89 - ASSESSMENT POSTURE OF SCHOOL CHILDREN IN ENVIRONMENT

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INTRODUCTION

According to Oliveira et al (2002), the incidence of postural problems in children and adolescents is increasing dramatically in recent years, with changes in posture stages of growth and development conditions that predispose to degenerative spine in the adult, such changes cause is in childhood, caused by trauma, emotional factors and order inherited (Ascher, 1976).

The mechanisms of adaptation to overload begin very early in the skeletal development, and functional changes in the attitude of the body's normal development that occurs in the bone tissues are coordinated by these adjustments (Oliveira et al, 2002). The bone deformities are caused from birth to 20 years, mostly between 7 and 14 years and is a propitious time to posture correction, because the bone structure becomes more rigid as the chronological age increases (Munhoz, 1995).

It is a fact that the child is a maturational process of constant changes, these changes, especially in developing physical, can lead to permanent changes to be observed in adulthood, and the child's posture behavior during the early school years between the ages of 6 to 10 years, the general responsible for postural defects acquired, taking into account the development of upright posture, the anatomical terms, the spine and the child's relations with the social environment in which they live. Ascher, (1976).

During the school years, the child is forced to remain in the same position for long periods, the seated position is considered the most damaging for the column may present or not functional changes (Nachemson, 1975; Eitner, 1989 and Viel & Esnault, 2000). Rapid growth may also have an adverse effect on posture, because the development of postural muscles does not track the rapid growth in height. (Eitner, 1989; Meissner et al, 1984).

As the sitting posture is maintained by irregular series of potential for action, the very securities may force the body to assume various positions, according to reports Knusel and Jelko (1994). You must give weight to height, depth and angles of the seats and lumbar support of the securities in order to adapt to man and his work so therefore can prevent damage to health, especially at the stage school. (Couto, 1995; Cunha, 2001).

The school furniture is undoubtedly an essential and extremely important in the educational process because it is responsible for the physical and psychological comfort of the student, encouraging their learning as well as being suitable for providing learner and proper handling during its use (Carvalho, 2000 ; Pitzen, 1981; Mandal, 1984).

Moro (1994) describes that most securities used in schools serves as a piece not educational, because usually the furnishings do not meet the age groups, thus not allowing the children to stay in a comfortable position, contributing to the school itself promotes the emergence of stress , Pains in the body, as well as damaging the school. These habits can cause poor posture changes in the child who spends hours during the day sitting in school, without a furniture suitable for their age and stature.

Given the above information studies and make it the goal of this study was to examine the position in the school environment for children from four grades of elementary school to a private school education network in the Manaua city.

MATERIALS AND METHODS

This study was characterized by descriptive, we tried to describe the biomechanical characteristics in the school environment as well as changes in posture from different way to position itself on the same school furniture.

The population of this study was composed of children of college students in a Private Network of Education of the City of Manaus. The group under study was composed of 60 individuals from 8 to 14 years, divided into 4 groups belonging to 3rd, 4th, 5th and 8th grade of elementary school, all with dominance in the right upper limb. This age group was chosen so as intentional as it is of paramount importance in ages maturational development of the child, where the greatest changes occur that can directly influence in shaping the attitude in adulthood.

Through the students, was sent to parents the End of Free and Informed Consent to participate in the study approved by the Research Ethics Committee of UniNorte. With a sample of the collection of data was held in the school environment itself, groups of 3rd and 4th grades have used the same furniture and groups of 5 and 8 series used different furniture, according to the one used in the classroom.

All subjects were filmed by a camera video camera in simulation of writing, with the feet supported on the ground or in this direction, with the back of the chair back in and outside of it, respectively. The camera was positioned on a tripod at a height of 80 cm with a horizontal distance of 3 meters in relation to individuals.

The subjects were placed at Styrofoam markers made of spherical shape of 2.5 cm in diameter, fixed on the body with a double-faced tape, after palpation of the structures previously selected and marked with pencil dermatográfico as protocol suggested by Mercadante et al , (2005). The markers were set in the anatomical structures based on literature (Netto, 2000; Kendall, 1995), positioned in articulation of the jaw, spinal process C7, right acromion, midline of the elbow joint, the radial styloid process, the midline ridge iliac, greater trochanter of the femur, popliteal line, lateral ankle, calcaneus and head of the 5th metatarsal (Figure 1), for analyzing the angles of the head, torso, knee and ankle.

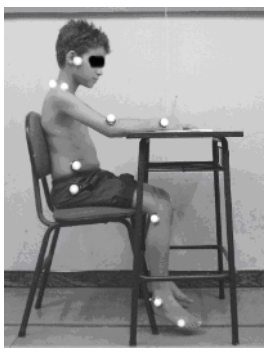


Figure 1 - Points needed to anatomical analysis study.

For evaluation, the subjects were presented with clothes for physical education, so that the markers could be fixed and consequently best viewed during the analysis of the data, in addition to maintaining the trust of the items selected because they were attached to skin.

For the data processing, the images were transferred to the computer, using a specific software for analysis in kinemetry, the Peak Motus system, where it was possible to realize the digitization of reference points of the joints of the human body to calculate the angles head, shoulders, trunk, hip, knee and ankle.

RESULTS

Through the scanned points and angular calculations can see in Tables 1 and 2, the values of the angles of the head and torso of the four groups (3rd, 4th, 5th and 8th grades), where the average values of 4 and 8 series is presented in greater compared with the values of 3 and 5 series, both for the angle of the head as to the angle of the trunk.

Analyzing the CV% we can see that both angles of the four classes were considered too high, which may be indicative for many adjustments that every child makes the adjustment from the chair. (Pitzen, 1981; Oliver & Middledith, 1998). Coury (1995); Kings and Moro (2002), recommend that the appropriate angle to the head is 20 to 30 degrees of tilt, and to work longer, over 120 minutes is the ideal angle of 15 degrees so that does not happen a bending of the trunk, reducing about 50% the pressure of vertebral discs of the lumbar spine. Well, if this slope exceeds the recommended, the students in their school activities tilt the torso forward, providing the beginning of a painful process in the neck and back (Kroemer and Grandjean, 1997).

Table 1: Values wording of angles of the head and torso of the groups 3 and 4 Series.

	Angular values			
	3 SÿRIE (n=20)		4 SÿRIE(n=10)	
	HEAD	TRUNK	HEAD	TRUNK
X	27,6	7,9	32	11,9
DP	16,5	6,7	18,3	5,2
CV%	59,80	84,50	57,2	43,5
Min	4,1	0,3	7,7	4,9
Max	62,9	23,6	60,9	21,4

Table 2: Values angles wording of the head and torso in 5 and 8 series groups

	Angular values			
	5 SÿRIE (n=13)		8 SÿRIE(n=17)	
	HEAD	TRUNK	HEAD	TRUNK
X	22,9	16,2	24,4	20,7
DP	10,2	12,3	8,8	8,5
CV%	44,6	76,1	19,2	18,6
Min	7	2,6	10,9	2,2
Max	45,6	43,1	37	36,2

Tables 3 and 4 express the values observed for the knee and ankle angles of the four groups (3rd, 4th, 5th and 8th grades), where the average values of 3 and 8 series are larger than the 4 series and 5 series, for the angle of the knee. For the angle of the ankle mean values of 3 and 5 series are larger than the 4th grade and 8th grades.

Table 3: Values wording of the knee and ankle angles of the groups of 3rd and 4th grade.

	Angular values			
	3 SÿRIE (n=20)		4 SÿRIE(n=10)	
	KNEE	ANKLE	KNEE	ANKLE
X	113,1	124,4	112,9	120,2
DP	6,3	10,3	5	9,4
CV%	5,6	8,3	4,5	7,8
Min	103,8	97,8	103,9	102
Max	125,3	138,7	119,8	133,3

Table 4: Values angles wording of knee and ankle in groups of 5 and 8 series.

	Angular values			
	5 SÿRIE (n=13)		8 SÿRIE(n=17)	
	KNEE	ANKLE	KNEE	ANKLE
X	104,5	117,8	127	115,7
DP	8,5	6,7	24,5	13,7
CV%	8,1	5,7	53,3	29,9
Min	87,2	109,5	86,2	94,9
Max	114	132	175,9	146,4

The values of furniture measures used by children of both groups of the study are presented in the table below, containing values of lengths, angles and heights according to the measured and regulatory standards imposed by ABNT (1997).

Table 5: Measures of the furniture used by school children in the experimental group in the study.

Point of reference	Measure	Description of distances and angles
Height popliteal	0,46 cm	Between the ground and anterior edge of the chair
Comp. Holy-popliteal	0,41 cm	Among the anterior border and the back of the chair
Height of the backrest	0,13 cm	Among posterior edge of the seat backrest and base
		Between the base and the apex of the back
Comp. board	0,22 cm	
Height Bureau	0,73 cm	Between the ground and the apex of the table
Tilt Seat	6,3 post + low	The line formed between the seat and the axis "x"
Tilt back	8,5 ÿpice post	The line formed between the backrest and the axis "y"
Relative seat backrest angle	93ÿ	

The popliteal region of the lower limb, which is supported on the front seat, may have an increase in compression depending on the height of the seat, resulting, for example, in the absence of foot contact with the ground, which can cause problems in blood circulation in the region, hindering the venous return and generating sciatic nerve compression (Reis, 2003; Souza, 2007; Taylor & Francis, 2001, Sanders et al, 1987; Soares, 1998; Chaffin, 2001; Coury, 1995).

Thus, trying to identify the contact of the foot on the soil of children assessed to be calculated the percentages within each group. Of individuals 3 and 4 of the series, 33% do not touch the foot on the floor, 60% do not touch the heel on the ground and only 6%

have the entire foot in contact with the ground during seated posture. Of individuals from 5 to 8 series, 36% do not touch your foot on the ground, 33% do not touch the heel and 30% have the entire foot in contact with the ground. Given the values expressed, most of the children keeps a foot of inappropriate contact with the ground, because the furniture was out of anthropometric standards of the children tested.

DISCUSSION

According to the rules of ABNT (1997), by NBR 14,006 - Mobile schoolchildren: seats and tables for educational institutions, which deals with issues related to ergonomic recommendations (attitude) and anthropometric (size) of this type of furniture, indicating the pattern for seven measures on the table and chair school in accordance with the stature of the individual.

According to the recommendations in this standard for the elementary school, covering the four groups showed that average height of 148 cm, the desk had, on the seat, popliteal height of 34 cm, 33 cm in length. The back, it would have height of 15 cm in length, 13 cm and tilt-back seat from 95 to 106 degrees. The Bureau of furniture would have a height of 0.58 cm.

Analyzing the results of the study, one can see that the furniture used for the classes are not examined in accordance with the anthropometry of children. This could be seen in the percentages of each group, indicate that most children with inappropriate contact of the feet with the ground, demonstrating that the height of the seat that makes contact with the popliteal region of the child does not agree with the standards, with activities in this posture sitting without support for the feet, increases the pressure in the gluteal, popliteal vein, sciatic nerve, impairing the venous return and contributing to the swelling of the feet. (Bendix et al, 1985; Soares, 1998; Souza, 2007 and Coury, 1995).

Nunes, (1993) conducted a study with students simulating tasks of writing, through the F-Scan confirming the increase of pressure in the gluteal cardiovascular causing discomfort to the legs, when compared with their feet and suspended supported the ground. Bendix (1986), Viel & Esnault (2000) and Nordin & Frankel (1989), warned that if the chair is high, the child will tend to sit in the front seat so that his feet touch the ground, leaving a position half - Seated, refusing to use the back injury. But if they adopt a relaxed position, a study conducted by Andersson et al (1974); Tribastone, (2001), emphasize that this position, ie with lumbar curvature retificada, leads to an increase in pressure of the disk, because the space Previous between the vertebrae decreases and later increases, pushing the disc back, and consequently increasing the possibility of injury in these disks.

The difference in height of the seat was 12cm, and above recommended by the rules and length of the seat was 8 cm higher than recommended. This difference may take the child to a wrong stance, not sitting with the gluteal region near the back of the chair, which can exacerbate the problems that occur in the spine, and this incorrect position taken by individual can cause the expression of motor schemes wrong and they, in turn, the announcement of bad moves (Tribastone, 2001; Taylor & Francis 2001; Parcells et al, 1999; Chung, 2003).

The tilt-back seat found in the school was assessed 93, with a value close to the minimum value indicated by the rules (95 to 106). However, in studies by Andersson et al (1974) and Couto (1995), concluded that the support in the lumbar region of a chair must have a slope near the 100th since reduce the myoelectrical activity of the muscles of the back and subsequent pressure on vertebral discs , Bringing fewer problems the maturation of the spine.

The height of the backrest, ie the lumbar region to the space meets with a difference of 2 cm below the recommended, and its length with a difference of 9cm above recommended. However, they found small variations in these measures of securities of the study compared the standards would not be the most important changes for a possible implication of change posture.

The height of the table meets with a difference of 15 cm above the recommended, the second Chaffin (2001), Kings and Moro (2002), the desktop tool is a concern, because a table very high cause abduction, flexion Previous and lifting of the shoulders, also influencing the attitude of the head, leading to fatigue of muscles of the neck and shoulders.

CONCLUSION

Analyzing the results of the study, one can see that the furniture used for the classes are not examined in accordance with the anthropometry of children. This can be seen in the percentages of the four groups, which point most children with inappropriate contact of the feet with the ground, demonstrating that the height of the seat that makes contact with the popliteal region of the child does not agree with the standards.

In analyzing the angles we can infer that there was no difference between the groups, but that the stance that the groups take the furniture favors school for the training of postural changes and onset of pain at cervical and lumbar mainly.

These results indicate that the institutions of elementary school should hold a special attention to the securities they use in the classroom and do postural guidelines for that damage to body structures can be minimized in the school in question.

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ASSESSMENT POSTURE OF SCHOOL CHILDREN IN ENVIRONMENT

The purpose of this study was to examine the position in the school environment for children to a private school education network in the city of Manaus. The sample of 60 children, between 8 and 14 years old, from 3rd to 8th grade. The subjects were filmed in writing simulation, with the feet supported on the ground or in this direction. For data processing system using the Peak Motus. The knee and ankle angles of the four groups showed average values for groups of 3 and 8 series of more than 4 series and 5 series, due to the furniture it is not used in accordance with the children anthropometry, the popliteal region, which is supported on the front seat, has increased the compression result of the absence of the foot contact with the ground and can cause problems in blood circulation of this region. Comparing the samples that exist in the furniture with regulatory standards adopted by the School, it was found that the furniture used for the classes are not examined in accordance with the children anthropometry. In the analysis of the angles there was no difference between the groups, but the groups take in school furniture favors for the generation of bodily pain. These results indicate that the institutions of elementary school should hold a special attention to the securities they use in the classroom and do postural guidelines for that damage to structures osteomioarticulares can be minimized in the school in question.

Key-words: ergonomics, posture, school children.

ÉVALUATION LA POSTURE DES ENFANTS À L´ÉCOLE

Le but de cette étude était d'examiner la situation dans le milieu scolaire pour les enfants à une école privée réseau d'éducation dans la ville de Manaus. L'échantillon de 60 enfants, entre 8 et 14 ans, du 3 au 8 e année. Les sujets ont été filmés dans la simulation de l'écriture, avec le pied appuyé sur le sol ou dans cette direction. Pour le système de traitement des données à l'aide de la Peak Motus. Les angles de la cheville, du genou et des quatre groupes ont montré de valeurs moyennes pour les groupes de 3 et 8 année, de plus de 4 et 5 année, en raison de la meubles ne peuvent être utilisés conformément à l'anthropométrie des enfants, faisant de la région poplité, qui est appuyé sur le siège avant, a augmenté la compression du fait de l'absence de contact du pied avec le sol et peuvent causer des problèmes dans la circulation sanguine dans cette région. Si l'on compare les modèles qui existent dans le mobilier avec les normes réglementaires adoptées par l'école, il a été constaté que le mobilier utilisé pour les classes ne sont pas examinées conformément à l'anthropométrie des enfants. Dans l'analyze de les angles, nous pouvons en déduire qu'il n'y avait pas de différence entre les groupes, mais que la position que les groupes prennent à l'école favorise les meubles pour la génération de la douleur physique. Ces résultats indiquent que les institutions de l'école primaire devrait tenir une attention particulière aux titres qu'ils utilisent en classe et ne posturale des lignes directrices pour les dommages causés aux structures du corps peuvent être réduits au minimum à l'école en question.

Mots Clé: l'ergonomie, la posture, de l'école.

EVALUACIÓN LA POSTURA DE LOS NIÑOS EN LA ESCUELA

El objetivo de este estudio era examinar la situación en el entorno escolar para los niños de una escuela privada de educación en la ciudad de Manaus. La muestra de 60 niños, entre 8 y 14 años, desde 3ro al 8vo grado. Los sujetos fueron filmados en la simulación de la escritura, con los pies apoyados en el suelo o en esta dirección. Para el sistema de procesamiento de datos utilizando el Pick Motus. Los ángulos de la rodilla y el tobillo de los cuatro grupos se presentaron valores promedio para grupos de 3ro y 8vo grado más de 4to y 5to grado e, debido a los muebles no se utilizarán de acuerdo con la antropometría de los niños, haciendo la región poplíteo, que se apoya sobre el asiento delantero, ha aumentado la compresión resultado de la ausencia de los pies en contacto con el suelo y pueden causar problemas en la circulación de la sangre en esta región. La comparación de los patrones que existen en el mobiliario con las normas reglamentarias aprobadas por la escuela, se constató que el mobiliario utilizado para las clases no se han examinado de conformidad con la antropometría de los niños. En el análisis de los ángulos podemos inferir que no hubo diferencia entre los grupos, pero que la postura que adopten los grupos en favor de mobiliario escolar para la generación de

dolor corporal. Estos resultados indican que las instituciones de la escuela primaria debe tener una especial atención a los muebles que se usa en el aula y hacer directrices para orientación postural para que los daños a las estructuras osteomioarticulares puedan reducirse al mínimo en la escuela en cuestión.

Palabras Claves: la ergonomía, la postura, la escuela.

AVALIAÇÃO DA POSTURA DE CRIANÇAS EM AMBIENTE ESCOLAR

O objetivo deste estudo que foi analisar a postura no ambiente escolar de crianças de uma escola privada da rede de ensino da cidade de Manaus. A amostra foi de 60 criancas, entre 8 e 14 anos, da 3º a 8º série. Os sujeitos foram filmados em simulação de escrita, com os pés apoiados sobre o solo ou na direção deste. Para o processamento dos dados utilizou-se o Sistema Peak Motus. Os ângulos do joelho e tornozelo dos quatro grupos apresentaram-se valores médios para os grupos da 3º e 8º série maiores que da 4º série e 5º série, devido ao mobiliário utilizado não estar de acordo com a antropometria das crianças, fazendo com que a região poplítea, que fica apoiada sobre a parte anterior do assento, tenha um aumento de compressão resultado da ausência de contato do pé com o solo, podendo gerar problemas na circulação sanguínea desta região. Comparando os padrões existentes em normas regulamentadoras com o mobiliário adotado pela Escola, verificou-se que o mobiliário utilizado para as turmas analisadas não estão de acordo com a antropometria das crianças. Na análise dos ângulos podemos inferir que não houve diferença entre os grupos, mas que a postura que os grupos adotam no mobiliário escolar favorece para a geração de algias corporais. Estes resultados indicam que as instituições de ensino fundamental devem reter uma atenção especial para os mobiliários que utilizam em sala de aula, bem como fazer orientações posturais para que os danos às estruturas osteomioarticulares possam ser minimizados nos escolares em questão.

Palavras Chave: ergonomia, postura, escolar.