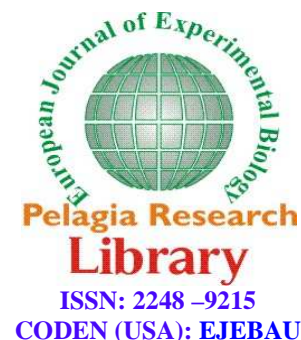




## Pelagia Research Library

European Journal of Experimental Biology, 2013, 3(4):181-187



### The relationship between ergonomic chair and musculoskeletal disorders in north of Khuzestan's students

Somayeh Sepehri\*<sup>1</sup>, Abdol Hamid Habibi<sup>2</sup> and Said Shakerian<sup>2</sup>

<sup>1</sup>Department of Physical Education, Shoushtar Branch, Islamic Azad University, Shoushtar, Iran

<sup>2</sup>Department of Physical Education, Shahid Chamran University of Ahvaz, Ahvaz, Iran

#### ABSTRACT

*The purpose of the present study The relationship between ergonomic chair and musculoskeletal disorders in north of Khuzestan's students. A survey of all the boys and girls of primary school pupils city of Dezful, poldokhtar formed. The number of students is 46,443 people. Of the population using random cluster sampling method, 40 classrooms, each with an average of 21 students per class in school were selected as samples. Among many parameters which are important in the design of seat height, depth and width of the seat were investigated. Upper extremity musculoskeletal disorders, including malformations of the head to the front, asymmetric shoulder, back together, back tilt and lumbar lordosis is determined using a checker board. Statistical Methods After collecting research information by statistical and descriptive methods such as average frequency and percent and to analyze the correlation of analytical and then  $\chi^2$  test is used to check for abnormalities and all these cases were analyzed by SPSS software. The results show that Relationship between congenital torticollis and ergonomic chairs meaningful student there and between the anomalies and ergonomic chair in front of the students and between congenital kyphosis and ergonomic chairs are not students and between abnormal drooping shoulders and ergonomic chairs students and between congenital scoliosis and ergonomic chairs students there and between lumbar lordosis and ergonomic chairs anomalies students there Discussion: The results show exercise and correct patterns of sitting, walking, reading and .... Using standard equipment, including shoes, bags and chairs in classrooms in schools can help prevent these kinds of remarkable anomalies do. In addition to the standard equipment for outdoor training, Bags and Backpacks kind of shoes standardized by students can influence the body in a position to prevent these anomalies have?*

**Key words:** ergonomic chair, musculoskeletal disorders, Khuzestan's students.

#### INTRODUCTION

Today's training the correct position of job or position of resting and prevention of skeletal complications resulting from non-compliance with its in every society is necessary and this training has a special importance for children and students because learn first of life how to stand, how to sleep, how to sit, how to walk, how to carry things and how to watch Tv? If this learning done correctly will continue until end of life and we can be hopeful that people of society will be healthy.

Today's a lot of people such as students and normal people has skeletal anomalies due to bad habits. Correct use of application and standard equipment in schools and remove bad habits can cause physical deformity or fix it useful.

At the beginning of the school year and the opening of schools, students are eager to buy shoes and bags so they can prevent most serious complications that can threaten the child's physical health by correct selection of standard equipments. Although certain general standards for these devices is not still in schools. For example all of girl and boy students in of school from first grade to fifth grade with different physical dimensions sit on a same chair While the students are growing in height and weight. Poor chair design will be injure students spine and discs. The height of seat will compress femoral and moreover, because the feet do not touch the ground, reducing the need to balance. A seat with little height design will further stretches the body and legs forward and back away from the rest of it and prevent the creation of optimal conditions for the lumbar support (3).

Today's in country schools we saw anomalies are decrease which is due to relevance of equipment ergonomic by physical structure of students. Unfortunately, no standard for the manufacturing of these devices due to the physical dimensions of students and this mismatch is causing some skeletal abnormalities.

Official statistics and expert opinions that are published from time to time by the press and media practitioners and specialists in the country, announced that it represents.

Height anomalies of female students than males are results of factors such as lack of exercise and machinery life. Girls students prevent dynamic activities considering the physiological changes during their leisure refrain.

60% chance of students in the country, 80 percent of developing the disorder in the height of the Iranian students, especially female students claim is not unfounded.

Most of height disorders in girls students is not seen because of their cover and unfortunately family are oblivious to their children's actions.

With some attention to girls exercise we can prevent most of heights disorders.

1.1.1 Physical inactivity and lack of interest in school sports and neglect to design non-standard seats and shopping non-standard bags and shoes for students increase structure height anomalies. Elementary school is not a good time to carry heavy equipment. use of school students is a right solution to reduce the use of heavy equipment by students.

Ergonomic is use of scientific information concerning humans to the design of objects, systems and environments are used by humans.

Ergonomic Is the science of designing tools we need to live and work. Human engineering is to proper tools and environment to live and work deals with human capabilities (4).

#### 1.1.2 Seating positions

Sitting is defined as a condition in which the body's energy supply and reduce the stress that is imposed on the body in an upright which body weight is transferred to areas supported by the prominence and soft tissues of the chair or the person (Scoberth 1962).

##### 1.1.2.1 advantages of sitting position:

advantages of a sitting position is as follows:

1. When a person sits in a chair will create less pressure on the joints of the lower limb.
2. Provide necessary stability to work with a high motor provides visual control.
3. Reduse Hydrostatic pressure in the lower limb circulation makes.
4. When sitting on the seat of the stand will consume less energy.
5. When the stored energy is spent sitting and standing pressures imposed on the body is reduced.

Due to these advantages, the biomechanical considerations should be taken into account when the person is sitting. Although many differences between sitting and standing positions and form the backbone of the seats there but there are also common features.

Sitting at the level of the spine is important, however arms and legs should also be considered.

Sitting posture, anterior, middle and posterior division, which depends on the seat.

This division is based on the body's center of gravity position has been transferred to a different support levels. The status of the spine are formed. In intermediate positions the center of gravity is directly over the Earth lands framework supports about 25% of body weight.

When we are in a position intermediate to rest or lumbar spine is straight or slightly kyphosis.

Today, the right tools and equipment designed to provide schools with students anthropometric sitting and getting habits of good posture is important. The proper design of equipment, training and ergonomic and anthropometric data is essential. This issue is about school kids who spend most of their time Likely to Give More Seats is true.

Repeatedly talked about the effects of prolonged Nshstnhay and now everyone knows that when they sit together must meet certain cases to avoid damage to the body, but how about school chairs? Is it possible to reduce the problem of students working in this field do?

Adjustable student desk and chair is best based on their stature has to be prevention of musculoskeletal disorders. Unfortunately, current there is not this situation in our country and for this reason, it is recommended that teachers allow students to cross stood up on a chair or be displaced. (Dr Reisosadat)

Students are recommended to reduce the problems, the teacher helps the students sitting in place, do some exercise and stretching, these exercises also reduce muscle fatigue, thereby also creating a lively atmosphere in the classroom (Secretary of the Board of Physical Medicine and Rehabilitation).

#### 1.1.2.2 Designing a fit Seat

1. Seat the student psychologically satisfying and comfortable to sit on it.
2. To provide stable support for the body.
3. That person is sitting comfortably in a long time.
4. To perform a task or activity that is done must be good condition.

So when a person sits in a chair in a long time and feel that it would be appropriate mental and the characteristics of the chairs have ergonomic factors such as chairs - and anthropometric and biomechanical properties depend (2).

Esmaili (2007) did an ergonomics research aimed to examine the appropriateness of the school bench with some anthropometric measurements in Torbat school students. In this study, some subjects and some anthropometric parameters were measured dimensions ergonomic bench. To evaluate the appropriateness of the anthropometric measurements of subjects with ergonomic desks and benches for the first time in formulas derived from studies Gvvaly and Bvdalvs (2006), which was designed based on ergonomics.

Vazirian (2007) measured 12 anthropometric parameters of the Agricultural students to design chairs for students to fit their body dimensions. So Designed to fit the physical dimensions of these chairs will allow users to effects such as lack of concentration, fatigue and lower levels of physical Brvznarahty to stop learning. And the use of efficient use of wood in furniture design will follow. In this study, anthropometric data, Agriculture and Natural Resources, Tehran University students design chair for their writings were collected and analyzed. Then by these results and combining the principles of ergonomics, seating design and the loads on the service conditions, the model was analyzed by the software structural analysisSAP2000 and optimal levels of seating components were obtained.

Motamedzade (2003) studied 1580 male and female students from first grade to fourth secondary school (with equal distribution of age and gender) using a cluster sampling method in hamedan and anthropometric variables were measured. Male and female students were divided into four groups according to the standard 5970 Iso bench designed to be appropriate.

The first school for boys and girls in the first group includes standard bench-scale (siz3) Iso5970 , the second group includes guidance for the second and third sons, and the third group to complete pre-university secondary school for

girls, standard furniture dimensions (siz4) Iso 5970, and the fourth group of college boys school before the bench scale (siz 5) Iso 5970.

Gouvali M. k boudolosa k. (2006) In a study to investigate whether the dimensions of school furniture Anthropometric data on whether students have corresponded. This study on 274 students from 6-18 years of Greek furniture sizes were divided into three groups were used. Anthropometric measurements including height off the back of the knee, shoulder, elbow height, knee height, hip width, the distance between the back of the knee to the hip. The results showed that for many kids table and chair height is greater than the acceptable level (respectively 71/5% and 81/8%).

panagiotopoulou Georgia et al. (2004) measured dimensions included height, shoulder height, elbow height, knee height, hip width, the distance between the back of the knee to the buttocks, behind the knee to the ground. The dimensions for the four types of desk chairs and 5 were measured in conventional classes. Consistency of results between students and the dimensions of the furniture. Too high and too deep Chairs and tables were too high. This situation impacts negatively on the physical status of their students, especially in reading and writing.

joanne W . Y chung et al. (2007) design a study to determine the appropriateness of the school bench in the student body of Hong Kong did. They musculoskeletal symptoms among the top ten students in Hong Kong is a major health problem. A total of 214 volunteers were examined. 90% of the total number of fifth and sixth grade students at the school were made up. Information collected includes data related to student body size, their health and physical condition and size of the bench.

Girls BMI was less than boys. The girls were standing leg longer than the width of the hips. Almost none of them had a proper seat height.

Di Harasoukaspouri (2007) did Study design classes at schools in rural India bench. The subjects were 621 male students aged 10-15 years. Anthropometric data were collected differently than the boys from their hips concluded that anthropometric dimensions increases. However, there was little difference between boys Mqdamyangyn anthropometric dimensions. In the 10-11 year age range between 2/9% to 8/8%, in the 12-13 year age range between 1/3% to 9/9% of the 14-15 year age range between 1/4% to 5/5 respectively., but when comparing children 10 and 15 years were more differences were observed (16/2% to 42/4%). It can be said apparatus designed for children 10 years old with 15 years of child anthropometric dimensions will fit. As a result of these studies is a step in the prevention of skeletal malformations.

## MATERIALS AND METHODS

A survey of all the boys and girls of primary school pupils city of Dezful, poldokhtar formed. The number of students is 46,443 people. Of the population using random cluster sampling method, 40 classrooms, each with an average of 21 students per class in school were selected as samples.

Among many parameters which are important in the design of seat height, depth and width of the seat were investigated. Upper extremity musculoskeletal disorders, including malformations of the head to the front, asymmetric shoulder, back together, back tilt and lumbar lordosis is determined using a checker board.

Statistical Methods After collecting research information by statistical and descriptive methods such as average frequency and percent and to analyze the correlation of analytical and then  $\chi^2$  test is used to check for abnormalities and all these cases were analyzed by SPSS software.

## RESULTS

Association between congenital torticollis and ergonomic chairs elementary students there.

index	value	Freedom degree	Meaningful level
The correlation coefficient	37.79	11	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 20. Chi-square test results between congenital torticollis and ergonomic chair.

The test statistic of  $p=0.001$  and  $\chi^2=79.37$  in Table 20 Relationship between congenital torticollis and ergonomic chairs meaningful student there. The second hypothesis is confirmed.

Ergonomic chairs and forth between the anomalies are related to elementary students.

Index	Value	Freedom degree	Meaningful level
The correlation coefficient	62.144	11	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 23. Chi-square test results between abnormal forward head and ergonomic chair.

The test statistic of  $p=0.001$  and  $\chi^2=62.14$  in Table 23 Significant correlations between the anomalies and ergonomic chair in front of the students. The fifth hypothesis is confirmed.

Association between congenital kyphosis and ergonomic chairs elementary students there.

Index	Value	Freedom degree	Meaningful level
The correlation coefficient	25	11	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 26. Chi-square test results between congenital kyphosis and ergonomic chair.

The test statistic of  $p=0.001$  and  $\chi^2=25.00$  Significant association between congenital kyphosis and ergonomic chairs are not students. The eighth hypothesis is confirmed.

The shoulder drop and ergonomic chairs abnormalities are related to elementary students.

Index	Value	Freedom degree	Meaningful level
The correlation coefficient	1.37	22	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 29. The chi-square test abnormalities shoulder drop and ergonomic chair

The test statistic of  $p=0.001$  and  $\chi^2=1.37$  there is a significant correlation between abnormal drooping shoulders and ergonomic chairs students. The eleventh hypothesis is confirmed.

Association between congenital scoliosis and ergonomic chairs elementary students there.

Index	Value	Freedom degree	Meaningful level
The correlation coefficient	42.10	11	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 32. Chi-square test results between congenital scoliosis and ergonomic chair.

The test statistic of  $p=0.001$  and  $\chi^2=42.10$  Significant association between congenital scoliosis and ergonomic chairs students there. The fourteenth hypothesis is confirmed.

Between lumbar lordosis and ergonomic chairs abnormalities are related to elementary students.

Index	Value	Freedom degree	Meaningful level
The correlation coefficient	37.80	11	0.001*

\* The  $0.05 > \alpha$  is significant.

Table 35. Chi-square test results between congenital lordosis and ergonomic chair.

The test statistic of  $p=0.001$  and  $\chi^2=42.10$  Significant correlation between lumbar lordosis and ergonomic chairs anomalies students there. The seventeenth hypothesis is confirmed.

### DISCUSSION

According to a survey of chairs and benches that seat height is the same as in the first to fifth grades. Boys and girls have a similar growth pattern to late childhood. However, there are small differences in the physical dimensions of students' age range 7-8 years, 8-9 years, 9-10 years, 10-11 years. But when you sit on the anomalies of the children are 7 and 10 years are more abnormalities.

The findings of the research results trustee M. (2003), Jesus Race (2005), Ismaili (2007), Parslezu Hubbard (1999), Standard pren (2004), Ju and Chang (2007), input Hara et al (2007), All of the differences between the physical dimensions of the students had gained ergonomic chair are consistent.

Due to differences in size of student body, seats will not be used for children from 7 years to 11 years. According to the standard pren in a classroom with desks and chairs should be different heights. pren (2004)

So the risk of congenital torticollis, forward head, kyphosis, drooping shoulders, scoliosis, lordosis, improper seating of these results with the results erudite professor (1993), Zarei (1998) Isa nezhad and Daneshmandi (2001) Motamedzade (2003), Yousefi (2005), Ismaili (2007), Vazirian (2007), Mandal (1982), Brecher (1989), Gzadvsky (1989) D Hara Suvkaspury (2007), Ju An, Changuh et al (2007), Gualy and Budals (2006), Panagytipullauo (2004), Motmenz, t Loon (2003), Parslzu Hubbard (1999), kron et al (1993) is consistent.

Despite the differences between the physical dimensions of the first and fifth-grade students, the same equipment is used. The resulting mismatch seat classroom with students with physical traits show. The research suggests that fatigue can be a factor that contributes to the occurrence of physical abnormalities.

The end result of this research shows that the prevalence of postural abnormalities such as crooked neck, head forward drooping shoulders, kyphosis, lordosis and elementary school students is on the rise. This increase resulted from failure to observe the correct movement patterns in daily life such as walking, standing, lying, sitting, reading, or the correct way to carry the bag on the students. Another point that should not be forgotten addressing the undeniable effect of exercise in the prevention of these disorders. Another point that should not be forgotten addressing the undeniable effect of exercise in the prevention of these disorders. This requires consideration of specific programs to attract students to exercise it is notes. In addressing the needs of scientific applications utilize exercise, because it does not follow that the exercise of certain of their cause postural abnormalities in the body. In addition to exercise and correct patterns of sitting, walking, reading and .... Using standard equipment, including shoes, bags and chairs in classrooms in schools can help prevent these kinds of remarkable anomalies do. In addition to the standard equipment for outdoor training, Bags and Backpacks kind of shoes standardized by students can influence the body in a position to prevent these anomalies have.

### REFERENCES

- [1] Ahmadi, Iraj. (2002) Evaluation of upper limb deformities martyr Chamran University male students and offer them remedial. Master's thesis. Martyr Chamran University
- [2] Bahrami, Farajollah (2007) Corrective exercises. Faculty of Physical Education Teachers College Press.
- [3] Davis J.E. et al. (1998). *RheumatoRehabilit*; 38:243-7.
- [4] Daneshmani, Hasan. Alizade, Mohammad hosein. Gharakhanlou, Reza (2008) Corrective actions. Tehran. Publications Office, Institute for Physical Education and Sport Science.
- [5] Daneshmandi, Hasan. (2007) Evaluation of upper extremity abnormalities in children. Master's thesis. University.
- [6] Daneshmani, Hasan. Alizade, Mohammad hosein. Gharakhanlou, Reza (2004) Corrective actions. Identify and prescribe exercises. Publications Office, Institute for Physical Education and Sport Science. Tehran.
- [7] Delshad, Amir. Keshvarifard, Abbas. Gharakhanlou, Reza. Rahnama, Nader (2009). Compared profile and its relation to physical fitness and motor function abnormalities in the relief situation. Seventh International Congress of Physical Education and Sports Science. Tehran, March 2009.
- [8] Javadi pour, Morteza (2009) impact of Carry bags weighing in changes in trunk muscle EMG boys twelve years. Master's thesis. Martyr Chamran University

- [9] Hasan pour, Gholamhosein (2002) Spine of abnormalities in boys 13-11 years old Dezful school. Master's thesis.
- [10] Mertz, A. ( 2000 ). *Journal of Applied ergonomics*. 100 - 98 : 90.
- [11] Sahrman S.H. ( 2002 ). Diagnosis and treatment of movement impairment syndrome. mosby, Missouri pp3-12-194.
- [12] Salesi (1999) Corrective actions. Shiraz University.