

The planned project is conducted with the aim of the assessment of the usefulness of shear wave sonoelastography in the diagnosis and monitoring of the management of increased tension of masseter muscles in the course of temporomandibular disorders.

The main examination analyzed in this study is shear wave sonoelastography. The study will be conducted with the use of modern ultrasound devices. After positioning of the head of the device on the skin, transvers acoustic waves are produced on various levels of depth and next, their propagation is measured with the speed of 5000 frames/second. Thanks to the application of shear wave sonoelastography, it is possible to determine pathological tone of masticatory muscles which accompanies some dysfunctions of the masticatory organ and may be cause of pain and abnormal jaw movements. Those main symptoms may coexist with headache, otolaryngological disorders, as well as increased tension and pain in the muscles of the neck and shoulder girdle. It worth noting that sonoelastography is a non-invasive and safe examination without any unpleasant experiences for patients.

First stage of the project is devoted to standardization of the examination methods. It will include healthy subjects without dysfunction of masticatory system using international protocol - Diagnostic Criteria for Temporomandibular Disorders (DC-TMD). Thanks to the series of tests and analyzes, normal values for various groups of patients as well as factors potentially affecting the result of the study will be determined. Also methodology of the examination will be developed which will enable standardized conduct of such measurements in various centers. Standardization will cover precise device head positioning and determining the position of the patient's head / jaw in the temporomandibular joint. The second stage will assess efficacy of this method in the monitoring of treatment progress in patients with temporomandibular disorders. The diagnosis will be made based on the DC-TMD protocol. A standardized sonoelastographic examinations will be conducted in two groups of patients: in healthy subjects and in patients with symptoms of masticatory dysfunction. Additionally, the level of pain and quality of life associated with oral health will be conducted. Measurement will be carried out at baseline and after 12 weeks of treatment with manual therapy and occlusal splint. As a result, it will be possible to compare sonoelastographic changes in relation to regression of clinical symptoms in response to treatment and to compare sonoelastography results to currently used methods for assessment of temporomandibular dysfunction. Study procedures are presented in diagram.

Current and significant problem of management patients with temporomandibular dysfunction is the limited number of sensitive and objective diagnostic methods. Sonoelastography is such an examination. Its use allows for objective assessment of hardness, tone, and cohesiveness of the organ or tissue being examined. The result from determined region of interest (ROI) the result is given in the form kPa, which allows for comparison of results in the same patient at different time points or comparison of results between patients. It must be also noted that this examination is non-invasive and safe for patients; no unpleasant sensations are experienced by patients during the examination.

In authors' opinion, there is a need for reliable determining of the sonoelastographic values for diagnostic purposes of temporomandibular disorders. Available literature reports indicate that hardness of individual muscles of the human body is different, but norms for masticatory muscles remain undetermined. Single publications on this topic bring unclear results and they do not cover the influence of such factors as age, sex, examination at rest and during jaw-clenching. They do not provide methodology of the examination. The present project will eliminate those limitations and as a result a contemporary medicine will get the basis for introducing sonoelastography for diagnosis and treatment monitoring of temporomandibular disorders. The project is also important for public health. Better diagnosis and monitoring of the treatment of this chronic disorder gives a chance for improving dental health care for the entire population. Among additional values of the project is the interdisciplinarity which is based on the use of cutting edge non-invasive diagnostic imaging method in dentistry.