ABSTRACT

Background: Weightlifting is a competitive sport that is played by many people. The basis of performing such exercise is to increase the mass of muscle and symmetry. The risk of injury during heavy lifting at work or during free time is a well-recognized problem. Injuries may occur due to heavy weightlifting in extreme joint positions. Older weightlifters may sustain greater percentages of joint sprains and muscle strains during resistance training, while younger athletes would bear a greater percentage of injuries linked to accidents. Objectives: The objective is to find the prevalence of upper extremity musculoskeletal disorders among Gujranwala's trained and untrained weightlifters. Methodology: It was a comparative cross-sectional study. A convenient sampling technique was used. A sample size of 180 participants was taken. Standard Nordic questionnaire and Quick Dash Questionnaire were used. Results: This study showed that a high percentage of weightlifters had difficulty in performing their regular tasks and jobs due to pain in their neck region. The maximum frequency of MSK Disorders was found in the shoulder region among untrained weightlifters and 41.1% felt symptoms in the last 7 days while exercising. A high percentage (38.9%) of weightlifters felt symptoms in the last 3 months. Overall results of the study show that Upper Limb Musculoskeletal Disorders were seen as common in both trained and untrained weightlifters with no significant difference between the both. Conclusion: All the findings of the study strongly support that the untrained weightlifters showed slightly more prevalence in MSK disorders of the shoulder region, wrist, and hand as compared to trained weightlifters.

Keywords: Weightlifting, Upper extremities, Muscle strain, Pain
INTRODUCTION

Weightlifting is a competitive sport that is performed by many people. The basis of performing such exercise is to increase the mass of muscle. The perfect body exhibits little body fat which is achieved by a regular regimen of exercise that includes weightlifting and also the nutritional support (1). The risk of injury during heavy lifting at work or during free time is a well-recognized problem. Injuries may occur due to heavy weightlifting in extreme joint positions (2, 3). Resistance training is a popular form of exercise both for athletic and recreational purposes. Many injuries may occur, as a result of power weightlifting, the shoulder joint though to be most commonly affected by such exercise activity (4). Injuries occurring commonly during weightlifting may include sprains, strains, tendon avulsions, and compartment syndrome. Chronic injuries that may result from weightlifting include rotator cuff tendinopathy, stress injuries, and fractures (1). Common upper extremities injuries that may occur during weightlifting may include chronic shoulder pain, muscle pain, muscle strains, bicep tendon ruptures and capsular or labral injuries. Each injury is unique owing to its specific anatomy and can be prevented by proper weightlifting techniques (5). Weightlifting is the type of strengthening exercise or power sport in which the athlete lifts a maximum weight with one repetition maximum. Weightlifting, like other sports, tends to cause musculoskeletal injuries in different areas of the body, if not performed properly with good technique (6). Adaptive weightlifting was first added in the Tokyo Olympics in 1964. Injuries in adaptive weightlifters occur due to poor techniques, equipment abuse, or overuse. Some of the most common injuries that are found during adaptive strength training are rotator cuff impact/tear, arthritis, humerus, distal clavicle osteolysis, and ulnar bursitis (7, 8). Even though Weightlifting is now becoming very popular among students and adults in Pakistan, upper extremities musculoskeletal problems due to poor lifting techniques in weightlifting are not yet explored in Pakistan. This study not only provides awareness about the different problems that are associated with poor lifting techniques but also provides awareness to the individuals to protect themselves from different injuries by correcting their lifting techniques. Several researches explain the shoulder injuries and stress fractures which are found in weightlifters but weightlifting is a neglected sport in Pakistan as compared to other countries. This study focused on the upper extremity musculoskeletal disorders of weight lifters in Pakistan which have not been done before. The objective of this study is to find the prevalence of upper extremity musculoskeletal disorders among the trained and untrained weightlifters of Gujranwala, the rationale of this study is to find the risk and give awareness about upper extremity disorders among weight lifters. This study will also help correct the poor techniques of weightlifting for efficient weightlifting if expressed in the study. Sarah Neuschwander et al 2009 had done a descriptive study to find the frequency of injuries with periodized resistance training in young untrained men and women. 64 men and women were selected to complete a 32-week periodized training program designed to improve lean body mass, muscle size, and strength. An experimental approach was used in which each subject was trained 3 times a week for 8 months for a total of 96 workouts. This study concluded that men are more prone to injuries than women and also that there were higher rates of injuries in endurance and hypertrophy training than in strength training (14). Alabbad, M. A., & Muaidi, Q. I. in 2016 stated that weightlifting is an active strengthening exercise during which the athlete in 1 repetition lifts the maximum weight. Like other sports, this too has consequences like musculoskeletal injuries. However, to introduce appropriate prevention the identification of injuries and etiology are the two prime steps. Injuries are commonly located in the shoulder, elbow, knee and lumber region respectively. The rules of weightlifting have also been modified last in 1972 eliminating the clean and press lifts due to their associated risks. Finally, as compared to other sports weightlifting is considered a safe sport (6). Hu, B., & Ning, X. et al in 2015 found out that the potential risk for low back pain development is lumber muscle fatigue. They investigated that weightlifting is influenced by the fatigue of lumber extensor muscles. The 15 males taken as subjects before...
and after fatiguing protocols of lumber extensors had to perform about 5 repetitions of weightlifting tasks (11). Moolyk et al 2013 studied the kinetic and kinematic strategies of the lower extremity and were compared in a study during weightlifting and jumping in the impact phase. Knee extensors largely contribute to the jumping and weightlifting tasks during the impact phase (12). Arora et al in 2012 wanted to examine amongst weightlifters the effects of core strengthening on low back pain. They designed a 6-week study on 30 low back patients dividing the subjects into 2 groups of 15. One group was given extension exercises while the other was given core stabilization exercises along with extension exercises. The results brought to the conclusion that VAS and Oswestry disability index was improved in both cases but core strengthening was significantly more effective in reducing pain and disability within an intervention of 6 weeks (13). Siewe et al 2014 stated that weightlifting consists of competitive bodybuilding which is a sport similar to powerlifting, Olympic weightlifting, and strongman competitions. This sport aims to increase symmetry, muscle mass, and body definition. However, data is rare for competitive bodybuilding regarding the overuse syndromes, rates of injuries, and pain in routine training (1). This study was done to investigate injury rates, overuse syndromes, and pain during workouts along with extrinsic and intrinsic factors influencing it. A large number of bodybuilders complained of pain but the injury rate is comparatively low to other weightlifting disciplines like Olympic weightlifting, powerlifting, and strongman competitions. If compared to contact sports the injury is minimal.

**METHODOLOGY**

**Study design**
Comparative cross-sectional study was performed.

**Setting**
Data were collected from 6 different Gyms in Gujranwala city.

**Duration**
The study was completed within 3 months in 2019.

**Sampling technique**
A convenient sampling technique was used.

**Sample size**
The sample size was taken as “180” from 6 gyms. A total of 30 weightlifting participants participated in each gym.

**Sample selection**

**Inclusion criteria**
Age ranges from 18 – 35 were included in the study. Individuals training for 6 months were considered trained. Those weightlifters that are not regular were included as untrained weightlifters.

**Exclusion criteria**
Subjects with any history of Upper limb surgery or trauma were excluded. Subjects with upper limb deformities were excluded from the study.

**Data collection procedure**
It is a cross-sectional study the data was taken from those individuals from different gyms in Gujranwala city who fulfilled the inclusion criteria and then informed consent was taken.

**Data collection tools**
Quick dash questionnaire was used which is an 11 items questionnaire that is used to measure physical functions and measures in a person with any or multiple disorders of musculoskeletal disorders of the upper limb. Modified Nordic questionnaires were also used.

**Modified Nordic questionnaire**
It consists of multiple-choice questions. The questionnaire was designed to answer various questions related to musculoskeletal problems. With this consideration in mind, a questionnaire was constructed according to the area of the body involved. Similar questionnaires were developed before with a focus on upper limb anatomic area was done in several studies in France. Sensitivity was excellent in all situations from 82.3% to 100%. Specificity was variable, from 51.1% depending upon the severity (9).

**Quick Dash questionnaire**
It was a widely used 11-item questionnaire that measures upper-extremity-specific symptoms and disability. One advantage of the Quick DASH is that it can be used to assess any region of the upper extremity. This instrument has adequate psychometric properties and has been validated for a broad spectrum range of upper-extremity disorders. The validity of quick dash according to Cronbach’s alpha = 0.94 and ICC = 0.94. The reliability of Quick Dash is r = 0.70 (10).
Ethical issues
Every step was taken to ensure the privacy of subjects. The Department of Physical Therapy Gujranwala Institute of Rehabilitation Science had approved to conduct the study in different gyms in Gujranwala. The safety of collected data was ensured. Permission was taken from the subjects and the owner of the gym before collecting data.

Statistical analysis
All the gathered data were entered and calculated through the computer operating program SPSS version 16. Frequency and Percentage were used with categorical variables. Mean and Standard deviation were used for discrete variables.

RESULTS AND DISCUSSION
Musculoskeletal Disorders which can occur in the upper limb include peripherally occurring nerve entrapments and also tendon disorders it also includes non-specific pain-causing musculoskeletal disorders which have become one of the most commonly occurring and costly health problems. Previous research has shown heavy weightlifting to be one of the causes of musculoskeletal disorders in the upper limb and proved that heavy lifting and forceful manual exertion, sustaining wrong postures during the exercise of the elbows, shoulders, and wrists can cause disorders in these regions. This Study took a sample of 180 weight lifters who participated in the study. Out of which 90 were trained and 90 were Untrained. Of the total 180 weight lifters maximum number of participants 81(45%) were from the age group of 22-28 years (Table 1, Figure 1). In Table 2 out of 180, 138 (76.7%) were those who were been training in the gym for one month. Table 3 shows that an equal number of participants were considered in both groups 90 (50%) were included as trained and 90 (50%) were included as untrained weightlifters. In Table 4, 90 trained weight lifters had a Mean of 13.0622 ± 16.36195, and 90 untrained weight lifters had a Mean of 23.2489 ± 16.58155. Table 5 and Figure 2, p Value of 0.000 shows that there is an association between the Quick DASH score of both trained and untrained groups, however, there is no significant difference present between the both. The highest frequency of MSK disorders among trained weight lifters was found in the wrist and hand who were having symptoms in the last 3 months and the lowest frequency of MSK disorders was found in the neck who was having difficulty in performing jobs due to trouble IN the last 3 months with the values of 35(38.9%) and 15 (16.7%) respectively as shown in Table 6.

Alabbad MA, Muaidi QI, et al in a study in 2016 revealed that elbow injuries are the most common overuse injury that occurs at the medial and lateral epicondyle known as epicondylitis. Elbow injuries were found to be 11%, while this study shows an almost equal proportion of elbow injuries occurring in both trained and untrained weightlifters, 48% of trained and 46% of untrained weightlifters showed symptoms in the elbow in the last 3 months (15). Kolber, Morey J., et al. in a recent study also stated that 36% of injuries in weightlifters occur to be in the shoulder region and this study also indicates a high percentage of trained 81.1% and untrained 76.8% who reported symptoms in the last 3 months at the shoulder region (16). Our study results showed that a high percentage of weightlifters had difficulty performing their regular tasks and jobs due to pain in their neck region. The maximum frequency of MSK disorders was found in the shoulder region among untrained weightlifters and 41.1% felt symptoms in the last 7 days while exercising a high percentage (38.9%) of weightlifters felt symptoms in the last 3 months. In our study, the frequency of MSK disorders (Figure 3) among untrained weightlifters was highest in the shoulder region who were having trouble in the last 7 days and the lowest frequency among untrained were found in the elbow who was having difficulty in performing their job due to trouble in last 3 months with the values of 37.
(41.1%) among untrained trouble in last 7 days And lowest first in the shoulder region 90 (50%) were included as trained and 90(50%) untrained, respectively.

Table 1. Age groups with frequencies

<table>
<thead>
<tr>
<th>Age Groups</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 to 22</td>
<td>52</td>
<td>28.9</td>
</tr>
<tr>
<td>22 to 28</td>
<td>81</td>
<td>45.0</td>
</tr>
<tr>
<td>28 to 35</td>
<td>47</td>
<td>26.1</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2. Training in the gym for one month

<table>
<thead>
<tr>
<th>Have you been training in the gym for one month?</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>138</td>
<td>76.7</td>
<td>76.7</td>
<td>76.7</td>
</tr>
<tr>
<td>No</td>
<td>42</td>
<td>23.3</td>
<td>23.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Regular trainers

<table>
<thead>
<tr>
<th>Do you regularly train in the gym?</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>90</td>
<td>50.0</td>
<td>50.0</td>
<td>50.0</td>
</tr>
<tr>
<td>No</td>
<td>90</td>
<td>50.0</td>
<td>50.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>180</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Quick dash score mean and standard deviation

<table>
<thead>
<tr>
<th>Group statistics</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quick dash score</td>
<td>Trained</td>
<td>90</td>
<td>13.06</td>
<td>16.36195</td>
</tr>
<tr>
<td></td>
<td>Untrained</td>
<td>90</td>
<td>23.24</td>
<td>16.58155</td>
</tr>
</tbody>
</table>

Table 5. Independent sample t-test trained and untrained weightlifters

<table>
<thead>
<tr>
<th>Levene's test for equality of variances</th>
<th>F</th>
<th>Sig.</th>
<th>T</th>
<th>Df</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equal variances assumed</td>
<td>.247</td>
<td>.620</td>
<td>-</td>
<td>178</td>
<td>.000</td>
</tr>
<tr>
<td>Equal variances not assumed</td>
<td>-</td>
<td></td>
<td>4.148</td>
<td></td>
<td>177.968</td>
</tr>
</tbody>
</table>

Figure 1. Out of a total of 180 weight lifters a maximum number of participants 81(45%) were from the age group of 22-28 years.

Figure 2. Total sample size of 180 trained and untrained weight lifters had a Mean Quick DASH score of 18.16±17.202.
Figure 3. The maximum frequency was at 0 of the VAS, mean and standard deviation of 2.93 ± 2.242 was reported of total 180 participants.

Limitations/Recommendations
Only male weightlifters were included. Some weightlifters are very conscious about their physical appearance and health and do not want to admit that they exercise in the wrong postures and could have musculoskeletal disorders. So some biases could be present in their statements. The study was conducted only in the gyms of Gujranwala. The study design was Comparative cross-sectional, further longitudinal studies and experimental studies should be conducted on particular athletes with regular follow-ups. Further research should be conducted on the shoulder region specifically.

Table 6. Frequency of musculoskeletal disorders in weightlifters

<table>
<thead>
<tr>
<th>Area</th>
<th>Symptoms in the last 3 months</th>
<th>Feel any trouble in the last 7 days</th>
<th>Difficulty in performing any activities, due to trouble in the last 3 months</th>
<th>Difficulty in performing job due to trouble in last 3 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trained N=69</td>
<td>Untrained N=69</td>
<td>Trained N=69</td>
<td>Untrained N=69</td>
</tr>
<tr>
<td>Neck</td>
<td>24(26.7%)</td>
<td>27(30%)</td>
<td>22(22.4%)</td>
<td>19(21.1%)</td>
</tr>
<tr>
<td>Shoulder</td>
<td>33(36.7%)</td>
<td>31(34.4%)</td>
<td>25(27.8%)</td>
<td>37(41.1%)</td>
</tr>
<tr>
<td>Elbow</td>
<td>25(27.8%)</td>
<td>27(30%)</td>
<td>23(25.6%)</td>
<td>27(30%)</td>
</tr>
<tr>
<td>Wrist hand</td>
<td>35(38.9%)</td>
<td>31(34.4%)</td>
<td>31(34.4%)</td>
<td>35(38.9%)</td>
</tr>
</tbody>
</table>

CONCLUSION
Overall results of the study conclude that Upper Limb Musculoskeletal Disorders were seen commonly in both trained and untrained weightlifters with no significant difference present between the both.

Acknowledgements
None

DECLARATIONS

Authors’ Contributions
SH and FA contributed to study concept, study design and data collection. AAU and WA contributed in data analysis and interpretation. AI, FN and IU did the literature review and UT and SS critically reviewed the manuscript. All the authors read and approved the final manuscript.

Ethical Approval
The Department of Physical Therapy Gujranwala Institute of Rehabilitation Science had approved to conduct the study in different gyms in Gujranwala.

Conflict of Interest
The authors declared no conflict of interest among them.

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None
REFERENCES


