

Stecko Monika, Wawryków Agata, Korabiusz Katarzyna, Fabian-Danielewska Anna, Maciejewska Martyna, Janik-Fuks Inga, Harasimowicz Joanna, Kordek Agnieszka. The most common spinal defects among children and adolescents. *Journal of Education, Health and Sport*. 2019;9(7):85-89. eISSN 2391-8306. DOI <http://dx.doi.org/10.5281/zenodo.3266470>
<http://ojs.ukw.edu.pl/index.php/johs/article/view/7101>

The journal has had 7 points in Ministry of Science and Higher Education parametric evaluation. Part B item 1223 (26/01/2017).
1223 Journal of Education, Health and Sport eISSN 2391-8306 7

© The Authors 2019;

This article is published with open access at Licensee Open Journal Systems of Kazimierz Wielki University in Bydgoszcz, Poland
Open Access. This article is distributed under the terms of the Creative Commons Attribution Noncommercial License which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author (s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non commercial license Share alike.
(<http://creativecommons.org/licenses/by-nc-sa/4.0/>) which permits unrestricted, non commercial use, distribution and reproduction in any medium, provided the work is properly cited.

The authors declare that there is no conflict of interests regarding the publication of this paper.

Received: 20.06.2019. Revised: 25.06.2019. Accepted: 03.07.2019.

The most common spinal defects among children and adolescents

**Monika Stecko¹, Agata Wawryków¹, Katarzyna Korabiusz¹, Anna Fabian- Danielewska²,
Martyna Maciejewska¹, Inga Janik-Fuks¹, Joanna Harasimowicz¹, Agnieszka Kordek³**

1. Pomeranian University of Medical Science, Doctoral Study of the Faculty of Health Sciences, Żołnierska 54, 71-210 Szczecin
2. Pomeranian University of Medical Science, Doctoral Study of the Faculty of Medicine, ul. Żołnierska 54, 71-210 Szczecin
3. Pomeranian University of Medical Science Neonatal Patology Clinic, Aleja Powstańców Wielkopolskich 72, 70-111 Szczecin

Dane autora korespondencyjnego:

Monika Stecko

mjstecko@gmail.com

Abstract

Correct posture is a harmonized system of individual parts of the body in relation to each other and in relation to the mechanical axis of the body, maintained at minimum tension of the muscular and nervous systems [1,2,3]. Any postural defect is commonly referred to as a bad posture. According to Wilczyński, these are changes in an upright, free position of the body, which differ significantly from the typical posture of a given gender, age, constitutional structure and race, which are the result of pathological changes and may occur at all body levels [4,5,6].

The most common postural defects associated with the spine include concave, round, round-concave, flat and scoliosis back.

Problems that occur in relation to each disease are not only a part of bad posture and do not concern only the spine itself. This is a complex problem and it is necessary to approach the subject holistically and in many directions.

Keywords: correct posture, bad posture, concave back, round back, round-concave back, flat back, scoliosis

Body posture

Correct posture is a harmonized system of individual body parts in relation to each other and in relation to the mechanical axis of the body, maintained at minimal tension of the muscular and nervous systems [1,2,3]. The correct posture creates conditions for optimal positioning of internal organs and occurs frequently enough to be considered characteristic for a given population [1,2].

The correct human body posture is influenced by the correct body structure and curvature of the spine, appropriate strength, tension and activity of muscles that stabilize the spine, creating the possibility of maintaining the correct posture – the body posture [2].

Additional factors determining correct posture include, among others, hereditary influences, vision impairments, hearing defects, lifestyle and eating habits [2].

It is important to remember that correct posture and spatial orientation are also dependent on the processing and interpretation of sensory information coming from deep sensory receptors, balance organ receptors and visual receptors [1].

The characteristic features of correct posture are: straight position of the head in the line of spine, physiologically occurring curvatures of the spine, well arched chest, pelvis properly supported on the heads of femur, straight limbs and feet properly arched [2].

Vertical position is an active activity, not without significance is how the child learns this skill and what pattern of attitude will be created. Habits have an important role in shaping the body posture – habituation to perform various activities in a specific way, in this case to adopt a specific body posture, especially during everyday activities [5].

The body posture is a characteristic feature of every human being. For all people similar but not identical is an expression of the physical and mental state of individual [3,4].

Bad posture

Any irregularities in body posture are commonly referred to as posture defects, although this term is not fully defined and unambiguous.

According to Wilczyński, these are changes in an upright, free position of the body, which differ significantly from the typical posture of a given gender, age, constitutional structure and race, which are the result of pathological changes and may occur at all body levels [4,5,6]. They are mainly affected by changes in the shape of spine and body parts directly related to it, i.e. chest, pelvis, lower limbs and feet [2,7]. Nawotny believes that bad postures refer to improper way of standing position, i.e. to functional changes [8].

“Bad posture is a deviation from the generally accepted characteristics of a correct posture” [9]. Postural defects are divided into congenital bones and muscles and acquired developmental and habitual defects [1].

Congenital defects are abnormalities in normal body structure as a result of factors that acted in the fetal period [1]. The causes are different, some are hereditary, others have developed as a result of disturbed intrauterine secretion, and some have been affected by toxic or mechanical factors [1].

Acquired defects may be caused by past diseases, such as developmental defects or habitual disturbance of normal posture – habitual defects [1].

The most common spine defects

Concave back (dorsum concavum)

This defect is a deepening the lumbar lordosis [1,7,10]. The body figure is characterized by a raised belly and buttocks, bending in the hip joints.

Cause:

- congenital, e.g. severe malposition of the sacrum, spondylolisthesis,
- acquired – rickets, tuberculosis of the spine, muscular dystonia, post-traumatic changes, stiffening of the thoracic section of different origin, hip joint stiffness, dislocation and contraction, excessive anteversion of the sacrum, visual impairment and psychogenic factors, etc.,
- muscle tension: erector spinae muscles in the lumbar section, quadratus lumborum, iliopsoas, rectus femoris, sartorius,
- muscle weakness: rectus abdominis muscle (umbilical part of the muscle), abdominal external and internal oblique, ischiocrural muscle, gluteus maximus.

We can distinguish a deepening of physiological lordosis without localization changes or displacement of lordosis peak, usually related to changes in its extent [1,11]. In the second group, there is a distinction between low lordosis, which is characterized by a short lumbar section with extended kyphosis, and high lordosis. In this case, the lordosis may belong to the lower thoracic section, which results in the so-called short high kyphosis [1,11].

Round back (dorsum rotundum)

A characteristic feature is excessive backward curve of the spine. If the curve is located in the upper thoracic section, it is called a kyphotic form. If the backbend concerns the whole spine, it is a total kyphosis [1,10,11].

Cause:

- muscle dystonia – disturbance of the balance of muscle tonus in the spine muscles, e.g. as a result of incorrect position at work or at school,
- genetic predisposition, age, somatotype,
- psychological factors (so-called embarrassing kyphosis),
- non-correction of vision impairments,
- shape of the cervical and lumbar lordosis,
- secondary diseases causing deepening of thoracic kyphosis (Scheuermann's disease, spinal tuberculosis, rickets, ankylosing spondylitis, post-traumatic changes) [1,10,11].

The respiratory chest function is impaired [1]. This defect can be both congenital and acquired.

Round-concave back (dorsum rotundo-concavum)

The characteristic feature of this defect is increased lumbar lordosis and thoracic kyphosis. The child's figure is characterized by the protruding of head and shoulders forward, the head does not project onto the sternum, shoulders are protruding and the abdomen is convex (leading), the pelvic angle is increased, and the buttocks protruding [1,11].

The shoulder and chest muscles, as well as erector spinae muscles in the thoracic section are excessively stretched, whereas in the lumbar section they are shortened. The weakened muscles are gluteal and abdominal muscles as the increased lordosis causes displacement of the organs of abdominal cavity forward and under their pressure they stretch [1,2,11].

Flat back (dorsum planum)

This defect is characterized by flattening or lack of physiological spine curvature [1,11,12]. In the preschool period it is a physiological feature, whereas in the later age it requires correction [11].

The lack of physiological curvature of the spine results in impaired spine cushioning, which is overloaded by individual elements leading to degenerative changes [10,11]. Respiratory capacity and chest mobility are impaired.

Cause:

- lack of proper pelvic arches development,
- sedentary lifestyle.

Characteristics:

- hypotension and muscle dystonia,
- muscle tension and contraction: erector spinae muscle in the thoracic section, neck muscles, muscles pulling the shoulders – muscles: trapezius, rhomboid and latissimus dorsi, glute, ischiocrural and abdominal muscles,
- relaxation of pectoralis major and minor muscles, as well as serratus and
- anterior cruciate ligament, rectus femoris, straight thighs, erector spinae muscle in the lumbar section and quadratus lumborum,
- cushioning function of the spine is reduced,
- susceptibility to lateral spinal curvature,
- reduced chest capacity and mobility [1,10].

This is the most common defect in children and adolescents.

Lateral spinal curvature (scoliosis)

According to the guidelines of the Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT), scoliosis is only mentioned when the angle of curvature (Cobb angle) reaches at least 10° [13,14].

It is an abnormality of the posture consisting in a multifaceted deviation of the spine line from the normal state, this deviation occurs in three planes.

A characteristic and leading feature is the lateral curvature of spine in the frontal plane with its rotation in the transverse plane and changes in the sagittal plane – usually a flattening of thoracic kyphosis [15,16,17].

The origin and development of scoliosis depend on two basic etiological and biomechanical factors [1].

There is a distinction between functional scoliosis in which there are no fixed changes in the structure of spine, and structural scoliosis in which changes are fixed.

The etiological division classifies scoliosis into bone derivatives, neuro derivatives, muscle derivatives and idiopathic [1,17]. There are four stages of scoliosis, depending on the severity of changes [1].

1. Scoliotic posture – preliminary scoliosis stage. Characteristic features are: asymmetry of arms, shoulders, waist triangles, curvature of the spine at this stage does not occur, or is small, posture correction can be achieved by adequate muscle tension;
2. 1st degree scoliosis – it is a curvature, which angle reaches 30 degrees (according to Cobb), there are also changes in the muscles-ligaments system, without changes in the skeletal system [1,2,11,17];
3. 2nd degree scoliosis – angular curvature varies between 31 and 60 degrees. There are changes in the structure of vertebrae and intervertebral discs. There is a costal hump (in thoracic section) or lumbar shaft (in lumbar section), which is a result of spine rotation [1,2,11,17];
4. 3rd degree scoliosis – curvature with an angle exceeding 60 degrees. There are folding, vertebral torso, rib and pelvic deformities. These curvatures are removed surgically [1,2,11,17].

Conclusion

The above mentioned postural defects are the most common among children and adolescents. Problems that occur in relation to each disease are not only a part of bad posture and do not concern only the spine itself. This is a complex problem and it is necessary to approach the subject holistically and in many directions. An extremely important issue is implementation of therapy – rehabilitation aimed at a given problem.

Piśmiennictwo

1. Kasperczyk T. (1998). Wady postawy ciała diagnostyka i leczenie. Wydanie V, Kraków.
2. Rosa K., Muszkieta R., Zukow W., Napierała M., Cieślicka M.: Częstość występowania wad postawy u dzieci z klas I-III Szkoły podstawowej. *Journal of Health Sciences*. 2013;3(12):107-136.
3. Bankovich M.: Epidemiologiczne występowanie wad postawy u dzieci – czynniki ryzyka. *Збірник наукових праць Волинського національного університету імені Лесі Українки*. No. 4, 2009: 7-11.
4. Nowotny-Czupryna O.: Profilaktyczne aspekty diagnostyki i terapii wad postawy ciała. W: Wady postawy ciała u dzieci i młodzieży. Profilaktyka–Diagnostyka–Terapia. (red.) Nowotny J. WSA, Bielsko-Biała, 2009.
5. A. Górecki, J. Kiwerski, I.M. Kowalski, W. Marczyński, J. Nowotny, M. Rybicka, U. Jarosz, M. Suwalska, W. Szlachowska-Kluza: Profilaktyka wad postawy u dzieci i młodzieży w środowisku nauczania i wychowania - rekomendacje ekspertów. *Pol. Ann. Med.*, 2009; 16(1): 168–177.
6. Drzał-Grabiec J., Sławomir Snela S., Bibrowicz K.: Postawa ciała w płaszczyźnie strzałkowej u dzieci z trzech pierwszych klas szkoły podstawowej. *Przegląd Medyczny Uniwersytetu Rzeszowskiego*. Rzeszów 2009, 4, 363–366.
7. Wilczyński J., Boczne skrzywienia kręgosłupa. Rozpoznanie i korekcja cz.I. wyd. uczelniane Wszechnica Święto-krzyska, Kielce 2000., 20–23.
8. Nowotny J., Nowotny-Czupryna O., Czupryna K., Reedukacja posturalna w systemie stacijnym, Bielsko-Biała 2008: 11.
9. Nowotny J. (1992). Kształcenie umiejętności ruchowych. Dział wydawnictw ŚAM, Katowice.
10. Tuzinek S.: Postawa ciała, fizjologia, patologia i korekcja, Politechnika Radomska, Radom 2003.
11. Maciałyzyk – Paprocka K.: Epidemiologia wad postawy u dzieci i młodzieży. Uniwersytet Medyczny im. Karola Marcinkowskiego w Poznaniu Wydział Lekarski I. Praca doktorska. Poznań 2013, 1-147.
12. Wilczyński J.: Korekcja wad postawy człowieka, Anthropos, Starachowice 2005
13. Kotwicki T, Durmała J, Czaprowski D, i wsp. Zasady leczenia nieoperacyjnego skolioz idiopatycznych. Wskazówki oparte o zalecenia SOSORT 2006. *Ortopedia Traumatologia Rehabilitacja* 2009;11(5):379-95.
14. Weiss HR, Negrini S, Rigo M, Kotwicki T, Haves MC, Grivas TB, Maruyama T, Landaner F. Indications for Conservative Management of Scoliosis (SOSORT Guidelines). W: Grivas TB, editor. *The Conservative Scoliosis Treatment*. IOS Press, Amsterdam-Berlin-Oxford-Tokyo-Washington- DC; 2008: 164-172.
15. Dyszkiewicz AJ, Kucharz EJ, Rumanowski M. Biomechanical aspects of axial function of the spine in the human body. *Fizjoterapia* 2006; 14, 4: 79-92.
16. Kotwicki T, Szulc A, Dobosiewicz K, Rapala A. Patomechanizm progresji skolioz idiopatycznych – znaczenie fizjologicznej kifozy piersiowej. *Ortopedia Traumatologia Rehabilitacja* 2002; 4(6): 756-765.
17. Nowotny J., Nowotny-Czupryna O., Czupryna K., Rottermund J.: O skoliozach inaczej (cz. I) Podstawy fizjologiczne i fizjopatologiczne terapii skolioz. *Przegląd Medyczny Uniwersytetu Rzeszowskiego i Narodowego Instytutu Leków w Warszawie Rzeszów* 2012, 3, 341–350.