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Assessment of the Relationship between the Standing Height and the Hip Joint Flexion Angle in Loaded Hip Thrust

Harpreet Singh*, Dr. Vijay Kumar, Dr. Dinesh P. Sharma*****
*Professional Physical Educationist, Preparing For Higher Studies
**Assistant professor, Deshbandhu College, University of Delhi, Kalkaji, New Delhi
***Associate Professor, IGIPESS, University of Delhi, B –Block Vikaspuri, New Delhi.
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Abstract

The aim of the present study was to assess the nature and degree of the relationship between the standing height and the hip joint flexion angle attained in the loaded hip thrust.16 male subjects, with age ranging from 17-22 year, from IGIPESS with intercollegiate sports participation had been randomly selected for the study. the selected variables for the study were: Standing height(SH)(in centimeters), Maximum Hip flexion Angle Per Repetition(MHFAR)(in degrees) and Maximum Hip flexion angle(MHFA)(in degrees).For the measurement of MHFAR, each subject performed a loaded hip thrust exercise with 85% of 1RM(calculated via Boyd Epley's formula) for four repetitions. The two dimensional video data of each subject's performance was recorded using a digital video camera.MHFA was calculated after the collection of video data and from the data of MHFAR. The video data was analyzed via using the KINOVEA 0.8.25 software and Statistical analysis was carried out using IBM SPSS v.22 for the selected variables. For the statistical analysis, tools of descriptive statistics namely, mean and standard deviation was used for each selected variable and the relationship between SH and MHFA was determined by using Pearson's product moment correlation coefficient. The strength of correlation was determined by using guidelines given by Evans(1996).A statistically significant correlation was found between the variables ,namely, Standing Height(SH) and Maximum Hip Flexion angle(MHFA) at loaded hip thrust with r= -0.551 and p(one tailed)<0.05. According to the strength rating suggested by Evans (1996), a negative moderate correlation was found between the Standing Height (SH) and Maximum Hip Flexion angle (MHFA) at the loaded hip thrust.

INTRODUCTION

Every athlete trains thighs and calf muscles but they forget the about most important muscle group that is gluteus, when it comes to training specifically for lower extremities. To maximize hip extension, there are a lot of exercises but athletes only perform exercises that improve leg strength like leg press or squats. When we load the leg press machine with a bunch of 45kg plates or do squats half way down, which is as far as people go when their thighs are parallel to the ground, we aren't fully engaging our gluteus. It may look cool to lift all that weight, but they don't have major significance as gluteus aren't doing all of the work they could be or should be.

For training of gluteus maximus basically 3 major exercises are performed:-

- **Hip thrust**
- **Gluteus bridge**
- **Frog pump**

But among these 3 the hip thrust is superior as:

- Muscles involved in hip thrust are: - primary hip extensors (gluteus maximus, hamstrings, and hamstring part of adductor magnus), secondary hip extensors (adductors and posterior fibers of gluteus medius and gluteus minimus), posterior vertebral stabilizers (erector spinae), and knee extensors (rectus femoris and vasti muscles).
- The primary benefit of the hip thrust compared to the glute bridge and frog pump is the extended range of motion. Elevating your shoulders creates a unique body angle that maximizes glute activation.
- The PEAK activation point of glute tension is at the top of the movement when the hips are fully extended and parallel to the shoulders.[1]

Despite being the superior exercise, Bret Contreras (2011) haven't mentioned about the effect of bench height with respect to height of the subject and kept the height constant for everyone[2]

Objectives

The study had following objectives:

1) To assess the degree of the relationship between the standing height of a subject with the hip flexion angle attained in the loaded hip thrust.
2) To assess the nature of the relationship between the standing height of a subject with the hip flexion angle attained in the loaded hip thrust.

PROCEDURE AND METHODOLOGY

Sample Selection

16 male subjects (aging 17-22) from IGIPESS with intercollegiate sports participation had been randomly selected for the study and all of them were conversant with the Hip thrust exercise.

Variables of the Study

The measurements of the subjects were recorded for the variables presented in the table no.1.

Variable of the Study

S.no	Variable	Abbreviation	Unit Of Measurement
1	Standing Height	SH	Centimeters
2	Maximum Hip flexion Angle Per Repetition	MHFAR	Degrees
3	Maximum Hip flexion Angle	MHFA	Degrees

Data Collection

SH was measured by using the Anthropometric Rod.

For the measurement of MHFAR each subject was instructed to perform a loaded hip thrust exercise with 85% of their 1 RM(calculated via Boyd Epley's Formula for 1 RM Calculation[3])

[1] http://csaaielynnlambert.com/what-the -difference-hip-thrust-vs-glute-bridge-vs-frog-pump/.(as retained on march 2, 2018)

[2] Contreras, Bret, et, al (2011). Barbell hip thrust, strength and conditioning journal, volume 33(5),58-61.

for four repetitions. The hip joint, knee joint and acromian process of the shoulder joint was marked for measuring the angle of hip flexion. Angle of hip flexion of each was measured and recorded.

The two dimensional video data of each subject's performance of exercise was recorded using a digital video camera.

MHFA was calculated after the collection video data as it is the mean of all the MHFAR recorded from all the repetitions and the subjects.

Analysis of Data

The video data was analyzed for the selected pertinent variables using KINOVEA 0.8.25 software for 2D analysis.

Statistical Analysis

For the Statistical analysis, IBM SPSS v.22 was used.

For the initial analysis, the tests of descriptive statistics, namely, measure of central tendency (mean) and Standard Deviation were calculated for each selected variable.

To assess the relationship between the SH and MHFA, Pearson's product moment correlation coefficient was calculated between these variables and to test the significance of the correlation, one tailed test of significance was applied at a significance level of 0.05.

After the determination of correlation coefficient of the selected variables, the guidelines suggested by Evans (1996)[4](as shown in table no.2)

Table no.2

Correlation Coefficient Rating by Evans(1996)

Value or Correlation Coefficient	Strength or level of correlation
0.00 to ± 0.19	Very Weak
± 0.20 to ± 0.39	Weak
± 0.40 to ± 0.59	Moderate
± 0.60 to ± 0.79	Strong
± 0.80 to ± 1.0	Very Strong

RESULTS AND FINDINGS

The findings in regard to descriptive statistics of the selected variables are presented in the table no.3.

Table no.3

Descriptive Statistics of Maximum Hip Flexion Angle Per Repetition at each Repetition

S.no.	Variable	Repetitions			
		1	2	3	4
		Mean ± S.D	Mean ± S.D	Mean ± S.D	Mean ± S.D

[3] Reynolds,Jeff M.,et,al(2006).prediction of one repetition maximum strength from multiple repetition maximum testing and anthropometry, journal of strength and conditioning research , 20(3), 584-592

[4]Evans, J.D. (1996) Straightforward Statistics for the Behavioral Sciences. Brooks/Cole Publishing, Pacific Grove.

1	MHFAR	97.31 ± 11.37	96.31 ± 15.59	94.31 ± 15.05	94.13 ± 11.73

Note: S.D=Standard Deviation

According to the table no.3, the descriptive statistics values(Mean±S.D) for the MHFAR at repetition no. 1 is 97.31±11.37, at repetition no.2 the descriptive statistics values are 96.31±15.59 and at repetition no.3 the values are 94.31±15.05 whereas at repetition no.4 the values are 94.13±11.73.

This is graphically presented in the fig.no.1.

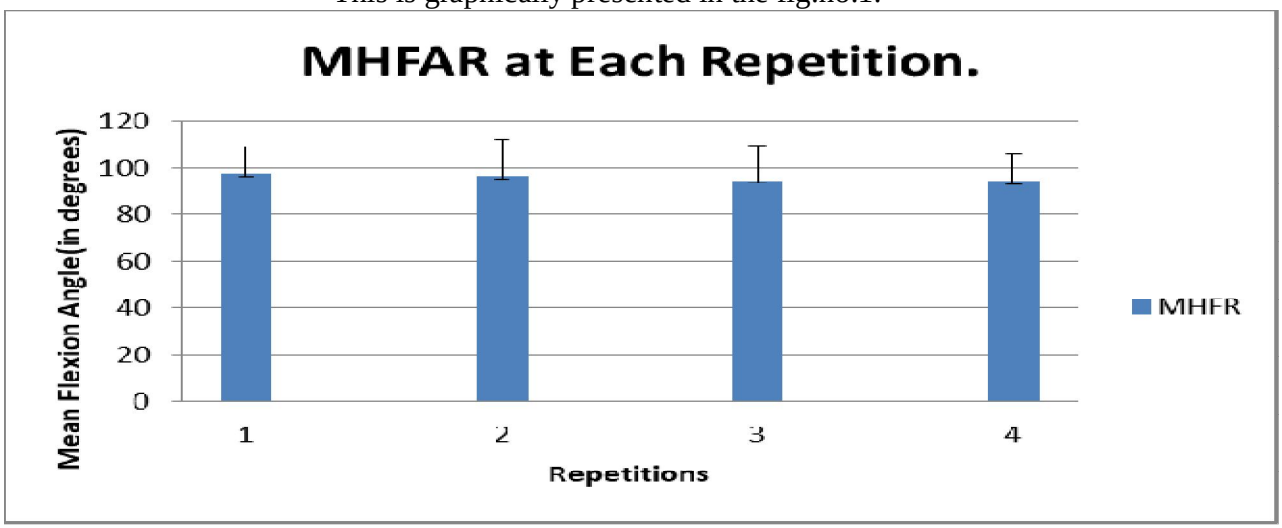

Fig no.1: Description of MHFR in regard to each repetition

The descriptive statistics and correlation coefficient along with the significance value of the variables SH and MHFA is presented in the table no.4 (i) and table no.4 (ii).

Table no. 4(i)

Standing Height and Maximum Hip Flexion Angle of the Subjects

S.No	Name	Standing Height (cm)	MHFA (in degrees)
1	AJK	174	89.75
2	AK	165	110.25
3	AR	160	100.25
4	ARJ	173.7	96.5
5	AS	180	83.25
6	BR	166	121.5
7	CH	168	100
8	GA	182	95.75
9	GAU	172	74.25

10	HA	170	98.25
11	KAB	184	92.25
12	KAM	167	99.75
13	PU	173	75
14	SU	170	93.25
15	VI	176	84.25
16	YA	164	114

Table no.4(ii)
Descriptive Statistics and Correlation of the Standing Height and Maximum Hip Flexion Angle of the subjects.

Variables	Mean	S.D	'r'	Sig.(1-tailed)	Level of Significance
SH(centimeters)	171.54	6.69	-0.551	0.013	0.05
MHFA(degrees)	95.52	12.92			

Note: S.D=Standard Deviation; 'r'= Correlation Coefficient; Sig.(1-tailed)=Significance Value at one tailed test.

As shown in table no.4(ii), the descriptive statistics values(Mean±S.D) of SH and MHFA were 171.54±6.69 and 95.52±12.92 respectively. The correlation coefficient between SH and MHFA,r = -0.551, which as per the guidelines suggested by Evans(1996) falls in the strength rating of "moderate" and this suggest that a negative moderate degree correlation exists between SH and MHFA. As, the significance value at one tailed test is less than the designated level of significance at 0.05 (as, 0.013<0.05), thus, p<0.05 which means that the ***correlation found is statistically significant.***

The graphical presentation of the correlation between the selected variables is shown in Fig no.2.

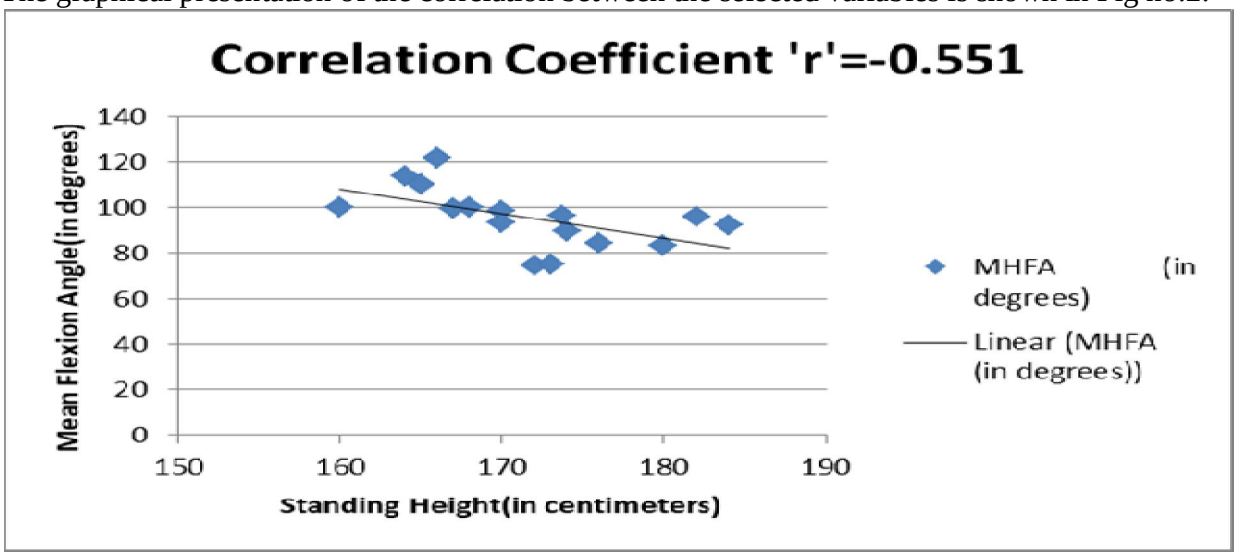

Fig no.2: Graphical presentation of Correlation between SH and MHFA

CONCLUSION

1) A statistically significant correlation was found between the variables ,namely, Standing Height(SH) and Maximum Hip Flexion angle(MHFA) at loaded hip thrust with $r = -0.551$ and $p(\text{one tailed}) < 0.05$.
2) According to the strength rating suggested by Evans(1996), a negative moderate correlation was found between the Standing Height (SH) and Maximum Hip Flexion angle(MHFA) at the loaded hip thrust.

RECOMMENDATIONS

- The height of the bench should be kept into consideration with respect to the height of the subject.
- Further study can be conducted with subjects having height less than 160cm for more findings.
- The height of bench appropriate for the specific subjects need to be calculated.

References

- http://csaaielynnlambert.com/what-the -difference-hip-thrust-vs-glute-bridge-vs-frog-pump/.(as retained on march 2, 2018)
- Contreras, Bret, et, al (2011). Barbell hip thrust, strength and conditioning journal, volume 33(5), 58-61.
- [1] Reynolds, Jeff M.,et,al(2006).prediction of one repetition maximum strength from multiple repetition maximum testing and anthropometry, journal of strength and conditioning research , 20(3), 584-592
- Evans, J.D. (1996) straightforward statistics for the Behavioural Sciences. Brooks/Cole Publishing, Pacific Grove