



A PROSPECTIVE STUDY OF TIME LOSS AND NON-TIME LOSS INJURIES SUSTAINED BY FEMALE HIGH SCHOOL VOLLEYBALL PLAYERS

Timothy McGuine PhD ATC, Stephanie Kliethermes PhD, Kevin Biese MS ATC, David Bell PhD ATC, Andrew Watson MD MS, M. Alison Brooks MD MPH, Eric Post PhD ATC, Dan Schaefer MS, and Pamela Lang MD
Study conducted at the University of Wisconsin, Madison WI USA

Background

Volleyball is the most popular team sport in the US for high school female athletes. Despite its popularity, there is limited evidence regarding the incidence and characteristics for time loss (TL) and non-time loss (NTL) injuries sustained by female volleyball players.

Purpose

Describe the incidence and characteristics for TL and NTL injuries in female high school volleyball players during a single competitive season.

Methods

Female players from 78 high schools in Wisconsin enrolled in this cohort study for the fall 2018 season. Baseline data were collected on sport related musculoskeletal and concussion injuries within the previous 12 months as well as the subject's height and weight.

Athletic Trainers recorded all volleyball related athletic exposures and TL and NTL injuries. Means and frequencies were used to summarize continuous and categorical variables – including injury counts. Injury rates were calculated per 1,000 AEs and injury rate ratios (IRRs [95%CI]) were calculated.

Results

A total of 2,072 females (Age: 15.6 ± 1.1, BMI: 22.4 ± 3.5, grades: 9 –12) enrolled in the study. 468 subjects (22.5%) sustained 549 injuries (NTL = 28.4%, TL = 71.6%). The distribution and characteristics of the injuries sustained during the study are found in Figures 1, 2 and 3.

The for TL injury was higher than NTL (IRR: 2.52, [2.09, 3.03]). The competition injury rate was greater than the practice injury rate for all injuries (IRR: 1.19, [1.00, 1.41]) and TL injuries (IRR: 1.31, [1.07, 1.60]).

Figure 1. Distribution of Injuries by Body Region and Type

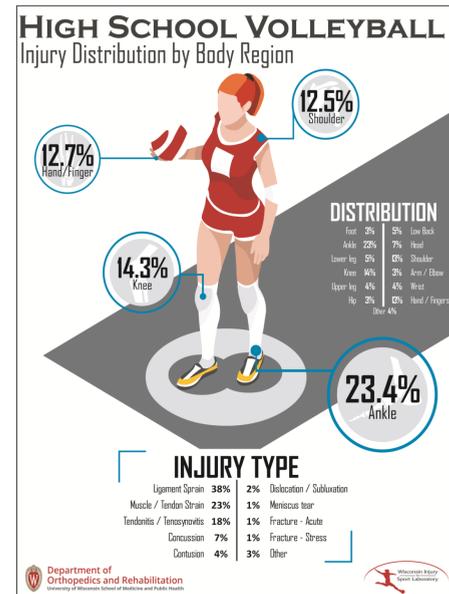


Figure 2. Distribution of Injuries by Position and Activity

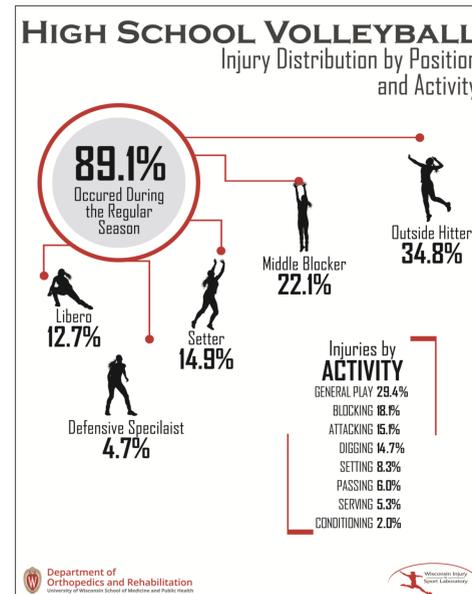


Figure 3. Injury Distribution by Court Location and Onset

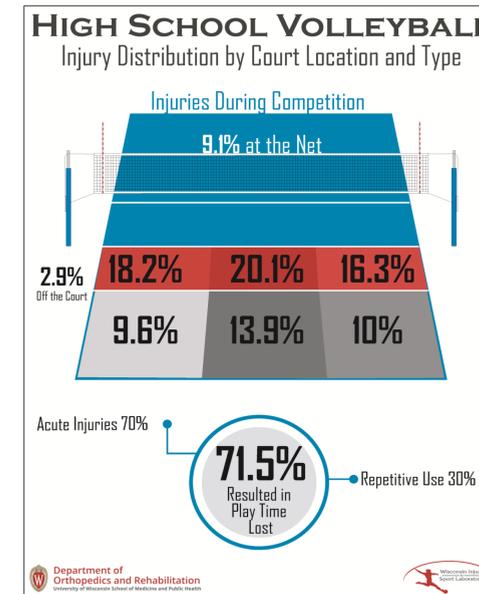


Table 1 Demographics and Univariable IRR with 95% Confidence Intervals for Volleyball Injuries

Variable	n (SD) or n (%)	Time Loss		Non Time Loss		All Injury	
		IRR (95% CI)	p-value	IRR (95% CI)	p-value	IRR (95% CI)	p-value
Age	15.6 (1.1)	1.10 (1.00, 1.20)	0.04	1.15 (1.00, 1.33)	0.04	1.11 (1.03, 1.20)	0.006
Height (inches)	65.9 (2.8)	1.06 (1.02, 1.09)	0.002	1.02 (0.96, 1.07)	0.55	1.04 (1.01, 1.08)	0.003
Weight (lbs)	138.6 (22.8)	1.06 (1.02, 1.10)	0.004	1.07 (1.00, 1.14)	0.04	1.06 (1.03, 1.10)	<0.001
BMI	22.4 (3.5)	1.02 (0.99, 1.05)	0.18	1.04 (0.99, 1.08)	0.07	1.02 (1.00, 1.05)	0.04
Grade			0.13		0.52		0.052
9	754 (36.4)	REF		REF		REF	
10	624 (30.1)	1.29 (1.00, 1.66)	0.052	1.20 (0.79, 1.80)	0.39	1.26 (1.02, 1.57)	0.04
11	403 (19.4)	1.25 (0.95, 1.66)	0.12	1.32 (0.85, 2.05)	0.21	1.27 (1.00, 1.61)	0.05
12	292 (14.1)	1.36 (1.01, 1.83)	0.06	1.35 (0.84, 2.16)	0.21	1.35 (1.05, 1.74)	0.02
Previous Injury < 12 Mon.	388 (18.7)	1.39 (1.09, 1.77)	0.008	1.30 (0.89, 1.90)	0.18	1.36 (1.12, 1.65)	0.002
Previous SRC <12 Mon.	121 (5.9)	1.65 (1.17, 2.32)	0.004	1.13 (0.59, 2.14)	0.71	1.50 (1.11, 2.03)	0.01

The ankle had the highest rate of TL Injuries (1.06 [0.88, 1.29]) while the hand/fingers had the highest rate of NTL injuries (0.33 [0.23, 0.46]). Ligament sprains had the highest incidence of TL injuries (1.51 [1.29, 1.77]) and NTL injuries 0.53 [0.41, 0.70]).

The subject demographics and associated risk factors are found in Table 1. For every unit increase in BMI, the injury rate increased, on average, by 2%. Similarly, the injury rate was higher among sophomores, juniors, and seniors when compared to first-year students. The rate of injury was 50% greater in athletes who experienced a sport related concussion (SRC) within the past year, compared to those who did not. Players with a previous musculoskeletal injury had a higher rate of TL than NTL injuries while players with a previous concussion also had a higher rate of TL than NTL injuries.

Conclusion

The characteristics of injuries sustained by volleyball players varied a great deal for TL or NTL, body part, position, activity and contact. Players in a higher grade or with higher BMI were at increased risk of injury. Further, players with a previous musculoskeletal injury or concussion reported higher rates of TL than NTL injuries.

Due to the increased popularity of high school volleyball, sports medicine providers need to take an active role in the prevention, recognition and effective treatment for these injuries.

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