



## ANALYSIS OF PHYSICAL FITNESS AMONG BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY

Jose Baby<sup>1,2</sup> and A.M. Moorthy<sup>2</sup>

<sup>1</sup>University College of Engineering, Muttom, Kerala.

<sup>2</sup>Tamil Nadu Physical Education and Sports University.

### ABSTRACT :

During the past few decades, performance in sports has enhanced significantly and improved physical fitness is considered as the foremost contributing factor for this. Studies examining the physical fitness among players of different strata were not examined extensively. Therefore, the purpose of this study was to analysis the physical fitness of Basketball and Handball players at different topographic regions of Kerala. For this, a total of three hundred players (Basketball (n=150) and Handball (n=150)) were selected randomly as subjects from different Colleges and Universities across Kerala, India. All the participants were aged between 18 and 25 years. The selected Basketball and Handball players were divided into three groups, with each group consisting of 50 players, according to their representation in sports. The study was conducted on selected physical fitness variables such as strength, strength endurance, agility, explosive power, speed and cardiovascular endurance. The static group comparison design and one way analysis of variance (ANOVA) were applied in the study. Whenever, the obtained F-ratio was found to be statistically significant, the Scheffe's test was used as post-hoc test to find out the difference among the paired means. In all the cases 0.05 level of significance was used to test the hypothesis. Our results revealed that there was significant difference among college, district and University Basketball as well as Handball players on selected physical fitness components. The University Basketball and Handball players were found to be better than the district and college players on all selected physical fitness. Further district Basketball and Handball players performed better than the college Basketball and Handball players on selected physical fitness. Overall, these findings indicate that University players were more physically fit than district and college players. Thus this study provides insight for the implementation of effective physical training programs for better sports outcomes.



**KEYWORDS :** strength, strength endurance, agility, explosive power, speed, cardio vascular endurance.

### INTRODUCTION

Sports in the present world have become extremely competitive. Recent advances in sports science have tremendously contributed towards human sporting performance at the highest level(Charles et al., 1987). Good physical fitness is the basis for sports and positively influences the performance of athletes. The physical fitness is defined as the general state of good physical health. Obtaining and maintaining physical fitness is a result of physical activities, proper diet and nutrition as well as proper rest for physical recovery. It enables people to perform up to their full potential(Lee et al., 2013; Singh, 1991).

Physical fitness is one of the main mottoes of physical education program. High level of physical fitness ensures healthy body and mind which in turn determines the success in sports (Basak and Dutta, 2016). Physical activity such as jogging, walking, treadmill training, swimming etc improves the fitness of an individual. Special training programs are also imparted to enhance the physical endurance of athletes. Studies have shown that persistent training is quintessential for development of physical strength.

Physical fitness of an individual is assessed by parameters such as strength, strength endurance, agility, explosive power, speed and cardiovascular endurance (Barry and Jack, 1988; Helsen and Starkes, 1999). Different sports require different fitness elements to excel. Therefore, training method and duration should be chosen on the basis of demand of sports (Bloom, 1985; Howe, 1999; Yang et al., 2009). Further, athletic performance can often be predicted from the physical fitness components (Sanjaya and Awati, 2014; Yong et al., 2014). Therefore it is prerequisite to accurately assess the physical fitness of sports personnel.

Team handball, also sometimes called continental, European and Olympic handball, provides a wealth of possibilities for school and community recreation programs. It is fun to play and exciting to watch. The players and spectators alike enjoy the rapid continuous play, the fast-breaks, the fleet and varied hand movements in passes and shots, and the spectacular leaps and dives into the air followed by the lightning reactions of the goalkeeper. Team handball players need intensive physical training as high fitness level is required to cope up with high energy demand of the game. Literature asserts that among the different physical fitness elements, strength training is of utmost importance and it appears that incorporation of strength training programs elevates the performance level (Ghai and Negi, 2007; Kohli and Singh, 2014). Overall fitness of basketball player is also important to maintain a high level of activity during the entire game (Nara, 2017). Therefore, it is necessary to have knowledge regarding the fitness and physiological parameters of basketball players for the execution of different scientific training programs. However, to our knowledge, there is little information available about the physical fitness of basketball and handball players. Therefore, the aim of the study was to assess the different physical fitness parameters among Basketball and Handball players at different topography across Kerala, India.

#### **METHODOLOGY:**

The current investigation was to analysis the physical fitness of Basketball and Handball players at different topography. To achieve this, a total of three hundred players (Basketball (n=150) and Handball (n=150)) in the age group of 18 to 25 years were selected randomly as subjects from the Colleges and Universities of Kerala, India. The selected Basketball and Handball players were divided into three groups according to their representation in sports with each group consisting of 50 players.

#### **Basketball**

- Group I - College Players (n=50)
- Group II - District Players (n=50)
- Group III - University Players (n=50)

#### **Handball**

- Group I - College Players (n=50)
- Group II - District Players (n=50)
- Group III - University Players (n=50)

#### **3.2 SELECTION OF VARIABLES**

The physical trainer and coaches were approached to measurement in terms of improved service to sportsman. Each player is a unique problem with his own peculiar background and capabilities, differing from other in innumerable ways. The fundamental function of physical trainer and coaches is to understand each player's qualities and needs in order to give adequate guidance and to adopt programmes to meet necessary needs. The following variables were selected for this study.

### Physical fitness Variables

- Strength
- Strength Endurance
- Agility
- Explosive Power
- Speed
- Cardiovascular Endurance

### 3.3 SELECTION OF TESTS

The present study was undertaken primarily to analysis the physical fitness of Basketball and Handball players at different topography. As per the available literatures, the following tests were used to collect relevant data on the selected dependent variables and they were presented in the table 3.1(Clarke. et al., 1972).

**TABLE 3.1  
TESTS SELECTION**

S.No	Criterion Variable	Name of the Test	Unit of Measurement
1.	Strength	Pull-ups	In Numbers
2.	Strength Endurance	Sit-ups	In Numbers
3.	Agility	Shuttle Run	In Seconds
4.	Explosive Power	Standing Broad Jump	In Metres
5.	Speed	50 yard run	In Seconds
6.	Cardiovascular Endurance	600 yard run	In Seconds

### RESULTS

**TABLE-4.1  
MEAN AND STANDARD DEVIATION OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT  
TOPOGRAPHY ON PHYSICAL FITNESS COMPONENTS**

Variables	Level of Participation	Basketball		Handball	
		Mean	Std. Deviation	Mean	Std. Deviation
Strength	College	7.40	0.78	6.38	1.28
	District	11.92	1.32	10.24	1.85
	University	16.88	1.77	13.68	1.86
Strength Endurance	College	21.38	3.50	21.06	3.79
	District	28.32	2.25	27.22	3.80
	University	42.20	3.79	39.50	5.77
Agility	College	9.72	0.59	10.16	0.58
	District	9.26	0.14	9.80	0.50
	University	8.92	0.26	9.32	0.19
Explosive Power	College	2.15	0.12	2.04	0.15
	District	2.19	0.09	2.24	0.07
	University	2.36	0.09	2.38	0.09
Speed	College	6.39	0.20	6.67	0.39

Cardiovascular Endurance	District	5.93	0.20	6.25	0.13
	University	5.68	0.20	5.99	0.22
	College	2.39	0.17	2.52	0.19
	District	2.02	0.20	2.35	0.15
	University	1.74	0.25	1.94	0.22

Figure I-VI presents the means of each continuous variable by the three groups.

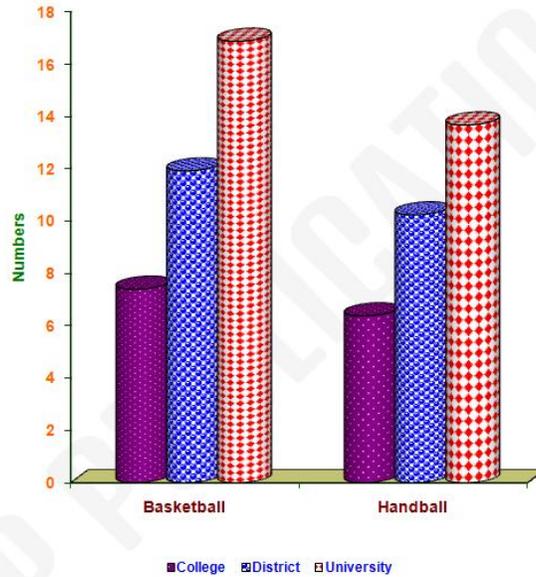


FIGURE I: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON STRENGTH.

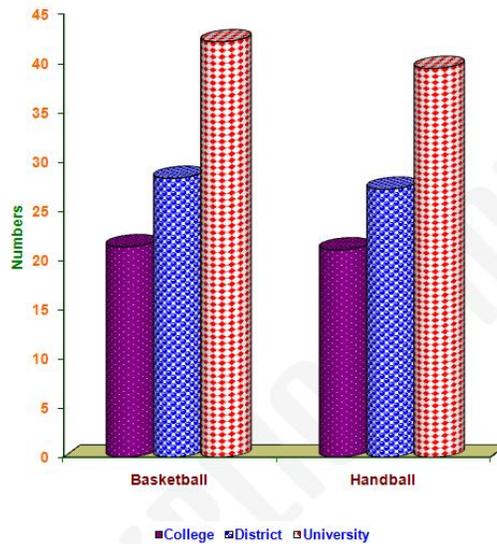
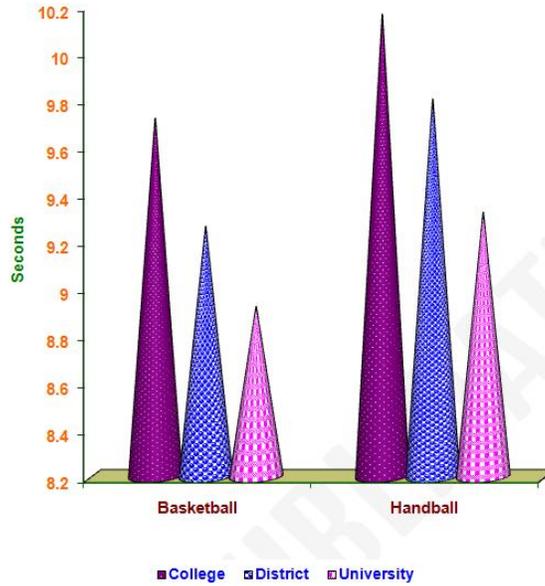
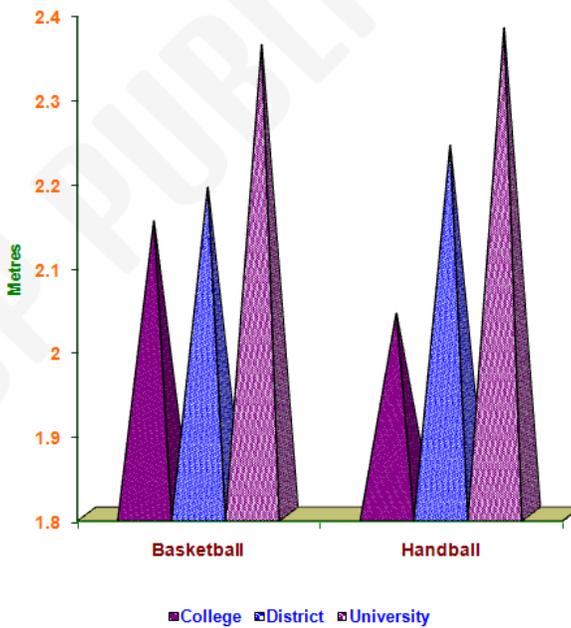


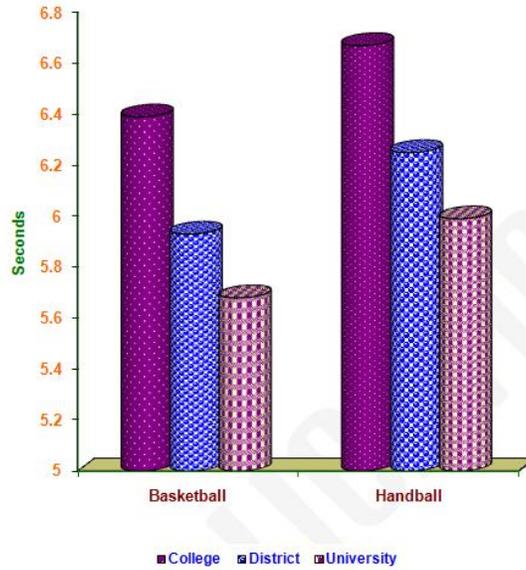
FIGURE II: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON STRENGTH ENDURANCE.



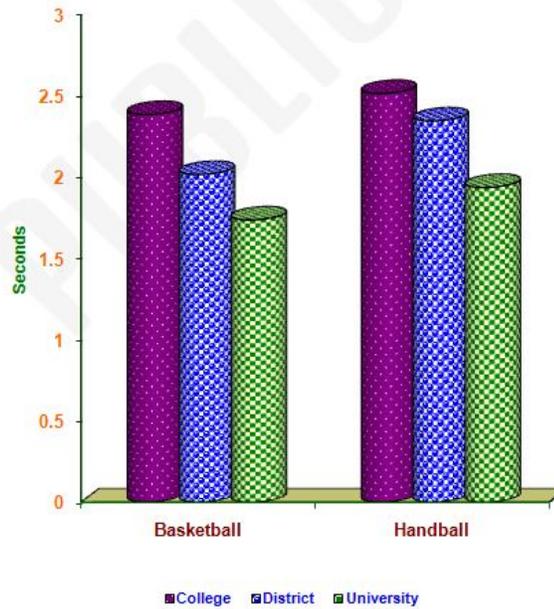
**FIGURE III: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON AGILITY.**



**FIGURE IV: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON EXPLOSIVE POWER.**



**FIGURE V: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON SPEED.**



**FIGURE VI: MEAN VALUES OF BASKETBALL AND HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY ON CARDIOVASCULAR ENDURANCE.**

**4.4.1.2 Basketball (Physical Fitness)**

Table 4.2 presents the results of the univariate ANOVA tests of six physical fitness variables (strength, strength endurance, agility, explosive power, speed, cardio vascular endurance).

**TABLE 4.2**  
**ANALYSIS OF VARIANCE ON THE SELECTED PHYSICAL FITNESS OF BASKETBALL PLAYERS AT DIFFERENT TOPOGRAPHY**

Variables	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Strength	Between	2248.37	2	1124.19	614.42*	0.000
	Within	268.96	147	1.83		
	Total	2517.33	149			
Strength Endurance	Between	11238.17	2	5619.09	531.99*	0.000
	Within	1552.66	147	10.56		
	Total	12790.83	149			
Agility	Between	16.06	2	8.03	54.28*	0.000
	Within	21.75	147	0.15		
	Total	37.81	149			
Explosive Power	Between	1.24	2	0.62	64.53*	0.000
	Within	1.41	147	0.01		
	Total	2.65	149			
Speed	Between	12.98	2	6.49	162.74*	0.000
	Within	5.86	147	0.04		
	Total	18.85	149			
Cardiovascular Endurance	Between	10.79	2	5.40	122.37*	0.000
	Within	6.48	147	0.04		
	Total	17.28	149			

\*Significant at 0.05 level. The table value required for .05 level of significance with df 2 & 147 is 3.04.

From the table 4.2, the obtained F-ratio values among college, district and university Basketball players on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance are 614.42, 531.99, 54.28, 64.53, 162.74 and 122.37 which are greater than the tabulated F-value of 3.04 with df 2 and 147 required for significance at .05 level of confidence. The result of the study shows that there was significant difference exists among college, district and university Basketball players on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance.

The results of the study indicated that there was a significant difference on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance. Hence, the Scheffe's test was applied as post hoc test to find out the paired means difference, if any and it has been presented in Table 4.3.

**TABLE 4.3**  
**THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF BASKETBALL WITH DIFFERENT TOPOGRAPHY ON SELECTED PHYSICAL FITNESS**

Variables	College Vs District	College Vs University	District Vs University	C.I. Value
Strength	4.52*	9.48*	4.96*	0.67
Strength Endurance	6.94*	20.82*	13.88*	1.60
Agility	0.464*	0.798*	0.334*	0.19
Explosive Power	0.039	0.209*	0.170*	0.05
Speed	0.462*	0.710*	0.248*	0.10
Cardiovascular Endurance	0.374*	0.654*	0.280*	0.10

\*Significant at 0.05 level.

**Strength:** The University Basketball players (mean = 16.88) significantly outperformed the District Basketball player (mean = 11.92) and College Basketball player (mean = 7.40) in strength with mean differences of 4.96 and 9.48 (CI = 0.67) respectively and also District Basketball players outperformed the college Basketball players in strength with mean differences of 4.52 (CI=0.67).

**Strength Endurance:** The strength endurance of University Basketball players (mean = 42.20) were greater than District (mean = 28.32) and College Basketball players (mean = 21.38) with mean differences of 13.88 and 20.82 (CI = 1.60) respectively and also District Basketball player's performance were better than college Basketball players with mean differences of 6.94 (CI=1.60).

**Agility:** The University Basketball players (mean = 8.92) significantly surpassed the District Basketball player (mean = 9.26) and College Basketball player (mean = 9.72) in agility with mean differences of 0.334 and 0.798 (CI = 0.19) respectively and also District Basketball players performed better than college Basketball players in agility with mean differences of 0.464 (CI=0.19).

**Explosive Power:** The University Basketball players (mean = 2.36) significantly outperformed the District Basketball player (mean = 2.19) and College Basketball player (mean = 2.15) in explosive power with mean differences of 0.170 and 0.209 (CI = 0.05) respectively and however there was no significant difference between district and college Basketball players in explosive power with mean differences of 0.039 (CI=0.05).

**Speed:** The University Basketball players (mean = 5.68) significantly outperformed the District Basketball player (mean = 5.93) and College Basketball player (mean = 6.39) in speed with mean differences of 0.248 and 0.710 (CI = 0.10) respectively and also District Basketball players outperformed the college Basketball players in strength with mean differences of 0.462 (CI=0.10).

**Cardiovascular endurance:** The University Basketball players (mean = 1.74) significantly outperformed the District Basketball player (mean = 2.02) and College Basketball player (mean = 2.39) in cardiovascular endurance with mean differences of 0.280 and 0.654 (CI = 0.10) respectively and also District Basketball players outperformed the college Basketball players in cardiovascular endurance with mean differences of 0.374 (CI=0.10).

#### 4.4.1.3 Handball (Physical Fitness)

Table 4.4 presents the results of the univariate ANOVA tests of six physical fitness variables (strength, strength endurance, agility, explosive power, speed, cardio vascular endurance).

**TABLE 4.4**  
**ANALYSIS OF VARIANCE ON THE SELECTED PHYSICAL FITNESS OF HANDBALL PLAYERS AT DIFFERENT TOPOGRAPHY**

Variables	Source of Variance	Sum of Squares	df	Mean Square	F	Sig.
Strength	Between	1333.72	2	666.860	235.770*	.000
	Within	415.78	147	2.828		
	Total	1749.50	149			
Strength Endurance	Between	8812.96	2	4406.480	212.943*	.000
	Within	3041.90	147	20.693		
	Total	11854.86	149			
Agility	Between	17.585	2	8.792	42.179*	.000
	Within	30.642	147	.208		
	Total	48.227	149			
Explosive Power	Between	2.815	2	1.407	111.981*	.000
	Within	1.847	147	.013		
	Total	4.662	149			
Speed	Between	11.617	2	5.808	79.875*	.000
	Within	10.69	147	.073		
	Total	22.307	149			
Cardiovascular Endurance	Between	8.929	2	4.465	124.149*	.000
	Within	5.286	147	.036		
	Total	14.215	149			

\*Significant at .05 level. The table value required for .05 level of significance with df 2 & 147 is 3.04.

From the table 4.2, the obtained F-ratio values among college, district and university Handball players on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance are 235.77, 212.943, 42.179, 111.981, 79.875 and 124.149 which are greater than the tabulated F-value of 3.04 with df 2 and 147 required for significance at .05 level of confidence. The result of the study shows that there was significant difference exists among college, district and university Handball players on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance.

The results of the study indicated that there was a significant difference on strength, strength endurance, agility, explosive power, speed and cardio vascular endurance. Hence, the Scheffe's test was applied as post hoc test to find out the paired means difference, if any and it has been presented in Table 4.5.

**TABLE 4.5**  
**THE SCHEFFE'S TEST FOR THE DIFFERENCES BETWEEN PAIRED MEANS OF HANDBALL WITH DIFFERENT TOPOGRAPHY ON SELECTED PHYSICAL FITNESS**

Variables	College Vs District	College Vs University	District Vs University	C.I. Value
Strength	3.86*	7.30*	3.44*	0.83
Strength Endurance	6.16*	18.44*	12.28*	2.24
Agility	0.36*	0.836*	0.476*	0.22
Explosive Power	0.202*	0.333*	0.131*	0.06
Speed	0.414*	0.676*	0.262*	0.13
Cardiovascular Endurance	0.173*	0.582*	0.409*	0.09

\*Significant at .05 level.

**Strength:** The University Handball players (mean = 13.68) significantly outperformed the District Handball player (mean = 10.24) and College Handball player (mean = 6.38) in strength with mean differences of 3.44 and 7.30 (CI = 0.83) respectively and also District Handball players outperformed the college Handball players in strength with mean differences of 3.86 (CI=0.83).

**Strength Endurance:** The University Handball players (mean = 39.50) significantly outperformed the District Handball player (mean = 27.22) and College Handball player (mean = 21.06) in strength endurance with mean differences of 12.28 and 18.44 (CI = 2.24) respectively and also District Handball players outperformed the college Handball players in strength endurance with mean differences of 6.16 (CI=2.24).

**Agility:** The University Handball players (mean =9.32) significantly outperformed the District Handball player (mean = 9.80) and College Handball player (mean = 10.16) in agility with mean differences of 0.476 and 0.836 (CI = 0.22) respectively and also District Handball players outperformed the college Handball players in agility with mean differences of 0.36 (CI=0.22).

**Explosive Power:** The University Handball players (mean = 2.38) significantly outperformed the District Handball player (mean = 2.24) and College Handball player (mean = 2.04) in explosive power with mean differences of 0.131 and 0.333 (CI = 0.06) respectively and however there was no significant difference between district and college Handball players in explosive power with mean differences of 0.202 (CI=0.06).

**Speed:** The University Handball players (mean = 5.99) significantly outperformed the District Handball player (mean = 6.25) and College Handball player (mean = 6.67) in speed with mean differences of 0.262 and 0.676 (CI = 0.13) respectively and also District Handball players outperformed the college Handball players in strength with mean differences of 0.414 (CI=0.13).

**Cardiovascular endurance:** The University Handball players (mean = 1.94) significantly outperformed the District Handball player (mean = 2.35) and College Handball player (mean = 2.52) in cardiovascular endurance with mean differences of 0.409 and 0.582 (CI = 0.09) respectively and also District Handball players outperformed the college Handball players in cardiovascular endurance with mean differences of 0.173 (CI=0.09).

## DISCUSSION

Modernization accompanied by change in life style has dramatically influenced the sports performance of athletes. Lack of exercise significantly reduced the physical fitness among sports personnel. Previous studies have shown that regular exercise enhanced flexibility, endurance, agility and reflex among players (Bae, 2007; Peterson et al., 2003). Our result shows that there is significant difference in physical

fitness variables among University, district and college players. The data revealed that for all the parameters assessed, University players outperformed over district and college players. From the results it is clear that the students of University have far better physical fitness than students of district as well as college. Improvements of these parameters are only possible through regular and systematic physical training and through rigorous physical activities. The high fitness level among university players might be due to their participation in the fitness training and various games included as part of their curriculum. Moreover, university is more equipped with trained staff to train and supervise students as well as better funded for top class facilities. On the other hand there is less scope for college students in the participation of such kind of fitness training and are less opportunistic.

### CONCLUSIONS:

- ❖ There was significant difference among college, district and university Basketball and Handball players on selected physical fitness such as strength, strength endurance, agility, explosive power, speed, cardio vascular endurance.
- ❖ University Basketball and Handball players found better than the district and college Basketball and Handball players on selected physical fitness such as strength, strength endurance, agility, explosive power, speed, cardio vascular endurance.
- ❖ District Basketball and Handball players performed better than the college Basketball and Handball players on selected physical fitness such as strength, strength endurance, agility, explosive power, speed, cardio vascular endurance.

This study therefore helps in proper assessment and understanding of the physical fitness parameters among players of different topography which is prerequisite to design effective fitness regime.

### REFERENCE

- Bae, S. H. (2007). Relations among health behaviors, health symptoms and physical fitness of people in the same community. *J Korean Acad Community Health Nurse* 18, 211–222.
- Barry, L. J. and Jack, K. N. B. (1988). Practical measurements for evaluation in physical education. *U.S.A.*, pp78,113,120,217-218,227.
- Basak, S. and Dutta, S. (2016). A COMPARATIVE STUDY OF PHYSICAL FITNESS PARAMETERS BETWEEN GENERAL COLLEGE STUDENTS AND TRAINING COLLEGE STUDENTS. *International Journal of Experimental Research and Review* 4, 26-30.
- Bloom, B. S. (1985). Developing talent in young people. *New York: Ballantine.*
- Charles, A., Bucher., Deborah, A. and Wuest. (1987). Foundations of Physical Education and Sports. *Saint Louis: Times Mirror and Mosby College Publishing.*
- Clarke., David, H. and Clarke, H. H. (1972). Advanced Statistics. *Englewood Cliffs, New Jersey: Prentice Hall Inc.*
- Ghai, G. D. and Negi, S. C. (2007). A Comparative Study of Motor Development Patterns of Trained and Untrained Indian Girls. *Journal of Exercise Science and Physiotherapy.*
- Helsen, W. F. and Starkes, J. L. (1999). A multidimensional approach to skilled perception and performance in sport. *Applied Cognitive Psychology* 13, 1-27.
- Howe, M. J. A. (1999). The psychology of high abilities. *New York University Press.*
- Kohli, K. and Singh, H. (2014). A Comparative Study of Physical Fitness Variables of male Volleyball Players and Football Players. *Research Journal of Physical Education Sciences* 2, 5-7.
- Lee, S. H., Seo, B. D. and Chung, S. M. (2013). The Effect of Walking Exercise on Physical Fitness and Serum Lipids in Obese Middle-aged Women: Pilot Study. *J Phys Ther Sci* 25, 1533-6.
- Nara, K. (2017). A study of physical fitness between basketball and football players of Haryana. *International Journal of Physiology, Nutrition and Physical Education* 2.
- Peterson, D. F., Degenhardt, B. F. and Smith, C. M. (2003). Correlation between prior exercise and present health and fitness status of entering medical students. *J Am Osteopath Assoc* 103, 361-6.

- Sanjaya, K. and Awati, A. (2014). A comparative analysis on physical fitness of rural and urban high school students. *New man international journal of multidisciplinary studies*. 1, 122-133.
- Singh, H. (1991). *Science of Sports Training*. New Delhi: D.V.S. Publication.
- Yang, D. J., Kang, D. M. and Yang, Y. A. e. a. (2009). Improvement of physical fitness and work ability of the middle-aged and aged workers through exercise prescription program. *J Korean Soc Occup Environ Hyg* 19, 297–306.
- Yong, M. H., Shin, J. I., Yang, D. J. and Yang, Y. A. (2014). Comparison of Physical Fitness Status between Middle-aged and Elderly Male Laborers According to Lifestyle Behaviors. *J Phys Ther Sci* 26, 1965-9.



**Jose Baby**

**University College of Engineering, Muttom, Kerala.  
Tamil Nadu Physical Education and Sports University.**