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Original Research Article

Occurrence and Patterns of Musculoskeletal Injuries of Female Volleyball Players: A Study of North and Central Gondar Under 17 Volleyball Projects

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ABSTRACT

Volleyball is a dynamic sport exposing athletes to risk of musculoskeletal injuries. Understanding the occurrence, patterns, and risk factors is essential for effective prevention. This study aimed to assess the prevalence and patterns of musculoskeletal injuries among female under-17 volleyball players in the North and Central Gondar projects. A descriptive cross-sectional survey design was used. A total of 45 female volleyball players from three selected projects in North and Central Gondar were included. Data on socio-demographic characteristics and injury history were collected using a questionnaire. Data were analyzed using descriptive statistics and the chi-square test to evaluate associations between variables. The study identified several statistically significant associations with injury exposure. Injury occurrence was found to be high among players with lower ages, weights, and years of experience. The anatomical distribution showed that the Upper Extremity was the most frequently injured area, reported by 21 players (46.7%), compared to the Lower Extremity (15.6%). Most injuries occurred during matches compared to team training, and the occurrence was higher on concrete fields than grass courts. New injuries (48.9%) were more common than recurrent injuries (13.3%).Musculoskeletal injuries are a concern for young female volleyball players in the study area, with demographic factors (lower age/experience) and extrinsic factors (playing surface, match play) significantly contributing to risk. The high prevalence of upper extremity injuries demands immediate focus for intervention programs.

Keywords: Musculoskeletal injuries, volleyball, Injury pattern, Injury incidence, Risk factors.

INTRODUCTION

Volleyball, as a highly popular and globally recognized sport, demands explosive power, agility, and repetitive movements. These specific physical demands expose

players to a high risk of both acute and chronic musculoskeletal injuries. Acute injuries often result from landing, blocking, or rapid directional changes, while overuse injuries commonly affect the shoulder due to repetitive spiking and the knee due to frequent jumping (Meeuwisse, 1994). Volleyball is a non-contact sport, but rapid and forceful movements make injuries inevitable (Kumilachew, Belay, & Tamirat, 2016; Verhagen et al., 2004b).

Epidemiological research on sport injuries provides the foundation for effective prevention strategies. Studies conducted internationally have consistently highlighted the ankle, knee, and shoulder as the most common injury sites among volleyball athletes, with ankle sprains and patellar tendinopathy being particularly prevalent (Bahr & Bahr, 1997). However, injury statistics and patterns are often population-specific, influenced by factors such as training methods, playing environment, and anthropometric characteristics (Junge & Dvorak, 2015).

In Ethiopia, data regarding the occurrence and patterns of injuries in specific athlete populations, such as young female volleyball players, remain scarce. This research aimed to fill this gap by assessing the occurrence and patterns of musculoskeletal injuries in this vulnerable population.

MATERIALS AND METHODS

The research employed cross-sectional survey design. The study focused on female Under 17 volleyball development projects located in North Gondar (Dabark and Adarkay) and Central Gondar (Lay Armacho) zones of the Amhara Regional State, Ethiopia.

The target population comprised all female volleyball players participating in the selected projects. The entire study population was included in the survey, resulting in a final sample size of 45 female volleyball players.

The primary data collection tool was an injury registration questionnaire adapted from Augustsson et al., (2006) to capture information on socio-demographic characteristics, training and match exposure, and injury event details. Data was collected by trained researchers using an interview-administered questionnaire survey. The collected data was processed using Statistical Package for Social Sciences (SPSS) Version 20. Descriptive statistics were used to summarize the data.

RESULTS

The key findings related to injury occurrence, patterns, and risk factors are presented below.

General Injury Occurrence

Out of the 45 participants, 28 players (62.2%) reported having been exposed to an injury. When examining the type of injury, new injuries (48.9%) were the most frequently reported, while recurrent injuries accounted for 13.3% of the total injuries reported.

Intrinsic Risk Factors and Association with Injury

The study found a statistically significant association between several intrinsic factors and injury exposure:

- Age, Weight, and Playing Experience: Injury occurrence was significantly higher among players with lower ages, lower weights, and less playing experience. Conversely, the likelihood of injury decreased as age, weight, and years of experience increased. The highest frequency of injury was reported among players aged 15 years.
- Height: A statistically significant difference in injury occurrence was found among different heights, with the highest percentage of injury occurring in players with heights between 1.41 m and 1.50 m.

Injury Location and Patterns

The anatomical part of the body most commonly injured was the Upper Extremity, which was reported by 21 players (46.7%). The Lower Extremity was reported by 7 players (15.6%).

- Skill/Situation: More injuries occurred when players were performing the setting skill compared to spiking, and spiking resulted in more injuries than blocking.
- Position: Players in the setter position reported the highest percentage of injuries (24%), followed by the backline (20%), and the left/right front row (16%).

Extrinsic Factors and Severity

- Exposure Time: The possibility of injury happening was highest during a match, and the smallest injury incidence occurred during team training.
- Playing Surface: Injury occurrence was significantly higher on a concrete field compared to a grass court.

- Absence from Training: Following an injury, 28.9% of players were absent for 2–4 weeks, while 17.8% were absent for less than 1 week. However, the majority of the total respondents (48.9%) reported no absence following an injury.

4. DISCUSSION

This study, a descriptive cross-sectional survey, provides critical insights into the injury patterns among young female volleyball players in North and Central Gondar, Ethiopia.

Injury Incidence and Exposure: The finding that the injury occurrence was highest during match play and lowest during team training is consistent with the global literature. Competitive matches involve higher intensity, maximum effort, rapid movements, and increased psychological pressure, all of which are established risk factors for acute trauma (Agel et al., 2007; Bahr & Bahr, 1997). This suggests that injury prevention programs must be specifically tailored and emphasized during the match preparation phase.

Intrinsic Risk Factors: The significant finding that players with lower age, less experience, and lower weight were at higher risk for injury is particularly noteworthy for this developmental population. This likely reflects a lack of:

1. Skeletal Maturity and Muscular Strength: Younger, less developed athletes may not possess the necessary muscle mass and bone resilience to withstand the repetitive high-impact forces of volleyball (Kujala et al., 1995).

2. Skill and Motor Control: Less experienced players often have poorer technique and less developed neuromuscular control, increasing the likelihood of awkward landings, poor spiking mechanics, and inefficient movement patterns that lead to injury (Meeuwisse, 1994). This underscores the need for strength and conditioning programs focusing on proper movement mechanics alongside sport-specific skill development.

Anatomical Location and Pattern: Contrary to much of the established international literature that consistently identifies the ankle, knee, and lower limb as the dominant injury sites (Bahr & Bahr, 1997; Verhagen et al., 2004), this study found that the Upper Extremity (46.7%) was the most frequently injured anatomical part, with the Lower Extremity (15.6%) being substantially lower. This finding warrants deep investigation.

The high prevalence of upper extremity injuries (e.g., shoulder, fingers) may be linked to the setting skill being cited as a high-risk situation. This suggests potential

mechanical issues or overuse syndromes related to repetitive overhead motion, possibly indicating a lack of proper technique instruction or insufficient rest/recovery time, leading to conditions like tendinopathy or impingement (Ferretti et al., 1987).

The high injury percentage reported by setters (24%) further supports the emphasis on upper extremity and core stability conditioning. The relative low rate of lower extremity injury compared to international standards may suggest that the trauma-related ankle sprains common in elite volleyball are less prevalent, or that ankle and knee injuries in this cohort are underreported or less severe, leading to less time loss.

Extrinsic Factors: The strong association between injury and playing on a concrete field highlights a critical, modifiable extrinsic risk factor. Hard, unforgiving surfaces increase the ground reaction forces experienced during jumping and landing, exacerbating the risk of both acute and chronic overuse injuries to the lower back, knees, and ankles (Verhagen et al., 2004b). Infrastructure improvements to ensure safe playing surfaces (e.g., wooden floors or synthetic courts) are a clear recommendation for injury prevention in these projects.

Limitations

As a cross-sectional survey, this study relies on retrospective recall of injury history, which can lead to recall bias, particularly the forgetting of minor injuries. Furthermore, the lack of an explicit calculation of Injury Incidence Rate (IIR) per 1000 player-hours limits direct comparison with international prospective studies (Bahr & Bahr, 1997). The small sample size (N=45) also limits the generalizability of the findings.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study concluded that musculoskeletal injuries pose a considerable health challenge to young female U-17 volleyball players in North and Central Gondar. Injury risk is significantly associated with lower age, weight, and experience, while the upper extremity is the anatomical site most frequently affected. Extrinsic factors, specifically match play and concrete playing surfaces, substantially increase the likelihood of injury occurrence.

Recommendations

Based on these findings, the following recommendations are forwarded:

- Targeted Training: Volleyball coaches must provide critical training programs that focus on strengthening and conditioning, especially for younger and less experienced players, to mitigate the risk associated with these demographic factors.
- Infrastructure: Urgent action must be taken by project managers to improve or replace concrete playing surfaces with safer, more shock-absorbent alternatives to reduce lower limb and spinal injury risk.
- Prevention Programs: Comprehensive, sport-specific awareness programs about intervention in volleyball injuries are required for the players. These should specifically address upper extremity mechanics during setting and spiking to prevent overuse syndromes.

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