Available online at www.sciencedirect.com

SciVerse ScienceDirect

British Journal of Oral and Maxillofacial Surgery 52 (2014) 822–826

BRITISH Journal of Oral and Maxillofacial Surgery

www.bjoms.com

Is the incidence of temporomandibular disorder increased in polycystic ovary syndrome?

Sidika Sinem Soydan [a,*], Kagan Deniz [b,1], Sina Uckan [a,2], Aslı Dogruk Unal [c,3], Neslihan Bascıl Tutuncu [d,4]

[a] *Department of Oral and Maxillofacial Surgery, 11. Sokak no:26 Bahçelievler, Ankara, Türkiye*
[b] *Department of Oral and Maxillofacial Surgery, Kısıklı Caddesi Oymacı Sokak No:7 Altunizade, Üsküdar İstanbul, Türkiye*
[c] *Endocrinology Department, Kısıklı Caddesi Oymacı Sokak No:7, Altunizade, Üsküdar İstanbul, Türkiye*
[d] *Endocrinology Department, Mareşal Fevzi ÇakmakCaddesi, 10. Sokak no:45, Ankara, Turkey*

Accepted 18 July 2014
Available online 12 August 2014

Abstract

The prevalence of temporomandibular disorders is higher among women than men (ratio 3:1 -9:1). Polycystic ovary syndrome(PCOS) is the most common endocrine disorder in women, which is characterised by chronic low-grade inflammation and excess of androgenic hormones that lead to metabolic aberrations and ovarian dysfunction. Increased activities of various matrix metalloproteinases (particularly MMP-2 and 9) in the serum of these patients has been reported, and it has been hypothesised that high activities of MMP may contribute to loss of matrix and chronic inflammation of the fibrocartilage in temporomandibular disorders. Our aim was to evaluate the incidence of temopormandibular dysfunction in women with PCOS compared with an age-matched, disease-free, control group. We studied 50 patients with previously diagnosed PCOS and 50 volunteers who had normal menstrual cycles. We made a comprehensive clinical examination of the temporomandibular joint (TMJ) and muscles of mastication in both groups and recorded the Visual Analogue Scores (VAS) for pain. There were significant differences ($p < 0.001$) in the incidence of temporomandibular disorders (n = 43 (86%) in the PCOS group compared with n = 12 24% in the control group), muscle tenderness(n = 32 (64%) in the PCOS group compared with n = 14 (28%) in the control group) and pain in the TMJ (mean (SD) VAS 2.9 (2.61) compared with 0.3 (1.56). We confirm the higher incidence and severity of disorders of the TMJ in patients with PCOS and suspect that chronic low-grade inflammation may play a part in the aetiology of the disease.

Keywords: Polycystic ovary syndrome; Temporomandibular joint disorder; Temporomandibular pain; Internal derangement; Matrix metalloproteinase

Introduction

The high female:male predominance of degenerative joint diseases is well-known and well- documented,[1] and the potential effect of female sex hormones (oestrogen, progesterone, and relaxin) on the development of degenerative joint disorders (together with the presence of the receptors of these hormones in the cartilage of the temporomandibular joint (TMJ)) have been described.[2–5]

The modulation of the remodelling activities of the extracellular matrix by oestrogen, progesterone, and relaxin may

* Corresponding author. Baskent University, Faculty of Dentistry, Department of Oral and Maxillofacial Surgery, 11. Sokak no:26 Bahcelievler, Ankara, Turkiye. Tel.: +903122151336; fax: +903122152962.
E-mail addresses: sdksoydan@yahoo.com (S.S. Soydan), kgndeniz@yahoo.com (K. Deniz), suckan@yahoo.com (S. Uckan), aslidogruk@yahoo.com (A.D. Unal), neslibascil@yahoo.com (N.B. Tutuncu).
[1] Tel.: +903122151336 Fax:+903122152962.
[2] Tel.: +903122151336 Fax:+903122152962.
[3] Tel: +903122122912 Fax: +903122154216.
[4] Tel. +903122122912 Fax: +903122154216.

http://dx.doi.org/10.1016/j.bjoms.2014.07.100

be one of the key mechanisms by which joints are predisposed to degenerative changes. Oestrogen induces the expression of matrix metalloproteinases (MMP) -3, -9, and -13 in various cells, including fibrocartilaginous cells.[6,7] Progesterone produces a dose-dependent receptor-mediated decrease in MMP-9 expression in trophoblasts.[8] Relaxin increases the turnover of fibrocartilage by the extracellular matrix, and induces MMP-1 (collagenase-1) and -3 (stromelysin-1), which are paralleled by loss of collagen and proteoglycan from the fibrocartilaginous tissue of the disc of the TMJ.[9]

Polycystic ovary syndrome (PCOS) is the most common endocrinopathy in women during the premenopausal period, and is defined as clinical or biochemical (or both) hyperandrogenism, hyperinsulinaemia, oligomenorrhoea or anovulation, and polycystic ovaries, according to the Rotterdam criteria.[10] In women, androgens are necessary to make oestrogen, but women with PCOS have concentrations in the high normal range. It is marked by a decrease in female sex hormones and hormonal imbalance,[11] and is a state of chronic low-grade inflammation that might be responsible for the development of ovarian dysfunction and metabolic abnormalities. The presence of certain cytokines in women with the syndrome correlates with obesity and insulin resistance.[12] Visceral adiposity is closely associated with insulin resistance and may be attributed to dysfunctioning adipocytes and the low-grade inflammation.[13]

A number of studies have shown that activities of MMP-2 and 9 are increased in the follicular fluid and serum of women with PCOS.[14] It may be speculated that increased activities of these MMP may be one of the most important factors that lead to the increased incidence of disorders of the TMJ among women, particularly those with PCOS. To our knowledge the incidence of such disorders has not yet been evaluated in women with PCOS. Our aim therefore was to evaluate the incidence of disorders of the TMJ in these women and compare it with that in an age-matched, disease-free, control group.

Patients and Methods

One hundred premenopausal women were included in this prospective study. They were divided into 2 groups, PCOS and control. The PCOS group consisted of 50 women who had previously been diagnosed with PCOS at the endocrinology department. The control group included 50 randomised healthy women who had regular menstrual cycles and were not taking any medication. The control group comprised students and staff of Baskent University Faculty of Dentistry. All subjects gave informed consent to participate in the study.

Exclusion criteria were: age over 40 years, known cardiovascular disease, thyroid disease, smoking, diabetes mellitus, hypertension (blood pressure > 140/90 mm Hg), renal impairment (serum creatinine > 150 mol/l), craniofacial syndromes, history of head and neck trauma, isolated muscular tenderness, or previous operation on the TMJ.

The TMJ and the masticatory muscles were evaluated by the same clinician. Patients described symptoms such as preauricular pain, limited mouth opening, deviation or deflection during mouth opening, and joint sounds. All patients were assessed using Okeson's *Muscle and temporomandibular joint examination and treatment outcome form*.[15] This form records (for both TMJ) tenderness and pain in the masseter, temporalis, lateral pterygoid, medial pterygoid, sternocleidomastoid, trapezius, splenius capitis, and digastric muscles, as well as maximum interincisal distance, restriction of laterotrusive and protrusive movements, joint sounds, deviation or deflection during mouth opening, and the visual analogue score (VAS) for pain in the TMJ.

In addition, any history of the following disorders was recorded: rheumatological disease, neurological disease, familial disease, muscular disease, history of closed lock or dislocation of the TMJ, bruxism, single-sided chewing, and limited mouth opening. Objective assessment of muscular tenderness, interincisal opening (mm), and VAS for pain in the TMJ were also recorded. Magnetic resonance imaging was used to support management where this was indicated, but was not used for the purposes of this study.

Statistical analysis

With the aid of SPSS (version 18.0, SPSS Inc, Chicago), and the independent two samples *t* test we compared the demographic data of the two groups. The proportional Z test was used to compare the significance of differences in the incidence of disorders of the TMJ, incidence of pain in the TMJ, and muscular tenderness in the two groups. The results of the VAS were compared using the non-parametric Mann Whitney U test.

Results

The mean (SD) age of the PCOS group was 27 (6) and 26 (5) in control group. There was no significant difference between the mean ages of two groups ($t(93) = -1.06$, $p = 0.29$). The mean (SD) interincisal distance in the PCOS group was 44 (7) mm and in the control group 46 (5) mm. There was also no significant difference between interincisal opening in the 2 groups ($t(64) = 1.617$, $p = 0.11$). The incidence of disorders of the TMJ did, however, differ significantly ($p = = 0.001$) being higher in the PCOS group (86%) than the control group (24%). There was also a significant difference in the incidence of pain in the TMJ ($p = 0.002$) in the PCOS group (72%) compared withthe control group (28%) and also in the severity of the pain as measured by VAS ($p = 0.001$), being 2.9 (SD:2.61) in the PCOS group and 0.3 (SD:1.56)in the control group (Table 1). The incidence of tenderness in one or more muscle was also significantly greater ($p = 0.002$) in the PCOS group (64%) than in the control group (28%) (Fig. 1).