International Journal of Physical Education, Sports and Health 2021; 8(2): 205-207

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2021; 8(2): 205-207

www.kheljournal.com
Received: 14-01-2021
Accepted: 18-02-2021

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Shuttle run performance of national soccer players in relation to menstrual cycle

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Abstract
The aim of the present study was to assess speed and agility in national female soccer players during different menstrual cycle. The sample of the present study was chosen with the help of non-probability sampling. 50 inter-university female soccer players were selected for this study. The average age of selected female soccer players was 23.18 years with no irregularity in their menstrual cycle. To assess speed and agility in national female soccer players, 100 yard Shuttle run (R) test was used. In the shuttle run, the subject covers a 25 yard course four times. Total timing to complete the test was recorded. Results indicate that speed and agility of female soccer players gets reduced prior to menstruation as well as during menstruation as compared to post menstruation condition. Based on results it was concluded that agility of national female soccer players was compromised during menstruation phase as compared to pre-menstrual and post-menstrual phase.

Keywords: female soccer players, agility, menstrual cycle

Introduction
Like track and field events, speed is important in soccer but in a different manner. Soccer is not a linear sport and a player needs to have speed along with quickness and ability to change direction. Soccer not only required speed at a stretch but agility to execute basic skills. Agility is made up of quickness and ability to change direction quickly, so it is a combination of both speed and changing direction at will. When the change of direction is less than 90° it is a quick cut or manouring and when the angle is greater than 90° it is a sharp cut. The change of direction in soccer is carried according to position of opponent and it is very demanding for muscles and energy sapping. In female soccer players, the basics of the game are same as far men's but with a difference. Female soccer players have to deal with menstrual cycle which is a natural phenomena. In this connection number of researchers namely Greeves *et al*. (1999) [3]; Janse de Jonge *et al*., 2001 [4]; Middleton and Wenger, 2006 [7]; Casey, Hameed and Dhaher, 2014 [1] reported that physical fitness, neuro muscular coordination, muscle strength and psychomotor abilities decreased during menstruation. Contrary to these findings, Jurkowski, *et al*. (1996) [6] and Girija and Veeraiah, 2011 [2] reported that physical fitness, motor fitness and neuro muscular coordination of female players remains the same even during menstruation phase. In the light of these contradictory findings, the impact of menstrual cycle on speed and agility of soccer players was analysed in the present study.

Objective
The objective of the present study is to find out the effect of menstrual cycle on speed and agility of national soccer players.

Hypothesis
It was hypothesized that the speed and agility of national soccer players as assessed by shuttle run timings will show significant variation during three phases of menstrual cycle.

Methodology
The following methodological steps were taken in order to conduct the present study.

Sample
To sample of the present study was chosen with the help of non-probability sampling. 50 inter-university female soccer players were selected for this study. The average age of selected female soccer players was 23.18 years with no irregularity in their menstrual cycle.

Tools
Cooper's Shuttle Run Test
To assess speed and agility in national female soccer players, 100 yard Shuttle run (R) test was used. In the shuttle run, the subject covers a 25 yard course four times. Total timing to complete the test is recorded.

Procedure
50 national female soccer players with regular menstrual cycle were selected as sample. Shuttle run test was administered to each subject 2 days before, during and 2 days after the menstruation. Timings on shuttle run in three phases of menstrual cycle was recorded. Repeated Measures ANOVA technique was used for data analysis and the results are given in table 1 and 2.

Result and Discussion

Table 1: Descriptive Statistics of Scores on Shuttle Run Before, During and after Menstruation

Conditions	N	Shuttle Run	
		Mean	S.D.
Before Menstruation	50	32.18	4.80
During Menstruation	50	32.94	4.72
After Menstruation	50	30.54	4.99

F = 129.21, $p<.01$

Results shown in table 1 revealed that shuttle run timings of female soccer players prior to menstruation (M=32.18), during menstruation (M=32.94) and after menstruation (M=30.54) differ significantly. The F ratio of 129.21, which is statistically significant at .01 level, confirms this finding.
The obtained results shown in table 1 were also confirmed by Least Significant Difference Test presented in table no. 2.

Table 2: Least Significant Difference Test with Significance Level .05

Mean (I)	Mean (J)	Mean Difference (I-J)
Before Menstruation	During Menstruation	-.767*
	After Menstruation	1.635*
During Menstruation	After Menstruation	2.407*

* Significant at .05 level

Statistical figures presented in table 25 draws following inferences:

- The shuttle run timings during menstruation (M=32.94) was found to be significantly more as compared to shuttle run timings prior to menstruation (M=32.18). The mean difference of .767 was found to be statistically significant at .05 level.
- The shuttle run timings was found to be significantly less after menstruation (M=30.54) as compared to the shuttle run timings prior to the start of menstruation (M=32.18). The mean difference of 1.635 was found to be statistically significant at .05 level.
- The shuttle run timings was found to be significantly less after menstruation (M=30.54) as compared to shuttle run timings during menstruation (M=32.94). The mean difference of 2.407 was found to be statistically significant at .05 level.

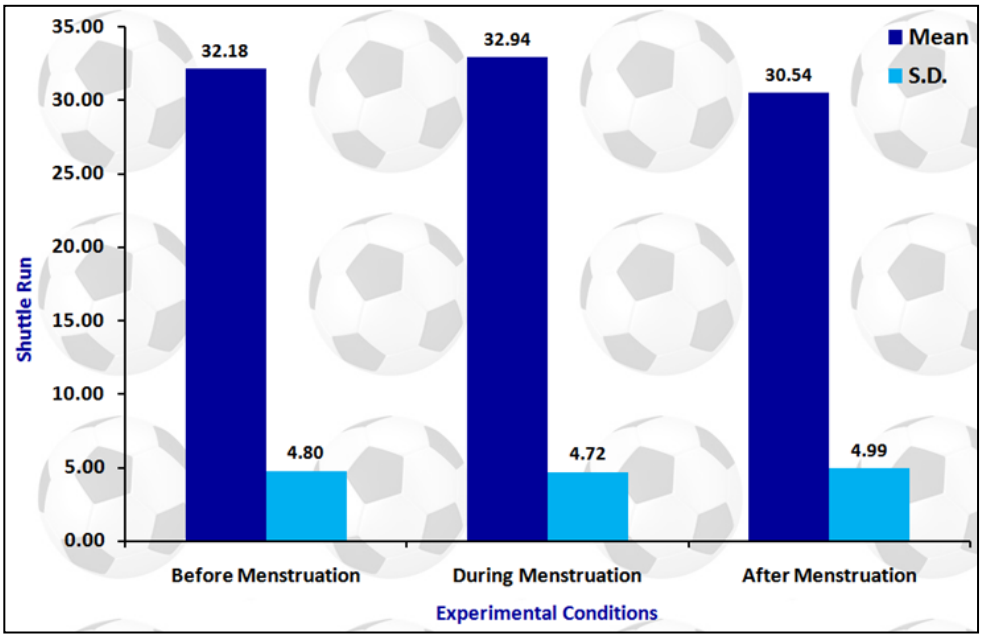

Fig 1: Bar Diagram Showing Mean Shuttle Run Timings in three experimental conditions i.e. before, during and after menstruation

Results shown in table 1 and 2 indicate that speed and agility of female soccer players gets reduced prior to menstruation as well as during menstruation as compared to post menstruation condition. It has been scientifically documented that level of estrogen increases during ovulation phase. The female sex hormone fluctuates across menstrual cycle and during menstrual phase females observe muscular fatigue. Julian *et al*. (2017) [5] reported that athletes had decreased physical capacity during menstruation. Hence the results of the present study support the previous findings that speed and agility of female soccer players gets decreased during menstruation and they are at their best after menstruation.

Conclusion
Based on results it was concluded that speed and agility of national female soccer players was compromised during menstruation phase as compared to pre-menstrual and post-menstrual phase. It may also be concluded that special

attention needs to paid on menstrual cycle of soccer players so that their motor abilities are not affected during a crucial match.

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