International Journal of Multidisciplinary Education and Research
ISSN: 2455-4588; Impact Factor: RJIF 5.12
Received: 16-06-2019; Accepted: 19-07-2019
www.educationjournal.in
Volume 4; Issue 5; September 2019; Page No. 41-43

Effect of Circannual rhythm on selected physiological variables among Kashmir collegiate students

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Abstract
The study was purposed to examine the effect of circannual rhythm (seasonal changes) on selected physiological variables among Kashmir collegiate students. In order to achieve the purpose 120 male college students were randomly selected from the 4 different colleges located at 4 different altitude levels of Kashmir valley. Their age ranged from 18 to 23 years. The study was designed in accordance with the guidelines issued by the ethics committee at Annamalai University. All the tests were took place in between the four seasons. The stadiometer and weighing machine was used for obtaining the B.M.I and the skin fold caliper was used for obtaining the Body Fat. The collected data was analyzed by analysis of variance (ANOVA) and Scheffe's post hoc test. A significant reduction was found in B.M.I and Body Fat. In conclusion the present study shows that the significant change has been shown in both variables between the subjects from different colleges with different altitudes.

Keywords: Circannual rhythm, physiological variables, altitudes, seasons, ANOVA

Introduction

A circannual cycle is a biological process that occurs in living creatures over the period of approximately one year. The term circannual is Latin, circa meaning approximately and annual relating to one year. Chronobiology is the field of biology pertaining to periodic rhythms that occur in living organisms in response to external stimuli such as photoperiod. The nature provides a strong basis for human structure and functions. The environment is playing a key role in consolidating and modifying habits, behavior and rhythmic change takes place in human's life span. The body and soul are inspirable and that learning could be promoted through physical activity. The human beings are said to possess highest form of life only because they learnt to modify, strengthen or weaken the impulse bestowed on them by nature. Biological and cultural evolution has for reaching implications for the physical education today. Physiology is the study of the body and how it functions. A physiologist studies the structure and the operations of the tissues, organs and systems of the body. Sports physiology is the study of the immediate and lengthy term effects of training and sports participation on the body's physical system (*Brain and Shurkey* 1986) [1]. In physiology we study how different parts or organs of an organism work together to accomplish a particular function in our body, for example, the digestion of food involves the act of hormones and other chemicals produced by the stomach, liver and pancreas. Muscle contraction occurs through the action of chemical messages produced by nerves that supply the muscles. If we learn how the body functions normally, then we can understand what happens when organs function abnormally and we can take care of our body (*Ajmersingh and Jagadish* 2003) [2]. The study of biological clocks is known as chronobiology and is in its own rights, a respected field of science. In the late 50s the theory of chronobiology stated that certain blood cells varied periodically by number, depending on the time of the day they were drawn from the body. From research, stimulated by this theory, scientists found that rather than performing at a study rate we are sometimes accelerating, sometimes slow down. We achieve peak efficiency for only a limited time each day (*Jim Crakes* 1986) [3]. Life as we know it evolved on a planet that rotates on its polar axis every 23 hour 56 minutes and 4 seconds, to provide a durinal cycle of day and night while it revolves around the sun once in 365.25 days to create a progression of a seasons. At the same time the more complicated movement of the moon in relation to earth and sun produces our lunar month and the tidal cycles. The rotation of the earth produces continuous alternation of light and darkness. Around it our sleeping, walking and all our highly complex social lives are organized. So, early in the evolution the activity of individual cell begin to respond to the powerful and repetitive day and night cues (*Farrester Ed* 1985) [4]. Seasonal reappearance of biological processes (Phenology) and its connection to environmental change is known as being of key scientific and public concern, but its current study largely overlooks the level to which Phenology is based on biological promptness mechanisms. Climate change and urbanization are used as essential examples of anthropogenic influences that put biological timing systems under pressure. They further investigated that consideration of Homo sapiens as predominantly a 'seasonal animal' can inspire new perspectives for understanding medical and psychological problems (*Helm et al.*, 2013) [5]. The study of

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biological rhythms fall in the sphere of Chronobiology, which is relatively new multidisciplinary branch of life science that examines periodic (cyclic) phenomenon in living organisms and their adaptation to rhythms in the geophysical realm (*Jha and Bapat*, 2004) [6].

Materials and Methods

One hundred and twenty 120 male college students were selected randomly from the 4 different colleges located at 4 different altitude levels of Kashmir valley. The age of the selected subjects were ranged from 18 to 23 years. To attain the purpose of the study, B.M.I and Body Fat were measured from the college students of different altitudes. The subjects were tested on selected variables such as B.M.I (Body mass index) evaluated by Wt/Ht^2 and Body Fat measured by Skin fold caliper. The procedures of conducted tests were discussed with the subjects in the presence of the physical training instructor of their respective colleges. The analysis of the data was done by applying analysis of variance (ANOVA) and Scheffe's post hoc test by SPSS software. The level of significance was fixed at 0.05 in all cases.

Statistical technique

The investigation of the Present study was statistically analyzed by applying ANOVA test and Scheffe's post hoc test for mean difference between the college students of different districts. By applying these tests the Investigator would find the significant difference on the selected physiological variables among Kashmir collegiate students.

Variables and tests

Selection of variables, tools and their measurements

S. No	Variables	Tests/equipments	Unit of measures
1	B.M.I	Wt/Ht^2	Kg/m^2
2	Body Fat	Skin fold caliper	Percentage (%)

Results

Table 1: indicates the B.M.I of selected college students of Kashmir valley. The Mean and S.D values of college students of Altitude /District Baramulla were 20.91and 1.93, for Srinagar 21.99 and 2.41, for Kulgam 20.49 and 2.00, and for Shopian 21.85 and 2.87. It is also clear from the above table that obtained "f" value is greater than the table value (2.69) which is required for significant at 0.05 levels with df 3 and 116. Hence the result shows that among the four Altitudes / districts significant difference were found on B.M.I of college students. To find out the paired mean difference Scheffe's post hoc test were applied and the results are presented in table. Table 2: indicates that paired mean difference between Baramulla, Srinagar, Kulgam and Shopian Altitudes / Districts of college students on B.M.I. The Mean differences between all Altitudes / Districts were found significant at 0.05 level of confidence.

Table 3: indicates the Body fat of selected college students of Kashmir valley. The Mean and S.D values of college students of Altitude /District Baramulla were 15.30 and 2.64, for Srinagar 16.06 and 3.21, for Kulgam 15.14 and 3.38, and for Shopian 18.17 and 4.31. It is also clear from the above table that obtained "f" value is greater than the table value (2.69) which is required for significant at 0.05 levels with df 3 and 116. Hence the result shows that among the four Altitudes / Districts significant difference were found on Body fat of college students. To find out the paired mean difference Scheffe's post hoc test were applied and the results are presented in table.

Table 4: indicates that paired mean difference between Baramulla, Srinagar, Kulgam and Shopian districts of college students on Hand reaction time. The Mean differences between all Altitudes / Districts were found significant at 0.05 level of confidence.

Discussion

The present study was conducted on physiological variables of Kashmir collegiate students at four different altitudes and different seasons. In this study the Investigator has conducted the study on B.M.I (Body Mass Index) and hand Body fat on college students. The study shows significant difference at 0.05 level of significance which is clearly shown in table 1 and 2 of the table value (2.69) which is less than the calculated "f" value (2.90) and (4.91) The Investigator has also analyzed the data with the Scheffe's post hoc test to see the mean difference in-between the four Altitudes / districts of Kashmir valley. The mean difference of the 4 Altitudes / districts found also significant.

B.M.I

The mean, standard deviation and "f" value of B.M.I of college students of four different Altitudes / Districts of Kashmir valley, which is shown in the given below table.

Table 1: ANOVA of college students of different Altitudes / Districts on (B.M.I)

Altitudes / Districts	Mean	S.D	SOV	S.S	df	M.S	f
Baramulla	20.91	1.93	BG	47.58	3	15.861	2.90*
Srinagar	21.99	2.41					
Kulgam	20.49	2.00	WG	634.20	116	5.467	
Shopian	21.85	2.87					

*significant at 0.05 level of confidence

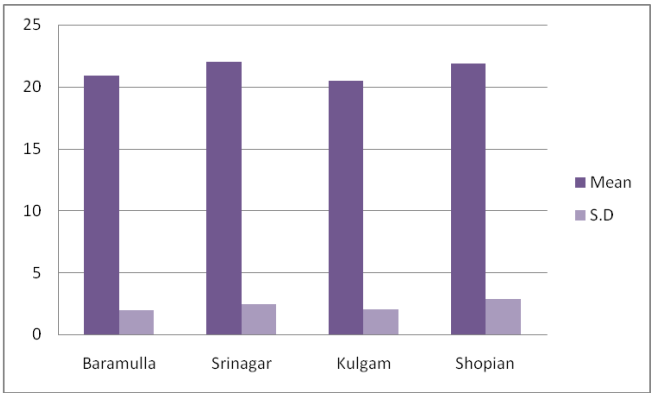

Fig 1

rhythms that underlie phenology: *biological time-keeping meets environmental change." Proceedings of the Royal Society B: Biological Sciences 280, no. 1765 (2013): 20130016.*

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Table 2: Scheffe's post hoc test for Mean difference of four different Altitudes / District of Kashmir valley college students on B.M.I

Variable	Altitudes / Districts vs Altitudes / Districts	Mean Difference	Std. Error	Sig.
B.M.I	Baramulla vs Srinagar	1.077	0.603	0.077
	Baramulla vs Kulgam	0.425	0.603	0.483
	Baramulla vs Shopian	.935	0.603	0.124
	Srinagar vs Kulgam	1.502	0.603	0.014
	Srinagar vs Shopian	0.142	0.603	0.814
	Kulgam vs Shopian	1.360	0.603	0.026

*significant at 0.05 level of confidence

Body Fat

The mean, standard deviation and "f" value of Body fat of college students of four different Altitudes / Districts of Kashmir valley, which is shown in the given below table.

Table 3: ANOVA of college students of different Altitudes / Districts on Body fat

Altitudes / Districts	Mean	S.D	SOV	S.S	df	M.S	f
Baramulla	15.30	2.64	BG	174.87	3	58.291	4.91*
Srinagar	16.06	3.21					
Kulgam	15.14	3.38	WG	1376.35	116	11.865	
Shopian	18.17	4.31					

*significant at 0.05 level of confidence

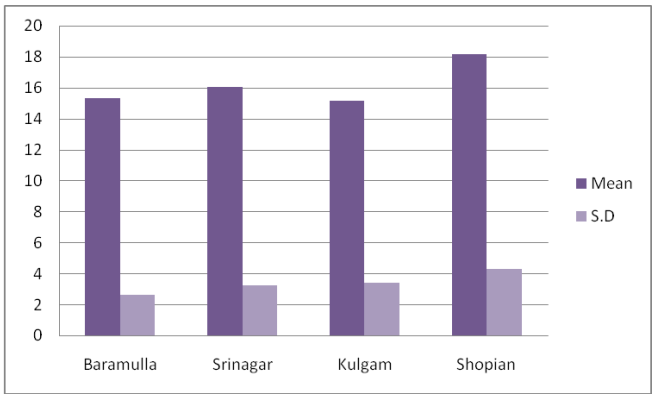

Fig 2

Table 4: Scheffe's post hoc test for Mean difference of four different Altitudes / Districts of Kashmir valley college students on Body fat

Variable	Altitudes / Districts vs Altitudes / Districts	Mean Difference	Std. Error	Sig.
Body Fat	Baramulla vs Srinagar	.748	0.883	0.402
	Baramulla vs Kulgam	0.161	0.883	0.856
	Baramulla vs Shopian	2.868	0.883	0.002
	Srinagar vs Kulgam	0.910	0.883	0.308
	Srinagar vs Shopian	2.119	0.883	0.019
	Kulgam vs Shopian	3.030	0.883	0.001

*significant at 0.05 level of confidence

Conclusion

It was conclude that the physiological parameters Body Mass Index and Body fat of college students might be appropriate to generalize the fitness and development of the college student. On the basis of the practical world college students should be given an important way of physiological techniques for the development of physical well-being of our generations for promoting the physical education in better and proper way to the worldwide.

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