

The reviews were presented in this section revealed the importance of physical fitness and personality traits which was analysed to find out the status and level of Basketball and Handball players at different topography. All the research studies were presented in the section proves that there was a significant difference exists in view of fitness and personality traits of sportsman.

The research studies reviewed are from many journals available in the websites such as www.pubmed.gov, ERIC websites etcetera., employ the selected variables such as physical fitness, variables and psychological variables that too among players at school, college and university level.

The review of literature helped the researcher from the methodological point of view too. It was learnt that most of the research studies cited in this chapter on content analysis and methods as the appropriate methods for finding out the lapses and remediation.

Chapter III

METHODOLOGY

The manner of handling the various details of experiment is extremely important to the success of research. Research methodology involves the systematic procedures by which the researcher starts from the initial identification of the problem to its final conclusion.

This chapter describes the procedures followed in the selection of subjects, selection of variables, selection of tests, competency of the tester, instruments reliability, reliability of the data, orientation to the subjects, method of research, administration of the questionnaire, Cattell's 16PF Questionnaire, administration of tests, measuring procedure in physical fitness test, data collection, and research design and statistical procedures were discussed.

3.1 SELECTION OF SUBJECTS

The purpose of the study was to analysis the physical fitness and personality traits of Basketball and Handball players at different topography. To achieve the purpose of the study, a total of three hundred players (Basketball (n=150) and Handball (n=150)) were selected randomly as subjects from the Colleges and Universities of Kerala, India. The age of the subjects ranged from 18 to 25 years.

The selected Basketball and Handball players were divided into three groups according to their representation in sports. Each group consisted 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, the priceless product on earth. 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

Psychological Variables

Personality Traits (Cattell's Sixteen Personality Factor)

Variable	Low scores	High scores
1 A	Reserved and critical	Participating and outgoing
2 B	Concrete-thinking	Intellectual and analytic
3 C	Easily annoyed or upset	Stable and secure-feeling
4 E	Mild, conforming, submissive	Dominant and stubborn
5 F	Prudent and serious	Enthusiastic and spontaneous
6 G	Unreliable and self-indulgent	Conscientious
7 H	Restrained and shy	Socially uninhibited
8 I	Self-reliant and tough	Sensitive and humanistic
9 L	Trusting and accepting	Suspicious, critical, opinionated
10 M	"Proper", conventional	Imaginative, unconcerned
11 N	Natural, forthright	Shrewd and deliberate
12 O	Self-confident	Guilt-prone
13 Q1	Overly cautious, traditional	Free-thinking, tolerant of ideas
14 Q2	Emotionally group dependent	Resourceful, self-organizing
15 Q3	Casual and non-integrated	Precise and orderly
16 Q4	Satisfied, emotionally relaxed	Fretful, tense

3.3 SELECTION OF TESTS

The present study was undertaken primarily to analysis the physical fitness and personality traits 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.

**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
7.	Personality traits	Cattell's 16PF Questionnaire	In Numbers

3.4 COMPETENCY OF THE TESTER

The investigator took all the measurements in this study with the assistance of coaches of concerned college, district and university teams. To ensure that the investigator was well versed in the technique of conducting tests, researcher underwent a number of practice sessions in the correct testing procedure. The tester's reliability was established by test and re-test method.

3.5 INSTRUMENT RELIABILITY

The instruments used for the study such as stopwatch, portable weighing machine and flexible steel tapes were new and in good condition. Hence, its calibration was accepted as accurate enough for research work. The instruments were purchased from reliable and standardized companies and were considered accurate enough for the purpose of the study.

3.6 RELIABILITY OF THE DATA

Test and retest method was followed in order to establish the reliability of data by using ten subjects selected at random. The same persons under similar conditions tested all the dependent variables selected in the present study twice for the subjects. The intra class co-efficient of correlation was used to find out the reliability of the data and the results are presented in Table 3.2.

TABLE 3.2
INTRA CLASS CO-EFFICIENT OF CORRELATION ON SELECTED
VARIABLES

S.No.	Variables	'R' Value
1	Strength	0.95*
2	Strength Endurance	0.93*
3	Agility	0.89*
4	Explosive Power	0.88*
5	Speed	0.87*
6	Cardiovascular Endurance	0.86*

*Significant at 0.01 level of confidence. (Table value required for significance at 0.01 level of confidence is 0.77)

Since the obtained 'R' values were much higher than the required values, the data were accepted as reliable in terms of instrument, tester and the subjects.

3.7 ORIENTATIONS TO THE SUBJECTS

The investigator explained the purpose of the study to the subjects and their part in the study. For the collection of data, the investigator explained the procedure of testing on selected dependent variables and gave instructions about the procedure

to be adopted by them for measuring. The subjects of all the groups were sufficiently motivated to perform their maximal level testing periods.

3.8 METHOD OF RESEARCH

The scholar adopted survey method of research for his investigation. The scholar gathered data in the form of responses to physical fitness and personality traits from the colleges, districts and universities in Kerala State, India.

3.9 ADMINISTRATION OF THE QUESTIONNAIRE

The investigator administered the questionnaire to three hundred subjects. The investigator collected the data from the subjects before their matches during their rest time. The purpose of the study was clearly mentioned. The investigator explained the subjects about the uses of the question and meaning of each questions and how to fill the questionnaire. Care was taken to see that the subjects answered the entire questions. The subjects were asked to answer the questions individually. It was assured to the subjects that their response would be kept confidential and would in no way influenced their performance and therefore they could give honest response without any sense of fear or apprehension. The filled up questionnaires from respondents were collected after checking all the items were responded and using the scoring key the total scores obtained by each subjects were tabulated.

3.10 CATTELL'S 16PF QUESTIONNAIRE

Due to its scientific origins, the 16PF Questionnaire has a long history of empirical research and is embedded in a well-established theory of individual differences. This questionnaire's extensive body of research stretches backs over half a century, providing evidence of its utility in clinical, counseling, industrial-

organizational, educational, and research settings (Cattell, R.B. Eber, H.W. & Tatsuoka, M.M, 1970; Cattell H.E.P. and Schuerger, 2003; Conn and Rieke, 1994; Krug and Johns, 1990). A conservative estimate of 16PF research since 1974 includes more than 2,000 publications (Hofer and Eber, 2002). Most studies have found the 16PF to be among the top five most commonly used normal-range instruments in both research and practice (Butcher and Rouse, 1996; Piotrowski and Zalewski, 1993; Watkins, C.E., Campbell, V.L., Nieberding, R. & Hallmark, R., 1995). The measure is also widely used internationally, and since its inception has been adapted into over 35 languages worldwide.

<i>Descriptors of Low Range</i>	<i>Primary Scales</i>	<i>Descriptors of High Range</i>
Reserved, Impersonal, Distant	Warmth (A)	Warm-hearted, Caring, Attentive To Others
Concrete, Lower Mental Capacity	Reasoning (B)	Abstract, Bright, Fast-Learner
Reactive, Affected By Feelings	Emotional Stability (C)	Emotionally Stable, Adaptive, Mature
Deferential, Cooperative, Avoids Conflict	Dominance (E)	Dominant, Forceful, Assertive
Serious, Restrained, Careful	Liveliness (F)	Enthusiastic, Animated, Spontaneous
Expedient, Nonconforming	Rule-Consciousness (G)	Rule-Conscious, Dutiful
Shy, Timid, Threat-Sensitive	Social Boldness (H)	Socially Bold, Venturesome, Thick-Skinned
Tough, Objective, Unsentimental	Sensitivity (I)	Sensitive, Aesthetic, Tender-Minded
Trusting, Unsuspecting, Accepting	Vigilance (L)	Vigilant, Suspicious, Skeptical, Wary
Practical, Grounded, Down-To-Earth	Abstractedness (M)	Abstracted, Imaginative, Idea-Oriented
Forthright, Genuine, Artless	Privateness (N)	Private, Discreet, Non-Disclosing
Self-Assured, Unworried, Complacent	Apprehension (O)	Apprehensive, Self-Doubting, Worried
Traditional, Attached To Familiar	Openness to Change (Q1)	Open To Change, Experimenting
Group-Orientated, Affiliative	Self-Reliance (Q2)	Self-Reliant, Solitary, Individualistic
Tolerates Disorder, Unexacting, Flexible	Perfectionism (Q3)	Perfectionistic, Organized, Self-Disciplined
Relaxed, Placid, Patient	Tension (Q4)	Tense, High Energy, Driven

3.10.1 Reliability of the Questionnaire

Test–retest reliabilities (measuring temporal consistency or stability) are documented in the *16PF Fifth Edition Technical Manual* (Conn S.R., and Rieke M.L., 1994). For the 16PF primary scales, test–retest reliabilities average 0.80 over a two-week interval (ranging from 0.69 to 0.87), and 0.70 over a two-month interval (ranging from 0.56 to 0.79). The five global scales of the 16PF Questionnaire show even higher test–retest reliabilities (they have more items); they average 0.87 for a two week interval

(ranging from 0.84 to 0.91), and 0.78 for a two-month interval (ranging from 0.70 to 0.82). International 16PF editions also show strong test–retest reliabilities. For example, two-week test–retest reliabilities for the Norwegian edition average 0.80 for primary scales and 0.87 for global scales (**IPAT, 2004b**); for the German edition, primary scale reliabilities average 0.83 over a one month interval (**Schneewind and Graf, 1998**); for the Danish edition, primary scale reliabilities average 0.86 over a two-week interval (**IPAT, 2004c**); and for the French edition, one-month reliabilities average 0.73 (**IPAT, 1995**).

3.10.2 Internal consistency of the Questionnaire

Internal consistency indicates the degree of inter-relatedness or homogeneity of the items in a scale, and is thus a good estimate of reliability for narrowly defined scales. Internal consistency estimates for the 16PF primary scales on a diverse sample of 4,660, range from 0.66 to 0.86, with a mean of 0.75 (**Conn and Rieke, 1994**). Normal internal consistency estimates are not appropriate for the global scales, because of their heterogeneous nature as weighted composites of primary scales. However, recently developed equations for estimating internal consistency in heterogeneous composites were applied, and average 0.87 over the five global scales.

Internal consistency for international versions of the instrument also meets professionally accepted standards. For example, Cronbach alphas averaged 0.74 in the German edition (**Schneewind and Graf, 1998**), 0.72 in the French edition (**Rolland and Mogenet, 1996**), 0.75 in the Japanese edition (**IPAT, 2007**), 0.69 in the Chinese edition (**Jia-xi and Guo-peng, 2006**), and 0.73 in the Spanish-American or Pan-Spanish edition (**H.E.P. Cattell, 2005**).

3.10.3 Procedure of Scoring Questionnaire

Though the test was untimed so the subjects were instructed not to delay unnecessarily and should try to answer as fast as possible but with concentration. The subjects were also instructed to write their, date of birth, body weight and weight and level of participation / position secured. The researcher checked the answer sheet of every subject as soon as they had understood the instructions clearly and were not committing mistakes in filling up the scores. After the subjects had completed the answer of 16 personality factors test (Appendix I). The answer sheet was thoroughly examined by the investigator to ensure that no question was left unanswered. Then in order to get raw scores of eight personality factors the Key A covered A,C,F,H,L,N,Q1,Q3 and Key B covered B,E,G,I,M,O,Q2,Q4 factors. The raw scores were converted into standard scores by using the standard norms table provided in the norms booklet of 16PF test for college, district and university level players.

The scoring procedure and conversion of raw score to Sten score for Cattell's 16PF questionnaire were presented in table 3.3 and 3.4.

TABLE 3.3
ARRANGEMENT OF ITEMS IN TEST FORMS WITH RESPECT TO FACTORS

Factor	Per Form		Position of High Scoring Response – Form A or B		
	No. of Total Score		(a)	(b)	(c)
	Items	Possible			
A	10	20	3,52,101,126,176	---	26,27,51,76,151
B	13	13	152,177,178	28,53,54, 78,103,128	77,102,127,153
C	13	26	4,30,55,104,105, 130,179	---	5,29,79,80,129, 154
E	13	26	7,56,131,155,156,180,181	---	6,31,32,57,81,106
F	13	26	33,58,83,132,133 182,183	---	8,82,107,108,157,158
G	10	20	109,134,160,184,185	---	9,34,59,84,159
H	13	26	10,36,110,111,135,136,186	---	35, 60, 61, 85, 86, 161
I	10	20	12,37,112,138,163	---	11,62,87,137,162
L	10	20	38,88,113,114,164	---	13,63,64,89,139
M	13	26	30,40,65,91,115,116,140	---	14,15,90,141,165,166
N	10	20	17,42,117,142,167	---	16,41,66,67,92
O	13	26	18,43,69,94,118,119,143	---	19,44,68,93,144,168
Q1	10	20	20,46,70,145,169	---	21,45,95,120,170
Q2	10	20	47,71,72,146,171	---	22,96,97,121,122
Q3	10	20	48,73,98,148,173	---	23,24,123,147,172
Q4	13	26	49,50,74,99,124,149,174	---	25,75,100,125,150,175

The item numbers and the direction of scoring are identical on Forms A. Factor A measure, with the left-hand (a) answer the high-scoring pole. The alternative (a) or (c) which is listed always indicates the response which contributes +2 to the factor score concerned. The “in between” answer always contributes +1 in such cases, the only exception to this being the B factor (Intelligence) where only the numbers indicated score anything (+1 in each case).

TABLE 3.4
CONVERSION OF RAW SCORE TO STEN SCORE

Factor	STEN SCORE									
	1	2	3	4	5	6	7	8	9	10
A	0-3	4	5-6	7-8	9	10-11	12-13	14-15	16	17-20
B	0-4	5	6	7	8	9	10	11	12	13
C	0-6	7-8	9-11	12-13	14-15	16-17	18-19	20	21-22	23-26
E	0-5	6-7	8-9	10-11	12-13	14-15	16-17	18-19	20-21	22-26
F	0-6	7-8	9-11	12-13	14-16	17-18	19-20	21-22	23	24-26
G	0-3	4-5	6-7	8-9	10-11	12-13	14-15	16-17	18	19-20
H	0-2	3-4	5-7	8-10	11-13	14-17	18-19	20-22	18-23	24-26
I	0-2	3	4	5-6	7-8	9-11	12-13	14	15-16	17-20
L	0-2	3	4-5	6-7	8	9-10	11-12	13	14-15	16-20
M	0-5	6-7	8	9-10	11-12	13-14	15-16	17-18	19	20-26
N	0-2	3	4-5	6	7	8-9	10	11	12-13	14-20
O	0-2	3-4	5-6	7	8-9	10-12	13-14	15-16	17-18	19-26
Q1	0-3	4	5-6	7-8	9	10-11	12	13-14	15	16-20
Q2	0-2	3-4	5-6	7-8	9	10-11	12-14	15	16-17	18-20
Q3	0-4	5-6	7-8	9	10-11	12-13	14	15-16	17	18-20
Q4	0-3	4-5	6-7	8-10	11-12	13-15	16-17	18-19	20-21	22-26

(Tatsouke, M.M. (1959). Standardized Scales: Linear and area transformations. Selected topics in advanced statistics, No.2. Champaign IPAT.)

3.11 ADMINISTRATION OF TESTS

3.11.1 Strength (Pull – ups)

Purpose

To measure arm and shoulder strength.

Facilities and equipment

A metal bar approximately 1 inch in diameter is placed at a convenient height. However for the lower age levels a door way gym bar is used. At times it may be necessary to improvise by using such equipment as a basketball goal support or a ladder.

Procedure

The bar is adjusted to such height that the subject can hang free of the floor. The subject should grasp the bar with his. Palms facing away from his body (over hand grasp). The student should then raise his body until his chin is over the bar and then lower it again to the starting position with his arms fully extended.

Instructions

The subject is not allowed to lift his knees to assist his pull-up by kicking. He must return to the 'hang' position with the arms fully straight. He will not be permitted to swing or snap his way-up.

Scoring

One point is scored each time the student completes a pull-up. Part scores do not count and only one trial is permitted unless it is obvious that the student did not have a fair chance on his first trial.

3.11.2 Strength Endurance (Sit-ups)

Purpose

To measure the abdominal strength and endurance.

Facilities anti Equipment

The mats are used to perform the sit-ups.

Procedure

The student lies flat on the back with knees bent and feet on the floor with the heels no more than one foot from the buttocks. The knee angle should be no less than 90 degrees. The fingers are interlocked and placed behind the neck with the elbows touching the floor. The feet can be held securely by a partner. The students then curl-up to a sitting position and touch the elbows to the knees. This exercise is repeated as many times as possible in the time requirement.

Instructions

The fingers must remain interlocked and in contact with the back of the neck at all times. He can curl-up from the starting position but he may not push off the floor with an elbow. When the subject returns to the starting position, his elbows must be flat on the mat.

Scoring

One point is scored for each correct situp. The score is the maximum number of sit-ups completed in 60 seconds.

3.11.3 Agility (Shuttle Run)

Purpose

To measure the speed and agility of the players.

Facilities and Equipment

Two lines parallel to each other are drawn on the floor 30 feet apart. Since the student may over run both of these lines it is necessary to have several feet more of floor space at either end. Two blocks of wood 2 inches by 4 inches and a stop watch are needed.

Procedure

The subject stands at one of the lines with two blocks at the other line. On the signal to start, the subject runs to the blocks takes one and returns to the starting line. He then turns to the second block, which is carried across the starting line on the way back. Two students can run at the same time if 2 timers are available. Two trials are permitted. The students start first from one line and then at the other, it is not necessary to return the blocks after each race.

Instructions

On the signal to 'go the subject runs as fast as he can to the next line and pickup a block. He should return the block over the second line where he placed it on the floor. He is not allowed to throw it. He shall return for the second block and this time he may run across the starting line as fast as he can without placing the blocks on the floor.

Scoring

The score is the elapsed time recorded in seconds and tenth of seconds for the better of 2 trials.

3.11.4 Standing Broad Jump

Purpose

To measure the power.

Facilities and Equipment

Measuring tape and a mat space on the floor an outdoor jumping pit.

Procedure

The subject stands behind a take off line with his feet several inches apart. Before jumping the subject dips at the knees and swings the arms backward. He then jumps forward by simultaneously v” extending the knees and swinging the arms forward. Three trials are permitted. Measurement is from the closest heel mark to the take off line. In door administration is best accomplished by placing a tape measure on the floor at right angles to the take off line and permitting the students to jump along the line. Measurement can then be made by sighting across the tape to the point of the jump.

Instructions

The subject must take off from both feet simultaneously, jump as forward as possible and land on both feet. Try not to fall backward after the landing. He can jump further by crouching before the jump and swinging his arm. Three trials were given.

Scoring

The score is the distance between the take off line and the nearest point where any part of the student s body touches the floor. It is measured in feet and inches to the nearest inch. Only the best trial is recorded.

3.11.5 50 Yards Dash

Purpose

To measure the speed.

Facilities and Equipment

Track area, football field or playground with a starting line, a 50 yards course and a finish line. Two stop watches or a split second timer.

Procedure

After a short warm up period the subject takes a position behind the starting line. Best results are obtained when 2 students run at the same time for competition. The starter uses the command 'Are you ready?',

The latter is accompanied by a downward sweep of the arm as a signal to the timer. The subjects run across the finish line. One trial is permitted.

Instruction

The subject can take any position behind the starting line he wishes. On the command 'Go', he can run as fast as he can across the finish line. He should not slow up until he crosses the finish line. Then he may slow down gradually.

Scoring

The scores is the elapsed time to the nearest tenth of a second between the starting signal and the instant, the student crosses the finish line.

3.11.6 600 Yards Run or Walk

Purpose

To measure the endurance.

Facilities and Equipments

400m standard track and stop watch.

Procedure

Subjects may run individually or they may run in group of a dozen more. When students run in groups they should be paired into partners. While one student runs the partner listens for the timer to call out his partner time. When he crossed the finish line and relay this time to the scorer. Students may inter space running with periods of walking and should be encouraged to pace themselves when a group is running the timer can call out times as each student crosses the finish line.

Instructions

The subject should run 3 times around this course and finish at the line. This is clearly marked. He should run as fast as he can and then he may have to walk for a short space of time. He should try to keep running, but keep going or a speed he thinks he can maintain.

Testing Personnel

One trained tester may operate the stopwatch and call the times and one assistant is needed to record the scores.

3.12 MEASURING PROCEDURE IN PHYSICAL FITNESS TEST

The tests were administered in the morning from 7.00 AM to 8.30AM and in the evening from 5.00 PM to 6.30PM at the time of their practice during the academic session. Sufficient time for warming up was given to the subjects before

administering the test. Each test was demonstrated and instructions were given for obtaining the best results. The whole test included six test items such as: pull up, bent-knee sit up shuttle run, standing broad jump, 50yard dash and 600-yard run or walk. The scores at each test item were marked by the investigator in the test card.

3.13 DATA COLLECTION

The investigator explained the significance of the study to coaches, lecturers in physical education, various levels of basketball and handball players like inter-college, inter-district level and inter-university and they were requested them to extend cooperation in order to collect psychological data of players. All the coaches and lecturers in physical education agreed to render full cooperation to the researcher. The subjects were given necessary instructions. They should express their frank opinion as per what they felt about themselves as per each question in the questionnaire.

3.14 RESEARCH DESIGN AND STATISTICAL PROCEDURE

The static group comparison design was used for this study. The collected data were analysed by using independent t-test to find out the difference, if any, between the basketball and handball players and one way analysis of variance (ANOVA) was used to find the difference if any among the intercollegiate, interdistrict and interuniversity handball and basketball players on the selected physical fitness variables and personality traits. Whenever, the obtained F-ratio was found to be significant, the Scheffe's test was used as post hoc test to find out the difference among the paired means. In all the cases .05 level of significance was used to test the hypothesis.