# PREVENTION AND TREATMENT OF PAIN SYNDROMES IN OFFICE WORKERS BY MYORELAXATION AND STRETCHING

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**Abstract**

*Sitting at a desk or computer can lead to muscle tension, stiffness, and strain in the neck, shoulders, arms, wrists, back, and legs which can lead to a musculoskeletal disorders (MSD). Purpose of the study was to investigate the effect myorelaxation and stretching on pain and functional abilities of office-workers with MSD. A total of 64 patients (mean age 42, SD 8.5) were included in the analysis. Patients were randomly assigned to either myorelaxation group (MG) or to stretching group (SG) for a period of 6 months. All subjects received the same prevention programme of 15 myorelaxation or stretching exercises. Results: The MG had a significantly greater improvement than the SG in function and pain measured with the PSFS (P<.0001) (between group mean differences 15.2, 95% CI 9.2-21.3).*
*Significantly lower pain intensity (assessed with VAS) was reported by the MG at the six month assessment compared with the SG in activity (P<.001), at rest (P< .01) and at night (P<.01). Follow up data showed that 85% of subjects from MG maintained the improved level of function and 81% of the subjects remained pain free for at least 1 year post treatment. The findings of this study provide strong evidence for a prevention effect of myorelaxation and stretching on musculoskeletal disorders.*

**Keywords**

*Physiotherapy, musculoskeletal disorders, myorelaxation, stretching.*

## 1 INTRODUCTION

Sitting at a desk or computer can lead to muscle tension, stiffness, and strain in the neck, shoulders, arms, wrists, back, and legs which can lead to a musculoskeletal disorders (MSD) according Woolf and Phleger (2003).

Most of PT`s are accustomed to encountering patients suffering from neck and back pain after prolonged use of visual-display units such as a computer workstation. For the back pain, prolonged poor posturing can cause a relatively fixed reversed lumbar lordosis. In these scenarios, simply giving a lumbar pad or support alone, which is very popular nowadays, does not work, and only succeeds in pushing the patient's trunk further down the seat.

As for the neck, many patients and office workers tend to hold their heads in a flexed posture, say 20–30°, this will cause more easy fatigue of the erector spinae muscles at the posterior tension band of the cervical spine, as more force needs to be exerted by the erector spinae muscles to balance the head in this posture instead of sitting with the head erect.

The result is easy fatigue, neck pain, and recent studies report that there may even be alteration in muscle activation patterns (Novak 2004; Woolf, Phleger 2003).

## 2 OBJECTIVES

The main purpose of the study was to investigate the effect of myorelaxation and stretching on pain and functional abilities of office-workers with musculoskeletal disorders. The next objective was to analyse determinant of prevention possibilities of musculoskeletal disorders in work places.

## 3 METHODS

### 3.1 Material

Patients between 26 and 65 years old diagnosed with MSD, by an orthopaedic surgeon were consecutively included in the study. A total of 64 patients (mean age 42, SD 8.5) were included in the analysis (44:20 female: male).

### 3.2 Procedure and Methods

*Underlying Etiologic Factors*

The causes of this symptom complex with the use of visual-display units are multifactorial and include: physical factors; individual factors; psychosocial factors and ergonomic factors. Prolonged positioning away from the ideal posture affects neural and other soft tissues in the upper extremity. Abnormal postures and positions may result in chronic nerve compression or may shorten muscles, and, if the muscle crosses over a nerve, compression may occur. These postures may also contribute to muscle imbalance Novak (2004)]. Mechanical loading is a major causative factor for tendinopathy; however, the exact mechanical loading conditions (magnitude, frequency, duration, loading history, or some combinations) that cause tendinopathy are poorly defined. Research is required to better understand the mechanisms of tendinopathy at the tissue, cellular, and molecular levels, and to develop new scientifically based modalities to treat tendinopathy more effectively.

*Management of the MSD*

Since frequently multifactorial, all factors need to be tackled: Job analysis and work-place visit was done by a physiotherapist. Patient education on ergonomic factors is given, as discussed below. Postural correction and re-training performed by physiotherapists, followed by periodic stretching exercises, what caused to taught to patient to be performed at the work-place. Specific physical therapy program to address the multiple levels and designed to rehabilitate the whole kinetic chain, detect signs of any nerve compression with confirmation as necessary by nerve conduction testing, and cervical-scapular muscle imbalance corrected in these cases by teaching patients avoidance of holding the scapulae in a protracted position. Behavioural modifications at home and at work were necessary. Patients were randomly assigned to either myorelaxation group (MG) or to stretching group (SG) for a period of 6 months.

Subjects in the myorelaxation group (MG) were 31. Subjects in the stretching group (SG) were 23. All subjects received the same prevention programme of 15 myorelaxation or stretching exercises. The following stretches were designed

specifically for those who work in an office workplace: active axial spine elongation, neck rotators stretch, neck extensors stretch, neck lateral flexors stretch, levator scapulae stretch, shoulder roll, upper back/shoulder stretch, pectorals stretch, forearm/wrist flexors and extensors stretch, back rotators stretch, back extensors stretch, hamstring and calf stretch, standing back extension and ankle roll. The patients were instructed to stretch daily for maximum benefit. Hold each stretch for 20-30 seconds.

They should feel a gentle stretch, not pain when stretching and stop if they feel pain. Myorelaxation group executed the same exercises as post isometric relaxation (PIR). Post isometric relaxation (PIR) was first described by Mitchell et al. (1979) as an osteopathic technique called isometrics. It was later modified by Karel Lewit (1986). PIR is a method of muscle relaxation aimed at neural modulation. It is guided by the therapist, but its success is totally dependent on the client. Primarily used to affect the contractile component of the muscle tissue, it helps eliminate abnormal muscle tone, abolish TrPs and tender points, and improve loss of motion due to altered muscle tone.

- In PIR, the muscle is isolated biomechanically as much as possible.
- The two ends of hypertonic muscle are moved apart to lengthen the shortened structures. It is important to be established the barrier of resistance, either where bind was first noted, or 'where resistance is first perceived'.
- The patient/model is asked to use no more than 20% of their available strength to contract the affected muscle against minimal manual resistance and to maintain this contraction for 10 seconds. This allows for the hypertonic foci of the TrPs to be activated and fatigued without much unnecessary activation of the surrounding muscle fibres. The patient/model should be using (contracting) the agonist, the muscle(s) which require release.
- As patient/model induce and hold the contraction they are commonly asked to hold the breath.
- Then the patient/model is asked to relax the muscle as completely as possible (The instruction is given, 'Now let your breath go and release your effort, slowly and completely', while the therapist maintains the limb at the same barrier)
- As the patient/model relaxes and exhales, the therapist gently guides the limb to the point where the therapist now senses a resistance barrier/bind. (The therapist should almost always have increased the range by a significant degree.)
- This procedure can be repeated 3 or 4 times. At that point the tenderness or abnormal tone and ROM are re-examined for positive changes. The result is relaxation of the muscle and deactivation of hypertonic areas within the muscle. There is no physical stretching of the muscle and therefore the effects of PIR are due to changes in neural function. The patients were instructed to perform 15 stretch exercises as self PIR.

All patients have to keep the following recommendations for work-place:

- Use a chair with arm rests at work.

- The same chair needs to have a back rest to support the back and help maintain normal lumbar lordosis.
- Height of standard table between 25 and 29 inches (63.5–73.66 cm), judging from the build of the patient.
- Tilt the computer monitor screen backward 10–20°.
- Recommend 40° viewing angle.
- Separation distance of eyes from screen 20–26 inches.
- Top of screen is at or below eye level.
- Add filter to reduce glare for the monitor screen.
- Shoulders should be relaxed and comfortable while seated, avoid prolonged protraction of both scapulae.
- Elbows should be parallel to the keyboard.
- Avoid excessive bending of the head and cervical spine.
- Foot rest should be installed.
- Keep wrists in neutral position and add wrist supports.
- Keep the most frequently used items within easy reach without significant bending or stretching of body parts.

Patient Specific Functional Scale (PSFS) and Visual Analog Scale (VAS) for Pain were used to measure functional results. The PSFS has been shown to be valid and responsive to change in musculoskeletal conditions such as neck pain, cervical radiculopathy, knee pain, and low back pain. The Patient Specific Functional Scale (PSFS) is a patient specific outcome measure which investigates functional status (Stratford, Gill, Westaway, Binkley 1995).

Patients are asked to nominate up to five activities with which they have difficulty due to their condition and then rate the functional limitation associated with these activities (0 to 10 scale, where 0 = unable to perform activity and 10 = able to perform activity at same level as before injury or problem).

## 4 RESULTS AND DISCUSSION

For group comparison the Student´s t-test was used to calculate differences in mean change (from baseline to six month assessment) as well as mean differences in the outcome measurements and the VAS.
The myorelaxation group (MG) had a significantly greater improvement than the stretching group (SG) in function and pain measured with the PSFS ($P<.0001$) (between group mean differences 15.2, 95% CI 9.2-21.3). Significantly lower pain intensity (assessed with VAS) was reported by the myorelaxation group at the six month assessment compared with the stretching group in activity ($P<.001$), at rest ($P< .01$) and at night ($P<.01$). Follow up data showed that 85% of subjects from myorelaxation group maintained the improved level of function and 81% of the subjects remained pain free for at least 1 year post treatment. Myorelaxation and stretching exercises relieve muscle tension and help reduce stress. They increase range of motion, which promotes flexibility and makes everyday activities easier. They increase blood flow to the muscles and surrounding tissues.

Correct posture is of utmost importance. A recent regimen published in Spine [6], using the concepts of “neutral zone”

maintenance was found by the author to be useful in helping workers that are forced to work for long hours such as the ever-increasing population of computer workers handling visual-display units. By the same token, we stress the importance of the concept of finding the best ergonomically sound posture in connection with positioning of the head/neck region, as well as the upper and lower extremities, but especially the former. Employer to introduce variability into the work tasks in addition to proper ergonomics (Delisle, Lariviere, et al. 2006).

In the busy clinic environment, it is suggested that the orthopaedic use the following eight screening tests for similarly affected individuals: "the overhead lift, overhead work, repetitive reaching, handgrip strength, finger strength, wrist extension strength, fingertip dexterity, and hand and forearm dexterity test". As for the generalized numbness, prolonged positioning away from the ideal posture will affect neural and other soft tissues in the upper extremity. Abnormal postures and positions may result in chronic nerve compression or may shorten muscles and, if the muscle crosses over a nerve, compression may occur. These postures may also contribute to muscle imbalance (Novak 2004) and should be avoided.

## 5 CONCLUSIONS

Flexibility is a key component of musculoskeletal disorders prevention. Flexibility allows for relaxed muscles and mobile joints. *Flexibility* is possible to understand as precursor in the prevention of *musculoskeletal* injury, and posture improving in any age, *disease* state, and gender.

The findings of this study provide strong evidence for a prevention effect of myorelaxation and stretching on musculoskeletal disorders. The ultimate purpose of the presented physiotherapeutic exercise program in work places is the achievement of symptom-free movement and function. The physiotherapist must know the basic principles and effects of treatment and relationships of the anatomy and kinesiology of the part being treated. Additionally, physiotherapists should have an understanding of the state of disability and its potential rate of recovery, complications, precautions and contraindications.

As Summers, Bajorek and Bevan (2014) mentioned, the self-management of chronic musculoskeletal disorders (MSDs) in the workplace. Self-management can be defined as an individual's ability to manage the symptoms, treatment, physical, social and psychological consequences of living with a chronic condition. Self-management can empower individuals with a better understanding of, and control over, their symptoms and provide them with the tools to ensure their condition is understood and accommodated by others. Work can have social, psychological and economic benefits for an individual living with an MSD, as well as economic benefits for wider society, underlining why it is important to research the underexplored relationship between self-management and the workplace.

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