

MODELING OF SET OF EXERCISES FOR LORDOSIS AND POOR LORDOTIC POSTURE

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(Original scientific paper)

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Abstract

Functional-anatomical and mechanical variables are of significant importance in determining the qualitative biomechanical aspects of physical exercise. The purpose of the research is to determine the biomechanical characteristics of complex exercises from the initial sedentary position with the method of qualitative biomechanical analysis. The proposed model of exercises has a coefficient of biomechanical similarity (CFBS = .685). The highest similarity is observed between the exercises No. 1. Alternative leg raises ALTLGRAI and No. 4. Criss cross scissors CRICROSCI with a coefficient .921. The highest coefficient of biomechanical resemblance to the rest of the exercises is present in the exercise Alternative leg raising ALTLGRAI (CBCF = .765), and the lowest coefficient is obtained in the exercise Double legs toe touch DOULGTTOU (CBCF = .540). The obtained results from the performed qualitative biomechanical analysis will serve the teachers of physical and health education, at the same time the kinesiologists who deal with the problem of corrective gymnastics, so that they can suggest optimal complexes of exercises for lordosis based on the mentioned biomechanical analysis.

Key words: lordosis, prevention, correction, biomechanics, analysis.

Introduction

Lordosis or lordotic poor posture of the body could be recognized by excessive inward curving of the lumbar spine and the cervical spine of the vertebrae as well as weak abdominal muscle (Wagner H., Liebetrau A., Schinowski D., Wulf T., De Lussanet M.H.E, 2012). This deformity of the spine is frequently recognized among obese children, but it is not unusual among slim children as well. Lordosis actually represents a pathological curving of the frontal curves of the lumbar and the cervical part of the spine which is not usually accompanied by symptoms except in the hardest cases. This deformity emerges as a result of long-lasting sedentary position or lasting standing on feet as well as hypokinesia and it is a common condition in the period of pregnancy. Lordosis often emerges in the period of childhood and the most common cases have unknown origin. This deformity of the spine emerges as a result of sprained hip that happened as a consequence of falling down and injuries (Shirazi S.A., Haghghi F.M., Alavi S.M., Nezhad F.F., Emami F, 2018). Lordotic poor posture is also a frequent phenomenon and is the main reason for the emergence of lordosis. This deformity is equally present in both males and females and there is no age limitation as well (Javadipour Z., Sedaghati P., Ahmadabadi S, 2021). Common cases of this deformity could only be treated by use of physiotherapy and particularly by use of corrective exercises that would have preventive and curative role (González-Gálvez N., Gea-García G.M., Marcos-Pardo P.J, 2019). For successful application of the exercises for correction and prevention of lordosis and the lordotic poor posture of the body the method of qualitative biomechanics analysis is applied, by which the biomechanical parameters would be established and used for prevention and correction of lordosis (El-Hamalawy F.A. A, 2011). Analyzed exercises would serve in the process of curing this deformity by kinesiologists.

Working methods

A sample of complex exercises for lordosis from the initial sedentary position on the floor mat

1. Alternative leg raising (ALTLGRAI)
2. Double leg raising (DOULGRAI)
3. Double leg circles (DOULGCIR)
4. Criss cross scissors (CRICROSCI)

5. Seated spread legs (SEASPRLG)
6. Straighten the bend knee (STRBEKN)
7. Double legs toe touch (DOULGTTOU)
8. Sit Up straight (SPITUSTI)
9. Bending knees towards the chest (BENKNTOWTHECHST)
10. Seated hamstring stretch (SEAHAMSTR)

All exercises are defined by binary biomechanical variables determined according to the biomechanical characteristics of the movements, but determination is conducted by use of a method of qualitative biomechanical analysis. (Tufekchievski, 1991, Tufekchievski, 2003, Tufekchievski and Aceski, 2009, Aceski and Tufekchievski, 2011).

Data processing methods

The basic motoric stereotypes-skills are analyzed by the method of qualitative biomechanical analysis, while the results will be given in an ordinary matrix that provides information about the basic biomechanical characteristics of each entity (exercise). The entity represents a vector, where the numeric value 1 indicates the possessiveness of a biomechanical characteristic, and 0 indicates the non-possessiveness of a biomechanical characteristic in that entity. The rows represent the vectors of the entities while the columns represent the vectors of the biomechanical variables. From the basic matrix, primarily, the coefficients of biomechanical similarity are determined among the analyzed entities. Then, full biomechanical similarity is determined i.e homogeneity as well as the force of the biomechanical similarity among the entities. This procedure is described in the Heraclitus and Alproby`s algorithm and SPSS 18.0.

Results and discussion

Table no.1 Standardized values of the biomechanical similarity- inter-similarity, coefficient of full biomechanical similarity and coefficients of biomechanical force connection of a set of exercises from initial sedentary position on floor mat for lordosis.

	Cosine of Vectors of Values									
	(НАИПОДИ СЛНЗ)	(ПОДИСПН Э)	(КРУЛДИС ПНЗ)	(НАИВКРИС ПНЗ)	(РАЗИСПНЗ)	(ПРИСВНИС П)	(ПОДИСПН ПИПСТ)	(ЗАТТРИСП РС)	(ПРИКОЛПР ДКОШ)	(ГРДСЕД)
(НАИПОДИ СЛНЗ)	1.000	.894	.801	.921	.792	.875	.500	.724	.766	.609
(ПОДИСПН Э)	.894	1.000	.900	.818	.766	.766	.553	.696	.826	.578
(КРУЛДИС ПНЗ)	.801	.900	1.000	.731	.761	.761	.560	.613	.736	.502
(НАИВКРИС ПНЗ)	.921	.818	.731	1.000	.881	.801	.440	.654	.695	.544
(РАЗИСПНЗ)	.792	.766	.761	.881	1.000	.792	.500	.638	.681	.522
(ПРИСВНИС П)	.875	.766	.761	.801	.792	1.000	.500	.638	.724	.522
(ПОДИСПН ПИПСТ)	.500	.553	.560	.440	.500	.500	1.000	.511	.553	.740
(ЗАТТРИСП РС)	.724	.696	.613	.654	.638	.638	.511	1.000	.783	.667
(ПРИКОЛПР ДКОШ)	.766	.826	.736	.695	.681	.724	.553	.783	1.000	.578
(ГРДСЕД)	.609	.578	.502	.544	.522	.522	.740	.667	.578	1.000
КЦБС	.685									
КСБП	(НАИПОДИ СЛНЗ)	(ПОДИСПН Э)	(КРУЛДИС ПНЗ)	(НАИВКРИС ПНЗ)	(РАЗИСПНЗ)	(ПРИСВНИС П)	(ПОДИСПН ПИПСТ)	(ЗАТТРИСП РС)	(ПРИКОЛПР ДКОШ)	(ГРДСЕД)
	.765	.755	.707	.720	.717	.709	.540	.658	.705	.585
	1	2	6	3	4	5	10	8	7	9

From the analysis of the obtained results in the inter-similarity matrix from tab. 1, it can be determined that the greatest similarity is observed between the exercises No. 1.Alternative leg raising ALTLGRAI and No. 4.Criss cross scissors CRICROSCI with a coefficient .921.The largest similarity coefficients range from .881 to .921.The smallest similarity is present between exercises No. 4.Criss cross scissors CRICROSCI and No. 7.Double legs toe touch DOULGTTOU with a coefficient .440.The smallest similarity coefficients range from .440 to .511.The coefficient of full biomechanical similarity is CFBS=.685. According to the obtained results, the highest values of the CBCF coefficient of biomechanical connectionforce of one exercise with all other highest values were obtained in exercises No. 4.Criss cross

scissors CRICROSCI with a coefficient .720, and No.2. Double leg raising DOULGRAI with a coefficient .755, and No. 1. Alternative leg raising ALTLGRAI with a coefficient of .765

Conclusion

Analysis of the obtained results points to the conclusion that the proposed exercises have a high homogeneity (Aceski, A., Tufekcievski, A., Klincarov, A. (2007). According to the obtained results, the highest values of the CBCF coefficient of biomechanical connection force of one exercise with all the other highest values were obtained in exercises No.4. Criss cross scissors CRICROSCI. with a coefficient of .720, No.2. Double leg raising DOULGRAI with a coefficient of .755. No. 1. Alternative leg raising ALTLGRAI with a coefficient of .765. The obtained results of this research are a good representative in planning and programming of the exercises that will serve for the prevention and correction of lordosis.

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