



Importance of Musculoskeletal Pain in Work Activities in Obese Individuals

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Abstract

Background The consequences of obesity include musculoskeletal pain and its influence on a person's social, personal, and professional life, which is a great challenge for the multidisciplinary team in the treatment of obesity. The objective of this work was to evaluate musculoskeletal pain in the work activities of obese individuals.

Methods An uncontrolled cross-sectional study was conducted. During 8 months, all obese individuals seen in the preoperative period at a tertiary care referral center for the treatment of obesity and metabolic syndrome were invited to participate in the study. Ninety-five persons filled out the Nordic questionnaire for the analysis of musculoskeletal symptoms (Nordic musculoskeletal questionnaire (NMQ)) after having signed an informed consent form and having met the inclusion criteria of the study.

Results Of the 95 patients assessed, 71 were females, the mean age was 39.3 ± 10.1 years, and mean body mass index was 47.25 ± 8.72 kg/m². Sixty-three (66.31 %) individuals felt musculoskeletal pain in some region of the body in the last 12 months, and 42 (44.21 %) sometimes gave up working in the same period because of musculoskeletal pain. There was a statistical association between BMI and the three aspects evaluated by the NMQ.

Conclusions Musculoskeletal pain was very related to obese individuals who participated in this study, and in the majority cases, execution of the work activities of these persons was impeded. This indicates a need for further studies that address this subject to better attend to and intervene in the health of this population.

Keywords Obesity · Comorbidities · Pain · Musculoskeletal

Introduction

Obesity is associated with important musculoskeletal stresses, mainly of the lower limbs, since the elevated weight is an excess burden on the joints and can cause over time musculoskeletal pain [1, 2]. Studies have examined the coincidence of obesity and chronic pain, because it is known that they are both influenced by genetic, psychological, and metabolic factors [3]. Melzack [4] noted that chronic pain is not a warning sign for the prevention of diseases and physical lesions, but rather it is a disease.

Work-related musculoskeletal disturbances (WRMD) are manifested as musculoskeletal pain, do not have a specific etiology, and are generally linked to ergonomic aspects of the work performed, besides the social and psychological aspects of individuals [5]. WRMD are an important concern for public health, which lead to temporary or permanent work disability [5], and besides, the influence of pain on functional capacity and quality of life is greater in obese people than non-overweight individuals [6], and it can cause neuroplastic alterations that diminish motor performance and favor its continuity in the individual [7].

Among the instruments for evaluating pain, the most comprehensive for any group of workers are those that are easy to handle, and whose form of presentation favors the complete answering of the questionnaire [8]. It is also important that it be easily applied, quickly filled out, and economically viable [8, 9]. The Nordic musculoskeletal questionnaire (NMQ) was developed for the purpose of standardizing the measurement of reports of musculoskeletal symptoms and helping epidemiological investigations [8] (questionnaire validated for the Portuguese version by Pinheiros et al. in 2002, with the title of Nordic questionnaire of musculoskeletal symptoms) [9].

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The objective of this study was to identify musculoskeletal pain and its influence on the work activities of obese individuals who were seen a tertiary care referral center for the treatment obesity and metabolic syndrome.

Material and Methods

A cross-sectional epidemiological study was conducted in the period of November 24, 2011 to July 27, 2012 with all obese individuals seen in the preoperative period at a tertiary care referral center for the treatment of obesity and metabolic syndrome. In total, 95 persons filled out the NMQ after signing an informed consent form and having met the inclusion criteria of the study. The inclusion criteria were BMI equal to or greater than 40 kg/m^2 or over 30 kg/m^2 associated with comorbidities. Patients who did not show an adequate level of comprehension for responding to the questionnaire were not included. The questionnaire was filled out by the participants in the presence of the physiotherapist responsible for data collection, during the physiotherapy consult.

The NMQ shows a drawing of the human body that indicates the ten body regions considered while answering the questionnaire (neck, shoulders, elbow, forearm, wrist/hands/fingers, dorsal region, lumbar region, hips/thighs, knees, ankles/feet). The questions utilized referred to the occurrence of pain, discomfort, or numbness in these regions in the last 12 months and in the last 7 days, and it should have been necessary to avoid normal work activities because of these symptoms in the last 12 months. The individual responded to each of the 30 questions according to his/her symptomatology, indicating one of the possible answers in each question.

The type of work activity performed, occurrence of pain on the day of assessment, and frequency of use of pain medication were determined.

A descriptive analysis of the variables obtained followed by Pearson's chi-square test was carried out, utilizing BMI of 30–39, 40–49, and $>50 \text{ kg/m}^2$, to determine the association of BMI, musculoskeletal pain, and inability to do work activity because of pain, assuming significant differences in the results when $P \leq 0.05$.

The study followed the guidelines of the 196/96 Law of Brazil's National Council of Health and was approved by the institution's Committee of Ethics in Research, registration no. CEP 11/05655.

Results

All 95 patients invited to participate in the study agreed to answer the questionnaire, and no patient was excluded because of inability to do so. Of the 95 individuals who participated in the study, 71 (74.7 %) were women. The mean age

was 39.3 ± 10.1 years, and the mean BMI, $47.2 \pm 8.7 \text{ kg/m}^2$. With respect to work activity, 51 (53.7 %) individuals did work requiring considerable physical demands, moving and activating postural muscles maintained for long periods of time.

On the day that the questionnaire was answered, 65 (68.4 %) reported feeling some musculoskeletal pain, and only 28 (29.5 %) indicated never using medication to alleviate musculoskeletal pain. The data regarding the occurrence of musculoskeletal pain in the last 12 months, occurrence of musculoskeletal pain in the last 7 days, and inability to do work activity because of musculoskeletal pain in the last 12 months are presented in Tables 1, 2, and 3, respectively.

Of the participants, 63 (66.3 %) noted feeling musculoskeletal pain at some moment in the last 12 months. With respect to missing work in this period, 42 (44.2 %) missed work at some moment because of musculoskeletal pain.

On analyzing the association of pain in the last 12 months and missing work with BMI, it was found that pain in the forearms was greater and statistically significant ($P=0.018$) in the group of individuals with BMI up to 39 kg/m^2 , that greater pain in the left knee of this group showed differences bordering on significance with $P=0.055$, and that for the group with BMI $>50 \text{ kg/m}^2$, pain in the feet was also greater, but with differences bordering on significance with $P=0.052$. Considering pain in the last 7 days, the knees showed more frequent pain, but at the limit of significance with $P=0.057$ in the group with BMI $>50 \text{ kg/m}^2$, and the feet, in the same group, also showed significantly more frequent pain with $P=0.013$. In relation to missing work in the last 12 months because of musculoskeletal pain, in the group with BMI $>50 \text{ kg/m}^2$, the dorsal region ($P=0.012$), knees ($P=0.011$), and feet ($P=0.013$) showed significantly higher values.

Table 1 Presence of musculoskeletal pain in the last 12 months

| | Felt pain (%) | Only R (%) | Only L (%) | Bilateral (%) |
|---------------------|---------------|------------|------------|---------------|
| Neck | 50.5 | – | – | – |
| Shoulders | 40 | 3.2 | 4.2 | 32.6 |
| Elbow | 15.9 | 3.2 | 3.2 | 9.5 |
| Forearm | 24.3 | 7.4 | 3.2 | 13.7 |
| Wrist/hands/fingers | 52.7 | 7.4 | 4.2 | 41.1 |
| Dorsal region | 45.3 | – | – | – |
| Lumbar region | 75.8 | – | – | – |
| Hips/thighs | 47.4 | 7.4 | 9.5 | 30.5 |
| Knees | 61.1 | 9.5 | 7.4 | 44.2 |
| Ankles/feet | 67.4 | 5.3 | 5.3 | 56.8 |

Table 2 Presence of musculoskeletal pain in the last 7 days

| | Felt pain (%) | Only R (%) | Only L (%) | Bilateral (%) |
|---------------------|---------------|------------|------------|---------------|
| Neck | 33.7 | – | – | – |
| Shoulders | 26 | 4.2 | 4.2 | 17.9 |
| Elbow | 7.5 | 1.1 | 1.1 | 5.3 |
| Forearm | 15.9 | 7.4 | 1.1 | 7.4 |
| Wrist/hands/fingers | 37.9 | 4.2 | 2.1 | 31.6 |
| Dorsal region | 35.8 | – | – | – |
| Lumbar region | 65.3 | – | – | – |
| Hips/thighs | 47.4 | 5.3 | 5.3 | 27.4 |
| Knees | 50.6 | 5.3 | 7.4 | 37.9 |
| Ankles/feet | 62.1 | 2.1 | 7.4 | 52.6 |

Discussion

The number of woman participants in this study, 71 (74.7%), practically three times more than men, is also described by other authors, including Marcus [1], Fabris et al. [2], and Shi et al. [10]. Other studies of obese individuals that also demonstrated a greater proportion of females in their population, but at lower percentages, are that of Salihoglu et al. [11] who included 58 % women in their study on the impact of morbid obesity and super obesity on ventilatory mechanics and hemodynamic parameters during bariatric surgery and that of McCarthy et al. [12] whose study included 62.8 % women when analyzing chronic pain and obesity in elderly patients. In their discussion, Peltonen et al. [13] noted that women are more sensitive to pain and that they show a greater prevalence of musculoskeletal pain compared to men and suggested as possible causes the difference in muscle strength and psychosocial factors. The mean age of the participants was 39.3 ± 10.1 years and very similar to that of studies of obese individuals by Marcus [1] and Fabris et al. [2], and the

Table 3 Inability to do work activities because of musculoskeletal pain in the last 12 months

| | Felt pain (%) | Only R (%) | Only L (%) | Bilateral (%) |
|---------------------|---------------|------------|------------|---------------|
| Neck | 18.9 | – | – | – |
| Shoulders | 21.1 | 1.1 | 2.1 | 17.9 |
| Elbow | 10.6 | 1.1 | 0 | 9.5 |
| Forearm | 13.8 | 3.2 | 1.1 | 9.5 |
| Wrist/hands/fingers | 22.1 | 2.1 | 1.1 | 18.9 |
| Dorsal region | 20 | – | – | – |
| Lumbar region | 44.2 | – | – | – |
| Hips/thighs | 27.4 | 2.1 | 3.2 | 22.1 |
| Knees | 35.8 | 2.1 | 4.2 | 29.5 |
| Ankles/feet | 44.2 | 2.1 | 4.2 | 37.9 |

mean BMI of 47.2 ± 8.7 kg/m² found in this study is similar to means described by Fabris et al. [2] and Salihoglu et al. [11]. The work activity cannot be compared with other studies due to the difficulty in standardizing the functions performed. Of the 67 (70.5 %) patients who reported the use of medication to alleviate musculoskeletal pain symptoms, 14 (14.7 %) used it daily. Costa et al. [14] noted that individuals with pain make more use of medications than do individuals without pain and pointed out the economic impact for some countries with regard to this situation.

Time off work due to musculoskeletal pain was reported by 63 (66.3 %) in the population studied. In their study, Santos et al. [5] stated that in the USA, musculoskeletal disturbances correspond to 32 % of cases of time off work and that in Brazil they are, according to data from Brazil's National Institute of Social Security, the second major cause of sick leave.

Lumbar pain was very frequent in this study, in agreement with Barofsky et al. [15], but it was not associated with time off work. It is believed that this fact is explained by the high percentages of lumbar pain shown in all BMI groups. Tsuritani et al. [16] pointed out that there is still no clear evidence that obesity causes lumbar pain. According to Siqueira [17], a series of biomechanical compensations occur that is initiated by the anterior displacement of the center of gravity of obese individuals, making lumbar lordosis worse and culminating in temporary modifications of the pelvis, knees, feet, and dorsal and cervical column. In the present study, the complaints of pain in these regions were similar, which suggest that these biomechanical changes are also intimately linked to the existence of pain, concurring with the literature. Ankles/feet and knees also showed high rates of pain in this study, which can be explained by the increase in dynamic stress generated by the obesity on these joints [2]. Comparing morbidly obese and super obese individuals, Fabris [2] found that even though the morphologic pattern of the knees and alterations of the feet do not differ much in these two groups, pain compromises the super obese more. In the upper limbs, the shoulders and wrist/hands/fingers were regions most cited in this study; Hitt [7] states that obese patients are more prone to feel pain, including regions such as arms and shoulders, when compared to nonobese individuals.

No studies were found that related pain and BMI to address the data, as proposed in this study. Hitt [7], in examining the relation between obesity and site of pain (self-reported), found that type III obese has an OR of 4.001 (95 % CI=2.415–6.631) for pain in the hips, legs, knees, or feet when compared to individuals considered being underweight or at normal weight. McCarthy [12] described the distribution of chronic pain (by localization) in two groups—BMI <30 and ≥ 30 kg/m²—and found a statistical difference ($P < 0.05$) for pain in the head, neck, and shoulders; ribs, arms, and hands; legs and feet; and abdomen and pelvis, but this population consisted of individuals with ages between 70 and 101 years.

On analysis of the data, it was evident that pain is present in the life of the majority of obese individuals and that their ability to work is often hampered by musculoskeletal pain. It was also observed that the lumbar column figures as the location most cited in complaints of pain, besides this pain also being the most frequent reason for work disability. More studies are necessary that aimed at associating obesity, musculoskeletal pain, and work activities to confirm the findings of this study and then to propose an appropriate intervention for the population, which would help in the attenuation and resolution of concerns such as musculoskeletal pain and its influence on the ability of obese persons to carry out their work activities. It is important to point out the relevance of musculoskeletal pain in this group of patients, because it is not currently considered a comorbidity that justifies indication of surgery in patients with BMI between 35 and 40 kg/m².

Conflict of Interest None of the authors has any conflicts of interest to declare.

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