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**Ofelia POPESCU , Nicoleta LEONTE ,  
Mihaela NETOLITZCHI & Teodora  
WESSELLY**

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# Means Specific to Basketball in Diversifying the Programs for Lordosis Prophylaxis

Ofelia POPESCU<sup>1</sup>, Nicoleta LEONTE<sup>2</sup>, Mihaela NETOLITZCHI<sup>3</sup>, Teodora WESSELLY<sup>4</sup>

**Abstract:** Even if the written information on movement by therapy, are "only" nearly 5,000 years old, no doubt that human beings had sensed long before the benefits which the motion exercises brought to restore health. Physical exercise, used both for the broad implications it has on the health of the human body in general and on most of its functions in particular, represents the basic means of the physical therapy prophylaxis. Basketball, through its means, can be considered an "associate" of the traditional physical therapy prophylaxis. Thus, one can obtain various physical therapy programs which do away with the monotony, refreshing the traditional means. Remodeling the apparatuses, structures and systems of the human body, according to the laws of growth, and also of the young people, is due to the current social dynamics, to the new lifestyles required to cope with the daily challenges, to become competitive and to integrate professionally. This paper proposes to promote the health and the prophylaxis of the body posture and alignment disorders, such as lordosis, over the lifetime, by diversifying the physical therapy means with various basketball game means.

**Keywords:** prophylaxis; lordosis; physical therapy; basketball.

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## 1. Introduction

Even if the written information on movement by therapy, are "only" nearly 5,000 years old, no doubt that human beings had sensed long before the benefits which the motion exercises brought to restore health. Today's youth have to be prepared for a dynamic and continuously evolving society,

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<sup>1</sup> Assist, Ph.D. candidate, The "Polytechnic" University of Bucharest, Bucharest, Romania, ofeliapopescu2002@yahoo.com,0040721377505.

<sup>2</sup> Lecturer, Ph.D., The "Polytechnic" University of Bucharest, Bucharest, Romania, nico\_balbeck@yahoo.com, 0040721879416.

<sup>3</sup> Professor, Ph.D. The "Polytechnic" University of Bucharest, Bucharest, Romania, netolitzchi\_miky@yahoo.com, 0040723234377.

<sup>4</sup> Lecturer, Ph.D., The "Polytechnic" University of Bucharest, Bucharest, Romania, teodoraw@yahoo.com, 0040722828800.

which also imposes a certain physical, intellectual, moral and civic structure (Leonte, N., 2014).

The changes at the social level (the technologization, excessive use of the computer, lack of physical activity) and spending a long time to perform the educational tasks, lead to posture deformations (lordosis, scoliosis, kyphosis), and this is a fact which requires an effort to anticipate the potential negative effects of the new technologies on the workers' health and safety.

These findings are also supported by other research conducted in Europe.

A recent Eurobarometer survey (2013) shows that 28% of the young people surveyed believe that the ergonomic risk (repetitive movements or tiring or annoying positions) is one of the important occupational hazards as well as lifting, carrying or moving loads daily (24%).

Bubanj S. et al. (2012) investigated the body posture of young athletes and young people who do not do sports. The results showed an incidence of 24.2% for the lordotic posture and of 33.1% for the kypho-lordotic posture. To prevent and correct postural deficiencies we should consider the isometric exercises for muscle strength.

Adolescence, the ontogenetic stage of shaping the human individuality and conduct, is characterized by the fact that it marks the end of childhood and the beginning of maturity. On both sexes, adolescence is characterized by a rapid growth in height, but without having a corresponding value in weight. The first consequences of this exaggerated waste growth emerge especially in the locomotor apparatus dealing with the body's support components. If we also add the fact that the nervous system is intensely stressed, and for tackling the school issues the adolescent is obliged to sit at the desk for hours in incorrect positions, we can understand why the self-control capacity decreases, finally affecting the body attitude. Promoting, through physical exercise, the health and the prophylaxis of the posture and body alignment disorders, contribute to combating the destructive effects on the body attitude.

Becoming aware of and practicing physical therapy programs, are often arduous for the youth with lordotic attitudes and oblige us to look for solutions to attract them by diversifying the physical exercises using means specific to different sports branches such as basketball.

The paper's originality and also its applicative value, consists in developing models based on the means specific to basketball in order to improve the health state of the young people.

## 2. Material and Methods

### *Research Purpose*

Starting from the premise that in the transition from adolescence to young adults, spine deformations are related to posture attitude vices and keeping a good health of the young people has a positive measurable impact on their academic and professional performance this paper proposes to enrich the means specific to physical therapy, so that the prophylactic programs for the deficient postural attitudes be more diverse and attractive to students.

### *Working Hypothesis*

Knowing and understanding the main biomechanical characteristics of the lordosis and of the means specific to basketball recommend their inclusion in the prophylactic programs for the lordotic postural attitudes.

### *Content*

Cordun M.(1999) believes that the normal body posture is a „function of the human body based on the synergistic and coordinated action of the locomotor apparatus elements and the central and peripheral nervous system, by means of which there is maintained the body stability, the balance and the constant relations between its segments and between this and the environment "

The attitude is a function of the human body which is based on a series of sensory-motor reflexes. (Fozza, C.A., 2003). Educating and maintaining the body correct attitude is not possible without the permanent participation of the nervous system which through its central and peripheral segments, and especially through the specialized organs contributes to a real sense of attitude.

The disorders of the body support and movement function always draw muscle imbalances if the contract function is troubled or the antagonists muscle tone; they will not be able to balance the opposing forces of the normal attitude and there will appear deficient attitudes that can vitiate the movement-making. This will entail the inadequate loading of the articular structures followed by a decrease in their efficiency and early fatigue.

The faulty attitudes and the physical deficiencies can be the result of the following:

- functional insufficiency (joint laxity, muscular hypotonia);

- rigidity or exaggerated tension (joint stiffness, increased muscular tone);
- functional inequality or asymmetry

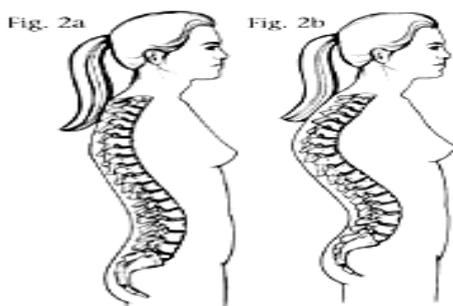
➤ The Lordotic Attitude

In acceptance of, Bratu I.(1997), consider that lordosis is a deviation in the sagittal plane of the spine with the convexity oriented anteriorly and located in the lumbar region.

According to Fozza C. (2006) lordoses are spine deviations in the anteroposterior plane with the concavity anteriorly consisting either in the exaggerated physiological lumbar curvature (the typical lordosis) or in the appearance of curves in another area or in the lumbodorsal crossing area (the atypical lordosis).

Lordotic attitudes have the following characteristics:

- do not involve structural modifications of the anatomic components;
- are supple, reducible, so they correct or hypercorrect when taking some positions (the sitting position) or when performing the trial (the trunk flexion) thus proving that the vertebral axis is supple;
- decrease as incidence with age;
- have a slow evolution and favourable prognosis;
- if not treated on time, it determines structural modifications and becomes pathologic lordosis.



**Fig. 1** Normal Spine Position (fig.2a) and lumbar lordosis (fig.2b) according to [www.spinaldoctor.com](http://www.spinaldoctor.com)

The specialists in the field refer to the muscular causes of the physiological curvatures modifications and to the important role of the spine balanced support.

➤ The biomechanical analysis of the lumbar spine

The lumbar area is in the form of a mobile lordosis, with great possibilities of variation of the curvature profile in the mediosagittal plane. This is supported by the lower coupling with the basin, done by the lumbar-sacral junction, through which the variation of the pelvis position by basculation in flexion or extension changes the lumbar lordosis configuration. Because of this, the stress of the lumbar spine through axial loading are more varied compared to the thoracic spine. The differences also occur through the projection of the trunk gravity center, which in the L3 is projected posteriorly to the vertebral body. This disposition transfers compressive stress to the lower spine, which it can take up to 30% of the load.

The lumbar spine is the second area in terms of mobility after the cervical spine with a movement gradient which increases towards the distal.

- The intervertebral discs have the largest sized in the mobile spine, but oversize remains within an appropriate balance. The disc height favors the mobility, but the disc large surface imposes the rigidity. In the lumbar area the proportion of the height increase in the disc surface determines a fixed ratio that falls within the function margins with a safety coefficient.

- In the lumbar area, the articular processes are oriented at  $90^\circ$  to the horizontal plane and at  $45^\circ$  to the frontal plane. This architecture together with the spheroidal articular surfaces, impose major restrictions on the rotational movement. Only in the lumbar-sacral area the orientation and shape of the articular surfaces allow a degree of rotation.

The flexion-extension movement increases gradually from  $12^\circ$  in the L1-L2 segment up to  $20^\circ$  in the L5-S1 segment, the anterior portion of the intervertebral discs is compressed, while the vertebral joint posterior ligament, the yellow ligaments, the interspinous ligaments, the supraspinous ligament and the back muscles are put under tension. The muscles initiating the movement are those of the abdominal wall and especially the right abdominal muscle and the two oblique muscles, the iliopsoas and the subhyoidian muscles and the sternocleidomastoidian muscles.

The lateral flexion movement maintains a constant value of  $6^\circ$  for each segment as the thoracic spine. Only the L5-S1 segment has a restriction of  $3^\circ$  in the lateral flexion. The two types of movement are facilitated by the large interlaminar spaces and the sagittal direction of the articular surfaces. The muscles acting in lateral flexion are the following: the quadratus lumborum, the psoas, the intertransverse muscles and the lateral right muscle of the head. There can also be involved the vertebral channel muscles and especially the transverse-spinous system, the

sternocleidomastoidian muscle, the scalene muscles, the neck muscles, the trapeze muscle, the large and small oblique abdominal muscles.

The movement of rotation is reduced to 2 ° for each lumbar segment, excepting the L5-S1 segment which can perform a rotation of 5 °. The movement of rotation is maxim in the cervical area. The dorsal spine rotates a little and only if it also tilts laterally. The lumbar spine twists when in extension. The muscles that perform the movement are the following: the abdominal oblique muscles, the intercostal muscles, and the spinal-transverse system of the vertebral channel muscles. Twisting on the same side is performed by the following: the latissimus dorsi, the splenius muscle, the longus colli and small oblique abdominal muscle. Twisting on the opposite side is performed by the following: the spinal- transverse system and the large oblique abdominal muscle.

Each kinematic chain consists of several muscle groups, thus forming muscle chains. Since most human movements are complex movements, in performing them there are mobilized more muscle groups with antagonistic and synergistic action and kinematic couples.

➤ Basketball, as an adapted sport

In terms of education, basketball contributes to achieving the general nature objectives that can be adapted and focus on issues concerning the following: the health state, body aspects, motor function aspects and mental and psycho-motor aspects. Since it is a sport that can also be easily adapted to people with various health problems we focused our attention on means specific to basketball such as the dribbling. This represents the technical element enabling the player that has the ball to move during the execution, the body does not swing, the arm work being independent of the other body segment movements. It retains a slightly leaning position, its tilting being related to the moving speed of the player: at a higher moving speed, the body is raised higher, and the trunk is straighter.

Exercises proposed to prevent/correct the lordotic attitudes

1. Lunged walking – lean the trunk forward – pass the basketball through the legs, at each step;
2. Walking – the basketball held at the chest in symmetric grip, at 3 steps lean the trunk forward and touch the ball with the foot tip placed in the front;
3. Relays: „The ball under the bridge”;

4. Stand with the legs apart at shoulder length, bended knees, and dribble with the right/ left hand, on the spot;
5. Stand with the legs apart at shoulder length, bended knees, and dribble with passing the ball from one hand into the other;
6. In pairs, face to face, stand away, with bended knees, – touch the partner's leg /ankle;
7. In pairs, face to face, stand away, with bended knees, dribble with the right/ left hand, touch the partner's leg /ankle;
8. Lying dorsally – the basketball held at the ankles, bend the knees at the chest and stretch them , keeping the ball between the ankles;

## Conclusions

We find that the lumbar spine recovers and corrects by toning with the shortening of the abdominal muscles which are weak and hypotonic, concomitantly with the lengthening and decontracting of the lumbosacral muscles. As a result of the exercises proposed to be introduced into the physical therapy program, the means used will act on the abdominal muscle concentrically and inside the contraction segment at the same time with the eccentric contraction and outside the contraction segment of sacrolumbar muscles.

The dribbling is a fundamental technical element in basketball, which can be used care successfully in the physical therapy programs.

Basketball, through its means, can be considered an „associate” of the traditional physical therapy prophylaxis. In this way, we can have varied physical therapy programs which eliminate monotony and refresh the traditional means.

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