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## Comparative study of bio-rhythmic variation in selected physical fitness components of baseball players

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### Abstract

The main purpose of study is to investigate the effect of bio-rhythmic variation on selected physical fitness components of baseball players. For the present study subjects was selected from Degree College of Physical education, Amravati, for the collection of data. 15 male baseball players were selected as subject. The subjects for the study were those who represented inter-collegiate tournament of S.G.B. Amravati. The age of the subject was ranging from 18 to 25 years. Purposive sampling (SRS) method was adopted for the selection of 15 players. The data pertaining to the selected physical fitness components i.e. speed, co-ordination, flexibility and explosive strength were examined by using one way analysis of variance (F-test) to find out the significant difference among the performance at four different timing of a day. When the difference was found significant the LSD post-hoc test was applied to assess the paired mean difference among the different timings. To find out the effect of bio-rhythmic variation of the selected physical fitness components of baseball players the level of significance was set at 0.05 level of confidence.

**Keywords:** bio-rhythmic variation, physical fitness speed, co-ordination, flexibility and explosive strength, baseball

### Introduction

Physical fitness is a state of general well-being, physically sound and healthy, along with mental stability. It is the capacity of the person to meet the physical demands of daily life and carry out the day's activities without undue fatigue. Physical fitness is considered a measure of the body's ability to function efficiently and effectively in work and leisure activities, to be healthy, to resist hypo-kinetic diseases, and to meet emergency situations. Fitness has a great importance and its significance increased day by day. Every person has different level of fitness which may change with time, place, work or situation. So fitness got attached to it. The performance in most of the sports is determined by three factors namely physical fitness, technique and tactics. Lack of knowledge about physical fitness is an important cause of relatively poor performance of our sportsmen in the international competitions.

### Methodology

The main purpose of study is to investigate the effect of bio-rhythmic variation on selected physical fitness components of baseball players. On the basis of literatures reviewed, available research findings and on scholars own understanding it was hypothesized that.

1. There would be significant difference in the variable of speed due to Bio-rhythmic variation
2. There would be significant difference in eye-hand co-ordination due to Bio-rhythmic variation.
3. There would be significant difference in trunk flexibility due to Bio-rhythmic variation.
4. There would be significant difference due to Bio-rhythmic variation on explosive leg strength.

### Sources of Data

The subjects for data collection were selected from male inter-collegiate baseball players of Degree College of Physical education, Amravati, hence the afore stated college was source of data.

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**Selection of Subject**

15 male baseball players were selected as subject. The subjects for the study were those who represented inter-collegiate tournament of S.G.B. Amravati. The age of the subject was ranging from 18 to 25 years.

**Sampling Procedure**

Purposive sampling (SRS) method was adopted for the selection of 15 players.

**Selection of Variables**

Following fitness variation were chosen for this study.

- a. Speed
- b. Eye hand Co-ordination
- c. Trunk Flexibility
- d. Explosive Strength

**Criterion Measures**

- 1. To test the formulated hypothesis the following test and criterion measure was chosen
- 2. To check the speed 50 meter dash was applied and the score was recorded in seconds.
- 3. By using Eye-hand Co-ordination test co-ordination was measured and the scores was recorded in seconds
- 4. To measure flexibility trunk flexibility, Modified Sit and Reach test was used and the measurement was recorded in centimeter.
- 5. To measure explosive leg strength and the measurement was taken in centimeter.

**Administration of Test**

**50 meters dash**

**Purpose:** To measure the acceleration speed of the subject.

**Equipment**

Stop watches, measuring tape, clapper etc.

**Procedure**

Three subjects started at a time on sound of clapper they ran a distance of 50meters. The time taken by each subject to complete the distance was recorded with the help of a stop watch. Two trials was given with some rest in between.

**Scoring**

The best time out of three trials to the nearest 1/100<sup>th</sup> of a second was recorded as final score.

**Eye- Hand Co-ordination Test**

To measure the co-ordination in between Eye- and hand

**Equipments**

A stop watch, floor play area painted black to indicated foot placement pattern with foot prints about 12 to 15 inches apart.

**Test Administration**

The subject was asked to stand in the middle of two boxes

laying at a distance of 15 feet from each other and 10 balls were put in the box lying on the left hand side of the subject. On the command ready, steady go the subject started ran to the box on his left, taken out one ball, ran to the right box put the ball in the box, ran back to the left box to take another and repeated the process till the last ball was dropped in the right box. The subject was given two trials after a slow practice trail.

**Scoring**

Out two trials the best timing was recorded in seconds as the score of the test.

**Modified Sit and Reach**

**Purpose:** To measure trunk flexibility (hip and back)

**Procedure**

The subject was asked to assume assumed a sitting position on floor keeping knees fully extended and the feet against bench. Subject was asked to flex trunk four times with arms fully extended and hands on the top of each other. In his last attempt he was asked to have his position for 1 second as to take measurement.

**Standing Broad Jump**

**Purpose:** To measure Explosive leg strength of the subject.

**Equipments**

A mat, measuring tape, chalk etc.

**Procedure**

Subject was asked to stand on the feet parallel to each other and behind the starting mark. The subject then bended his knees and swang his arms and jumped as forward as possible.

**Scoring**

The distance between the starting line and nearest point upon landing was recorded in centimeter as the score. Three trials were permitted and the score of the best trial was recorded as the score.

**Statistical Analysis and Interpretation of Data**

The data pertaining to the selected physical fitness components i.e. speed, co-ordination, flexibility and explosive strength were examined by using one way analysis of variance (F-test) to find out the significant difference among the performance at four different timing of a day When the difference was found significant the LSD post-hoc test was applied to assess the paired mean difference among the different timings.

**Finding of the study**

Findings pertaining to the bio-rhythmic variation on selected physical fitness test i.e. 50 meter dash, eye hand co-ordination, sit & reach and standing broad jump are presented in the tables given below:-

**Table 1:** Summary of One Way Analysis Of Variance For. The Data on 50 Meter Dash Performance Due To Bio-Rhythmic Variation

Source of variance	Degree of Freedom	Sum of Square	Mean Sum of Square	F-ratio
Between the groups	K-1 4-1= 3	1.29	0.43	1.79@
Within the group	N-K 60-4= 56	0.24	0.24	

\* significant at 0.05 level. Tabulated  $F_{.05 (3, 56)} = 2.772$

The analysis of data from table –1 shows that there is no significant difference in 50 meter dash performance at 0.05 level of confidence. as the calculated F value of 1. 79 is lesser

than the tabulated F value of 2.772 at 0.05 level of confidence for the 3/ 56 degree of freedom since the F-ratio is found to be insignificant, hence the post Hoc test is not applied.

**Table 2:** Summary of Analysis Of Variance on Eye Hand Coordination

Source of variance	Degree of Freedom	Sum of Square	Mean Sum of Square	F. ratio
Between the group	K-1 4-1= 3	14. 14	4.80	2.63@
Within the groups	N-K 60-4= 56	102.04	1.82	

@significant at 0.05 level, Tabulated  $F_{0.05(3, 56)} = 2.772$

Findings of table- 2 shows insignificant difference at 0.05 level of confidence in eye hand coordination, as the F- value of 2.63 is lesser than the tabulated F- value of 2.772 at 0. 05

level of confidence for the 3/56 degree of freedom. Since the obtained F ratio is found to be insignificant hence, the Post Hoc test is not applied

**Table 3:** Summary of Analysis Of Variance on Modified Sit and Reach Test

Source of variance	Degree of Freedom	Sum of Square	Mean Sum of Square	F-ratio
Between the group	K-1 4-1=3	275.82	91.94	5.39*
Within the group	N-K 60-4=56	954.48	17.04	

\*significant at 0.05 level, Tabulated  $F_{0.05(3, 56)} = 2.772$

Finding of table -3 shows that there is significant difference in sit & reach test. as the calculated F- value of 5.39 is greater than the tabulated F value of 2.772 at 0.05 level of confidence for the 3/56 degree of freedom .Since the obtained F ratio is

found to be significant hence the Least Significant Difference (L S D) post Hoc test was applied to find out the difference between the paired means and it has been presented in table-3

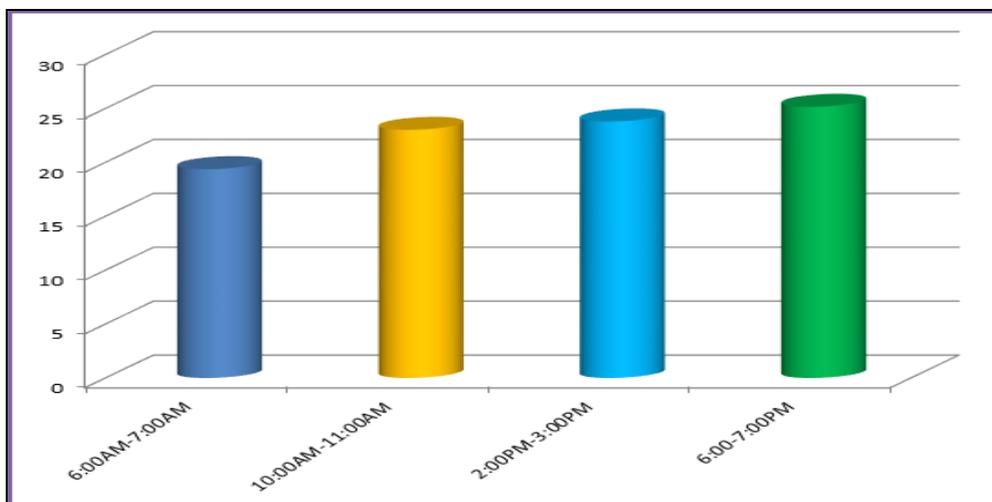
**Table 4:** Difference between the Paired Means for the Sit and Reach Test Performance Due To Bio-Rhythmic Variation

6:00 am 7:00 am	10:00am 11:00am	2:00pm 3:00pm	6:00pm 7:00pm	M.D	C. D
19.37	23.02			3.65*	3.02
19. 37		23.80		4.43*	3.02
19. 37			25.16	5.79*	3.02
	23.02	23.80		0.78	3.02
				2.14	3.02
	23.02		25.16	1.36	3.02
		23.80			
			25.16		

\*significant at .05 level

It is the evident from the table-4 that the mean difference values of 3.65 (6 am to 7 am & 10 am to 11 am), 4.43 (6am to 7am and 2 pm to 3 pm), 5. 79 (6 am to 7 am and 6 pm to 7 pm), are greater than the critical difference value of 3.02 at .05 level. Hence, the highest performance in modified sit and reach test was shown at 6:00pm to 7:00pm and it was followed by 2:00pm to 3:00pm, then 10:00am to 11:00am and least performing was shown at 6:00am to 7am.The table also

shows that there is no significant difference among the means of other timings i.e. 10:00am to 11:00am and 2:00pm to 3:00pm (MD=0.78), 10am to 11am and 6:00pm to 7:00pm (MD= 1.36) as all the above mentioned mean difference values are less than that of critical difference value of 3.02. The ordered mean difference has been shown graphically in Fig.1.



**Fig 1:** Mean Difference of Sit and Reach of Baseball Players Due to Circadian Variation

**Table 5:** Summary of One Way Analysis of Variance for the Data on Standing Broad Jump Performance Due To Bio-Rhythmic Variation

Source of variance	Degree of Freedom	Sum of Square	Mean Sum of Square	F-ratio
Between the group	K-1 4-1=3	0.11	0.039	1.21@
Within the group	N-K 60-4-56	1.83	0.032	

@significant at 0.05 level, Tabulated  $F_{0.05(3, 56)} = 2.772$

Finding of table-3 shows insignificant difference at 0.05 level of confidence in the performance of standing broad jump at the different timing of a day .As the calculated F- value 1.21 is quite less than the tabulated F- value of 2.772 at 0.05 level of confidence for the 3/56 degree of freedom Since the obtained F ratio is found to be insignificant, therefore post Hoc test was not applied.

### Discussion of finding

From the findings of statistical analysis it was clear that only the variable of flexibility showed significant difference due to Bio-rhythmic variation. It was also understand that during 6:00am to 7:00am selected subjects showed significantly lower performance than the other timings of a day i.e. 10:00am to 11:00am, 2:00pm to 3:00pm and 6:00pm to 7:00pm. The significant difference had been shown in the flexibility it may be attributed to the fact that flexibility of an individual depends on mobility of joints, elasticity property of surrounding muscles and ligaments, proper secretion of the synovial fluids. During early morning the joints, muscles, ligaments are not in such condition to felx the body optimally. As the time goes on the person keeps him busy with different activities. The subjects were chosen from the profession college of Education hence all them were bound to attend and perform different sports activities through which circulation of blood increases as a result body temperature as well as elasticity and mobility of the muscles, joints and ligaments also enhance hence such result might have occurred in this study.

### Conclusion

Within the limitations of the present study and on the basis of findings, the following conclusions are drawn:

1. Significant difference was found in the physical fitness of flexibility of baseball players due to Bio-rhythm
2. Insignificant difference was found in 50 meter dash, eye hand coordination and standing broad jump due to Bio-rhythmic variable.
3. It was also observed that baseball players showed best performance in flexibility during 6:00 to 7:00pm.

### Recommendation

1. It is recommended that, Bio-Rhythmic variation effects the performance during 24 hours cycle, hence, training programme should be modified according to the schedule of competition
2. A similar study may be undertaken by selecting different games and different components
3. The same study can be conducted with the female subject.
4. It is recommended that the similar study may be conducted by taking more variable (physical, physiological and psychological)
5. A study may be conducted by involving subject of different level of age and sex other than those used in the present study.

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