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Effect of sleep quality on hand-eye coordination in elite volleyball player

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Abstract
Several studies have been conducted in the past on key psychomotor indicators for the execution of basic and advanced volleyball skills. It has been noticed that sleep quality differs individually and hence may be explored to assess its effect on key performance indicators such as psychomotor skills essential in sports such as volleyball. To conduct the study, 60 elite male volleyball players from national-level tournaments were selected. The selected elite male national volleyball players were between 18 and 27 years of age. To evaluate sleep quality in elite male volleyball players, the Sleep Quality Scale prepared by Yi *et al*. (2006) was used. The Pearson correlation coefficient r = 0.557, calculated between sleep quality and hand-eye coordination in elite male volleyball players, is statistically significant ($p<0.05$). It indicates that when scores on sleep quality increase, errors committed in the hand-eye coordination test also increase; thereby, lesser sleep-related problems also yield better hand-eye coordination. It was concluded that good sleep quality is essential for volleyball players to have optimal hand-eye coordination.

Keywords: Volleyball, hand-eye coordination, elite

Introduction
Volleyball as a sport is dynamic in nature. Its nature comes from high-intensity physical movements and multi-directional movements during a short duration. The sudden change in direction, speed, and acceleration makes this sport a marvel of physical movements. There are some basic essential skills in volleyball such as (1) Serving, (2) Spiking, (3) Passing, (4) Setting. To track the ball in the air, the role of hand-eye coordination comes into play in volleyball.

When hand and eye are coordinated together to execute a motor task, it is referred to as hand-eye coordination. The seamless integration of visual information and manual movement allows the eyes and hands to guide each other during physical tasks. In this process, the brain provides real-time information about visuals presented to enable hands to do actions such as grasping an object, while feedback given by hands helps the visual system to adjust its focus. Hand-eye coordination is also known as perceptual motor function, as the name suggest it hand eye coordination is the action of hands based on visual cues. Ludeke and Ferreira (2003) [9] defined hand-eye coordination as a motor response through hands to a visual cue or sensory stimuli. This definition states that hand-eye coordination is synchronised motor movements of the hand to a visual signal with the help of the visual system. Hemphill (2000) [6] provides useful information about two types of scenarios in which a sportsperson uses hand-eye coordination to achieve a motor task. They are: (1) When a player throws the ball, or a tennis player serves, these are pro-action situations. Magill (2006) referred to this kind of hand-eye coordination as self-paced motor skills; (2) The second situation is reactive, in which athletes wait for stimuli to appear before making motor movements such as catching a ball or moving to receive a serve in volleyball. Studies have been conducted in the past to assess hand-eye coordination based on various sporting contexts, and some of the authors do suggest that among so many variables, sleep quality may also be considered as a potent variable.

In general terms, sleep quality assesses how well a person sleeps and is not related to the duration of sleep. The magnitude of sleep quality is determined through the amount of time taken to fall asleep, the soundness of sleep during the night and feeling refreshed after waking up. The human body and mind require good sleep because a person's physical health, cognitive awareness, emotional control and overall proficiency in work during the day are dependent on sleep quality. Grandner and Fernandez (2021) [5] stated that sleep as mandatory human behaviour which serves base for physical, mental, cognitive and biopsychosocial development. The core components of sleep quality are: a. The first component of sleep quality is latency. Ideally, 15-30 minutes are considered ideal for a person to fall asleep; b. The continuity of sleep is also an important component of sleep. Sleeping through the night for an ideal period without or minimal awakening is a sign of good sleep quality; c. Depth and rapid / non-rapid eye movement (REM) stages are essential for good sleep quality because they give our mind and body a chance to repair and d. A good sleep quality can be seen in an energized and alert individual without the need for any stimulants to perform a task.

Athletic performance needs rigorous training. Although there are variations in training schedules of athletes according to sports type, the majority of athletes train and practice all year round, be it off-season, with a difference that the intensity of training is adjusted accordingly. Sleep is vital for athletes to consistently handle rigorous training schedules, maximize workout adaptations, and sustain peak physical effort and endurance on the court. Studies conducted by Charest and Grandner (2022), Malhotra (2017) [3, 11] and Kolling *et al*. (2019) reported that sleep

indices affect the physical and mental performance of athletes, including recovery, but Lu *et al*. (2021) [8] reported a non-significant association between sleep quality and competition performance of elite air-rifle shooters. Hence, the present study was carried out to assess the impact of sleep quality on hand-eye coordination of elite male volleyball players.

Review of Literature

Beldman *et al*. (2025) [1] set the key criteria for talent identification in adolescent volleyball players. They used a nominal technique group and defined nine essential characteristics, which also include hand-eye coordination, agility and perceptual skills.

Gong *et al*. (2024) [4] conducted a meta-analysis on the effect of sleep deprivation on motor skills, including reaction time. They provided evidence that sleep deprivation has a negative impact on motor performance in athletes, including their reaction time. It was concluded in this meta-analysis that sleep is an essential element in the motor performance of athletes.

Teja and Manwatkar (2024) [14] studied different sleep parameters and their effect on cricket players' performance, especially proficiency in performance. After controlling for demographic and training factors, the regression analysis confirmed the significant contribution of sleep parameters to performance in cricket.

Zhu *et al*. (2024) [16] emphasized that blocking efficiency in volleyball hinges on a player's perceptual responsiveness, their ability to read the setter's cues, track the ball flight, and anticipate the hitter's approach paired with rapid physical reaction time.

Teece *et al*. (2021) [13] demonstrated that short sleep duration impairs professional rugby players' aerobic capacity during preseason training. Insufficient rest reduces cardiovascular efficiency, speeds up fatigue, and hampers oxygen delivery.

Vitale *et al*. (2019) conducted a meta-review on sleep quality and psychological characteristics in the athletic population. They conclude through examination of various studies that poor sleep quality induces sudden mood changes, which have a negative impact on their cognitive abilities, decision-making, as well as motor skills.

Bojanic *et al*. (2015) [2] in this study studied the impact of physical fitness and motor skills on the performance of volleyball players, for which they selected 75 top division league female players. They observed that situational volleyball skills in female players were significantly affected by their physical and motor fitness competencies.

Objective of the Study

The objective of the present study was to assess the impact of sleep quality on hand-eye coordination of elite male volleyball players.

Hypothesis

H_1: It is hypothesized that sleep quality will have a significant effect on hand-eye coordination among elite male volleyball players.

Methodology

Sample:

To conduct the study, 60 elite male volleyball players from national-level tournaments were selected. The selected elite male national volleyball players were between 18 and 27 years of age. Purposive sampling was used to select the desired number of elite male volleyball players.

Tools

Sleep Quality Scale

To evaluate sleep quality in elite male volleyball players, the Sleep Quality Scale prepared by Yi *et al*. (2006) was used. This scale uses six domains of sleep quality: daytime symptoms, restoration after sleep, problems initiating and maintaining sleep, difficulty waking, and sleep satisfaction. It consists of 28 items, with higher scores indicating more acute sleep problems and lack of sleep quality.

Mirror-drawing Test

Using a mirror-drawing apparatus, hand-eye coordination in chosen elite male volleyball players was evaluated. Three trials are given, and the least number of errors in a trial is considered the hand-eye coordination score of the subject. As per the nature of this test, the increase in the number of errors while drawing relates to decreases in hand-eye coordination.

Procedure

- 60 elite male volleyball players from national-level tournaments were selected, and the sleep quality scale was administered.
- The responses on this scale were numerically scored according to the scoring procedure given in this scale.
- The subjects were asked to trace a star on a mirror-drawing apparatus, and errors committed by them during this were recorded.
- The data were entered in an Excel sheet, and the Pearson correlation coefficient was computed.
- The result is given in Table 1.

Result and Discussion

Table 1: Computation of Pearson Correlation Coefficient between Sleep Quality and Hand-Eye Coordination of Male Volleyball Players (N=60)

	'r'	Hand-Eye Coordination
Sleep Quality		0.557, $p<0.05$

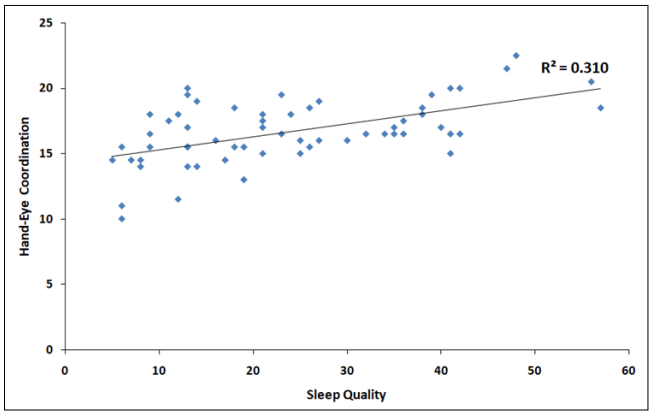


Fig 1: Coefficient of Determination between Sleep Quality and Hand-Eye Coordination (Elite Male Volleyball players, N=60)

In this study, hand-eye coordination was assessed using the number of errors committed during the mirror drawing test, where a higher number of error count indicates poorer hand-

eye coordination. For the sleep quality scale, higher scores reflect greater sleep-related difficulties.

The correlation coefficient given in Table 1 is analysed with the above interpretation. The Pearson correlation coefficient r = 0.557, calculated between sleep quality and hand-eye coordination in elite male volleyball players, is statistically significant ($p<0.05$). It indicates that when scores on sleep quality increase, errors committed in the hand-eye coordination test also increase; thereby, lesser sleep-related problems also yield better hand-eye coordination. As per the Coefficient of determination calculated in Fig. 4.26, sleep quality creates 31% ($R^2 = 0.310$) variance in hand-eye coordination of elite male volleyball players. Hence, the impact of sleep quality was observed on hand-eye coordination of elite male volleyball players.

It has been observed that poor sleep quality leads to decreased neuromuscular function and processing speed of the central nervous system. All these are required for good executive cognitive control. Explosive multidirectional movements along with visual tracking are essential elements of key psychomotor performance indicators; thereby, a decrease in sleep quality also reflects in negative outcomes in psychomotor abilities such as hand-eye coordination. Song *et al*. (2023a) in their study reported that sleep quality affects visual search behaviour. Hence, a person's motor preparation gets hampered in the early stages, thereby resulting in poor hand-eye coordination.

Conclusion

Based on the results, it was concluded that sleep quality significantly affects hand-eye coordination of elite male volleyball players, with an increase in sleep-related problems; hand-eye coordination in elite male volleyball players also declines.

References

1. Beldman E, Tsang SMH, Fu ACL. Exploring the essential characteristics for talent identification in volleyball: Insights from elite coaches. International Journal of Sports Science and Coaching, 2025, 21(1). https://doi.org/ 10.1177/ 17479541251359875.
2. Bojanic D, Milasinovic R, Ljubojevic M, Muratovic A. The impact of basic - motor potential to situational efficiency in female volleyball. Journal of Physical Education and Sport,2015:15(4):685 - 691.
3. Charest J, Grandner MA. Sleep and athletic performance: impacts on physical performance, mental performance, injury risk and recovery, and mental health: an update, (in eng). Sleep Med Clin.,2022:17(2):263–82.
4. Gong M, Min S, Sun Y, Jin L, Li S. Effects of Acute Sleep Deprivation on Sporting Performance in Athletes: A Comprehensive Systematic Review and Meta-Analysis. Nature and Science of Sleep,2024:16:935-48.
5. Grandner MA, Fernandez FX. The translational neuroscience of sleep: a contextual framework, (in eng). Sci.,2021:374(6567):568–73.
6. Hemphill D. Training hand-eye coordination on a new device. Unpublished (Sport and Exercise Science) Honours thesis. Sydney: University of Western Sydney, 2000.
7. Kölling S, Duffield R, Erlacher D, Venter R, Halson SL. Sleep-related issues for recovery and performance in athletes, (in eng). Int J Sports Physiol Perform,2019:14(2):144–8.
8. Lu J, Yan A, Qiu J. Relationshp Between Sleep Quality, Mood State, and Performance of Elite Air-Rifle Shooters. Research Square, Shanghai Research Institute of Sports Science (Shanghai Anti-Doping Center), 2021. DOI: https://doi.org/10.21203/rs.3.rs-1145112/v.
9. Ludeke A, Ferreira JT. The difference in visual skills between professional versus non-professional rugby players. S Afr Optom,2003:62(4):150-158.
10. Magill RA. Motor Learning and Control: Concepts and Applications. 5th Edition. New York: McGraw-Hill, 2003.
11. Malhotra RK. Sleep, recovery, and performance in sports, (in eng). Neurol Clin.,2017:35(3):547–57.
12. Song T, Du F, Xu L, Peng Z, Wang L, Dai C, et al. Total sleep deprivation selectively impairs motor preparation sub-stages in visual search task: Evidence from lateralized readiness potentials. Front. Neurosci.,2023a:17:989512.
13. Teece AR, Argus CK, Gill N, Beaven M, Dunican IC, Driller MW. Sleep and performance during a preseason in elite rugby union athletes, (in eng). Int J Environ Res Public Health, 2021, 18(9).
14. Teja R, Manwatkar P. The role of sleep quality and patterns in cricket player performance. International Journal of Sports, Health and Physical Education,2024:6(1):212-214.
15. Vitale JA, Weydahl A. Chronotype, Physical Activity, and Sport Performance: A Systematic Review. Sports Med,2017:47(9):1859-1868. doi: 10.1007/s40279 -017-0741-z.
16. Zhu R, Zou D, Wang K, Cao C. Expert Performance in Action Anticipation: Visual Search Behavior in Volleyball Spiking Defense from Different Viewing Perspectives. Behavioral Sciences,2024:14(3):163.