



Nap Opportunity As a Strategy to Improve Short-Term Repetitive Maximal Performance During the 5-m Shuttle Run Test: A Brief Review

Hamdi Chtourou^{1,2,*}, Cyrine H'mida^{2,3}, Omar Boukhris^{2,3}, Khaled Trabelsi^{2,3}, Achraf Ammar⁴ and Nizar Souissi¹

¹Activité Physique, Sport et Santé, UR18JSO1, Observatoire National du Sport, Tunis, Tunisia

²Institut Supérieur du Sport et de l'Éducation Physique de Sfax, Université de Sfax, Sfax, Tunisia

³UR15JSO1: Education, Motricité, Sport et Santé (EM2S), High Institute of Sport and Physical Education of Sfax, University of Sfax, Sfax, Tunisia

⁴Institute of Sport Sciences, Otto-von-Guericke University, Magdeburg, Germany

*Corresponding author: Institut Supérieur du Sport et de l'Éducation Physique de Sfax, Université de Sfax, Sfax, Tunisia. Email: h_chtourou@yahoo.fr

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Abstract

Sleep is fundamental for recovery and good mental, cognitive and physical performance. Many factors could affect the sleep of the physical active people or athletes such as: late night training sessions or competition, Ramadan fasting and jetlag. These conditions that affect the sleep quality have significant negative effects on mental, cognitive and physical performance. Thus, scientists have to find strategies to overcome the perturbation of sleep and to optimize mental, cognitive and physical performance especially for physical active people and athletes. One of the proposed strategies is the nap opportunity. Otherwise, in their routinely training sessions, athletes are required to perform short-term repetitive maximal sprints. One of the utilized exercise for testing or training is the 5-m shuttle run test (5mSRT). Recent studies concluded that a nap opportunity has a positive effect on performance during the 5mSRT. These studies reported that this positive effect depends on the duration and the time of day of the nap opportunity. Indeed, the positive effect of the nap opportunity was better after a duration of 45-minutes compared to a 25-minutes. Also, this positive effect was reported when the nap opportunity was performed at 14h00 or 15h00. However, no-positive effect was reported when the nap opportunity was realized at 13h00.

Keywords: Sleep, Sport, Nap, Performance

1. Background

Sleep is very important for the recovery process and regeneration (1). This night period of rest could be disturbed due to many factors such as: late night training or competition (2), sleep deprivation night (3). Therefore, for a good recovery during the day, many people perform a short afternoon nap. Indeed, a propensity to sleep after lunch (i.e., the post lunch dip) has been reported and was related to a reduction in central temperature and vigilance and an increase in the sensation of sleep (4).

Actually, many studies confirmed the regenerative properties of the afternoon nap opportunity (5-8). Indeed, an afternoon nap opportunity is beneficial for a subsequent mental, cognitive (5) or physical performance (6-8) especially after a night of sleep loss or perturbation.

On the other hand, some physically active people and/or athletes perform intensive repetitive efforts during their training routines. One of the most utilized exercises

during testing or training for athletes in many sports activities is the 5-m shuttle run test (5-mSRT). Indeed, this exercise is widely utilized for the development of both aerobic and anaerobic capacities as it consist to perform six repetitions of 30-seconds shuttle sprints with a recovery period of 35-seconds (9).

2. Objectives

The present study aimed to review the studies that have investigated the effect of an afternoon nap opportunity on physical performance during the 5-mSRT.

3. Methods

The search of studies was performed on two electronic databases (PubMed/MEDLINE and Web of Science) in August 27, 2019 using the combination of the following keywords: [(Nap)] AND [(shuttle run performance) OR (5-m

shuttle run test)]. The included studies are written in English language and are published in peer-reviewed journals.

4. Results and Discussion

The present study search resulted in two studies examining the effect of the nap opportunity on the 5-m shuttle run test (Table 1). The results of these two studies are presented in the Table 1. These studies reported clearly that a nap opportunity has a positive effect on the 5mSRT performance (10, 11).

The beneficial effect of the nap opportunity has been confirmed on cognitive (5), mood states (5) and psychomotor (12) and physical performance (7, 8). During a repeated sprint test, Hammouda et al. (7) showed that a 20-minutes and a 90-minutes enhanced the maximal and the mean power after one night of partial sleep loss. After a normal sleep night, Daaloul et al. (8) reported that cognitive performance (i.e., simple reaction time, lower reaction time and mental rotation) was better after a 30-minutes nap opportunity compared to a no-nap condition. Also, after a normal sleep night, Hsouna et al. (13) reported that physical performance during the five jump test and attention during the digit cancellation test improved after a nap opportunity ≥ 35 minutes. Nowadays, no-firm conclusion existed in the literature concerning the mechanisms related to the beneficial effect of a nap opportunity on physical and cognitive performance. However, some studies indicated a causal link between both cognitive and physical performance and the sensation of sleepiness and fatigue. In this context, the beneficial effect of the nap opportunity could be related to a reduction in the sleepiness sensation (6) and an improvement of alertness and the estimation of fatigue (5).

The reported positive effects of the nap opportunity on short-term repetitive maximal performance depends on the duration (11) and the time-of-day (10) of this resting period.

For the duration of the nap opportunity, Boukhris et al. (11) concluded that, compared to the 25-minutes and the 35-minutes, the 45-minutes is the better duration for improving the 5mSRT performance. It has been suggested that a long afternoon nap opportunity could be comparable to a night' sleep quality (14). In this context, a previous study suggested that better effect of the longer nap opportunity (e.g., 45-minutes compared to 25-minutes in the study of Boukhris et al. (11) could be related to a greater slow-wave sleep duration that was reported to be very im-

portant for the recovery process and helps to reduce anxiety and stress (15). Recently, Hsouna et al. (13) showed that a nap opportunity of 25 minutes, 35 minutes and 45 minutes could reduce the sensation of stress and fatigue. This reduction was higher after the longer nap opportunity. Thus, a possible causal link between the higher (i) reduction of stress and fatigue and (ii) increase in physical performance observed after the longer nap opportunity could be suggested.

For the time-of-day of the nap opportunity, Abdesslem et al. (10) concluded that a 25-minutes nap opportunity improve the physical performance during the 5-m shuttle run test when this rest period was performed at 14h00 and 15h00. However, when the nap opportunity was realized at 13h00 no-significant effect was reported. The authors suggested that later time of nap opportunity induces longer waking time and could increase the sensation of sleepiness (10). However, the interpretation of the findings of Abdesslem et al. (10) is difficult and further studies are required. Indeed, the beneficial time-of-day effect of the nap opportunity could depend according to many factors: the daily activities, the waking time, the prior night sleep, etc. In support of the data of Abdesslem et al. (10), Lavie and Weler (16) reported that the sleep latency was shorter and the sleep efficiency and the amount of deep slow sleep were better when the nap was realized closer to the early afternoon.

5. Conclusions

A nap opportunity was beneficial for the improvement of physical performance during the 5mSRT. This beneficial effect depends on the time-of-day and the duration of the nap opportunity. Indeed, the positive effect of the nap opportunity was better after a duration of 45-minutes compared to a 25-minutes. Also, this positive effect was reported when the nap opportunity was performed at 14h00 or 15h00. However, no-positive effect was reported when the nap opportunity was realized at 13h00.

Footnotes

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Table 1. The Effect of a Nap Opportunity (i.e., Compared to a Non-Nap Opportunity) on Performance During the 5-m Shuttle Run Test, Vigilance and the Perception of the Task (RPE)^a

First Author	Participants	Nap Opportunity Selection	Measured Parameters	Observation	Changes (Absolute Value or Percentage)
Boukhris (11)	Seventeen physically active males (age: 21.3 ± 3.4 years)	A 25 min nap opportunity at 14h00	Best distance during the 5-m shuttle run test	↑	6%
			Total distance during the 5-m shuttle run test	↑	3%
			Fatigue index during the 5-m shuttle run test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-
		A 35 min nap opportunity at 14h00	Best distance during the 5-m shuttle run test	↔	-
			Total distance during the 5-m shuttle run test	↑	3%
			Fatigue index during the 5-m shuttle run test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-
		A 45 min nap opportunity at 14h00	Best distance during the 5-m shuttle run test	↑	9%
			Total distance during the 5-m shuttle run test	↑	8%
			Fatigue index during the 5-m shuttle run test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-
Abdessalem (10)	Eighteen physically active males (age: 20.5 ± 3.0 years)	A 25 min nap opportunity at 13h00	Best distance during the 5-m shuttle run test	↔	-
			Total distance during the 5-m shuttle run test	↔	-
			Vigilance during the digit cancellation test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-
		A 25 min nap opportunity at 14h00	Best distance during the 5-m shuttle run test	↑	+9 m
			Total distance during the 5-m shuttle run test	↑	+28 m
			Vigilance during the digit cancellation test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-
		A 25 min nap opportunity at 15h00	Best distance during the 5-m shuttle run test	↑	+7 m
			Total distance during the 5-m shuttle run test	↑	+29 m
			Vigilance during the digit cancellation test	↔	-
			Mean RPE during the 5-m shuttle run test	↔	-

^a↑: Increased; ↔: no-change.

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