



COMPARISONS OF SHOULDER GIRDLE STRENGTH, EXPLOSIVE LEG POWER AND ABDOMINAL STRENGTH AMONG JUMPERS, THROWERS AND SPRINTERS

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Abstract:

The study was designed to compare the three parameters viz. Shoulder girdle strength, explosive leg power and abdominal strength among jumpers, throwers and sprinters. A total of forty five subjects, fifteen of each specialization were included in the study (Age group – 22-25 years). Three tests viz. Medicine Ball Throw Test, Sargent Jump Test (Vertical Jump), Bent-Knee Sit Ups were administered for testing Shoulder Girdle Strength, Explosive Leg Power and Abdominal Strength respectively. One-way ANOVA was applied to compare the three groups. Results revealed that significant differences exist among Jumpers, Throwers and Sprinters on all three parameters ($p < .05$). To conclude, Throwers exhibit more Shoulder Girdle Strength than jumpers and sprinters; Jumpers had more Explosive Leg Strength than throwers and sprinters; and Sprinters own more Abdominal Strength than jumpers and throwers.

Keywords: Sargent jump, sit ups, medicine ball, athletes

1. Introduction

The track and field athletics can mainly be classified into track field and road events, and, in a further division, it can be meticulously separated into racing, jumping, throwing, combination events and walking race (Sung & Ko, 2017). While viewing at the most significant physical fitness components in the track and field athletics, explosive power, anaerobic endurance and agility are essential in the sprinters (Sung & Ko, 2017). Throwers demand more strength, power, and coordination. Jumpers need more muscular strength, power, flexibility and coordination (Korea Institute of Sport Science, 1998). The significance of physical fitness is accentuated as it is a key element in performance (Hamilton, 1994; Korchmny, 1994). A physical fitness factors such as

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shoulder strength and leg strength are characterized as an ability of shoulder muscles to overcome the maximum resistance. Lower leg power is much needed in a range of sports and athletic events. Several prevailing procedures emphasis on plyometric or strength training to escalate vertical jump distance measure of leg power. The leg explosive power is predominantly vulnerable to contusions as it is often exposed to direct traumas. Leg explosive power is an ability of our leg muscles to overcome resistance in a short duration of time and is the combination of strength and speed of contraction of muscles. The existing literature define core stability in many ways, but still uncertain on a clear-cut definition. One definition states *“The core musculature includes muscles of the trunk and pelvis that are responsible for maintaining the stability of the spine and pelvis and are critical for the transfer of energy from larger torso to smaller extremities during many sports activities”* (Tse et al, 2005). Thus, it is tentatively assumed that if the extremities are robust and the core is feeble the drop in muscular outcome through the core may end in less power creation and ineffective movement arrangements. Strength of the abdominal muscles is vital in supporting upright posture and correct alignment of pelvis. The latter is particularly important in the maintenance of low back health. For testing and exercising the abdominal muscles, it is tough to segregate these muscles. The sit-up test is common in evaluating the performance of these muscles which includes the movement of the hip flexor muscles. It is thought that a sturdy core lets an athlete to complete transferal of forces produced in the lower extremities, over the torso, and to the upper extremities (Behm et al., 2005; Cissik, 2002; McGill, 2004). The objective of this study is to compare the Shoulder girdle strength, explosive leg power and abdominal strength among jumpers, throwers and sprinters.

2. Methodology and Procedure

2.1 Subjects

To fulfill the objectives of the study, forty-five (N=45) male athletes including 15 jumpers, 15 throwers and 15 sprinters of age 22-25 years were purposively sampled from the various colleges of Guru Nanak Dev university, Amritsar, Punjab, India.

2.2 Variables and their testing

Table 1: Description of variables, tests and measuring units

Variable	Test	Measuring unit
Shoulder Girdle Strength	Medicine Ball Throw Test	Meters
Explosive Leg Power	Sargent Jump Test (Vertical Jump)	Inches
Abdominal Strength	Bent-Knee Sit Ups	Maximum performed

2.3 Statistical technique

Descriptive data were presented as mean and standard deviation. The comparisons among three groups were made by applying One-Way ANOVA. LSD post-hoc was

employed where mean differences were found significant. Hypotheses were tested at .05 significance level.

Table 2: Multiple comparisons among jumpers, throwers and sprinters

Variable	Group	N	Mean	SD	F-value	p-value
Shoulder Girdle Strength	Jumpers	15	27.27	1.58	133.20	.001*
	Throwers	15	32.80	2.08		
	Sprinters	15	22.07	1.71		
Explosive Leg Power	Jumpers	15	21.72	1.97	44.47	.001*
	Throwers	15	17.47	1.81		
	Sprinters	15	16.20	1.15		
Abdominal Strength	Jumpers	15	40.72	1.67	179.78	.001*
	Throwers	15	36.27	1.32		
	Sprinters	15	47.00	1.65		

* Significant at .05 level

Table 2 depicts the results of multiple comparisons among jumpers, throwers and sprinters on the variables shoulder girdle strength, explosive leg power and abdominal strength. The mean and standard deviation for shoulder girdle strength among jumpers, throwers and sprinters was 27.27±1.58, 32.80±2.08 and 22.07±1.71 respectively. The results of ANOVA (F (2, 42) = 133.20, p<.05) revealed significant differences among the three groups. The mean and standard deviation for explosive leg power among jumpers, throwers and sprinters was 21.72±1.97, 17.47±1.81 and 16.20±1.15 respectively. The results of ANOVA (F (2, 42) = 44.47, p<.05) discovered that there exist significant differences among the three groups. The mean and standard deviation for abdominal strength among jumpers, throwers and sprinters was 40.72±1.67, 36.27±1.32 and 47.00±1.65 respectively. The results of ANOVA (F (2, 42) = 179.78, p<.05) depicts that there exist significant differences among the three groups. As the results ANOVA were discovered significant, the LSD post-hoc test was applied to uncover the between-group differences among athletes. The results of Post-hoc analyses are presented in table 3.

Table 3: Post-hoc (LSD) analyses among jumpers, throwers and sprinters

Variable	Group	Mean difference	p-value
Shoulder Girdle Strength	Jumpers vs. Throwers	-5.53333	.001*
	Throwers vs. Sprinters	10.73333	.001*
	Sprinters vs. Jumpers	5.20000	.001*
Explosive leg power	Jumpers vs. Throwers	4.26667	.001*
	Throwers vs. Sprinters	1.26667	.046*
	Sprinters vs. Jumpers	5.53333	.001*
Abdominal strength	Jumpers vs. Throwers	4.46667	.001*
	Throwers vs. Sprinters	-10.73333	.001*
	Sprinters vs. Jumpers	-6.26667	.001*

* Significant at .05 level

Table 2 uncovers the pairwise differences among the jumpers, throwers and sprinters. For the variable shoulder girdle strength, the mean difference between jumpers and

throwers was -5.53333, between throwers and sprinters was 10.73333 and between sprinters and jumpers was 5.2000. All three comparisons were found significant at .05 level. For the variable explosive leg strength, the mean difference between jumpers and throwers was 4.26667, between throwers and sprinters was 1.26667 and between sprinters and jumpers was 5.23333. Similarly, results confirmed that all three comparisons were found significant at .05 level. For the variable abdominal strength, the mean difference between jumpers and throwers was 4.46667, between throwers and sprinters was -10.73333 and between sprinters and jumpers was -6.26667. It can be seen from the table that all three comparisons were found significant at .05 level.

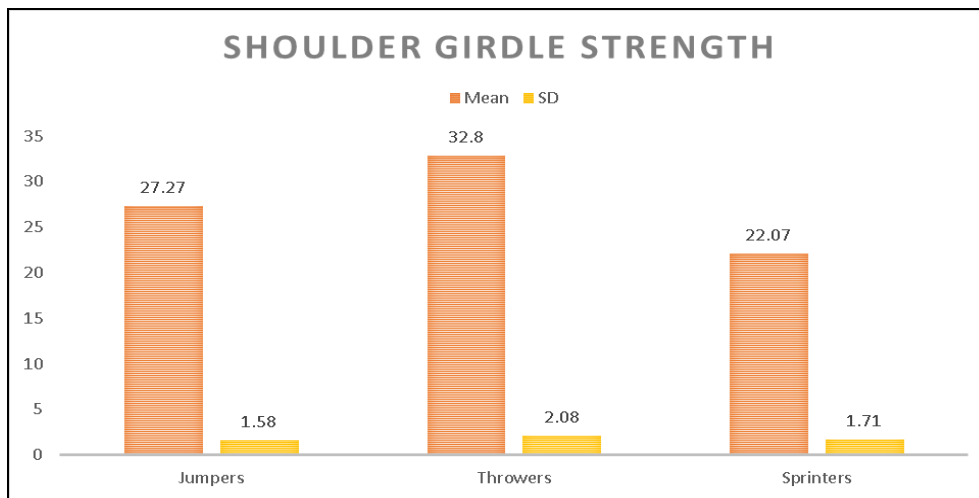


Figure 1: Graphical portrayal of mean values of shoulder girdle strength among jumpers, throwers and sprinters

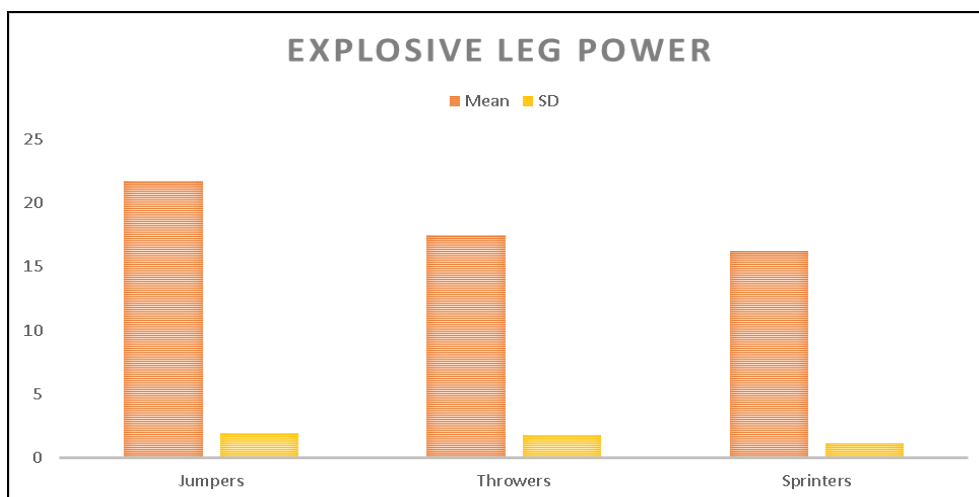


Figure 2: Graphical portrayal of mean values of explosive leg power among jumpers, throwers and sprinters

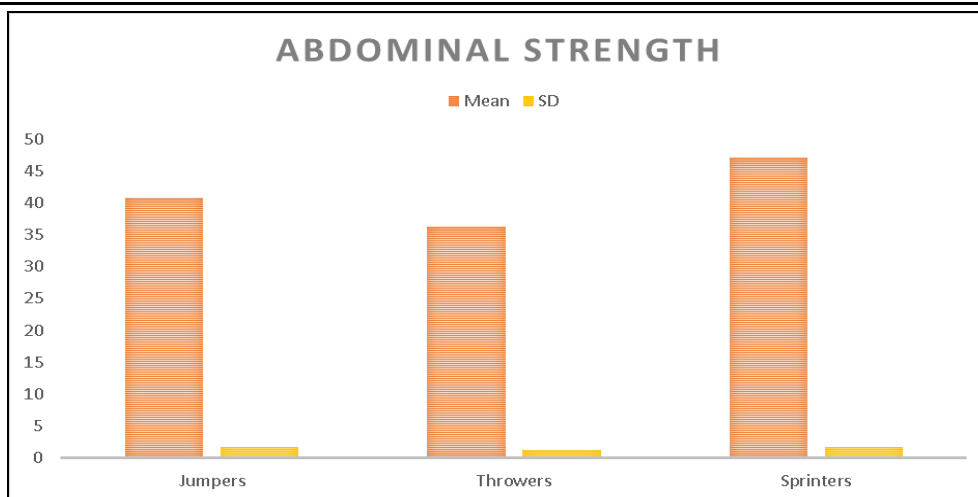


Figure 3: Graphical portrayal of mean values of abdominal strength among jumpers, throwers and sprinters

3. Discussion

The aim of this study was to compare the jumpers, throwers and sprinters on three variables viz. shoulder girdle strength, explosive leg power and abdominal strength. The subjects were college level athletes of age 22-25 years. It was uncovered from the results of ANOVA that all the comparisons on each variable were found significant. Hence, LSD post-hoc was applied to see the differences of means between the three groups. It is evident from the table 2 that all between group comparisons were discovered significant at alpha .05. With respect to the variable shoulder girdle strength, throwers were significantly better than jumpers and sprinters. Successively, jumpers performed better than sprinters. With regard to the variable explosive leg power, it was found that jumpers performed better than throwers and sprinters and throwers were having more explosive leg power than the sprinters. These results were already expected as jumpers frequently perform legs plyometric exercises that enhance the overall proprioception of the body (Singh et al, 2015). The results are consistent with a previous study which found jumpers better in explosive strength than the throwers (Sharma, 2015). A similar study found that differences among jumpers, throwers and sprinters. A study by Tiwari et al, (2011) found that throwers had more aggression level than the jumpers. Further, sprinters were found to have more abdominal strength than jumpers and throwers while jumpers were second best and throwers were at the last. Malhotra (1972) examined the functional capacity and body composition of throwers, jumpers, sprinters and middle and long distance runners. He uncovered that jumpers had higher lean body mass with less fat mass as compared to the throwers who were more heighted and of heavier physique. Jumpers owned more muscle power of legs whereas the throwers stronger arms and shoulder muscle strength. A study examined champion athletes and found that typical trackmen are light in skeletal framework with a relatively longer upper leg ratio and long trunk relationship. He also noted that most good sprinters have narrow hips and that the more ponderous men with longer and

larger trunk, but with relatively short limbs, are most likely to succeed in weight lifting, wrestling, gymnastics and diving (Cureton, 1951).

4. Conclusions

- Throwers own more shoulder girdle strength than jumpers and sprinters.
- Jumpers own more explosive leg strength than throwers and sprinters.
- Sprinters own more abdominal strength than jumpers and throwers.

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