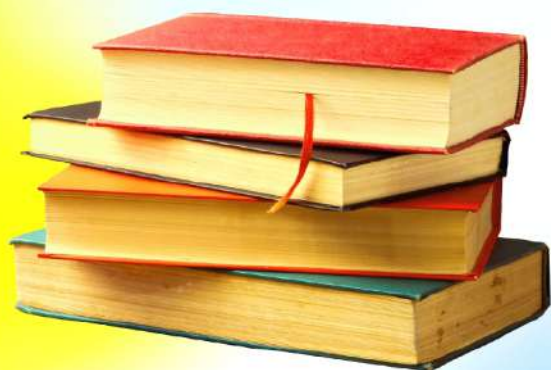


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Title of Content

S.No	Title of Articles and Authors	Page No
1	A Study on Awareness of Road Safety Among Young Adults Dr. Y. Edison Nesa Doss & J. Praveen Kumar Milkies	1-10
2	Children Attitude, Behaviour and Television Commercials – A Study on Children In Vellore K. Deepa & Dr. D. Paulraj	11-19
3	Products Preferred By Children of Vellore After Watching Advertisements on Television– A Study K.Deepa & Dr.D.Paulraj	20-32
4	Corporate Social Responsibilities of Leather Based Industries (A Study on Implementation of ‘Most’ Analysis) M. Mano & Dr. K. Udayakumar	33-42
5	SWOT Analysis of Corporate Social Responsibilities in Leather Based Industries	43-58
6	Human Resource Information System -A Study with special reference to Nutrine Confectionery Company ltd., Chittoor Dr. S. Murugan	59-66
7	A Study on Consumer Behaviour Towards Selected Non-Durable Goods in Vellore City Dr. A. Gnanavel	67-80
8	In-store Advertising, Promotions and its Impact on Consumers Purchase Decisions in Vellore City Dr. S. G. Samuel Collison	81-98
9	Collective Bargaining – Astudy With Reference To By Bhel / Bap / Ranipet Dr. V. Gunasekaran	99-116
10	A Study on The Effect of Quality of Work Life (Qwl) With Special Reference To Vellore Cooperative Sugar Mills Ltd., Ammundi Dr. V. Gunasekaran	117-133
11	The Amenities of Hotel Industries in Vellore District – A Study Dr. S. Murugan & Mr. S. Subramani	134-147
12	Consumers’ Attitude Towards Packaged Drinking Water – A Study With Reference To Vellore City Dr. S. Murugan & Dr. G. Venkatesan	148-167

13	Joint Liability Groups (JLGs): An Empirical Evaluation <i>Omali M & Dr. S Sajeev</i>	168-177
14	An analyses of the Evolution of Ragamalika form of Music <i>K. Prakash</i>	178-187
15	Native Wind Instruments of Carnatic Music <i>S. Rajeswari</i>	188-191
16	Tavil and it's Manufacturing Methods <i>S. Hariharan</i>	192-195
17	A Study on Youth Perception and Awareness Towards Skill India Training Programme <i>Dr. M.P. Asha Kumari & D. Satish</i>	196-206
18	CBT for Low Self Esteem Young Adults: A Case Example. <i>Vini Babu & DR. K.C.Bindhu</i>	207-211
19	A Case Study on Sanitary Workers in Lionstown Area Thoothukudi Town <i>Dr.A.Sudha</i>	212-222
20	Personal Safety Tips for Women on Campus <i>Dr.G.Amutha Ranjini</i>	223-227
21	Industrial Pollution and Health Impacts on the People of Muthaiahpuram Town in Thoothukudi District <i>Dr.N.Nagalakshmi</i>	228-241
22	Impact of Online Studies during Covid-19 <i>C.Girija & DR.C.Santhi</i>	242-247
23	Personal and Psychological Problems of College Students VS. Type of Family – A Descriptive Analysis <i>Dr. A. Jeya Sudha</i>	248-251
24	Influence of Academic Achievement Based on Social Media, Social Skills And Health Awareness <i>Mrs. Juliet Carolyn & Dr. Nellyappan</i>	252-257
25	Professional Development Based on Information Technology <i>Mrs. R. Kalaivani & Dr. K. C. Bindhu</i>	258-262
26	A Study on Influence of EMI Payments on Sales of Sathya Agencies in Subbiah Muthaliyar Puram of Thoothukudi District <i>Dr.A.Sudha</i>	263-273
27	Physical Activity intervention on Locomotor Skills among school children – Pre and post Randomized controlled study. <i>Dr. S. Sethu & R. Ramakrishnan</i>	274-280
28	Effects of Global Warming in The Environment <i>C.Girija & DR.C.Santhi</i>	281-288

29	Am I A Clymate of Climate? - Personal Motivation Through Climate Literacy Dr. R. Indra Mary Ezhilselvi	289-293
30	Influence of Circadian Rhythm on Athletes Dr. S. Josephine	294-298
31	Impact of Social Media and Academic Achievement Among High School Pupils Mrs. R.Mehala & Dr. S.P. Densia	299-306
32	Leadership Behaviour of Women Teachers in Madurai District. Mrs. T. Meena & Dr. K.C.Bindhu	307-317
33	Interpersonal Skills Among College Students in Tirunelveli District Mrs.E.Michael Jeya Priya & Mrs. M. Gnana Kamali	318-324
34	A Study Towards Cyber-Crime- Awareness Among Prospective Teachers Dr.E.C Punitha & M.Gnana Kamali	325-329
35	Family Media Habits of The Secondary Students in Thoothukudi District With Respect to Gender and Home Environment E.Michael Jeya Priya	330-336
36	Impact of Social Media on Emotional Wellness Mrs. Dr.N. Theresita Shanthi & Miss. M. Krishnavenidhivya	337-340
37	The Impact of Stress and The Ways to Manage It Effectively P. Priya	341-346
38	Physical Activity Intervention on Manipulative Skills Among School Children Aged 8-12years Dr. S. Sethu, R. Ramakrishnan & M. Ganeshwari	347-353
39	Crystalline, IR Spectral, Thermogravimetric Studies of $\text{NH}_4\text{K}_2\text{Zn}(\text{SO}_4)_2$ Crystal DipunadasC.N, D.Shiney Manoj, Sajikumar A.C, G.J.Shyju, Aswathy Sudhakar.S, & V. Bena Jothy	354-358
40	Relationship Between Emotional Intelligence and Leadership Quality of Women Teachers Mrs. S. Allimalar & Dr. K.C.Bindhu	359-379
41	Thermal Analysis on Solar Heater for Supplementary Heating of Fluid P.S Aanie, P.H. Sudharlin Paul & Dr.S Jeslin Sunitha Bai	380 -383

INFLUENCE OF CIRCADIAN RHYTHM ON ATHLETES**Dr. S. Josephine,**Director of Physical Education,
St. Ignatius College of Education,
Palayamkottai.**ABSTRACT**

The purpose of the study was to determine the variations in selected physical variables resulting from circadian rhythm. For this study, the following variables such as speed, flexibility, resting heart rate and skin temperature were selected. Fifteen inter college athletes were selected as one of the independent variables and four different times of the day such as 06:00, 10:00, 14:00 and 18:00 hours as other independent variable. The collected data were statistically analysed for significance using one way repeated measure analysis of variance (ANOVA). Whenever the 'F' ratio was found to be significant Scheffe's test was used as post hoc test. In all the cases .05 level was fixed as the level of confidence. It was concluded that the changes in speed, flexibility, resting heart rate and skin temperature showed significant variation in inter college athletes at different times of the day.

Key Words: Circadian Rhythm, Speed, Flexibility, Resting Heart Rate and Skin Temperature

Introduction

All living beings – plants, animals, and human beings – are regulated by biological cycles, or, in other words, biological events that repeat themselves at regular intervals. The rhythm of these cycles is called circadian, when it spans about 24 hours. In humans, the sleep-wake cycle obeys a circadian rhythm. Circadian rhythms are classed as exogenous and endogenous, depending on the extent to which they can be influenced by changes in environmental factors. The exogenous rhythms are the more labile and can be altered in phase or amplitude by manipulating variables extraneous to the individual. The main environmental factors which provide time cues for the body's clocks are light, temperature, physical and social activity. Rhythms that are endogenous are more resistant to changes in the environment.

Significance

Generally, circadian rhythms affect performance and the coach must take this into account. Therefore, the findings of this study will be of significance in the following way. The findings of the study will add to the existing knowledge with regard to the circadian variation on the selected bio-motor components, physiological variables among athletes. The results of the study may provide guideline, which will help the physical educators and coaches in preparing the training schedules for their athletes. The purpose of the study was to determine the variations in selected physical and physiological variables among athletes resulting from circadian rhythm.

Methodology

To achieve the purpose of the study fifteen intercollegiate male athletes were selected as

subjects from affiliated colleges of Manonmaniam Sundaranar University who had participated in the intercollegiate athletic meet and their age ranged from 20 to 25 years. Intercollegiate athletes were selected as one of the independent variables and four different times of the day such as 06:00, 10:00, 14:00 and 18:00 hours were selected as another independent variable. Speed, flexibility, resting heart rate and skin temperature were selected as dependent variables and were measured by 50 m run, sit and reach test, by using bio monitor and temperature of bio monitor respectively.

Analysis of Data

The experimental design for the study was the single group repeated measure design. If he obtained F ratio for different times of the day were significant, the Scheffe's test was used as post hoc test to find out the paired mean differences. All the hypotheses were tested for significance at .05 level of confidence. The data were analysed and is presented in the following tables:

The mean and standard deviation of the dependent variables of intercollegiate athletes at four different times of the day is presented in Table I.

TABLE I
MEAN AND SD OF THE DEPENDENT VARIABLES ON
ATHLETES AT DIFFERENT TIMES OF THE DAY

Dependent Variables	Mean $\pm$ Standard Deviation			
	06:00	10:00	14:00	18:00
Speed	6.96 $\pm$ 0.16	6.94 $\pm$ 0.11	7.06 $\pm$ 0.10	6.84 $\pm$ 0.11
Flexibility	45.8 $\pm$ 4.12	44.8 $\pm$ 4.61	43.2 $\pm$ 4.88	46.8 $\pm$ 4.31
Resting Heart Rate	67.7 $\pm$ 1.33	68.0 $\pm$ 1.90	69.2 $\pm$ 2.17	68.3 $\pm$ 1.75
Skin Temperature	96.9 $\pm$.6	97.6 $\pm$ 0.63	98.0 $\pm$ 0.87	98.7 $\pm$ 1.06

The data of the dependent variables have been analyzed by one way ANOVA with repeated measures and the obtained results are presented in Table II.

TABLE II: RESULTS OF ONE WAY ANOVA WITH REPEATED MEASURE

Dependent Variables	Source	SS	Df	MS	F	P
Speed	Treatment (between groups)	0.3685	3	0.1228	16.16*	< .0001
	Error	0.319	42	0.0076		
Flexibility	Treatment (between groups)	107.4	3	35.8	4.17*	< .011
	Error	360.6	42	8.5857		
Resting Heart Rate	Treatment (between	17.7333	3	5.9111	4.02*	< .013

	groups)					
	Error	61.7667	42	1.4706		
Skin Temperature	Treatment (between groups)	25.804	3	8.6013	43.91*	< .0001
	Error	8.226	42	0.1959		

* Significant at .05 level of confidence.

From the table II, the obtained F-ratio for speed, flexibility, resting heart rate and skin temperature are 16.16, 4.17, 4.02 and 43.91 respectively which are higher than the table value of 2.83 with df 3 and 42 required for significance at .05 level of confidence. The results of the study show that there is a significant difference exists at different times of the day and to determine which of the paired means of the dependent variables had significant difference, the scheffe's test was applied as post hoc test and the results are presented in Table III.

TABLE III

**SCHEFFE'S TEST FOR DIFFERENCE BETWEEN THE PAIRED MEANS
OF DEPENDENT VARIABLES ON ATHLETES IN FOUR DIFFERENT
TIMES OF THE DAY**

	Speed						Flexibility					
06:00	6.96	6.96	6.96				45.8	45.8	45.8			
10:00	6.94			6.94	6.94		44.8			44.8	44.8	
14:00		7.06		7.06		7.06		43.2		43.2		43.2
18:00			6.84		6.84	6.84			46.8		46.8	46.8
Mean Difference	0.03	0.10*	0.12*	0.13*	0.09*	0.22*	1.07	2.67*	0.93	1.60	2.00	3.60*
	Resting Heart Rate						Skin Temperature					
06:00	67.7	67.7	67.7				96.9	96.9	96.9			
10:00	68.0			68.0	68.0		97.6			97.6	97.6	
14:00		69.2		69.2		69.2		98.0		98.0		98.0
18:00			68.3		68.3	68.3			98.7		98.7	98.7
Mean Difference	0.33	1.47*	0.60	1.13*	0.27	0.87	0.69*	1.11*	1.81*	0.42*	1.12*	0.70*

* Significant at .05 level. CI for speed, flexibility, resting heart rate and skin temperature were 0.08, 2.57, 1.05 and 0.38 respectively.

Table III shows that the paired mean difference on speed were found to be significant in all paired means except between 06:00 and 10:00 hours of the day. The results of the study also show that the speed at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day.

Table III shows that the paired mean difference on flexibility were found to be significant in 06:00 and

14:00 hours and 18:00 hours of the day. However, insignificant variations in flexibility was noted in the paired means between 06:00 and 10:00 hrs, 06:00 and 18:00 hrs, 10:00 and 14:00 hrs and 10:00 and 18:00 hrs of the day. The results of the study also show that the flexibility at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day.

Table III shows that the paired mean difference on resting heart rate were found to be significant in 06:00 and 14:00 hours and 10:00 and 14:00 hours of the day. However, insignificant variations in resting heart rate was noted in the paired means between 06:00 and 10:00 hrs, 06:00 and 18:00 hrs, 10:00 and 18:00 hrs and 14:00 and 18:00 hrs of the day. The results of the study also show that the resting heart rate at 06:00 hours was better than 10:00, 14:00 and 18:00 hours of the day.

Table III also shows that the paired mean difference on skin temperature were found to be significant in six paired means out of the compared six paired means. The results of the study also show that the skin temperature at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day.

Conclusions

The following conclusions were drawn from the results of the study. There was a significant difference in speed, flexibility, resting heart rate and skin temperature among intercollegiate athletes at different times of the day. The results of the study show that the speed at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day, flexibility at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day, resting heart rate at 06:00 hours was better than 10:00, 14:00 and 18:00 hours of the day and skin temperature at 18:00 hours was better than 06:00, 10:00 and 14:00 hours of the day. It is also concluded that there was a significant difference in speed, flexibility, resting heart rate and skin temperature of athletes at different times of the day.

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