Journal of Pain & Relief
ISSN: 2167-0846

Karunanayake, J Pain Relief 2015, 5:1
DOI: 10.4172/2187-0846.1000222

Research Article Open Access

Prevalence of Chronic Muscular Skeletal Pain and Associated Factors of Adult and Adolescent Weight Lifters. Descriptive Cross Sectional Study

Karunanayake AL*

Department of Anatomy, Faculty of Medicine, University of Kelaniya, Sri Lanka

Abstract

Introduction: Weight lifting is a popular sport in Sri Lanka. This descriptive cross sectional study was done among adult and adolescent weight lifters in the Western and North eastern provinces of Sri Lanka.

Objectives: To determine the prevalence of chronic pain affecting the muscular skeletal system, whether their training habits differ from the guidelines recommended by the International Federation of Sports Medicine (IFSM) and the association between the training habits and the number of regions affected with chronic muscular skeletal pain.

Methodology: A structured interviewer administered questionnaire was used to collect data with regard to their demographic data, symptoms related to musculoskeletal system and training habits. Bivariant and multivariate analysis were done to determine the associations.

Results: Total sample: 50, Age range: 13-29yrs, Mean age (SD): 22.6 (4.1). Males accounted for 88%. Symptoms were present in 84% of subjects. The prevalence of pain in the lower back (22%), wrist (22%), knee (24%) and shoulder (20%) was high in our study. The mean frequency/week (5 days/week) and the mean duration/day (120 minutes/day) of training in our study was more than the recommended guidelines of 3 days/week and 60-90minutes/day of IFSM. Only the training frequency/week had a significant positive association (P=0.03, Exp B=1.845) with the number of regions in the muscular skeletal system affected by chronic pain.

Conclusions: The most common regions affected with pain were lower back, knee and wrist. The frequency and duration of training sessions were higher in our study compared to the recommended levels of strength training. Only the training frequency/week had a significant positive association with the number of regions affected with chronic muscular skeletal pain. These study findings will be useful to trainers in preventing muscular skeletal injuries of weight lifters during training.

Keywords: Weight lifting; Training; Sri Lanka; Low back pain; Knee pain; Shoulder pain; Wrist pain

Introduction

Weight lifting is type of athletic exercise or a competition of lifting weights to increase, strength, muscle mass and bone mass. Many types of lifts are used during weight lifting. Commonly used types of lifts are – squat, dead lift, bench press, snatch, and clean and jerk [1]. The squat is performed by squatting down with a weight held across the upper back under the neck and standing up straight. The dead lift is performed by squatting down and lifting a weight off the floor with the hand until standing up straight. The bench press is performed while lying face up on a bench and by pushing a weight away from the chest [1]. In the snatch, the barbell is lifted from the floor to an overhead position in one motion. The Clean & Jerk consists of two stages. The first stage, called the clean stage, is a lift where the barbell is picked from the floor and placed on the shoulders in one motion. After a pause, the athlete goes to the second stage of the motion. During the second stage, the athlete lifts the barbell into an overhead position while placing the legs in a lunge position (one leg in front of the other) [2]. All these types of lifts are compound exercises that involve muscles of the upper limb, lower limb, trunk and the neck [1].

Athletes involved in lifting weights may develop pain in many regions related to the muscular skeletal system. The shoulder, lower back and knee are the commonly affected areas with pain [3]. The prevalence of low back pain and knee pain among weight lifters were 23% and 31% respectively [4]. According to Jonasson et al (2011), the prevalence of muscular skeletal pain among athletes were (Cervical spine – 55%, thoracic spine –33%, Lumbar spine – 68%, Shoulder – 21%, Elbow – 7%, Wrist – 8%, Hip – 23%, knee – 44%, Ankle – 25%) [5].

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Many people report pain in the absence of tissue damage or any likely patho physiological cause; usually this happens for psychological reasons. There is usually no way to distinguish their experience from that due to tissue damage if the subjective report is considered. If people regard their experience as pain, and if they report it in the same ways as pain caused by tissue damage, it should be accepted as pain [6].

Acute pain generally represents a noxious stimulus produced by injury and/or disease, is limited in its duration. In contrast, persistent (e.g., chronic) pain lasts beyond the usual course of an acute process of an injury, or a chronic pathological process. Persistent pain can last for months or years and manifest symptoms intermittently or continuously [7].

The following factors need to be avoided during physical exercises to prevent injuries related to the muscular skeletal system. Sudden increases in the training load with regard to the intensity, frequency/

***Corresponding author:** Karunanayake AL, Department of Anatomy, Faculty of Medicine, University of Kelaniya, Sri Lanka, Tel: 0094773062184; Fax: 009429583367; E-mail: aranjan1368@gmail.com

Received November 18, 2015; **Accepted** December 15, 2015; **Published** December 17, 2015

Citation: Karunanayake AL (2015) Prevalence of Chronic Muscular Skeletal Pain and Associated Factors of Adult and Adolescent Weight Lifters. Descriptive Cross Sectional Study. J Pain Relief 5: 222. doi:10.4172/21870846.1000222

week and duration/day, using incorrect technique, incorrect surface, incorrect equipment, not adequately rehabilitating previous injuries, exercising in extreme weather conditions, muscle imbalances, nutritional errors and fluid intake errors [8].

Not many published data are available with regard to the prevalence of pain related to the musculoskeletal system and training habits of weight lifters in Sri Lanka and South Asian Countries. Hence this study was carried out among weight lifters to determine the prevalence of chronic pain affecting the muscular skeletal system, whether their training habits differ from the guidelines recommended by the International Federation of Sports Medicine (IFSM) and the association between the training habits and the number of regions affected with chronic muscular skeletal pain.

Materials and Methods

This descriptive cross sectional study was done among weight lifters in Western and North Eastern provinces of Sri Lanka. The data were collected over two days during a screening clinic for the presence of muscular skeletal system disorders. A structured interviewer administered questionnaire was used to collect data with regard to their demographic data, symptoms related to muscular skeletal system, medical and surgical history, training habits, timing of fluid intake, nutritional intake etc). In addition to the structured interviewer administered questionnaire the athletes training diaries were also studied to gather information.

The numerical rating scale (NRS) (e.g., 0 to 10-point scale. "0" equals no pain, "1-2" equals very mild pain, "3-4" equals mild pain, "5-6" equals moderate pain, "7-8" equals severe pain, "9-10" equals very severe pain) is an important uni-dimensional measure of pain. The response to this scale can be used to determine the proportion of participants with pain, its intensity, and the relationship between pain and other health-related conditions [7]. Therefore we used the NRS to measure the prevalence and intensity of pain among the participants in our study. The pain that lasted for more than three months (continuous or intermittent pain) was considered as a chronic pain [9]. The athletes who had a pain intensity of less than 2 in the NRS scale and who had a duration of pain less than 3 months duration were excluded from the study.

To find out the association between the number of regions in the muscular skeletal system affected by chronic pain and the training habits the number of regions were divided into two groups. Group 1- one region affected by pain and group 2 > one region affected by pain. The training duration/day was calculated in minutes and the training frequency/week was calculated in days. To find out the association between the number of regions in the muscular skeletal system affected by pain and training habits bivariant and multivariate analysis were done.

The ethical clearance for the study was obtained by the Ethical review Committee of the Colombo North Sports Medicine unit Sri Lanka. The data were collected only after obtaining informed consent of the participants. In the case of children the consent was obtained from the parent or the guardian.

Results

Total sample: 50, Age range: 13-29yrs. Mean age (SD): 22.6 (4.1). There were: 44 males (88%) and 6 females (12%).

Symptoms

Eighty four percent of people were affected by chronic pain related to various regions of the muscular skeletal system. Prevalence of pain in the lower back (22%), wrist (22%), knee (24%) and shoulder (20%) was high in our study (Table 1). The minimum pain intensity according to the NRS scale was 3 (mild pain) and the maximum pain intensity was 6 (moderate pain). The Mean (SD) pain intensity was 3.6 (0.9). Eighty percent of the athletes were affected with mild pain (Pain intensity in the range of (3-4).

Training habits

The mean frequency (5 days/week) and the mean duration (120 minutes/day) of training in our study was more than the recommended strength training guidelines of IFSM (Table 2). The mean time period (77 minutes) between the pre training main meal and the training session was less in our study compared to the recommended guidelines (180 minutes before the training session) of the IFSM (Table 2).

According to the results of bivariant analysis only the training frequency/week had a significant positive (P=0.006) association with number of regions affected with pain (Table 3). Even after multivariate analysis was done to adjust for confounding factors such as age, sex, height and body weight the training frequency had a significant positive association (P=0.03) with the number of regions affected with pain (Table 4).

Discussion

Symptoms

Majority of our study subjects were affected with chronic muscular skeletal pain. The prevalence of low back pain in our study was high and this finding was similar to the findings of studies done in other countries of the world. Research data indicates that during weight lifting, the disc experiences a high shear load at a flexion position and high compressive load at the upright position [10]. Based on peak values, back compressive force is highest for fast lifting speeds and the back compressive force cumulative loading is highest for slow lifting speeds. Therefore high and slow lifting speeds of weight lifting are both hazardous for the back [11].

Prevalence of knee pain was common in the present study and was similar to the prevalence in other countries. The aetiology of knee osteoarthritis is multi factorial. Excessive loading across the knee joint is considered an important risk factor in the pathogenesis of knee osteoarthritis. Activities done during which the knee is flexed beyond 90 degrees are known to place a greater load across the whole knee joint and potentially causes damage to the articular cartilage [12]. The knee is one of the most commonly affected joints by osteoarthritis. It has been suggested that biomechanically overloading a joint through excessive

Our study findings	%	Findings in other countries	%
Pain in lower back	22	Pain in lower back	23
Pain in knee	24	Pain in knee	31
Pain in the wrist	22		
Pain in the shoulder	20		
Pain in the upper back	06		
Pain in the elbow	16		
Pain in the forearm	06		
Pain in the hand	04		
Pain in the thigh	12		
Pain in the leg	12		

Table 1: Prevalence of muscular skeletal pain among weight lifters.

Accepted guidelines by IFSM	What is practiced in the present study
Sessions 3/week	Sessions 5/week
Duration of session (60-90 min)	Duration of Session (120 min)
Consumes water before practice	100% consumes water before practice
Pre practice main meal to be taken 180 min before training	Pre practice main meal is taken 77 min before training
Meals to be taken within 2 hrs after training	100% takes meals within 2 hrs after training
Warm up prior to stretching	100% did warm up prior to stretching
Warm up duration 10-15 min	The mean Warm up duration - 14 min
Stretching duration 5-10 min	The mean stretching duration - 7 min

Table 2: Accepted training habits and what is practiced in the present study

Independent variable	Pearson correlation (PC)	Significance
Weight	0.047	0.748
Height	-0.160	0.268
Age	-0.118	0.413
Sex	-0.125	0.388
Training frequency/week	0.386	0.006
Training duration/day	0.181	0.208
Warm up duration	-0.210	0.143
Stretching duration	-0.122	0.399

Table 3: The results of bivariant analysis demonstrating the factors associated with development of muscular skeletal pain.

Independent variable	Significance	ExP B	95% C.I For ExP (B)	
			Lower	Upper
Training frequency/week	0.03	1.845	1.062	3.203

Table 4: The results of multivariate analysis demonstrating the factors associated with development of muscular skeletal pain.

body weight, elite sports participation, or high-intensity occupational physical loading may contribute to knee osteoarthritis. Excessive intensity or duration of dynamic loading may stimulate catabolic processes that contribute to the development of osteoarthritis [13].

The most frequently injured body part in weight lifters is the shoulder [2]. In the present study the prevalence of shoulder pain was (20%), but it was less than the prevalence of pain in the lower back (22%), knee (24%) and the wrist (22%). According to some studies 2.4%–7.6% are injured with weight training during each year and the majorities of injuries occur in the lower back and shoulder [14]. Studies have found injuries to labrum of shoulder and tendon of long head of biceps during weight lifting [2].

Repetitive lifting tasks can affect the neck, shoulder, hand, wrist and elbow [15]. In the present study the prevalence of wrist pain and elbow pain was 22% and 16% respectively. There were no people affected with neck pain and the prevalence of hand pain (4%) was low in our study. The distal radio ulnar joint plays a central role in lifting. When lifting an object against gravity a transverse force runs from the hand and wrist to the radius and from there to the ulnar head. The ulna has the function of supporting the radius, which is connected to the ulna by the annular ligament and the triangular fibro cartilage complex [15]. During weight lifting significant loads and repetitive strains fall on distal radio ulnar joint and other ligaments of the wrist. This could lead to degenerative changes in the joint and injury to ligaments [16]. Wrist ligaments maintain intimate contact between carpal bones, allow a wide range of motion and maintain joint stability [16]. There are extrinsic and intrinsic ligaments. Extrinsic ligaments connect forearm bones or metacarpals with the carpus, whereas the intrinsic ligaments originate and insert within the carpus. Triangular fibro cartilage complex is an extrinsic ligament and is the main stabilizer of the distal radio ulnar joint. Scapho Lunate ligament and Lunate Triquetral ligament are the most important intrinsic ligaments [16]. Tears of the Triangular fibro cartilage complex, Scapho Lunate ligament and Lunate Triquetral ligaments are a common cause of wrist pain, instability, and limitation of joint movement [17].

Training habits

The aim of warming up prior to training and competition is to maximize performance and prevent injuries. Warm-up is typically composed of a sub maximal aerobic activity, stretching of the major muscle groups, as well as general and sport specific exercises performed at or near competition intensities. Low to moderate aerobic activity increases body and muscle temperature, muscle compliance and efficiency of physiological responses. Stretching, following sub maximal aerobic activity is known to further increase the range of motion, enhance performance and reduce the incidence of injury [18]. In this study the warm up and stretching duration of weight lifters were similar to the recommended guidelines of IFSM (Table 2).

The training duration/day (120 min/day) and frequency/week (5 days/week) of weight lifters in our study was higher than the IFSM recommended strength training duration/day (60-90 minutes/day) and frequency/week (3 days/ week) (Table 2). American College of Sports Medicine (ACSM) physical activity recommendations for healthy adults, updated in 2011, recommends for novice to intermediate individuals to use a load (amount of weight that is lifted) of 70-85% of 1Repetitive Maximum (1RM) of 1-3 sets of 8-12 repetitions and for advanced individuals to use a load of 70-100% of 1RM of 3-6 sets of 1-8 repetitions. With regard to the training frequency ACSM recommends that novice individuals to train the entire body for 2-3 days per week and intermediate individuals to train 3 days if using a total-body workout or 4 days if using an upper and lower body split routine, training each major muscle group twice per week. Advanced lifters can train for 4-6 days per week, training each major muscle group once to twice per week [19].

In the present study only five individuals (10%) were taking part in weight lifting competitions. However majority of individuals in this study were taking part in training 5 days/week and they were using a total body work out but not following an upper and lower body split routine. In this study the training frequency/ week had a significant positive association (P=0.03) with the number of regions in the muscular skeletal system affected with chronic pain (Table 4). Not having an adequate rest period between training sessions does not allow body to recover adequately [20].

None of the individuals in this study were following the 1RM principle to determine the amount of weight they were lifting and majority 26 (52%) of the individuals were lifting a weight that they could comfortably lift. The five (10%) individuals that take part in competitions mentioned that they start to train by lifting a load that is 70% of the target weight that they aim to lift during the competition.

The above individuals mentioned that number of repetitions they lift weights varied between 12-15 repetitions and the number of sets varied between 3-6 sets.

Nineteen individuals (38%) could not mention the exact number of repetitions, number of sets and the weight they were lifting on a regular basis during training sessions. Since a significant number could not provide information with regard to the weight that is lifted, number

of repetitions and the number of sets these three training related items were not included in the analysis to find out the association between the number of regions in the muscular skeletal system affected by pain and training habits.

According to IFSM guidelines the pre training main meal needs to be taken 180 min before starting the physical training activity. In the present study all the weight lifters had their main meal <180 min before the training session (Table 2). This habit could contribute to abdominal discomfort during training [21].

This study is one of the very few studies that have investigated all the regions in the muscular skeletal system affected by chronic pain and studied the association between the training habits and the regions of the muscular skeletal system affected by chronic pain.

Due to lack of funds the athletes were not investigated using a method such as the MRI scan. Therefore we were not able to identify whether there were any anatomical structures that were affected which would have been contributing to the pain in various areas of the muscular skeletal system.

Conclusions

The low back pain, knee pain and wrist pain were the most common symptoms in the present study. The weight lifter in this study was not following the accepted strength training guidelines recommended by the International Federation of Sports Medicine with regard to training frequency/week and session duration/day. Only the training frequency/week had a significant positive association with the number of regions in the muscular skeletal system affected with chronic pain. Our findings will be useful to trainers, medical and paramedical personnel to provide advice to athletes with regard to prevention of injuries during training.

Acknowledgements

I am grateful to Sri Lanka Higher Education Ministry for providing a research allowance to conduct research and for the athletes who volunteered to provide information.

References

1. List of weight training exercises (2015) Wikipedia Foundation.Inc. Accessed 5th May.
2. Hensley CP, Sum J (2011) Physical therapy intervention for a former power lifter after arthroscopic micro fracture procedure for grade IV gleno humeral chondral defects. Int J Sports PhysTher 6: 10-26.
3. Christakos CN, Fields KB (1999) Weight lifting and power lifting. In:Mellion MB, editor. Sports medicine secrets. Jaypee Brothers, New Delhi: 473-77.
4. Granhed H, Morelli B (1988) Low back pain among retired wrestlers and heavyweight lifters. Am J Sports Med 16: 530-533.
5. Jonasson P, Halldin K, Karlsson J, Thoreson O, Hvannberg J, et al. (2011) Prevalence of joint-related pain in the extremities and spine in five groups of top athletes. Knee Surg Sports Traumatol Arthrosc 19: 1540-1546.
6. Mersky H, Bogduk N (1994) Classification of pain. Second edition. IASP Task Force on Taxonomy. Seattle.
7. Shega JW, Tiedt AD, Grant K, Dale W (2014) Pain measurement in the National Social Life, Health, and Aging Project: presence, intensity, and location. J Gerontol B Psychol Sci Soc Sci 69 Suppl 2: S191-S197.
8. Bahr WR (2007) Principles of injury prevention. In:Brukner P, Khan K, editors. Clinical sports Medicine. New South Wales: McGraw-Hill Professional: 78-101.
9. Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, et al. (2015) A classification of chronic pain for ICD-11. Pain 156: 1003-1007.
10. Wang S, Park WM, Kim YH, Cha T, Wood K, et al. (2014) In vivo loads in the lumbar L3-4 disc during a weight lifting extension. Clin Biomech (Bristol, Avon) 29: 155-160.
11. Greenland KO, Merryweather AS, Bloswick DS (2013) The effect of lifting speed on cumulative and peak biomechanical loading for symmetric lifting tasks. Saf Health Work 4: 105-110.
12. Virayavanich W, Alizai H, Baum T, Nardo L, Nevitt MC, et al. (2013) Association of frequent knee bending activity with focal knee lesions detected with 3T magnetic resonance imaging: data from the osteoarthritis initiative. Arthritis Care Res (Hoboken) 65: 1441-1448.
13. Ezzat AM, Li LC (2014) Occupational physical loading tasks and knee osteoarthritis: a review of the evidence. Physiother Can 66: 91-107.
14. Burke DT, Bell R, Al-Adawi S, Alexandroni A, Dorvlo A, et al. (2014) Rate of injury and subjective benefits of gravitational wellness weightlifting. Open Access J Sports Med 5: 215-221.
15. Sundstrup E, Jakobsen MD, Jay K, Brandt M, Andersen LL (2014) High intensity physical exercise and pain in the neck and upper limb among slaughterhouse workers: cross-sectional study. Biomed Res Int: 218546.
16. Savvidou C, Murphy E, Mailhot E, Jacob S, Scheker LR (2013) Semiconstrained distal radioulnar joint prosthesis. J Wrist Surg 2: 41-48.
17. Pahwa S, Srivastava DN, Sharma R, Gamanagatti S, Kotwal PP, et al. (2014) Comparison of conventional MRI and MR arthrography in the evaluation wrist ligament tears: A preliminary experience. Indian J Radiol Imaging 24: 259-267.
18. Donti O, Tsolakis C, Bogdanis GC (2014) Effects of baseline levels of flexibility and vertical jump ability on performance following different volumes of static stretching and potentiating exercises in elite gymnasts. J Sports Sci Med 13: 105-113.
19. Esco MR (2011) Resistance Training for Health and Fitness. ACSM's Consumer Information Committee.
20. Bachl N, Faigenbaum AD (2007) Principles of exercise physiology. In:Micheli LJ, Smith AD, Bachl N, Rolf CG, Chan K, editors. F.I.M.S. Team Physician Manual. Hong Kong: Lippincott Williams & Wilkins Asia Ltd: 49-77
21. Vasavid P, Chaiwatanarat T, Pusuwan P, Sritara C, Roysri K, Namwongprom S, et al. (2014) Normal solid gastric emptying values measured by scintigraphy Using Asian-style meal:A multicenter study in healthy volunteers. J NeurogastroenterolMotil 20: 371-378.