RESEARCH "SITTING ON A SPINALIS CHAIR IN SCHOOL 2006-2011"

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Introduction

In these modern times, most people are not physically active enough. In developed countries, including Slovenia, more than half of children spend most of their free time on activities that involve sitting. Parents, too, tend to have less and less time for their children and physical activities that could be shared. Data demonstrates that spinal illness frequency is increasing decisively, becoming a global issue and are the most common chronic condition among the population under 45 years of age, the changes / injuries of the spine are one of the leading reasons for hospitalisations among the population under 65 years of age, the yearly prevalence of pain in the lower back area in developed countries is 15% and the costs related to treatment of lower back pain are between 80 and 200 EUR / person / year, where an incredibly rapid decrease in the age of those suffering the pain can be detected (children!).
Besides the stated, the ever more inactive lifestyle affects mental states. This can be detected in less concentration, poor motivation, aggression, hidden social stratification, intolerance, in other words, an ever increasing social – emotional spectrum of issues.

Starting Points

The modern lifestyle of children and wrong forms of exercise affect their spinal health in a very negative sense, especially in the abdominal – lumbar area. Due to insufficient amount of physical activity or wrong kinds of physical activity the muscles, responsible for correct (normal) body posture weaken or, through time, get overly reinforced, all of which contributes to the sensitivity of the spine to various internal and external influences. Improper body posture, changes and finally pain in lower back appear as a result (are a result) of the reduced capacity of back muscles (McGill, 2004). These negative phenomena affect a large number of modern children (Norris, 2000). Regular physical activity reduces the level and prevalence of lower back pain in children (Fanucchi, 2009), while physical inactivity causes the appearance of lower back pain in children (Skoffer and Foldspang, 2008). Lower back pain is becoming a daily companion and is related to the lifestyle of the modern child and an improper form of training (improper exercise). The prevalence of lower back pain is equal between children, actively involved in sports and those who aren't (Hellstrom, M., et al., 1990). Regular physical sports activity has a very notable effect on the maintenance and development of body structure (Malina, Bouchard, Bar-Or, 2004). However, how do we ensure, in time of the inactive lifestyle of the society and thus children, a healthy and coherent physical development? Hoe can we, through gradual activation of the lifestyle such as, e.g. active seating, improve physical development and thus maintain a healthy spine? These are the questions that this research will attempt to provide answers to.

Goals

The purpose of the research "Sitting on a Spinalis chair in school 2006-2011" was a longitudal following of two groups of elementary school children, which did and did not, during class, sit on

Spinalis chairs, and thus find out if sitting on a Spinalis chair in school has a positive effect on spinal health, the development of the spine and thus a prevention of lower back pain and other spinal ailments, or in the case of already diagnosed changes and ailments, mitigates them.

Methods

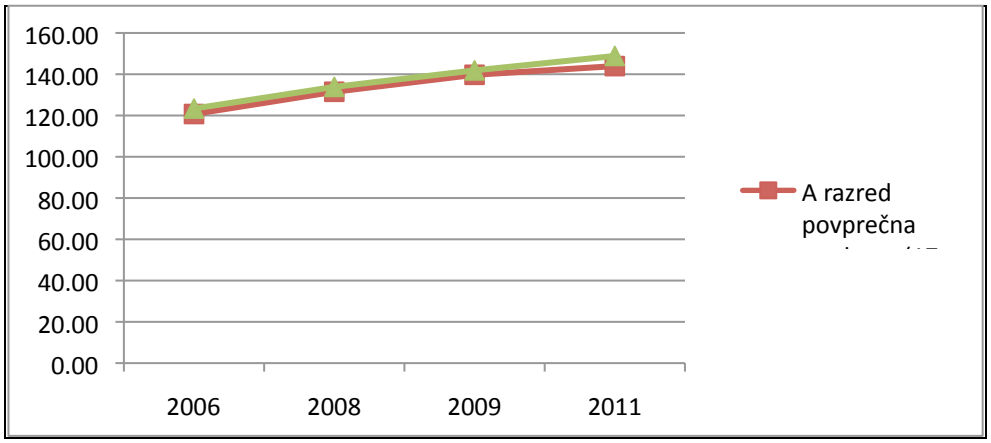
The measurements were carried out at the sample of two classes of students, those being a research class, class a., where the children sat on Spinalis chairs and the control class, class b., where children did not seat on Spinalis chairs. In the years 2006-2011 we carried out measurements in the two classes with a physical examination, measuring body height (BH) and body weight (BW) as well as an examination of skeletal – muscular apparatus, specifically Schober, shoulder blades, scoliosis, feet, body posture and flexibility of the lumbar spinal area with the forward bow and ground touching test. In the years 2009 to 2011, along with the physical examination and skeletal – muscular apparatus examination, we also carried out measurements with of the capacity of the side muscles of the back (Head down side-bridge test, McGill 2007), abdominal muscles (Curl up test advance, McGill 2007), back extensors (Back extensors test, McGill 2007) and spinal stabilisers (Flat roof test, McGill 2007).

Results

Results of the chosen measurements of the physical checkups between the years 2006 and 2011, the monitoring of the increase of BH and BW and the measurements of muscle capacity in the years 2009 to 2011.

The common analysis of the data of growth of BH in the classes a. and b. has shown, that BH grew proportionally, but that the students in class b. were, on average, taller, especially between the years 2009 and 2011, where there was a detectable spike in growth. The students of class b., in the year 2006 to 2011, on average, grew for 3,01 cm more than the students of class a.

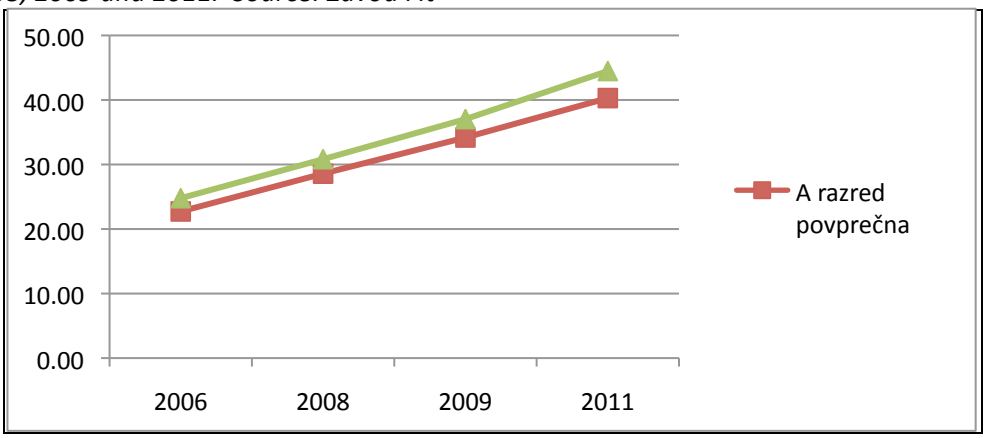
Diagram 6: BH 5.a : 5.b A comparison of growth of BH between the classes a. and b. in the years 2006, 2008, 2009 and 2011. Source: Zavod Fit



(translation – "A class average...")

The common analysis of data has shown, that BW grew, between 2006 and 2008, in both classes proportionally on average, but that the students in class b. were heavier on average. Between the years 2008 and 2009, the average increase of BW has been higher in class b. in comparison with class a., which is even more evident in the years 2009 and 2011. Students of class b. gained, between 2006 and 2011, on average 2,84 kg more weight than the students of class a.

Diagram 7: BW 5.a : 5.b A comparison of growth of BW between the classes a. and b. in the years 2006, 2008, 2009 and 2011. Source: Zavod Fit



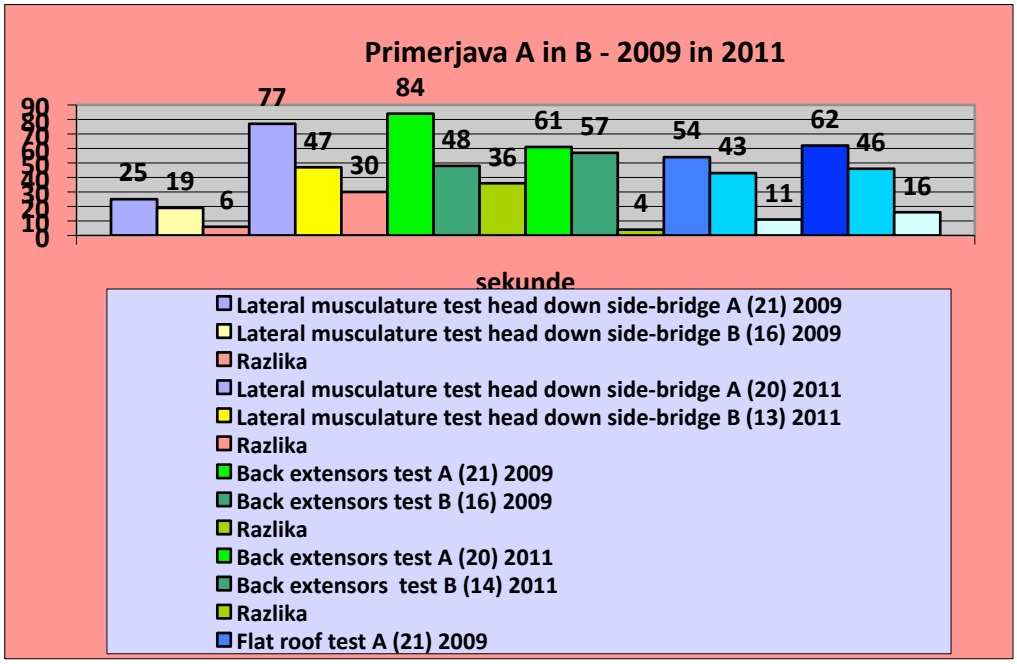
(translation – "A class average...")

From the data acquired through common analysis of growth of BH and BW we can conclude that the students in class b. were, on average, less mobile / active in sports or that, on a daily basis, they had a less active lifestyle in comparison with the students from class a.. Acquired data may also be connected to the sitting on a Spinalis chair, as sitting on a Spinalis chair, i.e. active sitting, encourages a constant muscular activity, which then maintain and acquire muscle strength and endurance and thus ensure a consistent growth and development of the locomotory apparatus. Active sitting on the Spinalis chair encourages constant activity of large muscle groups, which use energy from the body's supplies and thus help contribute to the BW management. Constant activity of the muscles and the related energy use from the body supplies also contributes to the stimulation of neuron connections, which consequentially results in a higher level of motivation, productivity and ultimately cognitive

abilities of the individual. Students, during class, usually spend 225 minutes sitting down. For this reason, the kind of chair they sit on and the way they sit in is of key importance.

A common analysis of measurement data of muscle endurance in classes a. and b. in the years 2009 (14th Dec. 2009) and 2011 (31st May 2011), with exempt maximal and minimal values, and with exempt measurement of muscle endurance of abdominal muscles has shown, that the measurement of side torso muscle capacity saw a better performance from the a. class students in comparison to the b. class students – exceeding the later by 6 sec. in 2009 and as much as 30 sec. in 2011. When measuring the capacity of back extensors, the a. class students were better by 36 sec. in the year 2009 and only 4 sec. in the year 2011. When measuring torso muscle capacity, the a. class students were again better than the b. class students, by 11 sec. in 2009 and 16 sec. in 2011.

Diagram 21: Muscle capacity test – A:B comparison of data from 2009 and 2011 for individual tasks with increase and difference – exempt minimal and maximal values Source: Zavod Fit



(Diagram translations; Title: Comparison A and B – 2009 and 2011; Razlika – difference)

Common data analysis with maximal and minimal values exempt in the class a. has proven, that the students of the class a., when measuring the lateral muscle of the torso in the year 2009, achieved an average of 25 sec. and in the year 2011 77 sec., thus improving the result by 52 sec., and in the measuring of back extensors, the average in 2009 was 84 sec. and in the year 2011 61 sec., seeing a decrease of results by 23 sec. When measuring the capacity of torso muscles, the average in 2009 was 54 sec and in 2011 62 sec., seeing an improvement of 8 sec. The common analysis of data in class b.with maximal and minimal values exempt showed that the students of class b., when measuring the capacity of lateral muscle, achieved an average of 19 sec. in 2009 and 47 sec. in 2011, improving their result by 28 sec.; when measuring the back extensor capacity, the result was 48 sec. in 2009 and 57 sec. in 2011, thus improving their result by 9 sec. and in the torso muscle measurements, the results were 43 sec. in 2009 and 46 sec. in 2011, improving the result by 3 sec.

From a further common analysis of acquired data, it is evident that the students of class a. in comparison with the students of class b. achieved a higher level of muscle capacity, it being visible in all tests of muscle capacity measurements, both in 2009 and in 2011.

Based on all obtained and analyzed data, we may conclude that active sitting on Spinalis chairs in school did help and does help acquire better muscular capacities, as demonstrated by the students of class a., and this to a better psycho – physical health. Of course, we must also take other factors into consideration, and the fact that they were not included in this research.

Research »Sitting on a Spinalis Chair in School 2006-2011« has thus proven, that active sitting on a Spinalis chair indirectly contributes to muscular activity of spinal stabilizers in a sitting position, relief of the spine especially in the lumbar area of the back, prevention of early and excessive degenerative changes, elimination of lower back pain, use of energy from the body's reserves and thus a management of BW, better state of mind, a higher level of concentration and motivation, higher productivity, stimulation and improvement of cognitive abilities and much more.

Conclusion

Considering the obtained results and the analysis thereof, it is safe to say that the a. class students were a lot more capable compared to the class b. students due to active sitting on Spinalis chairs, but must, at this point, emphasize that there are factors affecting the existing state and results that were not contained in the research, such as quantity / quality of movement / sports activity during class, quantity / quality of movement / sports activity as additional activity, active / sports activity in free time or forms of free time spending, quantity and quality (where and how) of sitting during free time activities and free time itself (which activities, how often and how much time), quantity of transport movement (trip to school, trip back home) and others.
We can surely confirm that nowadays, in the time of inactive lifestyle, it is very important to ensure an active and healthy form of sitting both in school as well as at home.

Recommendations

What can we actually do? Is there a way to put less of a burden on the spine while sitting?
Due to everyday irregular and overly intense burdens on the spine, it is very important that we take enough time to move and relax and thus relieve the spine daily. Long periods of sitting are one of the key factors in early degenerative changes and spinal illness. Active, correct sitting on a Spinalis chair can help prevent and cure degenerative change and illness of the spine.

Confirmation of research on sitting
Epidemiologic findings, presented by Videman, Nurminen and Troup (1990) have recorded an increased danger for the intervertebral disc dislocation with persons, who, at their work place, mainly sit. The known mechanical changes related to a sitting position involve a higher tension between intervertebral discs in comparison to the standing position (Nachmeson, 1966), increased stretching in the rear area of the binding ring, due to a slipping out of the rear (next to the spine) tissue, a reduction of firmness in the direction backwards – forwards and increase of shear forces, as well as the motion of mechanical lever backwards, which causes a reduction of mechanical advantage of extensors, further resulting in increased pressure on intervertebral discs.
Recently created instructions recommend an upper limit of sitting on chairs with fixed seat to be 50 minutes without pause. This will, in the future, be precisely monitored and evaluated.

Ways of reduction of spinal issues through long term sitting (McGill 2007) which could include correct active sitting on Spinalis chairs:

- Pick an ergonomic chair for active sitting and use it correctly (few people do). Many people believe that simply setting up the chair correctly means they are sitting in the proper body position, i.e. sitting area is set up for a height that enables hips and knees to be at 90°, while the body is straight. This may be an ideal position, but not for over 10 minutes. We may achieve that by changing position (legs on chair) leaning backwards, legs on desk...). Due to this, position on the chair should be changed every 10 minutes or even sooner. It is not recommended to sit in the same position on the chair for a prolonged time!
- Stand up several times! No restraints in this! Some directives recommend exercises in a sitting position and even stretching the spine by bending forward (contraction). Neither makes sense and is disastrous! Should we want to relieve the spine, we must carry out opposite activities to relieve the burden of the already burdened parts.
- During working time, perform some exercises for the strengthening and stretching of spine stabilizers. It is recommended to do it in the middle of the work day and not immediately in the morning. Only make a few exercises and be aware that quality, not quantity, matters!

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