

## Effects of Diurnal Variation on Explosive Strength of Active Male and Female Students

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### Abstract

The term Diurnal variation means daily variation or variation within 24 hours of a day. The relative term of 'Diurnal' is 'Circadian'. It comes from Latin word 'Circadian' which means "about a day". The purpose of the present Study was to observe the effect of Diurnal variation on Vertical Jump for leg explosive strength of university level male and female. 13 male and 08 female students age ranging from 22-26 years of B.P.Ed students were selected randomly as the subject of the present study. The grip strength of the subject were measured using standard procedure as referred by Nelson & Johnson in 1982. The age, height and weight of the subject were taken as personal data and the grip strength of both left and right hand was taken 6 times from morning 6.00 am to evening 9.00 pm in each three hours gap in between but due to inconvenience female students, they could not take part at 9.00 pm test. There is no significance difference between highest score and lowest score of Vertical Jump for male subjects. There is no significance difference between highest score and lowest score of Vertical Jump for Female subjects.

**KEYWORDS:** Diurnal, Vertical Jump, Active, Male, Female

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### Introduction

The term Diurnal variation means daily variation or variation within 24 hours of a day. The relative term of 'Diurnal' is 'Circadian'. It comes from Latin word 'Circadian' which means "about a day". The body maintains many cyclic mechanisms throughout a day like the daily rise and fall of body temperature or the tidal ebb and flow of the cortical steroid secretion when produces other effects upon the metabolic system. Body mechanisms adopt at varying rates to time changes. Some, like protein metabolism, adjust immediately. Whereas others take time, like the rise and fall of body temperature, which takes about 8 days, others, such as the adrenal hormones which may take as long as 3 weeks. Even intellectual proficiency or the ability to think clearly is Cyclical in nature. Younger individuals adjust more rapidly to time zone changes than do older people although the differences are not great.

In recent years this diurnal variation of the working efficiency of the different aspects of individuals has become the focus of attention to the researchers. In the field of games and sports this new area of investigation has also been given due emphasis. As jet power has made it possible to travel thousand of miles in just a few hours, the athletes and athletic teams are now quickly transported from one end of the country to the other and to foreign lands. So, they are being very much experienced with some particular physiological stress resulting for circadian dysrhythmia and this reflects a de-synchronization of one's biological and biophysical time clock. In organizing intercontinental championship,

world championship, Olympic games etc. The athletes are forced to participate in high level competitions in different times other than their usual times of practices and training as a result of changes of times in different continents due to the diurnal motion of the earth and of the organizational inconveniences.

Muscle strength is the maximum voluntary force that a muscle or muscle group can exert in one single contraction under a given set of circumstances. Because there is a vital protective mechanism housed in the central nervous system that normally prevents the body's muscles from achieving actual maximum muscle contraction, the terms "voluntary" and "under a given set of circumstances" are necessary for a complete and correct definition and understanding of strength. Incidentally, this CNS protective mechanism is vital to you, without it actual maximum muscle contraction would cause great damage. Strength is effected by many factors for example age, sex, temperature, season of the year, psychological factors etc. Similarly diurnal variation is one of the important factor which effects performance. Wright(1959) conducted some elaborate study relating to strength and diurnal variation. He has shown a remarkable variation in grip strength in time of the day. Farther he has shown the relationship between the diurnal variation of strength and oral body temperature. On the other hand Tornvall (1963) reported that variability in strength with time of day is not applicable to all muscles of the body. It is possible there are differences from muscles to muscles. Hettinger & Muller (1955) have shown a remarkable variation in strength gain with seasonal variation. They found minimum in January – February and maximum in September – October. Diurnal variation related to strength has been noticed by the researcher and in all probability. It is related to Bio-rhythms and changes in body temperature. In the present project the investigator intended to look into this aspect that is diurnal variation in-respect of strength, particularly to physical education trainee student who generally remain active throughout the year.

### **Purpose of the study**

The purpose of the present Study was to observe the effect of Diurnal variation on Vertical Jump for leg explosive strength of university level male and female.

### **METHODOLOGY**

#### **The Subject**

13 male and 08 female students age ranging from 22-26 years of B.P.Ed standard were selected randomly as the subject of the present study.

#### **Procedure of Data Collection**

The age, height and weight of the subjects were taken as personal data and the vertical jump test was taken 6 times from morning 6.00 am to evening 9.00 pm in each three hours gap in between but due to inconvenience of female students, they could not take part at 9.00 pm test. The Vertical jump of the subject were measured using standard procedure as referred by Nelson & Johnson in 1982, page no.210.

### Statistical analysis

After collecting data the following statistical calculation were drawn such as mean , standard deviation , critical value , T – test score to reach into result and conclusion.

### Result and Discussion

The personal data were presented in table No. 01

**Table No. 01**

**Personal data of the subjects**

Subjects		Age(years)	Height(cm)	Weight(kg)
Male	Mean	23.77	168.15	60.46
	S.D	1.05	7.17	3.17
Female	Mean	23.25	151.88	45.00
	S.D	1.20	6.13	3.46

The mean age, height & weight of the male subjects were 23.77, 168.15 & 60.46 respectively and for female 23.25, 151.88 & 45.00 respectively. And the S.D of age, height & weight for male subjects were 1.05, 7.17 & 3.17 respectively and the S.D of age, height & weight for female subjects were 1.20, 6.13 & 3.46 respectively.

### Vertical Jump for Male Subjects

The Mean & S.D of vertical jump for the male subjects of 6 different times i.e , 6.00 am to 9.00 pm were presented in table No. 02

**Table No. 02**

**Mean & S.D of Vertical jump scores (cm.) of male subjects during various time of the day**

Subjects		6.00 am	9.00 pm	12.00 noon	3.00 pm	6.00 pm	9.00 pm
Male	Mean	48.38	15.92	52.69	54.38	54.31	51.92
	S.D	8.45	7.23	8.43	8.07	8.03	7.84

It appears from the table that the mean value of Vertical jump of male subjects at 6.00 am to 9.00 pm were 48.38, 15.92, 52.69, 54.38, 54.31 & 51.92 respectively and the S.D were 8.45, 7.23, 8.43, 8.07, 8.03 & 7.84 respectively.

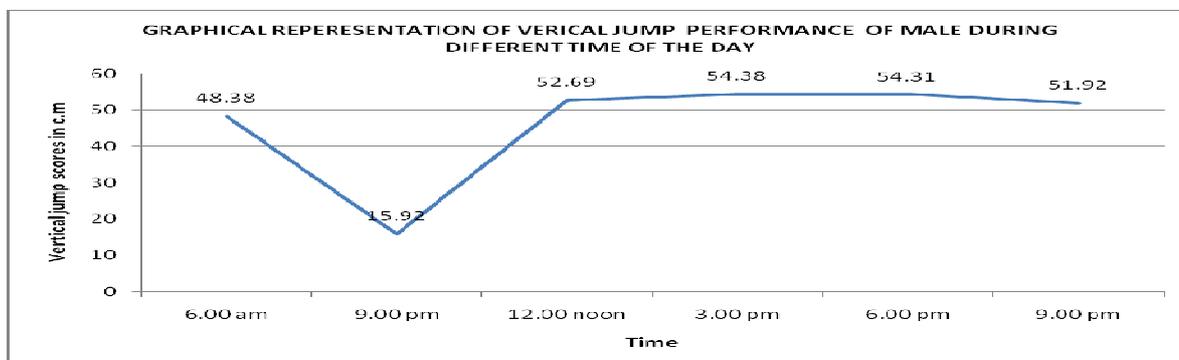
It appears from the mean value of vertical jump at different time trial that there was some difference exist between lowest & highest score. To observe the significant difference ‘t’ value calculated and presented in table no. 03.

**Table No. 03**

**Comparison between highest and lowest scores (6.00 am & 3.00 pm ) of Vertical jump (cm.)**

Subjects	Lowest score at 6.00 am	Highest score at 3.00 pm	% of Variation	't' test score	Critical Value (at 0.05 level)	Level of Significant
Male (N = 13) Vertical jump(cm.)	48.38	54.38	12.40	1.78	2.06	NS

It appears from the table no. 03 that the 't' value between highest score and lowest score of Vertical jump was 1.78 which was not significant



**Vertical Jump for Female Subjects**

The Mean & S.D of Vertical jump for the female subjects of 5 different times i.e , 6.00 am to 6.00 pm were presented in table No. 04

**Table No. 04**

**Mean & S.D of Vertical jump scores ( cm.) of female subjects during various time of the day**

Subjects		6.00 am	9.00 pm	12.00 noon	3.00 pm	6.00 pm
Female	Mean	34.75	37.38	37.63	38.13	39.13
	S.D	4.60	3.64	4.66	5.41	6.90

It appears from the table no. 04, the mean value of Vertical jump of female subjects at 6.00 am to 6.00 pm were 34.75, 37.38, 37.63, 38.13 & 39.13 respectively and S.D were 4.60, 3.64, 4.66, 5.41 & 6.90 respectively.

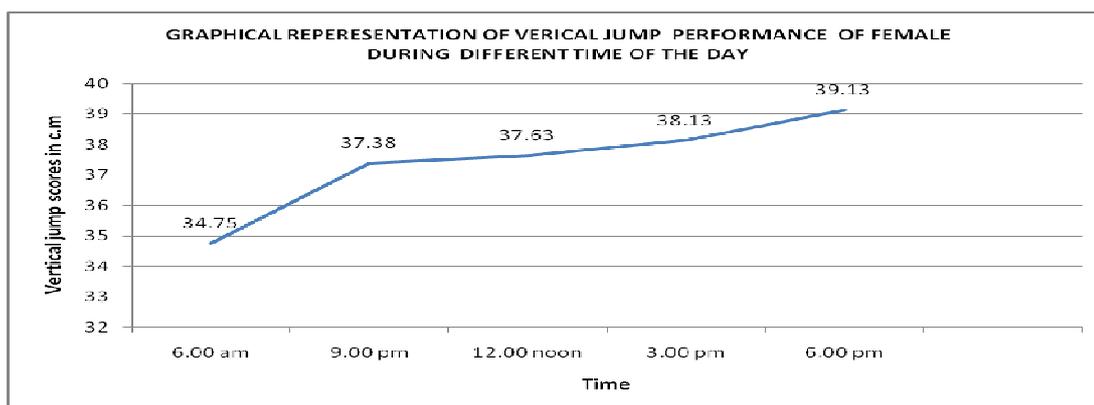
It appears from the mean value of Vertical jump at different time trial that there were some difference exist between lowest and highest score. To observe the significant difference ‘t’ value calculated and presented in table no. 05.

**Table No. 05**

**Comparison between highest and lowest scores (6.00 am & 6.00 pm ) of Vertical jump ( cm.).**

Subjects	Lowest score at 6.00 am	Highest score at 6.00 pm	% of Variation	‘t’ test score	Critical Value (at 0.05 level)	Level of Significant
Female (N = 08) Vertical jump(cm.)	34.75	39.13	12.60	1.78	2.14	NS

It appears from the table no. 05 that the ‘t’ value between highest score and lowest score of Vertical jump was found as 1.78 which was not significant.



## CONCLUSION

- 1) There is no significance difference between highest score and lowest score of Vertical Jump for male subjects.
- 2) There is no significance difference between highest score and lowest score of Vertical Jump for Female subjects.

## References

- 1) Kansal K. Devinder, (2012), “ Test Measurement And Evaluation” , SSS publication, New Delhi.
- 2) Singh Hardayal, (1991), “Science of Sports Training”, D. V. S publication, New Delhi.
- 3) Sidhu Singh Kulbir, (2011) “Methodology of Research in Education”, Sterling publication ,New Delhi.

- 4) GHOSH A, BOSE K, CHAUDHURI AB, J R Soc Health, 120 (2) (2000) 100.
- 5) WHO TECHNICALREPORT SERIES Physical Status The Use and Interpretation of Anthropometry (World Health Organisation, Geneva).  
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- 6) GUYTONAC Text Book of Medical Physiology (W.B. Saunders Co., Philadelphia, 1981).—25.
- 7)GANONG WF, Review of Medical Physiology (LANGE Medical Publications, California, 1981).