

Effects of Diurnal Variation on Grip Strength of Active Male and Female Students

Madhab Chandra Ghosh

Associate Professor, Dept. of Physical Education, University of Kalyani, Nadia, West Bengal, India

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 grip 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 Right hand Grip strength for male subjects. There is no significance difference between highest score and lowest score of Left hand Grip strength for male subjects. There is no significance difference between highest score and lowest score of Right hand Grip strength for Female subjects. There is no significance difference between highest score and lowest score of Left hand Grip strength for Female subjects.

KEYWORDS: Diurnal, Grip Strength Active, Male, Female

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 grip 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 students were selected randomly as the subject of the present study.

Criterion Measures:

The grip strength of the subject were measured using standard procedure as referred by Nelson & Johnson in 1982.

Procedure of Data Collection

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.

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

Subject		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.

Grip Sstrength for Male Subjects

The Mean & S.D of Right hand grip strength and Left hand grip strength 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 Grip strength scores (kg) 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(Right hand)	Mean	28.46	29.46	29.92	31.00	31.69	30.00
	S.D	5.35	5.26	5.25	5.38	4.98	3.61
Male(Left hand)	Mean	27.54	27.92	28.08	28.69	29.00	27.85
	S.D	7.50	7.57	6.91	7.22	7.35	7.11

It appears from the table that the mean value of Right hand grip strength of male subjects at 6.00 am to 9.00 pm were 28.46, 29.46, 29.92, 31.00, 31.69 & 30.00 respectively and the S.D were 5.35, 5.26, 5.25, 5.38, 4.98 & 3.61 respectively. And the mean value of Left hand grip strength of male subjects at 6.00 am to 9.00 pm were 27.54, 27.92, 28.08, 28.69, 29.00 & 27.85 respectively and the S.D were 7.50, 7.57, 6.91, 7.22, 7.35 & 7.11 respectively.

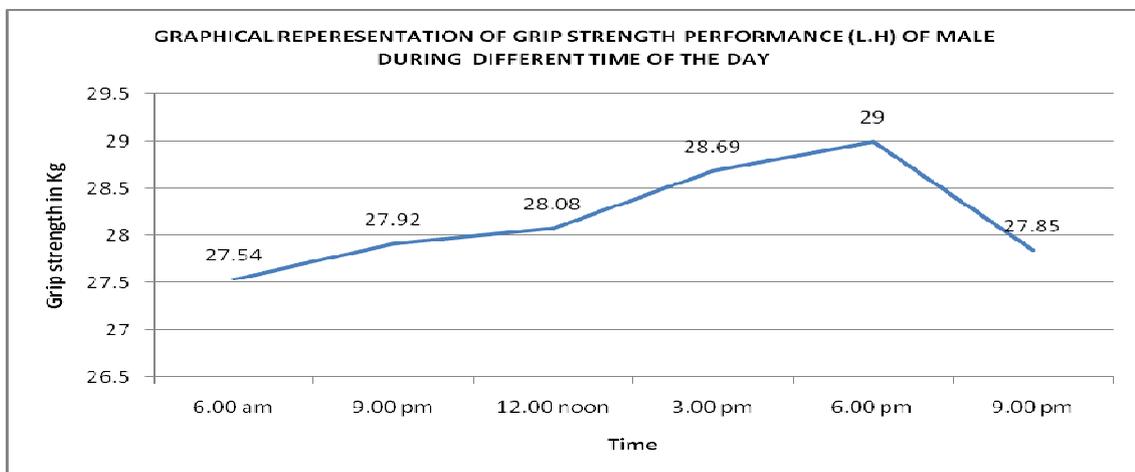
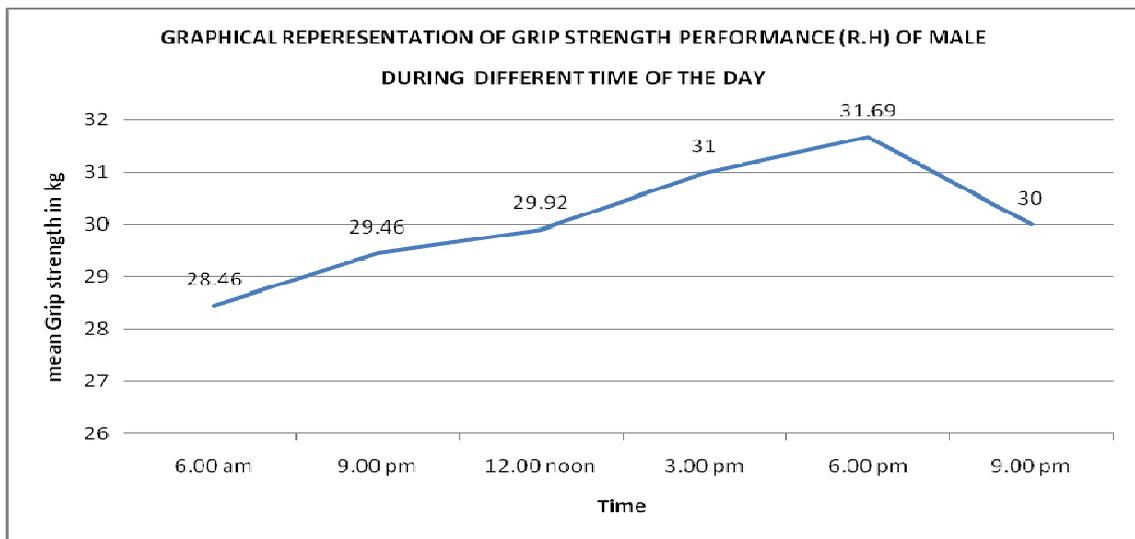
It appears from the mean value of Right hand grip strength at different time trial that there were some difference exist between lowest & highest score. To observe the significant difference 't' value calculated and presented in table no. 03.

Table No. 03

Comparison between highest and lowest scores (6.00 am & 6.00 pm) of Grip Strength (kg) of both hand

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 Significance
Male (N = 13)	Right hand	28.46	31.69	11.34	1.53	2.06	NS
	Left hand	27.54	29.00	5.30	0.48	2.06	NS

It appears from the table no. 03 that the 't' value between highest score and lowest score of Right hand grip strength was 1.53 which was not significant as well as the 't' value between highest and lowest score for left hand grip strength was 0.48 which was also not significant. On the other hand in case of female subject the 't' value between highest and lowest score of Right hand grip strength and Left hand grip strength were found as 0.95 and 1.62 respectively which were also not significant.



Grip Strength for Female Subjects

The Mean & S.D of Right hand grip strength and Left hand grip strength 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 Grip strength scores (kg) 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 (Right hand)	Mean	16.38	16.75	16.88	18.38	18.38
	S.D	4.21	4.02	3.84	3.67	3.64
Female (Left hand)	Mean	14.00	14.13	14.5	15.88	16.5
	S.D	2.96	2.98	3.12	2.67	2.78

It appears from the table no. 04, the mean value of Right hand grip strength of female subjects at 6.00 am to 6.00 pm were 16.38, 16.75, 16.88, 18.38 & 18.38 respectively and S.D were 4.21, 4.02, 3.84, 3.67 & 3.64 respectively. And the mean value of Left hand grip strength of female subjects at 6.00 am to 6.00 pm were 14.00, 14.13, 14.5, 15.88 & 16.5 and S. D were 2.96, 2.98, 3.12, 2.67 & 2.78 respectively.

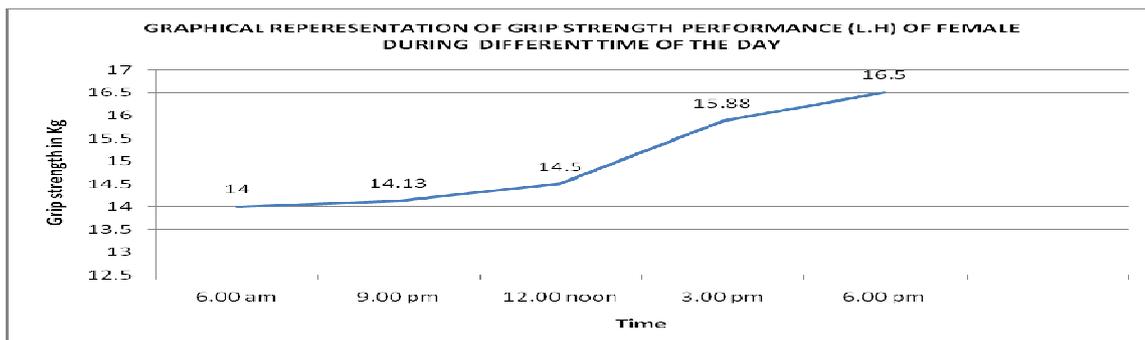
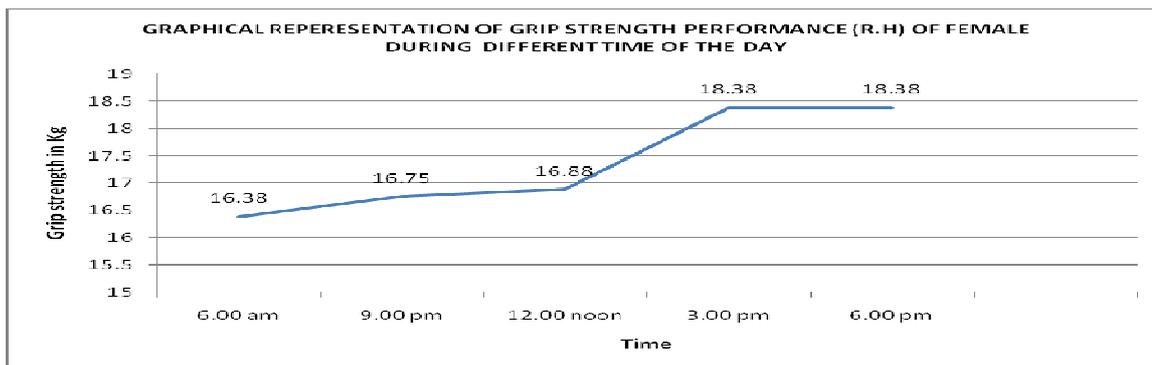
It appears from the mean value of Right & Left hand grip strength at different time trial that there were some difference exist between lowest and highest score. To observe the significant difference 't' value calculated and presented in table no. 05.

Table No. 05

Comparison between highest and lowest scores (6.00 am & 6.00 pm) of Grip Strength (kg) of both hand

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 Significance
Female hand (N = 08)	Right	16.38	18.38	12.21	0.95	2.14	NS
	Left hand	14.00	16.50	17.85	1.62	2.14	NS

It appears from the table no. 05 that the 't' value between highest score and lowest score of Right hand grip strength was 0.95 which was not significant as well as the 't' value between highest and lowest score for left hand grip strength was 1.62 which was also not significant.



CONCLUSION

- 1) There is no significance difference between highest score and lowest score of Right hand Grip strength for male subjects.
- 2) There is no significance difference between highest score and lowest score of Left hand Grip strength for male subjects.
- 3) There is no significance difference between highest score and lowest score of Right hand Grip strength for Female subjects.
- 4) There is no significance difference between highest score and lowest score of Left hand Grip strength for Female subjects.

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