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ПРОФИЛАКТИКА ПРОФЕССИОНАЛЬНОГО КОСТНО-МЫШЕЧНОГО ДИСКОМФОРТА У ПРЕДСТАВИТЕЛЕЙ РАЗЛИЧНЫХ ПРОФЕССИЙ С ИСПОЛЬЗОВАНИЕМ ТЕЛЕКОНСУЛЬТАЦИЙ (ОБЗОР ЛИТЕРАТУРНЫХ ИСТОЧНИКОВ)

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Prevention of Work-Related Musculoskeletal Discomforts in Various Occupations using Teleconsultation (Literature Review)

Резюме

Принимая во внимание растущий спрос на услуги онлайн, особенно среди разного рода офисных работников, цель данной работы заключается в том, чтобы проанализировать данные литературных источников касательно телеконсультаций по профилактике профессионального костно-мышечного дискомфорта у офисных работников. Результаты обзора подчеркнули отсутствие надлежащей осведомленности о телеконсультациях среди офисных работников, а также недостаточный уровень знаний об этой технологии. Рекомендуется, чтобы компании отнеслись с должным вниманием к внедрению услуг телеконсультаций для улучшения состояния здоровья и самочувствия своих работников, не забывая при этом о рентабельности.

Ключевые слова: *телеконсультация, гигиена труда, обучение, телемедицина, дистанционная медицина*

Конфликт интересов

Авторы заявляют, что данная работа, её тема, предмет и содержание не затрагивают конкурирующих интересов

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Abstract

Given the growing demand worldwide for online services, particularly among individuals engaged in diverse kinds of office work, this paper aims to analyze the literature data on teleconsultation for the prevention of work-related musculoskeletal discomforts among office workers. The findings of this review underscored a notable lack of attention to teleconsultation among office workers, coupled with insufficient education on utilizing this technology. It is recommended that companies prioritize the implementation of teleconsultation services to enhance the health and well-being of their employees, while also considering it as a cost-effective strategy.

Key words: *teleconsultation, occupational health, education, telemedicine, telehealth*

Conflict of interests

The authors declare no conflict of interests

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MSDs — Musculoskeletal Discomforts, GBD — Global Burden of Disease, CBT — Cognitive Behavioral Therapy, MBSR — Mindfulness-Based Stress Reduction, NSAID — Nonsteroidal Anti-Inflammatory Drug, SMD — Standardized Mean Difference, CI — Confidence Interval, AMSTAR — Assessment of Multiple Systematic Reviews

Introduction

Musculoskeletal discomforts (MSDs) are associated with pain and a prevalent issue-affecting worker across various occupations, with implications for their health and work performance. The causes of this pain can appear in various areas of the body and include physical and psychological aspects of working conditions. Effective preventive strategies are essential to reduce the onset and progression of work related musculoskeletal discomforts. Various types of mental and physical counseling are available for individuals with musculoskeletal discomforts, including pharmacological and non-pharmacological methods. Both time and cost savings emerged as crucial factors for individuals across all occupations, especially those occupations that require sitting for long periods of time and working with a laptop, keyboard, and mouse. This highlights the significant need for teleconsultation services.

Teleconsultation, which is a subset of telemedicine, is usually an efficient and acceptable alternative to in-person visits and could be used as a technology-based prevention method. According to the published papers, this literature review is trying to summarize the findings related to prevention of work related musculoskeletal discomforts among office workers, using teleconsultation.

For this purpose, multiple databases including PubMed, Scopus, Embase, Web of Science, and Google Scholar were systematically searched up to January 2024. The selected keywords for the search included “teleconsultation”, “occupations”, “telemedicine”, “office workers”, and “computer based workers”. Additionally, the reference lists of relevant papers were manually checked to ensure comprehensive coverage. The eligible papers, which focused on the use of online platforms for teleconsultation related to the health of office workers, were imported into Mendeley.

Epidemiology

Musculoskeletal discomforts (MSDs) are prevalent issues affecting office workers, with significant implications for their health and work performance. The incidence of MSDs and associated pain has dramatically increased in recent years, resulting in additional costs for healthcare systems [1,2]. Factors such as age, work history, obesity, stress, and prolonged static posture contribute to this pain [3,4]. These factors not only affect individuals’ psychological well-being but also affect their physical performance, often resulting in increased absenteeism and early retirement [5]. MSDs, excluding lower back pain, increased significantly by almost 30.7 % from 1990 to 2019 [2]. It is worth noting that, according to the 2017 Global Burden of Disease (GBD) report, lower back pain ranks as the second-highest cause of disability [6]. These personal risk factors explain the variation in the occurrence of MSDs and related disabilities seen among several nationalities and countries over time [7–9]. It is also important to consider the socio-economic situation of individuals and the provision level, including healthcare security.

High levels of burnout are associated with MSDs, according to Armon et al. (2010), which suggests that stress at work may increase the likelihood of developing these conditions [10]. Research conducted in 2014 found that a large number of employees deal with aches and pains in their muscles and joints. This study found that variables such as age, job satisfaction, company size, and safety climate were associated with the frequency of these symptoms [11]. In low-skill, physically demanding jobs, workers are more likely to experience daily pain, and women are more likely than men to report stressors other than pain [12].

In a recent study conducted in the Netherlands, office workers were found to experience numerous MSDs, not only in the lower back, shoulders, and neck, but also in the forearms, wrists, and knees, which could become chronic in nature [4, 12].

It is interesting to note that the severity of pain in the neck and shoulders is reported to be higher in women compared to men [13]. This difference between genders could be attributed to different anthropometric characteristics, especially in workstations that are typically designed for men [14].

In 2022, Putsa et al. mentioned that the prevalence of MSDs was 37.9 %, with the most common areas of complaint being the neck, shoulders, and back [15]. Ikiz and Ergin concluded that among the participants, 81.7 % experienced pain in at least one area of the body, with

the back being the most frequently reported pain, at a rate of almost 55 % [16].

Among the selected studies in this paper, the prevalence of MSDs ranged from 38 % to 80 % across different countries, with variations in education level, salary, age, and gender. In addition, in all of them, lower back pain, neck pain and shoulder pain were the most frequent areas of pain. Therefore, it is important to note that there would be several causes for MSDs that should be considered.

Etiology

The causes of MSDs can appear in various areas of the body and include physical and psychological aspects of working conditions. MSDs occur more frequently in jobs that require lifting heavy loads or working with arms raised, even after years of exposure [17]. Common complaints among office workers such as healthcare or fields involving frequent job changes or multiple duties, include back, neck, and knee pain [18, 19]. Psychosocial factors such as gender, psychosocial risk, work-life balance, and meaning of work influence MSDs. These factors emerge in different ways in different cultures. For example, women tend to work long hours, value power and promotions, and dislike social support, which increases the risk of MSDs [20]. The high prevalence of somatization in multifocal MSDs suggests that psychological variables rather than physical variables play a more important role in pain control [21].

According to the studies included in this review, the main cause of MSDs is related to long periods of sitting and lack of physical activity among office workers. Discrepancies in working conditions and anatomical and physiological characteristics are other reasons for the variations found in different studies. Diseases of the musculoskeletal system were observed in 15 % of all cases, and psychosomatic causes were estimated to be the leading factor in around 40 % of cases. Information about the main reasons for MSDs among office workers is provided in Table 1.

As shown, in 50 % of the selected papers (among 3048 subjects), lack of physical activity and prolonged sitting are identified as the main causes of MSDs, which

Table 1. *The reasons for MSD among office workers*

No.	Title	Results
1	«Work-related musculoskeletal problems and associated factors among office workers» [19].	Among 359 office workers, 53.8 % were in the category of low risk, and 4.2 % were in the category of high risk for MSDs. Age, body mass index, gender, the amount of work — related effort, and mental demand were listed as symptoms of MSDs.
2	«Factors associated with reduced risk of musculoskeletal disorders among office workers: a cross-sectional study 2017 to 2020» [15].	Among 545 computer-based workers, almost 38 % presented MSDs in the neck and shoulders. Lack of physical activity and long periods of sitting were the main reasons for MSDs.
3	«Occupational and non-occupational risk factors for neck and lower back pain among computer workers: a cross-sectional study» [22].	Among 2000 office workers, 48 % had MSDs in the neck and lower back. Lack of physical activity, job demands, and long-time sitting were the main reasons for MSDs.
4	«Risk Analysis of Musculoskeletal Disorders (MSDs) Among Computer User Workers in Makassar» [23].	Among 72 computer — based workers, work — related posture and ergonomic risk factors were introduced as the main reasons for MSDs.
5	«Analyzing musculoskeletal system discomforts and risk factors in computer-using office workers» [24].	Among 395 office workers, lack of physical activity and longtime sitting were the main reasons for MSDs.
6	«Effects of computer use on upper limb musculoskeletal disorders and function in academicians» [25].	Among 100 academicians, gender and age were presented as the important reasons for MSDs, especially in neck, shoulders and lower back.
7	«Effect of physical activity intervention on the musculoskeletal health of university student computer users during homestay» [26].	Among 40 computer-based students, during Covid-19, lack of physical activity and longtime sitting were the main reasons for MSDs.
8	«Musculoskeletal disorders and associated factors among office workers in an activity-based work environment» [27].	Among 68 office workers, lack of physical activity, working duration, and longtime sitting were the main reasons for MSDs.
9	«Musculoskeletal symptoms and their associated risk factors among Saudi office workers: a cross-sectional study» [28].	Among 451 office workers, almost 55 % of subjects had severe MSDs in lower back area. Age, body mass index were the most important factors for MSDs.
10	«Effects of risk factors related to computer use on musculoskeletal pain in office workers» [29].	Among 362 office workers, almost 60 % presented MSDs. work related posture and ergonomic risk factors were introduced as the main reasons for MSDs.

can occur in various areas of the body. In 30 % of these studies (among 910 subjects), the importance of age and gender in relation to MSDs is emphasized. Finally, in 20 % of the studies (among 434 subjects), the significance of ergonomic factors is highlighted.

According to the sources we analyzed, there is a significant correlation between the risk of MSDs and age and gender. Collins et al. demonstrated that the prevalence of lower back, neck, and shoulder MSDs was similar and above 50 % among 852 subjects. Additionally, there were significant differences in psychosocial exposures between different age groups and genders. However, there was no association between these exposures and the symptoms of MSDs [30]. In a non-randomized controlled study conducted among 252 office workers, it was shown that women are more susceptible to MSDs compared to men, particularly in the neck area (approximately +30 %) [16].

Traditional Prevention

Common MSDs can have a significant impact on a person's quality of life. Effective preventive strategies are essential to reduce the onset and progression of chronic musculoskeletal pain. Multilevel non-pharmacological approaches, such as exercise therapy, cognitive behavioral therapy, and other modalities including taping, and dry needling, are the cornerstone of the treatment of chronic and nonspecific musculoskeletal pain [31–34]. However, studies on the effectiveness of cognitive behavioral therapy (CBT) combined with exercise for the treatment of MSDs yields conflicting results. Some studies found significant improvements, while others found no changes at all [35]. Patients suffering from MSDs pain experience significant improvements in pain, disability, depression, and stress after participating in a new group and individual therapy program that combines psychological documentation with emotional identification and expression [36,37]. Physical exercise therapy alone can result in higher levels of disability, pain intensity, and fear of movement, while individually tailored behavioral medicine interventions that include biopsychosocial factors can lead to higher levels of pain control and self-efficacy [38].

Optimizing pain management in primary services for MSDs is possible by using a pharmacological pain management algorithm, self-management techniques, and cognitive behavioral therapy under the supervision of case management nurses [39]. Factors such as gender, age, education level, employment status, pain intensity, and psychological stress can affect the possibility of visiting a doctor for non-inflammatory musculoskeletal pain. Consulting with a musculoskeletal specialist in the workplace can improve pain relief and overall health, and can also encourage positive health habits, such as reducing NSAID use and increasing participation in physical therapy [40]. Patient-focused counseling for MSDs has been shown to be more effective than standard treatment in reducing psychological distress (anxiety) and the number of pain points [41,42]. Massage has also been shown to be more effective in the short term in treating chronic musculoskeletal pain, while Mindfulness-Based Stress Reduction (MBSR) has long-term positive effects on mood [43].

Technology-based prevention (Teleconsultation)

Various types of mental and physical counseling are available for individuals with MSDs, including pharmacological and non-pharmacological methods [32]. Teleconsultation, which is a subset of telemedicine, is usually an efficient and acceptable alternative to in-person visits. This is because they typically save money and cut down on transportation expenses without significantly impacting patient satisfaction or clinical outcomes [44].

Telemedicine is a broad term that encompasses various services such as diagnosis, consultation, therapy, and monitoring, all delivered through online platforms. Anyone can access this service from anywhere and at any time [45]. Due to these unique circumstances, the use of telemedicine during the pandemic has increased significantly not only among healthcare providers but also among people seeking treatment and advice [46, 47].

Over the years, with the evolution of telemedicine and the improvement of the knowledge of health providers and patients, the outcome measures of patients and their experiences regarding the services received online were considered and reported as well [46]. In addition, it is important to consider real-world factors that could affect the quality and safety of accessing online care. This is mainly because we prioritize factors such as ease of use of the technology and devices used, as well as the accuracy of the program process. Failure to adhere to these parameters can reduce patient engagement and waste patient and government time and money.

Several studies have investigated various types of telemedicine solutions for MSDs, with teleconsultation emerging as a significant tool in healthcare. Teleconsultation leverages communication technology to provide medical services remotely, which is particularly beneficial during times of social distancing or for patients with limited access to in-person consultations. Patients are more likely to adhere to physical therapy treatment plans when using remote counseling. This has several advantages, including ease of practice and regular contact with experts. During the COVID-19 pandemic, patients greatly benefited from telehealth visits, allowing them to continue exercising and stay in touch with physical therapists [48]. There is evidence that telemedicine in orthopedics and neurosurgery improves patient care by reducing the rate of unnecessary patient transfers and increasing the rate of early access to subspecialty care [49, 50].

There is also evidence suggesting that teleconsultation could significantly enhance occupational therapy education and healthcare delivery. However, the effectiveness and sustainability of this approach hinge on the implementation strategy, which should prioritize ongoing learning and adaptation. Unfortunately, teleconsultation remains unexplored among office workers, with insufficient education on its utilization. One significant drawback is the inability of patients to physically attend therapy sessions, rendering the use of therapy equipment impossible [48]. Although telemedicine can help manage physician workload and reduce unnecessary face-to-face consultations, it is not suitable for initial consultations because physical examination is essential for musculoskeletal evaluation [51]. Teleconsultation encounters challenges in terms of technicalities, communication, and the lack of a physical examination. This is especially true for conditions such as spinal cord injuries, where a hands-on approach is frequently required [52].

When dealing with MSDs that occur on the job, this approach is especially helpful because prompt and effective treatment is of the utmost importance. Remote clinical examinations, telerehabilitation, patient prioritization methods, mobile units for prehospital care, videoconferencing, weekly data submissions with video consultations, a variety of medical conditions, and long-term management interventions are all part of telemedicine [53, 54]. By allowing for constant monitoring and frequent consultations, telemedicine interventions boost patient agency and self-management by raising patients' level of understanding and agency over their health situations. According to studies conducted in emergency rooms, telemedicine has the potential to be cost-effective by lowering direct and indirect expenses while keeping staff and patients on board [55].

Remote neurological evaluations and treatment for MSDs can be efficiently provided by telemedicine. In order to make sure that both the doctor and the patient have working telehealth equipment, it is important to plan ahead for the visit so that telemedicine may be used appropriately. Improve the quality of virtual visits by providing patients with detailed instructions on how to position themselves, the camera, and their clothing. A thorough musculoskeletal assessment and in-depth patient history can be accomplished using telemedicine. Doctors can practice clinical examination methods that they would do in person using common household items. For initial management, there are home care instructions and rehabilitation tools available online. When a patient's diagnosis or treatment plan is uncertain, an in-person appointment should be set up [56]. Urgent examination is necessary for patients who may have a deformity or neurovascular impairment. In the event that the patient's condition is improving as anticipated, virtual follow-up can be conducted. An in-office evaluation should be conducted if the patient's condition is not improving or is getting worse and referral to formal physical therapy or specialty services should be considered as necessary.

Prognosis

Despite some limitations in image resolution and the need for a physical examination, teleconsultation using mobile camera phones is a viable option for the early diagnosis and triage of digital soft-tissue injuries. The technology has the potential for future uses in telemedicine and telecare, and it is easy to use, inexpensive, and portable [57]. Asynchronous teleconsultation in orthopedics can effectively manage most patient queries in primary health care, reducing the need for referrals to specialists, demonstrating the potential to improve patient management, and overcoming distance barriers to healthcare access [58]. Teleconsultation methods, including telephone and teleconsultation, are well accepted by patients waiting for outpatient rehabilitation services because teleconsultation provides higher quality human contact and can better meet support needs [59]. A physical activity program delivered by EHealth using physical therapist-led remote counseling resulted in clinically meaningful functional improvements in rural musculoskeletal pain patients compared with usual care [60].

Conclusion and practical recommendations

The use of teleconsultation has the potential to reduce and prevent MSDs in a variety of work environments. This service provides a practical and economical method of healthcare by facilitating continuity of care and reducing the need for in-person visits by specialist physicians. The use of telemedicine in orthopedic care has been shown to reduce the burden on secondary care services, and despite certain limitations such as a lack of physical equipment and the need for a physical examination, patients have demonstrated a high level of satisfaction with the method in some cases [61].

Since the COVID-19 pandemic, telemedicine has been an important resource for treating work-related MSDs. There are advantages and disadvantages to this method in the realm of musculoskeletal health, as it makes use of visual and auditory technologies to deliver remote evaluations and treatment. To aid in the diagnosis of local vs transferred pain, telemedicine can successfully mimic several features of in-person musculoskeletal examinations, such as the patient self-palpation and pointing to painful locations. The convenience of telemedicine may explain why patient satisfaction has remained high despite its limits in physical examination components such as palpation, percussion, and auscultation.

Table 2. *Prospects and limitations of telemedicine in MSDs*

No.	Benefits of telemedicine in MSDs	Limitations of telemedicine in MSDs
1	Early detection and intervention, and also preventing the progression of MSDs.	Lack of in-person assessment may limit the accuracy of diagnosing specific musculoskeletal conditions.
2	Patients can consult with specialists remotely, reducing the need for physical visits.	Access to reliable internet and appropriate devices may be a challenge in certain regions.
3	It enables personalized exercise programs at home, improving patient compliance.	Protecting patient data during virtual consultations is crucial but can be challenging.
4	It reduces travel time and costs for patients and healthcare systems.	Some musculoskeletal conditions require hands-on evaluation, which telemedicine cannot provide.
5	It allows continuous monitoring and follow-up, enhancing patient outcomes.	Motivating patients to actively participate in tele-rehabilitation can be difficult.
6	It provides educational resources for self-management and prevention.	Licensing, reimbursement, and liability issues vary across regions and may hinder telemedicine adoption.

When it comes to measuring things like gait, discomfort, muscle strength, and range of motion, telemedicine tests are reliable and valid. There needs to be a push for standardized measurements and tech upgrades because its validity for orthopedic special testing and neurological disorder assessments is low to moderate. Workplace resistance training exercise programs can aid in the prevention and management of symptoms and illnesses involving the musculoskeletal system in the upper extremities. Workers who are subjected to physically demanding tasks may find relief from musculoskeletal ailments through workplace strength training.

By adhering to a traditional method that incorporates pre-visit planning and clear patient instructions, telemedicine becomes more effective in treating MSDs. Virtual follow-ups are possible if the patient's condition is improving, and common household items can be utilized to mimic clinical examination methods. Virtual follow-ups are possible if the patient's condition is improving, and common household items can be utilized to mimic clinical examination methods. The benefits and limitations of telemedicine are concluded in Table2.

There is a lack of attention to the researches related to telehealth specified for MSDs among office workers, but there are some studies focused on MSDs using different aspects of telehealth such as teleconsultation and telerehabilitation. Therefore, here we have tried to summarize those related papers.

In a recent systematic review, conducted by Amin et al . in 2022, among 15 studies (12341 subjects were included in total), all the subjects were above 18 years old and had work — related MSDs. In all of those studies, the quality of the studies was confirmed using a critical appraisal checklist tool. Subjects were satisfied with both telerehabilitation and face-to-face intervention, but in three studies, it was mentioned that the subjects were more satisfied with telerehabilitation compared to face — to — face intervention [62].

The findings of another systematic review conducted among 13 studies (1520 subjects were included in total), and all the subjects were above 18 years old and had MSDs. The quality of the studies was confirmed using the Downs & Black Checklist. Their findings showed that telerehabilitation is effective in improving physical performance (SMD 1.63, 95 %CI 0.92-2.33, I2=93 %) and is more favorable (SMD 0.44, 95 %CI 0.19-0.69, I2=58 %) compared to face — to — face intervention. It is suggested as a practical and cost — effective method to improve physical performance and reduce pain levels among subjects with MSDs [63].

In an amazing umbrella review that summarized 35 systematic reviews, the quality of the papers was confirmed by AMSTAR 2. Unfortunately, 24 papers were found to have low quality. The final conclusion of this paper suggested that telerehabilitation is a favorable and cost — effective method compared to face — to — face interventions. It is important to note that most of the papers included in this study were of low quality, highlighting the need for further research with higher quality standards [46]. No adverse events were reported in those published papers.

However, the findings of this review underscored a notable lack of attention to teleconsultation among office workers, coupled with insufficient education on utilizing this technology. It is imperative for companies to prioritize the integration of teleconsultation services to enhance the health and well-being of their employees, while also recognizing its potential cost-saving measure. Moreover, ensuring regular educational training on teleconsultation usage is essential and warrants substantial emphasis. Additionally, providing regular educational training on teleconsultation usage is crucial and should be duly emphasized.

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