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ASSESSMENT OF MUSCULOSKELETAL LOADS IN THREE TYPES OF BODY POSTURE ACCORDING TO DOLPHENS

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Postural disorders are visible changes in posture that are the result of neuromuscular imbalances. They account for a high percentage of all health problems and often cause pain. One method of classifying the posture is the Dolphens' method. According to it, there are three types of body posture: neutral (N), swayback (SB) and lordotic (L). This study aimed to evaluate the effect of body posture type according to the Dolphens on musculoskeletal loads.

The study included a group of 29 subjects (14 females and 15 males; 9N, 10SB, 10L) aged between 18 and 30 years. All of the subjects were healthy, but some of them complained of lower back pain. Assessment of body posture according to Dolphens was carried out using the Posture Photographic Assessment System. A lateral projection photograph was taken of each subject. In addition, the following parameters were measured for each subject using an inclinometer: pelvic tilt angle, lumbosacral and thoracolumbar tilt, upper kyphosis tilt angle. The position of the joints and individual body segments in relation to the vertical axis (foot, leg, trunk, hand, head), the position of the centre of mass of the body and the values of the ground reaction forces acting on the feet were determined from the photograph of each subject. The results obtained provided the input for the modelling of the posture of each person in the AnyBody Modelling System. A full-body standing model was used. The model was scaled to weight and height for each subject. The highest values of lumbar loads were observed in subjects with a kyphotic posture.

For those with a kyphotic posture, the average resultant force at the L5-S1 level was 0.97 ± 0.31 BW (BW - body weight). For those with a lordotic posture it was 0.87 ± 0.27 BW and for those with a neutral posture it was 0.86 ± 0.15 BW. For the kyphotic posture, the highest values of the compression component of the force were recorded at the L5-S1 level, amounting to 0.96 ± 0.31 BW. The highest shear force values were obtained for the lordotic posture, amounting to 0.1 ± 0.04 BW. The study also assessed the force values of the abdominal and dorsal muscles. The highest force levels were observed for the erector spinae (ES) and transversus abdominis (TrA) muscles. The highest values of ES muscle force were obtained for the lordotic posture (0.108 ± 0.061 BW) and TrA for the kyphotic posture (0.21 ± 0.02 BW).