The Possible Role of Oral Contraceptives in the Development of Temporomandibular Disorders

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Abstract

Introduction: Temporomandibular disorders (TMDs) are musculoskeletal pain conditions affecting approximately 40% to 60% of the general population as a sign of some functional disturbance of the masticatory system. These disorders are more common and severe in women, especially in those who are in their reproductive age. The results of research on sex hormones and TMDs showed controversy. The aim of this study was to evaluate the possible role of OCs in the development of TMDs.

Material and methods: The incidence of temporomandibular disorders was compared across three consecutive menstrual cycles in oral contraceptive users (OC group) and non-users (Non-OC group). The type of disorder (muscular, articular and muscular/ articular) was determined. Data were analyzed using Chi-Square test.

Results: TMDs were observed in 75% and 83% of women in OC group and Non-OC group respectively. There was no statistically significant difference between the studied groups. Articular disorders were more common in both groups.

Conclusion: The results suggested that there wasn't any corelation between using oral contraceptives and development of TMDs in healthy menstruating women.

Key words: Temporomandibular disorders, oral contraceptives, menstrual cycle, estrogen, progesterone.

Introduction

Temporomandibular disorders (TMDs) are musculoskeletal pain conditions affecting approximately 40% to 60% of the general population as a sign of some functional disturbances of the masticatory system.[1] They can present as TMJ or masticatory muscle pain, limited range of TMJ movement, crepitation, headache or facial pain, and so on.

A narrative literature review suggested that there was a difference in the occurrence of pain according to sex, so that women are more susceptible to TMD pain.[2] Epidemiologic studies reported that TMDs are more common in younger females, with the highest prevalence occurring in women aged 18-45 i.e. During their reproductive years.[3-8] Population-based studies revealed the prevalence of TMD to be 2-5 times higher in women than in men in community samples.[9-11]

The role of sex hormones in the pathogenesis of TMD has been a source of controversy. It was reported that use of oral contraceptives was associated with referral for TMD care, with an increased risk of TMD of approximately 20% for OC users, whereas some other studies did not support the potential etiologic role for oral contraceptives.[10] Dao et al., suggested that use of OCs did not affect the mean pain intensity ratings in regularly menstruating women with TMD.[12] A clinical study also revealed that using oral contraceptives could not influence the development of TMD-like symptoms.[13] The aim of the present study is to evaluate the possible role of OCs in the development of TMDs.

Material and methods

The studied groups were identified through the volunteer female students in Mashhad University of Medical Sciences, School of Dentistry, Iran. Subjects were 7 women who wanted to start using oral contraceptives (OCs) for the first time (OC group);12 female controls who were not under contraceptive therapy (non-OC group).

Interested subjects were screened for inclusion and exclusion criteria, which are presented in Tables 1 and 2. All study participants were informed about the aim and the method of this study before giving consent. They had to have regular menstrual cycles (i.e. length of cycle varied by no more than 3 days). Women in OC group should start using OCs after entry to our study. They had to be using low dose combination (estrogen and progesterone) pills. On the other hand, control subjects should never have taken OCs.

The studied groups were examined between the 8-14 days of the menstrual cycle for three consecutive months. The procedure of TMJ examination was performed by a reliable calibrated prosthodontist every month in the TMD clinic, Department of Prosthodontics, Mashhad Dental School, Iran.

Subjects with TMD were required to meet the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) in three consecutive monthly examinations.[14] The following criteria were evaluated: sign or symptom of TMDs (e.g. clicking), limitation in the mandibular range of movement, mandibular deviation during mouth opening, pain compliance through guiding the mandible into CR, pain and tenderness of joints, pain in masticatory muscles. Finally, the type of disorder (muscular, articular and muscular/ articular) was determined according to RDC/ TMD. The data were analyzed using Chi-Square test.

Results

All subjects were examined in three consecutive months, except one female in the OC group who graduated during second month of study. In the control group, 9 women (75%) showed temporomandibular disorders (TMDs) in all three consecutive monthly examinations. One subject of this group did not show any symptoms of disorder and the other two women were diagnosed with TMD only in the second month of the examination (Table 3).

Five women (83%) of OC group had TMD in all monthly examinations, whereas any sign of disorder was not obser-

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Age group – 20-40 years
Generally healthy subjects
Subjects with Angle's class I occlusion without malocclusion
Women with regular menstrual cycle

Table 1: Inclusion criteria

Metabolic disease (e.g. Diabetes, Hyperthyroidism)
Neurologic disorders (e.g. Trigeminal Neuralgia, Migraine)
Neoplasia
Recent facial or cervical trauma
History of psychiatric disorders
Women currently receiving medication or other treatment that could not be stopped before and during the study
Parafunctional habits (e.g. bruxism and clenching)
Interferences in eccentric mandibular movement

Table 2: Exclusion criteria

Disorder	OC group	Non-OC group
With TMD	83	75
Without TMD	17	25
P-value = 0.34		

Table 3: The percentage of TMDs in the studied groups

Disorder	OC group	Non-OC group
Articular	60	67
Muscular	0	33
Articular/muscular	40	0

Table 4: The percentage of TMD type in the studied groups

ved in one subject (Table 3). According to Chi-square test, a significant difference was not detected between the studied groups (P-value > 0.05).

Of those taking OCs, three subjects (60%) met the criterion for an articular disorder; six subjects (67%) of those not taking OCs met the criterion. Concerning muscular disorder, none of those taking OCs met the criterion compared with three women (33%) of those not taking OCs. Two subjects (40%) of OC group showed articular/muscular disorder (Table 4). These findings indicated that the articular disorders were more common in both groups.

Discussion

Temporomandibular disorders particularly in patients with more severe conditions may be a great impact on quality of life.[15] Despite TMD being so common, the etiology and pathogenesis of most TMD conditions remain unclear. The role of sex hormones in the pathogenesis of TMD has been a source of controversy. The gender and age distribution of TMDs suggests a possible link between its pathogenesis and the female reproductive system.[16]

Several mechanisms by which hormones could influence TMD pain can be postulated. Increased systemic joint laxity in pregnant women has been linked to elevated levels of relaxin. Also a female polypeptide hormone which is presented in the blood in the end of cycle prior to the onset of menstruation and throughout pregnancy may play a role in development of TMD pain.[8] According to several in vivo and in vitro studies, estrogen may affect the bone, cartilage and related structures of TMJ.[17] Flake et al., reported that testosterone may mitigate, but estrogen may exacerbate, TMJ damage, due to lower TMJ plasma extravasation (PE) in female rats.[18] Another study exhibited that iNOS expression (an essential enzyme in the pathogenesis of inflammatory arthritis) in the synovial membrane of rats with deviated mandible may be exacerbated in the presence of estrogen.[19] Min et al., stated that estrogen deficiency is a candidate cause of TMD, whereas Haskin et al., proposed that there may be an increased relationship between circulating estrogen levels and joint pain.[16,20] Similar results were also found in a psychophysical study in which TMD pain was highest at times of lowest serum estrogen (end of the cycle and during menstruation) in both OC users and controls, but rapid estrogen change might also be associated with increased pain.[21] Yu et al., suggested that exogenous estrogen or serum estrogen is not enough to explain the female predilection of TMD.[22] They hypothesized that estrogen synthesized locally in condylar cartilage have a profound effect on the development of TMD.

Macfarlane et al., reported that pre-menopausal women using OCs did not show an increased risk of orofacial pain.[23] In some other studies, correlation between using oral contraceptives and development of TMD pain in healthy premenopausal women was not demonstrated which are in agreement with the current study.[13,24] In addition, the use of postmenopausal hormones in a group of Turkish women did not increase the signs and symptoms of TMD rather than those not using postmenopausal hormones.[25] Another study on a stratified random sample of 510 women, showed that estrogen replacement therapy did not place women at increased risk of developing TMD.[26] In contrast, Abubaker et al., revealed TMDs in women with higher use of exogenous hormones compared to the control group.[27]

The results of our study do not support an etiologic role for oral contraceptives in the pathogenesis of TMD in a selected sample of women. It has been suggested that using oral contraceptives in combination with conventional therapy (orthopedic treatment, drug and physiotherapy) has a more stable clinical effect compared to conventional therapy.[28] In our previous study, the authors found that there was no corelation between the estradiol and progesterone blood levels and the incidence of TMD in healthy female subjects. The most important etiologic factors were parafunctional habits (Bruxism and Clenching) and eccentric premature contacts.[29]

The high incidence of TMD in women can be explained by two factors; the first is whether women are more at risk for the one of the varied physiological factors thought to cause TMD (internal derangement of the TMJ, displacement of the disc between the condyle and the temporal bone, arthritis of the jaw joint, etc). The second is whether women, due to psychological, hormonal, or chromosomal factors, experience more significant pain or discomfort due to the disorder.[30] In addition, women seek treatment for dysfunction/disorders of orofacial structure more than men.[31]

During the menstrual cycle, serum levels of estrogen and progesterone fluctuate. In women, estrogen and progesterone levels are both relatively low at the beginning of the cycle. During the follicular phase, estrogen levels gradually increase, peaking prior to ovulation, and then moderately decrease during the luteal phase. Progesterone levels rapidly increase after ovulation, peaking during the middle of the luteal phase.[2] We evaluated the symptoms of TMD in the studied groups between the days 8 and 14 of menstrual cycle. As the highest level of serum estrogen is before ovulation in normal menstrual cycle, it may play an etiologic role in non-OC group.

In the current study, the OC group started using the pills after entry into study. Also all the women in this group were under the same contraceptive therapy (combination pills). This selected and controlled sample had not been considered in the previous studies.

Hormonal contraceptives contain synthetic versions of hormones. They mimic the action of estrogen and progesterone, and keeping hormones at a consistent level in the body. High levels of sex hormones may be related to TMD symptoms in this group. However, more research is needed to determine the possible effects of these hormones on TMD pain.

In the present study, we observed TMDs both in normally cycling women and in users of OCs. Therefore, it is concluded that the use of oral contraceptives is not a risk factor for TMDs. Further investigations with more sample size to evaluate etiologic factors of TMDs in women are purposed.

Acknowledgments

This study was supported by a grant from the vice chancellor of Mashhad University of Medical Sciences, Iran.

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Disclosure : The authors report no conflicts of interest.