

## REVIEW ARTICLE

# ABSENCE OF PHYSICAL EXERCISE AND INCIDENCE OF MUSCULOSKELETAL DISCOMFORTS AMONG OFFICE WORKERS: A SHORT REVIEW

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## ABSTRACT

Lower back, neck and shoulder pain are the most prevalent musculoskeletal problems affecting office workers worldwide. Several hypotheses regarding the underlying mechanisms and the maintenance behind office work-related musculoskeletal disorders have been presented. There is some evidence, based on epidemiological studies as well as studies upon smaller groups of subjects, that individuals who sit and work for a long time not only show cognitive impairment at the workplace, but also suffer from poorer and fragmented daytime sleep, in addition to increased risks of developing various psychological, physiological and medical impairments and musculoskeletal disorders. The related physical mechanisms behind musculoskeletal disorders are discussed in the context of new findings. The main causes, as well as varying levels in severity of musculoskeletal disorders, not to mention the link between such disorders in the neck, shoulder and lower back regions and physical activity among office workers are also stated. The main objective of this review paper is to conduct a systematic review to identify musculoskeletal disorders and how these disorders are correlated with physical activity among office workers. The results of this review indicate that the musculoskeletal disorder is a critical issue among office workers and the main cause is related to the absence of physical activity as well as the subjects' sedentary lifestyle.

**Keywords:** *Sedentary life style, Musculoskeletal disorders, Office workers, Physical activity*

## INTRODUCTION

Musculoskeletal issues (mainly shoulder, neck and lower back pain) are especially predominant in industrialized countries, influencing approximately 70% to 80% of adults at different times of their lives, with about 1% of the population of U.S. frequently disabled due to shoulder, neck or lower back pain<sup>2</sup>. This kind of disability results in poor life quality whereas the number of long-term disability claims absence and the amount of daily work are increased. The individuals who are influenced usually experience chronic fatigue, nervousness and sleep disturbances, and many are the victim of prescription medication abuse<sup>3</sup>. This problem's scale is expected to increase with both growing industrialization pace in the developing countries and an aging population. Numerous risk factors contribute to shoulder, neck and lower back pain, such as age, marital status, race and sex but the most predominant factor—particularly among adolescents—is the amount of time spent on sitting<sup>4</sup>. Musculoskeletal disorders (MSD) refers to an extensive range of conditions which can influence any part of the musculoskeletal system, such as the bones, muscles, nerves, spinal discs and joints, together with supporting blood vessels and connective tissues including cartilage, ligaments and tendons<sup>5</sup>. Injuries can happen, including strains, tears and sprains, as well as any form of chronic or acute pain or

soreness within the body's support frame. Normally these disorders are worsening, degenerative over time if the conditions that cause them are not properly addressed<sup>6</sup>. There is an increasing concern in study on the occupational hazards concerning shoulder, neck and lower back pain and its risk factors among enormous office workers populations. It is essential to perform researches on the musculoskeletal disorders' (MSD) prevalence, in addition to assess the efficiency of practical treatment methods for shoulder, neck and lower back pain. Recognizing the particular risk factors for people and reducing those factors are essential stages when dealing with such issue in its various forms<sup>7</sup>. Numerous researches are in line with the claim that individuals who work in offices are especially susceptible to suffering musculoskeletal discomfort, making an improved concern for, and awareness of, the office workers' welfare<sup>8</sup>. The reasons that is most commonly quoted for shoulder, neck and lower back pain high percentage are associated with factors such as sedentary lifestyle and the ergonomic conditions of one's workplace<sup>9</sup>, in addition to the lack of routine physical activity<sup>10</sup>. Unluckily, although the the problem's prevalence is growing, not much attention is paid by both company and government, even though lengthy working and sitting already have been addressed.

An essential ancestor to healthy living is physical activity, and it is crucial for maintaining proper

function order of the musculoskeletal system. Absence of exercise can lead to or shoulder back, neck and worsen lower pain due to increased damaged and stiffness muscles. People who live sedentary lifestyles not only lose the strength but also their muscles flexibility, both of which are crucial constituents of health-related natural posture and physical fitness. Nevertheless, these people cannot benefit from the usual exercises benefits in ways which go beyond the more obvious and common relations of cardiorespiratory flexibility, fitness and muscular strength - regular exercise offers nourishment of the soft tissues, ligaments and spinal discs. ligaments is frequently stretched with slouching in a chair or sitting forward for prolonged periods spinal and puts excessive strain on the intervertebral discs and nearby structures in the vertebral columns<sup>11</sup>. After a while, poor office ergonomics and incorrect sitting positions can cause or contribute<sup>9</sup> to frequent back pain encounters<sup>8</sup>. Professionals and physical therapists use resistance training and stretching to help people in recovering lost strength and motion causing from immobilization or pain. Being active in a standard exercise plan which includes stretching in addition to strength conditioning avoids future ailments and stimulates the existing problems' recovery<sup>12 13</sup>. Getting regular exercise enhances individual's overall abilities to do everyday tasks. Flexibility and muscles' strength Improving can also increase vertebral column and reduce the injuries reoccurrence in this part of the body. Consequently, the degree of pain they suffer will be decreased, thus letting more restful and much easier sleep, which in turn lowers fatigue's levels<sup>10</sup>. A great deal of study has been conducted on this subject, but most of it has merely emphasized the occurrence of these issues among office employees; some research have recommended a simple and general exercise protocol for the whole body, while others have suggested ways to revise their working environments' ergonomic conditions. Nevertheless, there has been a deficiency of study concerning the introduction of a particular routine to train office workers to deal with shoulder, neck and lower back pain. Studies conducted up to this point has revealed an important relation between the ergonomic and physical demands of an individual's life and musculoskeletal disorders of the shoulder, neck and lower back areas, particularly amongst office employees. Nevertheless, a number of issues concerning methodology will have to be addressed cautiously in this study to improve particular risk-assessment tools to identify the compound array of interactive factors dealing with office work. The precise recognition of these risk factors will, consecutively, simplify formation of targeted forms of intervention to decrease the musculoskeletal disorders' occurrence at work.

## METHODS

In this study, systematic review methods are used based on the purpose of research. A systematic investigation of recurrent literature databases was navigated between 2002 and 2015. Science Direct, PubMed and Scopus were searched for the subsequent key words: office worker, musculoskeletal disorders, neck pain, shoulder pain, lower back pain, physical activity as well as health and field studies. Initially 800 researches were recognized. As there are a huge number of researches about office working disorders, we could not analyse all the original articles, so we analysed and reviewed previous researches.

## RESULTS AND DISCUSSION

Musculoskeletal disorders<sup>9</sup> are able to influence any individual, irrespective of gender or age , and are usually connected to an individual's job directly<sup>14</sup>. In cases where such relation exists, either due to a work-related incident of some kind or the working environment, these circumstances are stated as work-related MSD. A research conducted in Nigeria shows prevalence of musculoskeletal disorders throughout the employees; Fabunmi et al.<sup>15</sup> stated that, during a 12-month period of time, the self-reported rate of musculoskeletal disorders at any particular work site was 91%. MSD's can thus justify somewhere between 42% and 58% of work-related health concerns<sup>16</sup>. Nevertheless, MSD's differ across various industries as well as between various countries, and specific professions - whether across or within diverse industries - can have rates of musculoskeletal disorders that is three to four times more than the general average of the overall workforce<sup>17</sup>. One important risk factor which has a powerful relation with the MSD's development is computer usage. individuals working in an office environment have greater probability of MSD's development, since their jobs normally makes them to spend extensive hours working with a computer<sup>18</sup>. Consequently, industries with large percentage of employees who work in office environments are probable to have a greater susceptibility to MSD's. An example is the banking industry, and researches show that the MSD's prevalence among bank employees vary from 60% to 80%, showing that they have a great vulnerability to these types of injuries<sup>19</sup>.The connection between the MSD's incidence and occupation is not totally based on the working environment' strain physical. Musculoskeletal risk

factors complaints among office employees who spend prolonged hours working with computers are connected not only to physical but also with psychosocial characteristics<sup>20</sup>. A research that conducted in Europe offers evidence that socioeconomic status can contribute to the liability of musculoskeletal disorders, precisely for osteoporosis, arthritis and spinal conditions<sup>21</sup>. Another research conducted in the UK reveals that musculoskeletal conditions, principally those of the shoulders, knee, back and neck, were more common in areas with economic disadvantage<sup>22</sup>. Nonetheless, the MSD's prevalence has highly been related to its connection with occupation that appears to be the leading overall factor- therefore the usage of the term "work-related MSD's". In a widespread systematic review by means of 63 separate studies and 1761 articles, Costa and Vieira (2010) emphasis that the labor-intensive nature of a person's occupation, psychosocial work demand, smoking, and body mass index (BMI), as along with previous injuries or any MSD history, are the most significant risk factors. prolonged awkward, heavy lifting, postures and Repetitive motions are the most frequently mentioned ergonomic risk factors stated in the literature<sup>23,24</sup>. Other epidemiological studies and reviews, as well as with a main report from the Institute of Medicine (IOM) and National Research Council (NRC) that are commissioned by the US Congress in 2001, have noticeably confirmed considerable connections between the work environment and MSD<sup>6</sup>.

#### a) Lower back, neck and shoulder pain and physical activity

The significance of physical activity (PA) and exercise is a key constituent in the care and cure of chronic pain and acute<sup>24,25</sup>. Individuals with chronic pain disorders are recommended to remain active physically, and gradual and early physical activity is advised whereas bed rest is not recommended in main care guidelines<sup>26</sup>. Nevertheless, to effectively manage such pain and prevent it from becoming chronic and recurring, is still a significant challenge. A growing focus to prevent long-term negative chronic pain consequences and a potential role for PA has been planned. A new valuation has recognized proof which supports the usage of physical activity as a main part in active self-management amongst individuals with chronic pain<sup>27</sup>. Simultaneously, as classified activity programs have been investigated on as a collective organizational plan for people in which

both chronic and acute forms of shoulder, neck or lower back pain are assumed to be existing, these studies did not estimate levels of activity in everyday life outside an environment which is controlled. Consequently, based on this study it is unlikely to suppose the presence of a connection connecting any alteration in physical activity to examples of recovery from pain<sup>28</sup>. The calculated result of pain on patients' activity levels with shoulder, neck or lower back pain has generally been based on the deconditioning model of these kinds of pain, and is supported by the neuromuscular changes, changes in physical performance's confirmation, psychological property, changes in the levels and patterns of patients' activity, and reduced levels of physical fitness<sup>29</sup>. This evidence has been challenged, many researches have been conducted which don't show any difference in either patients' activity or fitness levels with shoulder, neck or lower back pain when compared with healthy control groups<sup>30</sup>. Regarding this study, there is not much conclusive data concerning whether the patients' activity levels with shoulder, neck or lower back pain are related to LBP (low back pain) results, and the physical activity's role in these populations has not determined yet. The patients' activity level with shoulder, neck or lower back pain does not seem to be an important sign of prognosis, hence it has not frequently been examined specifically in most researches<sup>31</sup>. Generally, being active as an enhancement to physiotherapy healing appears to have positive results for both chronic and acute shoulder, neck and lower back pain populations; nonetheless, this hypothesis is supported by literature that does not comprise studies which does not purposely PA of such people. The likely function which PA may play concerning the occurrence of shoulder, neck or lower back pain has been also examined, but there was no absolute assumptions<sup>32</sup> Recently a review examined the relation between the lower back shoulder and neck pain prevalence and physical movement, this review concluded that both low and high levels of activity amplified the chronic post-activity pain probability, especially concerning female individuals. There is Only one longitudinal research which has precisely separated the movement levels into low, moderate and high at baseline prior to using self-reporting as a measure to discover the connection between pain outcome and activity level<sup>33</sup>. This research did not find any significant connection between the activity levels recorded

at baseline and varies in disability and pain 5 years later. There are no other studies which is specifically conducted to explore the actual effect of 'maintained moderate physical activity implementation while dealing with shoulder, neck or lower back pain, compared with high or low movement' levels on longer-term outcomes. Consequently, extra longitudinal study into the possibly unwanted influence of extreme or inadequate levels of activity is essential.

#### b) Impact of physical activity on lower back, neck or shoulder pain

Shoulder, neck or lower back pain, that often subjects reduced negative mood changes and physical activity, may essentially result in a decline in fitness or be perceived as such, and the importance of this problem must be addressed. The effect of LBP on physical activity is not totally clear, while fitness and health are usually assumed to affect the shoulder, neck and lower back pain prevalence<sup>34</sup>. An earlier research has revealed that many benefits provided by exercise for people who are suffering from shoulder, neck or lower back pain. Current research has also shown that exercise has reported positive influences in the same people concerning their feelings as well as levels of anxiety and stress, besides their depression encounters<sup>35</sup>, whereas they rarely attended any exercise program before the research. Nevertheless, an effective way to minimize the amount of sick-leave days among employees with chronic shoulder, neck or lower back pain is proven to be multi-purpose conditioning exercise with aerobic conditioning<sup>36</sup>. It is exposed that the general flexibility benefits are to be seen in neurological, biomechanical as well as molecular systems, which comprise myofibrillogenesis as a long-term result. The tendons' and muscles' resistance to soreness and viscous elastic properties is increased with growth in flexibility size. After exposing participants to muscle conditioning, it is recommended to rest for a period of thirty six to forty eight hours as an interval between workout sessions. Besides, because flexibility exercises change muscle proteins, a relaxation time of 36-48 hours between exercise sessions is crucial to escape extreme catabolism<sup>37</sup>.

#### CONCLUSION

To sum it up, musculoskeletal disorders, especially in the neck, shoulders and lower back constitute an ailment that plagues office workers worldwide, the main reasons being their sedentary lifestyle and absence of physical activity. Future studies, preferably large prospective cohort studies, should include data on practical treatment among office workers with regards to the severity of pain as current

academic scholarship on the topic is mostly theoretical rather than practical and therefore not easy to apply in an office environment. In this study. Not to forget, our sincerest gratitude to all respondents who took part in this research.

#### COMPETING INTERESTS

There is no conflict of interest.

#### REFERENCES

1. Knox, J. *et al.* The incidence of low back pain in active duty United States military service members. *Spine* **36**, 1492–1500.
2. Painter, J. T. & Crofford, L. J. Chronic opioid use in fibromyalgia syndrome: a clinical review. *JCR: Journal of Clinical Rheumatology* **19**, 72–77 (2013).
3. Kroenke, K. *et al.* Reciprocal relationship between pain and depression: a 12-month longitudinal analysis in primary care. *The Journal of Pain* **12**, 964–973 (2011).
4. Pincus, T., Greenwood, L. & McHarg, E. Advising people with back pain to take time off work: A survey examining the role of private musculoskeletal practitioners in the UK. *Pain* **152**, 2813–2818 (2011).
5. da Costa, B. R. & Vieira, E. R. Risk factors for work-related musculoskeletal disorders: a systematic review of recent longitudinal studies. *American journal of industrial medicine* **53**, 285–323 (2010).
6. Tamrin, S. B. M., Yokoyama, K., Aziz, N. & Maeda, S. Association of risk factors with musculoskeletal disorders among male commercial bus drivers in Malaysia. *Human Factors and Ergonomics in Manufacturing & Service Industries* **24**, 369–385 (2014).
7. Choobineh, A., Motamedzade, M., Kazemi, M., Moghimbeigi, A. & Heidari Pahlavian, A. The impact of ergonomics intervention on psychosocial factors and musculoskeletal symptoms among office workers. *International Journal of Industrial Ergonomics* **41**, 671–676 (2011).
8. Taieb-Maimon, M., Cwikel, J., Shapira, B. & Orenstein, I. The effectiveness of a training method using self-modeling webcam photos for reducing musculoskeletal risk among office workers using computers. *Applied ergonomics* **43**, 376–385 (2012).

9. Sitthipornvorakul, E., Janwantanakul, P., Purepong, N., Pensri, P. & van der Beek, A. J. The association between physical activity and neck and low back pain: a systematic review. *European Spine Journal* **20**, 677–689 (2011).
10. Hassim, Z. The efficacy of Ruta graveolens 6CH together with ergonomic interventions in the work-place in the treatment of computer vision syndrome. (2012).
11. Ferreira, M. L. *et al.* Comparison of general exercise, motor control exercise and spinal manipulative therapy for chronic low back pain: a randomized trial. *Pain* **131**, 31–37 (2007).
12. Nelson, A. & Kokkonen, J. *Stretching anatomy*. (Human kinetics, 2013).
13. Hocking, L. J. & Rivadeneira, F. Stratified medicine approaches for the treatment of musculoskeletal disorders. *Current opinion in pharmacology* **16**, 127–132 (2014).
14. Fabunmi, A. A., Oworu, J. O. & Odunaiya, N. A. Prevalence of musculoskeletal disorders among Nurses in University College Hospital, Ibadan. *West African Journal of Nursing* **19**, (2008).
15. Burton, A. K. *et al.* Chapter 2 European guidelines for prevention in low back pain. *European Spine Journal* **15**, s136–s168 (2006).
16. Bambra, C., Lunau, T., Van der Wel, K. A., Eikemo, T. A. & Dragano, N. Work, Health, and Welfare: The Association between Working Conditions, Welfare States, and Self-Reported General Health in Europe. *International Journal of Health Services* **44**, 113–136 (2014).
17. Cho, C.-Y., Hwang, Y.-S. & Cherng, R.-J. Musculoskeletal symptoms and associated risk factors among office workers with high workload computer use. *Journal of manipulative and physiological therapeutics* **35**, 534–540 (2012).
18. Loghmani, A., Golshiri, P., Zamani, A., Kheirmand, M. & Jafari, N. Musculoskeletal symptoms and job satisfaction among office-workers: A Cross-sectional study from Iran. *Acta medica academica* **42**, 46–54 (2013).
19. Eltayeb, S., Staal, J. B., Hassan, A. & De Bie, R. A. Work related risk factors for neck, shoulder and arms complaints: a cohort study among Dutch computer office workers. *Journal of occupational rehabilitation* **19**, 315–322 (2009).
20. Vavken, P. & Dorotka, R. Burden of musculoskeletal disease and its determination by urbanicity, socioeconomic status, age, and sex: results from 14,507 subjects. *Arthritis care & research* **63**, 1558–1564 (2011).
21. Biglarian, A. *et al.* Low back pain prevalence and associated factors in Iranian population: findings from the national health survey. *Pain research and treatment* **2012**, 653060 (2012).
22. Shariat, A., Tamrin, B., Arumugam, M., Ramasamy, R. & Danaee, M. Prevalence Rate of Musculoskeletal Discomforts based on Severity Level among Office Workers. *Acta Medica Bulgarica* **43**, (2016).
23. Shariat, A., Arumugam, M., Ramasamy, R. & Danaee, M. Package of Office Exercise Training as a New Idea for Office Workers. *Iranian journal of public health* **45**, 544–545 (2016).
24. Shariat, A., Tamrin, S. B. M., Arumugam, M., Danaee, M. & Ramasamy, R. Office Exercise Training to Reduce and Prevent the Occurrence of Musculoskeletal Disorders among Office Workers: A Hypothesis. *Med Sci* **23**, 54–58 (2016).
25. Kerssens, J. J., Sluijs, E. M., Verhaak, P. F. M., Knibbe, H. J. J. & Hermans, I. M. J. Back care instructions in physical therapy: a trend analysis of individualized back care programs. *Physical Therapy* **79**, 286–295 (1999).
26. Hendrick, P. *et al.* The relationship between physical activity and low back pain outcomes: a systematic review of observational studies. *European Spine Journal* **20**, 464–474 (2011).
27. Brandt, Å., Samuelsson, K., Töytäri, O. & Salminen, A.-L. Activity and participation, quality of life and user satisfaction outcomes of environmental control systems and smart home technology: a systematic review. *Disability & Rehabilitation: Assistive Technology* **6**, 189–206 (2011).
28. Dubois, J.-D., Abboud, J., St-Pierre, C., Piché, M. & Descarreaux, M. Neuromuscular adaptations predict functional disability independently of clinical pain and psychological factors in patients with chronic non-specific low

- back pain. *Journal of Electromyography and Kinesiology* (2014).
29. Halvorsen, S. *et al.* Physical fitness in patients with ankylosing spondylitis: comparison with population controls. *Physical therapy* **92**, 298–309 (2012).
  30. Oesch, P. Work-related evaluation and rehabilitation of patients with non-acute nonspecific low back pain. (2011).
  31. Fourney, D. R. *et al.* Chronic low back pain: a heterogeneous condition with challenges for an evidence-based approach. *Spine* **36**, S1–S9 (2011).
  32. Nemoto, O. *et al.* A longitudinal study of radiological changes in the lumbar spine in asymptomatic Japanese military young adults. *European Orthopaedics and Traumatology* **3**, 135–139 (2012).
  33. Helmhout, P. H. *et al.* Prognostic factors for perceived recovery or functional improvement in non-specific low back pain: secondary analyses of three randomized clinical trials. *European Spine Journal* **19**, 650–659 (2010).
  34. Mayer, J., Mooney, V. & Dagenais, S. Lumbar Strengthening Exercise. *Evidence-based Management of Low Back Pain* 104 (2012).
  35. Hagen, K. B. *et al.* Exercise therapy for bone and muscle health: an overview of systematic reviews. *BMC medicine* **10**, 167 (2012).
  36. Van Middelkoop, M. *et al.* Exercise therapy for chronic nonspecific low-back pain. *Best practice & research Clinical rheumatology* **24**, 193–204 (2010).