

# The Impact of Sleep Quality on the Performance of Omani Athletes

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## ABSTRACT

*Sleep quality (SQ) is a significant factor in athletes' performance. Good sleep helps restore energy, increase concentration, physical endurance and release growth hormones, which help build muscle and strengthen the immune system. When athletes get enough sleep, it enhances muscle recovery, improves mood and reduces psychological stress. Therefore, this study aimed to identify the impact of sleep quality on the health of Omani athletes in the Sultanate of Oman. A convenience sample of 95 male athletes responded to an online SQ Scale. The SQ Scale consisted of 65 items distributed into 5 sub-dimensions: Habitual sleep efficiency, daily training, competition period, external factors, and health factors. The results indicated that SQ of Omani athletes was average on all sub-dimensions of SQ Scale. The results also showed that there were statistical differences in the dimensions of the competition period and health factors in favor of athletes aged 26 and above. The study recommended conducting interviews with Omani athletes to identify the factors affecting their SQ and promoting awareness about the term of SQ by meetings and training programs.*

**Key words:** sleep quality, Omani athletes, team sports, individual sports.

## Introduction

The SQ is a strong indicator of an individual's physical, mental and psychological health, in addition to a high general health condition in general. The term of SQ has recently been used extensively by researchers and doctors, which prompted the National Sleep Foundation to bring together sleep experts to prepare a report on SQ that includes a set of recommendations, which were as follows: Sleep for the longest period of time when in the sleeping position in bed, up to 85% of the time, falling asleep in less than 30 minutes, not waking up more than once during sleep, not falling asleep for less than 20 minutes when in the sleeping position<sup>1</sup>.

Poor sleep may lead to the accumulation of fatigue, exhaustion, feelings of sleepiness, and changes in mood<sup>2</sup>. Moreover, insufficient sleep has a direct negative relationship to physical performance, as a decrease in neurocognitive functions such as attention and memory, a decrease in motor speed and anaerobic power, also public and physical health in general is affected, which subject the body to decreased immune function and risks of disease and

injury<sup>3</sup>. The SQ in general is linked to some quantitative variables such as the number of sleeping hours, the sleep period consistency, the interruption of the sleep period and the number of hours awake. It is also linked to some descriptive variables of sleep efficiency at certain times such as the training and competition period, which may be formulated in the questions form that the player answers personally<sup>4</sup>.

Buysse<sup>5</sup> indicated that sleep health or good sleep is a multidimensional pattern of wakefulness and sleep that pertains to and meets the requirements of the individual, society and the environment, which enhances the physical and mental well-being of individuals. Good sleep is characterized by satisfaction and happiness, controlling the appropriate timing, obtaining sufficient duration, high efficiency and sustainability, alertness during waking hours, and this is reflected in good performance and achievement of all the individual's life and personal activities. On the contrary, sleep deprivation negatively affects glucose metabolism and the efficiency of neuroendocrine function, which in turn affects carbohydrate metabolism, appetite, energy generation, and protein biosynthesis. In

addition to a strong and direct effect on athletic performance and recovery or healing<sup>6</sup>.

The personal evaluation of players is considered one of the most important things that promote healthy behavior in general, especially good sleep, as the sports field still suffers from the poor knowledge about SQ among athletes, not to mention the decline in quality among non-athletes as well, which is represented by sleeping fewer hours and not paying attention to standards<sup>7</sup>. SQ is evaluated using many methods, including sleep diaries, which are daily questions written to measure sleep quality, sleep measurement questionnaires, as there are many sleep questionnaires that vary according to time and the modern variables of contemporary life, variation and change in training patterns, in addition to other methods using devices, such as polysomnography and Actigraph<sup>8</sup>. Methods that rely on devices are considered one of the most accurate ways to measure quantitative and qualitative sleep variables, but they are considered financially expensive methods and force testers to adhere to the locations of the devices, which may cause sleep disturbance in the first place.

Below is a review of literature on previous research on SQ. Shantakumar et al.<sup>9</sup> confirmed that Ajman University students in the UAE suffer from problems in SQ, such as irregular sleep times and few hours of sleep. Al-Abri et al.<sup>10</sup> investigated sleep patterns and quality among Omanis using actigraphy. The results indicated that biphasic siesta sleep is a predominant pattern among Omani adults. Hamlin et al.<sup>11</sup> examined whether SQ and quantity were related to maladaptation in college athletes. Results showed that college athletes who maintained good sleep habits (8 hours) were less likely to experience high stress and maladaptation in college. The review of literature conducted by Wang and Boros<sup>12</sup> concluded that moderate physical activity is more effective than vigorous physical activity on SQ for young people and the elderly. On the other hand, Lipert et al.<sup>13</sup> discussed SQ and performance in professional athletes fasting during the month of Ramadan. Charest and Grandner<sup>14</sup> concluded that lack of sleep and/or poor SQ contributes to impaired muscle strength, speed, and other aspects of physical performance. Sleep problems can also increase the risk of concussion and other injuries, and impair recovery after injury. Moreover, Santos et al.<sup>15</sup> stressed that free-time physical activity practice improves SQ among university students in Brazil.

### Research Problem

A large part of sleep problems and poor SQ in Arab societies may be due to the lack of a good sleep culture. Therefore, there is insufficient awareness of the importance of sleep and good sleep habits. On the other hand, Omani athletes' consultations with sleep specialists are almost weak. The first author of the current study noted cases of recurrent sleep problems among Omani athletes in individual and team sports. In addition, this is the first

research in Oman and the Arab world. The authors did not find research in Arab scientific databases that investigated SQ of athletes in Oman. Most Arab research has focused on sleep disorders without focusing on SQ. Therefore, this study aims to identify the impact of SQ on the health of Omani athletes in individual and team sports by answering the following questions:

1. What is the level of SQ among Omani athletes?
2. Does SQ differ according to the type of sport (individual sports & team sports)?
3. Does SQ differ according to athlete's age (25 years & less, 26 years & above)?

### Methods

#### Research methodology

Quantitative descriptive research was used in this research. Descriptive research is a research method that describes the characteristics of a population or phenomenon by describing the demographic characteristics of the research participants. Accordingly, quantitative descriptive research seeks to describe the phenomenon through quantitative expression that presents a numerical description of the size of the phenomenon to be studied<sup>16</sup>.

#### Participants

The research population consisted of all Omani athletes in clubs, sports federations, educational institutions and Oman Olympic Committee. An online SQ scale was distributed to all athletes at these sports institutions in the Sultanate of Oman. 95 Omani athletes expressed their willingness to participate by responding on SQ scale. Therefore, these participants were selected using a convenience sampling method. Convenience sampling is a non-probability sampling method which is a way of selecting participants from the target research population based on ease of access<sup>17</sup>, or the friendship between the researcher and the participants<sup>18,19</sup>. In other words, convenience sampling describes the data collection process from a research population that is effortlessly reachable to the researcher<sup>20</sup>. Figure 1 shows the demographic data of the participants according to age and type of sport.

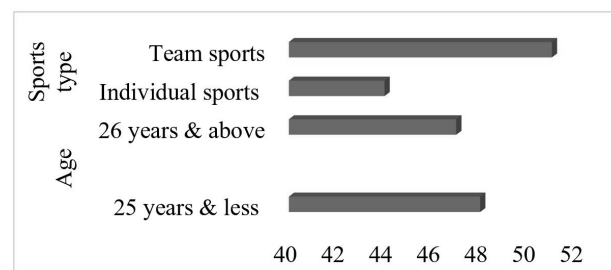


Fig.1. Participants' demographic data.

*Data collection*

The current research adopted the SQ scale for Egyptian athletes developed by Elbedewy et al.<sup>21</sup> after reviewing foreign research that dealt with SQ for athletes. The scale achieved high psychometric properties (validity and reliability). 3-Point Likert Scale (yes/sometimes/no) was used in this scale and the following scores are given respectively: Yes (3), sometimes (2), and no (1). The following criterion was used to calculate the mean of responses to items of SQ scale: Low (1:00 to 1.67), average (1.68 to 2.34), and high (2.35 to 3:00). Therefore, the scale is suitable for the Omani environment, which is close to the Egyptian environment in terms of language, culture and religion. The scale consisted of 65 items distributed into 5 sub-dimensions related to habitual sleep efficiency, daily training, competition period, external factors, and health factors. Below, the five sub-dimensions of SQ scale will be explained, as well as the references cited.

1. Habitual sleep efficiency: This dimension includes 17 items, covering sleep periods, sleep duration, sleep duration, sleep efficiency, and wakefulness efficiency<sup>1,22,23.</sup>
2. Daily training: This dimension includes 8 items, covering the effect of sleep and the biological clock on training efficiency, and the player’s relationship with his/her teammates<sup>24,25</sup>.
3. Competition period: This dimension includes 11 items, covering the psychological stress during the competition period such as anxiety, winning and losing, the requirements of the competition period in terms of travel and camps, and the change of team members or coaches<sup>26,27.</sup>
4. External factors: This dimension includes 17 items, covering the influences associated with modern lifestyle such as mobile, social media platforms, and artificial lighting<sup>28,29.</sup>
5. Health factors: This dimension includes 11 items, covering the healthy habits such as: eating healthy meals, drinking water, taking stimulants, and being free of physical and respiratory diseases<sup>30,31.</sup>

*Procedures*

Approval for conducting the research was obtained from the Research Ethics Committee at the College of Education in Sultan Qaboos University, Oman. SQ scale was designed by Google’s electronic forms. The link of SQ scale was distributed by WhatsApp and email to all Omani athletes in clubs, sports federations, educational institutions and Oman Olympic Committee.

Participants were informed that responding to the scale was voluntary and they were free to withdraw at any time. Participants were given three weeks to respond to

the scale during the period from March 10, 2024 to March 31, 2024.

Participants’ responses were downloaded from Google Drive and statistically analyzed using SPSS. Means, standard deviations, and t-test were used to answer the research questions. Tables 1a, 1b, 1c, 1d, 1e present means and standard deviations of items of all sub-scales of the SQ scale.

**TABLE 1a**  
MEANS AND STANDARD DEVIATIONS OF ITEMS ON HABITUAL SLEEP EFFICIENCY

Items	Mean	SD
I sleep for long periods of time	1.94	.641
I sleep for long, interrupted periods	1.72	.675
I feel relaxed after getting up	2.55	.613
The nap period is important in regaining my energy and completing my tasks	2.47	.769
I am used to sleeping early	2.07	.718
I like to stay up late a lot	1.65	.648
When I wake up early I feel energetic	2.63	.565
I wake up at different times every day	2.09	.772
I wake up many times at night after sleeping	1.71	.753
I go to sleep at different times every day	2.06	.782
I have nightmares a lot	1.30	.527
My dreams are similar to what I think about before sleep	1.78	.666
I talk a lot in my sleep	1.21	.481
I have difficulty waking up	1.49	.727
I toss and turn a lot during my sleep and I feel it	1.72	.764
I hear any sound that occurs next to me while I sleep	1.78	.797
I can’t get enough sleep every day	1.81	.789

**TABLE 1b**  
MEANS AND STANDARD DEVIATIONS OF ITEMS ON DAILY TRAINING

Items	Mean	SD
I exercise late at night	1.08	.347
I often go to sleep feeling exhausted from training.	1.98	.750
I go to bed with muscle pain.	2.13	.708
I sleep deeply on days with a high training load	2.47	.665
Lack of sleep affects my performance during training	2.67	.514
I dream a lot about my disagreements with my teammates.	1.30	.602
I need a period of time to sleep regularly after I change the coach or team	1.58	.792
I suffer from a lack of concentration when training early in the morning	1.60	.777

**TABLE 1c**

MEANS AND STANDARD DEVIATIONS OF ITEMS ON COMPETITION PERIOD

Items	Mean	S.D
In case of defeat, I need to sleep for way longer hours	1.70	.741
I celebrate winning by skipping bedtimes.	1.73	.827
Being injured affects my sleep	2.22	.746
My fear of injury causes me insomnia	1.58	.750
I can't sleep when I'm subjected to injustice during competition	1.96	.791
My sleep is affected when I feel dissatisfied with the judging or the result.	2.00	.837
I cannot sleep deeply when I change my sleeping place during competition	1.81	.828
I Draw performance plans for training or competition before bed.	2.34	.740
I think and feel very anxious on the night of the match.	2.00	.798
I cannot sleep well when traveling (work - tournament days).	1.89	.778
I can sleep in a different place during competitions (hotel - training camps – house).	2.49	.682

**TABLE 1d**

MEANS AND STANDARD DEVIATIONS OF ITEMS ON EXTERNAL FACTORS

Items	Mean	SD
I use bright lights or devices that emit light before sleeping.	1.41	.644
When I hear disturbing news, I cannot sleep deeply	2.03	.804
When I listen to relaxing music, I can fall deeply into sleep	1.57	.793
Family problems affect the way I sleep	1.97	.785
When I eat a late dinner, I cannot sleep easily	1.94	.842
When the pillow is uncomfortable, my sleep is affected	2.41	.778
I can't sleep while waiting for an important call	2.11	.769
I can wake up to answer the phone and fall back into sleep easily	2.16	.753
I prefer sleeping in the dark	2.84	.394
The alarm sounds next to me keeps going on until I can wake up.	2.15	.879
I need clear lighting to sleep	1.16	.497
I wake up immediately after the wake-up alarm starts	2.41	.707
I sense the annoying sounds quickly.	2.14	.757
I can sleep freely and enjoyably in my home	2.82	.437
I can sleep freely and enjoyably outside my home in camps	2.40	.590
I interact with social media platforms before bed and for a long period of time.	2.11	.741
I use technological devices immediately before bed (laptop, mobile phone).	2.35	.756

**TABLE 1e**

MEANS AND STANDARD DEVIATIONS OF ITEMS ON HEALTH FACTORS

Items	Mean	S.D
I take stimulants when exercising (coffee, for example)	1.81	.789
I feel anxious when the injury occurs again after rehabilitation operations	2.04	.861
I suffer from respiratory diseases that affect sleep	1.18	.511
The type of clothing I wear affects the depth of my sleep	2.08	.807
I can't sleep because I suffer from muscle pain	1.84	.673
I suddenly woke up having difficulty breathing	1.32	.591
I suffer from snoring while sleeping.	1.37	.604
I sleep an average of 8 hours a day	2.31	.606
I use sleeping pills to be able to sleep	1.15	.468
I eat right before bedtime	1.56	.694
I eat at least 3 meals that are complete with nutrients.	2.50	.666
I drink appropriate amounts of water during the day.	2.63	.565

**Results**

*Results of the first question:* What is the level of SQ among Omani athletes? To answer this question, means (M) and standard deviations (S.D) were calculated according to sub-dimensions of the scale. Table 2 shows the results. It indicates that the level of SQ for Omani athletes was average on all sub-dimensions of SQ scale. Figure 2 also illustrates this result.

*Results of the second question:* Does SQ differ according to the type of sport (individual sports & team sports)? To answer this question, means (M) standard deviations (S.D), and t-test were calculated according to sub-dimensions of the scale. Table 3 shows that there were no significant differences in the level of SQ of Omani athletes due to the type sport (individual/team). Figure 3 illustrates this result.

*Results of the third question:* Does SQ differ according to athlete's age (25 years & less, 26 years & above)? To answer this question, means (M) standard deviations (S.D), and t-test were calculated according to sub-dimensions of the scale. Table 4 shows the results.

**TABLE 2**

MEANS AND STANDARD DEVIATIONS ACCORDING TO THE SUB-DIMENSIONS OF SQ SCALE. (N=95)

Sub-dimensions	M	SD	SQ level
Habitual sleep efficiency	1.88	.204	Average
Daily training	1.85	.323	Average
Competition period	1.97	.350	Average
External factors	2.12	.228	Average
Health factors	1.82	.269	Average



Fig. 2. Sub-dimensions of SQ scale.

TABLE 3

T-TEST RESULTS ACCORDING TO THE TYPE OF SPORT

Sub-dimensions	Sport type	N	M	SD	df	f	Sig.
Habitual sleep efficiency	Individual	44	1.87	.224	-	-	-
	Team	51	1.89	.187	-	-	-
Daily training	Individual	44	1.86	.350	.276	93	.783
	Team	51	1.84	.300	-	-	-
Competition period	Individual	44	2.03	.355	1.351	93	.180
	Team	51	1.93	.342	-	-	-
External factors	Individual	44	2.12	.220	.117	93	.907
	Team	51	2.11	.237	-	-	-
Health factors	Individual	44	1.85	.271	1.051	93	.296
	Team	51	1.79	.266	-	-	-

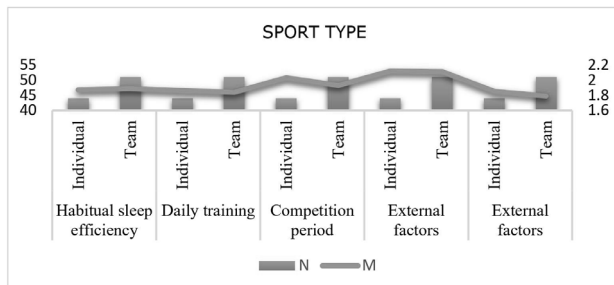


Fig. 3. The type of sport.

TABLE 4

T-TEST RESULTS ACCORDING TO ATHLETE'S AGE

Sub-dimensions	Athlete's age	N	M	SD	df	f	Sig.
Habitual sleep efficiency	25 & less	48	1.89	.210	.410	93	.683
	26 & above	47	1.87	.199	-	-	-
Daily training	25 & less	48	1.84	.348	-3.389	93	.698
	26 & above	47	1.86	.298	-	-	-
Competition period	25 & less	48	1.90	.298	-1.996	93	.049*
	26 & above	47	2.05	.386	-	-	-
External factors	25 & less	48	2.12	.274	-.054	93	.957
	26 & above	47	2.12	.172	-	-	-
Health factors	25 & less	48	1.75	.246	-2.686	93	.009*
	26 & above	47	1.89	.274	-	-	-

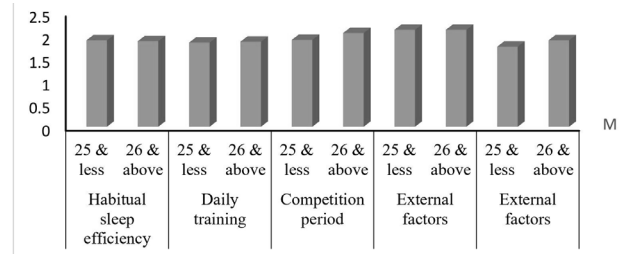


Fig. 4. The athletes' age.

Table 4 shows that there were significant differences in the level of SQ of Omani athletes due to the athlete's age in favor of athletes aged 26 and above in the dimensions of the competition period and health factors. Figure 4 illustrates this result.

Discussion

The results indicated that SQ of Omani athletes was average on all sub-dimensions of SQ Scale. The results also showed that there were statistical differences in the dimensions of the competition period and health factors in favor of athletes aged 26 and above. Below will be discussed the results of the current research.

The results of the first question indicated that the level of SQ was average as perceived by Omani athletes. These results can be explained by the fact that factors related to sleep efficiency, daily training, competition periods, health and external factors that contributed to the average level of SQ. Therefore, sleep is a state of stagnation, stillness, and immobility, and it is a natural process that is irreplaceable for any normal individual. Samuels et al.<sup>32</sup> indicated that the classic meaning of sleep for athletes: reflects the recovery process, regulating individuals' biological clock, controlling feelings of alertness and activity or sleepiness and fatigue throughout the day, especially on training days as well as competition days. Higher mental processes, compensation for damaged tissues, and metabolism are important physiological and psychological factors linked to the efficiency of physical performance, training, and even the recovery process as a whole.

There are many methods to evaluate and monitor sleep in individuals in general and in athletes in particular, including polysomnography (PSG), actigraphy, in addition to sleeping questionnaires and scales. Polysomnography is considered the best of all, but sleep scales and questionnaires are easy to use, for it is easy to distribute among players at any time without disrupting their training or competition schedule, and because it does not require any tools or laboratories, in addition to its low cost<sup>33</sup>, this emphasizes the importance of designing a SQ scale for athletes. Frohm et al.<sup>34</sup> confirmed that sleep duration is considered a strong indicator of poor physical performance and one of the first com-

plaints among athletes in SQ questionnaires, as most athletes mentioned sleeping less than 8 hours a day. The construction of the statements and results of the current research is also consistent and it directly affected the recovery process. In this regard, Ahmed et al.<sup>35</sup> confirmed that short sleep duration (less than 7 hours) affects 1 out of 3 Saudi adults due to comorbid conditions such as obesity, asthma, depression, diabetes, and blood pressure. A systematic review conducted by Cunha et al.<sup>36</sup> on 25 studies concluded that increasing the duration of sleep at night or through naps contributes to raising the physical and cognitive performance of athletes.

The results of the second question indicated that there were no significant differences in the level of SQ due to the type of sport (individual/team). This result can be explained by the fact that the items and dimensions of SQ scale included biological, health, psychological, emotional, social and environmental factors. These factors may positively or negatively impact on SQ of Omani athletes regardless of the type of sport, whether individual, group or both. In this regards, Hausswirth et al.<sup>37</sup> and Hotfiel et al.<sup>24</sup> indicated that muscle fatigue and muscles pain adversely affect sleep due to the activation of inflammatory cytokines that affect SQ. Lack of sleep affects the responses of the autonomic nervous system, increase the heart rate during rest, and the discomfort required to enter sleep. Sleep has an impact on the immune, endocrine, and metabolic systems. It also facilitates the restoration of neural connections in the waking state and plays a key role in learning, memory, and synaptic plasticity (the ability of synapses to become stronger or weaker over time).

The responses of Omani athletes on health factors were consistent with the findings of Jeukendrup<sup>38</sup>, who confirmed that some foods (carbohydrates and sugars) negatively affect sleep, delaying athletes' ability to fall asleep, while proteins increase the total sleep period. On the other hand, the athletes negative responses regarding the inability to sleep with the presence of lighting were also consistent with previous research, which indicated that the invention of artificial lights had several positives in addition to many negatives, that led to prolonging the range of activities that individuals perform at night, that appears today in the form of technological devices usage that emits light, such as computers and smartphones, which subsequently had a negative on individuals' biological clocks. Light plays a key role in regulating the circadian rhythm, which is the body's internal clock that indicates when to be alert and when to rest<sup>29</sup>.

The results of the third question indicated that there were significant differences in the level of SQ due to ath-

lete's age in in favor of athletes aged (26 and above) in the dimensions of the competition period and health factors. The states that changes in SQ and duration are common among older people, and the main reason for this is changes in the body's biological clock<sup>39</sup>. This leads to a disruption of the circadian rhythm that directly affects the time of feeling tired and alerted. Light also plays a major role in regulating the circadian rhythm, which is the body's internal clock that indicates when to be alert and when to rest<sup>29</sup>. Light also affects the production of melatonin, and melatonin is a hormone that the body naturally produces, and its production is closely linked to light, as it enhances its secretion during darkness and is an essential sleep-inducing hormone, and a biological rhythm regulator that controls the sleep-wake cycle. Wright et al.<sup>40</sup> indicated that exposure to artificial light at night, staying up late and sleeping during the day, and lack of exposure to natural daylight ruins the brain's biological clock, as previous studies have proven that the biological clock is the least to do brain stimulation, which is known as the level of cognitive performance or the physiological indicator of sleep, which occurs two hours after the usual time of awakening from sleep, and close to the timing of melatonin replacement, has become a new matter due to exposure to artificial lighting at times of awakening, especially during the day, and this is consistent with the players' answers about their weak responses during morning training.

## Conclusions

Sleep is a natural process that is irreplaceable for any individual. Therefore, sleep is an essential part of maintaining good health and well-being. However, in today's fast-paced world, many individuals struggle to get good SQ. Lack of sleep can have a significant impact on our physical and mental health. If you find yourself tossing and turning during the night or waking up feeling tired, it's time to take action to improve the quality of your sleep. Improving SQ can have a profound impact on our health. Adequate sleep plays a critical role in supporting an athlete's immune system, maintaining a healthy weight, promoting mental health, and enhancing cognitive function. Additionally, good sleep is positively associated with a lower risk of chronic diseases such as diabetes, cardiovascular disease, and cancer. Therefore, Omani sports institutions should improve SQ for athletes, which will positively reflect on winning Arab and international competitions. The study recommended conducting interviews with Omani athletes to identify the factors affecting their SQ and promoting awareness about the term of SQ by meetings and training programs. On the other hand, the results of the current research cannot be generalized to all athletes in the Sultanate of Oman. This is due to the small sample size, the low response of female athletes, and the use of a non-probability convenience sample method.

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## **UTJECAJ KVALITETE SNA NA IZVEDBU OMANSKIH SPORTAŠA**

### **SAŽETAK**

Kvaliteta sna (SQ) značajan je faktor u izvedbi sportaša. Dobar san obnavlja energiju, povećava koncentraciju, fizičku izdržljivost i potiče oslobađanje hormona rasta, koji doprinose izgradnji mišića i jačanju imunološkog sustava. Kada sportaši dobiju dovoljno sna, to pospješuje oporavak mišića, poboljšava raspoloženje i smanjuje psihički stres. Stoga je ova studija imala za cilj utvrditi utjecaj kvalitete sna na zdravlje omanskih sportaša u Sultanatu Oman. Prikladni uzorak od 95 muških sportaša ispunio je SQ skalu. SQ skala se sastojala od 65 stavki raspoređenih u 5 dimenzija: uobičajena učinkovitost spavanja, dnevni trening, razdoblje natjecanja, vanjski čimbenici i zdravstveni čimbenici. Rezultati su pokazali da je kvaliteta sna omanskih sportaša bila prosječna u svim dimenzijama SQ skale. Rezultati su također pokazali da postoje statističke razlike u dimenzijama natjecateljskog razdoblja i zdravstvenih čimbenika u korist sportaša u dobi od 26 i više godina. Studija je preporučila provođenje intervjua s omanskim sportašima kako bi se identificirali čimbenici koji utječu na njihovu kvalitetu sna i promicanje svijesti o njezinoj važnosti putem programa obuke.