Sports Scientists Views in
Indian Journal of Physical Education, Sports & Applied Sciences
I.J.P.E.S.A.S
Available Online
www.sportscientistsviews. com
Journal DOI-05-2016-44975451
Scientific Journal Impact Factor-5.684

A COMPARATIVE STUDY OF PHYSICAL FITNESS COMPONENTS AMONG ATHLETES OF DIFFERENT TRACK AND FIELD EVENTS

Dr. Dharmendra S Narwaria[1] & Dr. Ashish Kumar Nigam[2]

1. Sports officer, JNKVV, Jabalpur MP narwarialnupe@gmail.com Mobile- 9098605594,
2. Sports officer, JNKVV, Jabalpur MP, dr.aknigam@gmail.com, Mob. 9826348748,

ABSTRACT

The purpose of the present study is to compare the physical fitness components among athletes of different Track and Field Events. For the purpose of this study, three groups were made namely Sprinters, Middle Distance and Long Distance Runners. A total of 45 subjects (15 in each group) were randomly selected from LNUPE, Gwalior, who have represented LNUPE, Gwalior at All-India Inter-University level. All the subjects were tested on the cinder track of LNUPE Gwalior. Investigators conducted the physical fitness test by use of AAHPER Physical Fitness Test which possess of 6 items (1) Pull-ups (2) Sit ups (3) 10 yard Shuttle run, (4) Standing broad pump (5) 50 yard dash and (6) 600 yard run/walk. These 6 items test the arm strength, abdomen muscles strength, agility, leg strength, speed and endurance of the athletes. Six stations were marked with required equipment. While conducting the test the investigator personally motivated the subjects. The obtained data was analyzed by applying One Way MANOVA (multi-variate analysis of variance). The MANOVA table was found significant for all the variables at level of significance 0.05.

Keyword: Physical Fitness, Athletes, Track and Field Events

1. INTRODUCTION

The physical demands differ greatly between the track and field disciplines; thus the suitable assessments for each discipline and for particular athletes will vary to a great extent. The number of children and adolescents participating in organized athletic activities worldwide is increasing. However, physical fitness levels among youth are lower today than in previous decades**, (Cordelia W Carter, Lyle J Micheli, 2011).**

In many sports, training for successful competition has become virtually a year-round Endeavour. To assist in better preparation, a competitor's year may be divided into phases such as off-season and in-season, indicating reduced or increased competition commitments, respectively. A number of studies have described the effects of seasons or periods of competition, training, detraining and reduced training on aspects of physical fitness, **(Koutedakis Y., 1995)** Due to the increased interest in physical fitness and to the fact that athletes start their training at younger ages the risk for injuries to the growing individual has increased**. (Sward L, 1992).**

Physiological assessments are generally used to assess the overall fitness level of the athletes and to set guiding principle for individualized training program. **(Little, 1991, McArdle 2003).**

2. MATERIALS AND METHODS

2.1 Selection of subjects

A total 45 subjects (15 in each group) were randomly selected from LNUPE, Gwalior. The subjects were Sprinters, Middle Distance and Long Distance Runners who have represented LNUPE, Gwalior at All-India Inter-University level.

2.2 Selection of variables

Through both the critical and allied literature pertaining to the problem under consideration the following physical variables were selected-

1. Pull ups
2. Sit ups
3. 10 yard Shuttle run
4. Standing broad jump
5. 50 yard dash
6. 600 yard Run/ walk

The selections of these variables were also based on the feasibility criteria and the equipment available as well as the investigator's own experience in conducting the test and measurement to these variables.

2.3 Administration of the test

All the subjects were tested at cinder track of LNUPE Gwalior. Researcher conducted the physical fitness test by use of AAHPER Physical Fitness Test, which possess 6 items (1) Pull-ups (2) Sit ups (3) 10 yard Shuttle run, (4) Standing broad pump (5) 50 yard dash and (6) 600 yard run/walk. These 6 items test the arm strength, abdomen muscles strength, agility, leg strength, speed and endurance of the athletes. Six stations were marked with required equipment. The subjects were properly guided and motivated during test. Proper instructions regarding the objectives of the study and detail procedure were debrief to the subjects.

3. RESULTS

To assess the selected six components pf physical fitness of Sprinters, Middle Distance and Long Distance Runners, mean, standard deviation and ANOVA were computed with the help of SPSS 16.0 and data pertaining to this have been presented in Table 1 to 3.

TABLE 1
DESCRIPTIVE STATISTICS OF SELECTED PHYSICAL VARIABLES OF SPRINTERS, MIDDLE DISTANCE AND LONG DISTANCE RUNNERS.

Physical Fitness Components	Groups	N	M	SD
Pull-ups	Sprinters	15	24.86	2.42
	Middle Distance Runners	15	23.00	2.24
	Long Distance Runners	15	15.80	3.03
Sit-ups	Sprinters	15	47.46	4.12
	Middle Distance Runners	15	39.40	2.69
	Long Distance Runners	15	35.40	2.67
Shuttle-run	Sprinters	15	10.40	0.63
	Middle Distance Runners	15	11.82	0.37
	Long Distance Runners	15	11.93	0.62
SBJ	Sprinters	15	2.66	0.16
	Middle Distance Runners	15	2.28	0.09
	Long Distance Runners	15	2.27	0.10
50yrd Dash	Sprinters	15	6.33	0.29
	Middle Distance Runners	15	6.89	0.32
	Long Distance Runners	15	7.08	0.28
600yd Run/walk	Sprinters	15	1.49	0.17
	Middle Distance Runners	15	1.35	31.92
	Long Distance Runners	15	1.35	0.08

The mean scores of Sprinters, Middle Distance and Long distance Runners on selected physical variables have been depicted in figures 1 to 6

TABLE 2
ANALYSIS OF VARIANCE OF ON SELECTED PHYSICAL VARIBLES OF MALE SPRINTERS, MIDDLE DISTANCE AND LONG DISTANCE RUNNERS

Physical Variables	Source of Variance	df	Sum of squares	Mean Square	F-Value
Pull-ups	Between Groups	2	687.64	343.82	51.55*
	Within Groups	42	280.13	6.67	
Sit-ups	Between Groups	2	1133.38	566.69	54.22*
	Within Groups	42	438.93	10.45	
Shuttle Run	Between Groups	2	21.95	10.98	36.21*
	Within Groups	42	12.73	0.303	
SBJ	Between Groups	2	1.48	0.740	48.41*
	Within Groups	42	0.64	0.015	
50 Yard Dash	Between Groups	2	4.59	2.293	25.51*
	Within Groups	42	3.78	0.090	
600 Yard Run/Walk	Between Groups	2	0.19	0.099	7.76*
	Within Groups	42	0.53	0.013	

*Significant at .05 level, F .05 (2, 42)=3.21

It is evident from Table 2 that there were significant differences found among sprinters , middle distance and long distance runner on Pull-ups, Sit ups, 10 yard Shuttle run, Standing broad jump, 50 yard dash and 600 yard Run/ walk components physical fitness, as the obtained

F-values of 51.55, 54.22, 36.21, 48.41, 25.51 and 7.76 respectively were higher than F .05 (2, 42) = 3.21.

As the F-ratios for Pull ups, Sit ups, 10 yard Shuttle run, Standing broad jump, 50 yard dash and 600 yard Run/ walk were found to be significant, LSD Post Hoc Test was applied to find out the significance of differences between the ordered paired means and the data pertaining to this is presented in Table 3.

TABLE 3
SIGNIFICANCE OF DIFFERENCES BETWEEN ORDERED PAIRED MEANS OF PHYSICAL VARIABLES OF SPRINTERS, MIDDLE DISTANCE AND LONG DISTANCE RUNNERS

Variables	Sprinters	Middle Distance Runners	Long Distance Runners	Paired Mean Difference	Confidence Interval
Pull-ups	24.86	23.00	-	1.86	2.38
	24.86	-	15.80	9.06*	
	-	23.00	15.80	7.20*	
Sit-ups	47.46	39.40	-	8.06*	2.98
	47.46	-	35.40	12.06*	
	-	39.40	35.40	04.00*	
Shuttle Run	10.40	11.82	-	1.42*	0.51
	10.40	-	11.93	1.53*	
	-	11.82	11.93	0.11	
SBJ	2.66	2.28	-	0.38*	0.11
	2.66	-	2.27	0.38*	
	-	2.28	2.27	0.01	
50 Yard Dash	6.33	6.89	-	0.56*	0.28
	6.33	-	7.08	0.75*	
	-	6.89	7.08	0.18	
600 Yard Run/Walk	1.49	1.35	-	0.14*	0.10
	1.49	-	1.35	0.14*	
	-	1.35	1.35	0.00	

*Significant at .05 level

Table 3 reveals that the Post hoc test (LSD) for the critical difference between the means of the selected variables shows that there was a significant difference in pull-ups of Sprinters and Long Distance Runners and a significant difference was found between Middle Distance and Long Distance Runners. But there was no significant difference found in pull ups of sprinters and Middle Distance Runners. In case of Sit-ups also post hoc test (LSD) shows that there was a significant difference in Sit-ups between the sprinters, Middle Distance and Long distance Runners. In case of Shuttle Run, Standing Broad Jump, 50 yard dash and 600 yard run/walk post hoc test (LSD) shows that there was a significant difference found between the Sprinters and Middle Distance but there was no significant difference found in shuttle run of Middle Distance and Long Distance Runners.

TABLE 4
BOX'S M TEST OF EQUALITY OF COVARIANCE MATRICES

Box's M	66.066
F	1.243
df1	42
df2	5236.942
Sig.	.136

Table 4 reveals the equality of variance and covariance matrices, and it also shows that the Box's M test is insignificant.

TABLE 5
MANOVA TABLE FOR THE DATA ON SELECTED PHYSICAL VARIABLES OF SPRINTERS, MIDDLE DISTANCE AND LONG DISTANCE RUNNERS

	Value	**F**	**Hypothesis df**	**Error df**	**Sig.**
Pillai's trace	1.411	15.157	12.000	76.000	.000
Wilks' lambda	.053	20.611[a]	12.000	74.000	.000
Hotelling's trace	9.114	27.341	12.000	72.000	.000
Roy's largest root	8.024	50.819[b]	6.000	38.000	.000

*Significant at 0.05 level

The table 5 reveals that the Wilks'lambda test was significant in all selected physical variables at level of significance 0.05. table of that is shown below.

4. DISCUSSION

The purpose of the study is to compare the physical fitness of the athletes of different Track and Field Events. The physical fitness component of the sprinters were found to be higher than Middle Distance and Long Distance Runners in the tested items, the sprinters performed significantly better than Middle Distance and Long Distance Runners in the selected test items because it may be possible that the selected test items were well suited accordingly to the characteristics of sprinters. Similar study was also conducted by **Maruo, Y., Murphy, T. I., & Masaki, H. (2018)** and found the similar results. Further **Surinder Kaur, Dolly and Rajesh Kumar (2016)** also conduted similar study and found similar results**.** The training for the sprinters is focused at developing ATP-CP Energy system and many of the test items such as pull ups, Sit ups, 10 yard Shuttle Run, Standing broad jump, 50 yard dash also include the contribution of their energy system. At the same time the Middle Distance also have a greater anaerobic component and ability to perform better, a test items requiring the explosive strength. The test items in the fitness test battery were also suited to the physiological characteristics of the sprinters as they have higher proportion to white blood cell as compared to the Middle Distance and Long Distance Runners researchers conducted study and found the similar results **Mujika et. al. (2002).** The Sprinters performs various Plyometrics exercises, which enhances their stretch reflex mechanism. Sprinters also perform various movements in response to the variety of stimulus which could have enabled them to perform better than Long Distance and Middle Distance Runners in the test items like shuttle run similar findings also found by **Bushnell T,**

Hunter I. (2007). Standing broad jump, 50 yard dash etc ,sprinters also tend to perform a variety of strength exercises which helps them to attain higher score when performing strength related test, Middle Distance also performed better than the Long Distance Runners due to a greater component in their training program comprises of the strength related test items.

5. CONCLUSIONS

1. Significant differences were observed among sprinters , middle distance and long distance runner on Pull-ups, Sit ups, 10 yard Shuttle run, Standing broad jump, 50 yard dash and 600 yard Run/ walk components physical fitness,
2. Significant difference were found in pull-ups between of Sprinters and Long Distance Runners and between Middle Distance and Long Distance Runners. But sprinters and Middle Distance Runners did not differ significantly in pull ups.
3. Significant difference was seen in Sit-ups between the sprinters, Middle Distance and Long distance Runners.
4. Shuttle Run, Standing Broad Jump, 50 yard dash and 600 yard run/walk showed the significant difference between the Sprinters and Middle Distance but significant difference was not found in shuttle run between of Middle Distance and Long Distance Runners.

6. FUTURE DIRECTIONS

Similar may be conducted for school going students also. Similar may be conducted on female athletes also. Elite athletes can be picked as sample for the study. Study may be conducted on various psychological and biomechanical variables also. Study may be conducted on different running events also.

REFERENCES

Bushnell, T. & Hunter, I. (2007), Differences in technique between sprinters and distance runners at equal and maximal speeds. Sports Biomech. 6(3):261-8. doi: 10.1080/14763140701489728. PMID: 17933191

Carter, Cordelia W. and Micheli, Lyle J. (2011), Training the child athlete: physical fitness, health and injury, Division of Sports Medicine, Children's Hospital Boston, 319 Longwood Avenue, Boston, MA 02115, USA; michelilyle@aol.com

Koutedakis, Y. (1995), Seasonal variation in fitness parameters in competitive athletes. School of Health Sciences, Wolverhampton University, England., Sports Med., 19(6):373-92.

Little, N.G. (1991) Physical performance attributes of Junior and Senior women, Juvenile, Junior and Senior men judokas. J Sports Med Phys Fitness 31: 510–520.

Maruo, Y., Murphy, T. I., & Masaki, H. (2018), Long-Distance Runners and Sprinters Show Different Performance Monitoring - An Event-Related Potential Study. Frontiers in psychology, 9 : 653. https://doi.org/10.3389/fpsyg.2018.00653

Mujika, I., Goya, A., Ruiz, E., Grijalba, A., Santisteban, J., & Padilla, S. (2002), Physiological and performance responses to a 6-day taper in middle-distance runners: influence of training frequency. International journal of sports medicine, 23(5): 367–373. https://doi.org/10.1055/s-2002-33146

Sward, L. (1992), The thoracolumbar spine in young elite athletes. Current concepts on the effects of physical training." Department of Orthopaedics, Ostra Hospital, Gothenburg, Sweden. Sports Medicine (Auckland, N.Z.) 13(5):357-364.

Kaur, Surinder, Dolly and Kumar, Rajesh (2016), Assessment of Anthropometric and Physical Fitness components as predictors of performance of Athletes of 800m race. International Journal of Recent scientific Research, 7(4) : 10305-10308.