

## THE METHOD OF ASSESSMENT OF POSTURE

Miroslav ČERNICKÝ\* – Patrícia SHTIN BAŇÁROVÁ – Katarína KOVÁČOVÁ

*Faculty of Healthcare, Alexander Dubček University of Trenčín, Študentská 2, 911 50 Trenčín, Slovak Republic*

\*Corresponding author E-mail address: miroslav.cernicky@tuni.sk

### Abstract

Nowadays, people have an increasing problem with back pain and incorrect spine. Preventing and educating the proper holding of the body should therefore be the main goal. The problem of mistaking the body is good to capture at an early age because small children do not yet have stronger bones than adults, so there is a bigger chance of improving the skeleton's position, and the children are easier to get rid of the bad habits they get during their lifetime. Unfortunately, many children in the late age have a problem with holding the body. By puberty, problems with the spine do not end, but the body responds to all developmental changes. It is a period crucial for healthy spine development. Poor posture, scoliosis, are just signs that something is wrong with the back. We want to point out the model of proper body holding and the ways in which we evaluate body holding and are helpful in further diagnosis of the skeletal muscle system.

**Key words:** Posture. Diagnostics. Child.

### 1 Introduction

Holding the body along with walking is the basis of human motor skills. Holding the body is often underestimated, with the spine suffering and gradually becoming worn. By not teaching children the correct postural habits at an early age, we endanger their healthy development. The problem is to diagnose early and seek solutions for the healthy development of the locomotive apparatus. In comparison to the physical and motor development of the younger and middle school age, there are big differences, but one thing is common, for one's healthy development we can not neglect either of these periods [1].

*Motor development in younger school age:* Younger school age borders 6th to 10<sup>th</sup>-11<sup>th</sup>. year of child's life. The younger school age is the trigger that a child is not just playful, but also has certain duties to fulfill. The baby's schedule excludes sleeping in the morning and, unlike that, it must be able to concentrate and immobile to use the time at its place [1]. While in the pre-school age the game accounts for almost 100% of the child's activity, after the entrance into the school, the main form of activity is learning activity and also work activity. The child is more static because she is more sitting in the school bench. For this reason, we emphasize the upright posture of the body. An important part of the child's development is to train fine motoring and improve it. Children learn to write the first lines, then the letters and numbers to get the movement of the pen. We can train a fine motor skills different games or drawings. The child also improves in perseverance and patience, since initially the coordination of fine muscles is difficult and the child is unable to perform the most delicate movements [2]. Physical activity is, however, one of the most important needs of the child. Sitting in the bench is considered an unreasonable burden on the child's organism because children are subjected to a hypokinetic way of life. It is necessary to create conditions for movement activities, not only during breaks, but to inject training units during the classroom. If a teacher feels fatigued by pupils, he can use a simple exercise or simply change the position in the short-lived bench in a given position [3].

*Motor development of an older school age:* The motor of pubescent, or the teenage child, is sexually different. While boys are more clumsy and lose the grace of movement, the girls have graceful moves. The worst is in the first part of the period when there is uneven growth of bones and muscles, which can accompany pain. The child has a problem getting used to changing the length of the limbs. This awkward period is temporary, but pubescent perceives him emotionally, he understands poor performance when he cannot. This awkwardness is not permanent, after puberty it harmonizes. The quality of motor skills is developing in many spheres: strength, speed, length and height of the jump, and many more. At the present time, children spend more time behind their computers. Their physical activity is almost zero. At the same time, children do not consider the upright attitude as attractive. They do not realize that mistaken holdings cause them to develop incorrectly, and later pain and problems with the axial system [2].

### 2 Holding the Body

The ideal position of the body is when the main segments of the body are in balance. In an ideal position, one has the upper limbs running side by side, the shoulders running down, the shoulder blades flat on the ribs and slightly tightened to the back. The lower limbs are together, the hip and knee joints are slightly stretched and the pelvis is set in such a way that the center of gravity is above the hip joint at approximately S1-S2. The spine is anatomically curved and the head is directed so that the line of the ear canals and the lower edges of the eyes are in the horizontal plane [4].

*Holding the Body Standing:* The headstand is statically demanding because the center of gravity is high above the mat and the support surface is small. The basic anatomical position is described as follows: upright stand, head with eyes pointing straight ahead, upper limbs hanging loosely along the body with palms forward and lower limbs are stretched out. Upright posture of the body is natural to man, thanks to the innate postural reflex. Since our body is affected by the external environment, this reflex is not enough to maintain the upright position and all the muscles that we have in the body are involved. Ideal body hold is when the perpendicular line from head to chest is in one plane. The heights of the shoulders, shoulder blades and hips are bilaterally symmetrical [4].

*Holding the body in the seat position:* In this position the legs are discarded. The position in the hip joint controls the distribution of the entire axial system by affecting the position of the pelvis. For the right and painless sitting, it is important that we have a stiff back. The axial system is designed to keep the body in the upright position. When the pelvis is in the anteversion, the chest is pushed forward and the head is in the optimal position [5]. The right sit should be stable, with the wide straddled lower extremities and feet firmly on the ground. The large joints of the lower limb make an angle of 90°. Thus, the pelvis is planted and maintains the spine in the correct position. The arms are slightly tightened backwards, the head is not prone and the eyes are aligned with the height of the ears [6]. As children spend a lot of time in this position, the right chair is very important as well as the correct height of the chair and table. Every child is different, so the devices should be adjustable.

### 3 Body hold evaluation methods

We use a variety of tests and methods for examining body hold. They need to be combined because none of the tests individually reveal any body holding errors.

*Matthias Body Hold Test:* The child is undressed into underwear. The child stands with the forelegs at the right angle for 30 seconds. If the attitude does not change significantly, it is the proper hold. If there is a change in holding the body, it is a wrong bodyhold [7].

*Mayer's modified Klein and Thomas attitude:* The test is done in a standing position and follows 6 factors: head, chest and abdomen, pelvic inclination, pelvic curvature, shoulder height, and head position. Score 1-4 (1 - excellent, 2 - good, 3 - praise, and 4 - wrong). Mark 1: The head is upright with a right angle between the neck and the head. The chest is off, the stomach is flat, the spine is physiologically curved, and the shoulders and the shoulder blades are symmetrical. Mark 2: head slightly bowed forward, chest slightly flattened, stomach slightly protruding, spine showing signs of increased or decreased curvature, shoulders are disproportionate, but the blades are the same height. Mark 3: The head is inclined forward, the chest flat, the belly flapless and hanging, the spine has an enlarged or reduced curvature, the height of the arms is different and the shoulders protruding. Mark 4: The head is considerably inclined forward, the chest is inward, the stomach is significantly protruding, the spine curvature is greatly enlarged, the shoulders are asymmetrical and the shoulder blades are protruding. The lower extremities are evaluated separately by the mark 1-4, the criterion being the deflection of the joints from the long axis to the center or out. To add points, the individual will rank in the appropriate type: excellent 5 points, good 6-10 points, bad (poor) 11-15 points, incorrect (bad) 16-20 points [7].

*Jaros and Lomnický's Body Holding:* Holding the Head and Neck: With perfect holding, we monitor the upper part of the ear and the eye, which are in one line. The mandibula is slightly slid, the neck is vertical and the maximum lordosis of the cervical spine is 2cm. Flexion or hyperextension of the head is considered as a mistake. Chest: Chest bone is vertical. The roundness and shape of the ribcage are symmetrical. An arched, overturned or flat back is considered as a mistake. Abdomen and pelvic: the abdomen is withdrawn and does not pass. The norm of lumbar lordosis is 2.5-3 cm. The error is the increase in the pelvic inclination, which results in an overgrowth of the abdomen and an increase in lumbar lordosis. Spine curvature: The spine is twice curved (hyperlordosis, hyperkyphosis, hyperkypholordosis or flat back is considered a pathological condition), the height of the shoulders, shoulder blades and hips should be the same as the left and right sides. At the same time, it is necessary to pay attention to the curvature of the spine in the frontal plane, so as not to lead to a scoliotic position or scoliosis of the same. Lower legs: Axis should pass through the hip, knee and ankle joint. The vault of the foot is both longitudinal and transverse. The defect of the lower limbs is often a flat foot. The individual parts are scored on the score scale 1-4 (1 = best). The number is written as a fraction, in the numerator is the sum of the areas 1 to 5 and the denominator is a sign for the lower limbs. According to the average in the numerator, we can divide the children into groups by holding [8]. The assessment of the lower limbs, in the evaluation by Jaros and Lomnický is not included in the overall assessment but is evaluated separately, eg.  $10/3$  = good holding of the body with greater deviation of the lower limbs [7].

*Crampton test scores:* These tests are carried out in two positions: Face to wall test - the child stands against the wall by touching the tip of the foot. We see if the chest touches the wall and has a nose away from it about 5 cm. This position corresponds to the proper holding of the body. Test the back to the wall - the child turns to the back wall. The heels, sagging muscles, chest spine, and the top of the head rest against the wall. We measure the ratio of thoracic and abdominal circumference to inspiration and expiration. The circumference of the chest is measured at the height of the lower blade angles and the circumference of the abdomen at the height of L4. For a correctly developed child, the measured circumference of the coarse part of the abdominal area exceeds 10% [8].

*Trendelenburg Examination:* We test the muscle strength of the pelvifemoral stabilizers. The patient stands without help on one lower limb, while the other leg is lifted from the mat. We monitor the position of the pelvic. If the pelvic remains in the horizontal position, we evaluate the test as negative. However, if the pelvis falls on the underside, we evaluate the test as positive [9].

*Modern Technologies:* Scientists are trying to make easy and refine the examination holding of the body by using modern techniques to analyze the locomotor apparatus, with photographic and film recording, video recording and computer processing.

*SMART Motion Recording System:* This is a smart way of recording walks using six infrared camera cameras installed in the room. This system records the reflection of light from reflective marks placed on the human body at predetermined anatomically significant sites. The information is then computer-processed to create a 3D motion model [10-11].

*Spinal Mouse:* A PC mouse device that, in combination with a computer program, evaluates spine curvature. It checks the curvature and spine angles in the sagittal and frontal plane. With this device, we can evaluate body posture, mobility, function as well as spine performance. We get information via Bluetooth, which sends them to your computer. The corresponding software processes information both numerically and visually [10-11].

#### 4 Conclusion

To excellent body holding, we need to be able to stabilize the axial system properly. This will allow us to properly develop the rough and fine limb motor. The goal of the physiotherapist is to eliminate pain. The exercises that the child performs help him to strengthen the weakened muscles, to ensure the flexibility of the spine, to generally improve the condition and at the same time to eliminate the bad holding of the body. The problem of mistaking the body is good to capture at an early age, because small children do not have so strong bones as they are in adulthood, so there is a bigger chance of improving the skeleton's position, and the children are easier to get rid of the wrong habits they get during their lifetime. School attendance brings to children the loss of active movement, so breathing, relaxation, stretching and strengthening exercises need to be included in the classes. It is necessary to educate not only children, but also parents, teachers and educators, to supervise the proper development of children.

#### References

- [1] Kopecká, I. Psychologie. Grada, 2011, 200 pp. ISBN 978-80-247-3875-8.
- [2] Končecová, E. Vývinová psychológia. Prešov. 2010. 312 pp. ISBN 978-80-7165-811-5.
- [3] Hrčka, J. Držanie tela a jeho ovplyvnenie. Univerzita sv. Cyrila a Metoda v Trnave, 2008. 80 pp. ISBN 978-8105-064-0.
- [4] Binovský, A. Funkčná anatómia pohybového systému. Bratislava: Univerzita Komenského, 2013 pp. ISBN 978-80-223-3302-3.
- [5] Tóthné Steinhausz, V., Tóth, K. Tudatos ülés gerinciskolája általános iskolásoknak, Pécs. 2015, 38 pp. ISBN 978-963-642-966-9.
- [6] Havlová, J. Škola chrbta – kinestetika. Ošetrovateľský obzor. 2010; 7-6: 141-143.
- [7] Vrbas, J. Nové prístupy k hodnocení tělesné zdatnosti žáků - součást výchovy ke zdraví na 1. stupni ZŠ. Dissertation thesis [online] 2010 [cit.04.12.2017] Dostupné na webe: [https://is.muni.cz/th/12136/fsps\\_d/Vrbas\\_DisP\\_IS.doc](https://is.muni.cz/th/12136/fsps_d/Vrbas_DisP_IS.doc)
- [8] Viňanska, E. Porovnaní výsledků správného držení těla u žáků na 1. stupni ZŠ metodou míry shody. Diplomová práce [online] 2009 [cit.04.12.2017] Dostupné na webe: [https://is.muni.cz/th/136030/pdf\\_m/DP\\_-\\_Eva\\_Vinanska.pdf](https://is.muni.cz/th/136030/pdf_m/DP_-_Eva_Vinanska.pdf)
- [9] Baňárová, P. et al. Funkčné poruchy pohybového systému [diagnostika a terapia]. Univerzita Tomáše Bati ve Zlíne a Trenčianska univerzita Alexandra Dubčeka v Trenčíne. 2015. 168 pp. ISBN 978-80-7454-510-8.
- [10] Šimík, D. et al. Laboratórium pohybovej analýzy - výskum a vzdelávanie [online] 2008. [cit.15.12.2017] Dostupné na webe: [http://www.ab-acus.eu/smiling/pdf/Simsik\\_transfer\\_inovacii3.pdf](http://www.ab-acus.eu/smiling/pdf/Simsik_transfer_inovacii3.pdf)
- [11] Majerník, J., Dziaková, M. Hodnotenie účinku pohybovej liečby na poruchy držania tela a chôdze pomocou metód analýzy pohybu. Folia Medica Cassoviensia. 2012; 67 (2): 13-17.