



# Common Occupational Therapeutic Interventions Adopted to Alleviate Lower Back Pain Produced by Persistent Sitting Posture

Moraba LM\*, Ellapen TJ, Swanepoel, M, Strydom GL, Burger M, Hammill VH and Paul Y

Tshwane University of Technology, South Africa

\*Corresponding author: Lehlogonolo Moraba, Tshwane University of Technology, South Africa, Email: lehlogonolomoraba@gmail.com

Mini Review

Volume 3 Issue 2

Received Date: July 04, 2020

Published Date: August 12, 2020

DOI: 10.23880/aphot-16000154

## Abstract

Persistent-sitting-posture has been linked with vertebrae, shoulder, arm and leg work-related-musculoskeletal-complaints among computer-based office users. Work-related-musculoskeletal-disorders (WRMDs) affect the employee's overall health, the company's productivity and the nation's economy. Numerous strategies have emerged to combat the ill-effects of persistent-occupational-sitting-posture, which inter alia include enhanced ergonomic workstations (sitting and standing), dynamic-sitting posture, active workstations (treadmill and cycle workstations), regular instructional prompting to take compulsory rest breaks and exercise therapy prescription. Ergonomic reconfigured workstations and exercise therapy has been most successful. This commentary reviews the aforementioned interventions. In South Africa, occupational health and safety is a collaborative inter professional effort of medical doctors, occupational nurses, occupational therapists and bio kinetics. An understanding of common international therapeutic interventions adopted to alleviate lower back pain produced by persistent-occupational-sitting-posture will strengthen their therapeutic strategies.

**Keywords:** Ergonomic Interventions; Lower Back Pain; Sitting-Posture

**Abbreviations:** WRMDs: Work-Related-Musculoskeletal-Disorders; LBP: Habitual lower Back Pain; SCWP: Standing-Computer-Workstation-Posture; PSP: Persistent-Sitting-Posture.

## Introduction

Work-related-musculoskeletal-disorders are associated with persistent physical labour, repeated bending, maintaining a prolonged unnatural static posture, working behind a computer desktop and/or laptop [1]. Work-related-musculoskeletal-disorders often produce painful neuro-musculoskeletal symptoms at the vertebrae (cervical and lumbar), shoulders, arms, wrist and legs<sup>1</sup>. The absorbent financial cost linked to these WRMDs relate to protracted absenteeism, increased medical care, remuneration for acute and/or permanent kinesiological disability. Habibi, *et al.* [1] reported 25% or more of many European and African

countries annual expenses are attributed to increased medical care for WRMDs, which demonstrates the gravity of the WRMDs to the employee, employer and national economy [1,2].

Habitual lower back pain (LBP) has an international prevalence of 23%, but is higher among industrial blue collar workers [3]. There are physical, psychosocial and physiological predisposing risk factors responsible for the onset of LBP that continuously bombard the employee [3]. Literature analyses within the last two decades found a controversial relationship linking persistent sitting and the development and/or worsening of LBP. Lis, *et al.* [4] suggested that the combination of an awkward persistent sitting posture (slouched sitting, forward flexed neck, rounded shoulders) increases the likelihood of developing LBP [5,6]. Kumah, *et al.* [7] hypothesize that it is pragmatic to conceive that LBP can be instigated by unfavourable sitting

posture leading to work-related-neuro-musculoskeletal-complaints at the vertebrae (cervical and lumbar), shoulder, arm and leg pain.

Sitting behind a desk, computing for hours on end, does place stress on the human body that warrants an appropriate ergonomic computer workstation configuration. Ergonomics is described as the science of fitting workplace settings and job demands to the human employee's capabilities [1]. The task of ergonomically designing a workstation to articulate with the individual needs of the employee is complex and depends on a myriad of human physical, kinanthropometric and kinesiological characteristics (sitting with knees and hip flexed, while twisting the torso to answer the telephone and/or engage in a conversation with a colleague). The environmental design must be congruent with the employee's human anatomy, which can be accomplished by adjusting the person's seating height and backrest angle, maintain adequate desk height between the thighs and desk, and proper distance of computer monitor from the person's eyes to prevent excessive decrease in craniovertebral and craniohorizontal angle, as well as adequate illumination and limited auditory disturbances [7].

The traditional notion of the optimal occupational sitting posture suggests that one must assume an "upright sitting posture". This notion has been strongly interrogated and found wanting [7-9]. Static upright sitting posture has been gradually replaced by the notion of "dynamic sitting" [8,9]. Dynamic sitting involves the person continuously altering the sitting posture. Pynt, et al. [10] reported that there is no ideal sitting posture; therefore the continuous adoption of dynamic sitting postural change, alleviates vertebral, shoulder, arm and leg pain. Regular movements characteristic of dynamic sitting posture are essential for preventing LBP, by altering the individual's vertebral geometrical alignment thereby intermittently changing intervertebral disc pressure and volume [3]. Dynamic sitting posture varies the loading distribution and compressive pressure over the intervertebral disc, which induces an effective pump mechanism within the intervertebral disc to alter its gelatinous content [3]. This critical mechanism is important for intervertebral disc nutrition, regeneration, resistance against degenerative and compressive stimuli [3]. Some literature has refuted the evidence that dynamic sitting positively manages LBP, because it does not significantly alter trunk muscle activity [11]. Further clinical investigations are needed.

A standing-computer-workstation-posture (SCWP) has become a popular modern work ergonomic intervention to reduce sedentary behavior and LBP of persistent-sitting-posture (PSP). Users reported comparable discomfort of both PSP and SCWP within the first 10 minutes of work;

however SCWP had more than double as much discomfort as compared to PSP after 45 minutes. Persistent-sitting-posture most vulnerable anatomical site of pain and/or discomfort is the shoulders, while SCWP, the lumbar vertebrae [12]. Alternative active workstations interventions, such as treadmill desks or cycling desks, computer instructional prompts to stand and/or walk to ensure compulsory rest intervals, as attempts to reduced PSP as revealed inconclusive findings [12]. Further clinical investigations are needed.

Exercise therapy effectively alleviates vertebrae (cervical and lumbar) and shoulder work-related-neuro-musculoskeletal-complaints among administrators and industrial workers [12]. Coury, *et al.* described that the efficacy of exercise rehabilitation programmes was dependant on duration and patient compliance longer than 10 weeks, prescription of resistance exercises and supervised rehabilitation [13]. Kim, *et al.* and Schneck, *et al.* [14,15] reported that exercise therapy programmes that include stretching (short cervical and hip flexors) and strengthening (cervical and hip extensors) exercises are effective to alleviate vertebrae and shoulders work-related-neuro-musculoskeletal-complaints.

## Conclusion

Persistent-occupational sitting posture contributes to the development of WRMDs that ill-effects the employee's health, company's productivity and the nation's economy. There have been several interventions employed to alleviate the aforementioned WRMDs, which is invaluable to the interprofessional medical team effort to curb this occupational malady. Exercise therapy and ergonomically reconfigured has been the most successful interventions.

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