On The Way to a Healthy Spine in the Workplace

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Abstract

When performing numerous activities such as sedentary work duties, working on a computer or phone, reading, etc., we are forced to round forward our entire back. If we do not analyse our posture and if we are not familiar with the proper body positions, we cannot adjust them to individual situations. The present article presents the results of an online research in which my work colleagues (class and subject teachers, school counsellors) took part. There were 36 teachers included in the research. The findings show that 60 % of teachers experience pain in a lumbar area, and 53 % of teachers experience pain in the neck area of the spine. Although 82 % of respondents are familiar with the exercises for a healthy spine and exercises for a better posture, 62 % of them responded that they care for their spine "a little or not enough". Research participants partially adapt and rearrange their workplace (we need to keep in mind that the research was made during the period of distance learning). According to the research, 53 % of respondents do not pay enough attention to a correct position of a neck area. All participants included in the research would like to learn more about prevention measures which help to reduce strains on the body and consequently reduce the likelihood of spine injuries as well. There are enough reasons to study teachers' workplace and to form a programme which will encourage teachers to perform exercises for a healthy spine regularly in order to prevent the most frequent spine problems. However, the question remains: "How to motivate teachers to change their habits and movement patterns and incorporate daily practice of these exercises into the workplace as well as their home environment?"

Keywords: teachers' body posture, healthy spine, teachers' workplace, work ergonomy, sedentary lifestyle

1. Introduction

There is one crucial thing that we learnt at school, namely, while sitting for hours and hours, our bodies become clumsy, slow, stiff, and useless. The late Leon Štukelj, a well-known Slovenian sports personality, showed by his example what active lifestyle or "the movement for life" meant. To remain active, vital and young, even as we get older. Sitting has been taking away our freedom since we were in a kindergarten. We have got trapped in a system that makes us all immobile and rigid. It is not a matter of age, but a matter of our attitude to ourselves. It is time for us to change something regarding these matters as well.

(M. Irenej in the book What they don't tell you in schools?)

There are several challenges in the workplace, one of them definitely being (frequently overlooked and unintentionally neglected) teachers' work environment. Whatever activities we perform, we are forced to move forward – sedentary work, working in front of a computer, telephoning, reading, etc. This means that our head is tilted forward and down, which puts additional strain on the spine. Its curvature changes and consequently, its balance is altered as well. All adults are exposed to these daily burdens, since a sedentary lifestyle is becoming a predominant way of life. The Health and Safety at Work Act promotes healthy workplace environment and focuses on systematic target activities and measures enforced by employers in order to maintain and strengthen the physical and mental health of employees.

Due to the fact that we spend a considerable amount of time at work, we should strive to include regular physical activity in our work environment. Regular physical activity has been proven to lead to healthier, happier, and more productive individuals. This article aims to encourage people to devote more attention to these issues and take an active approach to finding the appropriate solutions. I hope that it will reach as many employees in the field of education as possible.

2. The anatomy of a healthy spine

In order to understand a body posture, one needs to be familiar with the anatomy of the spine, therefore I will briefly summarize the basics. The spine provides the main support for our torso, thus allowing for an upright position (Remec, 2007). The spine is made up of vertebrae and intervertebral discs. Intervertebral discs lie between vertebrae and they act as buffers intercepting the vibrations, blows and strokes that we are exposed to every day. Muscles and ligaments along the spine (neck, back, abdomen, buttocks, legs and pelvic floor muscles) move the spine and help spinal function: bending forward or backward, turning right and left, and bending right and left. In addition, the spine protects the spinal cord with spinal nerves branching off from the left and right side of the spinal cord and spreading throughout our body (Striano, 2019). The spine is the structure that is connected to pelvis, skull and shoulder girdle. The spinal column has the shape of a double 'S' and is divided into three major sections: the cervical (neck), the thoracic (sternum and ribs), and the lumbar section, more commonly known as the lower back (McGill, 2018).

The cervical spine (neck) starts immediately below the skull and ends at the first thoracic vertebrae, approximately where the neck and torso meet. The thoracic section starts on an imaginary line running across the upper part of the shoulders and extending all the way down to the end of the ribs. The lower back or lumbar spine is the anatomic region between the lowest rib and the upper part of the buttock, extending to the pelvis, to the tailbone (McGill, 2018). The thoracic section of the spine has a slight curvature which is called kyphosis. Both the cervical and the lumbar spine are slightly curved as well, and this inward curvature is called lordosis (Striano, 2019).

3. Physiological body posture

Physiological body posture is a prerequisite for a healthy movement (Knific, Petrič and Backović Juričan, 2016). During intense physical activity and vigorous exercise, all body parts that are in a physiological position should have the optimal load. Otherwise, individual parts of the body may become overloaded and strained, which is likely to increase the risk of injury. In the physiological position, the feet shall be aligned with the hips. The knees are slightly bent. The pelvis in the physiological position provides good support to the spine, lower limbs and internal organs. The spine has a thoracic, lumbar and cervical curve. The physiological position of the chest (thorax) enables the optimal functioning of the respiratory organs, with the head being in an upright position and maintaining its equilibrium, which will prevent excessive neck strain. The optimal line of gravitational force, which acts on the body in an upright posture, passes through the ankle, knee, hip joint, torso (spinal curves) and head, thus forming the appropriate physiological posture. We talk about the »neutral« spine position when all three curves are present, which is the correct and natural position. In this position, our back is strongest and best supported.

4. Causes of back pain

According to scientists, there are two main causes of back pain, namely, a lack of exercise and insufficient supply of nutrients along with a limited blood flow to muscles, ligaments, tendons and intervertebral discs (Froböse, 2016).

The most common consequences, resulting from the two factors mentioned above which increase the risk of back pain are as follows:

1. Due to a lack of physical activity, muscles waste away (atrophy); muscles, namely, require load and movement, otherwise they lose their stiffness.
2. In the event of permanent insufficient load, any rotation of the body is considered to be dangerous for our vertebrae, as the muscles no longer provide adequate support for our spine. If we don’t take care of our muscles, this reduces, in particular, small deep muscles which, due to genetic reasons, lose their mass and strength significantly faster than other muscles.
3. Due to insufficient load and insufficient care, our ligaments become loose. The ligaments, which should provide support to our back, start losing flexibility and can therefore no longer ensure stability.
4. If, due to insufficient load and relief, there is no exchange of fluid that ensures a sufficient supply of nutrients, the intervertebral discs shrink. If there is an insufficient fluid supply, they literally dry out.
5. If we don’t take care of our connective tissues, they are no longer able to perform important tasks such as protecting muscle envelopes and maintaining the flexibility of ligaments and tendons.

6. If we don't keep our nervous system healthy or in the event of pinched nerves occurring on account of hardened tissues, nerves can no longer follow body movements. It is really important that the nerves remain flexible.
7. Due to permanent physical inactivity, the cartilage on almost 50 small vertebral joints begins to disintegrate.
8. As a result of the lack of movement, our bones become weak and brittle, since the cells that contribute to bone growth do not get the stimuli or an order to carry out their operations. There are predominantly cells that break down bone tissue and thus our bones gradually become hollow.
9. Shoulders and hip joints which have become immobile on account of the lack of movement, put strain on the spine as they have to compensate for the lack of mobility of these two large adjacent joints.
10. Physical inactivity, insufficient tissue load, and insufficient supply of nutrients and limited blood flow prolong the recovery of damaged tissues (ibid).

5. Physical activity in the workplace

Venna Declaration, which is an important element of the European Healthcare Directive 2020, highlights, among other things, the importance of a health-friendly environment that promotes physical activity, active holidays, and a healthy work environment.

Europe is the first in the world to pursue the physical activity strategy, and it is the Northern and Western European countries that prove to be the most successful at implementing these measures (Sušec in Zovko and Filipič Jeras, 2020). In Slovenia, there is a high level of awareness regarding the importance of physical and sports activity. Slovenia also celebrates its day of sports, declaring 23 September as the national Sports Day. Physical activity in the workplace is extremely important, as it encourages better employee health and contributes significantly to maintaining the health of all employees. In order to promote physical activity at work, employees should be encouraged to take the stairs (instead of an elevator), resort to active transport (walking, cycling), and take active breaks (WHO in Zovko and Filipič Jeras, 2020). The two authors also stress that one-sided loads lasting for several hours and forced postures gradually reduce physical abilities and increase fatigue.

By taking active breaks at appropriate intervals, we prevent the negative effects of long-lasting activities and protect the health of our employees. Chairs for active sitting and tables that are adjustable in height and allow work in a standing position are increasingly used in today's modern workplaces. By means of appropriate activities, we allow for a faster physical and mental recovery of our body (ibid). In order to encourage Workplace Health Promotion (WHP), the World Health Organisation has presented some practical exercises for employees, aimed at improving cardiovascular endurance (WHO, 2020).

Working from home also leads to an increase in the amount of time we spend sitting. That is why in remote working, an active break is extremely important, raising the significance of workout videos which thus come to the fore. I am personally very satisfied with the following

providers of such physical-activity content: www.smartphit.si, www.mehanikhrbta.si, Spinea (Facebook page).

6. Research on sedentary lifestyle and back pain

Excessive sitting along with a lack of physical activity increases the risk of muscle fatigue, leading to poor posture and in the long run this can also bring about spinal deformity (Zurc, 2006). Poor posture may also result from prolonged sitting on bad chairs (Gorenšek v Zurc, 2006).

I did not find any data that would directly address posture problems of the Slovenian citizens, however, spinal diseases and spinal defects have been classified by the National Institute of Public Heath (NIJZ) as chronic diseases placing a huge burden on Slovenian society (Vinko at al., 2018).

Given below is some interesting statistical data relating to this issue, which can be found on the NIJZ website:

- In view of good and very good health self-assessment, Slovenia ranks in the lower half of the EU countries. However, there are differences in terms of education and accordingly, people with higher education rank at the very top of the scale, whereas those with primary education are placed at the bottom of the scale (Lesnik et al., 2018).
- 21 % of the adult population of Slovenia most often suffer from spinal diseases and spinal deformities.
- Spinal diseases and deformities are more prevalent in women, and this applies to all age groups, the biggest difference occurring among the population aged between 45 and 54 (Vinko at al., 2018).
- 53 % of respondents have experienced pain in the lower part of the spine in the last 30 days.
- 42.8 % of respondents have had neck/shoulder pain in the last 30 days.
- Slovenian citizens sit for an average of five hours on a normal working day, and four hours a day at weekends.
- On working days, people aged between 25 and 34 are the ones who spend most time sitting.
- Citizens with primary and lower education sit for an average of 3.4 hours a day, while those with higher education sit for an average of 6.6 hours a day (ibid).

7. Research results and analysis of the results

There were 36 teachers participating in the study.

The results of the study showed that:

- 49 % of teachers fall into the 35–44 age group, with 87 % of respondents being female;
- 59 % of teachers rate their health as »good« and none of them as »bad«;
- 62 % of teachers claim they »do not take sufficient care of their spine«;
- 60 % of teachers have experienced lower back pain (lumbar spine) in the last 30 days;
- 53 % of teachers have experienced neck pain (cervical spine) in the last 30 days;
- 33 % of teachers have experienced shoulder pain in the last 30 days;
- 33 % of respondents experience pain occasionally, some of them pointing out that they experience pain more often during online classes, as they sit in front of a computer for a longer period of time;
- 31 % of teachers were diagnosed with spinal diseases or spinal deformations by a doctor;
- 54 % of teachers spend up to 2 hours a day at work (school) on a normal working day;
- 62 % of respondents usually spend approximately additional 4 hours a day in a seated position at home or while performing their free-time activities (e.g. watching TV, using computer or mobile phone, driving a car or bus, sitting and chatting, eating, etc.);
- 41 % of respondents are often aware of their posture;
- 82 % of teachers are familiar with the exercises that can help improve posture and the exercises which help you maintain a healthy spine;
- The three most common exercises that teachers use to improve posture and manage back pain are: board, cat, and various stretching exercises;
- 38 % of teachers did the same amount of physical activity during the period of online education as they did in the pre-Covid period;
- 85 % of teachers sit more during the period of remote learning;
- The most common characteristics related to the working environment of teachers during online home-schooling are as follows:
  - adjusting the screen distance and adjusting the height of the screen to the eye level;
  - a mousepad with a wrist rest or a wrist support;
  - an ergonomic mouse;
  - the type of chair which is customized (office chair), but only in some cases, since otherwise many teachers use an ordinary kitchen chair.
- 49 % of respondents opt for the so-called active break during online lessons;
- 100 % of teachers believe that sitting behind a computer puts the most strain on their spine and disrupts their proper posture while working;
- 56 % of teachers have noticed a correlation between stress and back pain;

- All survey participants would like to get more information about preventive measures that help reduce our body burden and consequently decrease the risk of spinal cord injury.

Given below are some statements by respondents:

»My posture is much worse during the period of remote work. Despite the regular exercise; I have experienced pain that I never felt before or that I might have experienced only occasionally. However, it is true that I am now more aware of the problems with my posture than I used to be.«

»Until the moment we started with online classes, I didn't notice any problems with my back, since I had always been quite active in class, dancing, singing, and doing various activities with my students, either in a classroom or outside the school. At that time, that is in pre-Covid times, I was sitting very, very rarely. However, now that I am forced to sit for hours and hours at the computer, prepare materials, conduct videoconferences, check and correct assignments, etc., I started experiencing back pain and I can feel it every day, sometimes more, sometimes less. When I experience a burning sensation, I get up and walk or I head out for a run, but sometimes I have video conferences, one after another, and that is when I get really exhausted. I sincerely hope that we will all go back to school and that we will no longer have to work remotely! I truly hope that my spinal pain will thereafter go away.«

»I would like to become familiar with certain exercises that will help me maintain a healthy spine and which would be suitable for short breaks during the period of remote work.«

»Given that I have a hernia, sitting for long periods of time causes me pain. By using a sitting ball, I have been able to work remotely during these months when I have been sitting for up to 10 hours. Without a sitting ball, I probably wouldn't have been able to make it.«

The survey data indicate that the survey participants are relatively young people, therefore a high self-assessment of good health is expected and is consistent with the findings of the survey entitled *Health-related behavioural style of Slovenian citizens* (Vinko at al., 2018). The survey at our school shows that on a normal working day (school lessons) my work colleagues on average spend up to two hours a day in a seated position, which is less than an average Slovenian spends sitting. However, large differences occurred during the period of distance learning, as 85% of teachers report that distance learning in the form of videoconferences requires much more sitting. Teachers have collectively (100%) expressed their view that sitting behind a computer puts a huge strain on their spine and disrupt their proper posture while working. The data from the research entitled *Health-related behavioural style of Slovenian citizens* (ibid.) illustrate that the amount of time people spend sitting is closely related to the type of work that they perform. The amount of sitting per working day also varies with the level of education - those with higher education spend an average of 6.6 hours a day sitting. The data also shows that the percentage of teachers who have had pain in the cervical and/or lumbar spine in the last 30 days is higher than the average in Slovenia. It

can be concluded that the findings are the result of the changes in the teaching process. It would be sensible to repeat the research in the future and compare the teachers' health status during the period of online classes and on-site lessons. In one third of the teachers, the diagnosis of the disease or spinal disorder was established by a doctor, which is approximately 10% higher in comparison with the results of the survey carried out at the national level. It is also encouraging that the respondents are aware of the importance of an appropriate work environment which they try to adapt to the best of their ability, but judging by the data, they could put even more effort into rearranging their work space, thus making it even more suitable and appropriate for the needs dictated by the new reality. Similarly, a high percentage of teachers (82%) is well familiar with the exercises that help relieve back pain, yet they still want to gain more knowledge and further training in this area. In accordance with the Health and Safety at Work Act and in agreement with our school principal and physiotherapist, we are planning to hold a workshop on healthy spine.

8. Recommendations for preventing poor posture

The current situation has forced teachers to work from home, therefore it is extremely important to reduce the strain on the body and pay attention to the general well-being in order to perform distance learning successfully. Although there may be many people who feel no spinal pain, this does not mean that we are safe from strains. Excessive strains, which currently occur every day, lead to a gradual decline in the tolerance limit of the spine, which means that over time, we become much more susceptible to the onset of pain and major injuries (Gumilar, b. d.).

Based on the findings, I established three sets of recommendations. During the lecture, I already presented my recommendations for better posture and exercises to improve posture at work and at home. Listed below are five tips to help create ergonomic adjustments in the workplace (ibid.).

1. The height of the chair should be adjusted, so that the forearms can rest relaxed on the table at an angle of 90 degrees in the elbow. The most common mistake is that the chair is set too low, which leads to tension in the shoulder joint and neck area. If your feet are not stable on the floor, it is recommended that you raise the ground level (e.g. with blocks of paper). Through the feet, we can reduce the forces on the spine by up to 20%.
2. A chair with a lumbar support: i.e. forward convex curve on the chair in the lumbar region. If such support is not provided by the chair, we can create it ourselves by rolling up a towel. While sitting, the lumbar curve is straightened or even arched back. This in turn means that much more force is placed on the intervertebral discs, which may potentially lead to the development of hernias and trigger some other problems.
3. Screen height: when sitting with a straight back, your eyes should be 5-7 cm below the top edge of the screen. In practice this means that the browser we open should appear at

eye level. The screen should be positioned directly in front of you. For laptops, the use of a special stand is recommended.

4. »Micro movements«: even before the pain occurs, it is recommended to perform cyclic movements by changing the position of the backrest, arms, legs, pelvis and feet. In this manner, we allow certain muscles and structures to rest and regenerate, and at the same time, we increase the blood circulation of these structures by means of movement.
5. An active break allows us to relieve muscle tension and relax your muscles that have been under a constant tension and, at the same time, we also speed up the blood flow – the flow of nutrients that will give our muscles energy for a new period of tension (sitting).

9. Conclusion

»As I am filling out this questionnaire, I have already started paying more attention to my posture«, is one of the written statements that can be found at the end of the survey questionnaire. I personally believe that this study will help to raise the level of awareness of employees regarding the impact of prolonged sitting on spinal deformation, highlight the importance of a properly designed workplace, and consequently reduce tension problems in the cervical spine (neck region). By identifying the current state of employees, providing recommendations for adapting the work environment, drawing up programmes, and holding lectures for my work colleagues, I managed to achieve much more than I could have imagined at the beginning of this journey. As regards all of you reading this article, however, I wish you would put a squeeze on the pain by leading an active lifestyle, and turn your back on a sedentary and inactive lifestyle.

References

Froböse, I. (2016). *Nova vadba za zdrav hrbet: kako se hitro znebimo bolečin.* Ljubljana: Mladinska knjiga.

Gumilar, T. (b. d.). *Pet nasvetov za ergonomsko prilagoditev pisarne* (dostopno 3. 1. 2021) na https://smartphit.si/2020/12/08/5-nasvetov-za-ergonomsko-prilagoditev-domace-pisarne/

Knific, T., Petrič, M. in Backović Juričan, A. (2016). *Gibam se: delovni zvezek za udeležence delavnice: z vztrajnostjo in ozaveščenostjo skupaj do boljšega zdravja.* Ljubljana: Nacionalni inštitut za javno zdravje.

Lesnik, T., Gabrijelčič Blenkuš, M., Hočevar Grom, A., Kofol Bric, T., Zaletel, M. (ur). (2018). *Neenakosti v zdravju v Sloveniji v času ekonomske krize.* Ljubljana: Nacionalni inštitut za javno zdravje (dostopno 18. 2. 2021) na https://www.nijz.si/sites/www.nijz.si/files/publikacije-datoteke/neenakosti_v_zdravju_2018.pdf

McGill, S. (2018). *Postani sam svoj mehanik hrbta: McGillova metoda ozdravitve bolečin v hrbtu – korak za korakom.* Domžale: KinVital kineziološki center.

Remec, M. (2007). *Za zdravo in lepo držo: promocija telesne aktivnosti in zdravja gibal.* Izola: Fizioterapija, Zdravstveni dom.

Striano, P. (2019). *Anatomija vadbe za zdrav hrbet: vadbeni program kiropraktika proti bolečinam v hrbtu.* Ljubljana: Mladinska knjiga.

Škarja, P. (2019). *Česa šole ne povedo?: predavanja za življenje.* Trbovlje: 5ka.

Vinko, M., Kofol Bric, T., Korošec, A., Tomšič, S., Vrdelja, M. (ur). (2018). *Kako skrbimo za zdravje? Z zdravjem povezan vedenjski slog prebivalcev Slovenije 2016.* Ljubljana: Nacionalni inštitut za javno zdravje (dostopno 18. 2. 2021) na https://www.nijz.si/sites/www.nijz.si/files/ publikacije-datoteke/kako_skrbimo_za_zdravje_splet_3007_koncna.pdf

Zakon o varnosti in zdravju pri delu (dostopno 11. 10. 2021) na https://www.uradni-list.si/glasilo-uradni-list-rs/vsebina/2011-01-2039/zakon-o-varnosti-in-zdravju-pri-delu-zvzd-1?h=zakon%20o%20varnosti%20in%20zdravju%20pri%20delu

Zovko, V. in Filipič Jeras, K. (2020). Pomen telesne dejavnosti na delovnem mestu. *Šport.* LXVIII (3-4), 170-174.

Zurc, J. (2006). *Drži se pokonci: pomen gibalne aktivnosti za otrokovo hrbtenico.* Koper: Univerza na Primorskem, Znanstveno-raziskovalno središče, Inštitut za kineziološke raziskave: Založba Annales.

World Health Organization (2020). *Stay physically active during self-quarantine* (dostopno 11. 10. 2021) na https://www.euro.who.int/en/health-topics/disease-prevention/physical-activity/publications/2020/stay-physically-active-during-self-quarantine