

# ANALYSIS OF PRE-SEASON AND IN-SEASON ATHLETE LOADS IN WOMEN COLLEGIATE VOLLEYBALL PLAYERS

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## BACKGROUND

- Monitoring athlete load is vital to provide objective data on volume and intensity of training and competition.
- In volleyball athletes, jump count is often used to quantify external load.
- The collegiate volleyball pre-season typically consists of two daily practices across a condensed period (i.e., 10-14 days).
- If not managed properly, such an abrupt spike in activity and workload could pose an increased risk of injury during the competitive season.

## PURPOSE

- To quantify and assess the relationship of workloads of women collegiate volleyball athletes during preseason practices relative to in-season practices and matches.

## METHODS

- National Collegiate Athletic Association D-I (NCAA D-I) women volleyball athletes (n=17: middle blocker (MB; n=6), outside hitter (OH, n=6), setter (S, n=3), libero (L, n=2) participated during the 2022-2023 season.
- Athletes wore an inertial measurement unit (IMU) sensor (Figure 1) for 22 preseason practices (AM practice (P1); PM practice (P2)), 39 in-season practices (ISP), and 27 in-season matches.
- External load metrics assessed were duration (DUR), daily training load (DTL), and total jump count (TJ).
- Internal load was determined via assessment of session Rating of Perceived Exertion (sRPE = RPE x DUR).
- A two-way multivariate analysis of variance (MANOVA) assessed differences in load metrics for pre-season practices, in-season practices and matches (p<0.05).
- Post-hoc analysis consisted of Tukey HSD.

## KEY FINDINGS

**Pre-season and in-season practice loads were higher than match loads.**

**Morning practice duration and daily training load did not differ from in-season practice load.**

**The combined daily training load and jump loads during pre-season are 3-4x that of match loads.**

Table 1. Volleyball Athlete Characteristics (n=17)

Age (years)	Height (cm)	Body weight (kg)	Body fat (%)
19.85±1.13	175.27±8.27	75.59±9.57	29.00±3.59

Values presented as mean ± standard deviation

Table 2. Summary of Internal and External Athlete Load Metrics

		Duration (min)	sRPE	DTL (AU)	Total Jumps (#)
Pre-Season	Practice 1	174 ± 16 <sup>bc</sup>	799 ± 339 <sup>ac</sup>	1522 ± 629 <sup>bc</sup>	129 ± 75 <sup>ac</sup>
	Practice 2	166 ± 27 <sup>de</sup>	659 ± 325 <sup>e</sup>	1489 ± 619 <sup>de</sup>	100 ± 61 <sup>de</sup>
In-Season	Practice	146 ± 44 <sup>f</sup>	724 ± 410 <sup>f</sup>	797 ± 483 <sup>f</sup>	122 ± 72 <sup>f</sup>
	Match	156 ± 42	455 ± 437	578 ± 612	64 ± 49

Values presented as mean ± standard deviation, sRPE = session rating of perceived exertion, DTL = daily training load, AU=arbitrary unit  
<sup>a</sup> Practice 1 different from Practice 2; <sup>b</sup> Practice 1 different from In-season Practice; <sup>c</sup> Practice 1 different from Match; <sup>d</sup> Practice 2 different from In-season Practice; <sup>e</sup> Practice 2 different from Match; <sup>f</sup> In-season practice different from Match



Figure 1. IMU device (Vert®)



## RESULTS

- Athlete load metrics stratified by P1, P2, ISP, and matches are included in Table 1.
- During pre-season, P1 had higher sRPE-load (p=0.006) with greater TJ than P2 (p<0.001).
- When compared to ISP, P1 had greater DUR and DTL (p<0.001) while sRPE-load and TJ did not differ.
- P2 had greater DUR and DTL than ISP and lower TJ (p<0.001).
- With the exception of match DUR exceeding ISP DUR (p=0.003), all remaining metrics for P1, P2, and ISP were greater than those of matches (p<0.001).

## CONCLUSIONS

- Findings indicate women collegiate volleyball athletes are exposed to higher loads during pre-season and in-season practices than during matches.
- It is of interest that practice DUR decreased from pre-season to in-season, but sRPE-load did not, which may be indicative of an increased practice intensity over a shorter time period.

## PRACTICAL APPLICATIONS

- It is recommended that pre-season training serves to develop sport specific fitness and skills needed to compete, while not inducing an excessive amount of stress that may require an extended recovery period. To reduce the volume and intensity of in-season practices which are vital to recovery, the primary goal of in-season practices should be to refine technical and tactical strategies that are implemented during competition.
- Such an approach may help promote athlete well-being and improve sport performance throughout the season.

