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17(5) 2022
Mini Review

The results of orthopaedic medical examinations in adolescent amateur weightlifters

JENNIFER STEWART (1) NIDA FATIMA(2)

(1)Editorial Office, Journal of Orthopaedics and Trauma, Poland

(2)Department of Biotechnology IBST, Shri Ramswaroop Memorial University, Lucknow,India

Address for correspondence:

Nida Fatima, Department of Biotechnology IBST, Shri Ramswaroop Memorial University, Lucknow,India

nidafatima@gmail.com

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Received: 11.05.2022; Manuscript No. jotsrr-22-78793;
Editor assigned: 12.05.2022, PreQC No. jotsrr-22-78793 (PQ);
Reviewed: 26.05.2022, QC No. jotsrr-22-78793 (Q);
Revised: 3.06.2022,
Manuscript No. jotsrr-22-78793 (R); Published: 9.06.2022,
DOI. 10.37532/1897-2276.2022.17(5).73

Abstract

Few studies have been conducted on adolescent weightlifters' injuries and physical characteristics. The goal of this study was to report the results of orthopaedic medical examinations performed on adolescent amateur weightlifters from 2012 to 2019. Physical examinations, generalised joint laxity, muscle and joint tightness, static alignment, lower extremity muscle volume, and medial longitudinal arch of the foot were all part of the orthopaedic medical examination (the height from the tip of the navicular tubercle to the ground surface).

Keywords: Adolescent weightlifters, orthopaedic medical examination, early sports specialization, gender difference

INTRODUCTION

Resistance training, such as weightlifting, has grown in popularity among athletes because several studies have shown that including resistance training improves performance in sports. Weightlifting, on the other hand, is linked to an increased risk of Low Back Pain (LBP), shoulder and knee injuries. It is still debatable whether children and adolescent athletes should engage in weightlifting as part of their training. Adolescent athletes are particularly vulnerable to sports-related injuries due to growth spurts and increased participation in sports activities. McCambridge and colleagues report several studies on injuries in adult elite weightlifters have been published. A recent systematic review found that the injury rate among Olympic level weightlifters was 2.4-3.3 injuries/1000 h of training. However, studies on the prevalence of injuries and physical characteristics in young amateur weightlifters are scarce. Only one study has evaluated imaging findings in adolescent weightlifters, to the best of our knowledge. Bush et al. discovered that serious injuries were more common in elite weightlifters who specialised at a younger age (16 years old). Furthermore, there are significant differences in sports-related injuries between male and female athletes during puberty. Stracciolini et al. found that young female athletes were more likely to sustain overuse injuries, whereas young male athletes were more likely to sustain traumatic injuries. Many factors have been identified as contributing to male-female differences in the types of sports-related injuries, including biomechanical, flexibility-related, and anatomical and hormonal differences. However, no research has been conducted to examine gender differences in adolescent amateur weightlifters. Yokoe et al. Reported the importance of orthopaedic medical examination (orthopaedic screening) for young amateur athletes as a screening tool for injury prevention and an opportunity to educate athletes and their staff [1,2].

MATERIALS AND METHODS

Our hospital's institutional review board approved this study (Accession No 2015-101). The study was conducted ethically in accordance with international standards. A patient and his or her parent or legal guardian provided written informed consent. From 2012 to 2019, the records of orthopaedic medical examinations for young amateur athletes were reviewed retrospectively, and the results of adolescent weightlifters were identified. Annual orthopaedic medical examinations for young athletes were conducted at a single institution in the study area. The examinations' specifics have been described elsewhere. All of the young amateur athletes who underwent orthopaedic medical examinations were junior high or high school students from the study area who had been chosen to compete in the annual national championship tournament (The Japanese National Sports Festival). This sports festival was founded in 1946 and has been held every year since. every year after that. Weightlifters were among the young athletes included in this study. Weightlifters who had been competing in weightlifting for less than a year were left out of the analyses. The participants were asked if they had received orthopaedic treatment, as well as whether they experienced any pain or symptoms in the spine or lower extremities (for example, over a period of four weeks) at the time of medical examinations. During the research period, orthopaedic surgeons A total of ten senior orthopaedic surgeons conducted medical examinations. 20 certified physical therapists with a focus on sports medicine. The orthopaedic medical examination was divided into six categories: category 1, physical examinations of the spine, knee, and ankle joints; category 2, assessment of generalised joint laxity (GJL); category 3, assessment of lower extremity muscle and joint tightness; category 4, assessment of lower extremity static alignment; category 5, assessment of lower extremity muscle volume; and category 6, assessment of lower extremity muscle volume. Orthopaedic surgeons performed Category 1, while physical therapists performed the other categories. Each measurement (category 3-6) was repeated three times, and the mean of the results was used in the analyses [3-5].

DISCUSSION

The following were the study's main findings: Orthopaedic treatment was received by 9.1% of adolescent amateur weightlifters, with spine-

related injuries being the most frequently treated (44.4%). There were no discernible gender differences. Of the adolescent weightlifters who did not receive orthopaedic treatments, 31.1% had pain in the spine or lower extremities that had lasted for more than four weeks, and 65% of LBP weightlifters had positive Kemp test results. There were no discernible gender differences. There were significant gender differences in quadriceps tightness and ankle joint dorsiflexion between male and female adolescent weightlifters. Several studies on injuries among adult elite weightlifters have found that the shoulder, spine, and knee are the most common injury sites.

According to Calhoon et al., acute injuries accounted for 59.6% of all injuries, while chronic injuries accounted for 30.4%. A systematic review found that the incidence of injuries in weightlifters was comparable to that of other non-contact athletes. To the best of our knowledge, this was the first and largest population study of adolescent amateur weightlifters' injuries and physical characteristics. Spine-related pain and injuries were the most common in adolescent weightlifters, as they were in elite adult weightlifters. Almost 20% of young weightlifters had LBP for more than 4 weeks, and 65% of those with LBP had positive Kemp test results. LBP is a common symptom in young athletes, and according to Micheli et al., spondylolysis is the most common cause of LBP, accounting for 47% of cases. At the end of a three-year cohort study, 91.7% of young weightlifters had abnormal spine findings on magnetic resonance imaging (MRI). In early-stage spondylolysis, Sakai et al. reported a bone healing rate of 93.8%. As a result, screening for LBP, particularly for early detection of spondylolysis, may be necessary to protect young weightlifters. Weightlifting was reported to have the highest prevalence of injuries and positive physical examination findings of the four sports activities. Adolescent weightlifters should have orthopaedic medical examinations to screen for injuries. The current study found no significant gender differences in the incidence of injury, pain in the spine or lower extremities, or physical examination findings. According to a retrospective review of 2133 young athletes, young female athletes sustained more injuries to the spine and lower extremities than young male athletes. Some researchers discovered that female athletes were more likely than males to sustain knee injuries. A variety of factors influence the gender differences in the occurrence and type of sports-related injuries. Different growth patterns between genders, including bone mineral density, can have an impact on sports-related injuries, particularly during puberty. Sexual differences in "weightlifting"-related injuries among non-weightlifters were reported by Quatman et al. However, no research has been conducted to examine the gender differences in injuries among competitive weightlifters. Female weightlifters had significantly lower dorsiflexion of the ankle joints than male weightlifters in the current study. Restricted ankle dorsiflexion is associated with increased knee valgus, a lower knee flexion angle, and higher ground reaction forces on landing. As a result, limited ankle dorsiflexion may be a risk factor for knee injuries like anterior cruciate ligament injury and patellofemoral pain [6].

Bell et al. reported that improving ankle joint dorsiflexion reduced medial knee displacement during squatting. As a result, improving dorsiflexion of the ankle joint may be required to prevent injuries in female weightlifters.

However, due to its retrospective design and small population size, the current study was unable to draw conclusions about gender differences in weightlifters. More research is needed to investigate gender differences in young and adult weightlifters in order to personalize weightlifting prevention and treatment strategies.

It is debatable whether early specialization is required for weightlifters [7].

This study's participants were all early weightlifting specialists. Some sports, such as gymnastics and figure skating, may require early sports specialization because peak performance occurs before physical maturation. Early sports specialization, on the other hand, has been linked to an increased risk of overuse injuries, burnout, and depression. According to Bush et al. 68.8% of adult elite weightlifters do not believe that early specialization is required to achieve elite status. Furthermore, the American Academy of Pediatrics advised

preadolescents and adolescents to avoid heavy lifting until they reached physical and skeletal maturity. More research is needed to determine the impact of early specialization on physical and psychological problems in adolescent weightlifters. The current study has several limitations. First, the upper extremities were not evaluated during the orthopaedic medical examinations in this study. Shoulder injuries are common in weightlifters, so more research is needed to assess the injuries and physical characteristics of the upper extremities in adolescent weightlifters. Second, the study included a small number of adolescent female athletes. However, because few female weightlifters specialize in competitive weightlifting at a young age, this could not have been avoided. Third, the orthopaedic medical examinations were carried out in a cross-sectional manner (annually). As a result, the impact of early specialization on weightlifters' careers was not assessed. Despite

these limitations, the current study provided clinicians and researchers with useful information about young amateur weightlifters, as well as weightlifters and their healthcare providers [8-10].

CONCLUSION

A total of 9.1% of adolescent amateur weightlifters had received orthopaedic treatments, with spine-related injuries being the most prevalent of the adolescent weightlifters who did not receive orthopaedic treatments, a third reported pain in the spine or lower extremities lasting for >4 weeks, accompanied by positive findings on physical examinations. There were no significant gender differences in the incidence of pain or findings of physical examinations, although female weightlifters had more reduced dorsiflexion of the ankle joints.

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