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M Ch D THESIS

THE INTERACTION BETWEEN PHYSICAL SIGNS, AND CHRONIC PAIN, DEPRESSION AND NONSPECIFIC PHYSICAL SYMPTOMS, IN PATIENTS WITH TEMPOROMANDIBULAR

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CONTENTS PAGE

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A research dissertation submitted to the Faculty of Dentistry of the University of the Western Cape in partial fulfilment of the requirements for the degree of Magister Chirurgiae Dentium in the discipline of Prosthodontics.

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DECLARATION

I,.....declare that this dissertation entitled " The Interaction between Physical Signs, and Chronic Pain, Depression and Nonspecific Physical Symptoms, in patients with Temporomandibular Disorders." is my own work and that all sources I have quoted have been indicated and acknowledged by means of references.

Signed: .....

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IV. The patients that have taken part in this study.

DEDICATION

This dissertation is dedicated to my wife, Sadna, for her love, encouragement and support.

ABSTRACT

There are both physical and emotional components which are associated with the chronic pain of TMD patients. One of the difficulties in making an accurate assessment of each component, is the lack of objective criteria for quantitative measurement of the emotional component. This need, lead to the development of Research Diagnostic Criteria (RDC) by Dworkin and LeResche (1992). The aim of this study was to use RDC criteria to record the prevalence, and associations between Axis I (physical) and AXIS II (emotional) factors in a sample of 100 patients attending a TMD Clinic. Patients were examined using the RDC guidelines and the diagnosis classified as either, myogenic, disc displacement or arthritis. Patients completed a self-administered personal history questionnaire which analyzed emotional factors including, chronic graded pain, depression and nonspecific physical symptoms such as headaches, faintness and lower back pain. Patients with low to high intensity pain with low-related disability was reported in 71% of the sample and 26% reported dysfunctional chronic pain. Nonspecific physical symptoms were reported by 63% of the patients. 66% of the patients were categorised as being moderately to severely depressed. Significant associations were found between nonspecific physical symptoms, and both severe depression ($p<0.001$) and muscle tenderness ($p<0.0001$). Significant associations were also found between depression and both graded chronic pain ($p<0.05$) and muscle tenderness ($p<0.05$). Depression appears to contribute as an independent factor in the syndrome of TMD and thus supports the use of anti-depressants as a legitimate part of combined therapy. These results emphasise the value in history taking, of questions which reveal associated physical symptoms and depression, as these factors allow a more holistic approach to the diagnosis and treatment of TMD.

1. INTRODUCTION

There are both physical and emotional components which are associated with the chronic pain of Temporomandibular Disorder (TMD) patients. One of the difficulties in making an accurate assessment of each component is the lack of objective criteria for quantitative measurement of the emotional component. This, with the need to develop a standardised diagnostic tool, led to the development of the Research Diagnostic Criteria (RDC/TMD) by Dworkin and LeResche (1992).

These diagnostic criteria have been tested predominantly in developed countries such as the United States of America and Sweden (List and Dworkin 1996). The applicability of these criteria to developing populations (e.g. in South Africa) has not been determined. The TMJ (Temporomandibular Joint) clinic at the Faculty, has used a number of diagnostic tools to assess TMD patients in the past and recently adopted the RDC/TMD criteria. The Dental Faculty of the University of the Western Cape is located in a socially and economically deprived community, in which the levels of oral diseases are high, as is the prevalence of edentulousness.

The RDC/TMD criteria attempt to identify both the physical and emotional factors implicated in TMD. However, the interaction between these factors has not been fully understood, and so the purpose of this study will be to assess the relationship between

physical signs, and chronic pain, depression and nonspecific symptoms in patients with TMD, attending the TMJ clinic at the Oral Health Centre of the Faculty in Mitchells Plain.

2. LITERATURE REVIEW

2.1. Definition of TMD

Temporomandibular disorder (TMD) is a collective term embracing a number of clinical problems that involve the masticatory musculature, the temporomandibular joint (TMJ) and associated structures, or both (Bell 1969).

2.2. History of TMD

Costen (1934), an otolaryngologist, reported in 1934, that patients with symptoms of pain in or near the ear, tinnitus, dizziness, a sensation of ear pressure or fullness, and difficulty in swallowing seemed to improve by altering the vertical dimension of occlusion. It was concluded that malocclusion was the underlying cause, and treatment for TMD and a variety of other orofacial pains, shifted from being under the domain of medicine to that of dentistry. Dental "occlusionists" then contended that occlusal disharmony rather than a closed bite was the primary aetiologic factor in TMD (Schuyler 1935). Various restorative techniques to balance or stabilise the occlusion were utilised during the period from the late 1930s to the post-2nd World War era.

The role of occlusion in TMD gained in popularity from the late 1950s with an emphasis on occlusal equilibration (Mc Collum and Stuart 1955) or adjustment (Ramfjord 1961; Krough-Poulson and Olssen 1966). In the 1960s the quality of clinical investigation and scientific research was becoming increasingly sophisticated and there was a gradual de-emphasis of the role of occlusion in TMD aetiology (Kawamura and Majima 1964).

Later studies in the fields of neuromuscular physiology and joint biology included investigations into dysfunction, remodelling, and degenerative processes, and led other clinical investigators to emphasise different approaches to the management of head, neck and orofacial pain, and TMD (Blackwood 1966; Moffet et al 1964). Regional and referred pain of myofascial origin was considered to be a major influence in these conditions. At this time multidisciplinary knowledge was leading to more refined differential diagnoses and the realisation that orofacial pain patients may suffer from a variety of disorders including systemic-related problems and articular, neuromuscular, neurologic, neurovascular, and behavioural disorders. There had also been an expansion of knowledge in the basic mechanisms of pain, and major advances in the neurophysiology and neuropharmacology of pain.

It became evident in the 1980s that diagnostic and management guidelines were of paramount importance. The need for an improved classification system that would permit proper comparison of epidemiologic, diagnostic, and treatment data was stressed at the

1982 American Dental Association conference (Griffiths 1983). It was also recognised that some patients developed a lingering, chronic, painful illness with an unpredictable treatment response to modalities usually found effective in managing biomechanical, structural dysfunctions. The complexity of managing a chronic orofacial pain disorder was acknowledged and the use of multidisciplinary and interdisciplinary management programmes became common (Griffiths 1983).

More recently, advances in imaging techniques that include tomography, arthrography, computed tomography (CT), and magnetic resonance imaging (MRI), have enabled improved visualisation of the intracapsular structures (Mohl 1993). However, the value of these technological advances must still be assessed in relation to improved diagnosis and management of TMD.

2.3. Epidemiology of TMD

2.3.1 Temporomandibular Disorders

Cross-sectional epidemiologic studies of non-patient populations show that approximately 75% have at least one sign of joint dysfunction (movement abnormalities, joint noise, tenderness on palpation, etc.) and approximately 33% have at least one symptom (face pain, joint pain, etc.) (Rugh and Solberg 1985). Although the data from epidemiologic studies vary from study to study, some signs appear commonly in healthy populations; eg. joint sounds or deviation of mouth opening occur in approximately 50% of healthy non-

patient populations. Other signs are relatively rare: mouth opening limitations only occur in approximately 5% of healthy non-patient populations. The signs and symptoms of TMD generally increase in frequency beginning in the second decade of life (Agerberg and Bergenholz 1989). In one study, the majority of 3428 patients were between the ages of 15 and 45 years (mean 33 years), which led the authors to suggest that older patients are less bothered by their symptoms (Agerberg and Bergenholz 1989).

The prevalence of nonspecific measures of overall symptom levels (eg. the Helkimo index) was reported to be almost equal in males and females in Scandinavian non-patient surveys of adults (Agerberg and Carlsson 1972) and younger populations (Nilner and Lassing 1981; Nilner 1981). In contrast, when individual symptoms were evaluated, females were found to experience more headache, TMJ clicking, TMJ tenderness and muscle tenderness (Agerberg and Bergenholz 1989; Pullinger, Seligman and Solberg 1988). These differences between males and females found in epidemiologic studies only partially explained the clinical experience of a female to male ratio of between 3:1 to 9:1 in seeking care for TMD (Pullinger, Seligman and Solberg 1988).

Some recent patient studies (Pullinger and Seligman 1987; Randolf et al 1990) have suggested that Temporomandibular Disorders are often self-limiting, or fluctuating over time. There is increasing evidence that progression to chronic and disabling intracapsular TMJ disease is an uncommon occurrence.

Despite the large percentages of the population having signs and symptoms, only 5-7% are estimated to be in need of treatment (Dworkin et al 1990). These estimates are supported by a study that indicated that only 7% of a patient population with non-problematic TMJ clicking showed progression to a problematic clicking status over a 1 to 7.5 year period (Randolf et al 1990).

The prevalence of a specific temporomandibular disorder is difficult to determine because of the lack of a universally accepted classification scheme with diagnostic criteria. However, different investigators have used combinations of signs and symptoms to indirectly deduce the prevalence of differentiated diagnoses. A study of patients seeking treatment for TMD in a private dental practice reported 31% with internal derangement, 39% with arthritis, and 30% with a muscle disorder (Pullinger and Seligman 1991a). Schiffman et al (1989) used specifically tested diagnostic criteria on a general population and found 33% with TMD and 41% with masticatory muscle disorders but only 7% of the population had a disorder severe enough to be comparable to a clinic population. Thus, prevalence values of patients may overstate the clinical significance of individual problems because of the inclusion of patients with mild transient signs and symptoms not requiring treatment. Therefore, to overcome the various shortcomings of past studies, a universally acceptable classification scheme with clear case definitions is desirable (LeResche et al 1991).

2.3.2 Chronic Pain Disorder

Although most Temporomandibular Disorders appear to be mild and self-limiting, a substantial number of TMD patients develop a chronic pain syndrome (Pullinger and Seligman 1991b). Chronic pain syndromes are defined as persistent pain that lasts more than six months with associated behavioural and psychological factors. There is increasing recognition in epidemiologic studies of the prevalence and the impact of chronic and recurrent pain.

2.3.3. Headaches

Headaches can be a symptom of many disorders affecting the masticatory system. Many studies have found recurrent headaches to occur in as many as 70% of TMD patients, compared to approximately 20% of a general population (Magnusson and Carlsson 1978). It has been estimated that one in three persons suffers from severe headache at some stage in his or her life. Currently, 5-10% of the American population has sought medical advice for severe headache (Campbell 1987).

Because headache is a major cause of suffering and absenteeism from work or school, epidemiologic studies are needed to clarify the relationship with TMD. Temporomandibular Disorders do not necessarily cause headaches and there is need for a study investigating the possibility that TMD aggravates headaches in those patients predisposed to headaches. An association between the presence of headaches and TMD

has been well documented (LeResche et al 1991) but this association has not yet been shown to be a causal relationship and may be coincidental in many cases. Clarification of the role of the musculoskeletal system in producing headache is not currently available.

2.4. Current aetiological issues in TMD

Many factors can affect the dynamic balance or equilibrium between the components of the masticatory system (Parker 1990). There are numerous factors driving the equilibrium either toward normal or adaptive physiologic health and function or dysfunction and pathology. Bone remodelling, TMJ soft tissue metaplasia, and muscle hypoactivity or hyperactivity are all adaptive physiologic responses to insult or change. Loss of structural integrity, altered function, or biochemical overloading in the system can compromise adaptability and increase the likelihood of dysfunction or pathology. Direct trauma to any component of the masticatory system can spontaneously initiate loss of structural integrity and concomitant altered function thereby reducing the adaptive capacity in the system. In addition, there are other contributing anatomic, systemic, pathophysiologic and psychosocial factors that sufficiently reduce the adaptive capacity of the masticatory system and cause TMD.

2.4.1. Muscle trigger points

According to Travell & Simons (1983) a myofascial trigger point (TP) is a hyperirritable spot, usually within a taut band of skeletal muscle or in the muscle's fascia. This area is

painful to compression and can give rise to characteristic referred pain, tenderness and autonomic phenomena. A TP can be either active or latent. An active TP is painful. A latent TP is clinically silent with respect to pain, but may cause restriction of movement and weakness of the affected muscle. The TP's can be referred from a single muscle or several muscles. Considering that the majority of the TMD patients suffer from myofascial pain, the importance of muscles as a source of pain should not be under- estimated.

2.4.2 Chronic pain

Chronic pain involves long term nociceptive input with complex central and peripheral nervous system changes at the levels of both perception and reaction. Patient response to chronic pain is different from that of acute pain response. Ongoing peripheral pathology is potentiated by neuropsychological factors, such as social situations, attitudes, and emotional problems, and may cause an enhanced perception of continuous pain. Some patients with chronic pain are able to cope with this continuous unpleasant perception and manage to live productive lives (Turk and Rudy 1987). When their coping mechanisms break down, however, patients may become depressed, disabled, and dependent on the pain regardless of the original event. These patients have complex pain and are often victims of multiple drug misuse and surgical interventions.

2.4.3. Psychological factors

These include individual, interpersonal, and situational variables that impact on the patient's capacity to function adaptively. As a group, TMD and orofacial pain patients are markedly dissimilar both culturally and economically, and present a wide diversity of the relevant psychosocial factors. However, individual TMD patients may have personality characteristics or emotional conditions that make managing or coping with life situations difficult (Southwell, Deary and Geissler 1990). There is evidence that some patients with TMD experience more anxiety than do healthy control groups and that TMD symptoms may be only one of several somatic manifestations of emotional distress (Gerschman et al 1987). These patients often have a history of other stress-related disorders. Depression and anxiety related to other major life events may alter the patient's perception of and tolerance for physical symptoms, causing them to seek more care (Molin, Edman and Schalling 1973). Chronic TMD patients have been found to have psychosocial and behavioural characteristics similar to patients with lower back pain and headache (Turk and Rudy 1990). Thus, psychological factors may predispose certain individuals to TMD and may also perpetuate TMD once symptoms have become established. A careful consideration of psychological factors is therefore important to the diagnostic evaluation of every TMD patient.

2.4.4. Trauma

There is evidence to support trauma as an etiologic factor for a subset of TMD. In fact, overt trauma and adverse loading from parafunction may cause injury to the masticatory structures and are often implicated as aetiological factors leading to TMD signs and symptoms. Overt trauma inflicted to the head, neck, or jaw can result from an impact injury (Braun et al 1992). An injury while eating, yawning, singing, or from prolonged mouth opening or extensive stretching, as may occur during long dental appointments may lead to or aggravate TMD signs or symptoms (Pullinger and Seligman 1991). Another form of trauma has been hypothesised to originate from sustained and repetitious adverse loading of the masticatory system through postural imbalances or from oral or parafunctional habits. It has been suggested that postural habits such as forward head position or phone-bracing may create muscle and joint strain and lead to musculoskeletal pain, including headache, in the TMD patient (Travell and Simons 1983).

2.4.5. Skeletal factors

These comprise maladaptive biomechanical relationships that can be genetic, developmental, or iatrogenic in origin. Several skeletal malformations, inter-arch and intra-arch discrepancies, and past injuries to the teeth are examples of possible structural factors.

Extensive overbite (vertical overlap of anterior teeth) has been associated with joint sounds (Runge et al 1989) and broad masticatory muscle tenderness (Solberg, Flint and Brantner 1972), but other studies (Solberg, Flint and Brantner 1972, Cachiotti et al 1991) have not support these associations. Reduced overbite, in particular skeletal anterior openbite, however, has been associated with osteoarthrosis, and with rheumatoid arthritis (Tegelberg and Kopp 1987).

Extensive overjet (horizontal overlap of anterior teeth) has been mentioned as associated with TMD symptoms and osteoarthrosis (Pullinger and Seligman 1993). Other studies (Solberg, Flint and Brantner 1972; Pullinger, Seligman and Solberg 1988) fail to provide evidence of overjet associations to TMD. Seligman and Pullinger (1991) have shown that overjet greater than 5mm was very uncommon in a nonpatient population.

Crossbite is not associated with TMD (Seligman, Pullinger and Solberg 1988). However, while a recent study has not found any evidence that anterior or posterior bilateral crossbite is associated with TMD, unilateral maxillary posterior lingual crossbite was found to be common in TMD patients (Seligman and Pullinger 1991).

2.4.6. Occlusion

The dental profession historically has viewed malocclusion as a primary aetiologic factor for TMD. Occlusal features such as working interferences and nonworking posterior

contacts and discrepancies between the retruded contact position (RCP) and intercuspal position (ICP) have been commonly identified as predisposing, initiating, and perpetuating factors. However, the literature does not strongly support the role of anatomic aetiologic factors (Pullinger, Seligman and Solberg 1988). There is a suggestion that those occlusal factors that are more prevalent in patients (large overjet, minimal overbite and anterior skeletal open bite, occlusal slides greater than 2mm, lack of firm posterior tooth contact) are possibly the result of condylar positional changes following intracapsular alterations associated with disease, and not the causes of the disease (Seligman and Pullinger 1991). Thus, studies to date suggest that occlusion is likely to be of secondary importance as a factor, exacerbating symptoms once TMD has become established for other reasons (Pullinger, Seligman and Solberg 1988; Seligman and Pullinger 1991).

Although the evidence in the literature suggests that there is a move away from occlusal factors in the aetiology of TMD amongst dentate patients, it has been shown in a comprehensive survey that 15% of denture wearers had some degree of dysfunction (Choy and Smith, 1980). The authors also concluded that denture wearers had a higher prevalence of TM disorders than dentate people. The wear of acrylic teeth and alveolar resorption are common events in patients who have worn dentures for some years. This wear is usually concentrated on the posterior teeth due to food abrasion and/or parafunction. The anterior teeth develop facets due to tooth against tooth contact and become locked against each other. In some denture patients, this uneven distribution of

load caused by abrasion of posterior teeth and attrition of anterior teeth may be a factor in the development of TMD. It has been suggested that the relief from dysfunction in denture wearers which occurs when the vertical height of occlusion is increased, may be attributed to the removal of incisal interferences rather than to a change in the vertical dimension (Wilding and Owen, 1985).

2.5 Diagnosis

The diagnosis of TMD has been facilitated by the use of several diagnostic systems. These have been developed by different researchers using clinical symptoms to cluster patients into diagnostic subgroups. A review of the literature done by the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) project, (Dworkin and LeReschc, 1992) revealed nine different diagnostic systems. The review used carefully controlled evaluation criteria and concluded that comparisons of the systems, and patients whose diagnoses have been based on these systems, are difficult to perform. This is because the systems vary widely in their criteria for clinical signs and symptoms, and for defining clinical cases. The authors also recognised another level, or "axis" that must be considered in evaluating and managing TMD pain. This represents the psychosocial influence on the patient's pain experience. This was the first time that a dual axis was initiated which recognised both the physical conditions as well as the psychosocial issues that contribute to the suffering, pain behaviour, and disability associated with the patient's pain experience.

To address these shortcomings, RDC/TMD have recently 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 also includes assessment of behavioural, psychological, and psychosocial factors (see appendix 1, page 77-83).

The RDC/TMD is based on a dual axis system that allows a physical diagnosis based on pathophysiology to be placed on one axis (Axis I). This is co-ordinated with an assessment of TMD-related parafunctional behaviours, psychological distress, and psychosocial dysfunction on a second axis (Axis II). The RDC/TMD will also allow for standardisation and replication of research into the most common forms of muscle- and joint-related TMD.

2.6. Summary

Since the 1970's many researchers have attempted to develop a diagnostic tool for TMD disorders. It is commonly accepted that TMD is a multifactorial disorder. Many of the tools developed did, however not take the multifactorial nature of the condition into consideration. Emphasis was placed almost exclusively on either the physical signs and symptoms or the psychosocial components, without acknowledging the complex interaction between the physical and psychological dimension of persistent pain.

This study will investigate the interaction between physical signs, and chronic pain, depression and non specific symptoms, by using the RDC/TMD Criteria in a sample of TMD patients attending the TMJ clinic at the Dental Faculty of the University of the Western Cape.

3. AIMS AND OBJECTIVES.

3.1. Aims of the study.

1. To investigate the interaction between physical signs, and chronic pain, depression and nonspecific physical symptoms of TMD, using some of the Axis II and Axis I factors of the RDC/TMD system.

Null Hypothesis: There is no association between Axis II and Axis I factors studied in this sample of patients.

3.2. Objectives.

1. To record the demographics of the study population.
2. To apply the RDC/TMD to investigate a sample of TMD patients.
3. To analyse the frequency of the various signs and symptoms.
4. To investigate the association between Axis II factors and some of the factors of Axis I.
5. To draw conclusions from the analysis.

4. MATERIALS AND METHODS.

4.1 Study design.

This was a cross-sectional analytical study.

4.2 Subjects.

100 consecutive patients referred to the TMJ clinic at the Dental Faculty were entered into the study.

All patients underwent a TMD clinical examination and completed the RDC/TMD questionnaire according to the RDC/TMD specifications (see appendix 1; Pages 77-83)

Exclusion criteria:

1. Patients below the age of 18 years, because several questions were difficult to understand or may have been inappropriate.
2. Illiterate patients.

All patients were treated using a conservative approach by means of either or combination of drug therapy, Bite plane therapy, TENS, Ultra-sound, Muscle exercises or Counselling.

The RDC/TMD involves use of a carefully specified history questionnaire and clinical examination to derive a clinical TMD diagnosis and psychosocial assessment. These are placed on two axes as follows:

Axis I - Clinical Examination

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

Group I: *Muscle Disorders*: one of two types:

- A diagnosis of "Myofascial pain" is given when three or more muscles are tender to palpation and a mouth opening of greater than 40mm is recorded.
- When the mouth opening is less than 40mm with three or more muscles tender to palpation, the diagnosis is "Myofascial pain with limited opening".

Group II: *Disc Displacements:* one of three types:

- In "disc displacement with reduction", the disc is presumed to be displaced anterio-medially and a click is heard when the disk is recaptured over the condyle. The click should be reproducible on 2 or 3 consecutive trials.
- In "disc displacement without reduction and with limited opening", there is disc displacement anterio-medially, but no click is heard and there is also a history of limited opening.

- In "disc displacement without reduction and without limited opening", there is an anterio-medial displacement of the disc with no click and no restricted opening.

Group III: <u>*Other Joint Disorders:*</u> one of three types:

- A diagnosis of "arthralgia" is recorded when there is pain in one or both joints during palpation along with self-reports of pain in the joint itself or during function.
- When arthralgia is present with a coarse crepitus in the joint, a diagnosis of "osteoarthritis" is recorded.
- Absence of arthralgia with a coarse crepitus is diagnosed as "osteoarthrosis".

Note: There is a possibility of no diagnosis in any Axis 1 group. Both joints are recorded separately and a maximum of five diagnoses can be recorded.

Axis II - Psychosocial assessment

The history questionnaire includes 31 questions covering information devoted to demographics and Axis II psychosocial assessment.

- Pain intensity will be assessed with visual analog scales and temporal patterns of TMD-related pain. The graded chronic pain 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; and 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.

- Oral habits and other possible risk factors, will be assessed as a summary score of limitations in ability to use the jaw, providing data pertaining to parafunctional behaviours and jaw disability.
- The psychologic status will be assessed through depression and nonspecific physical scores measured with subscales of the Symptom Checklist-90 Revised (SCL-90-R).
- Psychosocial functioning will be assessed through the graded chronic pain scale, 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 because of TMD pain.

Intra examiner reliability was tested using the Kappa Test. 30 patients were used to examine the intra examiner reliability. All patients were examined initially and examined one hour later. The scores were then calculated. The κ value for pain on palpation of extraoral and intraoral muscles ranged from 0.61 to 0.64. The κ value

for pain on palpation of the temporomandibular joint was 0.52. The scores for pain on palpation are considered good, and the score for pain on palpation of the temporomandibular joint is considered acceptable according to κ values reported in another study done by Dworkin, LeResche and DeRouen (1988).

4.3. Data Analysis.

Frequency distributions of signs and symptoms were determined and analysed. The majority of the data were categorical and the Chi-Square test was used to determine the associations between Axis I and Axis II factors. In order to apply the Spearman's rank correlation, the data was converted to means.

4.4. Pilot Study.

A pilot study (see appendix 2, pages 84-85) was carried out. It was found that the methodology of this study was sound and was worth pursuing with a greater number of patients.

4.5. Ethical Considerations.

The protocol was submitted to the Ethics Committee of the University of the Western Cape for approval. An introduction to the researcher, basic aims and objectives of the study, what participating in the study would involve, was explained to all participants.

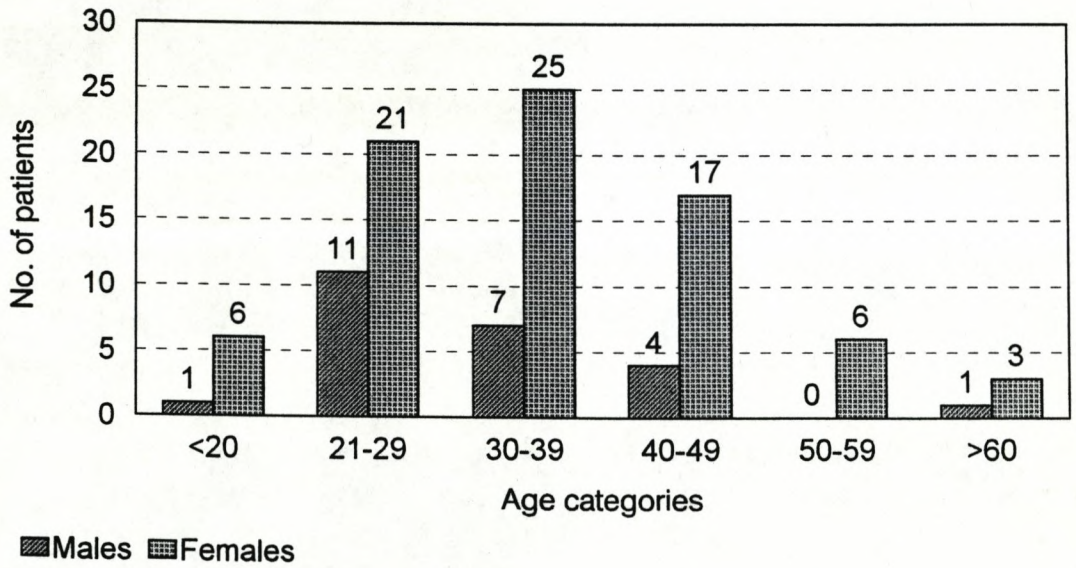
Informed consent was obtained from each participant. It was also been explained that strict confidentiality would be maintained at all times.

5. RESULTS.

5.1 Patient Characteristics.

After application of the exclusion criteria, 102 of the 120 referrals were included in the study. Seventy eight patients (77%) were females, with a mean age of 36 years (range of 18 to 65 years); 24 patients (23%) were males, with a mean age of 31 years (range of 18 to 62 years). For the age distribution of the sample see figure 1. The female-male ratio was approximately 3:1.

Figure 1:- Age and Gender distribution



5.2 Pain and Disability Characteristics.

The mean pain intensity was 5.6 with a standard deviation of 2.7. The mean disability was 3.5 with a standard deviation of 3. Ninety eight patients (96%) reported pain.

5.3 Frequency of the various signs and symptoms.

5.3.1 Axis I: Clinical Findings

The patients were classified into one or more of the three diagnostic groupings proposed by the RDC/TMD for classifying the most common forms of TMD.

Muscle disorder diagnoses were the most common, occurring twice as often as internal derangement diagnoses. Diagnoses of degenerative joint disease, except for arthralgia, were infrequent.

A Group I disorder, or muscle disorder, with and without limitation, was found in 86% of patients (see Table 1).

Group II disorder: Disc Displacement was found in 37% of patients (see Table 2).

Group III disorder: Other Joint Conditions were found in 21% of the patients in the right joint and in 26% of the patients in the left joint. Arthralgia was the most prevalent disorder in this group. One patient had arthralgia in the left joint and osteoarthritis in the right joint (see Table 3).

Table 1: Distribution of RDC/TMD diagnoses: Group I: Muscle disorders (%)

Muscle Disorders	%
Myofascial Pain	30
Myofascial Pain with Limited opening	56
No Diagnoses	14

Table 2:Distribution of RDC/TMD diagnoses: Group II: Disc Displacements (%)

Disc Displacement	Right Joint	Left Joint	Both Joints
Disc Displacement with Reduction	7	10	18
Disc displacement without Reduction with Limited opening	N/A	N/A	2
Disc Displacement without Reduction without Limited opening	0	0	0
No Diagnosis	N/A	N/A	63

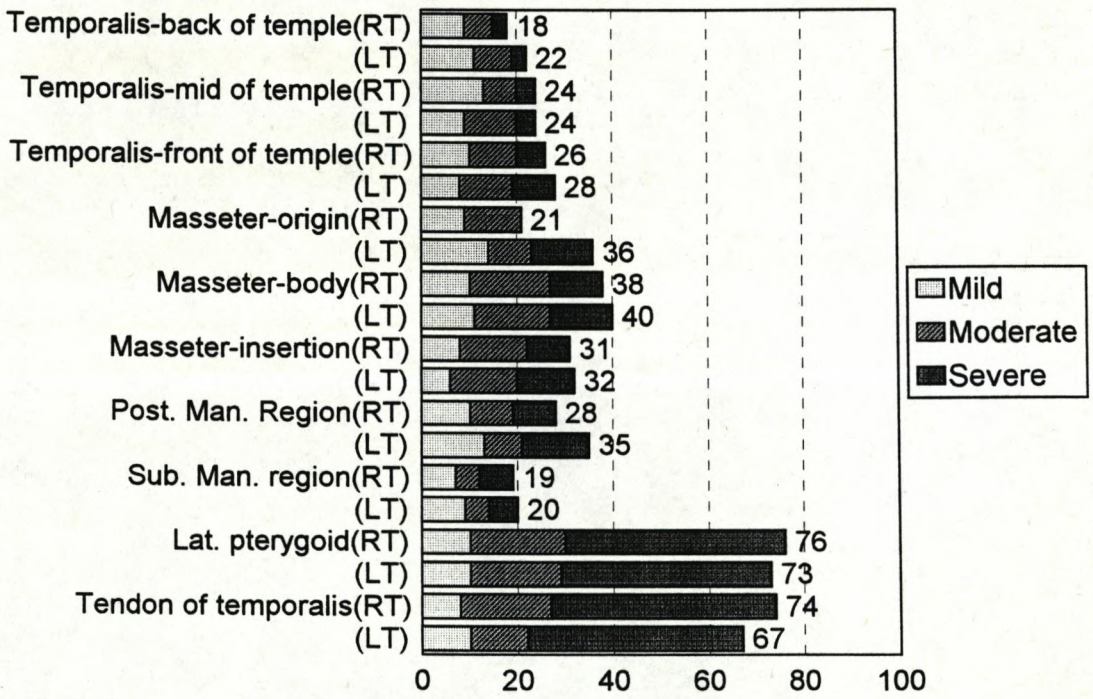
Table 3: Distribution of RDC/TMD diagnoses: Group III: Other Joint Conditions (%)

Other Joint Conditions	Right Joint	Left Joint	Both Joints
Arthralgia	16	22+1	17
Osteoarthritis	3+1	2	1
Osteoarthrosis	1	1	2
No Diagnosis	N/A	N/A	33

5.3.1.1 Muscle Tenderness:

In this study, the lateral pterygoid and tendon of the temporalis showed severe tenderness in the intraoral group. In the extraoral group the masseters and posterior mandibular region were amongst the most tender. The distribution of the various muscles palpated and the levels of muscle tenderness is shown in figure 5.

Figure 5:-Distribution of Muscle Tenderness

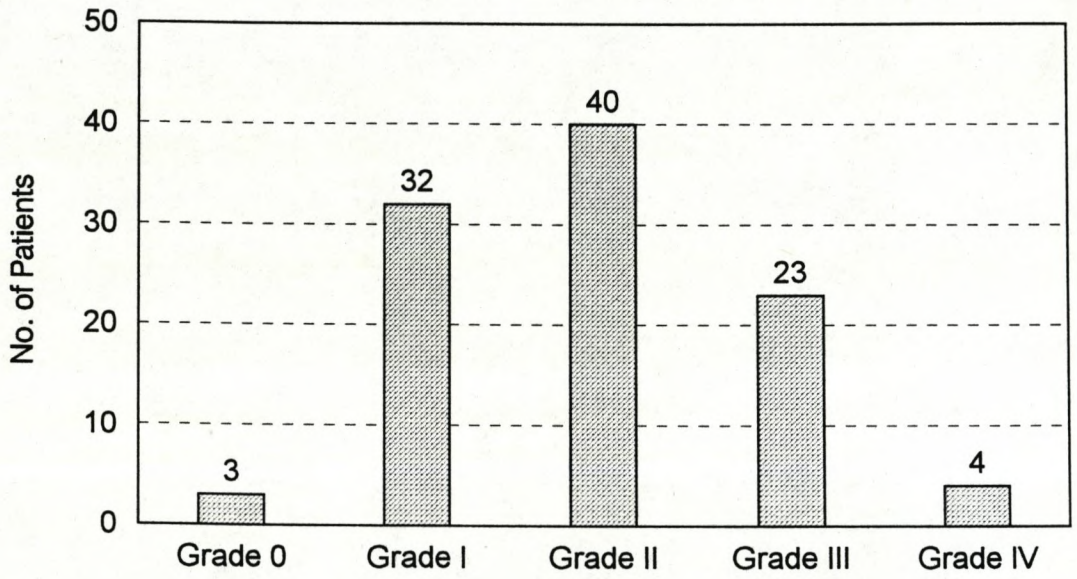


5.3.2 Axis II: Psychosocial Assessment

5.3.2.1. Graded Chronic Pain:

The RDC/TMD uses a graded chronic pain scale developed to quantify more accurately the level of pain-related psychosocial function. The distribution of patients according to graded chronic pain severity (0-IV) is presented in figure 2.

Figure 2:-Distribution of chronic graded pain scores.



Pain patients yielding Grades I and II are considered as psychologically functional, (according to the RDC/TMD criteria) revealing minimal interference or disability associated with their daily lives. Grades III and IV are considered to indicate psychologically dysfunctional levels of pain-related disability, indicating a greater impact on activities of daily living. Twenty seven patients (26%) exhibited dysfunctional chronic

pain. A greater portion of the patients (71%) exhibited low to high intensity pain with low-related disability.

5.3.2.2 Psychological Status:

A) Depression:

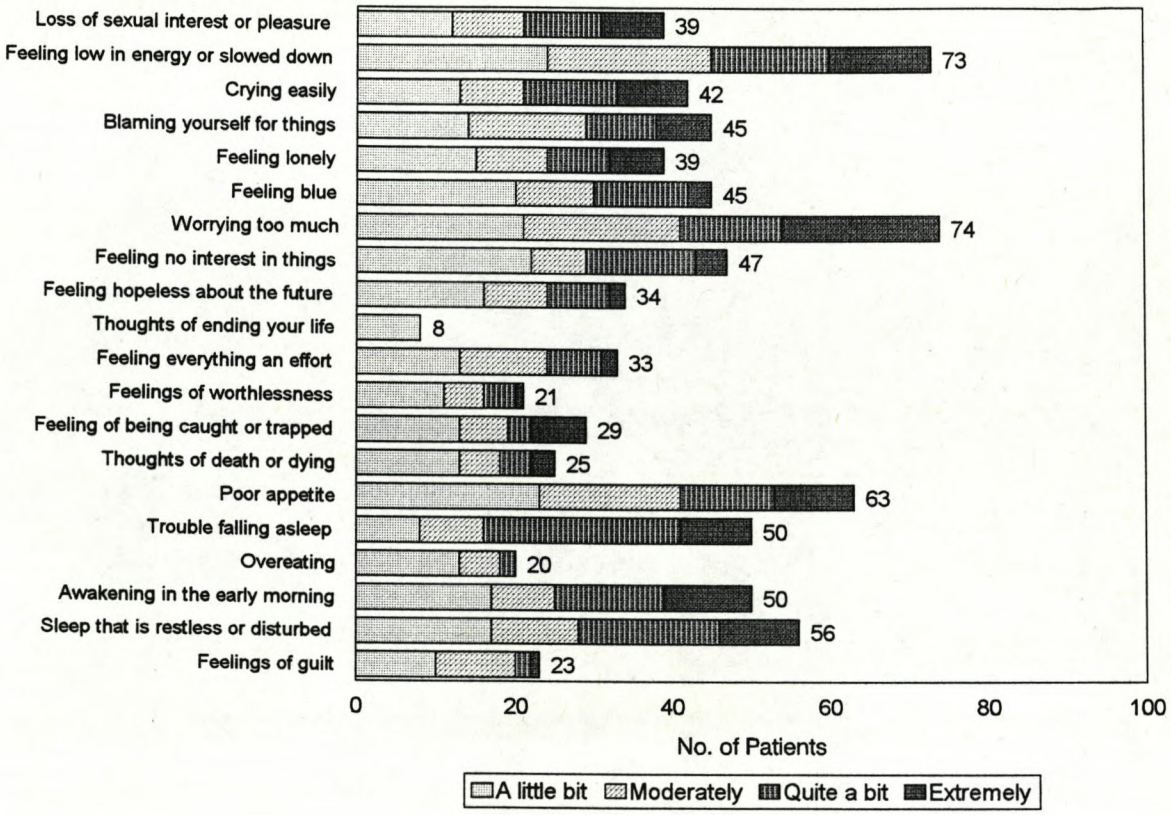
The majority of the patients (66%) exhibited moderate to severe depression of which 30% were severe. The distribution of depression is shown in Table 4.

Figure 3 shows the frequency distribution of the various depression variables. Feeling low in energy, worrying too much, poor appetite and sleep that is restless or disturbed were among the most common symptoms reported.

Table 4: Distribution of Depression(%)

Depression	% of Patients
Normal	34
Moderate	36
Severe	30

Figure 3:-Frequency of the various depression symptoms.



B) Nonspecific physical symptoms:

The majority of the patients (63%) exhibited moderate to severe nonspecific physical symptoms of which 41% were severe. The distribution of nonspecific physical symptoms is shown in Table 5.

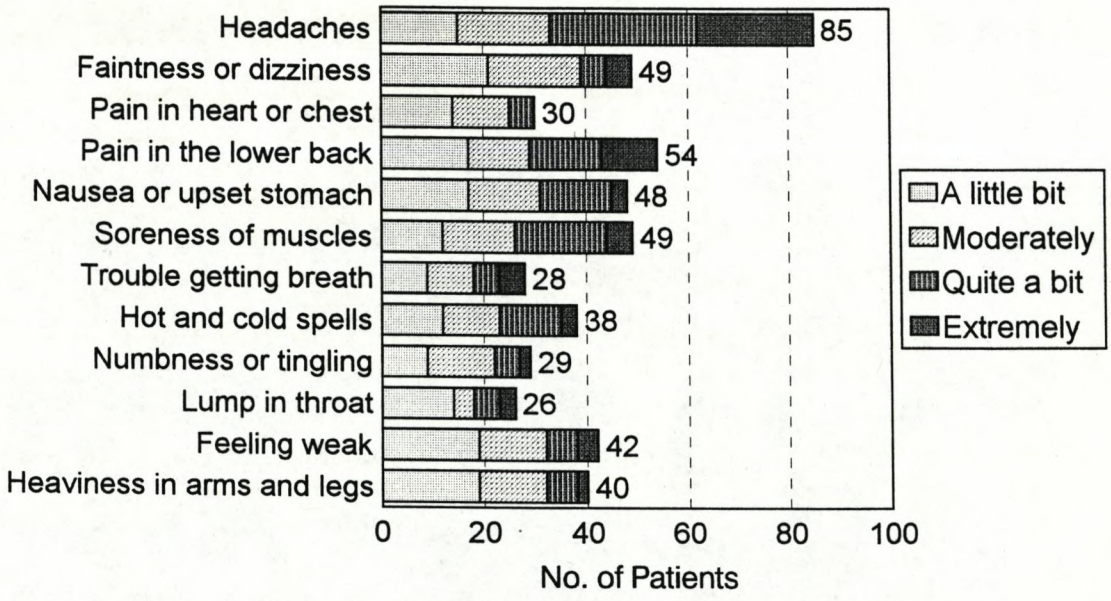
Figure 4 shows the frequency distribution of the various nonspecific symptoms. Of the nonspecific physical symptoms reported, headaches, faintness or dizziness, pain in the

lower back, soreness of muscles and nausea or upset stomach were amongst the most common.

Table 5: Distribution of nonspecific physical symptoms %

Nonspecific physical symptoms	No. of Patients
Normal	37
Moderate	22
Severe	41

Figure 4:- Frequency of the various nonspecific physical symptoms



5.3.2.3 Jaw Disability:

The jaw disability checklist of the RDC/TMD is a composite of 12 items concerning the limitations in activities related to mandibular functioning. The checklist measures the number of activities limited and not the degree of limitation in mandibular functioning. The most common activities which limited mandibular movement were during yawning, eating hard foods and chewing (see Table 6).

Table 6: Distribution of Limited Mandibular Activity

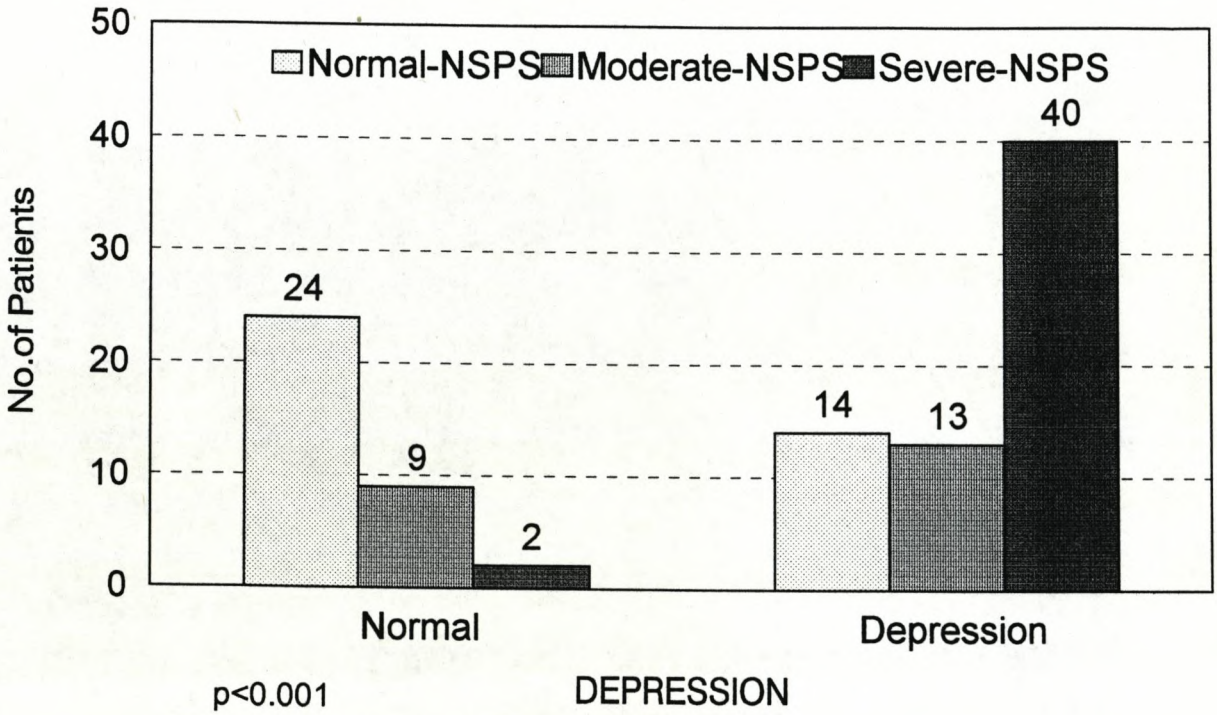
Limited Mandibular Activity	No. of Patients
Chewing	65
Drinking	14
Exercising	27
Eating hard foods	67
Eating soft foods	18
Smiling/laughing	38
Sexual activity	13
Cleaning teeth or face	39
Yawning	69
Swallowing	18
Talking	37
Usual facial appearance	16

5.4 Associations between the various Axis II factors & between Axis II and Axis I factors.

5.4.1 Depression and Nonspecific Physical Symptoms

Depression was collapsed into 2 grades, those patients who were normal and those who were depressed. This was done because the numbers of patients with depression was small (see figure 6). Nonspecific symptoms had 3 grades; normal, moderate and severe. Figure 6 shows a statistically significant relationship between depression and nonspecific physical symptoms ($p<0.001$). With increase in depression there was an increase in nonspecific physical symptoms.

Figure 6: Association between Depression and Nonspecific Physical Symptoms (NSPS) and Table showing data below.

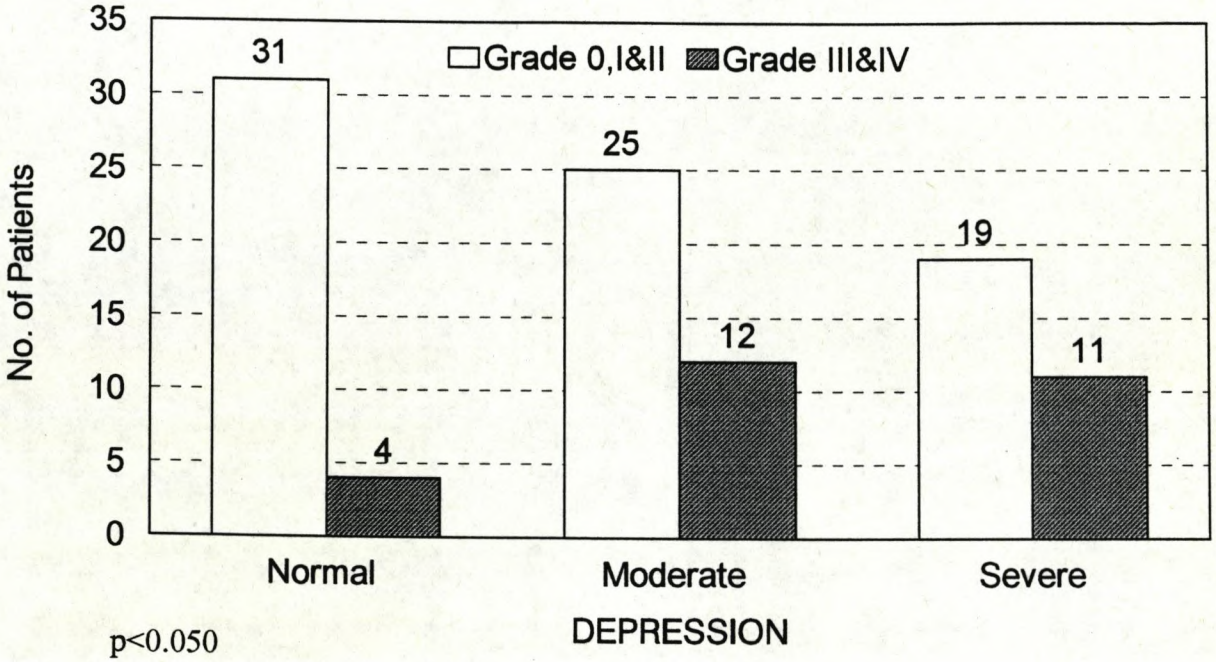


DEPRESSION	NORMAL	MODERATE	SEVERE
NORMAL-NSPS	24	12	2
MODERATE-NSPS	9	11	2
SEVERE-NSPS	2	14	26

5.4.2. Depression and Graded Chronic Pain

There are 3 groups of depression; normal, moderate and severe. There are 2 groups of graded chronic pain. Because the number of patients were small in each group of graded chronic pain, Grades 0 - II, and Grade III and IV were collapsed. Grades 0 - II were grouped because all these patients exhibited no dysfunctional disability. All the patients in Group III and IV showed dysfunctional disability. Figure 7 shows a statistically significant relationship between depression and graded chronic pain ($p<0.050$). With increase in depression there was an increase in the severity of graded chronic pain.

Figure 7: Association between Depression and Graded Chronic Pain and Table showing data below.



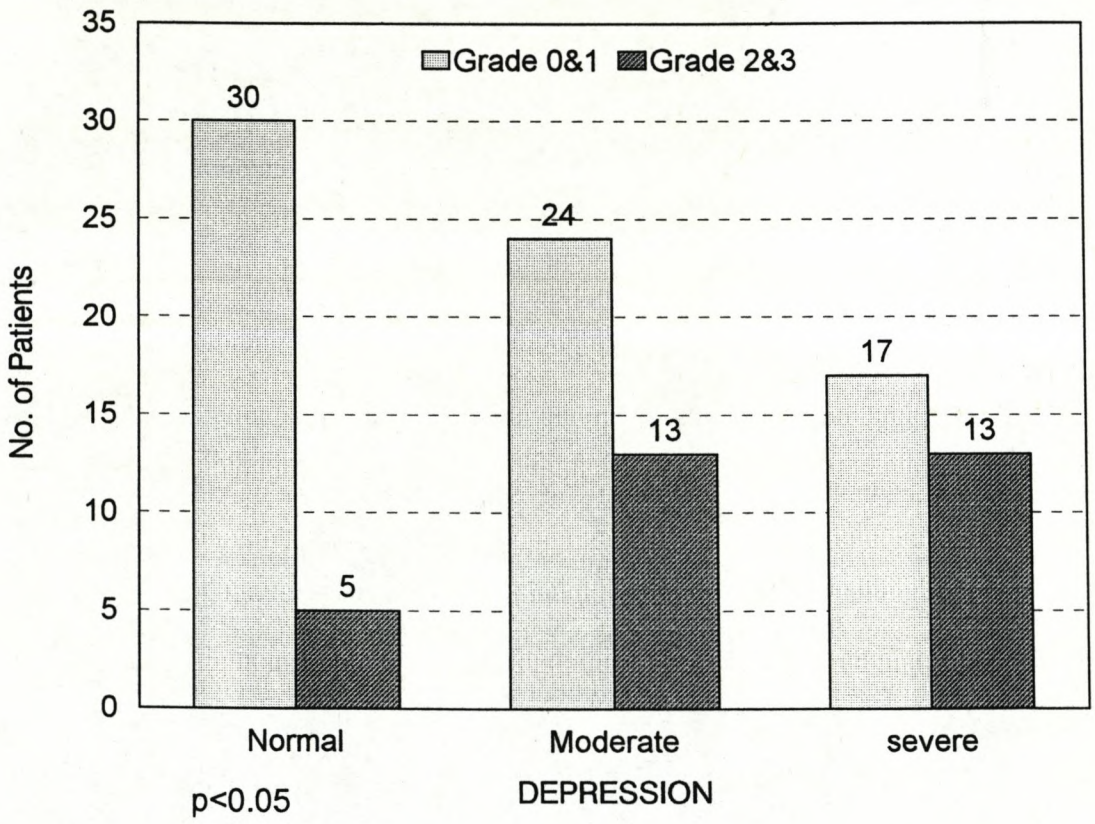
p<0.050

DEPRESSION	NORMAL	MODERATE	SEVERE
PAIN-GRADE 0	3	0	0
PAIN-GRADE I	12	13	7
PAIN-GRADE II	16	12	12
PAIN-GRADE III	4	10	9
PAIN-GRADE IV	0	2	2

5.4.3. Depression and Muscle Tenderness

Muscle tenderness grades 0 and 1, and grades 2 and 3 have been grouped. Figure 8 shows a statistically significant relationship between depression and muscle tenderness ($p<0.050$). With increase in depression there was an increase in the level of muscle tenderness.

Figure 8: *Association between Depression and Muscle Tenderness and Table showing data below*

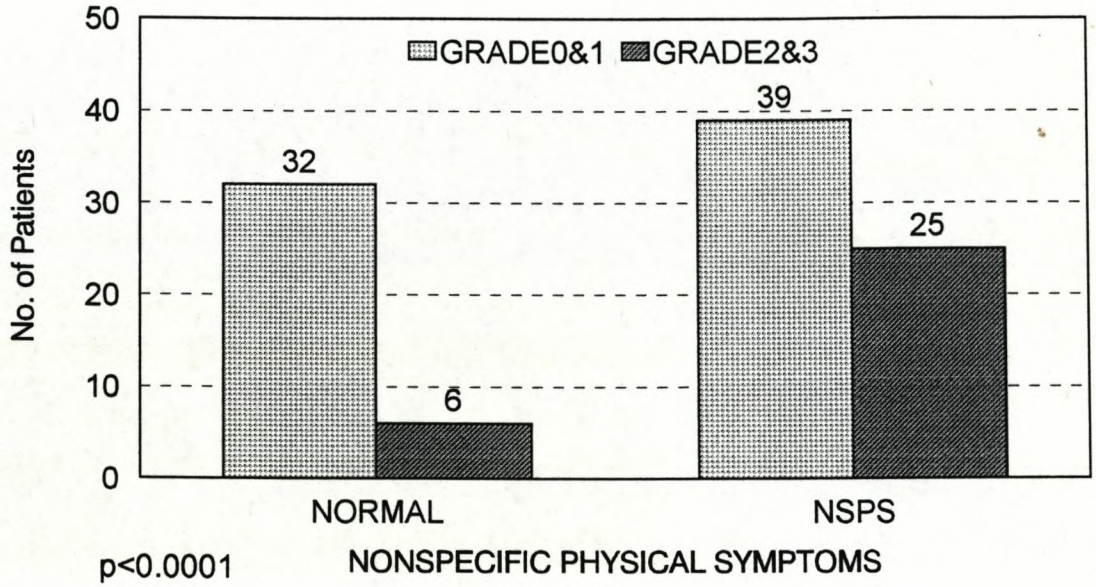


DEPRESSION	NORMAL	MODERATE	SEVERE
TENDERNESS-GRADE 0	8	2	1
TENDERNESS-GRADE 1	22	22	16
TENDERNESS-GRADE 2	2	13	8
TENDERNESS-GRADE 3	3	0	5

5.4.4. Muscle Tenderness and Nonspecific Physical Symptoms

Nonspecific physical symptoms were given 2 grades, normal patients and those with nonspecific symptoms. Muscle tenderness was also grouped as in 5.4.3. The relationship between muscle tenderness and nonspecific symptoms was significant ($p<0.0001$). Patients with nonspecific physical symptoms had increased levels of muscle tenderness. This suggests that there is a strong association between the muscles around the face and nonspecific symptoms such as headaches, lower back pain, etc.

Figure 9: Association between Muscle Tenderness and Nonspecific Physical Symptoms and Table showing data below

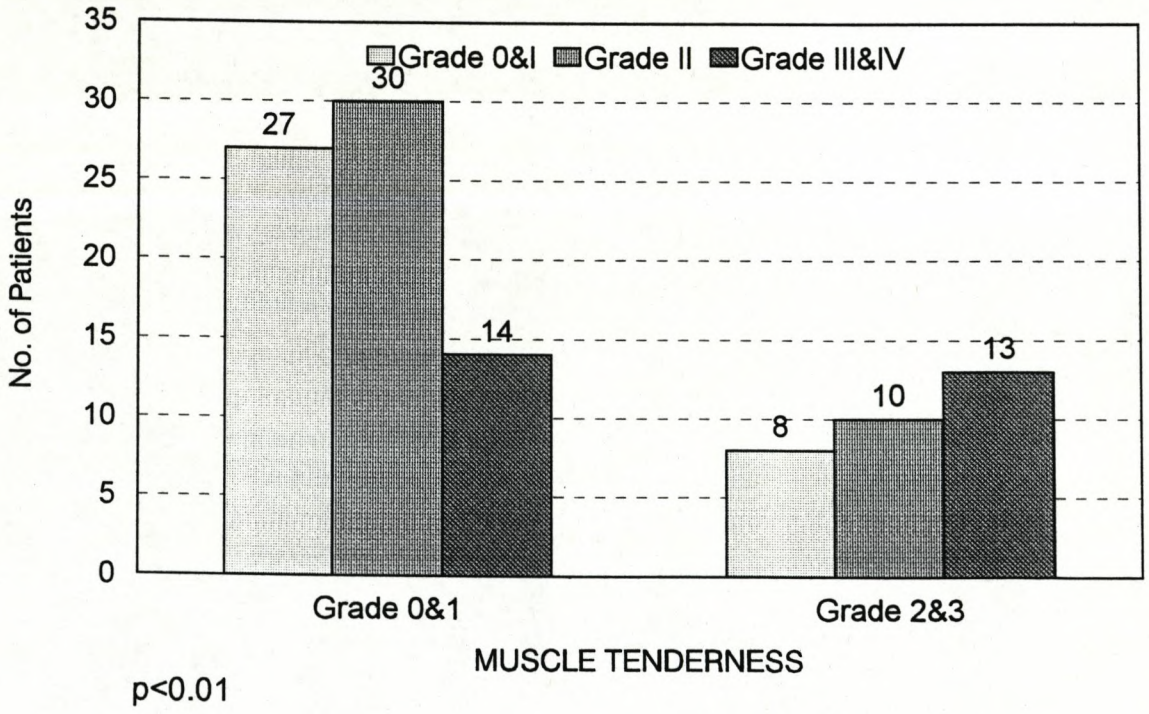


MUSCLE TENDERNESS	GRADE 0	GRADE 1	GRADE 2	GRADE 3
NSPS-NORMAL	10	22	6	0
NSPS-MODERATE	1	16	4	1
NSPS-SEVERE	0	22	15	5

5.4.5 Muscle Tenderness and Graded Chronic Pain

There are 2 groups of muscle tenderness Grades 0&1 and Grades 2&3. There are 3 groups of graded chronic pain Grades 0 & I, Grade II and Grades III & IV. Figure 10 shows a statistically significant relationship between muscle tenderness and graded chronic pain ($p<0.01$). It seems to suggest that the perception of pain is related to the extent of tissue damage.

Figure 10: Association between Muscle Tenderness and Graded Chronic Pain and Table showing data below



MUSCLE TENDERNESS	GRADE 0	GRADE 1	GRADE 2	GRADE 3
PAIN - GRADE 0	2	1	0	0
PAIN - GRADE I	7	17	6	2
PAIN - GRADE II	1	29	9	1
PAIN - GRADE III	1	9	7	3
PAIN - GRADE IV	0	1	3	0

5.5 Correlation between Mean Values of Axis II and Axis I Factors.

In order to test the correlations of Axis II and Axis I factors, the categorical data was converted into mean values. The mean values of the different variables of Axis II and Axis I factors are shown in table 7. According to the RDC scoring criteria, mean pain, mean disability and disable days were grouped together to obtain a chronic graded pain scale (see appendix 1 Page 80). The patients in this sample fell into the Grade II High Intensity category. If all the patients were included in the calculation of disable days the mean is 5.92 with a standard deviation of 21.47. However, if only patients who had reported disable days from 1 to 20 days were included, the mean decreased to 5.68. Only 7 patients in the sample were disabled for more than 2 weeks. Of the questions related to limited relation to mandibular movement 35% on average elicited a positive response. The mean depression score was 0.87. According to the RDC scoring criteria for depression (see appendix 1 Page 80), this sample of patients fell into the moderately depressed group. The mean for nonspecific physical symptoms was 0.91 which suggests that patients showed moderate forms of nonspecific symptoms. The mean muscle tenderness of 0.98 suggests a mild response to the twenty palpation sites.

Table 7: Averages, Medians and Standard deviation of Axis II and Axis I factors

VARIABLE	AVERAGE	MEDIAN	STANDARD DEVIATION
AGE	34.55	32.00	11.50
MEAN PAIN[1]	5.59	5.67	2.74
MEAN DISABILITY[2]	3.45	3.00	3.03
MEAN DISABLE DAYS	5.68	4.00	5.20
LIMITED RELATION TO MANDIBULAR MOVEMENT[3]	0.35	0.33	0.22
MEAN DEPRESSION[4]	0.87	0.70	0.64
MEAN NONSPECIFIC PHYSICAL SYMPTOMS[5]	0.91	0.75	0.73
MEAN MUSCLE TENDERNESS[6]	0.98	0.81	0.77

[1] This is the average of the three responses to the pain related questions (using the visual analog scale).

[2] The is the average of the three responses to the disability related questions (also using the visual analog scale).

[3] This is the average of the "yes" responses to the twelve questions related to mandibular function.

[4] This is the average of the responses to the twenty questions related to levels of depression.

[5] This is the average of the responses to the twelve questions related to the nonspecific symptoms.

[6] This is the average of the tenderness in twenty palpations sites.

5.6 Spearman's Rank Correlations of various Axis II and Axis I Factors.

A Spearman Rank Correlation was carried out because the data for both Axis I and II factors were non-parametric. Table 8 shows the correlations between the various factors of Axis I and II. It shows that there are highly significant correlations ($p<0.001$) between (i) mean pain and muscle tenderness, (ii) mean pain and mean disability, (iii) mean depression and mean nonspecific physical symptoms and (iv) mean muscle tenderness and mean nonspecific physical symptoms. There are moderately significant correlations ($p<0.01$) between mean muscle tenderness and both limited relation to mandibular function and mean depression. There are significant correlations ($p<0.05$) between (i) mean nonspecific physical symptoms and mean pain, and (ii) mean disable days and limited relation to mandibular movement. The correlations between all the other factors are not significant.

Table 8 : Spearman Rank Correlations of various Axis I and Axis II Factors.

VARIABLE	AGE	MEAN PAIN	MEAN DISABILITY	MEAN DISABLE DAYS	LIMITED RELATION TO MANDIBULAR MOVEMENT	MEAN DEPRESSION	MEAN NONSPECIFIC PHYSICAL SYMPTOMS	MEAN MUSCLE TENDERNESS
AGE								
MEAN PAIN	0.02		***				*	***
MEAN DISABILITY	0.16	0.52						
MEAN DISABLE DAYS	0.18	0.14	0.23		*			
LIMITED RELATION TO MANDIBULAR FUNCTION	0.007	0.10	0.09	0.32				**
MEAN DEPRESSION	0.18	0.18	0.18	0.22	0.07		***	**
MEAN NONSPECIFIC PHYSICAL SYMPTOMS	0.06	0.22	0.10	0.29	0.13	0.69		***
MEAN MUSCLE TENDERNESS	0.01	0.37	0.19	0.28	0.27	0.24	0.40	

n = 101 patients

Mean Disability = 79 patients

Mean Disable Days = 41 patients

* = $p < 0.05$

** = $p < 0.01$

*** = $p < 0.001$

6. Discussion.

6.1 Patient Characteristics.

The mean age of the sample of patients was 35 years (range of 18 - 65 years). The mean age of the males and females was 31 and 36 years respectively. The majority of patients were between the ages of 21 and 49 years (see Figure 1). These findings concur with other (although limited) population based epidemiological data available which also indicate a peak prevalence in young adults (20 to 40 years) and a lower prevalence of signs and symptoms at older ages (Agerberg and Bergenholz, 1989).

The female : male ratio in the sample was 3 : 1. A recent study (List and Dworkin, 1996) using the RDC criteria also reported a similar gender ratio of 3,6 : 1. There seems to be some acceptance in the literature that TMD patients reflect an overwhelming predominance of women in the third and forth decades. The gender discrepancy may be due to treatment-seeking behaviour, coping style and illness behaviour. These are frequently suggested but not scientifically supported. There seems to be another belief that female susceptibility for TMD's may be due to female reproductive hormone (LeResche et al, 1997). However, the reported discrepancies in gender differences still require explanation and further research

6.2 Pain and Disability Characteristics.

The mean pain intensity was 5.6 with a standard deviation of 2.7. The List and Dworkin study (1996), reported mean pain intensity of 4.6 ± 2.2 for a Swedish group and 4.0 ± 2.6 for a U.S. group. Ninety eight patients (96%) of the sample reported pain. In contrast, the Swedish group reported pain in 83% and the U.S. group reported 95%. The reporting of pain as a symptom is very similar between these studies and suggests that there is some uniformity in the patients reporting their pain.

6.3 Frequency of the various signs and symptoms.

6.3.1 Axis I: Clinical Findings

In Group I Muscle disorders: The main diagnostic subgroup "Myofascial pain", which includes presence of pain, tenderness upon palpation of three or more sites, was diagnosed in 30% of the sample. This is lower than the findings of List and Dworkin (1996), which showed a higher diagnosis of myofascial pain (50% in the Swedish group and 46% in the U.S. group). The diagnostic subgroup "myofascial pain with limited opening" was diagnosed in 56% of the sample (see Table 1). This is similar to another study by Zaki et al (1994), also using the RDC/TMD, which reported a diagnosis in 58% of the sample. The discrepancies between the studies may be due to the fact that not enough care is exercised to ensure that the self-report of pain reflects pain arising from the muscles and not the joints, when deciding if criteria for Group I muscle disorder diagnosis are met.

In Group II Disc Displacements: Disc displacement with reduction was found in 35% of the right and left joints; disc displacement without reduction, with limited opening, occurred at a much lower rate of 2% for either joint (see Table 2). These findings are similar to the List and Dworkin (1996) study, in which they reported a disc displacement with reduction in approximately 30% of the right and left joints and disc displacement without reduction, with or without limited opening of 5% of either joint.

In Group III: Other Joint Conditions were diagnosed in 21% of the patients in the right joint and 26% of the patients in the left joint (see Table 3). In order to compare the data with the List and Dworkin (1996) study, the table has been redrawn to make comparisons between the studies easier (see Table 9).

Table 9: Distribution of RDC/TMD diagnoses: Group III: Other Joint Conditions (%)

Other Joint Conditions	Present Study		List & Dworkin (1996)			
	Right Joint	Left Joint	Right Joint		Left Joint	
			Sweden	US	Sweden	US
Arthralgia	32	41	20	42	22	38
Osteoarthritis	5	3	1	2	1	2
Osteoarthrosis	3	3	2	0	2	1
No Diagnosis	60	53	77	56	75	59

Arthralgia was diagnosed in 32% in the right joint and 41% in the left joint. In comparison with List and Dworkin (1996) (Table 9), these data both support that the diagnosis of

Arthralgia was lower in the right joint. In this study the right joint was also less frequently affected than the left, although the differences are less striking.

Osteoarthritis and Osteoarthrosis were found in less than 10% of the right and left joints. This prevalence was also a similar to the List and Dworkin (1996) study. It should be remembered that rates reported here for RDC/TMD diagnoses of joint disorders of all kinds do not include confirmation by joint imaging (eg. MRI or arthrograms).

6.3.1.1 Muscle Tenderness:

The most common muscles which elicited tenderness on palpation were the lateral pterygoid, tendon of the temporalis and the masseters (see Fig. 5). These findings are similar to the findings of Dworkin et al.(1990), who reported muscle tenderness in 45% of the sample on palpation of the lateral pterygoids and 14% report pain on palpation of the deep masseters. Another study done by Cooper (1997) reported muscle tenderness in the temporalis (52.8%), lateral pterygoid (67.7%) and masseter (10.3%). They also reported tenderness in other muscles like sternocleidomastoid and the trapezius. These muscles are however, not included in the research diagnostic criteria. One could consider including these muscles in the RDC evaluation.

6.3.2 Axis II: Psychosocial Assessment

6.3.2.1. Graded Chronic Pain:

The level of disability is a critical factor in estimating the morbidity of chronic facial pain. The codes used to designate disability are not adequate, as pointed out in the chapter on results. Disability could be a useful estimation of the tolerance of chronic pain.

While a greater portion of the patients (71%) exhibited low to high intensity pain, the disability was low. This concurs with the List and Dworkin study (1996) which reported figures of 73% in both the Swedish and the US group. In the present study, 26% (see Figure 2) of the patients exhibited dysfunctional chronic pain (defined as group III and IV). The List and Dworkin (1996) study reports a lower prevalence (14%) of dysfunctional chronic pain in the Swedish group, but in the US group pain was high (20%). These data may suggest that different social groups display different levels of disability and therefore a different tolerances to chronic pain.

6.3.2.2 Psychological Status:

A) Depression:

The majority of the patients (66%) exhibited moderate to severe depression of which 30% was severe (see Table 4). The List and Dworkin study (1996) reported 51% (Swedish) and 46% (US) with moderate to severe depression of which 18% and 19% respectively,

were severe. This sample of patients presented with higher incidence of, moderate and severe depression.

The most common depressive symptoms were, feeling low in energy, worrying too much, poor appetite and sleep that is restless or disturbed (see Figure 3). These symptoms appear to be consistent with the nature of the stresses in our society and in the community from which the patients are drawn, where unemployment and crime rates are high.

B) Nonspecific physical symptoms.

The majority of the patients (63%) exhibited moderate to severe nonspecific symptoms of which 41% were severe (see Table 5). The List and Dworkin study (1996) reported 61% (Swedish) and 63% (US) with moderate to severe nonspecific physical symptoms of which 28% and 31% respectively, were severe. Although there is similarity between presence of nonspecific physical symptoms, in the past and present studies, the present sample showed a higher incidence of patients with these symptoms. The high prevalence of nonspecific physical symptoms is an indication of the association between TMD and emotional stress, tension and depression, and highlights the need to address behavioural aspects of patient treatment.

The most frequent nonspecific symptoms were headaches, faintness or dizziness, pain in the lower back, soreness of muscles and nausea or upset stomach (see Figure 4). All these

complaints are related to somatisation. Somatisation is a term which has been used to describe a range of behaviours: reporting numerous physical symptoms, frequent utilisation of health care, and the persistence in seeking a physical or biomedical explanation for and treatment of symptoms. All these symptoms are stress related disorders in which there may be the transference of emotional pain to some part of the body.

6.3.2.3. Jaw Disability

The most common activities which limited mandibular movement were chewing, eating hard foods and yawning (see Table 6). Stegenga et al (1993) reported that most of the pain is provoked by a stretching and loading movement of the mandible. This finding was supported in this study by the relatively high scores in eating hard foods and yawning.

6.4 Associations between the various Axis II factors and between Axis I and Axis II factors.

6.4.1. Depression and Nonspecific Physical Symptoms

In this study depression and nonspecific physical symptoms were found to be related. In patients with depression the increased proportion of nonspecific physical symptoms was significant (see Fig.6). Somatisation and nonspecific physical symptoms are not synonymous. Nonspecific physical symptoms are a report of symptoms and somatisation

is a behavioural trait. Somatisation specifically refers to a personality trait where the patient tends to report physical distress arising from what may be perceived symptoms, but which may not be consistent with measurable pathologic or physiologic findings. High somatisation scores may also indicate excessive and inappropriate sensitivity to physical symptoms and a difficult patient to treat, for as one symptom subsides, another comes to the fore.

Several workers including Rudy et al. (1995), Fricton and Olsen (1996), Krogstad et al. (1996), Kinney et al. (1992), and McCreary et al (1992) have demonstrated clear relationships between depression and nonspecific physical symptoms. These were also identified as predictors of outcome of TMD treatment. Although these studies vary in methodology and statistical analysis used, they all conclude that the management of behavioural and psychological factors is a requirement if long term management of TMD is to be successful. This relationship of somatisation and depression was also shown by Wilson et al (1994) who also used the SCL-90-R scales to measure depression and somatisation. Their results indicate that a tendency to report numerous somatic symptoms is more strongly related to reports of dispersed pain, than to psychological distress. In other words, the strongest connections remain within the somatic domain.

Most conventional measures of psychological states such as depression and anxiety include a combination of emotional, cognitive, behavioural and somatic items, consistent with

current understanding of multidimensional determinants of these affective disturbances (e.g., muscle tension, heart palpitations, sweating, fatigue, sleep disturbance). This could account for the association between measures of psychological distress and reported pain. Buckelow et al (1986) demonstrated that chronic pain patients experienced more somatic symptoms as opposed to self-reported emotional upset. These findings are consistent with the theoretical view of Katon et al (1991), that for certain individuals somatisation may represent an idiom of expression of distress; that is, psychological disturbance may be expressed somatically rather than as self-reported emotional upset.

6.4.2. Depression and Graded Chronic Pain

Depression and Graded Chronic Pain were found to be related in this study (see fig.7). This finding is in agreement with Gatchel et al (1996) who believe that "chronic pain is commonly characterised by depression and is often accompanied by addictive/appetitive disease [e.g. substance abuse, eating disorders]". Kinney et al (1992), using a structured clinical interview, found that both anxiety and depression were not merely transient symptoms. Instead, they reported that "psychological disorders are a major concomitant factor of chronic TMD". Perhaps the importance of these findings lie in the possibility that for some people, chronic pain may be the expression of a psychological disorder that existed before the chronic pain syndrome developed. A recent study by List and Dworkin (1996), who also used the RDC to evaluate a Swedish and a U.S. group, also showed strong correlations between graded chronic pain and depression.

6.4.3. Muscle Tenderness and Depression

Depression and muscle tenderness are related. In patients with depression the proportion of high muscle tenderness was significant. This indicates that there is a relation between the severity of depression and muscle tenderness. It is commonly assumed that stress in some way influences the pain and the extent of TMD and there is evidence which supports that those who suffer TMD have a different stress response to those who do not. At a biochemical level, it has been found that TMD patients, as compared to controls, had significantly higher levels of catecholamines and 17-hydroxysteroids (Evakus and Laskin, 1972). Perhaps the most conclusive evidence comes from the work of Yemm (1976) who found that those with TMJ pain responded to stressful situations by contracting their masseter muscles to a greater degree than normal controls. Rugh and Solberg (1976) have similarly shown that patients with TMD respond to stress by increased contraction of their masseters at night. Thus, stress leads to muscle fatigue and muscle fatigue leads to pain.

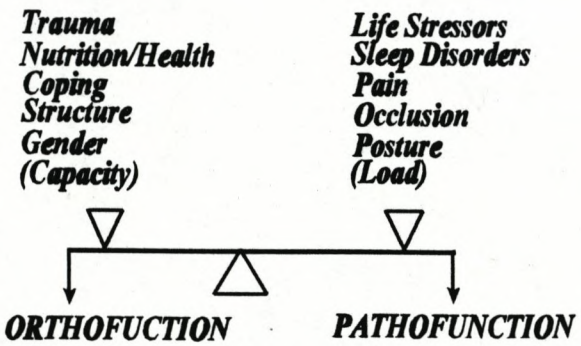
It is important to understand that, although pain may be of psychogenic origin, it is never "imagined". It is accentuated by mood and never created by it. Most cases of depression associated with TMD are the result of chronic pain and not the cause of it. This may be why the use of very low doses of tricyclic antidepressants has been useful in the treatment of these patients.

6.4.4. Muscle Tenderness and Nonspecific Physical Symptoms

Muscle tenderness and nonspecific symptoms are related. This suggests that there is a strong association between the muscles around the face and nonspecific symptoms such as headaches, lower back pain, etc. There is some evidence to confirm this finding, as it has been shown that chronic TMD patients have been found to have psychosocial and behavioural characteristics similar to patients with lower back pain and headache (Turk and Rudy 1990). To explain this phenomenon Wanman and Agerberg (1990) proposed a concise model of TMD etiology, based on TMD dynamics:

$$\frac{Load}{Capacity} \rightarrow Tissue\ Response\ Capacity$$

This was modified by Parker (1990) who proposed a model which has five factors on the left, which influences the capacity of the stomatognathic system, and five factors on the right that affect the load on the system:



If the load is within the a patient's stomatognathic capacity, the tissue response is orthofunction; if the load exceeds the patient's capacity, a TMD (pathofunction) results.

The reason for expanding the model in the present context is to depict the effect that psychologic factors may have on TMD dynamics. The literature suggests that patients' perception of pain, the effect of pain on their lives, dysphoric mood, responses of others, and levels of activity all contribute to their suffering and disability. Therefore it is important to assess patients themselves in addition to focusing on the physical symptoms.

6.4.5. Muscle Tenderness and Graded Chronic Pain

Pain is a unique personal experience that cannot be fully shared by anyone else. We cannot transmit pain, but we can communicate pain by words or by behaviour. The understanding of pain is complicated further by the fact that the same painful stimulus may be perceived differently by different people, and differently by the same people at different times. The person's reaction to the circumstances surrounding the pain experience and the interpretation of the pain meaning may also be different.

Chronic pain has very complex and multifaceted features, and cannot be understood by simply applying the concepts of acute pain and its causes and treatment. Chronic pain does not respond well to analgesics and narcotics and is resistant to most traditional therapies for pain. There may not be a definable local cause. The presence of mild depressive overtones, and other psychological features in many patients has led to the belief that psychological mechanisms underlie this disorder. Chronic pain is an important medical and social problem. It is distressing to patients, as it alters their lives and

sometimes their employment, and it responds poorly to treatment. Patients with chronic pain may have localised or widespread pain and tenderness, some with tender points in predictable "muscle trigger spots", but with few other physical findings. They often complain of fatigue, sleep disturbance, and limited function.

In this study, graded chronic pain is related to the severity of muscle tenderness. This suggests that the perception of pain is related to the extent of tissue damage.

6.5. Spearman's Rank Correlations of various Axis II and Axis I Factors.

Table 8 shows the correlations between the various factors of Axis I and II. It shows that there are highly significant correlations ($p<0.001$) between (i) mean pain and muscle tenderness, (ii) mean pain and mean disability, (iii) mean depression and mean nonspecific physical symptoms and (iv) mean muscle tenderness and mean nonspecific physical symptoms. There are moderately significant correlations ($p<0.01$) between mean muscle tenderness and both limited relation to mandibular function, and mean depression. There are significant correlations ($p<0.05$) between (i) mean nonspecific physical symptoms and mean pain, and (ii) mean disable days and limited relation to mandibular movement. The correlations between all the other factors are not significant.

A study by Wilson and workers (1994) who also reported on similar correlations of these various factors, showed similar findings to the present study. In the highly significant group, nonspecific symptoms and depression was 0.69 compared to 0.66. Mean pain and Muscle tenderness was 0.37 compared to 0.34. Nonspecific physical symptoms and muscle tenderness was 0.22 and much higher 0.46 when compared with the Wilson (1994) study. Other correlations that were similar was mean pain and somatisation which was 0.32, and muscle tenderness and depression which was 0.25.

Somatisation showed a strong relationship with depression ($r=0.69$, $p<0.001$) and a significant relationship with mean pain ($r=0.22$, $p<0.05$). The results indicated that an elevated somatisation score was associated with the report of more widely dispersed TMD pain during palpation of the muscles. One possible interpretation of these results could be that some patients were somatically focused or sensitised solely because of a higher intensity or more severe pain condition, thus reporting many muscle sites as painful. These results also indicate that somatisation has a strong connection with depression and chronic pain.

Although depression did not emerge as a powerful predictor of pain dispersion in this study, pain intensity continued to be significantly related to muscle tenderness. High-intensity pain may be sensitising and promote increased vigilance about physical well being, lowering the threshold either for detecting physical sensations or for describing them as distressing or painful. Perhaps the flare-up of an ordinary low-intensity pain or chronic pain condition prompts the person to be more somatically preoccupied and more likely to label physical sensations as painful.

These tests confirm the findings of the associations carried out using the chi-square test for the categorical data. The categorical data are non parametric, whereas the continuous data used to test for correlations may be parametric. This

was done to give a clear indication of the degree of interrelationship between each factor.

7. LIMITATIONS OF THE RESEARCH DIAGNOSTIC CRITERIA.

There are several limitations to the research diagnostic criteria.

Firstly, the classification that constitutes Axis I was derived from expert consensus rather than empirical evidence. After the oral and dental examination, the patients are assigned to diagnostic groups. There is no way of knowing whether the characteristics that constitute the proposed categories reported, are in fact artificial constructions based on clinical experience.

The second axis is problematic in that it combines psychological factors such as emotional distress with mandibular function (Von Koff et al 1992). There are arbitrary cutoffs which serve as the basis for the assignment of patients to different subgroups for both axes. Two patients who are just above and just below the cutoff respectively, may be more similar than two other patients both of whom are just above the cutoff but whose scores vary significantly.

Another problem with the RDC is that diagnoses constituting the physical axis are not mutually exclusive, and patients may have multiple diagnoses, one from each group. The finding that many patients with TMD receive multiple physical (axis I) diagnoses in the RDC system, in addition to the observation that most examination findings used to derive the classification can be represented as continuous rather than dichotomous scores, suggests that an empirically derived multivariate classification approach would produce a set of mutually exclusive diagnoses based on signs and symptoms. These unique classifications should provide better discrimination among patients with TMD than the arbitrary dichotomous scoring approach used by, and the overlapping categories contained in the RDC. This approach identifies independent groups of patients and can be compared with other methods and studies.

The disability index scale used is not sensitive enough. This is due to the fact that patients who have excruciating pain, but still continue their daily activities are not included as being disabled. Some measure is necessary to record this level of disability e.g. totally exhausted at the end of the day.

Occlusion is also not considered in the RDC. There has been a move away from occlusion as an aetiological factor in TMD. However, the wear of acrylic teeth and alveolar resorption are common events in denture wearers who have worn

dentures for some years. This wear is concentrated on the posterior teeth and the anterior teeth develop facets due to tooth against tooth contact and become locked against each other. It has been suggested that the relief from dysfunction in denture wearers which occurs when the vertical dimension of occlusion is increased, may be attributed more to the removal of incisal interferences rather than the change in the vertical dimension (Wilding and Owen, 1985). This is an important consideration as Choy and Smith (1980) found that 15% of denture wearers had some degree of dysfunction.

8. LIMITATIONS OF PRESENT STUDY.

The sample size in this study was small. This made comparisons between the smaller sub-groups difficult. Therefore, in many instances it was necessary to collapse some of the groups in order to assess associations.

It was also a convenient sample, as the patients used in the sample were all patients of the TMD clinic at the Dental Faculty, who were in need of TMD treatment.

9. CONCLUSION

The purpose of this study was to investigate the interaction between physical signs, and chronic pain, depression and nonspecific physical symptoms of TMD, using some of the factors of the RDC/TMD system. The results suggest that there is an association between the various Axis II factors and between Axis I and Axis II factors.

This study confirms the value of Axis II factors in the aetiology of TMD. TMD is a chronic pain condition. This pain is persistent irrespective of its aetiology or whatever else may be entailed in its underlying physiological or psychological processes. TMD also has a behavioural and emotional component. This psychological and emotional disturbance is reported by patients as stress, anxiety, depression or somatisation. It can show itself as social isolation and inability to carry on activities of daily living. These manifestations are often accompanied by increased reliance on medicines and heightened use of both traditional and alternative health care providers. This puts TMD patients at increased risk of experiencing disturbances in how they think, feel and act. This can be transient and minor, or moderately distressing, or can reach appreciably dysfunctional levels. This study shows that TMD as a chronic pain condition and TMD as a psychological disturbance are related. It is important to consider that pain is never "imagined". It is accentuated by mood and never created by it. It also must be

remembered that most cases of depression associated with TMD are the result of chronic pain and not the cause of it. "Thus, to advocate incorporating biobehavioural methods into treatment of TMD is not equivalent to asserting that behavioural factors caused the TMD, or that TMD is not a real condition" (Dworkin 1996). The available evidence does support the potential effectiveness of behavioural approaches in treating TMD. These biobehavioural treatments of chronic pain include electromyographic biofeedback, relaxation, behaviour modification, cognitive behaviour therapy, education and hypnosis. Therefore, the practitioner and the patient must strive to develop a treatment plan that is evidence-based and patient-centred. In devising any treatment plan, the practitioner must weigh the patient's perception of pain and dysfunction and the impact of these on the patient's quality of life. In the absence of overt pathology, some patients and practitioners can work together to implement a program of patient self-management with education and an understanding of the role of emotional factors. A number of conservative, noninvasive, and reliable treatments should be used together with a patient self management. The patient's responsibility for self awareness and to develop the necessary life skills in coping with their pain is also important.

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11. APPENDICES.

11.1 Appendix 1 : RDC\TMD Questionnaire

ID# _____
Date: __ / __ / __

History Questionnaire

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, or poor?
   Excellent 1
   Very good 2
   Good 3
   Fair 4
   Poor 5

2. Would you say your oral health in general is excellent, very good, good, fair, or poor?
   Excellent 1
   Very good 2
   Good 3
   Fair 4
   Poor 5

3. Have you had pain in the face, jaw, temple, in front of the ear, or in the ear in the past month?
   No 0
   Yes 1

   [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
   [If one year ago or more SKIP to question 5]
   [If less than one year ago, code 00]

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

5. Is your facial pain persistent, recurrent, or was it only a one-time problem?
   Persistent 1
   Recurrent 2
   One-Time 3

6. Have you ever gone to a physician, dentist, chiropractor, or other health professional for facial ache or pain?
   No 1
   Yes, in the last 6 months 2
   Yes, more than 6 months ago 3

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 — Pain as bad as could be
   0 1 2 3 4 5 6 7 8 9 10

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 — Pain as bad as could be
   0 1 2 3 4 5 6 7 8 9 10

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 — Pain as bad as could be
   0 1 2 3 4 5 6 7 8 9 10

10. About how many days in the last 6 months have you been kept from your usual activities (work, school, or housework) because of facial pain?
    _____ Days

11. In the past 6 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 — Unable to carry on any activities
    0 1 2 3 4 5 6 7 8 9 10

12. In the past 6 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 — Extreme change
    0 1 2 3 4 5 6 7 8 9 10

13. In the past 6 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 — Extreme change
    0 1 2 3 4 5 6 7 8 9 10

14.a. Have you ever had your jaw lock or catch so that it won't open all the way?
    No 0
    Yes 1

    [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 0
    Yes 1

15.a. Does your jaw click or pop when you open or close your mouth or when chewing?
    No 0
    Yes 1

b. Does your jaw make a grating or grinding noise when it opens and closes or when chewing?
    No 0
    Yes 1

c. Have you been told, or do you notice, that you grind your teeth or clench your jaw while sleeping at night?
    No 0
    Yes 1

d. During the day, do you grind your teeth or clench your jaw?
    No 0
    Yes 1

e. Does your jaw ache or feel stiff when you wake up in the morning?
    No 0
    Yes 1

f. Do you have noises or ringing in your ears?
    No 0
    Yes 1

g. Does your bite feel uncomfortable or unusual?
    No 0
    Yes 1

16.a. Do you have rheumatoid arthritis, lupus, or any other systemic arthritic disease?
    No 0
    Yes 1

16.b. Do you know of anyone in your family who has had any of these diseases?
    No 0
    Yes 1

16.c. Have you had or do you have any swollen or painful joint(s) other than the joints close to your ears (*TMJ*)? No ..... 0 Yes 1

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

If Yes,

16.d. Is this a persistent pain that you have had for at least one year? No ..... 0 Yes 1

17.a. Have you had a recent injury to your face or jaw? No ..... 0 Yes 1

[If no recent injuries SKIP to question 18]

If Yes,

17.b. Did you have jaw pain before the injury? No ..... 0 Yes 1

18. During the last 6 months have you had a problem with headaches or migraines? No ..... 0 Yes 1

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

a. Chewing	No 0	Yes 1
b. Drinking	No 0	Yes 1
c. Exercising	No 0	Yes 1
d. Eating hard foods	No 0	Yes 1
e. Eating soft foods	No 0	Yes 1
f. Smiling/laughing	No 0	Yes 1
g. Sexual activity	No 0	Yes 1
h. Cleaning teeth or face	No 0	Yes 1
i. Yawning	No 0	Yes 1
j. Swallowing	No 0	Yes 1
k. Talking	No 0	Yes 1
l. Having your usual facial appearance	No 0	Yes 1

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

	Not at all	A little bit	Moderately	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
l. 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 ..... 1 Very good ..... 2 Good ..... 3 Fair ..... 4 Poor 5

22. How good a job do you feel you are doing in taking care of your oral health?
Excellent 1
Very good..... 2
Good 3
Fair 4
Poor 5

23. When were you born? Month ___ Day ___ Year ___

24. Are you male or female?
Male 1
Female 2

25. Which of the following groups best represent your race?
Aleut, Eskimo or American Indian 1
Asian or Pacific Islander 2
Black 3
White 4
Other 5
_____ (please specify)

26. Are any of these groups your national origin or ancestry?
Puerto Rican 1
Cuban 2
Mexican/Mexicano 3
Mexican American 4
Chicano 5
Other Latin American 6
Other Spanish 7
None of the above 8

27. What is the highest grade or year of regular school that you have completed?
Never attended or Kindergarten 00
Elementary School: 1 2 3 4 5 6 7 8
High School: 9 10 11 12
College: 13 14 15 16 17 18+

28a. 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 1
No 2

[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 1
No 2

[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 1
Yes, layoff 2
Yes, both on layoff and looking for work. 3
No 4

29. What is your marital status?
Married—spouse in household 1
Married—spouse not in household 2
Widowed 3
Divorced 4
Separated 5
Never Married 6

30. Which of the following best represents your total combined household income during the past 12 months?
___ $0–$14,999
___ $15,000–$24,999
___ $25,000–$34,999
___ $35,000–$49,999
___ $50,000 or more

31. What is your 5-digit zip code? ___ ___ ___ ___ ___

Examination Form

1. Do you have pain on the right side of your face, the left side, or both sides?
   None 0
   Right 1
   Left 2
   Both 3

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

Right	
None	0
Jaw Joint	1
Muscles	2
Both	3

Left	
None	0
Jaw Joint	1
Muscles	2
Both	3

[Examiner feels area subject points to if it is unclear whether it is joint or muscle pain]

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 9
   a. Unassisted Opening Without Pain ___ ___ mm
   b. Maximum Unassisted Opening ___ ___ mm
   c. Maximum Assisted Opening ___ ___ mm
   d. Vertical Incisal Overlap ___ ___ mm

Pain				Joint		
None	Right	Left	Both	Yes	No	NA
0	1	2	3	1	0	9
0	1	2	3	1	0	9

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

		Right	Left
b. Closing	None	0	0
	Click	1	1
	Coarse Crepitus	2	2
	Fine Crepitus	3	3

Measurement of Closing Click ___ mm ___ mm

		Right	Left
c. Reciprocal click eliminated on protrusive opening	No	0	0
	Yes	1	1
	NA	9	9

6. Excursions
   a. Right Lateral Excursion ___ ___ mm
   b. Left Lateral Excursion ___ ___ mm

Pain				Joint		
None	Right	Left	Both	Yes	No	NA
0	1	2	3	1	0	9
0	1	2	3	1	0	9

   c. Protrusion ___ ___ mm

Right	Left
1	2

   d. Midline Deviation ___ ___ mm

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, 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 or 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

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 (origin) "Cheek/under cheekbone"	0 1 2 3	0 1 2 3
e. Masseter (body) "Cheek/side of face"	0 1 2 3	0 1 2 3
f. Masseter (insertion) "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

9. Joint Pain With Palpation:

	Right				Left			
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:

	Right				Left			
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

Subject Patient Summary of Findings

ID number [Name] _____

Demographics:
Age _____ Gender _____ Ethnicity _____ Race _____

Educational level _____ Annual Household Income _____

Self-Reported Patient Characteristics:

Click	Yes	No	AM Stiffness	Yes	No
Grating/Grinding	Yes	No	Ringing in Ears	Yes	No
Nocturnal Clenching/Grinding	Yes	No			
Diurnal Clenching/Grinding	Yes	No			
Uncomfortable/Unusual bite	Yes	No			

Axis I Diagnosis:
Group I. Muscle Disorders (Circle only one response for Group I):
A. Myofascial Pain (I.a)
B. Myofascial Pain With Limited Opening (I.b)
C. No Group I Diagnosis

Group II. Disk Displacements (Circle only one response for each joint for Group II):

Right Joint	Left Joint
A. Disc Displacement With Reduction (II.a)	A. Disc Displacement With Reduction (II.a)
B. Disc Displacement Without Reduction, With Limited Opening (II.b)	B. Disc Displacement Without Reduction, With Limited Opening (II.b)
C. Disc Displacement Without Reduction, Without Limited Opening (II.c)	C. Disc Displacement Without Reduction, Without Limited Opening (II.c)
D. No Right Joint Group II Diagnosis	D. No Left Joint Group II Diagnosis

Group III. Other Joint Conditions (Circle only one response for each joint for Group III):

Right Joint	Left Joint
A. Arthralgia (III.a)	A. Arthralgia (III.a)
B. Osteoarthritis of the TMJ (III.b)	B. Osteoarthritis of the TMJ (III.b)
C. Osteoarthrosis of the TMJ (III.c)	C. Osteoarthrosis of the TMJ (III.c)
D. No Right Joint Group III Diagnosis	D. No Left Joint Group III Diagnosis

Axis II Profile:

1. Graded Chronic Pain Status (0–4) _____
2. Depression score: Normal Moderate Severe
3. Nonspecific physical symptoms scale: Normal Moderate Severe
4. Limitations Related to Mandibular Functioning: _____ (No. of positive responses/No. of items answered)

Axis II Scoring Criteria

Scoring Criteria for Grading Chronic Pain Severity

Characteristic Pain Intensity is a 0 to 100 score derived from Questions 7 through 9:
Mean [Pain Right Now, Worst Pain, Average Pain] × 10

Disability Score is 0 to 100 score derived from Questions 11 through 13:
Mean [Daily Activities, Social Activities, Work Activities] × 10

Disability Points: Add the indicated points for Disability Days (Question 10) and for Disability Score.

Disability Points

Disability Days (0–180)		Disability Score (0–100)	
0–6 Days	0 Points	0–29	0 Points
7–14 Days	1 Point	30–49	1 Point
15–30 Days	2 Points	50–69	2 Points
31+ Days	3 Points	70+	3 Points

Classification

Grade 0	No TMD pain in prior 6 months
Low Disability	
Grade I *Low Intensity*	Characteristic Pain Intensity < 50, and less than 3 Disability Points
Grade II *High Intensity*	Characteristic Pain Intensity ≥ 50, and less than 3 Disability Points
High Disability	
Grade III *Moderately Limiting*	3 to 4 Disability Points, regardless of Characteristic Pain Intensity
Grade IV *Severely Limiting*	5 to 6 Disability Points regardless of Characteristic Pain Intensity

Scoring the SCL-90-R Scales (as modified)

Use the raw mean scale score, which is computed by adding up the item score for all items answered and dividing by the number of items answered. If less than two thirds of the items are answered, set the scale score to missing.

Classification

	Normal	Moderate	Severe
Depression (including vegetative symptoms)	<0.535	0.535 to <1.105	1.105+
Nonspecific Physical Symptoms (pain items included)	<0.500	0.500 to <1.000	1.000+
Nonspecific Physical Symptoms (pain items excluded)	<0.428	0.428 to <0.857	0.857+

11.2 Appendix 2 : Pilot Study

Evaluation of TMD Patients Using the Research Diagnostic Criteria.

N.PATEL*, R.J.C.WILDING. (Dept. of Oral Biology, University of Western Cape.)

There are both physical and emotional components which are associated with the chronic pain of TMD patients. One of the difficulties in making an accurate assessment of each component, is the lack of objective criteria for quantitative measurement of the emotional component. This need, lead to the development of Research Diagnostic Criteria (RDC) by Dworkin and LeResche (1992). The aim of this study was to use RDC criteria to record the prevalence, and associations between Axis I (physical) and AXIS II (emotional) factors in a sample of 48 patients attending a TMD Clinic. Patients were examined using the RDC guidelines and the diagnosis classified as either, myogenic, disc displacement or arthritis. Patients completed a self-administered personal history questionnaire which analyzed emotional factors including, chronic graded pain, depression and nonspecific physical symptoms such as headaches, faintness and lower back pain. High intensity pain was reported by 40% of the sample, and 15% reported their pain interfered with normal life patterns. Nonspecific physical symptoms was reported by 71% of the patients. 67% of the patients were categorised as being moderately or severely depressed. Significant associations were found between nonspecific physical symptoms, and both severe depression ($p<0.01$), and muscle tenderness ($p<0.05$). No association was found

between the grades of chronic pain and depression. Depression appears to contribute as an independent factor in the syndrome of TMD and thus supports the use of anti-depressants as a legitimate part of combined therapy. These results emphasise the value in history taking, of questions which reveal associated physical symptoms and depression, as these factors allow a more holistic approach to the diagnosis and treatment of TMD.