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THE EFFECTIVENESS OF VITAMIN D PROVISION ON THE EXPRESSION OF FIBROBLAST GROWTH FACTOR-2 UNDER THE ORTHODONTIC MECHANICAL STRESS IN PREGNANT WISTAR RAT (*RATTUS NORVEGICUS*)

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ABSTRACT : Female patients have the possibility of pregnancy in the course of fixed orthodontic treatment. Pregnant women are often advised by physician to consume various kinds of nutritional support vitamins for the mother and fetus contained, one of which is vitamin D. The outcome of this research is to examine the effectiveness of vitamin D provision on the fibroblast growth factor-2 (FGF-2) expression during orthodontics mechanical stress (OMS) in pregnant wistar rats (*Rattus Novergicus*). Healthy pregnant Wistar rats (*R. novergicus*) 16-20 weeks-old, 200-250 grams body weight then grouped randomly into 4 groups; control group: pregnant rats administered vitamin D without OTM (K7 and K14) and treatment group: pregnant rats with OTM and vitamin D administration (P7 and P14). Nickel Titanium (NiTi) closed coil spring was installed among upper central incisor to the upper first molar to induce OMS with 10g/mm^2 force. After 7 days or 14 days all animals were sacrificed for pre-maxilla extraction. Immunohistochemically examination was carried out to examine FGF-2 expression in the tension and compressed side. The lowest expression of FGF-2 was found in the P7 group in the tension side (4.7±2.39) and compression side (4.31±1.7). There was no significant difference between groups in the FGF-2 expression on the tension side (p=0.28;p>0.05) and compression side (p=0.14; p>0.05). The vitamin D provision during OMS in pregnant wistar rats (*R. novergicus*) had no significant effect on the expression of FGF-2.

Key words : Fibroblast growth factor, maternal health, medicine, orthodontic tooth movement, vitamin D.

INTRODUCTION

Female patients have the possibility of pregnancy during in the course of orthodontic treatment. Pregnancy is a physiological state that brings various hormonal changes in women. Pregnancy affects not only general health, but also oral health (Narmada *et al*, 2019). During orthodontic treatment with orthodontic mechanical stress (OMS), there are changes in the periodontal ligaments and alveolar bone cellular and biochemical activities, which allows movement of tooth, one of which is fibroblasts in the periodontal ligament (Nugraha *et al*, 2020; Sitasari *et al*, 2020; Rahmawati *et al*, 2020).

There are some vitamin supplements that physicians recommend to consume as a nutritional support for pregnant women, one of which is vitamin D. Vitamin D provision during orthodontic tooth movement (OTM) in the pregnant experimental animal models increases the osteoclast number and receptor activator of nuclear factor κB ligand (RANKL) expression (Narmada *et al*, 2019). However, administration of vitamin D did not have a significant effect on vascular endothelial growth factor (VEGF) expression, angiogenesis, osteoblast number and bone alkaline phosphatase (BALP) expression during the OTM of pregnant wistar rats (Nareswari *et al*, 2019; Hisham *et al*, 2019). FGF-2 is one of kind growth factors that play an important role during wound healing and remodeling of alveolar bone due to injuries (Inayati *et al*, 2020). Thus, the purpose of this research is to examine the effectiveness of vitamin D provision on the FGF-2 expression during orthodontic mechanical stress (OMS) in pregnant wistar rats (*Rattus novergicus*).

MATERIALS AND METHODS

This study obtained ethical qualifications from the ethical clearance committee, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia with number: 733/HRECC.FODM/XI/2019. Female healthy Wistar Rats (*R. novergicus*) 16-20 weeks-old, 200 grams-250 grams of body weight were randomly grouped into 4