

Abstract

The thesis deals with the effect of asymmetric postural loading on the movement of the right hemidiaphragm. The main aim of the thesis was to assess how this asymmetric loading affects the inspiration and expiration positions of the diaphragm and diaphragmatic excursion.

The theoretical part of the thesis summarizes the basic knowledge regarding the diaphragm, the main respiratory muscle. Individual chapters deal with its anatomy, functions, or its relationship to other structures of the human body. Hemiparesis of the diaphragm as a manifestation of unilateral damage is also described in detail. Further chapters focus on diaphragm examination using ultrasonography, spine stabilization, and trunk asymmetry.

Methodology: The study involved 40 healthy subjects. Ultrasonographic examination of the right half of the diaphragm was performed in M-mode during tidal and loaded breathing induced by lifting a kettlebell with one hand on the contralateral and ipsilateral sides. From the resulting record, the distance of the diaphragm from the ultrasonographic probe in the inspiratory and expiratory positions was measured, and subsequently, the size of diaphragmatic excursions was calculated.

Results: When comparing breathing during contralateral and ipsilateral loading, a statistically significant difference was observed in the expiratory position of the diaphragm ($p < 0.001$) and diaphragmatic excursions ($p < 0.001$), but not in the inspiratory position of the diaphragm ($p = 0.997$). Comparing tidal breathing with contralateral loading revealed a difference in the inspiratory position of the diaphragm ($p = 0.004$) and diaphragmatic excursions ($p < 0.001$), but not in the expiratory position of the diaphragm ($p = 0.872$). Comparing tidal breathing with ipsilateral loading showed differences in all three observed parameters - inspiratory position of the diaphragm ($p = 0.005$), expiratory position of the diaphragm ($p < 0.001$), and diaphragmatic excursions ($p = 0.023$).

Conclusion: This study demonstrated a differential response of the right half of the diaphragm to contralateral and ipsilateral loading. The right half of the diaphragm was in a more caudal position during expiration with ipsilateral postural loading, resulting in smaller postural-respiratory excursions compared to contralateral loading.