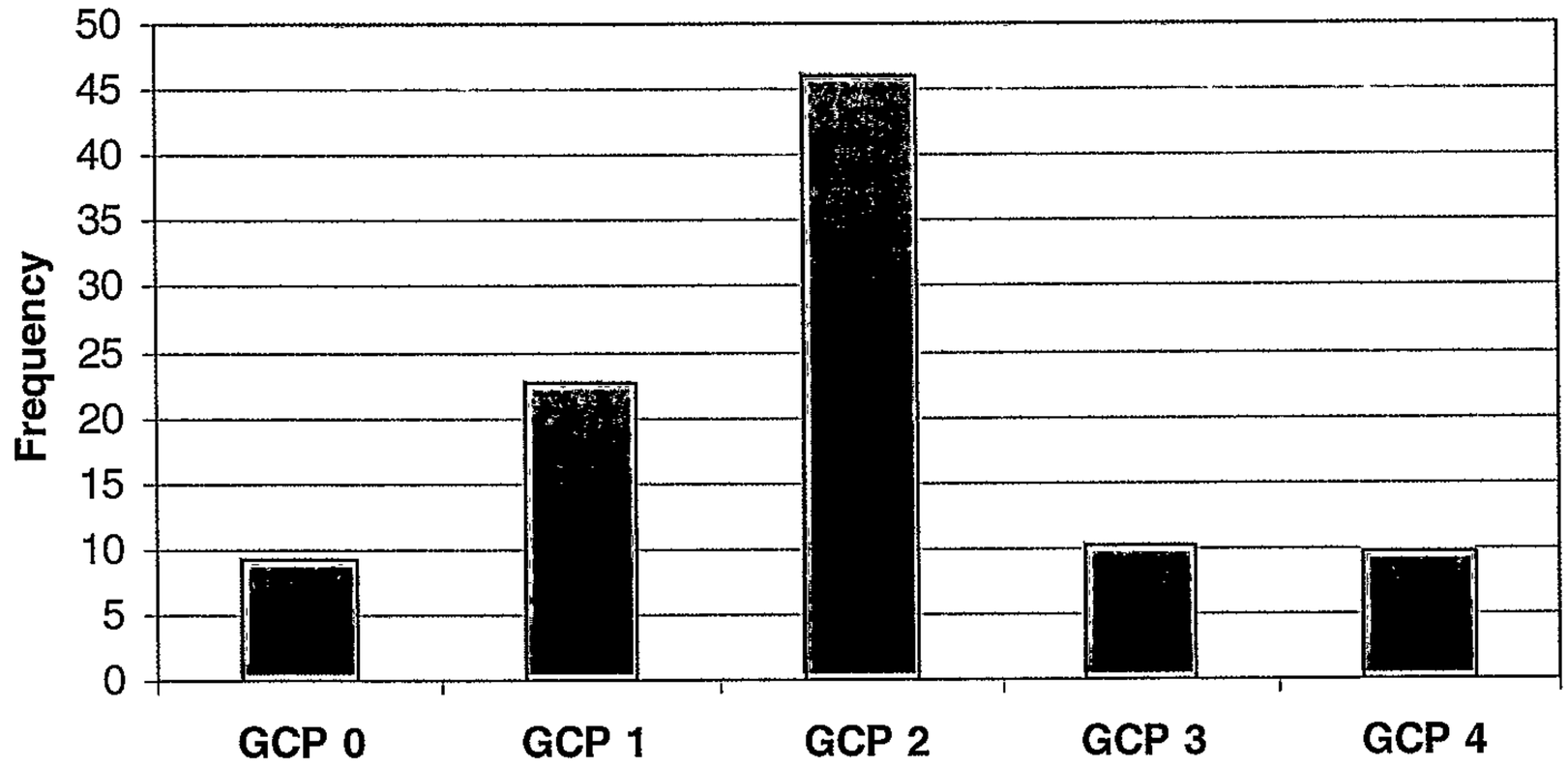


Figure 7. Illustrates distribution of the study population within graded chronic pain status (GCP 0 = no TMD pain and no pain-related disability; GCP I = low pain intensity and low pain-related disability; GCP II = high pain intensity and low pain-related disability; GCP III = moderately limiting disability; GCP IV = severely limiting disability).

Frequency of graded chronic pain status was higher in grade II (45.9%) and grade I (22.7%) (Figure 6). Within diagnostic subgroups, in grade II and I maximum patients were in **muscle pain** followed by **joint pain** and **muscle and joint pain**. However, in grade III and IV; percentage was highest in the **muscle and joint pain** group. (Table1).

Parafunction

Q. Have you been told, or do you notice that you grind your teeth or clench your jaw while sleeping at night?

Diagnostic group	**Yes**	**No**
Joint pain	57.7%	42.3%
Muscle and joint pain	54.8%	45.2%
Muscle pain	51.1%	48.9%
Other orofacial pain	31.4%	68.6%

Pearson's chi square test shows awareness of grinding or clenching during sleeping at night is not significant for diagnostic group membership ($F(3,190) = 6.22$, $P > .05$). However, a higher percentage of subjects reported positive awareness in the **TMD** group than the **other orofacial pain** group.

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Q. during the day, do you grind your teeth or clench your jaw?

Diagnostic group	**Yes**	**No**
Muscle Pain	58.7%	41.3%
Muscle and joint pain	57.6%	42.4%
Joint pain	53.8%	46.2%
Other orofacial pain	27.8%	72.2%

Person's chi square test shows grinding or clenching during the day is significant for diagnostic group membership ($F(3,193) = 10.40$, $P < .05$).

Q. Does your jaw ache or feel stiff when you wake up in the morning?

Diagnostic group	**Yes**	**No**
Muscle and joint pain	73.8%	26.2%
Muscle pain	60.9%	39.1%
Joint pain	53.8%	46.2%
Other orofacial pain	38.9%	61.1%

Pearson's chi square test shows jaw ache or stiffness in the morning is significant for diagnostic group membership ($F(3,192) = 13.79$, $P < .01$).

Cross-tabulation of positive responses to anamnestic indicators within diagnostic sub-groups

	Muscle and joint pain	Muscle pain	Joint pain	Other orofacial pain	P value
Night time grinding	54.8%	51.1%	57.7%	31.4%	>.05
Daytime clenching	57.6%	58.7%	53.8%	27.8%	<.05
Morning stiffness	73.8%	60.9%	53.8%	38.9%	<.01

Table 2. Shows percentage of positive responses within the diagnostic subgroups to different anamnestic indicators.

In this study, the relationship of bruxism was analysed with anamnestical indicators. Awareness of night time grinding/clenching was not statistically significant. More positive responses were noted in the **muscle and joint pain** and **muscle pain** groups and were significant for the **TMD** group than the **other orofacial pain** group.

Functional disability

Q. What activities does your present jaw problem prevent or limit you from doing?

Chewing

Diagnostic group	Yes	No
Muscle and joint pain	81.2%	18.8%
Joint pain	69.2%	30.8%
Muscle pain	56.5%	43.5%
Other orofacial pain	54.1%	45.9%

Pearson's chi square test shows presentation of difficulty in chewing is significant for diagnostic group membership (F (3,194) = 12.98, P< .01).

Drinking

Diagnostic group	**Yes**	**No**
Muscle pain	17.4%	82.6%
Muscle and joint pain	10.6%	89.4%
Joint pain	7.7%	92.3%
Other orofacial pain	2.7%	97.3%

Pearson's chi square test shows presentation of difficulty in drinking is not significant for diagnostic group membership (F (3,194) = 5.01, P> .05).

Exercising

Diagnostic group	**Yes**	**No**
Muscle and joint pain	27.1%	72.9%
Muscle pain	13%	87%
Joint pain	.11.5%	86.5%
Other orofacial pain	5.4%	94.6%

Pearson's chi square test shows presentation of difficulty in exercising is significant for diagnostic group membership (F (3,194) = 10.38, P<.05).

Eating hard foods

Diagnostic group	Yes	No
Muscle and joint pain	83.5%	16.5%
Joint pain	69.2%	30.5%
Muscle pain	63%	37%
Other orofacial pain	66.7%	33.3%

Pearson's chi square test shows presentation of difficulty in eating hard food is significant for diagnostic group membership ($F(3, 193) = 8.09$, $P < .01$).

Eating soft food

Diagnostic group	Yes	No
Joint pain	19.2%	80.8%
Muscle and Joint pain	19%	81%
Muscle pain	15.2%	84.8%
Other orofacial pain	8.3%	91.7%

Pearson's chi square test shows presentation of difficulty in eating soft food is not significant for diagnostic group membership ($F(3,192) = 2.35$, $P > .05$).

Swallowing

Diagnostic group	Yes	No
Muscle pain	19.6%	80.4%
Muscle and joint pain	16.5%	83.5%
Joint pain	15.4%	84.6%
Other orofacial pain	5.6%	94.4%

Pearson's chi square test shows difficulty in swallowing is not significant for diagnostic group membership ($F(3,193) = 3.4$, $P > .05$)

Smiling/Laughing

Diagnostic group	Yes	No
Muscle and joint pain	54.1%	45.9%
Joint pain	42.3%	57.7%
Muscle pain	37%	63%
Other orofacial pain	16.7%	83.3%

Pearson's chi square test shows presentation of difficulty in smiling and/or laughing is significant for diagnostic group membership ($F(3,193) = 15.12$, $P < .01$)

Sexual activity

Diagnostic group	Yes	No
Muscle and joint pain	16.9%	83.1%
Joint pain	7.7%	92.3%
Muscle pain	4.8%	95.2%
Other orofacial pain	11.1%	88.9%

Pearson's chi square test shows difficulty in sexual activity is not significant for diagnostic group membership ($F(3, 187) = 4.49$, $P>.05$)

Cleaning teeth or face

Diagnostic group	Yes	No
Muscle and joint pain	36.5%	63.5%
Muscle pain	32.6%	67.4%
Joint pain	26.9%	73.1%
Other orofacial pain	5.6%	94.4%

Pearson's chi square test shows difficulty in cleaning teeth or face is significant for diagnostic group membership ($F(3,193) = 12.36$, $P<.01$)

Yawning

Diagnostic group	Yes	No
Muscle and joint pain	77.6%	22.4%
Muscle pain	60.9%	39.1%
Joint pain	53.8%	46.2%
Other orofacial pain	41.7%	58.3%

Pearson's chi square test shows difficulty in yawning is significant for diagnostic group membership ($F(3,193) = 15.96$, $P < .01$).

Talking

Diagnostic group	Yes	No
Muscle and joint pain	51.8%	48.2%
Joint pain	30.8%	69.2%
Muscle pain	30.4%	69.6%
Other orofacial pain	13.9%	86.1%

Pearson's chi square test shows difficulty in swallowing is significant for diagnostic group membership ($F(3,193) = 17.52$, $P < .01$).

Having your usual facial appearance

Diagnostic group	Yes	No
Muscle and joint pain	23.5%	76.5%
Muscle pain	22.2%	77.8%
Joint Pain	7.7%	92.3%
Other orofacial pain	11.1%	88.9%

Pearson's chi square test shows difficulty in maintaining usual facial appearance is not significant for diagnostic group membership ($F(3,192) = 5.09$, $P > .05$).

	Muscle and joint pain	Muscle pain	Joint pain	Other orofacial pain	P value	Frequency within study population
Eating hard food	83.5%	63.0%	69.2%	66.7%	<.01	73.6%
Chewing	81.2%	56.5%	69.2%	54.1%	<.01	68.6%
Yawning	77.6%	60.9%	53.8%	41.7%	<.01	63.7%
Smiling and laughing	54.1%	37.0%	42.3%	16.7%	<.01	41.5%
Talking	51.8%	30.4%	30.8%	13.9%	<.01	36.8%
Cleaning teeth or face	36.5%	32.9%	26.9%	5.6%	<.01	28.5%
Exercising	27.1%	13.0%	11.5%	5.4%	<.05	17.5%
Having your usual facial appearance	23.5%	22.2%	7.7%	11.1%	>.05	18.8%
Soft food	19.0%	15.2%	19.2%	8.3%	>.05	16.1%
Swallowing	16.5%	19.6%	15.4%	5.6%	>.05	15.0%
Sexual activity	16.9%	4.8%	7.7%	11.1%	>.05	11.8%
Drinking	10.6%	17.4%	7.7%	2.7%	>.05	10.3%

Table 3. Shows frequency of positive responses to anamnestic indicators within diagnostic subgroups and study population

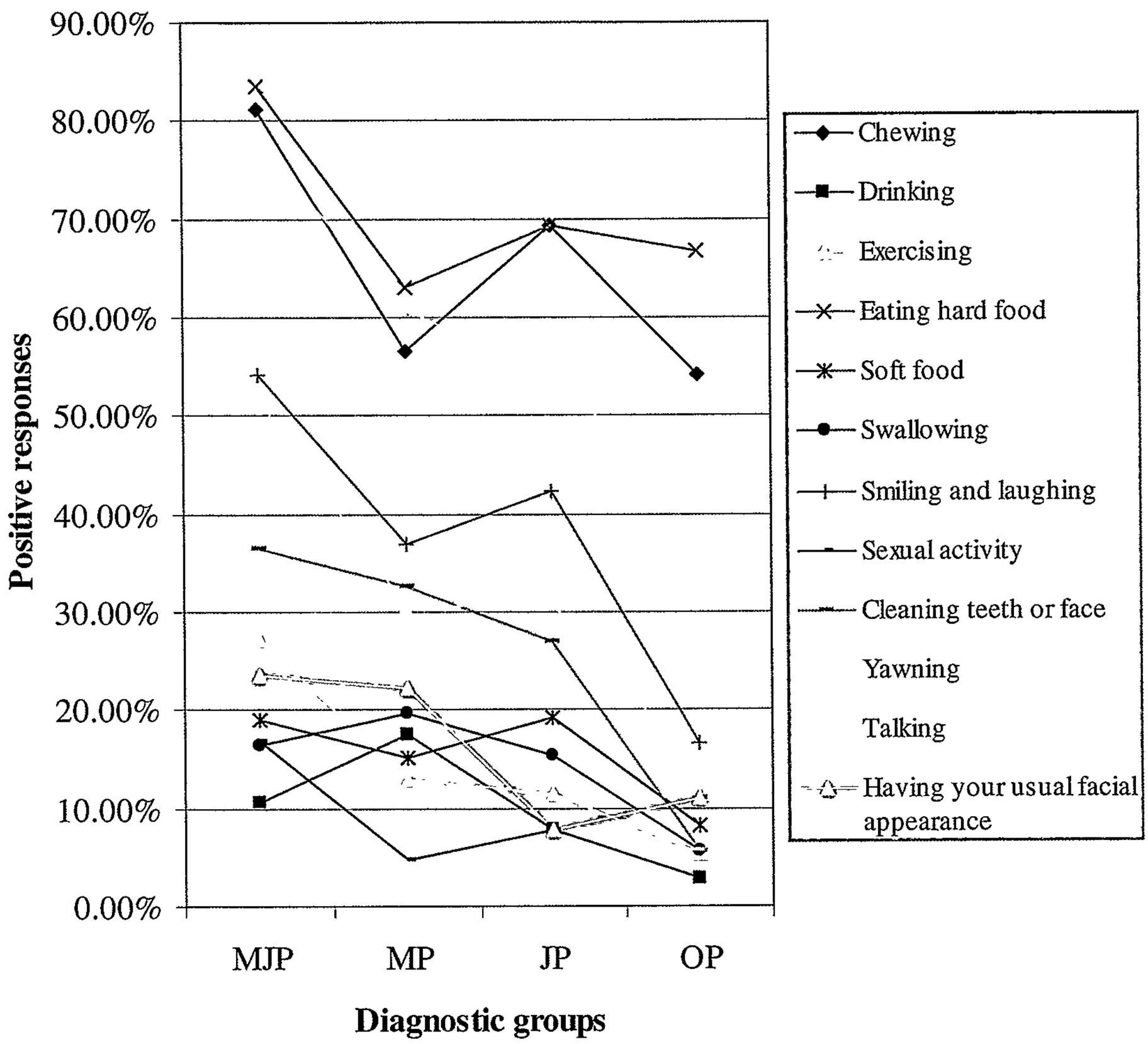

Figure 8. Illustrates percentage of positive responses to anamnestic indicators. (MJP = Muscle and joint pain; MP = Muscle pain; JP = Joint pain; OP = Other orofacial pain).

All the indicators except drinking, eating soft food, swallowing, sexual activity and having usual facial appearance were statistically significant for diagnostic group membership.

Difficulty in eating hard food, chewing, and yawning were the most frequently reported symptoms (P<.01) (Figure 7). Difficulty in yawning was significantly higher in the

muscle and joint pain (77.6%) and **muscle pain** (60.9%) groups, whereas difficulty in chewing and eating hard food was higher in the **muscle and joint pain** (81.2% and 83.5%) and **joint pain** (69.2%) respectively (Table 3).

Q. Is there a correlation between number of tender muscle sites, diagnostic group membership and inter-incisal opening?

A one way ANOVA test was performed to determine the correlation between number of tender muscle sites and diagnostic group membership

Diagnostic group	**Mean value**
Muscle and joint pain	8.41
Muscle pain	7.96
Joint pain	3.31
Other orofacial pain	1.41

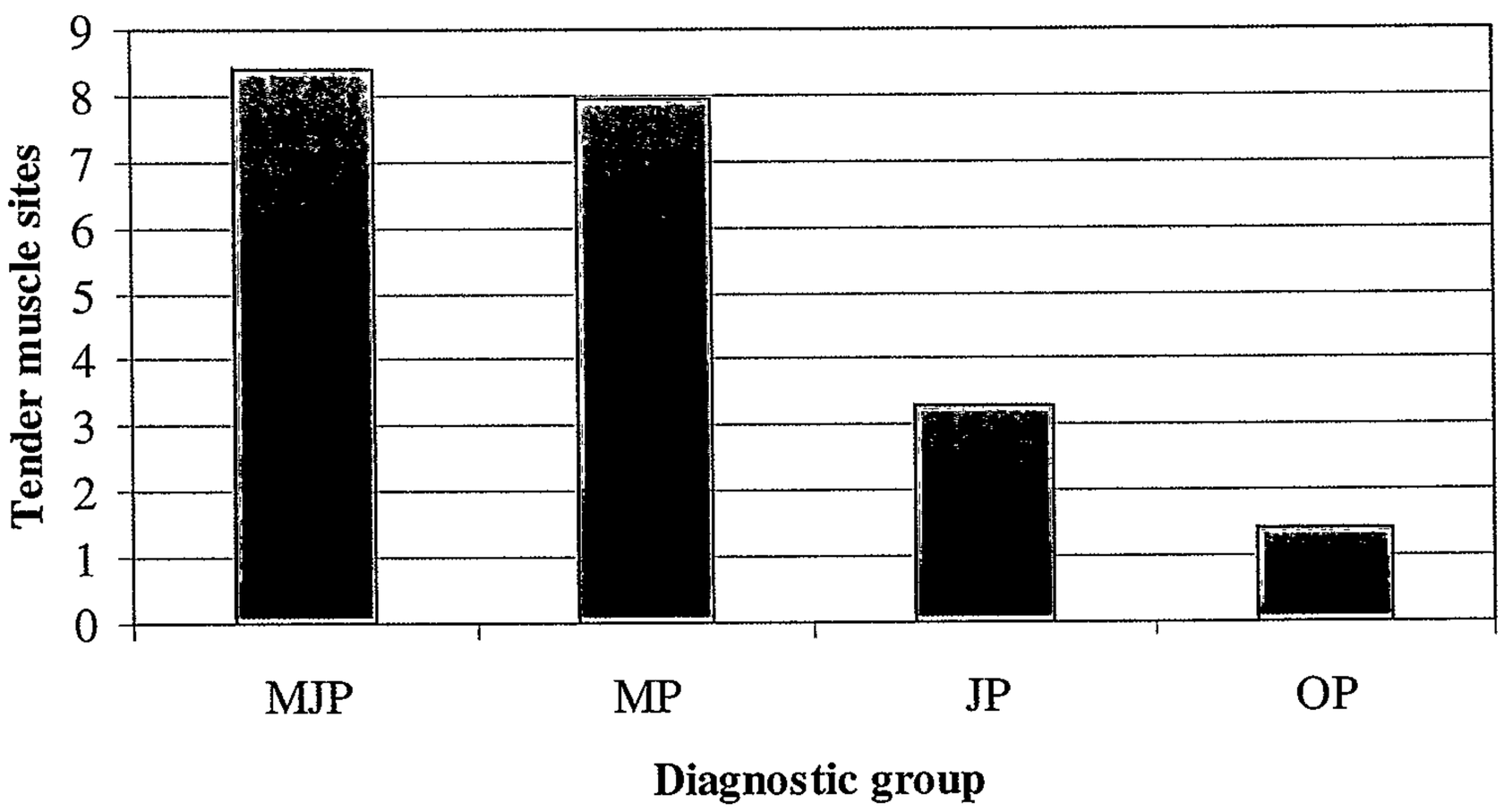

Figure 9. Illustrates correlation of no. of tender muscle sites and diagnostic group membership. (MJP = Muscle and joint pain; MP = Muscle pain; JP = Joint pain; OP = Other orofacial pain).

Correlations

		e4a	Number of tender sites
e4a	Pearson Correlation	1	-.309(**)
	Sig. (2-tailed)	.	.000
	N	194	194
Number of tender sites	Pearson Correlation	-.309(**)	1
	Sig. (2-tailed)	.000	.
	N	194	194

** Correlation is significant at the 0.01 level (2-tailed).

Table 4. Shows the inverse relationship of number of tender muscle sites and inter-incisal opening.

Number of tender muscle sites and diagnostic group membership are statistically significant P< .001 (Table 4).

To test the correlation between number of tender muscle sites and inter-incisal opening Pearson's Correlation test was performed. It is statistically significant P< .01. The negative value of Pearson's Correlation indicates an inverse relationship between the number of tender muscle sites and inter-incisal opening (Table 4).

Psychosocial

Q. Is there a correlation between depression and diagnostic group membership?

Nonparametric Kruskal-Wallis test shows

Diagnostic group	**Mean ranks**
Muscle and joint pain	108.85
Joint pain	100.96
Muscle pain	91.14
Other orofacial pain	76.91

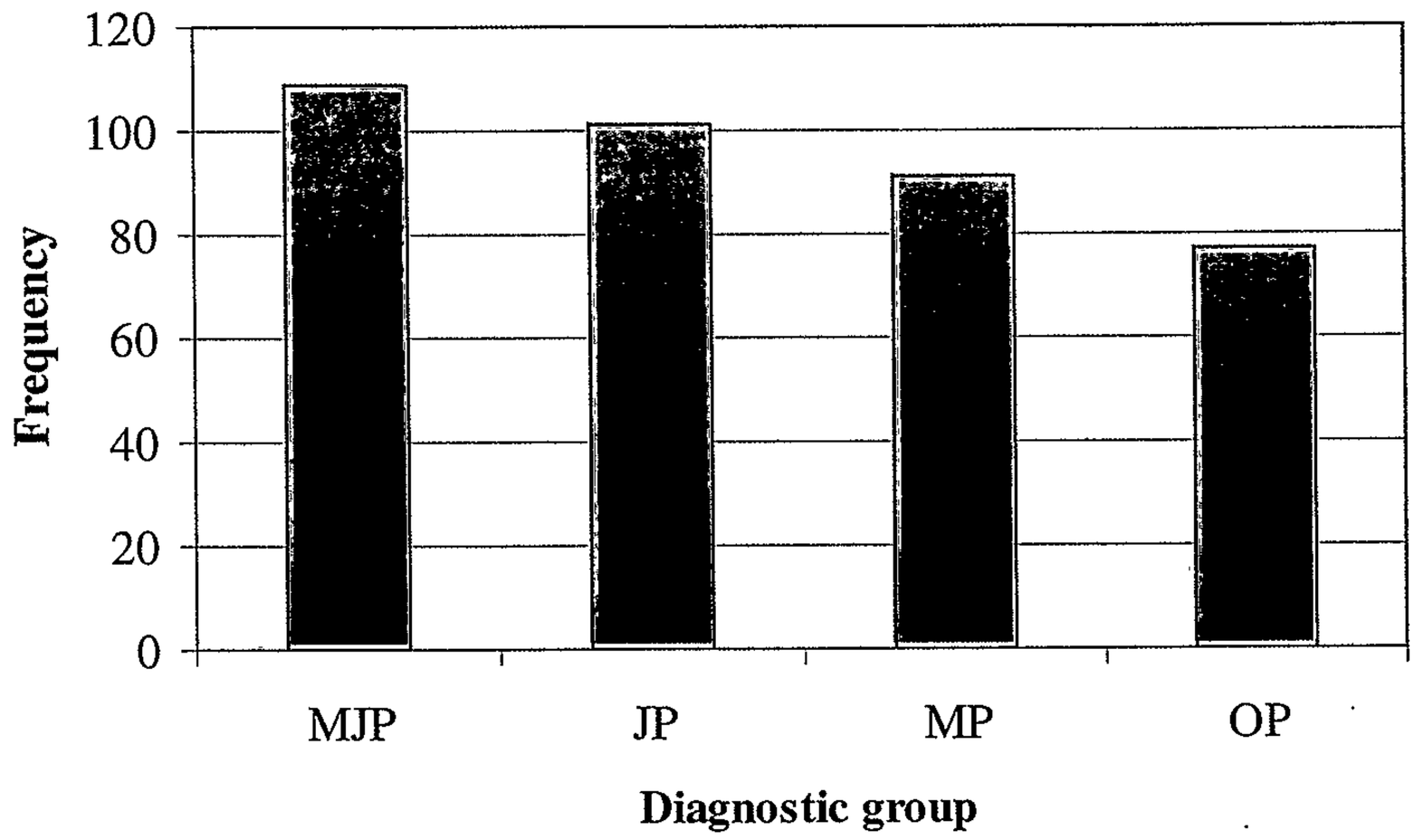

Figure 10. Illustrates distribution of depression within diagnostic subgroups (MJP = Muscle and joint pain; JP = Joint pain; MP = Muscle pain; OP = Other orofacial pain)

Depression is significant for diagnostic group membership. Chi-square test P<.05

	Muscle and joint pain	Joint pain	Muscle pain	Other orofacial pain	N=194 100%
Normal	31.8%	38.5%	52.2%	59.5%	83(42.8%)
Moderate	40%	38.5%	23.9%	32.4%	67(34.5%)
Severe	28.2%	23.1%	23.9%	8.1%	41(22.7%)

Table 5. Shows percentage of positive responses to depression within diagnostic subgroups

Pearson's chi-square P<.05

Frequency of depression within the study population was 57.2%. Within this group, 42.8% had moderate and 22.7% had severe depression. Moderate and severe depression was highest in the **muscle and joint pain** group (Table 5).

Q. Is there a correlation between somatisation and diagnostic group membership?

Nonparametric Kruskal-Wallis test shows

Diagnostic group	**Mean ranks**
Muscle pain	110.00
Muscle and joint pain	107.95
Joint pain	85.17
Other orofacial pain	66.61

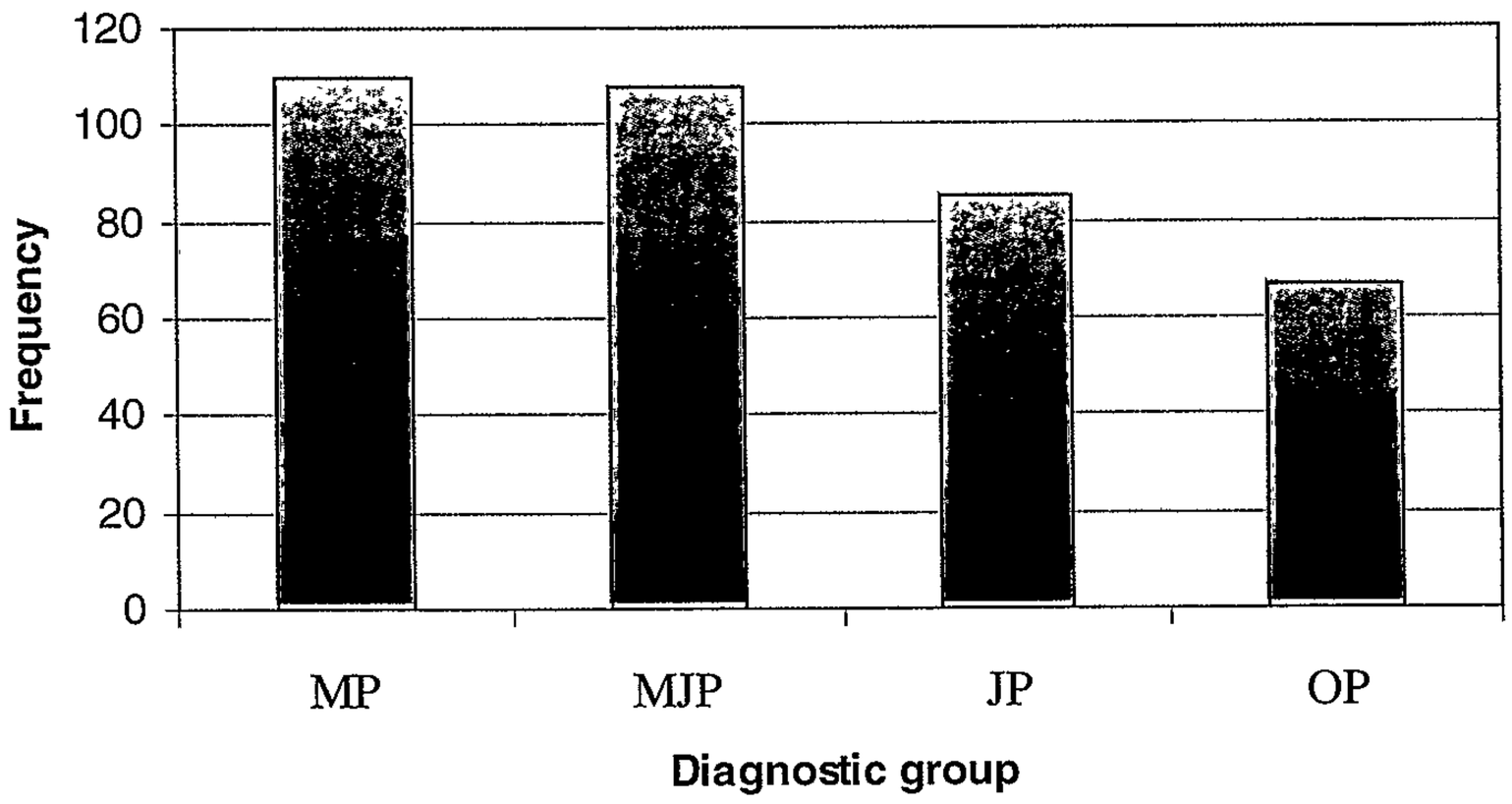

Figure 11. Illustrates distribution of somatisation within diagnostic subgroups (MP = Muscle pain; MJP = Muscle and joint pain; JP = Joint pain; OP = Other orofacial pain).

Somatisation is significant for diagnostic group membership. Chi-square test shows

P<.01

	Muscle and joint pain	Joint pain	Muscle pain	Other orofacial pain	N=194 100%
Normal	18.8%	34.6%	21.7%	54.1%	55(28.4%)
Moderate	31.8%	38.5%	26.1%	29.7%	60(30.9%)
Severe	48.2%	26.9%	52.2%	16.2%	78(40.2%)

Table 6. Shows percentage of positive responses to somatisation within diagnostic subgroups.

Pearson's chi-square test shows $P<0.05$

Frequency of somatisation within study population was 71.1%.Within this group 30.9% had moderate and 40.2% had severe somatisation. Moderate somatisation was highest in the **joint pain** 38.5% group and severe somatisation was highest 48.2% in the **muscle pain** group (Table 6).

DISCUSSION

This hospital-based retrospective analytical study of temporomandibular disorders and orofacial pain is the first of patients from the Sydney metropolitan area using the RDC/TMD protocol. The population was multicultural and referred for diagnosis and management of TMD and orofacial pain to the orofacial pain clinic at the Westmead Centre for Oral Health. The diagnosis of TMD was based on a standardized examination as defined by the RDC/TMD protocol which included physical, socioeconomic and psychological variables. Patients were examined, evaluated and treated by different registrars, however the registrars were trained and calibrated in the assessment methods and diagnosis and verified by the specialist clinician managing the clinic.

A retrospective study carries weaknesses inherent with this type of research. One of these weaknesses includes the inability to make statements regarding cause and effect. It also restricts the type of statistical analyses that can be applied due to the questionnaire format, for example, most questions are structured to only provide categorical data. The magnitude of the differences in numbers between the groups may also have contributed to the findings. Retrospective research of this type helps guide the design and method of prospective studies.

Diagnostic subgroups

Based on the entire data set and on the criteria defined by de Leeuw et al (1994), as well as the corresponding guidelines of the American Academy of Orofacial Pain (Okeson 1996), subjects were classified into four subgroups

1) Muscle pain

2) Joint pain

3) Muscle and joint pain

4) Other orofacial pain

The highest percentage of study subjects belonged to the **muscle and joint pain group** (44%), followed by **muscle pain** (24%) and **joint pain** (13%). 19% represented **other orofacial pain** group.

The Orofacial Pain clinic is physically located within a teaching Dental hospital, which is also a referral Hospital for the region for specialist services. Hence, study subjects are patients needing active treatment. Several studies suggest that subjects with muscular diagnoses have more severe pain and psychological distress than those with joint diagnoses (Dworkin et al 1989, McCreary et al 1991). Kuttila et al (1998) after a logistic regression analysis concluded that a person experiencing both myogenous and arthrogenous signs and symptoms of TMD appear to be in greatest need for treatment, irrespective of age and gender. Our study lends support to this hypothesis.

Age

A number of studies have shown an interaction between TMD symptoms, gender and age (Agerberg and Inkapool 1990, Salonen et al 1990, Jensen et al 1993, Lipton et al 1993). Although no real consensus exists on the exact relationship between age and TMD symptoms, it is a general finding that the highest prevalence occurs among adults under 45 years of age (Locker and Slade 1988, Von Korff et al 1988, Glass et al 1993). Making comparisons among surveys that used different sampling and data collection methods is always difficult. A study reported by Goulet et al (1995) used a randomized stratified probability sample to counterbalance the effect of a random or systematic error in the sampling process, estimated the prevalence of TMD symptoms according to gender, age, and other socioeconomic variables and also confirmed the above trend. In our study when patients were divided by age groups, the largest group was from 31-40 years. This age group accounted for 23.7%. Contrary to the expectation of higher prevalence of TMD among older age groups, there is a history of pain and dysfunction in the joint but without current complaints (DeBoever et al 1999). Our result shows only 12.9% of patients were above 60 years of age. One explanation may be that the elderly are better at dealing with and adapting to chronic conditions, especially if the pain/dysfunction is not associated with major disability.

Gender

This study reinforces published findings indicating that prevalence of TMD among females is significantly greater. Early cross-sectional epidemiologic studies have demonstrated equal prevalence figures for men and women (Agerberg 1972, Hansson 1975). In more recent studies, however, higher prevalence figures have been found among women. (Dworkin 1990, Kononen 1993, Unruh 1996). An epidemiological study of more than 10,000 TMD patients showed that women reported a higher level of severity of all physical and psychological symptoms than men (Levitt and McKinney 1994). 85% of the subjects in this study were female in comparison with 86.7% in a study by Friedman and Weisberg (2000). A study on cross cultural comparisons amongst TMD patients by List and Dworkin (1996) reported a female to male ratio of 3.6:1 in a Swedish population and 5:1 in a US population. In our study 76% subjects were women.

The gender differences have been interpreted in different ways. Gelb and Bernstein (1983) considered that the gender difference is due to the limited clinic and office hours that conflicts with normal working hours which prevented more males than females from accessing these services. However, in recent years women are entering the workforce almost in equal number as men. The higher sensitivity of women to painful stimuli (Riley et al 1998, Bassols et al 1999, Riley & Gilbert 2001), and higher scores of stress among women have been reported (Kuttila et al 1998). Unruh (1996) in his review summarised differences in care-seeking behaviour within gender. Prevention of multiple role disruption from household management to child care and increased social responsibilities

may also motivate women to use more social and professional support and to use short-term disability to avoid long-term disability. The same review describes several possible coping strategies for men, including denial, "talking the problem down", and using tension-reducing activities such as alcohol, smoking, or drug use. A study by Von Korff et al (1991) indicated that persons with more severe, persistent pain were more likely to seek care. In the present study analysis of reported pain intensity within gender groups revealed that higher pain intensities were reported by females than males (Figure 4).

Berkley (1997), Dao and LeResche (2000) summarized, for experimentally delivered somatic stimuli, females have lower thresholds, greater ability to discriminate, higher pain ratings, and less tolerance of noxious stimuli than males. These differences are, however small, exist only for certain forms of stimulation and are affected by many situational variables such as presence of disease, experimental setting, and even nutritive status. For endogenous pains, women report more multiple pains in more body regions than men. With no obvious underlying rationale, some painful diseases are more prevalent among females, for many diseases, and symptoms differ between females and males. Sex differences in attitudes exist that affect not only reporting, coping, and responses to treatment, but also measurement and treatment. Sex differences in the actions of sex hormones suggest pain-relevant differences in the operation of many neuroactive agents, opiate and non-opiate systems, nerve growth factor, and structural and functional differences in the sympathetic system. Drangsholt and LeResche (1999), and Huang et al (2002) have identified female gender as a possible risk factor for TMD.

Pain intensity and pain related disability

The average pain intensity reported was 4.61 (SD 2.90, median 5.00) and duration was 3.66 years (SD 4.58, range 20.00, median 5.00). List and Dworkin (1996) reported mean pain intensity of 4.6 (SD 2.2) for the Swedish group, and 4.0 (SD 2.6) for the US group. Swedish patients had a mean pain duration of 5.7 years, and 8.3 (SD 11.1) for the US group. Several investigators (McCreary et al 1991, Rudy 1995) have reported higher pain intensities in subjects with diagnosis of muscle pain than joint pain. The current study was inconsistent with the studies mentioned above. Mean pain intensity and mean duration reported for the **muscle pain** group was 4.72 (SD 3.45) and 4.07 (SD 4.74) years and 3.86 (SD 2.29) and 3.60 (SD 5.48) years for the **joint pain** group. These results are comparable to the study reported by Lindroth (2002) where there was no significant difference in pain intensity and duration in myogenous and arthrogenous pain groups. Pain intensity reported over the past six months was not significant. The wording of the questions and the suggested descriptors, which are always open to individual interpretation, influence symptom-reporting behaviour.

The RDC/TMD uses a graded chronic pain scale developed to more accurately quantify the level of pain-related psychosocial function (Von Korff et al 1992). It is a brief ordinal measure of global pain severity distinguishing levels of functional pain from dysfunctional pain. The graded chronic pain scale uses seven questions concerning pain intensity, interference in daily activities, and disability days for a 0 to IV scale score, where Grade 0 = no TMD pain and no pain-related disability; Grade I = low pain

intensity (VAS for pain intensity < 5/10) and low pain-related disability; Grade II = high pain intensity (VAS ≥ 5/10) and low pain-related disability; Grade III = moderately limiting disability; Grade IV = severely limiting disability (eg, TMD-related days lost at work). Grades III and IV are typically associated with high pain intensity and TMD-related lost work days. Graded chronic pain scale has acceptable to good reliability of 0.71. Based on data sets from more recent randomized clinical trials, Cronbach's alpha averaged 0.90; which indicates a high internal consistency (Dworkin 2002).

In our study (Table 1 and Figure 7), 68.6% subjects were in grade I and II and 20.1% in grade III and IV, which is similar to 73% and 20% in the US and 74% and 13% in the Swedish population respectively (List and Dworkin 1996).Yap et al (2002) also reported that 78.5 % of asian study subjects belonged to grade I and II, but only 4 % to grade III and IV.

Data in Table1 suggests more functional pain in the **muscle pain** group**,** however dysfunctional pain is more common in the **muscle and joint pain** group, where there was a higher level and greater incidence of depression.

Parafunction

The American Academy of Orofacial pain has defined bruxism as an oral parafunctonal activity that can occur when an individual is asleep and awake (American Academy of Orofacial Pain 1996). In the absence of a medical cause, the primary forms of bruxism

include daytime clenching and sleep bruxism (Lavigne and Manzini 2000). In addition, the American Academy of Sleep Medicine has classified sleep bruxism as parasomnia (Thorpy 1997). Numerous investigators propose that bruxism is a possible causal factor for TMD (Okeson 1997, Glaros et al 1998, Molina et al 1999); others suggest that bruxism could be a TMD in and of itself (Lobbezoo and Lavigne 1997); while others suggest that bruxism and TMD simply could coexist without having any causal relationship (Dao et al 1994).

A difficulty with the study of bruxism and in the evaluation of its relationship with TMD arises through the uncertainty of determining whether or not bruxism is present. The standard of reference for sleep bruxism is the use of polysomnographic investigation, for which validated diagnostic criteria have been proposed by Lavigne et al (1996). The relationship between sleep and awake-bruxism is far from clear, and as of yet there is no clinical assessment or indication to readily differentiate these two entities (Palla 2001). Consequently, in the absence of standardized clinical criteria in the past few years a number of methods based on a combination of interviews, questionnaires, tooth wear evaluation, electromyography, and masticatory muscle palpation, have been proposed to assess bruxism (Molina et al 1999, Chung et al 2000, Ciancaglini et al 2001).

The assessment procedure adopted in this investigation was based on use of anamnestic indicators. Table 2 shows that awareness of night time grinding or clenching is not statistically significant. Morning stiffness was reported in 73.8% of the **muscle and joint pain** group, 60.9% of the **muscle pain** group, and 53.8% of the **joint pain** group($P<.01$). These results are comparable to 71.4% in the **muscle pain** alone or combined with other

RDC/TMD groups and 53.3% in **joint** conditions only as reported by Manfredini et al (2003). Kampe et al (1997) reported the most common symptoms and signs of TMD in a group of 29 subjects with longstanding bruxism. Among those symptoms, a high prevalence of pain was described in the face or jaws in the morning (44%). Positive responses to daytime clenching were similar across the diagnostic groups (P<.05) in our study. Support for the association between tooth clenching and TMD was also shown in a study done by Moss et al (1995) and Glaros et al (2000).

Functional disability

Jaw disability checklist comprising of twelve items is used in RDC/TMD to assess the extent to which TMD interferes with activities specifically related to mandibular function. While this checklist is easy to administer and score, its reliability and validity have not been evaluated.

Selected well-known symptoms by themselves establish a 70-80% probability for the presence of TMD (McNeill 1990, Okeson 1997). A study was conducted by (Nassif and Talic 2001) to review the current literature for TMD symptoms in order to determine if there is a sufficient consensus for specific symptoms to be considered classic symptoms, and to compare self-reported major complaint symptoms in TMD patients. The agreement among the nineteen references for some of the select symptoms from jaw disability checklist was as follows:

1) High agreement for difficulty or pain on jaw opening (84-100%)

2) Majority agreement for chewing, cheek or face pain (58-79%)

3) Fair agreement for yawning and talking (26-37%)

The percent differences were significant (P<.0001). Yawning has an intimate relation with difficulty in jaw opening.

In our study, three distinct subsets of symptoms in their order of reporting are noted (Table 3, Figure 8).

Subset 1	Eating hard food	(73.6%)
	Chewing	(68.6%)
	Yawning	(63.7%)
Subset 2	Smiling	(41.5%)
	Talking	(36.8%)
	Cleaning teeth or face	(28.5%)
Subset 3	Exercising	(17.5%)
	Having usual facial appearance	(18.8%)
	Eating soft food	(16.1%)
	Swallowing	(15.0%)
	Sexual activity	(11.8%)
	Drinking	(10.3%)

The three most frequent jaw disabilities reported by Yap et al (2002a) were; eating hard food (77.6%), yawning (75.7%), and chewing (64.5%).

Amongst all the symptoms the highest percentage of positive responses belonged to the **muscle and joint pain** group.

Psychosocial

Chronic pain patients have an increased occurrence of co-existent psychological distress, most notably depression and anxiety disorders (Bennett et al 1996). Whether psychological distress is an antecedent or consequence of chronic pain has been the subject of debate and controversy (Fishbain et al 1997). Findings from epidemiologic 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 (Dworkin and Massoth 1994). Chronic pain and depression as well as reports of non-specific physical symptoms have been found to be strongly correlated (Dworkin and Massoth 1994). Earlier studies found that only a portion of TMD patients are clinically depressed (Auerbach et al 2001, Lundeen et al 1987).

In our study 34.5% had moderate and 22.7% had severe depression. These results are comparable to the 30% moderate and 18% severe depression reported by List and Dworkin (1996) in a cross-cultural study between US and Swedish population and to 39% moderate and 14% severe depression in an Asian population by (Yap et al 2002b). Somatisation was present in 71% of the study population in the present study compared with 61% reported by List and Dworkin (1996) and 54.7% by Yap et al (2002b). It is, however important to note that the distribution of normal, moderate and severe score scales was based on normative values derived from a large USA population.

A positive correlation was observed between depression and somatisation (Pearson's r = 0.6 at 0.01 level). A similar correlation of 0.7 was reported by Yap et al (2002b).

Some authors found that patients affected with muscle pain had greater depression than patients with TMJ pathologies (McCreary et al 1991, Auerbach et al 2001, Lindroth et al 2002), whereas others found no difference between the two groups (Michelotti et al 1998, Marbach and Lund 1981). In contrast with these studies, moderate depression was found to be more in the **joint pain group** (38.5%) than in the **muscle pain group** (23.9%). No difference was noted in severe depression within the groups. Moderate somatisation was greater in the **joint pain group** (38.5%) than in the **muscle pain group** (26.1%). Severe somatisation was found twice more in the **muscle pain group** (52.2%) compared with the **joint pain group**. Patients belonging to the **muscle and joint pain** group were, however, significantly more depressed and had higher somatisation scores (Table 5 and 6).

CONCLUSION

A retrospective analytical study was performed on 194 consecutive patients referred for diagnosis and management to the Orofacial Pain clinic at Westmead Centre for Oral Health, University of Sydney.

This study shows the trends and correlations between demographic factors, and signs and symptoms of TMD and orofacial pain patients in the Sydney metropolitan area. Our results are similar to other published findings with a greater representation of females (76%), maximum numbers in the middle age group, 30 to 40 years at 23.7%, and only 12% in the over 60 age group.

No significant differences were found between the **muscle pain** and the **joint pain** groups. Subjects within the **muscle and joint pain** group reported higher pain intensity, more dysfunctional pain, higher scores on graded chronic pain scale, severe somatisation and depression.

Our findings are comparable with studies comparing TMD signs and symptoms in populations from Sweden and USA. Numerical values should be interpreted with caution, since no population-based standardized scores for axis II in the Australian population have been reported. Similarly, as the population for this study was taken within a hospital-based pain clinic, the data cannot be generalised to the wider community.

This study is a small component of future studies that are required to provide an understanding of these disorders and their clinical management. Further multicentre studies of both prospective and retrospective design are needed.

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APPENDIX 1 Date:_____

RESEARCH DIAGNOSTIC CRITERIA (RDC): HISTORY ID. _____

Please read each question and respond accordingly. For each of the questions below circle only one response.

1. Would you say your health in general is:

Excellent Very good Good Fair Poor

2. Would you say your oral health in general is:

Excellent Very good Good Fair Poor

3. Have you had pain in the face, jaw, temple, in front of the ear or in the ear in the past month?

No
Yes

[If no pain in the past month SKIP to question 14]

If Yes,

4.a. How many years ago did your facial pain begin for the first time? _____years ago

[If one year ago or more SKIP to question 5]

4.b. How many months ago did your facial pain begin for the first time? _____months ago

5. Is your facial pain persistent, recurrent or was it only a one-time problem?

Persistent
Recurrent
One-Time

6. Have you ever gone to a physician, dentist, chiropractor or other health professional for facial ache or pain?

No
Yes, in the last six months
Yes, more than six months ago

7. How would you rate your facial pain on a 0 to 10 scale at the present time, that is right now, where 0 is "no pain" and 10 is "pain as bad as could be"?

NO PAIN
0 1 2 3 4 5 6 7 8 9 10
PAIN AS BAD AS COULD BE

8. In the past six months, how intense was your worst pain rated on a 0 to 10 scale where 0 is "no pain" and 10 is "pain as bad as could be"?

NO PAIN
0 1 2 3 4 5 6 7 8 9 10
PAIN AS BAD AS COULD BE

9. In the past six months, on the average, how intense was your pain rated on a 0 to 10 scale where 0 is "no pain" and 10 is "pain as bad as could be"? [That is, your usual pain at times you were experiencing pain].

NO PAIN 0 1 2 3 4 5 6 7 8 PAIN AS BAD AS COULD BE 9 10

10. About how many days in the last six months have you been kept from your usual activities (work, school or housework) because of facial pain? _____DAYS

11. In the past six months, how much has facial pain interfered with your daily activities rated on a 0 to 10 scale where 0 is "no interference" and 10 is "unable to carry on any activities"?

NO INTERFERENCE 0 1 2 3 4 5 6 7 8 UNABLE TO CARRY ON ANY ACTIVITIES 9 10

12. In the past six months, how much has facial pain changed your ability to take part in recreational, social and family activities where 0 is "no change" and 10 is "extreme change"?

NO CHANGE 0 1 2 3 4 5 6 7 8 EXTREME CHANGE 9 10

13. In the past six months, how much has facial pain changed your ability to work including housework) where 0 is "no change" and 10 is "extreme change"?

NO CHANGE 0 1 2 3 4 5 6 7 8 EXTREME CHANGE 9 10

14.a. Have you ever had your jaw lock or catch so that it won't open all the way?

No
Yes

[If no problem opening all the way SKIP to question 15]
If Yes,
14.b. Was this limitation in jaw opening severe enough to interfere with your ability to eat?

No
Yes

15. a. Does your jaw click or pop when you open or close your mouth or when chewing?

No
Yes

b. Does your jaw make a grating or grinding noise when it opens and closes or when chewing?

No
Yes

c. Have you been told, or do you notice that you grind your teeth or clench your jaw while sleeping at night?

No
Yes

d. During the day, do you grind your teeth or clench your jaw?

No
Yes

e. Does your jaw ache or feel stiff when you wake up in the morning?

No
Yes

f. Do you have noises or ringing in your ears?

No
Yes

g. Does your bite feel uncomfortable or unusual?

No
Yes

16.a. Do you have rheumatoid arthritis, lupus, or other systemic arthritic disease?

No
Yes

16.b. Do you know of anyone in your family who has had any of these diseases?

No
Yes

16.c. Have you had or do you have any swollen or painful joints) other than the joints close to your ears (TMJ)?

No
Yes

[If no swollen or painful joints, SKIP to question 17.a]

If Yes,

16.d. Is this a persistent pain which you have had for at least one year?

No
Yes

17.a. Have you had a recent injury to your face or jaw?

No
Yes

[If no recent injuries SKIP to question 18]

If Yes,

17.b. Did you have jaw pain before the injury?

No
Yes

18. During the last six months have you had a problem with headaches or migraines?

No
Yes

19. What activities does your present jaw problem prevent or limit you from doing?

a. Chewing
No
Yes

b. Drinking
No
Yes

c. Exercising
No
Yes

d. Eating hard foods
No
Yes

e. Eating soft foods
No
Yes

f. Smiling/laughing
No .
Yes

g. Sexual activity
No
Yes

h. Cleaning teeth or face
No
Yes

i. Yawning
No
Yes

j. Swallowing
No
Yes

k. Talking
No
Yes

I. Having your usual facial appearance
No
Yes

20. In the last month, how much have you been distressed by.

	Not At All	A Little Bit	Moderatelv	Quite A Bit	Extremely
a. Headaches	0	1	2	3	4
b. Loss of sexual interest or pleasure	0	1	2	3	4
c. Faintness or dizziness	0	1	2	3	4
d. Pains in the heart or chest	0	1	2	3	4
e. Feeling low in energy or slowed down	0	1	2	3	4
f. Thoughts of death or dying	0	1	2	3	4
g. Poor appetite	0	1	2	3	4
h. Crying easily	0	1	2	3	4
i. Blaming yourself for things	0	1	2	3	4
j. Pains in the lower back	0	1	2	3	4
k. Feeling lonely	0	1	2	3	4
I. Feeling blue	0	1	2	3	4
m. Worrying too much about things	0	1	2	3	4
n. Feeling no interest in things	0	1	2	3	4
o. Nausea or upset stomach	0	1	2	3	4
p. Soreness of your muscles	0	1	2	3	4
q. Trouble falling asleep	0	1	2	3	4
r. Trouble getting your breath	0	1	2	3	4
s. Hot or cold spells	0	1	2	3	4
t. Numbness or tingling in parts of your body	0	1	2	3	4
u. A lump in your throat	0	1	2	3	4
v. Feeling hopeless about the future	0	1	2	3	4
w. Feeling weak in parts of your body	0	1	2	3	4
x. Heavy feelings in your arms or legs	0	1	2	3	4
y. Thoughts of ending your life	0	1	2	3	4
z. Overeating	0	1	2	3	4
aa. Awakening in the early morning	0	1	2	3	4
bb. Sleep that is restless or disturbed	0	1	2	3	4
cc. Feeling everything is an effort	0	1	2	3	4
dd. Feelings of worthlessness	0	1	2	3	4
ee. Feeling of being caught or trapped	0	1	2	3	4
ff. Feelings of guilt	0	1	2	3	4

21. How good a job do you feel you are doing in taking care of your health overall?

Excellent
Very good
Good
Fair
Poor

22. How good a job do you feel you are doing in taking care of your oral health?

Excellent
Very good
Good
Fair
Poor.

23. When were you born? Month_____Day_____Year_____

24. Are you male or female? Male Female

27. What is the highest grade or year of regular school that you have completed?

Never attended or Kindergarten
Primary School
High School
University

28.a. During the past 2 weeks, did you work at a job or business not counting work around the house (include unpaid work in the family farm/business)?

Yes
No

[If Yes SKIP to question 29]

If No,

28b. Even though you did not work during the past 2 weeks, did you have a job or business?

Yes
No

[If Yes SKIP to question 29]

If No,

28c. Were you looking for work or on layoff from a job during those 2 weeks?

Yes, looking for work
Yes, layoff
Yes, both on layoff and looking for work
No

29. Are you married, widowed, divorced, separated or never been married?

Married / defacto -spouse in household
Married / defacto -spouse not in household
Widowed
Divorced
Separated
Never Married

30. Which of the following best represents your total combined household income during the past 12 months?

$0-$14,999	$25,000-$34,999	$50,000 or more
$15,000-$24,999	$35,000-$49,999	

APPENDIX 2

Date_____
ID_____

RESEARCH DIAGOSTIC CRITERIA (RDC): CLINICAL EXAMINATION

1. Do you have pain on the right side of your face, the left side or both.

None	0
Right	1
Left	2
Both	3

2. Could you point to the areas where you feel pain?

Right		Left	
None	0	None	0
Jaw Joint	1	Jaw Joint	1
Muscles	2	Muscles	2
Both	3	Both	3

(Examiner feels area subject points to, if it is unclear whether it is joint or muscle.)

3. Opening Pattern

Straight	0
Right Lateral Deviation (uncorrected)	1
Right Corrected ("S") Deviation	2
Left Lateral Deviation (uncorrected)	3
Left Corrected ("S") Deviation	4
Other	5

Type(specify) _____

4. Vertical Range of Motion

Maxillary incisor used	(8)	1.1
	(9)	2.1

(a) Unassisted opening without pain _____ mm

		MUSCLE PAIN				JOINT PAIN			
		None	Right	Left	Both	None	Right	Left	Both
(b) Maximum unassisted opening	_____ mm	0	1	2	3	0	1	2	3
(c) Maximum assisted opening	_____ mm	0	1	2	3	0	1	2	3

(d) Vertical incisal overlap _____ mm

5. Joint Sounds (palpation)		RIGHT	LEFT
(a) Opening	None	0	0
	Click	1	1
	Coarse Crepitus	2	2
	Fine Crepitus	3	3
Measurement of Opening Click		_____ mm	_____ mm
(b) Closing	None	0	0
	Click	1	1
	Coarse Crepitus	2	2
	Fine Crepitus	3	3
Measurement of Closing Click		_____ mm	_____ mm

(c) Reciprocal click eliminated on protrusive opening

No	No
Yes	Yes
NA	NA

6. Excursions		MUSCLE PAIN				JOINT PAIN			
		None	Right	Left	Both	None	Right	Left	Both
(a) Right Lateral Excursion	_____ mm	0	1	2	3	0	1	2	3
(b) Left Lateral Excursion	_____ mm	0	1	2	3	0	1	2	3
(c) Protrusion	_____ mm	0	1	2	3	0	1	2	3

(d) Midline Deviation _____ mm RIGHT LEFT NA

7. Joint Sounds on Excursions

Right Sounds:	None	Click	Coarse Crepitus	Fine Crepitus
Excursion Right	0	1	2	3
Excursion Left	0	1	2	3
Protrusion	0	1	2	3

Left Sounds:	None	Click	Coarse Crepitus	Fine Crepitus
Excursion Right	0	1	2	3
Excursion Left	0	1	2	3
Protrusion	0	1	2	3

DIRECTIONS FOR ITEMS 8-10

The examiner will be palpating (touching) different areas of your face, head and neck. We would like you to indicate if you do not feel pain of just feel pressure (0), or pain (1-3). Please rate how much pain you feel for each of the palpations according to the scale below. Circle the number that corresponds to the amount of pain you feel. We would like you to make a separate rating for both the right and left palpations.

0 = No Pain/ Pressure Only

1 = Mild Pain

2 = Moderate Pain

3 = Severe Pain

PLEASE GIVE PATIENT RATING CARD

8. Extraoral muscle pain with palpation:

	RIGHT	LEFT
a. Temporalis (posterior) "Back of temple"	0 1 2 3	0 1 2 3
b. Temporalis (middle) "Middle of temple"	0 1 2 3	0 1 2 3
c. Temporalis (anterior) "Front of temple"	0 1 2 3	0 1 2 3
d. Masseter (superior) "Cheek/under cheekbone"	0 1 2 3	0 1 2 3
e. Masseter (middle) "Cheek/side of face"	0 1 2 3	0 1 2 3
f. Masseter (inferior) "Cheek/jawline	0 1 2 3	0 1 2 3
g. Posterior mandibular region (Stylohyoid/posterior digastric region) "Jaw/throat region"	0 1 2 3	0 1 2 3
h. Submandibular region (Medial pterygoid/Suprahyoid/anterior digastric region) "Under chin"	0 1 2 3	0 1 2 3
i. Sternocleidomastoid (origin) "Under ear"	0 1 2 3	0 1 2 3
j. Sternocleidomastoid (body) "Side of neck"	0 1 2 3	0 1 2 3
k. Trapezius (origin) "Back of head"	0 1 2 3	0 1 2 3
l. Trapezius (body and insertion) "Neck and shoulders	0 1 2 3	0 1 2 3

9. Joint pain with palpation:

a. Lateral pole "Outside"	0 1 2 3	0 1 2 3
b. Posterior attachment "Inside ear"	0 1 2 3	0 1 2 3

10. Intraoral muscle pain with palpation:

a. Lateral pterygoid area "Behind upper molars"	0 1 2 3	0 1 2 3
b. Tendon of temporalis "Tendon"	0 1 2 3	0 1 2 3
c.Tongue "Tongue"	0 1 2 3	0 1 2 3

APPENDIX 3

Scoring Protocol for Graded Chronic Pain

Any TMD pain reported in the prior month? (History questionnaire, Question 3)

If NO, Chronic Pain Grade = 0
If YES, Continue

Characteristic pain intensity (CPI): (CGP scale, Questions 1, 2 and 3) Calculate as follows:

CPI = -------- + ---------- + --------- = ------- divided by 3 = ----- x 10 = ---
Question # 1 Question # 2 Question # 3

Disability points:

***Disability days*:** (GCP scale, Question 7)

Number of disability days = ---------
Question # 7

0-6 days = **0** Disability points
7-14 days = **1** Disability point
15-30 days = **2** Disability points
31+ days = **3** Disability points

***Disability Score*:** (GCP scale, Questions 4, 5 and 6)

--------- + ---------- + ---------- = -------
Question # 4 Question # 5 Question # 6
Divided by 3 = ------
X 10 = -------

Score of **0-29** = **0** Disability points
Score of **30-49** = **1** Disability point
Score of **50-69** = **2** Disability points
Score of **70+** = **3**Disability points

---------- + ---------- = ---------- **Disability points**
Points for disability days Points for disability score

Chronic pain grade classification:

Grade 0 No TMD pain in prior 6 months
Low disability
Grade 1 Characteristic pain intensity < 50, and less than 3 Disability points
Grade 2 Characteristic pain intensity > 50, and less than 3 Disability points
High disability
Grade 3 3 to 4 Disability points, regardless of characteristic pain intensity
Grade 4 5 to 6 Disability points, regardless of characteristic pain intensity

APPENDIX 4

Scoring protocol for the SCL

1) Count items answered. Enter "Total Items" below in the third column. If this number of "Total Items" is less than the minimum number indicated in the first column, the scale cannot be scored and should be recorded as "missing."

2) Add up the item score for all items answered: Not at all = 0; A little bit = 1; Moderately = 2; Quite a bit = 3; Extremely = 4. Enter "Total Score" below.

3) Divide score obtained by the total number of items answered. Enter "Scale Score" below.

4) Use guide below to classify patient on each scale.

	Minimum Number	Total Score	Divided by	Total Items	Equals	Scale Score
Depression:	(12)	-----	÷	-------	=	------
Nonspecific physical Symptoms (pain items included):	(8)	-----	÷	-------	=	------

Classification:

	Normal	Moderate	Severe
Depression	< 0.535	0.535 to < 1.105	1.105 +
Nonspecific physical symptoms	< 0.500	0.500 to < 1.000	1.000 +