

A Review on Musculoskeletal Pain and Injuries among Fitness Instructors

Susan Annie George¹, Dr. Arun Thomas Abraham²

¹Research Scholar, College of Physiotherapy, Srinivas University, Mangalore, India and Associate Professor, Medical Trust Institute of Medical Sciences, Irumpanam, Kerala, India

²Assistant Surgeon, Community Health Centre (Government Health Services), Poothotta, Kerala, India

Corresponding Author: Susan Annie George

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ABSTRACT

Background: Musculoskeletal disorders are very common among gym/fitness instructors. Through their personal sessions or while supporting their clients during their training sessions, gym instructors do high intensity work. This may be the most common causes of injuries and pain. Moreover, high prevalence of work related musculoskeletal disorders has been reported among them.

Objective: This literature review aims to describe previous studies and its findings of musculoskeletal pain and injuries among gym/fitness instructors.

Methods: In this study, the authors explored 10 related articles from different databases including Pub Med, Google Scholar, Scopus, and Research Gate. The selected keywords were classified into two categories as follows: - 1. Related to Ergonomics, exercises, Fitness/Gym Instructors, 2. Related to MSDs such as Musculoskeletal Disorders, musculoskeletal pain, and occupational injuries.

Results and conclusion: The prevalence of symptoms varies among different body regions and commonly affected areas were low back and knees. Also, prevalence of musculoskeletal injuries is higher in male instructors than in females. gym/fitness instructors job has several risk factors that may be related to ergonomics, high intensity, weight lifting, environment, nature of work, repetitive movements. So, they are prone in musculoskeletal pain and injuries and there is scarce in literature also. From this literature review, authors suggest the fitness industries to follow ergonomic principles and to adapt MSDs prevention strategies. To fill the

research gap, further studies can conduct on prevalence of symptoms on musculoskeletal disorders among gym goers.

Key words: Ergonomics, Musculoskeletal Disorder, Gym instructors, Fitness, Occupational Injuries

INTRODUCTION

Musculoskeletal disorders (MSDs) are the one of the most prevalent work related health issues. A musculoskeletal condition has a significant influence on one's quality of life while also posing a significant financial burden in terms of compensation payments and lost wages [1]. Sick leave, non attendance, and job abandonment diminish job efficiency, and the disorders are also costly in terms of treatment and separate discomfort [2]. Work-related dangers can result in musculoskeletal injuries and accompanying discomfort. Musculoskeletal pain can result from traumatic events such as jerky movements, falls, fractures, or underlying musculoskeletal diseases; it can also be result of unusual or repetitive activities that strain the muscles, tendons, and sprain the ligaments [3]. In the previous 10-15 years, the fitness industry has seen a growth in the number of attendants. Individuals can improve their cardiovascular endurance, muscular and bone strength, immune system, mobility and balance, and posture by working with gym instructors in the business. Though physical activity and

exercise provide various health benefits, one main drawback is the potential of injuries that result in pain [4]. Rapid work pace, repetitive motion patterns, insufficient recovery time, heavy lifting, forceful manual exertions, non-neutral body postures, obesity, smoking, mechanical pressure concentrations, segmental or whole body vibration, and local or whole body exposure to cold are all associated with the development of MSDs [5].

Ergonomics is the science of tailoring the workplace to the individual. The ergonomics principle is to design the work environment and job around the human body rather than forcing the worker to adapt to inadequate design and task function [6]. Understanding human limitations early in the development of medical devices help prevent errors and avoid performance difficulties exacerbated by stress and tiredness. Ergonomics has several important responsibilities to play in the health area. The use of ergonomics in the design process can lower product acquisition and maintenance costs. Ergonomics can help to reduce the risk of injury or long term illness as a result of bad working conditions [7]. To avoid musculoskeletal discomfort and injury, ergonomics is critical in all aspects. Few studies have focused on the role of ergonomics in breast feeding among first-time breastfeeding moms [8]. Many ergonomic-related MSDs are thought to be caused by contact stress, uncomfortable posture (body positions that deviate significantly from the neutral position while performing occupational activities), and repetition, according to evidence[9].

The study's goal was to find and collect all papers, researches, and reports on Musculoskeletal Disorders (MSD) in fitness instructors. ii. Make recommendations to gym instructors on how to prevent musculoskeletal diseases (MSD).

METHODS

Search Methods

The present study was conducted to evaluate the musculoskeletal pain and injuries among fitness instructors in March 2022. In this study, the authors explored 15 related articles from different databases including PubMed, Google Scholar, Scopus, and Research Gate. The selected keywords were classified into two categories as follows:-1. Related to Ergonomics, exercises, Fitness/Gym Instructors,2. Related to MSDs such as Musculoskeletal Disorders, musculoskeletal pain, occupational injuries

Criteria for Inclusion and Exclusion

Letters to the Editor and conference proceedings were omitted. Empirical research, case studies, and literature reviews published in peer-reviewed English publications were examined for inclusion. Fitness/gym instructors have to be mentioned as participants in the studies. There were no restrictions regarding age, gender, colour, or social background. The literature review did not include any articles that were not written in English. Because MSD literatures are less common among gym instructors, all studies on the subject were taken into account.

Study Selection

The titles, keywords, and abstracts of all research publications found during the search were evaluated for their relevance to this literature review. Full text copies that matched the inclusion criteria were retrieved. Various studies on musculoskeletal problems in different vocations were accessible. During the search, however, there were less MSDs among gym instructors.

Search Results

A total of 18 items were found after a thorough search of the databases. The relevancy of the titles, keywords, and abstracts was checked, and duplicates were eliminated. A total of 10 potentially relevant

papers were obtained as a result of this approach. Eight publications were removed from the evaluation after further analysis because they did not evaluate the prevalence of MSD or establish putative MSD risk factors associated to gym or fitness instructors. Following the exclusions, a final batch of ten papers was selected for the review.

RESULTS

A study among gym instructors in Pune, India was done by few researchers to determine the prevalence of musculoskeletal discomfort and injuries. Gym instructors, in their opinion, engage in high-intensity work during personal sessions or when support clients during training sessions. This is one of the most common causes of numerous injuries and suffering. A cross-sectional study of 108 gym instructors from various fitness clubs was conducted. The research was conducted using a self-administered questionnaire. The scores were subjected to a percentile analysis. According to the findings, 16 percent of gym instructors complained from shoulder, low back, and knee injuries. Around 82 percent of gym instructors felt pain in different parts of their bodies. As a result, they came to the conclusion that the prevalence of pain and injury was significant in this area which demands fitness industries to adapt prevention strategies [4].

Another online survey study conducted in Norway among gym instructors in three different fitness centres. Total 1473 fitness group teachers were participated. Questions about working as a group fitness teacher for a long time, weekly instructions, exercise loading and modality, injuries, musculoskeletal pain, usage of alcohol, nicotine, snuff, menstrual dysfunction, and disordered eating were assessed as independent variables (Eating Disorder Inventory, EDI). The participants were divided into two groups;(HIL), which consisted of 5 hours of training per week, and low instruction loading (LIL), which consisted of 5 hours of instruction per week.

The response rate was 57% (n=837). The mean total loading (instruction plus exercises) in the HIL and LIL group was 11.8 h/w and 6.3 h/w, respectively (p.001). Acute injuries (9% vs. 6%, p.05), overuse injuries (38% vs.24%,p.001), and combined acute and overuse injuries (25% vs. 10%, p.001) were all more common in the HIL group than in the LIL group. The most usually affected locations were the ankle and lower leg. Musculoskeletal pain was most common in the shoulder/neck area. Injury was associated to instruction loading (h/w), years as an instructor, and EDI score. A high total EDI score predicted musculoskeletal pain. The high rate of injuries and musculoskeletal discomfort in the fitness industry demonstrates the necessity for preventive measures. Weekly instruction loading must be kept to a minimum, especially in classes with significant metabolic and /or mechanical demands [10].

In another study, occupational problems among sports teachers have little attention, particularly among those who are expected to practice while teaching. As the number of sports instructors grows, additional data on their potential injuries, daily workload, and fitness level is required. The goal of this study was to evaluate fitness (FI) and swimming teacher's occupational problems, cardio respiratory fitness, and daily workload (SI). 435 educators took part in an online survey about occupational illnesses (256 FI and 42 SI) using maximum oxygen consumption (VV O₂max) as an indication. The heart rate and perceived effort were used to estimate daily labour (using Borg scale). FI had a greater 2- year incidence of musculoskeletal injuries, while SI had a higher rate of upper respiratory tract infections VVO₂max was similar in both FI and SI, ranging from 47.0 to 51.9 ml.kgl.min⁻¹. Female SI had a considerably higher mean heart rate and mean heart rate to maximal heart rate ratio than female FI in terms of daily effort, while there was no significant difference between male FI and SI. There was no significant

difference in the perceived exertion of FI and SI. Preventive interventions are needed to reduce occupational problems in FI and SI[11].

Cardio kickboxing has become a popular pastime, and research show that knee and hip injuries are the most common in cardio kickboxing teachers. Cross fit is a popular and growing programme that consists of a sequence of exercises. It comprises of high-intensity exercises that are completed quickly with no or little recovery time between repetitions. Cross fit has a higher injury rate than Olympic weightlifting, long distance running, track & field, rugby, or gymnastics. The literature was examined for research that evaluated injury rates between Cross Fit fitness programme participants and those who participated in other exercise programmes. The initial search generated over 100 results, which were filtered down to three level 2b retrospective cohort studies that met inclusion/exclusion criteria. The reported incidences of injuries linked with cross fit training programmes were comparable or lower than rates of injury in Olympic weightlifting, distance running, track and field, rugby, or gymnastics in all three studies analyzed. Cross fit training appears to have an injury risk comparable to Olympic weightlifting, distance running, track and field, rugby, football, ice hockey, soccer, or gymnastics, according to current information. Cross Fit injuries to the shoulder(s) appear to be the most common. Clinicians should be aware that injury is more common when athletes do not always have access to supervision. This is especially common among male cross fitters, who may not actively seek supervision during their workout. Recommendation strength: cross fit's risk of injury is equivalent to or lower several conventional kinds of exercise or strength training, according to level 2b data from three retrospective cohort studies[12].

Squatting is a common strength training exercise that is utilized for rehabilitation, fitness and competition

preparation. Some researchers conducted study on kinematics of the trunk and the lower extremities during restricted and unrestricted squats. It is important to understand the loading and motion of the back during the squat exercise. The goal of this study was to compare and analyze the kinematics of the lower leg, trunk and spine during unrestricted and limited squats (knees are not allowed beyond toes). A total of 30 people did unrestricted and restricted barbell squats with added loads of 0, 25, and 50% of their body weight. A 12-camera vicon system was used to track motion. They assessed 3D segmental kinematics between the pelvic and lumbar regions, the lumbar and thoracic segments, and the lumbar and thoracic spine's curvatures. When compared to a limited squat, the angle of the knee is larger in an unrestricted squat, and the range of motion between the lumbar and thoracic segments is significantly smaller ($p < 0.05$). During restricted squats, the study individuals showed significantly higher ROM for thoracic curvature. The unconstrained squats results in a higher ROM in the knee, as well as smaller alterations in the thoracic spine's curvature and the range of smaller segmental motions inside the trunk. As a result of this execution, back stress is reduced. The unrestricted leg exercises help to improve leg muscles. So, instructor should not be overly rigid when it comes to preventing anterior knee displacement during squat performance [13].

Some researcher found that male gym instructors were having high degree of discomfort when compared with female gym instructors. One of the causes could be maximum number of male gym instructors being subjected to significant mechanical loads as a result of which is having a greater impact on a person's body weight, putting strain on joints, ligaments or tendons that are inflamed. Shoulder joint is the most commonly injured area according to these researchers, followed by low back and knees. Shoulder joint provides mobility at the cost of stability. This joint is held

together by muscles and ligaments, as the joint are prone to instability, when its stretch beyond the limit. Thus it may result to the pain or injury either immediately or gradually. Regular overhead activities with abduction and flexion of arm may put strain on the rotator cuff muscles which may leads to pain or injury[4].

Few researchers conducted a cohort study to find out the prevalence of low back pain among athletes. They compared the symptoms of low back pain in various loading activities of lumbar region such as flexion and extension loading, no specific loading in athletes group as well as non athletic group. The main reason for back pain can be heavy weight lifting, sudden twisting of trunk while doing a high intensity workout without proper strengthening of core muscle training.

Repeated movement of flexion and extension and long standing in endurance sports does not lead to more low back pain but heavy training in the previous years can be risk factors of LBP[14]. From the above study, it is clear that not only sudden

twisting of trunk and heavy weight lifting can be a reason for low back pain but also training for long years also can be risk factor for the same. So, it can be common cause of musculoskeletal pain and injury among gym instructors.

Some researcher conducted study in incidence of injury in cardio kickboxing concluded that the other most common region which have high chance of injury were knee joint. Reason behind can be ligament sprain, hamstring and quadriceps muscle tightness and spasm of thigh muscles. Excessive loading will be more at patellofemoral joint, when lifting the heavy weights, which may lead to retropatellar pain. There are high chance for ligament stretch when exercise by the use of weights with heavy mechanical loading. Warm up and proper stretching are very important before performing any activities. Otherwise, muscle spasm or soreness or even injury can occur. From few other studies also its confirmed that knees and hip are the most common site of injuries in cardio kickboxing [15].

Table 1: Literature Review Summary

S. No.	Findings	Authors
1	Work- related dangers can result in musculoskeletal injuries and accompanying discomfort.	Dieppe P., (2013). [3]
2	Around 82 % of gym instructors felt pain in different parts of their bodies. As a result, it is concluded that the prevalence of pain and injury was significant in gym area which demands fitness industries to adapt prevention strategies.	Shinde N., Sahasrabudde P.,(2021). [4]
3	Musculoskeletal pain was most common in the shoulder/neck area. Mechanical demands in loading must kept in minimum.	Bratland-Sanda S., Sundgot-Borgen J., Myklebust G., (2015). [10]
4	Preventive interventions are needed to reduce occupational problems in Fitness Instructors and Swimming Instructors.	Merati G., Bonato M., Agnello L., Grevers D.,et al (2021). [11]
5	CrossFit injuries to the shoulders appear to be the most common.	Klimek C., Ashbeck C., Brook AJ., DurallC.(2018). [12]
6	Fitness instructor should not be overly rigid when it comes to preventing anterior knee displacement during squat performance	List R., Gülay T., Stoop M., Lorenzetti S., (2013).[13]
7	Male gym instructors were having high degree of discomfort when compared with female gym instructors	Shinde N., Sahasrabudde P.,(2021). [4]
8	Not only sudden twisting of trunk and heavy weight lifting can be a reason for low back pain but also training for long years also can be risk factor for the same.	Foss IS., Holme I., Bahr R., (2012). [14]
9	Warm up and proper stretching are very important before performing any activities.	Romaine LJ., Davis SE., Casebolt K.,(2003).[15]
10	There is a link between WMSDs and specific occupational characteristics.	Ju YY., Cheng HY., Hsieh YJ., (2011). [16]

Study conducted on Athletic trainers in Taiwan, stated that they are frequently required to work long and irregular hours or days, as well as reacts quickly in emergency situations. These workers are at risk of developing musculoskeletal problems as a

result of their jobs. The effects of WMSDs on athletic trainers as well as relevant personal and occupational characteristics were studied. They assessed for association between personal/occupational related characteristics and WMSD symptoms. This

study concluded that a significant rate of WMSDs among Taiwan, as well as a link between WMSDs and specific occupational characteristics. Athletic trainers and other similar professions need to make preventive and therapeutic changes to their work environment to reduce the occurrence of WMSDs[16].

CONCLUSION

The prevalence of symptoms varies among different body regions and commonly affected areas were shoulders, low back and knees. Also, prevalence of musculoskeletal injuries is higher in male instructors than in females. Gym/fitness instructor's job has several risk factors that may be related to ergonomics, high intensity, weight lifting, environment, nature of work, repetitive movements. So, they are prone in musculoskeletal pain and injuries and there is scarce in literature also. From this literature review, authors suggest the fitness industries to follow ergonomic principles and to adapt MSDs prevention strategies to avoid pain and injuries. To fill the research gap, further studies can conduct on prevalence of symptoms on musculoskeletal disorders among gym goers.

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