

Heart Rate Analysis of Field Hockey Umpires

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Abstract:

The aim of the current study was to analyze the heart rate of field hockey umpires. For the purpose of the study, the researcher had chosen 21 matches of 9th hockey India senior men national championship 2019 held in Gwalior. Out of those matches, 13 were group stage matches, 4 were quarterfinal stage matches, 2 were semifinal stage matches, 1 match was for 3rd position and 1 was the final match. Polar Heart Rate Monitor device was used to monitor the heart of the umpires. For analysis purposes, 'Maximum Heart Rate' (MHR) and 'Average Heart Rate' (AHR) variables were used. The result of the study revealed that the field hockey umpires were having average heart rate of 146.89 ± 7.81 beats per minute when mean maximum heart rate was 186.64 ± 6.20 beats per minute. The result of the study revealed that there was no significant difference between the groups for both the variables. The result also revealed that maximum heart rate of umpires in group level matches was 186.19 ± 6.76 beats per minute. In knock out matches it was 187.37 ± 5.31 beats per minute. In group level matches average heart rate of the umpires was 145.94 ± 8.46 whereas the average heart rate in knock out level matches was 148.43 ± 6.59 beats per minutes. It was also found that there was no any significant correlation between the variables goal difference in matches with the maximum heart rate and average heart rate.

I. Introduction:

Field hockey is a world-famous game. It can be considered as the world's second largest team sport after Soccer. It is played over 100 countries. The Indian National Sport used to be field hockey. Indian has a golden history of field hockey in Olympic. The game is quite popular in central and north part of India. According to new format of play, each match will consist of four quarter of 15 minutes. There will be 2 minutes breaks between two quarters and between second and third quarter there will be a break of 15 minutes. It is a sport which is very difficult to officiate because within blink of eyes the ball position may be changed from the D area of one team to the D area of opponent team. It is considered as one of the fastest sports in the world. Generally, a hockey match is controlled by two umpires. Controlling the respective half is the responsibility of each umpire. Since the fastest characteristic of the sport demand a very high level of fitness for the players, the umpires are not exceptional from it. The field hockey umpires need to possess a very high level of fitness to maintain correct and effective decision throughout the whole match while officiating it. And that is why the International Hockey Federation published the International Umpire Fitness Training Manual along with the Guidelines for Fitness of Umpires. According to the guideline, an international level Field Hockey Umpire must undergo two tests; i.e.:

- The YO-YO Intermittent Recovery Test
- 45-meter Sprint Test

In India, field hockey is the most popular sport right after cricket. The intensity of the domestic competitions is not less than any international competition. Increasing intensity of competitions also increase the demands upon umpires, physically as well as mentally. Therefore, in the current study the researcher intends to analyze the fitness and workout intensity of hockey umpires in an national level hockey competition.

II. Methodology:

For the purpose of the study, the researcher had analyzed total of 21 matches. Out of those matches, 13 were group stage matches, 4 were quarterfinal stage matches, 2 were semifinal stage matches, 1 match was for 3rd position and 1 was the final match. Each match was conducted by two umpires. To collect the heart rate data of the umpires during the match, the researcher used Polar Heart Rate Monitor device. The device was attached around the chest of the umpires and real time heart rate data were recorded using it. The heart can generate variables like 'Maximum Heart Rate' (MHR) and 'Average Heart Rate' (AHR) and the researcher used these two variables in his study.

III. Results:

The table 1 displays the descriptive statistics of MHR and AHR of the umpires in 21 matches.

Table 1: Descriptive Statistics of MHR and AHR

	Minimum	Maximum	Mean	Std. Deviation
MHR	175	198	186.64	6.20
AHR	128	165	146.89	7.81

The researcher also tried to analyse the difference of variables MHR and AHR between Group level matches and Knock out level matches. The table 2 displays the descriptive statistics of both the variables for different level of matches.

Table 2: Descriptive Statistics of MHR and AHR of Different Level of Matches

	Level of Play	Mean	Std. Deviation
MHR	Group Level	186.19	6.76
	Knock Out	187.37	5.31
AHR	Group Level	145.94	8.46
	Knock Out	148.43	6.59

The table 3 is the t-Test result of the variables MHR and AHR along with the F-Value of the test.

Table 3: t-Table for MHR and AHR between different level of play

Variables	Mean Difference	SE of Mean Difference	t Value	p Value	F Value	p Value
MHR	-1.18177	1.98859	-.594	.556	.629	.433
AHR	-2.48987	2.48432	-1.002	.322	.886	.352

The table 4 displays the Pearson's product moment correlation coefficient test result between Goal difference and MHR and AHR.

Table 4: Correlation between Goal Difference and MHR and AHR

	MHR	AHR
Pearson Correlation	.103	.094
Goal Differences		
Sig. (2-tailed)	.518	.555

IV. Discussion:

The result of the study demonstrates that the field hockey umpires were having average heart rate of 146.89 ± 7.81 beats per minute when mean maximum heart rate was 186.64 ± 6.20 beats per minute. In a similar kind of study, it was mentioned that the mean heart rate during the match was 149 ± 9 beats per minute (Sunderland, Taylor, Pearce, & Spice, 2011). In the current study the researcher found the range of maximum heart rate between 175 and 198 beats per minute whereas the range of average heart rate was between 128 and 165 beats per minute. The researcher also tried to investigate the difference between group level matches and knock out level matches. The result of the study (Table 3) reveals that there was no significant difference between the groups for both the variables. The result (Table 2) reveals that maximum heart rate of umpires in group level matches was 186.19 ± 6.76 beats per minute. In knock out matches it was 187.37 ± 5.31 beats per minute. In group level matches average heart rate of the umpires was 145.94 ± 8.46 whereas the average heart rate in knock out level matches was 148.43 ± 6.59 . The researcher also tried to check whether there was any relationship between goal difference in matches with the maximum heart rate and average heart rate of the umpires. But the result of the Pearson's product moment correlation coefficient test (Table 4) reveals that there was no any significant correlation between the variables.

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