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Published in:
International Journal of Industrial Ergonomics

DOI (link to publication from Publisher):
10.1016/j.ergon.2021.103172

Publication date:
2021

Document Version
Accepted author manuscript, peer reviewed version

Title

Neck pain prevalence and associated occupational factors in Portuguese office workers.

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Abstract

Objective: This study aimed to assess the prevalence of neck pain and to identify associated occupational factors in Portuguese office workers.
Background: There is still necessary to quantify the association of the use of new technologies with neck pain in office workers.
Methods: Six hundred-and-one office workers completed online questionnaires with questions related to anthropometric parameters, work-related variables, workstation setup, and musculoskeletal pain from the Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire.
Results: The prevalence of neck pain was 56.1%. An average of 35.6% of the office workers with neck pain reported pain in more than three body segments. The significantly risk factors were "age between 50-65" [OR: 1.92 (1.26-2.91) *P*=0.002], "working without break for two hours" [OR: 1.82 (1.00-3.31) *P*=0.05], "more than three hours" [OR: 2.41 (1.35-4.10) *P*=0.003], screen localization not centered" [OR: 2.01 (1.01-4.00) *P*=0.045], and "use of computer mouse more than 50% of the worktime" [OR: 2.05 (1.14-3.71) *P*=0.017].
Conclusion: There was a high prevalence of neck pain and a considerable number of painful body segments in office workers. Age, working without break, screen localization and the use of computer mouse where the significant risk factors associated with the development of neck pain.
Relevance to Industry: A high prevalence of neck pain and number of areas with pain in office workers require a detailed pain mechanism assessment. There were associated occupational risk factors for the development of neck pain. Call for concerted actions to explore optimal and efficient management plans.

Keywords: Office workers, neck pain, computer, workstation.

Acknowledgement:

Center for Neuroplasticity and Pain (CNAP) is supported by the Danish National Research Foundation (DNRF121). We are thankful to Dra. Claudia Correia at Lisbon University (UL), prof. Sandra Pais at Algarve University (UAlg), Dr. Celso Mendes at Albufeira City Council and Dra. Susana Caldeira for the implementation of the web-based questionnaire.

Funding Sources
No funding.

Introduction

In Portugal, the use of computer for office workers increased from 27.4% to 66.8% from 2002 to 2017 (INE 2019a). More than 84% of the population between 16-44 years of age use computer (INE 2019a). In 2019, the average computer use was 99.2% in all economic sectors (INE 2019b) in companies with more than ten workers. In professions that use a computer, like office workers, the generalize pain involving neck/shoulder ranged from 20% to 60%, a problem verified worldwide (Côte et al., 2008; Sarquis et al., 2016). In Portugal, the prevalence of neck pain has been reported to be approx.20% (Cunha-Miranda et al., 2010). Lately, telework has been increasing, especially due to the pandemic situation, and, have been calling attention to the adverse outcomes of the work conditions, namely the musculoskeletal impairments in the neck and shoulder segments (Tavares 2017). In the Global Burden of Disease reports (Vos et al., 2016) neck pain rank among the top 4 global burden for many years but as compared to the other top-ranking diseases, few pharmacological and non-pharmacological randomized controlled trials have been conducted to explore the best management options for this possible disabling and quality of life reducing condition.

In office workers with neck pain, the average self-reported productivity loss had been reported between 20% and 43% (Hagberg et al., 2002; van de Heuvel et al., 2007; Madeleine et al., 2013). This loss of productivity increases with upper limb pain symptoms (van de Heuvel et al., 2007). Also, the risk of work sickness absence increased almost three times in subjects with neck pain (Matsudaira et al., 2011).

Several systematic reviews and meta-analysis call for identification of risk factors for neck pain in office workers (IJmker et al., 2007; Larsson et al., 2007; Waersted et al., 2010; Andersen et al., 2011; Paksaichol et al., 2012; Jun et al., 2017; Coenen et al. 2019). Accumulating evidence suggests that female are in higher risk and that previous history of neck pain predicts a onset of neck pain (Paksaichol et al., 2012). Studies suggest that satisfaction with the workplace environment, closed keyboard position, low task variation, self-perceived muscle tension (Jun et al. 2017), and computer use *per si* (Andersen et al., 2011; Coenen et al., 2019) predict onset of neck pain.

Ergonomics interventions can reduce neck pain in office workers (Aas et al., 2011; Hoe et al., 2012; Hoe et al., 2018). Still, perhaps the most important, in cases of chronic neck pain, is to reduce the physical strain in the musculoskeletal system, for other types of interventions to

become more effective. Also, the advances in technology in the past few years, resulted in substantial work changes, like the increase use of laptop and desktop and/or multiple screens with different sizes at the same time (Woo et al., 2015). There is still necessary to quantify the association of the use of new technologies, like the use of a laptop, with neck pain in office workers (Coenen et al., 2019).

Therefore, the aims of this study were 1) to assess the prevalence of neck pain and to identify associated occupational factors in a cohort of office workers and 2) to assess the prevalence of body areas with pain in office workers with and without neck pain.

Methods

Subjects

From May 2017 to April 2019, 2595 office workers from the Lisbon University, Algarve University, Albufeira City Council, and a private Portuguese supermarket company (central services) were invited to participate in the study. The work characteristics and environment of these different work setting are mainly characterized by 8 hours of administrative tasks (finances, central shopping centers, occupational safety and health management), that include the use of computer, mouse and keyboard, as well as document manipulation, at least 3/4 of the work shift. The work pace is free. The participation consisted of filling-out a web-based questionnaire. The eligible criteria were: adult office worker from 18-65 years of age; to have seniority higher than 1 year in the same job position; to have a rate of least 3/4 of the working hours with a computer (Johnston et al., 2008; Sjörs et al., 2011; Andersen et al. 2014); understand the Portuguese Language.

This research was conducted in accordance with the Declaration of Helsinki and was approved by the Ethic Council (CEFMH) at the Faculty of Human Kinetics – Lisbon University (Approval Number:23/2017). All participants gave written informed consent.

Self-reported measures

A structured web-based questionnaire was designed and supported on previous studies (Kiss et al., 2012; Madeleine et al., 2013; Garza et al., 2014). It included questions related to demographics and anthropometric parameters, work-related variables, workstation setup, and musculoskeletal complaints.

Regarding the demographic and anthropometric parameters, include age, gender, height and weight to calculate body mass index (Madeleine et al., 2013).

The computer work-related variables were: the number of working years at a computer was asked in three categories: “10 years or less”, “between 11 and 20 years”, and “more than 20 years”. The number of working hours per week was asked in three categories: “less than 36 hours”, “between 36 and 40 hours”, “more than 40 hours”. The number of working hours on a computer per day was asked in five categories: “4 hours or less”, “5 hours, “6 hours”, “7 hours”, “8 hours or more”. The number of hours working on a computer without a break in three categories “1 hour”, “2 hours”, “3 hours or more” (Kiss et al., 2012; Madeleine et al., 2013; Garza et al., 2014).

The workstation layout included the type of computer for office work, categorized into three categories: “laptop”, “desktop” or “both”. The use of documents was asked in “no” and “yes”, and if “yes” categorized in: “side of the keyboard”, or “between screen and keyboard”. Screen position was evaluated in relation to eye level into three categories: “upper border screen eye level”, “upper border screen below eye level” and “upper border screen above eye level. Screen localization was evaluated in relation to working position into three categories: “in front”, “right side” or “left side”. Elbow position was asked relative to keyboard during keyboard working into three categories: “at same level”, “below” and “above”. Forearm support during keyboard work into three categories: “no forearm support”, “forearm supported for less than 2/3 on the work table”, “forearm supported more than 2/3 on the work table”. The use of mouse during work dichotomized in two categories: “less than 50% of working time on computer” and “more than 50% of working time on computer”. Mouse localization on the work table into three categories: “close to the table edge”, “beside keyboard”, “fairway from the keyboard” (Kiss et al., 2012; Garza et al., 2014).

Finally, the musculoskeletal pain complaints were evaluated by the Portuguese version of the Standardized Nordic Musculoskeletal Questionnaire (Mesquita et al., 2010).

Statistical analysis

Descriptive statistics were calculated for age, gender, BMI, working time per week, computer work hours per day, computer work per year, the average of musculoskeletal pain per segment, number of body segments with pain and neck pain causes.

The prevalence of several musculoskeletal pain conditions was determined using point estimates and 95% Clopper-Pearson confidence intervals.

Simple logistic regression analysis was used to calculate the odds ratio and their 95% confidence intervals for the presence of neck pain for each occupational factor. A multiple logistic regression analysis, using a stepwise method for variable selection, was done considering the variables of the simple logistic regression with *p*-value <0.20 as candidate variables (Hosmer et al., 2013). In each model, the polychotomous variables were transformed into "dummy" variables for the calculation of Odds Ratio, concerning the reference category of each of these variables.

Some determinant factors of the models were reorganized in new categories using the following cut-offs: age in "between 25 and 39 years", "between 40 and 49 years", "between 50 and 65 years"; the number of working hours on a computer per day was dichotomized "6 hours or less" or "more than 6 hours"; screen position was dichotomized in "eye level" or "no eye level"; screen localization was dichotomized in "center" or "not center"; elbow position was asked relative to the keyboard during keyboard working was dichotomized in "same level" or "not level"; and mouse localization on the work table was dichotomized in "keyboard side" or "no keyboard side". The main outcome, neck pain, was dichotomized according to the cut-off of 3 in the pain intensity scale used in the Nordic Questionnaire (Sihawong et al., 2016). $P<0.05$ was considered significant.

The statistical analysis was conducted using SPSS 25.0 software (SPSS Inc., Chicago, IL, USA).

Results

Sample caracterization

From the 2595 office workers population, 601 completed the questionnaires, which corresponded to an answer rate of 23.1%. From those, 436 were female (72.5%), and 165 were male (27.5%). The mean age and working years on a computer of the sample were 44.2 years (SD 9.1) and 18.7 years (SD 8.2), respectively. Table 1 reported office workers individual characteristics.

Table 1 – Characteristics of office workers (n=601).

Individual Characteristics	***N (%)***	***M* ± SD**
Age (years)		44.2 ± 9.1
Gender (female/male)	436 (72.5) / 165 (27.5)	
BMI (kg/m^2)		24.8 ± 4.0
Working time (h/wk)		39.3 ± 6.7

Computer work (h/day)		6.5 ± 1.5
Computer work (years)		18.7 ± 8.2
Office workers with neck pain (yes / no)	337 (56.1) / 264 (43.9)	

BMI – Body Mass Index

Prevalence of neck pain and body areas with pain

In office workers reporting pain the prevalence of neck pain was 56.1% (95 CI 52.0-60.1). The prevalence of pain in the other body regions were for shoulder 40.1% (95 CI 36.2-44.1), for low back 38.8% (95 CI 34.9-42.8), for dorsal 27.6% (95 CI 24.1-31.41), for wrist/hand 24.0 % (95 CI 20.6-27.6), for knee 11.6% (95 CI 9.2-14.5), for ankle 7.8% (95 CI 5.8-10.3), and finally for hip 5.0% (95 CI 3.4-7.0).

Office workers with pain (n=468) self-reported less than three body segments represented 71.3% (n=334), meaning that 28.7% (n=134) reported pain in more than three body segments. In office workers with neck pain (n=337), self-reported less than three body segments represented 64.4% (n=217), meaning that 35.6% (n=120) reported pain in more than three body segments. Only 37 office workers reported neck pain without pain in other body area (table2).

Table 2 – Number of body areas with pain and those with neck pain

Number of Body Areas	Office workers with pain (n=468)			Office workers with neck pain (n=337)		
	N	%	95% CI	N	%	95% CI
1	97	20.7	[17.1, 24.7]	37	11.0	[7.6, 15.3]
2	133	28.4	[24.4, 32.7]	96	28.5	[19.6, 30.0]
3	104	22.2	[18.5, 26.3]	84	24.9	[20.3, 30.8]
4	64	13.7	[10.7, 17.1]	54	16.0	[10.4, 18.9.1]
5	35	7.5	[5.3, 10.2]	32	9.5	[6.7 60.1]
6	19	4.0	[2.5, 6.3]	18	5.3	[3.3 9.1]
7	10	2.1	[1.0, 3.9]	10	3.0	[1.5, 6.0]
8 and 9	6	1.3	[0.5, 2.8]	6	1.8	[0.6, 4.1]

Associations between neck pain, age, and computer work-related factors

In a simple logistic regression analyses, “age between 50-65 years” [OR: 1.96 (1.29-2.96) *P*=0.001], and “working more than three hours without a break” [OR: 1.90 (1.10-3.28) *P*=0.02] were the risk factors significantly associated with the development of neck pain.

The number of working hours per week between "36-40 hours" [OR: 0.52 (0.35-0.78) *P*=0.001] and "more than 40 hours" [OR: 0.47 (0.32-0.71) *P*<0.001] were a significant protective factor for neck pain (table 3).

In the multiple logistic regression analyses, age between "50-65 years" [OR: 1.92 (1.26-2.91) *P*=0.002], "working two hours without a break" [OR: 1.82 (1.00-3.31) *P*=0.05], and "working more than three hours without a break" [OR: 2.41 (1.35-4.10) *P*=0.003] were the risk factors significantly associated with the development of neck pain (table 4).

Table 3 - Prevalence of neck pain in the past 12 months and associations with age and computer work-related factors, evaluated using simple logistic regression analyses.

Variable	Total number of office workers	Number and percentage of OW with chronic neck pain, reporting ≥ 3 in VAS (0-10)		*P*	OR (95% CI)
	n	n	%		
Age (years)					
25-39	194	78	40.2		1
40-49	231	103	44.6	0.36	1.20 (0.81-1.76)
50-65	176	100	56.8	**0.001**	**1.96 (1.29-2.96)***
Number of working hours per week					
<36	281	157	55.9		1
36-40	171	68	39.8	**0.001**	**0.52 (0.35-0.78)***
>40	149	56	37.6	**<0.001**	**0.47 (0.32-0.71)***
Number of working hours on a computer per day					
≤6	281	140	49.8		1
>6	320	141	44.1	0.11	0.77 (0.56-1.06)
Number of years working at a computer					
<10	116	50	43.1		1
11-20	242	111	45.8	0.62	1.12 (0.72-1.47)
>20	243	120	49.4	0.27	1.29 (0.82-2.01)
Number of working hours on a computer without a break					
1	67	23	34.3		1
2	175	79	45.1	0.13	1.57 (0.88-2.83)
≥3	359	179	49.9	**0.02**	**1.90 (1.10-3.28)***

Abbreviations: OR: Odds Ratio; CI – Confidence Interval.

Table 4 – Multiple logistic regression model for the presence of neck pain in office workers for age and computer work-related factors.

Variable	*P*	OR (95% CI)
Age (years)		
25-39		1
40-49	0.56	1.12 (0.76-1-66)
50-65	**0.002**	**1.92 (1.26-2.91)**
Number of working hours on a computer per day		
≤6		1
>6	**0.016**	**0.65 (0.46-0.92)**
Number of working hours on a computer without a break		
1		1
2	**0.05**	**1.82 (1.00-3.31)**
≥3	**0.003**	**2.41 (1.35-4.30)**

Abbreviations: OR: Odds Ratio; CI – Confidence Interval.

Associations of neck pain with workstations setup

In a simple logistic regression analyses, "screen localization not centered" [OR: 2.12 (1.09-4.16) *P*=0.03] was the risk factor significantly associated with the development of neck pain. Working with a laptop [OR: 0.51 (0.32-0.80) *P*=0.04] was a significant protective factor associated with neck pain (table 5).

Multiple logistic regression analysis was performed on the risk factors variables with a $p<0.20$ extracted from the previous step to determine the association of each variable with neck pain. "Screen localization not centered" [OR: 2.01 (1.01-4.00) *P*=0.045] and the "use of computer mouse during worktime more than 50%" [OR: 2.05 (1.14-3.71) *P*=0.017] were the risk factors significantly associated with the development of neck pain (table 6).

Table 5 - Prevalence of neck pain in the past 12 months and associations with workstations layout, evaluated using simple logistic regression analyses.

Variable	Total number of office workers	Number and percentage of OW with chronic neck pain, reporting ≥ 3 in VAS (0-10)		*P*	OR (95% CI)
	n	n	%		
Computer Type					
Desktop PC	364	183	50.3		1
Laptop	103	35	34.0	**0.04**	**0.51 (0.32-0.80)***
Mist	134	63	47.0	0.52	0.88 (0.59-1.30)
Usual position of documents					
keyboard/screen	144	67	46.5		1
Side keyboard	388	185	47.7	0.81	1.05 (0.71-1.54)
Screen					
Screen Localization					
Center	454	216	47.6		1
Not center	41	27	65.8	**0.03**	**2.12 (1.09-4.16)***
Height upper border screen					
Eye level	365	170	46.6		1
No eye level	130	73	56.1	0.06	1.47 (0.98-2.20)
Keyboard					
Elbow position relative to keyboard					
Same Level	398	182	45.7		1
Not level	203	99	48.7	0.48	1.13 (0.80-1.58)
Forearm support					
More 2/3 forearm	303	136	44.9		1
Less 2/3 forearm	139	70	50.3	0.28	1.25 (0.83-1.86)
No support	159	75	47.2	0.64	1.10 (0.75-1.61)
Mouse					
Use of computer mouse during worktime					
<50%	73	27	37.0		1
>50%	516	252	48.8	0.06	1.63 (0.98-2.70)
Mouse localization during work					
Keyboard side	425	193	45.4		1
No keyboard side	170	87	51.2	0.21	0.79 (0.56-1.13)

Abbreviations: OR: Odds Ratio; CI – Confidence Interval.

Table 6 – Multiple logistic regression model for the presence of neck pain in office workers for workstation layout.

Variable	*P*	OR (95% CI)
Screen Localization		
Center		1
Not center	**0.045**	**2.01 (1.01-4.00**)
Height upper border screen		
Eye level		1
No eye level	0.058	1.49 (0.99-2.24)
Use of computer mouse during worktime		
<50%		1
>50%	**0.017**	**2.05 (1.14-3.71)**

Abbreviations: OR: Odds Ratio; CI – Confidence Interval.

Discussion

This study reported the prevalence of neck pain and to identified associated occupational factors in a cohort of office workers. The study found a high prevalence of neck pain followed by pain in the shoulder, low back, dorsal and wrist/hand segments in office workers. Moreover, there was a high number of office workers with pain in more than three body segments. For neck pain, the variables age and computer work-related factors for neck pain, the "age between 50-65 years" and "the number of working hours on a computer without a break" were the most relevant risk factors. For the workstation layout variables for neck pain, "screen localization not centered" and "the use of computer mouse more than 50% during worktime", were the most relevant risk factors.

Prevalence of neck pain and body areas with pain

The high prevalence of neck pain in office workers in our study was quite similar with previous studies (Jensen et al., 2003; Sillanpää et al., 2003; Wahlström et al., 2004; Juul-Kristensen & Jensen 2005; Cagnie et al., 2007; Janwantanakul et al., 2008; Ranasinghe et al.,

2011; Kiss et al., 2012; Cho et al., 2012; Oha et al., 2014; Piranveyseh et al., 2016; Celik et al., 2017; Chen et al., 2018; Shariat et al., 2018). Compared with a previous Portuguese study, the prevalence was considerably lower, about one third (19.2%) (Cunha-Miranda et al., 2010).

However, our results in office workers with pain in other body regions were similar with previous studies, regarding low back pain (Juul-Kristensen & Jensen 2005; Janwantanakul et al., 2008; Piranveyseh et al., 2016; Harcombe et al., 2010; Celik et al., 2017; Shariat et al., 2018), shoulder pain (Sillanpää et al., 2003; Eltayeb et al., 2009; Harcombe et al., 2010; Ranasinghe et al., 2011; Cho et al., 2012; Piranveyseh et al., 2016; Celik et al., 2017; Shariat et al., 2018), dorsal (Janwantanakul et al., 2008; Cho et al., 2012; Celik et al., 2017), and wrist/hand pain (Sillanpää et al., 2003; Janwantanakul et al., 2008; Eltayeb et al., 2009; Harcombe et al., 2010; Ranasinghe et al., 2011; Piranveyseh et al., 2016; Celik et al., 2017).

Another significant report from our study was the number of body segments with pain. The primary *International Classification of Diseases, 11th Revision (ICD-11)* (World Health Organization, 2020), classified chronic widespread pain has a diffuse pain in at least in 4 of 5 body regions with associated emotional distress. The chronic widespread pain average in the general population ranged from 10 to 15% (Mansfield et al., 201; Andrews et al., 2018). In the current study, there was no information considering emotional distress and was used a different number of body regions, but our numbers should raise concern in this population.

Unfortunately, this is not very often reported in study designs similar to our study. Nevertheless, in the study from Tornqvist et al. (2009) the co-morbidity in office workers with neck, shoulder and arm/hand symptoms plus symptoms in one more region ranged from 27 to 53% of the cases per segment. Regarding productivity loss, it increased from 10 to 36% when office workers had together neck/shoulder and arm/hand symptoms (van den Heuvel et al., 2007).

Associations between independent variables and neck pain

In the present study, office workers “between 50-65 years of age” and “working more than 2 hours on a computer without a break” increased almost two times the risk for neck pain. From the literature, there is conflicting evidence from these two risk factors. Several studies did not find an association between age and neck pain (Jensen et al., 2003; Jull-Kristensen & Jensen 2005; Ranasinghe et al., 2011; Paksaichol et al., 2012; Celik et al. 2018). In the study from Gerr et al. (2002) was reported a slight increase in the risk ratio of 0.3 points from the age

30-39 to more than 40 years. In the opposite direction, Cagnie et al. (2007) found a U-shaped association where the pain increased until the age of 50 years and then it started to decrease.

Concerning the variable “working on a computer without a break” associated with neck pain in office workers, some studies reported a similar result with our research (Cagnie et al., 2007; Kiss et al., 2007; Celik et al., 2018). However, there was no association in other studies (Hagberg et al., 2007; Ranasinghe et al., 2011). In a meta-analysis with longitudinal studies, there was no significant association with neck pain (Jun et al., 2017). Nevertheless, is recommended a break of 5 to 15 minutes for every hour of work on a computer (Woo et al., 2015).

In the current study, in the workstation layout variables, the “screen localization not centered” and the “use of computer mouse more than 50% during the worktime”, increased two times the risk for neck pain. The research was more in favor of no association of the risk factor related to "duration of the mouse work" with neck pain (Sillanpää et al., 2003; Brandt et al., 2004; Hagberg et al., 2007). A systematic review and meta-analysis from prospective studies conclude there was no significant risk ratio for the “duration of mouse use” for the development of neck pain (Jun et al., 2017). To our knowledge, only the study from Kiss et al. (2012) demonstrated an identical result with our study.

Concerning the “screen localization” the majority of the studies evaluate the screen height adjusted to eye level and not if the screen was placed in front or sideways in relation to the office worker. The studies from Kiss et al. (2012) and Celik et al. (2018) did not found a significant association with neck pain if the computer screen was not in front of the worker. Nevertheless, the standards and guidelines for computer work and workstation recommended the computer screen to be placed in front of the worker. Moreover, the frequency of neck pain was higher in the mentioned factors, reinforcing the need for ergonomic adjustment during computer work (Woo et al., 2015).

Finally, in the past few years, there was an increased use of laptop and multiple screens at work (Woo et al., 2015). In the present study, the use of a laptop in the simple logistic regression analyses showed a statistically significant protective factor for neck pain. To our knowledge, this was the first observational study in office workers that differentiate between a desktop computer, laptop and use both simultaneously, as an associated factor for neck pain. The difference in sample sizes in our study between laptop and desk computer can explain our result. A further explanation is the age of the office workers using laptop was statistical lower compared with the users of desktop (p=0.045) (Appendix 1). Mainly when is reported that subjects with chronic neck pain, the use of laptop compared with desktop computer increases

neck and upper trunk flexion, bilateral shoulder elevation, which can contribute to neck pain (Lee et al., 2020). Previous studies associated "irregular head posture" (Cagnie et al., 2007; Eltayed et al., 2009), and "awkward body posture" (Ranasinghe et al., 2011) as risk factors for neck pain in office workers. Further studies are necessary to associate laptop and other technology devices as risk factors for musculoskeletal disorders.

Implications for practice

The high prevalence of neck pain and the presence of a significant number of body segments with pain in office workers require a detailed pain mechanism assessment. This can be a basis for treatment and interventions to reduce the prevalence of pain in this population. Decision-makers and employers need to be included in this process, as working time and workstation setup variables were risk factor associated with the development of neck pain. The study in conjunction with the many other neck pain studies calls for concerted actions to explore optimal and efficient management regimes in randomized, controlled studies.

Study Limitations

The present study has some limitations that should be considered. This study was inside in a research project designed to study neck pain. Thus, office workers with neck pain may lead to an increasing number in replying the online questionnaire instead of office workers without neck pain. The reporting of pain or discomfort may be biased, due to the fact, that office workers had to report the segments of pain with more than thirty days in the last twelve months (Ranasinghe et al., 2011). This observational study with a cross-sectional design consisted of an online questionnaire that relies on self-reported measures. The sample size was not analyzed regarding gender where there is strong evidence from prospective cohort studies that gender female was a risk factor for neck pain in office workers (Paksaichol et al., 2012). The absence of the possibility of in-depth characterization of working conditions by observational methods, such as the "Rapid Upper Limbs Assessment-RULA" (McAtamney and Corlett 1993) or "Rapid Office Strain Assessment-ROSA" (Sonne et al. 2012), could be an important issue to highlight. However, considering the high sample size, it was our option to use to alternative techniques (subjective judgments), such as the exposure questionnaire, in order to overcome this constrain and to obtain extensive information about the exposure to which workers in these different economic sectors are exposed in their daily work journey. Therefore, the results of the current study should be interpreted with care. The office workers

participated worked in Portugal but the prevalence of pain reported was similar to other countries indicating that the data presented is a representative sample to explore the problem.

Conclusion

The present study found a high prevalence of neck pain and a considerable average of the number of body segments with pain in office workers. “Age between 50-65 years”, “number of hours working on a computer without a break”, “screen localization not centered” and “use of computer mouse more than 50% of the worktime” where the significant risk factors associated with the development of neck pain in office workers.

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