ABSTRACT

The temporomandibular joint (TMJ) is one of the most complex joints in the body. Its harmony is established by coordination between occlusion, muscle, and joint. Changing lifestyles, decreasing physical activity, which is increasing the number of degenerative joint diseases of various etiologies, and certain dental procedures, are increasing the number of patients complaining of pain or other problems in their temporomandibular joints. Estimated 42% of the population is affected and 2-5,5 % is seeking treatment.

Temporomandibular disorders (TMD) are clinical problems that involve the masticatory muscles, the temporomandibular joints and associated anatomical structures. Typical signs and symptoms of TMD are facial pain, clicking or crepitation of the TMJs, limited jaw opening capacity and deviation in the movement patterns of the mandible. The basis of successful treatment is a determination of the patient's causal problems. The analysis is based on the model of the ideal biomechanics of TMJ. The rehabilitation of temporomandibular joint disorders needs comprehensive long-term therapy based mainly on physical, surgical, and prosthetic treatment.

Detailed knowledge about the function and morphology of temporomandibular joint are necessary for clinical evaluation and treatment of temporomandibular joint disorders. Movements of temporomandibular joint are biomechanically sophisticated and are up-to-date not clear. Therefore the theoretical aim of the PhD thesis gives the suitable mathematical approach for analyses of temporomandibular joint based on traction and compression forces. The obtained results, based on two- and three-dimensional mathematical models, represent an introductory work for further studies of biomechanical aspects of temporomandibular joint and of its prosthesis. The models were based on the theory of contact problems in linear elasticity.