

## **Abstract**

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Title of Thesis: Association of phase angle with dynamometric and spirometric parameters in patients with COPD.

**Background:** Chronic obstructive pulmonary disease (COPD) is a lung disease with extrapulmonary comorbidities which have a significant impact on the quality of patients' life, their mortality and morbidity. Loss of muscle strength and dysfunction of the peripheral skeletal muscle fibres are considered as one of the crucial system consequences of COPD. For the purposes of the clinical evaluation of muscle strength, dynamometers can be used. Spirometry is regarded as a gold standard for the diagnosis. In this thesis, we focused on association of the dynamometric and spirometric parameters with the detected values of the phase angle (PA) measured by means of the bioimpedance analysis in COPD patients.

**Methods:** Our study was based on a sample of 50 COPD patients (38 men, 12 women) of the average age of 66 years  $\pm$  7 years. According to the measured values of PA, the patients were divided into 2 groups: a group with low PA value ( $PA < 5^\circ$ ;  $n=17$ ) and a group with normal value ( $PA \geq 5^\circ$ ;  $n=33$ ). The monitored parameters were evaluated both for the total group and for the male subgroup (the female subgroup was not separately statistically analysed considering the low number of females in the cohort of patients). Muscle strength and endurance were measured by a hand dynamometer (Pinch Grip Analyser), pulmonary function by a spirometer (Micro DL) and PA by means of bioimpedance analysis (Body Composition Monitor).

**Results:** Both in the total group and the male subgroup with normal PA significantly lower values of the biological age and estimated lung age were discovered. At the same time higher values of maximum hand grip strength, and its values corrected for body height and ratio of target to total time in endurance test were monitored compared to the groups with low PA. Only in the case of the total group with normal PA, significantly higher values of weight, body mass index, area under the force-time curve and absolute value of forced expiratory flow at the level of 50 and 75% of exhaled forced vital capacity were identified. Especially in the male subgroup with normal PA the maximum hand grip strength corrected for fat free mass was notably higher in comparison with men with low PA. The other spirometric parameters did not differ significantly. The correlation analyses proved mainly strong direct dependence of PA on the maximum hand grip strength and its values corrected for height both in the total group and the male subgroup. But association of PA with some other dynamometric and spirometric parameters was proved, too.

**Conclusions:** First of all, direct dependence of PA on the maximum hand grip strength and its values corrected for height was proved as well as association of PA with certain dynamometric and spirometric parameters. Substantial differences of dynamometric and spirometric parameters between the group with normal and low PA value were also discovered. PA seems to be a propiate indicator of peripheral muscle strength and can be used for estimation of physical condition and problems related to dyspnoea in COPD patients. However, it cannot substitute spirometric examination.

**Key words:** chronic obstructive pulmonary disease, phase angle, dynamometry, spirometry, bioimpedance analysis.