

The Impact of the Psychological Stress on the Heart Rate of the Losing and Winning Coaches of the Soccer Premier League

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Abstract

The purpose of the present study is to investigate the effect of psychological stress on the heart rate of winning and losing coaches of the Iranian Soccer Premier League in the tournament (2005-2006). The subjects of this study were 16 professional coaches from the Super League with average age of (52.27 ± 9.18), having a history of coaching in league (11.67 ± 6.01 years) and the average heart rate of (64.40 ± 5.91) beats per minutes. Salivary samples were collected on the day of the match in five stages (one hour before the match, before the match, between the two periods, at the end of the match and one hour after the match). The heartbeat of the coaches during the rest and at the time of the match have been analyzed using the team polar heart rate measurement unit. In addition at the critical moments of the match (scoring, receiving goal, penalties, free kicks around the penalty area, conflicts of the players with the referee) the heartbeats of the coaches have been recorded in a special form. Data from laboratory analysis of salivary specimens using variance analysis test with repeated ANOVA measurements and post-scheffe test, as well as independent t test have been used to analyze the hypothesis with significant level of $p < 0.05$. The results of this study showed that in all the cases there was a significant difference between heart rate in the different moments of the game in comparison with resting time, this difference was very impressive at the critical moments of the competition. The average heart rate of coaches in the critical moments of the game was ($135/80 \pm 9/49$) beats per minute, which showed a 70-beats difference from the rest time.

Keywords: Psychosocial stress, Cortisol, Testosterone, IgA, Heart Rate, Winning Coaches, Losing Coaches.

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Introduction

Coaches is a diverse, dynamic and complex career that involves different roles that require a lot of skills. For some coaches this career is a part of their lives and for other professional coaches this is entire their lives. However, professional coaches should be responsible for all the team problems.

The importance and magnitude of winning soccer game adds to the prevalence and severity of stressful encounters. The psychological pressures caused by the nature of the coaching profession, the constant expectation of victory, the cruel judgments of the enthusiasts and fans of the team, the need for regular travel, the need for different roles and having anxiety and fear of failure before the match, during the time leads to the prostration of the coaches. Stress is a process that becomes apparent at any time in accordance with specific events. The psychological stress and bearing this stresses cause changes in hormonal and increased heart rate in the body, which can have dangerous physiological effects and cause problems for coaches. The physiological complications of the psychological stress of the matches on the nervous system, cardiovascular and immune system are very dangerous. For this reason, in the last two decades, the attention of sports researchers has increased on hormones changes, especially stress hormones, during sports competitions.

Many studies have focused on the relationship between hormones and behavior in men on levels of cortisol, testosterone, and Immunoglobulins, especially Immunoglobulins A. Competition pressures also affect the levels of cortisol, testosterone, and heart rate. One component of the competition is winning and losing. Mazor et al. (1998) reported an increase in testosterone levels following competition for winners and reduced in that hormone for losers after the match. While Clad et al. (2001) suggested that winning is not the main factor in developing a hormonal response, but the individual's perception of winning may alter the levels of testosterone.

However, the effect of competition on hormones has been revealed, but its psychological interpretation remains unknown. In general, the interpretation of changes in hormonal levels is difficult because of several factors affecting the outcome, such as the importance of the competition, the feeling of losing and winning before the

match, the perception of the coaches and players of the difficulty of the competition, the acquisition of social status, the belief in the role of luck, and the referee's judgment effect on the result of the match. With regard to the above mentioned and contradictions in this field, the present research was designed to answer the following questions:

- A. What are the effects of the psychological pressure of a soccer match according to its specific nature in the heart rate of soccer coaches?
- B. Is there a difference in the heart rate of the winning and losing coaches?

Research methodology

The population and the statistical sample of the study were comprised of 16 professional soccer leagues coaches during the 2005-2006 season. One of the subjects who used a sedative during the study was excluded from the subjects. All subjects have been participated in different stages of the study, and none of them had hormonal disorders.

3.3. Research variables

Independent variable: Soccer psychological stress

Dependent variables: Heart rate changes in soccer coaches.

3.5. Information gathering method

Measuring the resting heart rate of the subjects was conducted one week after the end of the season and the completion of the tournament in order not to be at the condition of the match. Before sampling, the subjects washed their mouths and after a few moments, they drained four milliliters of their saliva into the sample collection tubes. On the day of the match, saliva samples were collected again in the following stages.

- One hour before the match
- Before the match begins
- Between two periods
- Immediately after the end of the match
- One hour after the end of the match

The heart rate of the subjects was measured using Team-Polar (Group Measurement) to record changes in heart rate during the course of the match. For this purpose, the belt was hanged to the chest of the coaches 15 minutes prior to the start of the match, and the belt hanging times, the start of the match, the end of the first period, the beginning of the second period, the end of the match and the opening of the belt were recorded in the special form. Heart rate data is stored in the device's memory, and after connecting to the computer and using the relevant software, these changes have been shown as a chart and the heart rate of the coaches displayed in numerical order every 5 seconds.

3.6. Statistical Methods

To describe the statistical data, the mean and standard deviation were used. To test the research hypotheses, the variance analysis with repeated measures (ANOVA) and scheffe post hoc tests as well as t test to analyze the variables between winning and losing coaches have been used. To draw charts EXCEL software have been used and all of the statistical operations were performed using SPSS 11 software. significant level ($p \leq 0.05$) was considered.

Results

5- Heart Rate

- A. The average heart rate of coaches in the sampling process is presented in Table 4-14.

Table 4-14: Mean and standard deviation of the heart rate of coaches in the sampling process.
 average

Sampling steps Heart Rate) in a minute)	Rest	Beginning of the Match	End of the First Period	Between the two period	Beginning of the second Period	End of the match	Sensitive situation
Average	64/40	112/47	111/87	115/47	115/57	129/87	135/80
±	±	±	±	±	±	±	±
Standard deviation	5/91	15/07	12/50	12/98	12/68	8/49	9/49

The results of Table 4-14 show that the highest heart rate of coaches is related to the critical situations of the match and the lowest of the rest time. A better understanding of the information is provided in Fig. 4-13.

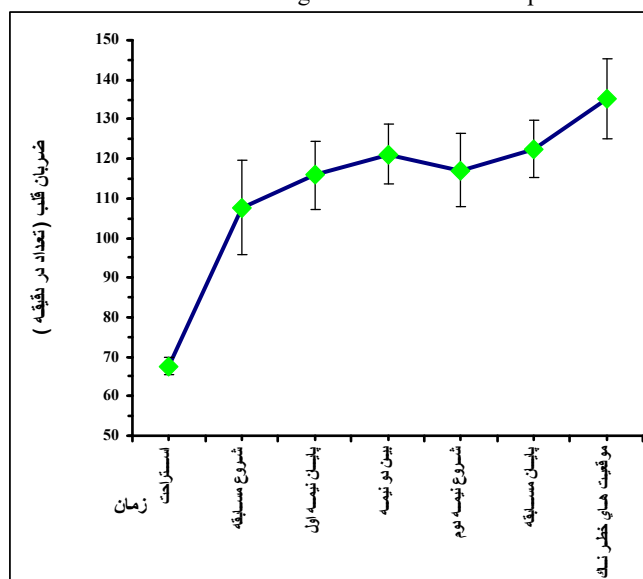


Fig. 4-13: The average heart rate of coaches in the sampling stages

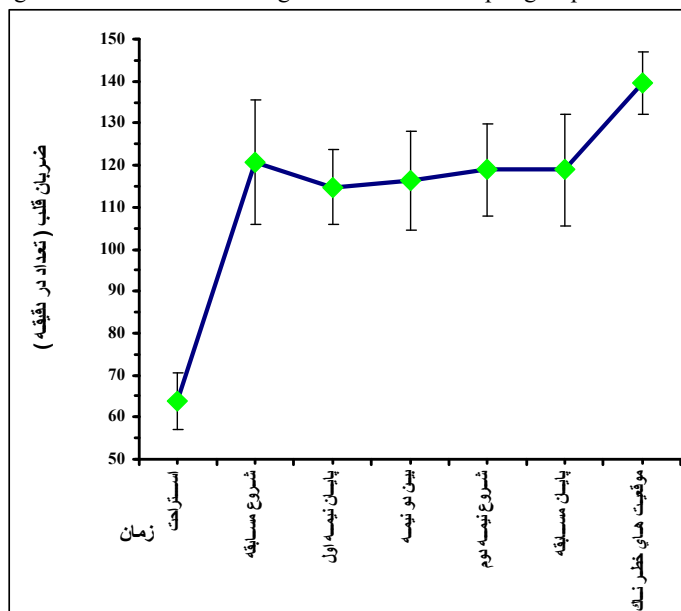
B. The average heart rate of the winning coaches in the sampling process is presented in Table 4-15.

Table 4-15: Mean and standard deviation of the heart rate of winning coaches in the sampling process.

Sampling steps Heart Rate (in a minute)	Rest	Beginning of the Match	End of the First Period	Between the two period	Beginning of the second Period	End of the match	Sensitive situation
Average	63/71	120/71	114/71	116/43	118/86	118/86	129/71
±	±	±	±	±	±	±	±
Standard deviation	6/68	14/71	8/86	11/73	10/93	13/36	7/41

The results of Table 4-15 show that the highest heart rate of the winning coaches is related to the critical situations of the match and the lowest is the rest time. To better understand the information obtained, Figure 4-14 is presented.

Figure 4-14: The average heart rate of the winning coaches in the sampling steps



The average heart rate of losing coaches in the process of sampling is presented in Table 4-16.

Table 4-16: Mean and standard deviation of the heart rate of losing coaches in the process of sampling

Sampling steps / Heart Rate (in a minute)	Rest	Beginning of the Match	End of the First Period	Between the two period	Beginning of the second Period	End of the match	Sensitive situation
Average	67/67	107/67	115/83	121/17	117/17	122/50	139/71
±	±	±	±	±	±	±	±
Standard deviation	2/34	11/99	8/57	7/68	9/20	7/34	10/11

The results of Table 4-16 show that the highest heart rate of the losing coaches is related to the sensitive situations of the match and the lowest of the rest time. A better understanding of the information is provided in Fig. 4-15.

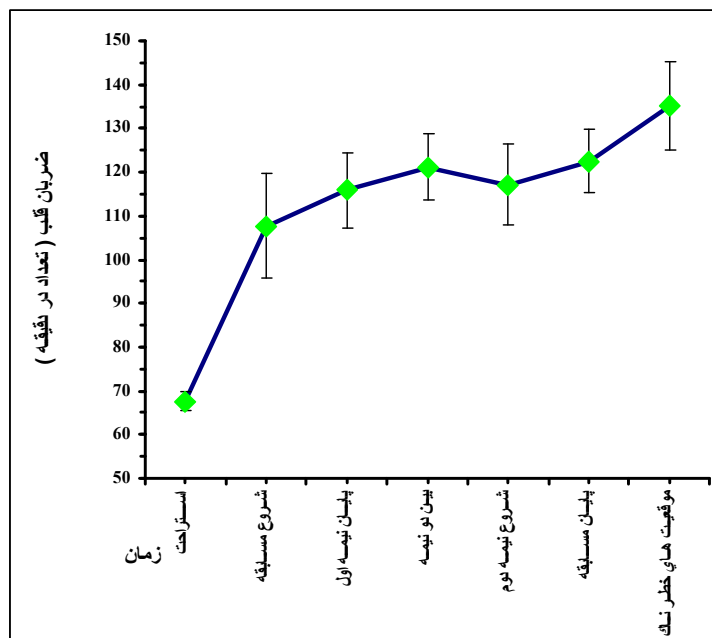


Figure 4-15: The average heart rate of the losing coaches in the match

D. Comparing the mean density of heart rate of winners and losers in Table 4-17.

Table 4-17: Comparison of the mean heart rate of winning and losing coaches in the sampling stages.

Sampling steps / Heart Rate (in minute)	Rest	Beginning of the Match	End of the First Period	Between the two Periods	Beginning of the second period	End of the Match	Sensitive Situation
Winning Coaches Average	63/71	120/71	114/71	116/43	118/86	118/86	129/71
±	±	±	±	±	±	±	±
Standard deviation	6/68	14/71	8/86	11/73	10/93	13/36	7/411
Losing Coaches Average	67/67	107/67	115/83	121/17	117/17	122/50	135/17
±	±	±	±	±	±	±	±
Standard deviation	2/34	11/99	8/57	7/68	9/20	7/34	10/11

The results of Table 4-17 show that the highest heart rate belongs to the position of the losers who are sensitive to the situation and the least to the rest time in the winners. To better understand the information provided in Fig. 4-16.

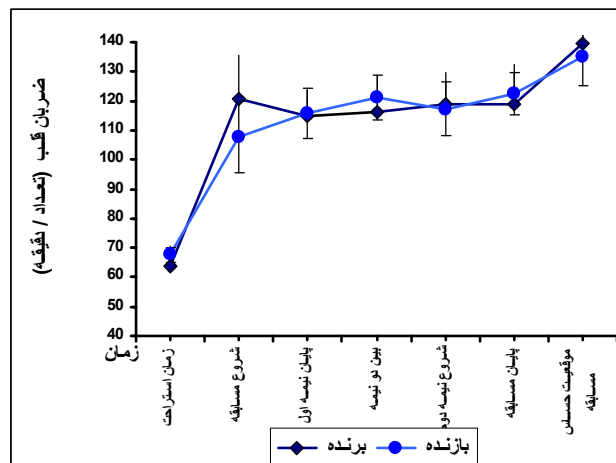


Figure 4-16: Comparison of the mean heart rate of winner and loser coaches in the sampling stages

Hypothesis 13: The psychological pressure of the competition has a significant effect on the heart rate of the league coaches.

The results of analysis of variance with repeated measurements on the heart rate of coaches in the sampling stages in seven levels are presented in Table 4-39 and 40-40.

Table 4-39: Results of analysis of variance with repeated measurements of heart rate of coaches during sampling.

Statistical indicators	total squared variation	degrees of freedom	the mean squared value	F Value	P Value
source	SS	df			
Intra-group	43240/38	6	7206/73	98/60	0/000
Inter-group	7501/56	14	535/83		
Interaction and Remaining	6139/91	84	73/09		
Total	56881/85	104			

Table 4-40: Analysis of the difference between the mean of heart rate of coaches in the sampling stages

Sampling steps	Rest	Beginning of the Match	End of the first period	Between the two Periods	Beginning of the Second Period	End of the Match	Sensitive Situation
Rest	-	-48/06	-47/46	-51/07	-51/27	-53/86	-71/40
Beginning of the Match		-	-0/60	-3	-3/20	-5/80	-23/33
End of the first period			-	-3/60	-3/80	-6/40	-23/93
Between the two Periods				-	0/20	-2/80	-20/13
Beginning of the Match					-	-2/60	-20/13
Sensitive situation						-	-17/53

The results show that the F score obtained from Table F ($F=2/18$) is larger and the number of coaches' heart rate at rest is one hour before the match, before the match, between the two halves, the end of the match, and also in the position Sensitive with other stages there is a significant difference.

Therefore, the hypothesis that psychological stress does not have a significant effect on the heart rate of soccer coaches. ($P<0/05$)

Hypothesis 14: Psychological stress has no significant effect on the heart rate of the winners of the soccer league. The results of analysis of variance with repeated measurements on the heart rate of the winning coaches in the sampling steps in seven steps are presented in Table 4-41 and 42-4.

Table 4-41: Results of analysis of variance with repeated measurements of heart rate of winning coaches at sampling steps

Statistical indicators	total squared variation	degrees of freedom	the mean squared value	F Value	P Value
source	SS	df			
Intra-group	22994/86	6	3832/47	41/40	0/000
Inter-group	1646/29	6	274/38		
Interaction and Remaining	3332/86	36	92/58		
Total	279/74	48			

Table 4-42: Analysis of the difference between the mean of heart rate of the winning coaches in the sampling steps

Sampling steps	Rest	Beginning of the Match	End of the first period	Between the two Periods	Beginning of the Second Period	End of the Match	Sensitive Situation
Rest	-	-57	-51	-52/71	-55/14	-55/14	-76
Beginning of the Match		-	6	4/29	1/86	1/86	-19
End of the first period			-	-1/71	-4/14	-4/14	-25
Between the two Periods				-	-2/42	-2/42	23/28
Beginning of the Match					-	00	20/85
Sensitive situation						-	20/85

The results show that the F score obtained from table F ($F=2.36$) is larger and there is a significant difference between the heart rate of the coaches during rest time with other stages and also a significant difference between sensitive situations with the end of the first period and the second period.

Therefore, the hypothesis that the psychological stress of the competition does not have a significant effect on the heart rate of the coaches of the winning soccer league is rejected ($P < 0.05$).

Fifth hypothesis: The psychological stress of the competition does not have a significant effect on the heart rate of the losing coaches of the soccer league.

The results of variance analysis with repeated measurements on the heart rate of loser coaches in the sampling steps in seven steps are presented in Table 4-43 and 4-44.

Table 4-43: Results of analysis of variance with repeated measurements of heart rate of loser coaches at sampling stages

Statistical indicators /Source of change	Sum of squares SS	Degrees of freedom df	Mean squares	Value f	Value p
Intra group	16530.91	5	2755.15	54.54	0.000
Inter group	1093.55	6	218.71		
Mutual interaction and residual	1517.95	30	50.59		
total	19142.41	41			

Table 4-44: Analysis of the difference between the average heart rate of the losing coaches in the sampling steps

Sampling steps	One hour after the match	The end of the match	Between two periods	Before the match	One hour before the match	Rest
Rest	*-54.83	*-49.5	*-53.5	*-48.16	*40-	---
One hour before the match	-14.83	-9.5	-13.5	-8.16	---	
Before the match	-6.66	-1.33	-5.33	---		
Between two periods	-1.33	4	---			
The end of the match	-5.33	---				
One hour after the match	---					

The results show that the F score obtained from F table ($F = 2/36$) is larger, and the difference the heart rate of the loser's coaches during resting with the other stages and also between the sensitive situations 1 with the start of the match and the end of the first half You are there

Therefore, the hypothesis that the psychological stress of the competition does not have a significant effect on the heart rate of the losing coaches of the soccer league is rejected ($P < 0.05$).

16th hypothesis: There is no significant difference between the number of heart rate of winner and loser coaches in the sampling stages.

Independent t-test results are presented in Table 4-45 for examining the difference between the amount of heart rate of the winning and losing coaches in the sampling steps.

Table 4.45: Statistical Indicators Calculated to examine the difference between the heart rate of the winners and the losers in the sampling steps

Statistical indicators/ Salivary cortisol		Mean	Standard deviation	Mean difference	Difference percentage	DF	T value	T table	P value
Rest	Winner	63.71	6.68	3.95	8/5%	11	-1.37	2.20	0.197
	loser	67.67	2.39						
One hour before the match	winner	120.71	14.71	13.05	8/10%	11	1.73	2.20	0.111
	loser	107.67	11.99						
Before the match	winner	114.71	8.86	-1.12	09%	11	-0.230	2.20	0.822
	loser	115.83	8.56						
Between two periods	winner	116.42	11.73	-4.73	9/3%	11	-0.844	2.20	0.417
	loser	121.16	7.68						
End of the match	winner	118.86	10.93	1.69	1%	11	0.299	2.20	0.771
	loser	177.17	9.19						
One hour after match	winner	118.85	13.36	-3.64	2/2%	11	-0.596	2.20	0.565
	loser	122/50	7.34						

The results show that t obtained from table t ($t = 2.20$) is smaller in all cases and there is no significant difference between the number of heart rate of winning and losing coaches in the sampling stages.

Therefore, the hypothesis that there is no significant difference between the number of heart rate of winner and loser coaches in the sampling steps, is accepted ($05 \text{ } ^\circ / 0 \text{ } P <$).

Discussion and Conclusion

The findings of this study showed that there was a significant difference between heartbeat and resting heart rate in all stages of the match. However, there was no significant difference between the average heart rate at different stages of the match compared to each other, except for the critical moments of the match.

Previous studies of heart rate changes show that researchers have focused on two central nervous system and hormonal systems. This is probably due to the role of these systems against physical and psychological stresses, which can somehow affect cardiac function (8). For this reason, the sympathetic nervous system stimulation in response to environmental conditions and the sensitivity of the competition has increased the amount of secretion of epinephrine and epinephrine light, and ultimately significantly increased myocardial contractility and heart rate (4).

The findings of the study are consistent with the findings of Peter and Gasz on the 30 soccer and basketball coaches during the match, and Debra Luis (1984), which correlates with the relationship between stressful occupations and heart rate in men and women [17] 58).

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