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THE IMPACT OF THE SEDENTARY WORK, AN ACTIVE LIFESTYLE AND SOME SOCIO-DEMOGRAPHIC VARIABLES ON THE MUNICIPAL EMPLOYEES' MUSCULOSKELETAL PAINS, AND BODY WEIGHT INDEX

AZ ÜLŐMUNKA, AZ AKTÍV ÉLETMÓD ÉS EGYES SZOCIODEMOGRÁFIAI VÁLTOZÓK HATÁSA AZ ÖNKORMÁNYZATI DOLGOZÓK MOZGÁSSZERVI FÁJDALMAIRA ÉS TESTTÖMEGINDEXÉRE

Abstract

Objectives: In the group of risk factors that lead to diseases, sedentary lifestyle has by now become the most significant one, therefore, those people, who work at a desk and sit most of the day, and, in addition, do not exercise enough, are exposed to increased health risks. The aim of our research is to explore the interrelatedness of the length of sitting time at work, physical activity, and some other socio-demographical variables with the occurrence of musculoskeletal pain (MSP), as well as the body mass index (BMI).

Hypotheses: It was assumed that MSP and BMI were dependent on sociodemographic variables, the length of sitting time at the workplace, and the physical activity.

Material and methods: Questionnaires were used, and the respondents included municipal employees of Csongrád-Csanád County in Hungary (N=899). Two-pattern t-test and 1-cri-

teria variance analysis were used to explore the relationship between the individual variables.
Results: Women, people of more mature age and those who mostly sit while working in an office have more serious MSP concerning each area of their bodies. Intensive sport activity may reduce, while obesity and excess weight may intensify the occurrence of pain. There are significantly fewer people who do sport in the group of women. It is men who tend to be more obese than women, and the same refers to adults of more mature age when compared with younger office workers. No correlation could be found between BMI and the length of sitting time in the office. The amount of weekly physical activity and BMI were reversely related with one another. Active modes of transport have not shown any relatedness to MSP symptoms and BMI.
Conclusions: It is recommended to include specialists in order to increase the number of occasions when people do physical activities with the aim of reducing the length of sitting time and using active modes of transport when going to work; in brief, it is of utmost importance to create such conditions, that may lead to improved health and increased work performance of office employees.
Key words: physical activity, sedentary work, musculoskeletal complaint, BMI, Csongrád-Csanád County

Absztrakt

Célkitűzések: A krónikus megbetegedésekhez vezető kockázati tényezők között a mozgásszegény életmód mára a legjelentősebbek közé került, vagyis komoly egészségügyi kockázatoknak vannak kitéve azok, akik a nap nagy részét íróasztalnál töltik és mindennapjaikban nem mozognak eleget. Kutatásunk célja, hogy feltárja a munkahelyi ülésidő hosszának, a fizikai aktivitás és néhány más szocio-demográfiai változó összefüggéseit a mozgásszervi fájdalmak (MSP) jelentkezése és a testtömeg-index (BMI) között.
Hipotézisek: Feltételeztük, hogy az MSP és a BMI függ a szociodemográfiai változóktól, a munkahelyen eltöltött idő hosszától és a fizikai aktivitástól.
Anyag és módszerek: Kérdőíves felmérést végeztünk a Csongrád-Csanád megyei önkormányzati alkalmazottak között (N=899). A változók közötti összefüggéseket kétmintás t-próbával és egyszempontú varianciaanalízissel (ANOVA) tártuk fel.
Eredmények: a nők, az idősebbek, és a munkahelyen többet ülők MSP-pontszámai valamennyi testtáj (nyak, váll, hát, derék, kar, láb) tekintetében magasabbak. Az intenzív testmozgás csökkenti, a túlsúly és az elhízás pedig fokozza a fájdalmak megjelenését. A nők között jóval magasabb az egyáltalán nem, vagy csak

ritkán mozgók aránya. A férfiak átlagosan túlsúlyosabbak, elhízottabbak a nőknél, az idősebb felnőttek pedig a fiataloknál. A munkahelyi ülésidő és a BMI között azonban nem találtunk összefüggést, de a magasabb heti mozgásidő fordított kapcsolatban áll a BMI-vel. A rendszeres aktív közlekedés nem állt kimutatható kapcsolatban az MSP pontszámokkal és a BMI értékekkel.
Következtetések: Az összefüggések további feltárása érdekében további életmódváltozókat is érdemes bevonnunk vizsgálatunkba. Emellett szorgalmazzuk a rendszeres, alkalomszerű, vagy véletlen munkahelyi és/vagy azon kívüli fizikai aktivitás feltételeinek javítását, szakemberek bevonásával a mozgásalkalmak számának növelését, valamint az aktív munkába járás támogatását.
Kulcsszavak: fizikai aktivitás, ülőmunka, mozgásszervi panasz, BMI, Csongrád-Csanád megye

Introduction

In the group of risk factors that lead to diseases, sedentary lifestyle has by now become the most significant one (Hallal et al., 2012; Lim et al., 2012). This role can primarily be explained by the fact that, on the one hand, sitting lifestyle has by now become the norm (Kinczel and Müller, 2020), and, also, that, on the other hand, there has been a decrease in the amount of regular or occasional physical activities people are engaged in (Stephenson et al., 2000). Physical inactivity is the primary risk factor considering the occurrence of all lifestyle-related diseases, since it greatly increases the chance of the development of a complexity of symptoms, including obesity- and excess weight-related health problems, cardio-vascular diseases, cancer, type-2 diabetes, various locomotor diseases and osteoporosis (Owen et al., 2010; Varga et al., 2015; Beck et al., 2017; Gero et al., 2018). Two thirds of the adult male population of Hungary, and a bit more than half of the Hungarian women are overweight or obese, and the resulting most common health problems include musculoskeletal diseases and high blood pressure; these are the health problems, almost one third of Hungary's adult population is diagnosed with (Boros et al., 2021). There is a significant difference concerning the BMI figures of men and women: the national average in the group of men is 27.5 kg/m^2, while in the group of women it is 27.4 kg/ m^2.

Regular physical activity, including sport and other daily activities, certain parts of the weekly routine (e.g., active mode of transport, physical work), reduce the risk of obesity and excess weight, and thus make the development of the previously outlined diseases rare. In addition, physical activity slows down the aging process and improves the quality of life (Duncan, 2006; Church, 2011; Lampek and Rétsági eds., 2015; Hock et al., 2015; Radak and Taylor, 2019; Torma et al., 2020; Tóth, 2022). The psychological effects of physical activities also play an important role, including stress relief, the prevention of anxiety and depression (Paluska and Schwenk, 2000), the improvement of people's mental state, improved intellectual performance (Morrow et al., 2010; Berki and Tarjányi, 2022), and, at the same time, physical activities also have a beneficial effect on the subjective evaluation of one's health status (Piko, 2000).

Considering the above, the World Health Organization recommend each healthy adult doing a weekly 150-300 minutes of physical activity of medium intensity, or, 75-150 minutes of physical activity of high intensity, or a combination of these (WHO, 2020). Unfortunately, despite all these recommendations, almost one half (46%) of Europe's adult population does not do any sport at all and Hungary's relevant figures are even worse than this (53%); on average 15% of Europeans and 20% of the Hungarians walk continuously less than a daily 10 minutes.

According to the figures of Hungary's Central Statistical Office (KSH, 2021b), it is only 7% of Hungary's adult employees who do some kind of sport (men: 9%, women: 5%). In case other forms of free time physical activities are also considered (walks, hikes), the proportion is somewhat higher, but the overall time spent on physical activities is much less than the required minimum, considered as necessary to preserve good health. On average out of 218 minutes of free time at a person's disposal on a daily basis, an employee spends only 6 minutes (men: 8 minutes, women: 4 minutes) exercising.

In case a person neglects exercising and, in addition, is engaged in sedentary work, it is even less probable that he or she will be able to do the amount of physical activity recommended by WHO. The so-called 'white-collar workers' in Hungary are mostly engaged in sedentary jobs, and, in comparison with the EU average, they exercise even less: 6 out of 10 people do not do any sport, or, in case they do it, they do it rarely; on the other hand, the European figure is 5 out of 10 (Eurobarometer, 2018). It is needless to mention that due to the restrictions of the COVID-19 pandemics starting in 2019, the amount of daily sitting time has drastically increased and the proportion of those who do exercises on a regular basis fell significantly (Ács et al., 2021).

On the other hand, the preciously described average values do not reflect the underlying social and regional differences. In Hungary's Southern Great Plain, the geographical region our current research focuses on, the results have shown (Győri et al., 2021) that those adult males who are relatively young, whose income is favourable, live in more populous settlements, and, whose body mass index (BMI) is within the normal range, do physical activities more intensively than the average. These findings are in accordance with those statements found in general professional literature, according to which the willingness to do exercises is related to several socio-demographic factors, as well as to some anthropometric parameters (e.g., Gerovasili et al., 2015; Eurobarometer, 2018; Katona et al., 2021). In relation to this latter feature it can be mentioned that the increase in age, BMI and the level of physical activity are inversely proportional (Suryadinata et al., 2020) men, despite the fact that they are in general more willing to do some kind of sport than women, they are often more overweight than their female counterparts (KSH, 2019).

The proportion of physical activity-inactivity is mainly determined by people's daily sitting times, but it is also influenced by the profession itself, the ways how people get to their workplaces and also the way they spend their free time. By Eurobarometer data (2018) the sitting time of the European adult population is on the increase; currently it is 41 % of Europeans and 33 % of Hungarians sit more than 5.5 hours a day. Since too much sitting leads to musculoskeletal pains (MSP), and, in addition, it increases the chance of the development of various metabolic diseases (Westgaard and Winkel, 1997; Haufler et al., 2000), the conclusion can be drawn that high sitting time at workplaces has a negative effect on the ability to work and also on work performance (De Vries et al., 2013).

Johansson and his colleagues (2020) have found that male office workers sit more than women but move around more intensively during their working hours; women tend to stand more frequently; in addition, researchers concluded that office workers of more mature age move around less than their younger counterparts. Lin et al., (2015) analyzed the data of American employees and they concluded that longer sitting time was related to higher BMI, primarily in case of men. Eriksen et al., (2015) focused on Danish office workers and found out that men tended to sit more, they were more frequently overweight or obese, but the positive link between BMI and sitting time was only proven in case of female employees. Some other researchers have even concluded (Ekelund et al., 2015) that high BMI indices predestine sedentary lifestyle, since no direct evidence was found concerning whether or not it was too much sitting that led to gaining excess weight. Van Uffelen and his fellow researchers (2010) in their overview of 43 research papers investigated the relationship between sitting work and its consequences; they also pointed out the clear connection between sedentary work and higher BMI, and in their opinion the risks of diabetes type 2 and higher mortality rate were also more probable.

In case long hours of sitting is absolutely necessary in a job, it definitely leads to increased pain occurring in different parts of the body (Bontrup et al., 2019), a condition, that definitely results in a variety of psychosocial symptoms, reduced ability to work, an increase in sick days, also meaning more health insurance costs (Hildebrandt, 2000; Makai, 2015). Physical inactivity at a workplace (too much sitting or standing), but also its opposite, too much physically demanding work (lifting heavy weights, too much walking), may cause the development of chronic musculoskeletal complaints. It is typical of the situation in Hungary that with the advancing of age, pain symptoms are intensifying, too. It is the larger proportion of women rather than men who suffer from musculoskeletal problems (neck-, or lower back pain, rheumatism, arthritis, or joint wear) (Kovács, 2012).

Considering the characteristics of sedentary work, Bau and his fellow researchers (2017) investigated a group of female office workers, and they found a connection of significance between pain in the area of shoulder and neck, the age of the workers and the length of their employment. According to research findings the intensity of pain depended on the blood flow value measured in the shoulder girdis; the age-related worsening of microcirculation, when paired up with sedentary lifestyle, was more likely to trigger ischaemic pain. King and his colleagues used a special device (2013) (biofeedback mouse) to prove that holding the upper limb continuously in a bad position while working had an influence both on the frequency of occurrence and the strength of pain symptoms.

It has already been approved by research that sitting work increases the risk of chronic lower back pain (Davis and Kotowski, 2014; Gibbs et al. 2018), a complaint, which is the most typical in the group of the middle-aged adult population. Its prevalence is about 60%, and it is closely correlated to several sociodemographic factors (e.g., It increases with the advancement of age, and women, also those workers who have sedentary jobs, or, on the contrary, those who do heavy physical work, suffer the most frequently from this type of pain) (Járomi et al., 2021). According to Heuch and his colleagues (2010) the frequency of the occurrence of lower back pain is positively related to higher BMI value, but it is more likely to develop while doing strenuous physical work than in sedentary jobs (Ganasegeran et al., 2014; Heuch, 2017). Bener and his colleagues (2014) also argued that the chance of the development of chronic lower back pain is equally high in groups doing sedentary or standing work, and in the group of those who do heavy physical work. Sitting in incorrect body posture may lead to pain, consequently, it is worth reducing sitting time at workplaces. Open inner office areas make it possible for office workers to move around; also, workstations characterized by ergonomic features are also helpful (Koohsari, 2022; Westgaard and Winkel, 1997).

According to Callaghan and his colleagues (2015) and the alternation of sitting and standing positions also has a positive effect on workers' health; it also means, that, on the one hand people feel less discomfort, and, on the other hand, their work performance may improve. Based on instrumental measurement data it has been approved that even a slight increase in physical activity may reduce the pain, typical of sedentary jobs (Chia et al., 2017). On the other hand, Antle and his colleagues (2018) have called the attention to the fact, that workstations, suitable for both sitting and standing, and which were originally created to reduce sitting time, may involve the risk of circulation and/or orthopaedic problems. Consequently, standing too long can be harmful, too, and this mode of work done for too long in incorrect body posture needs to be avoided as well.

There are several signs that the reduction of sitting time in itself is not enough to improve employees' health (Moreno-Llamas et al., 2022). Parry and his colleagues have analyzed (2019) 10 studies, detailing the impact of physical changes in the working environment. They haven't found any convincing proof in connection with the positive effect of standing or walking when working, as opposed to sitting. It is more likely that the proportionate changes are also necessary to reduce musculoskeletal pains. It is likely that the proportion of physical activities when working in the office and also when going to work (walking or cycling) need to be increased (Mason, 2000; Sherwood and Jeffery, 2000).

Pedersen and his colleagues (2009) observed office workers uninterruptedly for a year and they found that their blood pressure and body fat percentage could be positively altered by doing a variety of physical exercises and special resistance training. In addition, their shoulder- and lower back pain was reduced as well. Andersen and his colleagues (2010) proved that regular and organized physical training sessions considerably reduced musculoskeletal pain in each part of the workers' body. According to a research, focusing on 36 studies (Shiri and Hassani, 2017) it was concluded that regular exercises reduced the frequency of chronic lower back pain by approxi-

mately 11-16%. At the same time, Kamada and his research group (2014) did not find any link of significance between regular physical exercise and the occurrence of chronic lower back- or knee pain.
There is no doubt that the amount and the intensity of physical activity need to be increased, and a 'spine friendly' working environment needs to be established in the offices. These measures need to be accompanied with the demonstration and the teaching of correct body postures and active physiotherapic methods to all those people who do sedentary work (Jaromi et al., 2012).

Objectives

It is well known that physical activities have a beneficial effect on skeletomuscular complaints, body mass and in general the health status of individuals, consequently, our research objective was to investigate people's attitude to physical activities and the practical aspects of exercise in a group of office workers. We also intended to find out whether certain sociodemographic variables (gender, age, educational background) and the length of sitting time at the workplace are related to musculoskeletal pain=MSP and the body mass index=BMI of participants.

Hypotheses

It was assumed that the perception of musculoskeletal pain (MSP) was dependent on sociodemographic variables (H1), the length of sitting time at the workplace (H2) and the physical activity itself (H3). In addition, it was also assumed that the body mass index (BMI) was also dependent on sociodemographic variables (H4), the length of sitting time at the workplace (H5) and the physical activity (H6).

Material and methods

Data collection was carried out in 7 settlements of Csongrád-Csanád County (Csongrád, Hódmezővásárhely, Kistelek, Makó, Mórahalom, Szeged, Szentes) and workers of the government offices were included in it (N=899) (Number of ethical permission: 2/2019 SZTE). The survey was conducted in August and September 2019. The workers were informed about the aims of our research through their internal electronic system. Participation was anonymous and voluntary; filling in the online questionnaire took about 30-40 minutes. Our questionnaire was based on the one used in a previous project with the ID number TÁMOP-4.2.2.-08/1-2008-0006. The questionnaire of that project was supplemented with new questions of our own, in which we used the work of Keresztes et al. (2011). The questionnaire in its final form included questions concerning the respondents' sociodemographic data (gender, age, educational background), their sport habits (e.g., How many hours a week do you do sports? On what level do you currently do sports?), the length of sitting during their work hours (e.g., How many hours do you sit daily as part of your office work?), the mode of going to work (e.g., How do you usually go to work?) as well as some anthropometric variables (self-declared height and body weight).

Additionally, there were questions concerning the pain participants may repeatedly have experienced in their necks, shoulders, back, arms, lower back, or legs. Respondents scored the intensity of that musculoskeletal pain (MSP) on a scale from 1 to 11; the largest score was meant to mark the strongest pain. Six – possibly painful - body areas were thus evaluated and the sum of the individual figures (theoretically ranging from 6 to 66) is the so-called musculoskeletal pain total score, i.e., MSP TS. This figure shows to what extent the individual can be characterized by his or her musculoskeletal complaints. The individuals' BMI was calculated on the basis of the person's self-reported figures of their height and weight.

Data processing was carried out using the SPSS programme. In addition to the methods of descriptive statistics (e.g., average, standard deviation, relativistic distribution), two-pattern t-test and 1-criteria variance analysis were used to explore the relationship between the individual variables. Significance level was determined with 0.05 accuracy.

Results

When considering their gender, the group of office workers (N=899) had more women than men (n_{men}=207; n_{women}=692) in it. The average age of our sample was 43.2 (SD=8.8) years, and 6 out of 10 respondents were middle-aged (30-48 years). 8 out of 10 had university or college degrees (Table 1).

Table 1. Survey participants by some sociodemographic indicators, body mass index, sitting time at workplace and physical activity (N=899)

Indicators	n (%)
Gender	
Men	207 (23.0%)
Women	692 (77.0/%)
Age groups	
Young adult (19-29 years)	117 (13.0%)
Middle-aged (30-49 years)	564 (62.7%)
Mature middle-aged (50+ years)	218 (24.2%)
Educational background	
Secondary school	172 (19.1%)
College	400 (44.5%)
University	327 (36.4%)
BMI (categories)	
Thin	20 (2.2%)
Normal	447 (49.7%)
Overweight	290 (32.%)
Obese	142 (15.8)
Sitting time at workplace	
1-3 hours	19 (2.1%)
3-5 hours	70 (7.8%)
5-8 hours	489 (54.4%)
8+ hours	321 (35.7%)
Mode of going to work	
Car, public transport	596 (59.6%)
On foot, bicycle	363 (40.4%)
How much time a week do you spend on sport?	
None	479 (53.3%)
half an hour-an hour	65 (7.2%)
1-4 hours	255 (28.4%)
4 + hours	100 (11.1%)
At what level do you currently do sport?	
Hobby	379 (84.4%)
Competitive	70 (15.6%)

Source: Authors' edition

Doubtless, office work is sedentary work, and it can be characterized by sitting long hours. 9 out of 10 respondents declared to sit more than 5 hours during a workday. More than half of our respondents do not currently do any sport, despite the fact that earlier, before they reached 18 years of age, many of them used to do some kind of competitive sport or did sport as a hobby. The overwhelming majority of those respondents who are still active in one sport or another (n=641) do it with the aim of recreation. In addition to sport, other physical activities also played a role when the lifestyle and health status of office workers were considered. Active transport may be important, too, but this aspect is possibly strongly influenced by other factors, such as the distance between home and the workplace. As far as the mode of going to work is concerned, 4 respondents out of 10 chose an active way, i.e., walking or cycling. The BMI average was 25.6 kg/m^2 (men 27.0 kg/m^2; women 25.2 kg/m^2). When considering the summary of BMI categories, it was found that the proportion of people with slim and average physique (BMI<25) represented one half, while the other half was overweight (BMI≥25). Differences by gender in this respect were significant. 66.2% of men and 42.8% of women were overweight.

The total score (MSP TS) occurring in various body parts demonstrates significant differences ($p<0,001$) by gender, but also by age and sitting time. It was the female participants, those of more mature age and those who declared longer sitting time when working, who experienced more intense pain almost in relation to each body part (Table 2). The average value of the perceived pain was higher in the group of more mature middle-aged respondents (50-65 years of age). No relation was found between the respondents' educational background and MSP TS.

Table 2. The relationship of musculoskeletal pain (MSP) scores and body mass indexes (BMI) with some sociodemographic indicators

	Neck pain Sc. AVG (SD)	Shoulder pain Sc. AVG (SD)	Back pain Sc. AVG (SD)	Arm pain Sc. AVG (SD)	Lower back pain Sc. AVG (SD)	Leg pain Sc. AVG (SD)	MSP Total Sc. AVG (SD)	BMI (kg/m^2) AVG (SD)
Gender								
Men	1.8 (1.95)	1.98 (2.12)	2.32 (2.41)	1.50 (1.31)	2.85 (2.85)	2.37 (2.44)	12.88 (10.06)	26.95 (3.3)
Women	2.89 (2.83)	3.15 (2.99)	3.23 (2.99)	2.04 (2.03)	3.40 (3.15)	2.6 (2.82)	17.67 (13.75)	25.16 (4.80)
t-value	-4.77***	-5.22***	-3.98***	-3.59***	-2.39**	-2.71*	-4.65***	4.94***
Age groups								
18-29 years	2.15 (2.30)	2.22 (2.40)	2.53 (2.72)	1.44 (1.12)	2.47 (2.77)	2.00 (2.35)	12.80 (11.91)	23.73 (4.26)
30-49 years	2.63 (2.68)	2.85 (2.83)	3.03 (2.89)	1.82 (1.83)	3.09 (3.01)	2.64 (2.54)	16.07 (12.73)	25.28 (4.46)
50-65 years	3.01 (2.85)	3.30 (3.08)	3.26 (2.96)	2.43 (2.28)	4.15 (3.27)	3.75 (3.19)	19.90 (14.10)	27.30 (4.77)
F-value	4.02*	5.49*	2.41	12.70***	14.08***	19.74***	12.51***	26.86***
Educational background								
Secondary school	2.77 (2.77)	2.99 (2.60)	3.19 (3.03)	2.08 (2.00)	3.30 (3.10)	2.98 (2.68)	17.31 (13.91)	25.57 (4.62)
College	2.72 (2.72)	2.97 (2.69)	3.19 (2.98)	1.95 (1.99)	3.36 (3.07)	2.82 (2.73)	17.00 (13.21)	25.31 (4.52)
University	2.52 (2.60)	2.72 (2.86)	2.73 (2.68)	1.80 (1.74)	3.13 (3.09)	2.76 (2.75)	15.65 (12.62)	25.89 (4.78)
F-value	0.68	0.85	2.89	1.32	0.49	0.38	1.28	1.41
BMI (categories)								
Thin	2.10 (2.57)	1.90 (1.99)	2.70 (2.90)	1.55 (1.60)	3.05 (2.81)	1.85 (1.81)	13.15 (11.56)	17.77 (0.65)
Normal	2.76 (2.76)	3.02 (2.95)	3.08 (2.90)	1.81 (1.76)	3.10 (3.07)	2.55 (2.60)	16.34 (13.16)	22.30 (1.73)
Overweight	2.49 (2.59)	2.67 (2.70)	2.91 (2.85)	1.93 (2.00)	3.36 (3.07)	2.91 (2.71)	16.30 (12.75)	27.19 (1.34)
Obese	2.73 (2.65)	2.97 (2.95)	3.07 (2.89)	1.91 (1.90)	3.61 (3.31)	3.65 (3.16)	18,30 (14,03)	33.63 (3.28)
F-value	0.93	1.89	0.29	2.09	1.18	6.89***	1.37	1403.64***

Notes: *p<0.05; **p<0.01; ***p<0.001

Source: Authors' edition

When considering BMI categories, a strong relation was found in the category of pain in the leg (p<0,001); excess weight and obesity can largely increase the pain symptoms in the lower limbs. Longer sitting time was seen to have increased pain in each body part, it was to the smallest extent –still significantly linked to lower back pain (p<0,05) (Table 3). No relation was found between MSP TS. and the length of time doing sport on a weekly basis, but those people who do competitive sport declared much less pain (p<0,001), especially in the neck-, shoulder-, and lower back areas. No relation has been found between a variety of musculoskeletal pain and the mode of going to work. It was less than half of our respondents (40%) who walked, cycled, or used a scooter to get to their place of work; this figure is certainly influenced by the distance between one's home and place of work.

Table 3. The relationship of musculoskeletal pain (MSP) score and body mass indexes (BMI) with sitting time at workplace and some indicators of physical activity

	Neck pain Sc. AVG (SD)	Shoulder pain Sc. AVG (SD)	Back pain Sc. AVG (SD)	Arm pain Sc. AVG (SD)	Lower back pain Sc. AVG (SD)	Leg pain Sc. AVG (SD)	MSP Total Sc. AVG (SD)	BMI (kg/m^2) AVG (SD)
Gender								
Men	1.8 (1.95)	1.98 (2.12)	2.32 (2.41)	1.50 (1.31)	2.85 (2.85)	2.37 (2.44)	12.88 (10.06)	26.95 (3.3)
Women	2.89 (2.83)	3.15 (2.99)	3.23 (2.99)	2.04 (2.03)	3.40 (3.15)	2.6 (2.82)	17.67 (13.75)	25.16 (4.80)
t-value	-4.77***	-5.22***	-3.98***	-3.59***	-2.39**	-2.71*	-4.65***	4.94***
Age groups								
18-29 years	2.15 (2.30)	2.22 (2.40)	2.53 (2.72)	1.44 (1.12)	2.47 (2.77)	2.00 (2.35)	12.80 (11.91)	23.73 (4.26)
30-49 years	2.63 (2.68)	2.85 (2.83)	3.03 (2.89)	1.82 (1.83)	3.09 (3.01)	2.64 (2.54)	16.07 (12.73)	25.28 (4.46)
50-65 years	3.01 (2.85)	3.30 (3.08)	3.26 (2.96)	2.43 (2.28)	4.15 (3.27)	3.75 (3.19)	19.90 (14.10)	27.30 (4.77)
F-value	4.02*	5.49*	2.41	12.70***	14.08***	19.74***	12.51***	26.86***
Educational background								
Secondary school	2.77 (2.77)	2.99 (2.60)	3.19 (3.03)	2.08 (2.00)	3.30 (3.10)	2.98 (2.68)	17.31 (13.91)	25.57 (4.62)
College	2.72 (2.72)	2.97 (2.69)	3.19 (2.98)	1.95 (1.99)	3.36 (3.07)	2.82 (2.73)	17.00 (13.21)	25.31 (4.52)
University	2.52 (2.60)	2.72 (2.86)	2.73 (2.68)	1.80 (1.74)	3.13 (3.09)	2.76 (2.75)	15.65 (12.62)	25.89 (4.78)
F-value	0.68	0.85	2.89	1.32	0.49	0.38	1.28	1.41
BMI (categories)								
Thin	2.10 (2.57)	1.90 (1.99)	2.70 (2.90)	1.55 (1.60)	3.05 (2.81)	1.85 (1.81)	13.15 (11.56)	17.77 (0.65)
Normal	2.76 (2.76)	3.02 (2.95)	3.08 (2.90)	1.81 (1.76)	3.10 (3.07)	2.55 (2.60)	16.34 (13.16)	22.30 (1.73)
Overweight	2.49 (2.59)	2.67 (2.70)	2.91 (2.85)	1.93 (2.00)	3.36 (3.07)	2.91 (2.71)	16.30 (12.75)	27.19 (1.34)
Obese	2.73 (2.65)	2.97 (2.95)	3.07 (2.89)	1.91 (1.90)	3.61 (3.31)	3.65 (3.16)	18,30 (14,03)	33.63 (3.28)
F-value	0.93	1.89	0.29	2.09	1.18	6.89***	1.37	1403.64***

Notes: *p<0.05; **p<0.01; ***p<0.001

Source: Authors' edition

The average BMI seems to be strongly related ($p<0,001$) to the categories of gender and age. On the basis of BMI average both men and women could be classified as overweight but there were significantly more men in this category (26.95) than women (25.16). BMI average increased with age. When considering the educational background of respondents, their sitting time at work, the level of past or current sport activities (competitive or hobby) and active transport no relation of significance was found to the BMI average. On the other hand, BMI was closely related to ($p<0.01$) the frequency of weekly sport activities: there were more overweight or obese people in the group of those who exercised less.

Discussion and conclusions

The distribution by gender in our sample (Men: 23%, Women: 77%) reveals that in Hungary women represent a high percentage of employees in administrative and office jobs (75%) (KSH, 2021a). The distribution by age does not show any considerable difference when considering the percentage of all employees in Hungary: the majority is middle-aged adults (63%). Due to the fact that the nature of work in the government offices is intellectual, in our sample the percentage of those with degrees from higher education is two and a half times more (81%) than the similar indicator of all employees in Hungary (30%).

Considering the BMI average of our sample it was only the group of women that showed favourable deviation when compared with similar indicators of the overall adult population of Hungary. The BMI average in case of men was 27.0 kg/m^2, while in women it was 25.2 kg/m^2. The same tendency was seen in the proportion of the combined ratio of overweight and obese persons: at national level two thirds of men and slightly more than half of the women (Rurik et al., 2014; Boros et al., 2021), while in our sample 66.2% of the men and only 42.8% of the women were found overweight or obese.

Sitting time at work is high, even if compared to the general daily sitting time of the Hungarian population (Eurobarometer, 2018). 9 people out of 10 sit at least 5 hours at their workplace and 3 sit more than 8 hours. But we found no evidence that gender and age were related to sitting time at the office (see Johansson et al., 2020).

As far as the questions about sport are concerned, 53% of our respondents never did and do not do any sport; it is an answer, identical with the Hungarian average figure as determined by the Special Eurobarometer 472 survey (Eurobarometer, 2018). But there are differences by gender, too. There are significantly fewer people who do sport in the group of women (Men 48%, Women 57%). The share of those who do not do any sport, or, who do sport rarely (55%) is by 4-5 points more favourable than the average measured in the group of Hungarian office workers.

Based on the findings of relevant specialist literature, we assumed, that, the perception of musculoskeletal pain (MSP) is dependent on sociodemographic variables (H1). Our own findings have supported those earlier results (Kovács, 2012), according to which women tend to suffer more from musculoskeletal problems than men ($p<0,001$), and also that pain intensifies with the advancement of age ($p<0,001$) (Bau et al., 2017; Járomi et al., 2021). Although it is a well-known fact that the educational background plays a role in the health status of the population (Orosz and Kollányi, 2016), we have not succeeded in proving the relatedness of education and MSP TS ($p>0,05$). The reason behind it can be found in the specificity of our sample: 81% of it had a degree from an institution of higher education. These respondents can be divided into two groups: those with a university and those with a college degree. There were only a few people in our sample who had secondary school certificate.

Sitting time at workplace and MSP TS (H2) were found to be closely interrelated ($p<0.001$), meaning, our research has been able to prove that due to long sitting time at the workplace skeletomuscular problems and pain in various body parts were to intensify (Westgaard and Winkel, 1997; King et al., 2013; Davis and Kotowski, 2014; Bau et al., 2017; Gibbs et al., 2018; Bontrup et al., 2019; Haufler et al., 2000).

The analysis of the relation between physical activity and skeletomuscular pain (H3) has led to double result. According to our findings no relation exists between the amount of time of weekly exercise and skeletomuscular pain symptoms ($p>0.05$), a result that seems to support the results of Kamada and his colleagues (2014). The perception of pain was not dependent on the mode of daily transport ($p>0,05$) either (active and/or motorized vehicle-based). On the contrary, the level of sport activities (competitive, or hobby-level) had a very powerful impact on the intensity of pain ($p<0,001$): being engaged in competitive sport requires very intensive physical activity and regular training, so it lessens the pain when compared with the same aspect of hobby-level sport. These findings seemed to underline the fact that sport activities have a preventive impact concerning skeletomuscular diseases (Pedersen et al., 2009; Andersen et al., 2010; Shiri and Hassani, 2017).

As far as the relationship between BMI and sociocultural variables is concerned (H4), our results have proven the statements made by other Hungarian researchers, namely, that the men and the more mature people have higher BMI (Rurik et al, 2014; KSH, 2019); on the other hand, in relation to the respondents' educational background no significant difference was found. There was no interrelatedness between the time of sitting at the workplace and BMI (H5), consequently, the high amount of sitting time is not the only factor leading to excess weight and obesity (Van Uffelen et al., 2010; Ekelund et al., 2015).

In relation to physical activity and BMI (H6) our research results also demonstrated that the increased amount of physical activity per week ($p<0,001$) is related to BMI (Suryadinata et al., 2020; Győri et al., 2021). In this respect there was no difference between those who do competitive sport and those who do sport as a form of recreation. The mode of going to work (active or motorized vehicle-related) did not have any impact on the respondents' BMI ($p>0,05$).

Our research was aimed at exploring the relationship of sitting time at the workplace, physical activity and some sociodemographic variables with musculoskeletal complaints (MSP), and body mass index (BMI). The respondents of our questionnaire-based research were employees of the Government Office of Csongrád-Csanád County. When analyzing the research findings, it became clear that our research results are in accordance with the preliminary research statements, namely, that it is women and older employees who can be characterized with more intensive musculoskeletal complaints. Pain symptoms are increased when there are longer sitting times, excess weight, and obesity, while active sport reduces them.

In accordance with the general trends in Hungary, it was men who proved to be more obese and overweight than women and adults of more mature age than the young ones. In relation to the preventive and health preserving role of sport our results have proven to be convincing. At the same time the interrelatedness of sedentary work and BMI has not been confirmed. It is possible that those who sit long hours at their workplace, as a form of compensation, are more active in their free time and do a lot more physical exercise. On the other hand, when investigating this latter aspect, no significant relationship has been found between the amount of sitting time and the weekly amount of physical activity. Active mode of transport was not interrelated with skeletomuscular pain symptoms, or BMI of respondents.

Given that the factors affecting health are multidimensional (Bácsné Bába, et al., 2021), in the future several other lifestyle variables need to be included in our research, too, in order to further explore the topic. All the possible manifestations of physical activities need to be considered when investigating the health impact. Furthermore, on the basis of our current and our planned future research we support the creation of such conditions within and outside workplaces which make regular or occasional physical activities possible for the employees. It is also strongly recommended to include specialists in this process in order to increase the number of occasions when people do physical activities with the aim of reducing the length of sitting time, using active modes of transport when going to work; in brief, it is of utmost importance to create such conditions, that may lead to improved health and increased work performance of office employees.

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