143 - STATISTICAL ANALYSIS OF CHILDREN POSTURAL CHANGES IN THE 1ST TO 4TH GRADE PRIVATE SCHOOL OF PONTA GROSSA - PR

CELSO BILYNKIEVYCZ DOS SANTOS
(UEPG – Ponta Grossa – Paraná – Brazil); bilynkievycz@uepg.br

JULIANA DE CARVALHO SCHLEDER
(CESCAGE – Ponta Grossa – Paraná – Brazil); juscheleder@yahoo.com.br

KELY CRISTINA PAINTNER HAUSER
(IESSA – Ponta Grossa – Paraná – Brazil) kph@bol.com.br

LEANDRO PEREIRA LEITE BAKUN
(UEPG – Ponta Grossa – Paraná – Brazil); le_bakun@hotmail.com

MARCUS WILLIAM HAUSER
(UEPG – Ponta Grossa – Paraná – Brazil); mwhauser1@gmail.com

INTRODUCTION

The ideal posture for all individuals is characterized primarily by the state of muscular balance of all segments of the body, protecting it from damage and structural deformities. This statement underlines the effectiveness of muscle contractility in ideal positions, and these static or dynamic in prolonged periods and with less energy or localized pains, encompassing all segments of the body, featuring a good muscle tone (KUSSUKI, 2007).

Achieving and maintaining this posture ensures a better balance to the body, emphasizing the protection of the supporting structures against injury or various deformities, thus avoiding limiting changes to the individual.

Thus it is undoubtedly important observation of posture in the early years of any individual, as this practice may be the first factor to prevent various orthopedic problems in the long term.

Moreover, it is precisely in this period of human life cycle that occur considerable postural oscillations, while the child was here affected by intrinsic and extrinsic factors. This fact evidenced by studies showing an alarming increase in postural imbalance in children around the world, largely due to poor posture adopted in the classroom by students (Santos 2007).

It is clear that certain behaviors have acquired influence by poor posture. Thus, poor posture is responsible for a significant and alarming of the functional kinetic alterations, resulting in a greater strain on the supporting structures of the body, causing a compensatory posture and wrong in the individual, creating painful picture and even disabilities biomechanical, thereby undermining the good life habits.

However, by early detection of such irregularities, these individuals most likely to obtain corrections adopting a correct postural pattern in adult life, while also ensuring a healthy condition in aging (MARTELLI, 2006).

According Kisner (2009) standing, an oscillation occurs before and after up to 4 (four) inches, thus leading the recruitment of muscle groups that support the body associated with the location of the center of gravity of the individual. Although the perspective of this author, postural stability is described in three systems: passive, active and neural control. Instability or ineffectiveness of one of these systems affect posture as a whole.

The center of gravity or center of mass involves vertebral curvatures near the joints of the lower limbs, causing a balance of anterior and posterior muscle groups (Nordin, 2003).

It can be concluded that the high incidence of postural disorders are detected more frequently in the spine and lower limbs by inducing a muscle imbalance in the anterior or posterior (KUSSUKI, 2007).

Being the center of gravity of the point of application of the weight force, which acts in the human body all the time, it has direct influence in maintaining postural equilibrium states.

OBJECTIVES

Describe the major postural changes in private school children from first to fourth grades of elementary school of Ponta Grossa - PR.

Enable parents and teachers grants for interventions in the area of postural changes.

METHODOLOGY

This study is prospective in nature, applied, descriptive, and was approved by the Ethics Committee (CEP), the Center for Higher Education in the Campos Gerais (CESCAGE) under the registration number 531/CEP.

Were selected to compose the sample universe 883 children (n = 883), with ages ranging from 5 (five) to 11 (eleven) years of primary school (1st to 4th grade), six (6) Educational Institutions deprived the city of Ponta Grossa, Paraná state. Were excluded from the process of selecting individuals who did not have the consent form completed by those responsible.

Data collection took place between the months of January, 2008 to January 2010. Where were collected personal data such as age and grade school, and anthropometric data of height and body mass, which then allowed calculation of body mass index (BMI).

In postural analysis, we used the visual technique, while the child to stay focused on the pitch position, where the views were observed earlier, sides, right and left, and later, complete with bend test trunk. Also inspected the body segments, head, trunk and limbs, seeking misaligned positions, following the guidelines of Santos (2001).

All assessments were conducted individually, with children in separate environments. Postural changes found, as well as the personal data of the volunteers were recorded in an evaluation form itself.

After all collections descriptive analysis of the data. Used as methodology the initial stages of Knowledge Discovery Process (Knowledge Discovery in Data Bases KDD). For the database we used to use MS ACCESS software. Through SQL (struct Query Language) was able to recognize specific data collected by performing an analysis of distribution, which will serve as a decision-making for future investigations which will be used several different tasks in KDD and data mining techniques and continuing the process of KDD.

At the end of the collections, were prepared lectures for parents and guardians in participating schools to report the main postural abnormalities found.

RESULTS

Data collection began in 2008 forming 53.34% of the database and lasted until the year 2010, totaling 883 records Postural Assessment. During this period data were collected from students in six (6) schools, with a mean age of 7.96 years (SD = 1.34), body mass of 28.86 kg (sd = 7.62), height of 1, 31 m (SD = 0.09) and body mass index (BMI) of 16.23 (SD = 3.02), as the following table:

Table 1 - Characteristics of the sample

Statistical	Age (Years)	Body mass (kg)	Height (m)	BMI (kg/m^2)
Mean (± standard deviation)	7,96 (±1,34)	28,86 (±7,62)	1,31 (±0,09)	16,23 (±3,02)
Maximum	11	66	1,55	35
Minimum	5	14	1,04	10

The results obtained for the Postural Assessment from a previous view (frontal plane, the results are presented in the following table:

Table 2 - Anterior View

Segments	Class	%	
Head	neutral	56,17	100
	inclined	19,82	
	round	16,99	
	tilted and rotated	6,91	
	s/c	0,11	
Shoulder	left high	29,56	100
	right high	25,48	
	line	21,18	
	left high and high	6,68	
	right high and high	5,55	
	rotated	3,40	
	depressed	3,06	
	depressed and rotated	1,02	
	depressed and left high	0,79	
	depressed and right high	0,79	
	left high and rotated	0,57	
	high	0,45	
	right high and rotated	0,45	
	run high and	0,23	
	high and right aligned	0,23	
	high and shot high and right	0,11	
	Left high and shot high and rotated	0,11	
	depressed and turned and left high	0,11	
	aligned and rotated	0,11	
	s/c	0,11	
Pelvis	aligned	57,42	100
	left high	23,56	
	right high	18,57	
	s/c	0,45	
Knee	genu valgus	38,84	100
	rotated into	23,56	
	normal	23,22	
	genu varus	8,27	
	s/c	6,12	
Feet	normal	42,36	100
	plan	15,86	
	eversion and plan	14,72	
	lateral rotation	10,99	
	dig	3,28	
	plane and lateral rotation	2,94	
	inversion	2,15	
	eversion	1,36	
	normal e plan	1,13	
	dig e inversion	0,91	
	inversion e plan	0,91	
	medial rotation	0,79	
	plan and medial rotation	0,79	
	dig and and lateral rotation	0,68	
	normal e rotation lateral	0,23	

*s/c (without clear characterization)

From Table 2 it follows that the most common postural deviations in the segment heads are tilted (19.82%) and round (16.99%), while the segment shoulder, it was observed that the elevation of the left shoulder (29.56%) is more frequent than the

elevation of the right shoulder (25.48%).

In relation to the pelvis, it is reported that the left has a higher elevation (23.56%) compared to right side (18.57%).

In the segment knee, it appears that the incidence of genu valgus (38.84%) and internal rotation (23.56%) is greater than the normal alignment (23.22%) and feet in the segment, there is a higher incidence the flat foot (15.86%) compared to pes cavus (3.28%), and a higher incidence of inversion (2.15%) compared to eversion (1.36%).

DISCUSSION

Statistical analysis of postural changes mentioned allowed a better interpretation of data for the region of Ponta Grossa in relation to private education.

Fish on the shoulder, this study showed considerable gaps compared to other studies, elevated left shoulder and right shoulder 29.56% High 25.48% to 55.04% of misalignment, premium content when compared to the study of Santos (2009) showed that 50.2% of unevenness of the shoulders in their evaluations. Factor associated with the use of backpacks with weights disproportionate mass of the individual and the dominant limb, which consequently leads to greater muscle hypertrophy, causing decompensation.

Fish on the knee, we found significant changes, knee genu valgus knee 38.84% and 23.56% run into, and these are higher when compared with the study by Santos (2009) featuring a 29.6 incidence of knee valgus, whereas 80% of children have knee valgus during the development or associated changes such as medial rotation, the change starts from three to six years old, but should then disappear.

Certain changes are characteristic of the child's own development, the importance of early postural assessment is very important to follow a better development, so that appropriate measures are initiated if any postural abnormalities is emphasized.

CONCLUSION

The biggest changes in the present study more than ideal position of each segment in the segment were shoulder, left shoulder elevation is more frequent than the elevation of the right shoulder, resulting in gaps in this segment over more than half of the evaluated group, the protrusion shoulder or medial rotation had the highest incidence of any amendment to this research, it is noteworthy that the right shoulder showed greater change, a fact related to the dominant member of each child evaluated.

Considering the segment of the knee, it was observed that the incidence of genu valgus and internal rotation are larger than the normal alignment, related to this factor, one must consider the child's development with the changes associated with age, as compared to that segment, the age is very important to classify this type of change.

The rate of segments may be related to altered physiological development of the children, where each shift may be caused by poor posture in the house or even within the classroom, it is noteworthy sedentary children, the result, related to extensive use of computers and video games without proper correction factor that predisposes an improvement in postural deformity.

The misdirection or lack of good posture may be the main cause of the changes found in this study, which may provide subsidies to a better understanding of parents, teachers and children, thus avoiding more long-term complications.

BIBLIOGRAPHIC REFERENCES

ARRUDA, M.F. **Characterization of overweight in childhood and its influence on the musculoskeletal system of school children in Araraquara - SP. 2006. 92 f. Dissertation (Master of Physical Education)** - Universidade Estadual Paulista Julio Mesquita Filho, Araraquara. 2006.

BATES, A.; HANSON, N. **Aquatic therapeutic exercises**. 1. ed. New York: Manole, 1998.

BIENFAIT, M. The static imbalance. **Physiology, pathology and physiotherapy treatment.** 4. ed. New York: Summus, 1995.

BRUSCHINI S. **Pediatric Orthopedics.** 2nd ed., London: Atheneu, 1998.

CLARKSON, H. M. **Musculoskeletal assessment. Range of motion and manual muscle strength.** 2. ed. Rio de Janeiro: Guanabara Koogan S.A, 2000.

DETSCH, C., LIGHT, AMH, CANDOTTI, CT; OLIVEIRA, DS; LAZARONI, F. et al. **Prevalence of postural changes in high school students in a city in southern Brazil. Rev Panam Salud Publica.** 2007. (4): 231-8.

FISBERG, M. **Obesity in Children and Adolescents**. New York: BYK, 1995.

HAMILL, J., KNUTZEN, K.M. **Biomechanical basis of human movement.**
New York: Manole, 2008.

HAUSER, M. W. ; PEREIRA, Q. Q. M. A. ; HAUSER, K. C. P. Statistical Analysis of postural problems in public school children Kazuko Inoue - Kindergarten and elementary school in the city of Ponta Grossa - PR.
In: World Congress of Education Física/23 International Congress of Physical Education - Physical Therapy FIEP 2008/Congresso MERCOSUR /
V Brazilian Congress of Scientific FIEP, 2008, Foz do Iguacu. **FIEP BULLETIN.** Foz do Iguacu: New World Graphics, 2008. v. 78. P. 453-455.

HAUSER, M. W., Santos, C. B., Heil, O. G.; SON COME Gens, J. S. Biomechanic Analysis of the March in Gestants Through Variable Kinematic and Antropometrics in the City of Ponta Grossa - PR. In: III Latin American Scientific Congress of the FIEP, 2006, Foz do Iguaçu. **Proceedings of the III Latin American Scientific Congress of the FIEP**. Foz do Iguacu: New World Graphics, 2006. v. Only. P. 188-193.

HOFFMAN, S. J., HARRIS, J. C. **Kinesiology. The study of physical activity**. Porto Alegre: Artmed, 2002.

HOPPENFELD, S. **Orthopedic workup. Spine and extremities.** Sao Paulo: Athena, 2004.

JASS F.J., PASTRE, C.M. **Postural changes in the spine in schoolchildren: strengthening, stretching and relaxation with the Pilates method.**
Madrid: Madrid School of Osteopathy, 2007. Available at:
http://www.efisioterapia.net/articulos/leer228.php.

KENDALL, H. O. **Muscles Testing and Function.** 4. ed. New York: Manole.

KISNER, C., COLBY, L. A. **Therapeutic Exercise. Fundamentals and techniques.**
5 th. Ed London: Manole, 2009.

KUSSUKI, M..O. M., JOHN, S..M. A., Cunha, A..C..P. **Spinal postural characterization of obese children 7 to 10 years. Physical Therapy in Motion [online],** March 2007 [cited 02/10/2011]; volume (20): 1. Available at:
http://www2.pucpr.br/reol/index.php/RFM?dd1=104.

MARTELLI, R. C; TRAEBERT, J. Descriptive study of backbone postural changes in students 10 to 16 years of age. Tangara-SC, 2004. **Rev. Bras. Epidemiol**., V. 9, No 1, p. 87-93, 2006.

NORDIN, M.; FRANKEL, V. H. **Basic biomechanics of the musculoskeletal system.** 3. ed. Rio de Janeiro: Guanabara Koogan, 2003.

OLIVEIRA, A. L.; DAGNONE FILHO, VILELA JÚNIOR, G. DE B., HAUSER, M. W. **Kinesiology.** 1. ed. Ponta Grossa, Ponta Grossa State University, 2011.

SACCO, I. DE C. N,; TANAKA, C. **Kinesiology and biomechanics of the joint complex**. Rio de Janeiro: Guanabara Koogan, 2008.

SANTOS, A. **Postural Clinical Diagnosis: A Practical Guide**. 3. ed. New York: Summus, 2001.

SANTOS, C. I. S. et al. **Occurrence of postural deviations in public schoolchildren in fundamental Jaguariúna,** Sp. Paulo.Rev. paul. Pediatr. [Online]. 2009, vol.27, no.1, pp. 74-80. ISSN 0103-0582. http://dx.doi.org/10.1590/S0103-05822009000100012.

THOMSON, A. **Physiotherapy Tidy.** 12. ed. Sao Paulo, Santos, 2002.

MARCUS WILLIAM HAUSER
mwhauser1@gmail.com
RUA: ALMIRANTE WANDERCOLCK, 130
BAIRRO UVARANAS – VILA ANA RITA
PONTA GROSSA – PARANÁ
CEP 84020 – 250

STATISTICAL ANALYSIS OF CHILDREN POSTURAL CHANGES IN THE 1ST TO 4TH GRADE PRIVATE SCHOOL OF PONTA GROSSA - PR

SUMMARY

The body mechanics is a field of study that relates the static and dynamic forces that act on the human body. The optimal alignment of the body is related to a series of factors and difficult to achieve in all aspects, but it is standard for the meaning of which is directing efforts to obtain such an alignment. Poor posture is a faulty relationship between the segments of the body where a balance is less efficient on its structure. So observe and analyze the changes that such a stance entails erroneous, it is unquestionably important, especially when it comes to children. For this situation the objective of this study is to evaluate the posture of children in the fourth series of the first private education in the region of Ponta Grossa - PR, emphasizing segments of which the incidence of changes was greater than the ideal position. This goal is realized by means of a prospective, applied, descriptive, conducted with 883 children (n = 883), elementary school special education institutions of the city of Ponta Grossa. The postural analysis was done visually by trained, with observation of the previous views, side, right and left, and later. Postural changes found, as well as the personal data of the volunteers were recorded and later presented in a descriptive analysis. This led to the conclusion that the major changes found in the analysis using the previous view, were: 29.56% higher left shoulder, right shoulder high 25.48%, 38.84% knee genu valgus and knee rotated inward 23.56 %. From these results, it was possible to conclude the presence of changes in prevalence of upper limb segment (shoulder high and uneven), lower limbs (knee valgus and rotated inside) with higher values over the range considered normal.

KEYWORDS: postural changes, children, private educational institutions.

ANALYSE STATISTIQUE DES ENFANTS MODIFICATIONS POSTURALES À L'ÉCOLE PREMIER-QUATRIÈME TENEUR PRIVÉS DE PONTA GROSSA – PR

SOMMAIRE

La mécanique du corps est un champ d'étude qui concerne les forces statiques et dynamiques qui agissent sur le corps humain. L'alignement optimal de l'organisme est lié à une série de facteurs et difficile à réaliser dans tous les aspects, mais il est standard pour la signification de ce qui est de diriger les efforts pour obtenir un tel alignement. Une mauvaise posture est une relation défectueuse entre les segments du corps où un équilibre est moins efficace sur sa structure. Donc observer et d'analyser les changements qu'une telle attitude implique erronée, il est incontestablement important, surtout quand il s'agit d'enfants. Pour cette situation, l'objectif de cette étude est d'évaluer la posture des enfants dans la quatrième série de la première éducation privé dans la région de Ponta Grossa - PR, en insistant sur les segments de laquelle l'incidence des changements a été supérieure à la position idéale. Cet objectif est réalisé au moyen d'une étude prospective, appliquée, descriptive, réalisée avec 883 enfants (n = 883), élémentaire établissements scolaires d'enseignement spécial de la ville de Ponta Grossa. L'analyse posturale été fait visuellement par une formation, avec l'observation de la vue précédente, sur le côté droit et gauche, et plus tard. Modifications posturales trouvé, ainsi que les données personnelles des volontaires ont été enregistrés et plus tard présentés dans une analyse descriptive. Cela a conduit à la conclusion que les changements majeurs dans l'analyse en utilisant la vue précédente, étaient: 29,56% plus élevé épaule gauche, l'épaule droite de haut 25,48%, 38,84% en valgus genu genou et tourné vers l'intérieur au genou 23,56 %. De ces résultats, il a été possible de conclure de la présence de changements dans la prévalence du segment du membre supérieur (épaule haute et inégale), les membres inférieurs (genou valgus et en rotation à l'intérieur) avec des valeurs plus élevées sur les limites considérées comme normales.

MOTS-CLES : modifications posturales, les enfants, établissements d'enseignement privés.

ANÁLISIS ESTADÍSTICO DE LOS NIÑOS CAMBIOS POSTURALES EN LA ESCUELA DE GRADO PRIMERO A CUARTO PRIVADO DE PONTA GROSSA - PR

RESUMEN

La mecánica del cuerpo es un campo de estudio que relaciona las fuerzas estáticas y dinámicas que actúan sobre el cuerpo humano. La mejor alineación del cuerpo se relaciona con una serie de factores y difícil de lograr en todos los aspectos, pero es un estándar para el significado de lo que es dirigir los esfuerzos para obtener dicha adaptación. La mala postura es una relación defectuosa entre segmentos del cuerpo donde el equilibrio es menos eficiente en su estructura. Así que observar y analizar los cambios que esta postura implica errónea, es sin duda importante, especialmente cuando se trata de niños. Por esta situación, el objetivo de este estudio es evaluar la postura de los niños en la cuarta serie de la primera educación privada en la región de Ponta Grossa - PR, haciendo énfasis en los segmentos de los cuales la incidencia de los cambios fue mayor que la posición ideal. Este objetivo se consigue por medio de una aplicación, prospectivo, descriptivo, realizado con 883 niños (n = 883), las instituciones escolares de primaria de educación especial de la ciudad de Ponta Grossa. El análisis postural se realizó visualmente por personal capacitado, con la observación de los puntos de vista anterior, lateral, derecha e izquierda, y más

tarde. Los cambios posturales encontrados, así como los datos personales de los voluntarios se registraron y luego se presentan en un análisis descriptivo. Esto llevó a la conclusión de que los cambios más importantes se encuentran en el análisis con la vista anterior, fueron: 29,56% por encima del hombro izquierdo, hombro derecho elevado 25,48%, 38,84% genu valgus de rodilla y girar la rodilla hacia adentro 23,56 %. A partir de estos resultados, se puede concluir la presencia de cambios en la prevalencia del segmento de la extremidad superior (la altura del hombro y desigual), los miembros inferiores (rodillas en valgo y rotación en el interior) con valores más altos en el rango considerado como normal.

PALABRAS CLAVE: cambios posturales, los niños, las instituciones educativas privadas.

ANÁLISE ESTATÍSTICA DE ALTERAÇÕES POSTURAIS EM CRIANÇAS DE 1a A 4a SÉRIES DAS ESCOLAS PRIVADAS DA CIDADE DE PONTA GROSSA – PR

RESUMO

A mecânica corporal é uma área de estudo que relaciona as forças estáticas e dinâmicas que agem sobre o corpo humano. O alinhamento ideal do corpo é relativo a uma série de fatores e difícil de ser obtido em todos os aspectos, porém ele é padrão para cujo sentido se direcionam os esforços de obter tal alinhamento. A má postura é uma relação defeituosa entre os segmentos do corpo onde ocorre um equilíbrio menos eficiente sobre sua estrutura. Portanto observar e analisar as alterações que tal postura errônea acarreta, torna-se indiscutivelmente importante, ainda mais quando se trata de crianças. Por essa situação o objetivo do presente estudo é avaliar a postura de crianças de 1a a 4a séries do ensino privado da região de Ponta Grossa – PR, enfatizando segmentos dos quais a incidência de alterações foi maior que a postura ideal. Tal objetivo concretizou-se por meio de uma pesquisa prospectiva, aplicada, descritiva, realizada com 883 crianças (n = 883), do Ensino Fundamental de instituições de ensino particulares da cidade de Ponta Grossa. A análise postural foi feita de forma visual por pesquisadores treinados, com observação das vistas anterior, laterais, direita e esquerda, e posterior. As alterações posturais encontradas, bem como os dados pessoais dos voluntários foram registradas e posteriormente apresentadas em uma análise descritiva. Essa possibilitou a conclusão de que as maiores alterações encontradas utilizando na análise a vista anterior, foram: ombro esquerdo elevado 29,56%, ombro direito elevado 25,48%, joelho genu valgo 38,84% e joelho rodado para dentro 23,56%. A partir desses resultados, foi possível concluir a presença da prevalência de alterações nos segmentos de membros superiores (ombro elevados e desnivelados), membros inferiores (joelho valgo e rodado para dentro) com valores superiores em relação ao considerado como faixa de normalidade.

PALAVRAS CHAVE: Alterações posturais, crianças, instituições de ensino privadas.