

## ABSTRAK

Ankilosis Sendi Temporomandibula (STM) adalah suatu kelainan berupa keterbatasan pembukaan mulut akibat penyatuan kondilus dengan fosa glenoidalis oleh jaringan, yang dapat menimbulkan gangguan bicara, pengunyahan, rampan karies, *oral hygiene* yang buruk, gangguan pertumbuhan wajah serta gangguan psikologi. *Bone Morphogenetic Proteins (BMPs)* dan *Transforming Growth Factor-beta (TGF- $\beta$ )* merupakan polipeptida faktor-faktor pertumbuhan yang berperan pada proses penyusunan dan perbaikan tulang atau kartilago, terutama berperan dalam mendorong dan mengaktifkan osteoblas pada saat penyembuhan tulang akibat trauma. Tujuan penelitian ini adalah untuk menganalisis pengaruh kerusakan STM dan lama imobilisasi terhadap ankilosis dan korelasi imunoekspresi *Bone Morphogenetic Proteins-7 (BMP-7)* dan *Transforming Growth Factor-beta (TGF- $\beta$ )* pada ankilosis sendi temporomandibula pasca trauma dengan berbagai tingkat kerusakan dan lama imobilisasi.

Penelitian eksperimental murni terhadap 27 kelinci *New Zealand White* yang dibagi menjadi 3 kelompok perlakuan trauma (ringan, sedang, berat) pada STM kanan dan 3 perlakuan imobilisasi rahang (0, 15, 30 hari). Penilaian ankilosis dilakukan dengan mengukur pembukaan mulut dan pemeriksaan histopatologi (HE) dengan menilai terbentuknya jaringan yang menyatukan kondilus dengan fosa glenoidalis. Ekspresi BMP-7 dan TGF- $\beta$  dinilai dengan pemeriksaan imunohistokimia. Pengujian pengaruh lama imobilisasi dan tingkat kerusakan STM menggunakan uji statistik ANOVA,  $\alpha=0,05$ . Pengujian korelasi imunoekspresi BMP-7 dan TGF- $\beta$  menggunakan *Chi-square Contingency Test* dengan  $p=0,05$ .

Hasil penelitian memperlihatkan ankilosis STM terjadi pada semua perlakuan trauma dengan lama imobilisasi 30 hari dan jaringan yang banyak terbentuk adalah fibrokartilago. Tingkat ekspresi BMP-7 adalah lemah (14,8%), sedang (7,4%), dan kuat (14,8%). Tingkat ekspresi TGF- $\beta$  adalah lemah (18,5%), sedang (7,4%), dan kuat (14,8%). Ekspresi BMP-7 dan TGF- $\beta$  berkorelasi dengan lama imobilisasi tetapi tidak berkorelasi dengan tingkat kerusakan.

Kesimpulan penelitian adalah kerusakan yang berat pada struktur STM dan lama imobilisasi berpotensi terhadap timbulnya ankilosis, sedangkan ekspresi BMP-7 dan TGF- $\beta$  dapat memprediksi timbulnya ankilosis namun tidak dapat memprediksi beratnya ankilosis STM.

Kata Kunci: Ankilosis, Sendi Temporomandibula, *Bone Morphogenetic Proteins-7 (BMP-7)*, *Transforming Growth Factor-beta (TGF- $\beta$ )*

## ABSTRACT

Temporomandibular joint (TMJ) ankylosis is a disorder, occurring in temporomandibular joints, indicating limitation on mouth opening as a result of the fusion of the glenoid fossa and condyle by tissue, it can induce other disorders such as speech disorders, impaired mastication, rampant caries, poor oral hygiene, facial and mandibular growth disturbances as well as psychiatric disorders. Bone Morphogenetic Proteins (BMPs) and Transforming Growth Factor-beta (TGF- $\beta$ ) are polypeptide growth factors having roles in the process of bone formation and recovery or cartilage, they especially induce the generating and activating of osteoblasts during bone recovery by trauma. The purpose of this study was to analyze correlation between immunoreexpression of BMP-7 and TGF- $\beta$  on temporomandibular joint ankylosis following trauma along with its various degrees of damage and duration of immobilization.

The true experimental study on 27 New Zealand White rabbits were divided into 3 groups of trauma on the right TMJ and Each group was further divided into 3 immobilization treatments (0, 15, 30 days). Ankylosis was measured on its mouth opening wide and Histopathological (HE) examination of TMJ by assessing the forming of the tissue which combines condyle with glenoid fossa. Expression BMP-7 and TGF- $\beta$  was assessed through Immunohistochemistry (IHC) examination. The analysis of influence of duration immobilization and degrees of TMJ damage against the occurrence of TMJ ankylosis was conducted by performing a statistic test, ANOVA,  $\alpha = 0,05$ . Examination on the correlation between duration of immobilization, degrees of TMJ damage and immunoreexpression BMP-7 and TGF- $\beta$  was conducted by Chi-square Contingency Test,  $p = 0,05$ .

Results of study indicated the occurrence of TMJ ankylosis with the highest value in those trauma with 30 days immobilization and most tissue formed was fibrocartilage. BMP-7 expression degrees in ankylosis tissue are weak (14,8%), moderate (7,4%), and strong (14,8%). Expression degrees of TGF- $\beta$  expression in ankylosis tissue were weak (18,5%), moderate (7,4%) and strong (14,8%). BMP-7 and TGF- $\beta$  expression was correlated with duration of immobilization but was not correlated with the degree of TMJ structural damage.

Studies concluded that severe structural damage to the TMJ and duration of immobilization potentially might induce the occurrence of ankylosis, expression of BMP-7 and TGF- $\beta$  can predict the onset of ankylosis but can not predict the severity of TMJ ankylosis.

**Keywords:** Ankylosis, temporomandibular joint, Bone Morphogenetic Proteins-7 (BMP-7), Transforming Growth Factor-beta (TGF- $\beta$ )