THE UNIVERSITY OF
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RETROSPECTIVE STUDY OF TEMPOROMANDIBULAR DISORDERS IN THE OROFACIAL PAIN CLINIC OF WESTMEAD CENTRE FOR ORAL HEALTH

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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: To examine distribution of symptoms in patients referred to a University Oro-facial Pain Clinic from 1990 to 2000.

Hypothesis: Patients with TMD and orofacial pain present with a difference between symptoms and clinical signs.

Study design: Study population consists of 300 orofacial pain patients referred for assessment, diagnosis and treatment. The information derived from a standard protocol of clinical health questionnaires, medical histories, clinical findings, diagnosis, and treatments completed by MDSc (Prosthodontics) students, has been systematically retrieved and analysed.

Results: The most frequently presenting symptoms were pain and clicking. The most common presenting sites of pain in order of occurrence were joint pain, facial pain, earache and pain around the ear. Few patients were aware of parafunction, even though signs were clearly observed as tooth wear in many patients. The most frequently observed clinical sign was palpation tenderness of jaw and cervical muscles. Outcome - the majority of the positive results were achieved within 6 months.

PREAMBLE

Definition of 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 (adopted from Peat et al. 2001).

Aim: To examine and contrast symptoms and clinical signs of orofacial pain and temporomandibular disorders

- distribution of symptoms of TMD and orofacial pain
- distribution of clinical signs of TMD and orofacial pain
- outcome of the treatment

Hypothesis: Patients with TMD and orofacial pain present with a difference between symptoms and clinical signs.

REVIEW OF THE LITERATURE

Introduction

Temporomandibular disorders (TMD) denote a group of related disorders of the TM joint and/or the associated musculature. Some of the more common TMD conditions include inflammation, clicking, anterior displaced disc with and without reduction, and jaw muscle pain. These conditions may have a number of possible causes which may not be clear. TMD may present with a variety of signs and symptoms, including but not limited to pain in the jaw joint and/or jaw muscles, face, headaches, earaches, dizziness, hypertrophy of jaw muscles, limited jaw opening, and joint sounds. TMDs are the major cause of non-dental pain in the orofacial region (Okeson 1995).

Epidemiology

Temporomandibular disorders (TMD) are recognized as the most common non- dental chronic orofacial pain conditions confronting dentists and other health care providers. However estimating incidence and prevalence of TMD is difficult. In part, the difficulty can be attributed to the lack of consensus regarding what constitutes clinically significant TMD symptoms.

The aim of epidemiological studies is to provide a scientific basis for efforts to prevent and control disease, illness, and disability (Lillienfeld & Lillienfeld 1980). Reviews of epidemiological studies of TMD signs and symptoms have found studies lacking because of the focus on patients seeking treatment or on convenience samples or other non-representative populations groups (Green & Marbach 1982).

Epidemiology of TMD has been a special interest in Scandinavia. In the 18 epidemiological studies published between 1979 and 1984, Scandinavia predominates, but there is a greater worldwide distribution of epidiomological studies now available. The methodology of these studies is variable; some are based only on interviews or questionnaires, while others also include clinical examination, and employ varying techniques.The prevalence of TMD in these recent surveys are, however, similar to those of previous studies. The range of prevalence is 16-59% for reported symptoms and 33-86% for clinical signs (Carlsson & LeResche 1995). In a review of the epidemiological literature related to TMD, Carlsson (1999) concluded that epidemiological studies regarding signs and symptoms of TMD have reported great variation in prevalence rates,

probably due more to methodological shortcomings than real differences between samples. Irrespective of this variation, Carlsson concluded that TMD signs and symptoms are common, however, prevalence rates do not directly correspond to treatment need. Signs and symptoms of TMD are in general more prevalent, more severe, and more long-lasting in women than in men. Signs and symptoms of TMD in children are usually mild and often fluctuating, and there is no evidence that they regularly progress to more severe conditions in adulthood. Awareness of TMD symptoms decrease with increasing age in elderly people. There is often a substantial discrepancy between need and demand for TMD treatment. Professional assessment of treatment need has varied between 1.5% and 30%, whereas 3% to 7% of subjects in epidemiologic samples have sought treatment for TMD.

Epidemiological studies confirm a high prevalence of signs and symptoms of TMJ dysfunction. Cross-sectional epidemiological studies of specific populations show that about 75% have at least one sign of joint dysfunction (joint noise, tenderness, etc) and about 33% have a least one symptom (face pain, joint pain, etc) (Rugh & Solberg 1985). The results vary considerably in studies because of differences in methods of data collection and inclusion of signs and symptoms, such as headache and neck pain, that may or may not be related to TMD. Signs and symptoms of TMD generally increase in frequency and severity from the second through to the fourth decade of life. The majority of the patients were between the ages of 15 and 45 years (mean 32.9 years). Although small gender differences have been found in some epidemiological studies, recent clinical studies report a female-to-male ratio varying from 3:1 to 9:1 in persons seeking care for

TMD (McNeill 1990). Most epidemiological studies are one of two types:

a) those conducted on patients who present for treatment, usually at large medical centers and dental schools, and

b) those conducted on nonpatient populations, such as a random sample from a particular geographic location, or a special group such as college students.

In the first study type, data is derived from reports by the patients, or observations by the clinicians, or both. Presenting symptoms, location, onset, duration, course, and other factors are compiled. Other important data such as sex, age, and prior illness behavior are also frequently collected. Several studies of this type have been reported, in which groups of patients with mandibular dysfunction have been analyzed in this manner. These studies are in general agreement with regard to personal characteristics and symptoms of the patients, but have provided no information about the incidence or distribution of this disorder in the asymptamatic population (Green & Marbach 1982).

In the second type of study, the validity of the patients' answers in interviews and questionnaires varies with the type of question and symptoms. Widely different criteria and research designs make these studies difficult to compare with either one another or with subsequent studies. The fact that some individuals seek professional help for their problems distinguishes them from people who do not. Those clinicians who work in Facial Pain Centers recognize that patients who seek treatment for their TMD are different from patients who are referred because their doctors are concerned about symptoms such as clicking, limited opening, or tenderness. The latter group must be

considered separately in any epidemiologic survey and must also be separated from the "abnormal" patients who are identified solely by clinical examinations.

An epidemiologic study was conducted by Dworkin et al (1990) to compare signs of TMD in patients referred for treatment ("clinic cases"), with community cases which reported TMD pain but did not seek treatment in the prior 6 months, and with community controls free of TMD pain. The data reveals that only a small number of distinctions emerge among the clinical findings that separate cases from controls. The clearest distinctions among cases and controls observed in this study include measures of vertical range of motion; uncorrected deviation on jaw opening; the presence of joint clicks; and palpation tenderness of the TMJ and related muscles.

Range of motion: The mean and range for vertical opening dimensions are significantly smaller for clinic cases than for either community cases or controls. Restricted vertical opening was rare in controls, and although more frequent in cases, was present in only one-fifth of clinic cases. About twice as many clinic cases (28.6%) showed uncorrected deviation on jaw opening compared with controls (13.0%).

Joint sounds: Discrete clicking and popping sounds are overwhelmingly the most common joint sounds produced by cases and controls. Clinic cases yielded these sounds significantly more frequently than community cases or controls. Crepitus did not occur more frequently in cases than controls.

Pain on palpation: Painful responses to palpation of jaw muscles, muscles of the neck, and of TMJ occurred significantly more frequently in clinic cases than controls.

DeKanter et al. (1993) compared the results of a meta-analysis of 51 TMD prevalence studies. The analysis revealed a perceived dysfunction rate of 30% and a clinically assessed dysfunction rate of 44%. The most significant results of the meta-analysis were:

a). TMD was not defined in more than 75% of the studies.

b). The dentition was not specified (natural dentition-partial/full dentures) in 50% of the samples.

c). Re-examinations were seldom (12%) reported.

d). TMD prevalence varied from 6% to 93% based on an interview.

e). The clinically assessed TMD prevalence ranged from 0 to 93%

A retrospective study by Glaros et al. (1995), of 257 patient records from a university – based facial pain centre, examined the "natural history" of patients with TMD for consultation and treatment. Data were obtained on demographic variables, referral patterns, variety of providers visited for consultation, and the types of diagnostic tests ordered by the providers. Results showed that patients with TMD see more than three providers prior to their referral to a tertiary care center. While dentists were more commonly consulted, physicians were consulted from 28.3% to 34.5% of the time. Unfortunately these studies do not indicate how patients decide to seek the care of physicians and dentists, nor do they give how such decision-making is influenced by symptom presentation.

The results of a study by Goulet et al. (1995) indicated TMD jaw pain is self-reported by 30% of the general population; However, the prevalence of cases reporting frequent

episodes is estimated at 7%, with more than two-thirds (69%) of the respondents in this subgroups experiencing moderate to severe pain. The prevalence rates of frequent difficulty in opening and joint clicking were estimated at 9% and 4%, respectively. Approximately one in four subjects with frequent episodes of jaw pain also reported frequent joint clicking or difficulty in jaw opening, and a strong association was found with these three TMD symptoms. However, these results must be interpreted with caution for several reasons. No clinical examinations were conducted; therefore, there was no independent confirmation of the location of pain, or of how reports of difficulty in opening and joint clicking related to clinical findings. The wording of the questions and the suggested descriptors, which are always open to individual interpretation, may influence symptom-reporting behavior.

Aetiology

The cause of TMD is often unclear. Factors often attributed to causing TMD are not proven as causal factors, but have been shown to have associations with TMD. Trauma as well as anatomic, systemic, pathophysiologic, and psychosocial factors may disrupt the masticatory system's equilibrium and may be associated with TMD. At present, TMD are considered not as a single entity but as comprising several diseases of varying etiology and pathology, and controversy exists because of limited knowledge of the etiology and natural history of the course of TMD (Dworkin & LeResche 1992, McNeill 1993). General factors, such as impaired health, general joint and muscles diseases, psychological and psychosocial factors, and local influences such as occlusal disturbances, parafunctional habits such as bruxism, and traumas, can affect the stomatognathic system (Okeson 1996).

Occlusal factors

Historically the dental profession has viewed the occlusion as a primary etiologic factor. Several reviews and studies have not found any strong support for an occlusal etiology, at least not as a unique or dominant factor (McNeill 1993, Pullinger et al. 1993, McNamara et al. 1995, Okeson 1996, Clark et al. 1997, Pullinger & Seligman 2000). It has been stated, however, that the low correlation between occlusal factors and TMD may be partly due to problems in the study designs conventionally applied (Kirveskari & Alanen 1993). Some studies, as a result, have shown the role of occlusion in TMD to be more important than is generally accepted (Raustia et al. 1995, Kirveskari 1997). Occlusal

features such as anterior open bite, missing posterior teeth, working and non-working posterior contacts and discrepancies between the retruded contact position (RCP) and intercuspid position (ICP) or centric relation-centric occlusion discrepancies have been proposed as causes of TMD (Egermark-Eriksson et al.1990, Kirveskari et al. 1992, Pullinger et al.1993, Seligman & Pullinger 1996).

In a recent review (De Boever et al. 2000), which focused on whether there is any indication for occlusal therapy in prevention and treatment of TMD, the authors concluded that:

- occlusion does not play a major role in the aetiology of TMD; the impact of occlusion is not zero however, and should be determined in each case;
- occlusal adjustment as the only treatment modality can no longer be justified; and
- there is a need for continuing research on the relationship between the occlusion and TMD using evidence-based study methods.

Bruxism

Bruxism is defined as: the forceful grinding of teeth other than during chewing which is performed during intense concentration during the day (diurnal bruxism) and/or during sleep (nocturnal bruxism) (Klineberg 1994). The prevalence of bruxism in the general population ranges from 8 to 21% when assessed by questionnaire, and from 48 to 58% with oral examination (Seligman et al. 1988). Some studies report bruxism and other parafunctional habits are associated with TMD (Dao et al. 1994, Molina et al. 1997, Glaros et al. 1998). Bruxism has been suggested to be a multifactorial psychosomatic phenomenon, which is also associated with increased levels of stress and tension,

disturbed sleep, and depression (Dao et al.1994). Recently, bruxism has been proposed as a phenomenon of centrally mediated neurologic activity related to sleep disorders (Lobbezoo & Lavigne 1997).

Trauma

Patients with a history of trauma present with signs and symptoms of TMD (De Boever & Keersmakers 1996, Friedman & Weisberg 2000). Epidemiological studies also described the association between trauma and TMD (Seligman & Pullinger 1996, Kamisaka et al. 2000). In contrast, a population-based study (Locker & Slade 1988) found no association between trauma and signs or symptoms of TMD. Additionally, a critical review by Ferrari & Leonard (1998) revealed no substantial TMJ injury to be associated with TMD.

Psychological factors

The perception of pain is highly dependent upon psychological state (Price 1983). Psychological factors are thought to have a role in the aetiology or maintenance of TMD (Rugh 1992), and may predispose to chronicity (Gatchel et al.1996). Sub-categorization of patients into diagnostic subgroups suggests that myogenous patients may have more psychological difficulties than patients with arthrogenous TMD (McCreary et al. 1991, Levitt & McKinney 1994, Lobbezoo-Scholte et al. 1995). TMD patients have been found to have increased somatization scores (Wilson et al. 1994, McGregor et al. 1996). Somatization is defined as a tendency to experience and communicate somatic distress in response to psychosocial stress and to seek medical help for it (Lipowski 1988).

There is evidence of greater prevalence of depressive symptoms in subjects with chronic pain in community (VonKorff et al. 1988, Dworkin et al. 1990) and patient samples (Magni 1987) than in controls. Numerous studies have also shown a high rate of depression in patients with facial pain and TMD (McCreary et al. 1991, Gallagher et al. 1991, Carlson et al. 1998, Madland et al. 2000). In contrast, McGregor (1996) found no differences between depression rates in orofacial pain patients and asymptomatic controls.

The aetiological factors for defining TMD subgroups are not clear. To overcome this uncertainity on aetiology, De Boever et al (2000) reflecting the prevailing view as suggested by McNeill (1990), classified the contributing factors as predisposing, initiating, and/or perpetuating.

Predisposing factors: Usually systemic, psychological (personality, behaviour) and structural (occlusal features, extensive overbite, loss of molars, open bite, joint laxity) factors are classified in the predisposing group, increasing the risk of TMD.

Initiating factors: The following are often considered: trauma, (micro-and macro-trauma); parafunctional habits; adverse or overloading factors.

Perpetuating (or sustaining) factors: These are considered to be mechanical and muscular stress, metabolic problems, behavioural, social and emotional difficulties.

Diagnosis

Temporomandibular disorders were first identified in the early 1930s, when James Costen noticed that his patients' complaints were not limited to arthritis-like symptoms, but also included dizziness, ringing in the ears, headaches, and stuffiness in the ears. Costen's treatment provided joint traction and jaw stability, and was successful. This early clinical work firmly established the use of an occlusal-biomechanical approach as the primary method of treatment for oro-facial pain and jaw dysfunction problems that were collectively described as Costen's Syndrome. The occlusal-biomechanical method predominated until the 1960s.

In the 1960s and 1970s the psychophysiological theory was proposed. This theory advocated that, except for obvious degenerative arthritic conditions, TMDs were not due to occlusal abnormalities but psychological factors as the primary etiology. These symptoms were defined as myofascial pain dysfunction syndrome (Laskin 1969). In the late 1970s and 1980s, intracapsular problems associated with the TM joint then became the new focus of interest following a series of anatomical and radiographical studies. This led to the conclusion that patients did not have a single problem, but possibly many different problems, including internal derangements, osteoarthritis, and myogenous disorders, chronic pain, and other orofacial sensory disturbances.

Over the years, many classifications for TMD have been proposed (Okeson 1997). Helkimo's Dysfunction Index was the first to be developed based on epidemiological studies in the diagnosis of TMD (Helkimo 1974a) and is still frequently used (Carlsson &

LeResche 1995). Helkimo's anamnestic index (AiI) comprises three degrees of severity, which are symptomless (Ai0), mild symptoms (AiI), and severe symptoms (AiII). The clinical dysfunction index (Di) is based on the evaluation of five clinical signs: impaired range of movement, impaired function of the TMJ, muscle pain, TMJ pain, and pain on jaw movement. The Di index comprises four degrees, which are signless (Di0), mild dysfunction (DiI), moderate dysfunction (DiII), and severe dysfunction (DiIII).

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).

The research diagnostic criteria (RDC) developed by Dworkin and LeResche (1992), established a dual axis for diagnosis that recognizes:

a) physical conditions (axis I), including muscle disorders, disc displacements and other types of joint conditions that may contribute to the pain disorder, as well as
b) the psychosocial issues (axis II) that contribute to suffering, pain behavior, and disability associated with the patient's pain experience.

Management

The primary concern in TMD treatment is managing pain (Dworkin & LeResche 1992). There has been controversy regarding the need for actively treating patients with TMD. The contrast between conservative (reversible) and invasive or irreversible treatments is becoming clear: studies show that many TMD patients gain pain relief with reversible therapies such as behavior modification, physical therapy, medication, and occlusal splints (Carlsson 1985, Skeppar & Nilner 1993). As good results can be demonstrated with these conservative therapies, invasive therapies such as full-mouth reconstruction, and orthognathic surgery are irrelevant to the majority of chronic pain patients, but need to be carefully evaluated as to their risk and benefit for specific patients.

Pharmacotherapy

Pharmacological intervention in the management of TMD is usually considered adjunctive to other treatments (Dionne1997). Based on a meta-analysis, of the literature published from 1980 to 1992, Antczak-Boukoms (1995) concluded that it is not clear whether the drug therapies currently in use for TMD provide any benefit over placebo alone. However, palliative pharmacological management of pain is considered an indication when pain is poorly controlled by other treatments (Dionne 1997).
Of interest is the study by Dworkin (2002), which showed that a home care self help program are equally effective as other forms of therapy.

The most popular pharmacological agents include analgesics, anti inflammatory agents, corticosteroids, anxiolytics, muscle relaxants and antidepressants. Non-opiate analgesics

are effective for mild to moderate acute pain associated with TMD, and opioid narcotics are considered for short-term use in controlling acute severe pain (McNeill 1997). Tricyclic antidepressants appear to be effective in the control of chronic orofacial pain of non-inflammatory origin, independent of their effects on mood, with daily doses smaller than those typically used in the treatment of depression (Pettengill & Reisner-Keller 1997).

Intraoral appliances

Intraoral appliance therapy with occlusal splints of varying designs, have been used in the treatment of TMD(Okeson 1996). Previous studies have demonstrated that the use of intraoral appliances can produce rapid improvement of pain for TMD patients (Turk et al.1993). In contrast, controlled clinical trials conclude that appliances are not effective (Dao et al.1994, Marbach & Raphael 1997). Based on the systematic review of randomized controlled trials on splint therapy from 1966 to 1999, Forssell et al. (1999) concluded that "the use of occlusal splints may be beneficial in the treatment of TMD, but the evidence is scarce".

Other treatments

Some forms of physical therapy, including thermal therapy, acupuncture, laser therapy, electrical stimulation, manipulation and exercise, have been used in the treatment of TMD. Although there is little evidence about the long-lasting effect of these therapies on TMD signs and symptoms, it has been suggested that exercise programs to improve physical fitness are effective in pain and disability conditions of the musculoskeletal system (Feine et al. 1997).

Psychological findings have led to the development of TMD treatment protocols addressing psychological dimensions (Rudy et al. 1995). Recently, it has been suggested that facial pain sufferers would benefit from certain types of cognitive-behavioral treatment (Schwartz & Gramling 1997). Several studies have evaluated different methods, i.e. habit reversal, relaxation training, problem-solving or stress management, and brief cognitive restructuring, in addition to the standard stomatogathic treatment (Turk et al. 1993, Dworkin et al. 1994).

STUDY DESIGN

Study population

The study population consists of a selection of 300 orofacial pain 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 April1990 to April 2001. History and clinical examinations were conducted by the MDSc (Prosthodontics) registrars. Standardized Patient Health Questionnaire, Case History Form, and Clinical Examination Forms were used. The information from health questionnaires, medical histories, clinical examination findings, diagnoses, and treatments has been systematically retrieved from the files of 300 patients.

Protocol for patient file selection

The log books of the MDSc (Prosthodontics) registrars of the selected period were obtained. It is the requirement of the MDSc (Prosthodontics) program that a log book will be maintained by each student as a record of treatment of all patients. Every second file was selected from the files available. Those files that were not obtainable were reported and the immediately following file selected.

Inevitably a significant number of files were not obtainable due to lack of unique dental registration number, wrong unique registration number, difficulty to trace from secondary storage or were destroyed, but once 300 files were retrieved no further files were examined.

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

RESULTS

Demographics

The mean age of the patients was 40.5 years. The data revealed that 85% of the patients were women. The age range of female was 9 years to 86 years with a mean age of 40.3 years. The age range of men was 17 years to 72 with a mean age of 41.8 years . The largest group was in 3rd and 4th decade of life (Table 1 and Fig 1).

Nearly 65% of the patients were referred to the Orofacial Clinic of Westmead Center for Oral Health by a dentist or a dental specialist, while 35% were referred by a general medical practitioner or a medical specialist. A patient who was referred by an orthodontist, maxillo-facial surgeon or other dental specialist was coded as referred by a "dental specialist". All other referrals by private practitioners or public sector dental officers were coded as "dentist". A patient who was referred by an otolaryngologist, neurologist, or rheumatologist was coded as referred by a "medical specialist" (Table 2). The data shows that patients consulted both dental and medical practitioners in their seeking help for their orofacial pain problem.

Table 1
Demographics

Age in years	Female		Male		Total	
	n	%	n	%	n	%
<10	1	0.4	-	-	1	0.3
11-20	39	15.3	5	11.1	44	14.5
21-30	37	14.5	9	20.0	46	15.0
31-40	51	20.0	9	20.0	60	20.0
41-50	50	19.6	8	17.8	58	19.3
51-60	30	11.7	5	11.1	35	11.7
61-70	28	10.1	7	15.5	35	11.7
71-80	18	7.0	1	2.2	19	6.9
>80	2	0.8	-	-	2	0.6

Table 1.Illustrates number of females , males and total subjects in each age group in decades. The largest group was in 3rd and 4th decade of life.
(n = number; % = percentage of subjects in the particular gender)

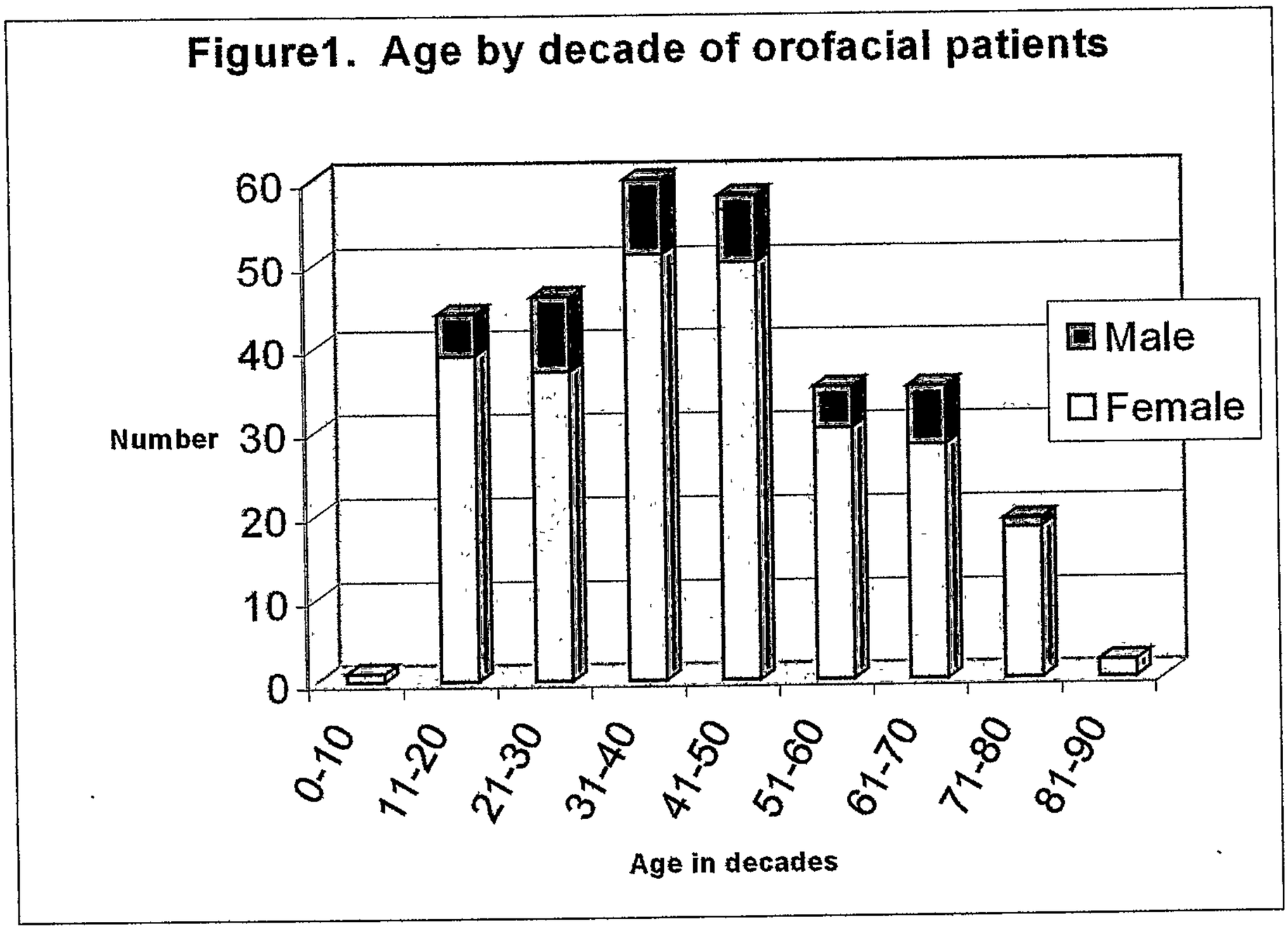

Figure 1.Illustrates graphic presentation of number of females, males and total subjects in each age group in decades.

Table 2
Sourse of referral to Orofacial Pain Centre

Dental			Medical		
Type of provider	**n**	**%**	**Type of Provider**	**n**	**%**
Private Practitioner	46	23.6	Private Practitioner	86	81.9
WCOH* dental officers	64	32.8			
Regional Hospitals dental officers	85	43.5			
Specialist:					
Oral & Max.fac. surgeon	19	9.7	Rheumatologist	3	2.8
Prosthodontist	9	4.6	Orthopaedic surgeon	1	0.9
Orthodontist	9	4.6	Otolaryngologist	11	10.5
Endodontist	1	0.5	Neurologist	2	1.9
			Psychiatrist	1	0.9
Others:					
Dental therapist	1	0.5	Physiotherapist	1	0.9
Total	195	65.0		105	35.0

*WCOH: Westmead Centre for Oral Health

Table 2 shows the source of referral to Orofacial Pain Centre. Sixty five percent of the patients were referred by dentist or dental specialist, while 35% were referred by general medical practitioner or a medical specialist.

Presenting symptoms

The most frequent presenting symptoms were pain and clicking (85.5% and 23.6%). Other presenting symptoms included limited opening (5.3%), periodic jaw locking (6.5%), sensitive teeth (3.3%) and sounds or ringing in ears (2.6%) (Table 3 and Figure 2).

The most common presenting sites of pain in order of occurrence were temporomandibular joint pain, facial pain, earache and ache or pain around ear (Table 3 and Figure 3). Presenting symptoms are an accurate description of the patient's chief complaint. The patient's ability to describe the location of the pain may be different.

Table 3
Presenting symptoms

Symptoms	n	%
Pain	**257**	**85.5**
In and around ear	58	22.5
Face	57	22.3
Temporomandibular joint	70	27.0
Jaw: mandible/maxilla	28	10.5
Teeth	29	11.0
Jaw muscle	4	1.5
Head	32	12.5
Neck	6	2.3
Arm	2	0.7
Temporomanibular joint	**111**	**37.3**
Clicking	71	23.6
Limited opening	16	5.3
Dislocation of jaw joint	3	1.0
Locking jaw –periodic	20	6.5
Deviation on opening	1	0.3
Unable to close the mouth	1	0.3
Teeth	**17**	**5.6**
Sensitivity	10	3.3
Tooth wear	5	1.6
Uncomfortable bite	2	0.6
Ear	**8**	**2.6**
Sounds/ringing in ears	8	2.6
Sensory disturbances	**15**	**5.0**
Burning mouth	3	1.0
Burning face	1	0.3
Numbness of face	6	2.0
Burning gums	5	1.6

Table 3. Presenting symptoms were broadly devided into 5 groups. The most frequent presenting symptoms were pain and clicking TMJ.

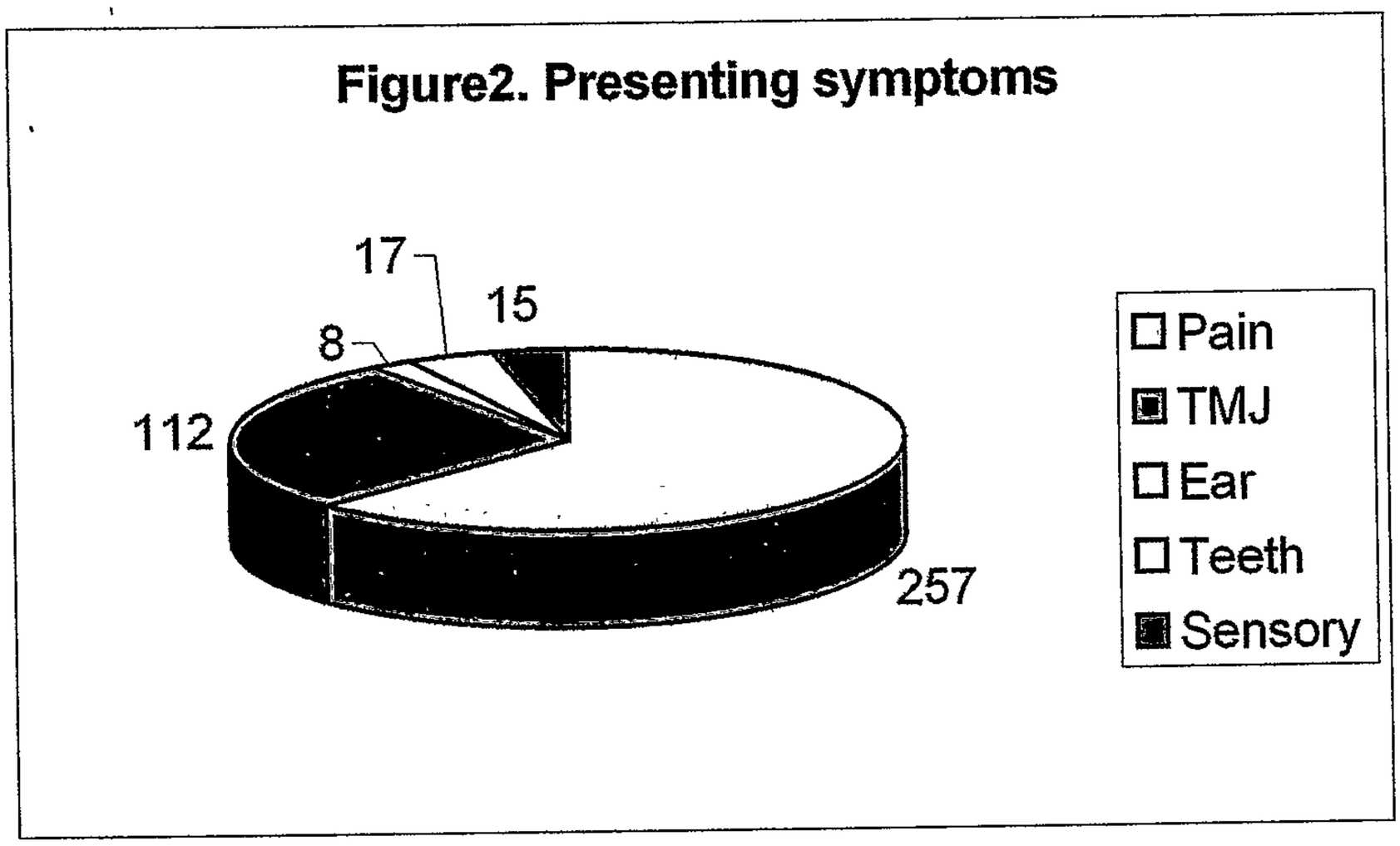

Figure 2. Pie chart illustrating the various sub groups of presenting symptoms.

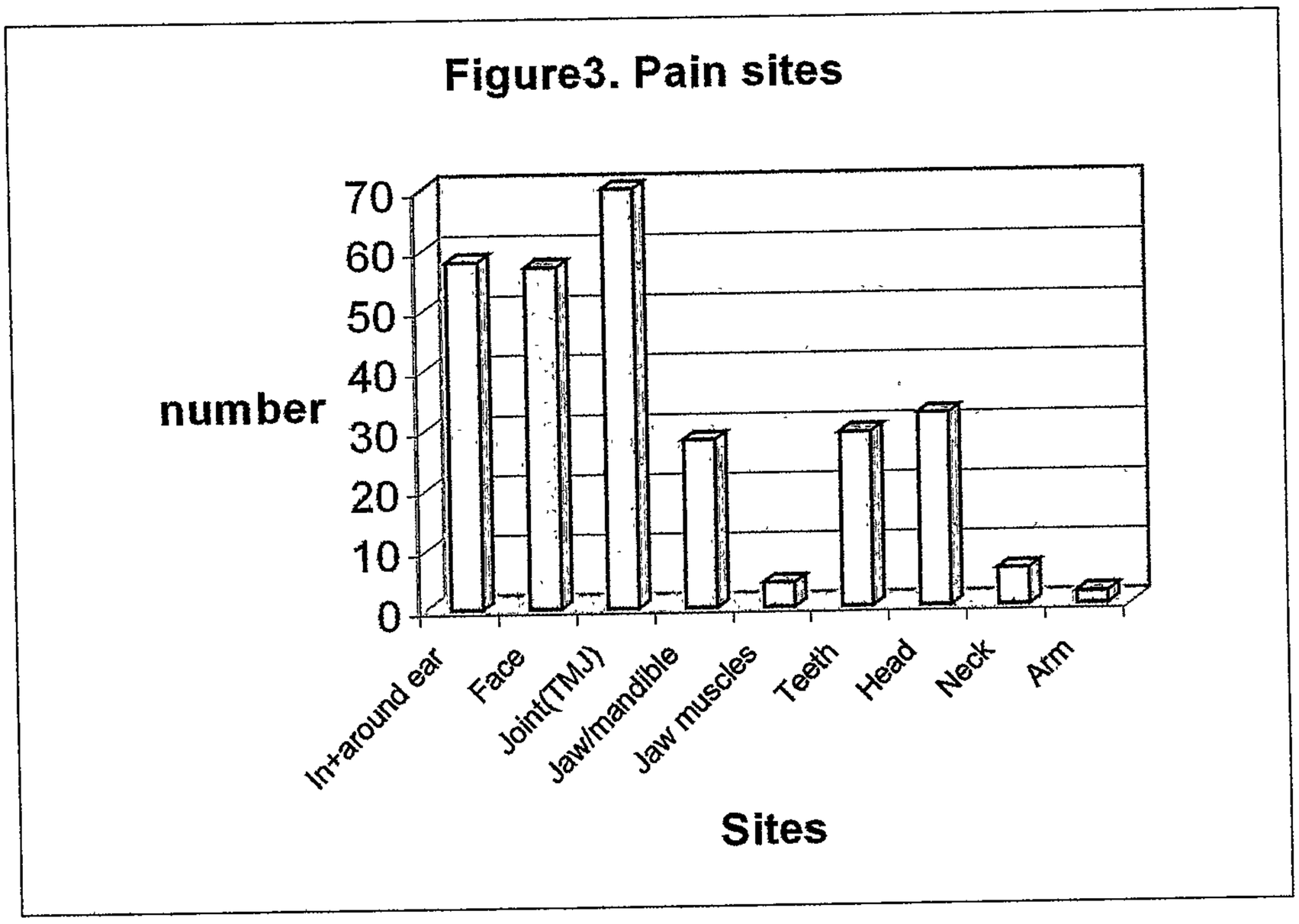

Figure 3. Graphic representation of the reported pain sites. The most common presenting Site of pain was temporomandibular joint.

Clinical signs

TMJs

Fifty percent of the sample was found to have joint tenderness (Table 4 and Figure 4). Palpation tenderness of the TMJs was more often unilaterally (28%) than bilaterally (22%). There was no significant gender difference. Unilateral tenderness was more on the left side (57.2%) than on right side (42.8%).

Forty four and half percent of the sample was found to have joint sounds. Joint clicking was most common and appeared in 37% while crepitus in 7.5% subjects. Data indicated that more joint sounds, characterized as clicking and crepitation, were found in women (46.2%) than in men (35.5%).

Muscles

Palpation tenderness of jaw and cervical muscles varied between the different muscles and was most frequently found in the following order - masseter (53%), sternocleidomastoid (32%), temporalis (31%), trapezius (27%), medial pterygoid (19.5%) and lateral pterygoid (15%) (Table 4). In general, women showed more palpation tenderness than men. Unilateral tenderness was more on the right side than on the left side, and it was found more frequently unilaterally than bilaterally.

Tooth surface loss (attrition and erosion combined)

Fifty three percent of the subjects showed tooth surface loss due to attrition, erosion or both (Table 5). There was no significant gender difference associated with tooth surface loss. Few patients were aware of parafunction, even though signs were clearly observed

as tooth wear in many patients.

Jaw mobility

Restricted jaw movement either opening or lateral movements was observed in 17.5% of the subjects, and was slightly higher in females (18.4%) than in males (13.3%). Jaw deviation on opening was observed in 23% of the subjects. Deviation on opening to the right was seen in 55.7% subjects, while to the left in 44.3%.

Table 4
Clinical signs (data retrieved from patient files) in the entire sample and in men and women

Clinical signs	Unilateral		Bilateral		Total		Men		Women	
	n	%	n	%	n	%	n	%	n	%
Temporomandibular joints										
Pain/tenderness	84	28.0	66	22.0	150	50.0	22	48.8	128	50.2
Clicking	81	27.0	30	10.0	111	37.0	13	28.9	98	38.4
Crepitus	10	3.3	13	4.3	23	7.5	3	6.6	20	7.8
Subluxation	17	5.6	37	12.3	54	18.0	6	13.3	48	18.8
Restricted jaw movement					53	23.0	6	13.3	47	18.4
Jaw and cervical muscle tenderness										
All Jaw+ cervical	13	4.3	10	3.3	23	7.5	2	4.4	21	8.2
Masseter	100	33.0	60	20	160	53.0	18	40.0	142	55.7
Temporalis	60	20.0	34	11.3	94	31.0	17	37.8	77	30.1
Lateral pterygoid	24	8.0	21	7.0	45	15.0	6	13.3	39	15.3
Medial pterygoid	35	11.6	24	8.0	59	19.5	10	22.2	49	19.2
Trapezius	35	11.6	46	15.3	81	27.0	8	17.8	73	28.6
Sternocleidomastoid	51	17.0	45	15.0	96	32.0	12	26.7	84	32.9
Posterior diagastric	26	8.6	19	6.3	45	15.0	10	22.2	35.	13.7

Jaw deviation on opening	Total		to right		to left	
	n	%	n	%	n	%
	70	23	39	13.0	31	10..3

Jaw muscle pain	1 muscle		2 muscles		> 2 muscles	
	n	%	n	%	n	%
	41	13.6	50	16.6	156	52.0

Table 4. Data of clinical signs retrieved from patient files, sub-grouped into signs related to TMJ and jaw and cervical muscles. Data illustrates the clinical signs either unilateral or bilateral, in the entire population and in men and women.

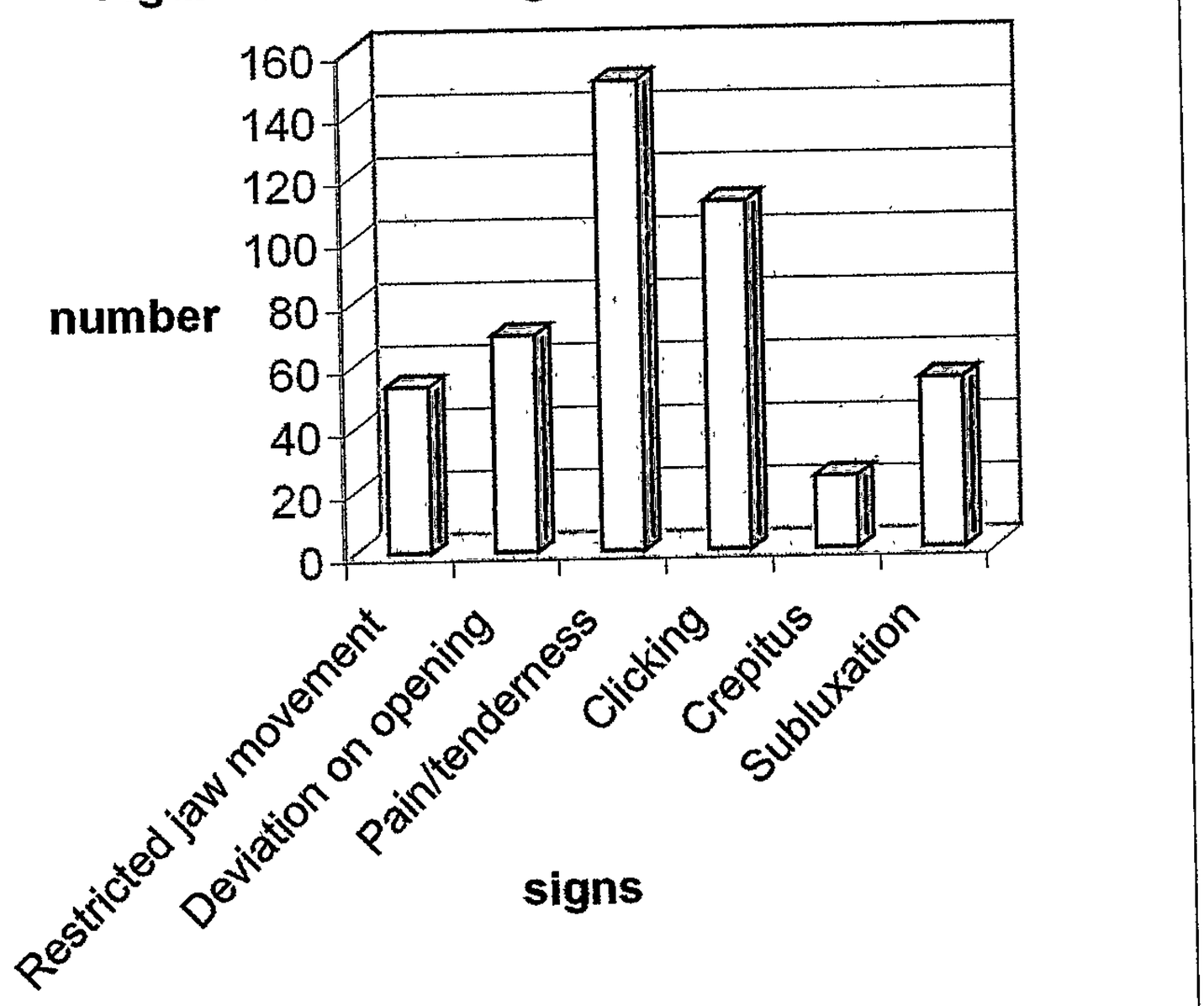

Figure 4: Graphic illustration of the clinical signs in the entire sample

Table 5
Tooth surface loss-attrition and erosion combined

Age in years	Female		Male		Total	
	n	%	n	%	n	%
<10	-	-	-	-	-	-
11-20	21	53.8	2	40.0	23	14.7
21-30	26	70.2	5	55.5	31	19.4
31-40	33	64.7	5	55.5	38	23.8
41-50	25	50.0	4	50.0	29	18.1
51-60	16	53.3	3	60.0	19	11.9
61-70	10	35.7	3	42.8	13	8.1
71-80	7	38.8	-	-	7	4.4
>80	-	-	-	-	-	-

Table 5. Illustrates the number of females, males and total subjects in each age group showed signs of tooth surface loss due to attrition, erosion or both .
(n = number; % = percentage of age group with tooth surface loss)

Diagnosis

The most common diagnosis of temporomandibular disorders of muscular origin was found in 56% of the patients (Table 6). Temporomandibular disorders of joint origin was found in 39.6% of the patients. The most common disorders of the TMJ were internal derangement and arthritis.

Table 6
Diagnosis

Diagnosis	n	%
Temporomandibular disorders		
Muscular origin	168	56
Temporomandibular joint origin	108	36
Arthritis	11	3.6
Dental pain	28	9.3
Headaches	7	2.3
Migraine	6	2.0
Neuropathic pain		
Trigeminal neuralgia	2	0.6
Others	4	1.3
Atypical odontalgia	4	1.3

Table 6. The most common diagnosis of temporomandibular disorders of muscular origin was found in 56% of the patients . Temporomandibular disorders of joint origin was found in 39.6% of the patients.

Treatment outcome

Treatment outcome is shown in Table 7 and Figure 5. Of the 300 subjects, 95 (31.7%) patients did not return for follow-up visits. Twenty seven (9%) patients were referred to other clinicians for the management of the non-TMD related symptoms. These clinicians include the following - neurologist, periodontist, rheumatologist and orthodontist.

Hundred and twenty eight patients (42.7%) reported that they were better or symptom free from 1 month to 2 years after the treatment. Most of the positive results were achieved with in 6 months (30.0%).

Table 7
Outcome

Outcome	Total		Female		Male	
	n	%	n	%	n	%
Single visits (no shows for follow up)	95	31.7	80	31.3	15	33.3
Single visits (referred to other clinicians)	27	9.0	26	10.2	1	2.2
Symptoms relief in < 3 months	30	10.0	23	9.0	7	15.5
Symptoms relief in < 6 months	55	18.3	46	18.0	9	20.0
Symptoms relief in < 12 months	35	11.6	27	10.6	8	17.8
Symptoms relief in > 12 months	8	2.7	7	2.7	1	2.2
No change	50	16.7	46	18.0	4	8.9

Table 7. Illustrates the treatment outcomes in the total subjects (n=300), in female and in male patients.

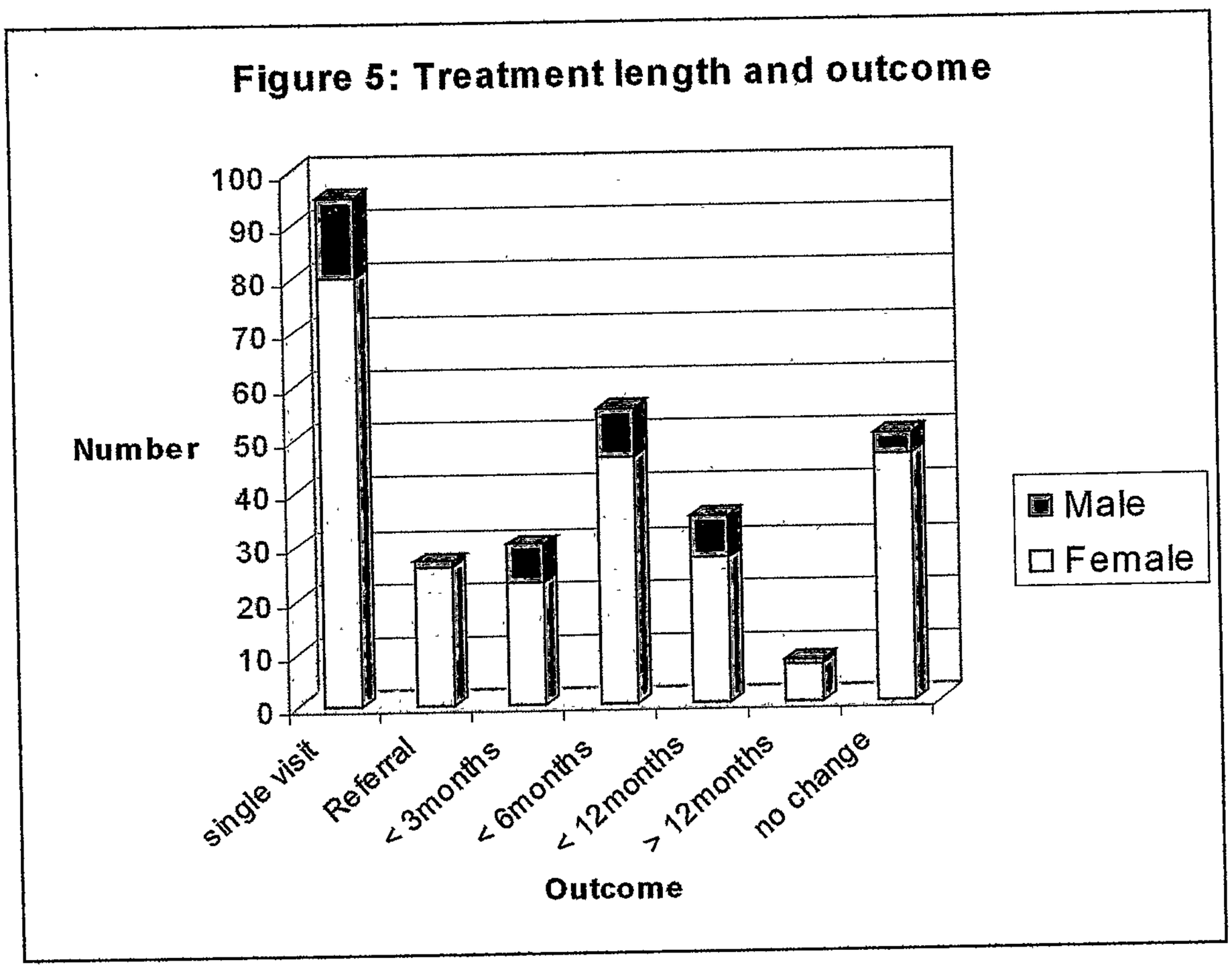

Figure 5: Graphic representation of the treatment outcomes. The majority of the positive results were achieved with in 6 months.

DISCUSSION

This is the first hospital-based retrospective analysis of temporomandibular disorders and oro facial pain of referred patients from Sydney metropolitan area. The population was multicultural urban and rural, referred for diagnosis and management of TMD and orofacial pain to the Westmead Centre for Oral Health, Prosthodontics clinic.

The diagnosis of TMD was based on a standardized examination protocol, which included physical, socioeconomic, psychological and occlusal variables. Patients were examined, evaluated and treated by different registrars, however the registrars were trained in the assessment methods and diagnosis verified by the specialist clinician managing the clinic.

Gender differences

This study reinforces published findings indicating that prevalence of TMD among female is significantly greater when the sample is drawn from a clinic population. 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). Eighty five percent of the subjects in this study were female in comparison to 73% to 76.5% in the study by Gelb and Bernstein (1983), 86.7% in the study by Friedman and Weisberg (2000), and 84% by Esposito et al (1998). 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. Other explanations have been proposed to explain the gender difference, including: the role of female reproductive hormones (LeResche et al 1997, Dao et al 1998), the higher sensitivity of women to painful stimuli (Riley et al 1998, Bassols et al 1999, Riley & Gilbert 2001), higher scores of stress among women (Kuttila et al 1998), and differences in care-seeking behavior.

Provider

The data shows that patients seen at an orofacial centre used a variety of providers in their pursuit of diagnosis and treatment for theïr symptoms. Sixty five percent of subjects were referred by dentists and 35% by physicians. These figures are similar to those reported by Glaros et al (1995). We do not know how patients decide to seek the care of physicians or dentists. As noted earlier, nearly 65% of patients were referred by dentists. The Orofacial Pain clinic is physically located within a teaching Dental Hospital, which is primarily staffed by dentists and also a referral Hospital for the region for specialist services. The high referral rate from dentists is consistent with data showing that 40% of general dentists do not treat patients with symptoms of TMD, and that about 50% of general dentists frequently refer such patients elsewhere (Glass et al 1993).

Age

Although no consensus exists on the exact relationship between age and TMD symptoms, it is a general finding that the highest prevalence occurs among adults less than 45 years

of age (Locker and Slade 1988, Von Korff et al1988, Glass et al 1993). In our study when patients were devided by age groups, the largest group was from 31 - 40 years. This age group accounted for 20%. One would normally expect a higher prevalence of TMD among older age groups. However, it has been reported that at least some forms of TMD such as osteoarthrosis show a burnout phase without pain. In this burnout phase, patients do not feel a need for treatment. Data also strongly suggest that, over the years, TMD is self-limiting, which results in the older age group that have a history of pain and dysfunction in the joint but without current complaints (De Boever et al 1999). One study reported that symptoms of TMD tend to decrease by 35% in-patients over 65 years of age (Rieder et al 1983). Our result shows only 19.2% of patients were above 60 years of age. The reason for this trend may be that the elderly are at better at dealing with and adapting to chronic conditions, elderly persons seem to complain less from pain or difficulties associated with communication and transportation.

Presenting symptoms

The presenting symptoms have been sub-grouped as: pain, symptoms related to TMJ, teeth, ear, and sensory disturbances.

Eighty five percent of the subjects in our study presented with pain, which is in agreement with Dworkin et al (1990), who found that almost every patient seeking treatment (95%) did so because of pain and 97% of a TMJ private practice group reported pain in the study by Gelb and Bernstein (1983). The most common presenting site of pain in order of occurrence were joint pain (27%), facial pain (22.5%), in and around the ear (22.5%)

and headaches. There was some overlap of description of the pain sites. Presenting symptoms are an accurate description of the patient's chief complaint. Each patient's ability to describe the location of the pain may be different, and may have been influenced by the referring clinicians comments.

Clinical signs

Generally, TMJ sounds were detected in two ways, with digital palpation or through use of a stethoscope. In our study it is a standard protocol to use a stethoscope to detect all joint sounds. Two types of joint sounds were assessed: clicking or popping, defined as clicking or popping sensations with discrete onset and offset detected during opening and closing; crepitus - a longer lasting, grating sound.

Clicking sounds were found in 37% of the subjects and reported as symptoms in 23.6% subjects. Crepitus was found in 7.5% of the subjects. The high prevalence of clicking sounds and low prevalence of crepitus sounds corresponds with figures from other studies (Dworkin et al 1990, Skeppar and Nilner 1993, Magnusson et al 1994). The data presented in our study do not allow adequate interpretation of the clinical significance of joint sounds except as an aid for diagnósis. We do not know, whether currently painfree controls who have joint sounds are at greater risk for developing TMD pain or other related signs and symptoms.

A common sign was tenderness to palpation of the jaw and cervical muscles, which is also reported by Skepper and Nilner (1993), Dworkin et al (1990) and Magnusson et al (1991).

Tooth surface loss

Only five (1.6%) subjects reported tooth wear but 160 (53%) of the subjects showed tooth surface loss due to attrition, erosion or both. There was no significant gender difference associated with tooth surface loss in contrast to the study of Agerberg and Inkapool (1990) where severity of tooth wear was significantly more often recorded in men than women. This data confirms the difference between patients awareness (symptoms) and clinical signs.

Outcome

Ninety five (31.7%) reported that they were better or symptom free from between 1 and 12 months after the treatment. The majority of the positive results were achieved with in 6 months (30.0%). The results of the study by Mejersjo and Carlsson (1983), in which 154 symptomatic women (18 to 60 years of age) who had been treated with conservative therapeutic schemes participated in a 7-year recall evaluation; showed that 65% of these patients reported no symptoms.

CONCLUSIONS

A retrospective review was performed on 300 patient's files referred for diagnosis and management to the Orofacial Pain Clinic of Westmead Centre for Oral Health, University of Sydney. The results tend to emphasize the heterogeneity of patients with functional disturbances of the masticatory system. Despite the pitfalls of a retrospective study design, this study shows the trends and correlations between demographic factors, and signs and symptoms of TMD and orofacial pain patients in Sydney. This study reinforces published findings indicating that prevalence of TMD among females is significantly greater than males. The majority of the patients were referred by dentists. General dentists have prime responsibility in diagnosing and treating TMD and orofacial pain patients, and to know when to refer. Continuing education programs could play an important role in educating dental practitioners on diagnosis and management of these conditions.

This study is a small component of studies required to provide an understanding of these disorders. Further studies both prospective and retrospective and including randomised trials to test efficacy of treatments are needed. Population based studies also need to be completed in different population groups and the influence of cultural background on disease prevalence.

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