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Systematic Review
TMJ Disorders

Is oestrogen associated with mandibular condylar resorption? A systematic review

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Abstract. A systematic review of the literature was performed regarding the influence of oestrogen on the occurrence of mandibular condylar resorption. Search terms for oestrogen were used in combination with terms related to the effect on condylar remodelling. A search of the PubMed, Embase, and Cochrane Central Register of Controlled Trials databases yielded 419 articles published between October 1993 and March 2017. An additional 48 articles were retrieved through manual searching of the reference lists. After initial abstract selection, 94 eligible articles were screened in detail, resulting in a final number of 33 articles included in the review. From this review, no evidence was found that oestrogen (deficiency) contributes to mandibular condylar resorption. The conclusions are limited by the lack of studies with a high level of evidence. Further investigations on serum oestrogen concentrations in women with condylar resorption are needed. Moreover, future studies should focus on the effects of the different types of medication and diseases influencing oestrogen concentrations, the utility of oestrogen concentrations during preoperative screening, and the policies for managing orthognathic surgery patients with an oestrogen deficiency. Finally, whether the mechanisms and risk factors that lead to idiopathic condylar resorption are the same in condylar resorption following orthognathic surgery remain to be elucidated.

Key words: oestrogen; oestradiol; ovariectomy; contraceptive agents; sex hormones; menopause; female hormones; hormone therapy; menstrual cycles; condylar resorption; mandibular condyle; temporomandibular joint; synovial membrane; cartilage; condylysis; osteoarthritis; systematic review; PRISMA statement.

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Condylar resorption is a multifactorial condition that affects the mandibular condyle and is characterized by changes in the condylar shape and a decrease in condylar mass. These changes can lead to malocclusion, temporomandibular joint (TMJ) dysfunction, and pain[1]. There are a number of local and systemic factors and/or pathologies that are associated with condylar resorption. When the specific cause is unknown, the condition is commonly termed idiopathic condylar resorption (ICR), also known as idiopathic condylysis, condylolysis, condylar atrophy, and progressive or aggressive condylar resorption[2].

Because condylar resorption occurs more frequently in women than in men, many have thought that a prominent systemic factor for the pathogenesis of this disease might be related to sex hormones, particularly oestrogens[3–7]. Several studies have shown the presence of high-affinity oestrogen receptors in the synovial

Table 1. Search terms used in this review.

Primary key words	Secondary key words
Oestrogen	Condylar resorption
Oestrogen receptor	Mandibular condyle
Oestradiol	Temporomandibular joint
Female hormones	Synovial membrane
Sex hormones	Cartilage
Contraceptive agents	Condylysis
Hormone therapy	Condylolysis
Menopause	Osteoarthritis
Menopausal	
Menstrual cycles	
Ovariectomy	
Ovarian cancer	

membrane, articular disc, and mandibular condyle of females[8–10], and also the potential effect of oestrogen on the metabolic activity of the TMJ[11–14]. The oestrogen deficiency in postmenopausal women elicits bone loss in the vertebrae and long bones resulting in bone fractures, and this condition is called postmenopausal osteoporosis[15]. While considerably less information is available on mandibular condyle bone loss under oestrogen-deficient conditions[15], two clinical studies have reported that female patients presenting ICR have low serum levels of 17β-oestradiol[7,16], suggesting a possible relationship between oestrogen deficiency and condylar resorption.

This systematic review was performed to investigate the effects of oestrogen on condylar resorption in order to determine whether oestrogen should be considered a risk factor for condylar resorption.

Materials and methods

Search strategy

A systematic review of the literature was conducted concerning the influence of oestrogen on mandibular condylar resorption; the PRISMA guidelines were followed[17]. The electronic databases PubMed (National Library of Medicine, NCBI), Cochrane Central Register of Controlled Trials, and Embase were searched to identify relevant articles; the search covered the period from database inception to March 2017. Search terms for oestrogen were used in 'AND' combination with search terms of condylar resorption, mandibular condyle, temporomandibular joint, synovial membrane, cartilage, condylysis, condylolysis, and osteoarthritis (Table 1). Search terms included controlled terms from medical subject headings (MeSH) in PubMed and Emtree in EMBASE, as well as free text terms in the Cochrane Library. The references of the articles identified were searched for additional relevant publications.

Study selection and inclusion criteria

Two reviewers (LFPN and EAA) independently screened all potentially relevant titles and abstracts against pre-specified eligibility criteria. When the abstract did not provide sufficient information, the full text article was checked against the eligibility criteria. All discrepancies were resolved through a discussion and consensus procedure.

Peer-reviewed and non-peer-reviewed articles were considered. Articles were included when (1) they reported oestrogen and condylar resorption or an interaction with the TMJ, (2) the full text was available in the English language, and (3) they reported human clinical trials, randomized and prospective studies, case series, in vitro human simulation studies, and multicenter and comparative studies. Exclusion criteria were (1) animal studies, (2) literature reviews, (3) case reports, (4) congress abstracts, (5) opinion articles, (6) no available translation, and (7) no full text available in international libraries.

Articles on the effects of oestrogen on TMJ osteoarthritis (TMJ OA) were included, as it is hypothesized that similar hormonal receptor effects and disease mechanisms may play a role. Similarly, articles on the effects of oestrogens on temporomandibular disorders (TMD) without further specification were also

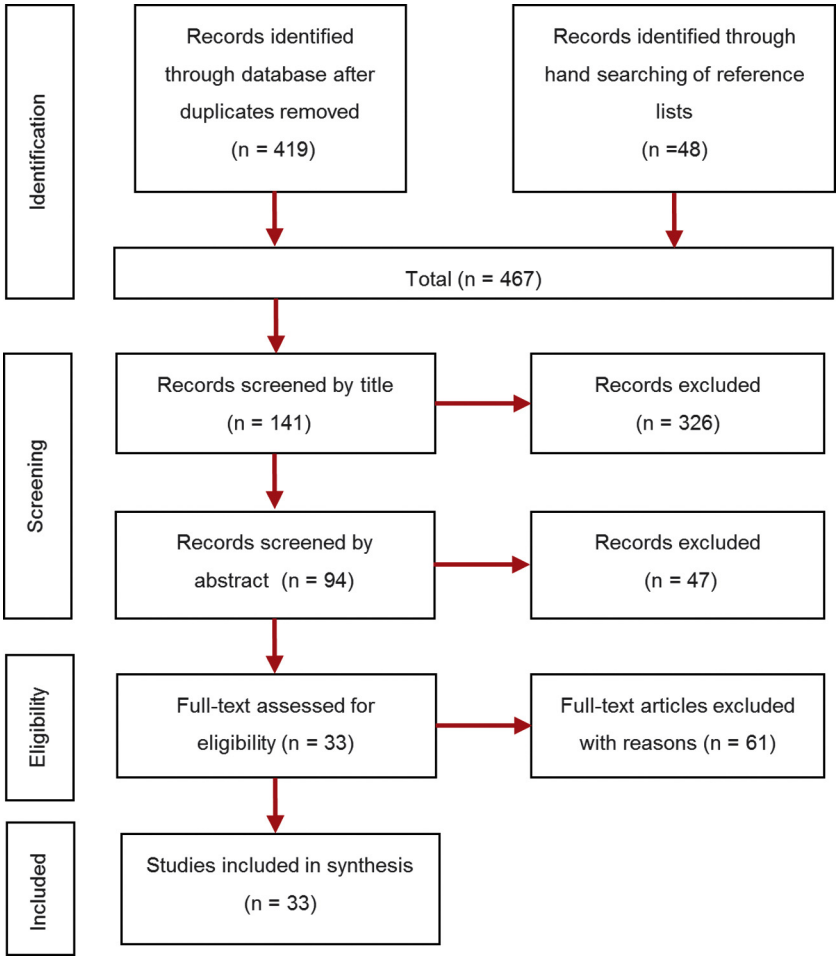

Fig. 1. Flowchart of the search strategy and study selection using PubMed, Embase, and the Cochrane Library.