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The assessment of the anterior and posterior spine curvatures in taekwon-do practitioners and the socially unadjusted from Juvenile Detention Centres

Marta Motow-Czyż, Jacek Wąsik, Marek Kluszczyński

Institute of Physical Education and Tourism and Physiotherapy, Jan Długosz University of Czestochowa; Poland

Abstract

Background and Study Aim. Daily physical activity prevents from a number of changes in the body posture such as the anterior and posterior spine curvatures. Training hand-to-hand combat as a form of physical activity when following the rules of Taekwon-do can contribute to the improvement in body posture. Children and adolescents from Juvenile Detention Centres are presumed to use hand-to-hand combat to resolve conflicts. The question arises: does the range of curvatures differ between the groups. The objective of the work is thoracic kyphosis and lumbar lordosis in the groups of Taekwon-do practitioners and the socially unadjusted.

Material and methods. The research material included 39 children and adolescents aged 10-18 (20 Taekwon-do practitioners and 19 subjects from Juvenile Detention Centres in the region of Silesia). The Saunders inclinometer was used to measure the angle of lumbar lordosis and the angle of thoracic kyphosis. The variations between the groups were assessed on the basis of χ^2 Pearson's test at the significance level of $p < 0.05$.

Results. Kyphotic curvatures deviating from the norm were observed mostly in the group of children and adolescents from Juvenile Detention Centres where thoracic curvatures occurred in 42.1 % of the subjects. In the group of Taekwon-do practitioners the figure was apparently higher (65%). Lordotic curvatures, within the norm, occurred in 60% of the Taekwon-do practitioners and 52,63% of the subjects from the other group.

Conclusion. Despite some variations in spine curvatures, the test did not confirm the statistical significance between the groups of Taekwon-do practitioners and the socially unadjusted, which can result from a high level of physical activity of the members of the two groups.

Key words: thoracic kyphosis • lumbar lordosis • body posture • taekwon-do

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Corresponding author: Jacek Wąsik, Institute of Physical Education, Tourism and Physiotherapy, Jan Długosz University of Czestochowa, Armii Krajowej 13/15; 42-200 Czestochowa, Poland; e-mail: jwasik@konto.pl

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INTRODUCTION

The procedures aiming at improving motor skills and people's personality date back to ancient times. Physical activities were usually an element of military training and a means of building up courage and self-discipline for an individual. Plato as an Athenian soldier emphasized a positive influence of physical activities and referred to them as 'an older sister of spiritual education' [1]. Today's civilization development boosts sedentary lifestyle and thus, contributes to the muscular system deterioration. As a result, the system cannot function properly and loses its dynamic stability of the spinal column.

In the world of the socially unadjusted adolescents, the efficiency of sports as an educational and moral means was emphasized by a number of researchers [2]. S.C. Miller and B.J.L. Bredemeier, Shields indicate a close link between the programs of motor activities for the socially unadjusted and the activities promoting moral development [3]. Hence, the educational effect is achieved through the positive approach towards motor activities adopted even by those who do not like school or other formal education classes.

Despite technical skills, martial arts improve moral and ethical behaviour. Taekwon-do, being an example of combat sports, places an emphasis on improving self-discipline, self-control, mental endurance, mental acuity, as well as body and mind balance [4-6]. Moreover, Taekwon-do training encompasses a wide range of stretching exercise improving agility and spinal mobility, which has a positive effect on a proper development of the spine. However, it is important to consider the fact that the tendency to improve body posture and particularly spinal curvatures in young people who practise sports depends on the training specification and its frequency [7].

The objective of the work is to assess thoracic kyphosis and lumbar lordosis in the groups of Taekwon-do practitioners and the socially unadjusted. The following questions were addressed:

Are there any essential differences in forming the anterior and posterior spine curvatures between the Taekwon-do practitioners and the socially unadjusted?

What variations in the anterior and posterior spine curvatures occur in particular groups?

MATERIAL AND METHODS

Subject

The research material included 39 boys aged 10-18 (13.78 ± 2.67 years old) from the region of Silesia:

20 Taekwon-do practitioners (13.2 ± 2.6 years old) and 19 boys from Juvenile Detention Centres (14.36 ± 2.62 years old).

Protocol

The physiological spine curvatures analysis was performed by means of the Saunders inclinometer in accordance with the manufacturer's instructions. The angle of lumbar lordosis and the angle of thoracic kyphosis were determined. According to the norms accepted by Panjabi and White [8], the norms of lumbar lordosis and thoracic kyphosis were established at 20-45 degrees. Furthermore, the occurrence of hypokyphosis, norm kyphosis and hyperkyphosis as well as hypolordosis, norm lordosis and hyperlordosis was evaluated. The tests were performed by an experienced physiotherapist and the records-taking person.

Human Subjects Research Committee of the University scrutinized and approved the test protocol as meeting the criteria of Ethical Conduct for Research Involving Humans. All subjects in the study were informed of the testing procedures and voluntarily participated in the data collection.

Statistics

Descriptive statistics were calculated for the studied parameters, i.e. the mean value and standard deviation. The differences between the compared groups were obtained on the basis of Person's test of statistical significance χ^2 . The statistical significance was put at the level of $p < 0.05$. All the measurements were obtained with the use of MS Excel.

RESULTS

The achieved chosen results were plotted in Tables 1 and 2.

Table 1. The recorded kyphotic curvatures in the group of Taekwon-do practitioners (TKD) and the socially unadjusted (P)

Spinal curvatures	TKD	P	Test results χ^2
Hypokyphosis	7	9	0.432
Norm kyphosis	13	8	0.203
Hyperkyphosis	0	2	0.059

Table 2. The recorded lordotic curvatures in the group of Taekwon-do practitioners (TKD) and the socially unadjusted (P)

Spinal curvatures	TKD	P	Test results χ^2
Hypolordosis	6	4	0.928
Norm lordosis	12	10	0.525
Hyperlordosis	2	5	0.087

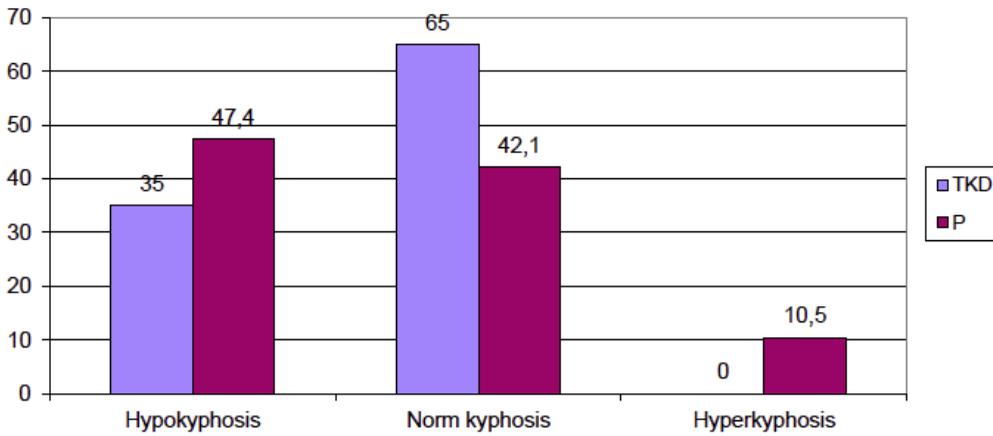


Figure 1. The percentage distribution of kyphotic curvatures occurrence in the studied groups (TKD – Taekwon-do practitioners, P- the socially unadjusted group)

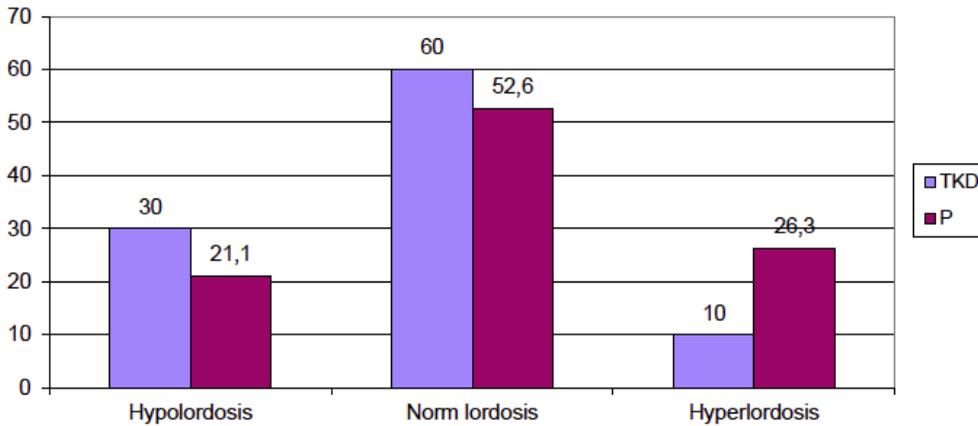


Figure 2. The percentage distribution of lordotic curvatures occurrence in the studied groups (TKD – Taekwon-do practitioners, P- the socially unadjusted group)

DISCUSSION

Scientific literature comprises a few publications concerning the influence of martial arts on the body posture. [9,10]. However, it is extremely difficult to find similar literature on the same topic relating to the socially unadjusted group.

The analysis suggests no statistically significant variations in the anterior and posterior spinal curvatures between the two groups. It is assumed that the lack of the variations can be the result of using hand-to-hand combat techniques, but still more data is required. In the group of the Taekwon-do practitioners hand-to-hand combat technique is used as a form of sports competition. On the other hand, in the group of the socially unadjusted, it is used to regulate conflicts, which is an ethical issue. However, certain variations expressed in percentage are observed.

More than a half of the Taekwon-do practitioners remain the norm where the occurrence of norm kyphosis is observed in 65% of the studied subjects and norm lordosis is observed in 60 % of the studied subjects. In the control group the occurrence of the curvatures is estimated at the level of 42% and 52.6% respectively (figure 2). The similar results were achieved by other researchers. Balanced types of body posture defined as extremely correct and correct occurred more often in Taekwon-do practitioners [11]. Moreover, their kyphotic posture remained within the norm [12].

It is proved that there is a close link between the occurrence of lordotic spinal curvatures and a kind and intensity of the trained physical activity [13-16]. Judo practitioners are a good example of sportspeople with kyphotic postures [17]. The same refers to female handball players [18].

The research proves less occurrence of body posture deformities in the group of Taekwon-do practitioners. Hypokyphosis was observed in 35% of the subjects. There were no cases of hyperkyphosis. Hyperlordosis was observed in only 10% of the subjects. However, in the group of the socially unadjusted hypokyphosis was observed in 47.4% of the subjects while hyperkyphosis occurred in 10.5% and hyperlordosis was observed in 26.3% of the subjects (figure 1,2). On the contrary, hypolordosis was observed in 30% (TKD group) and in 21.1% of the subjects (P group).

The study is just a portion of the whole issue as it constitutes a preliminary phase of an in-depth study. The presented data and the following discussion provide other researchers with the comparative data and pave the way for further studies.

CONCLUSIONS

On the basis of the collected data, the following assumptions were made:

1. Despite different conditions of physical development in the subjects of the groups of Taekwon-do practitioners and the socially unadjusted, distinctive variations in the anterior and posterior spinal curvatures are absent.
2. In most of the studied Taekwon-do practitioners, there is no evidence of a pathology in body posture. Norm kyphosis and norm lordosis were observed in more than 60% of the studied subjects of the group.

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