Chapter – II

REVIEW OF RELATED LITERATURE

The research scholar has made sincere efforts to locate the literature related to the present study. The relevant studies found through various sources have been enumerated below:

Rawal\(^1\) conducted a study to compare the coordinative abilities of basketball and handball players. 30 intervarsity players of basketball and handball of LNIPE, Gwalior were selected for the study. The data was collected by administrating various coordinative ability tests as suggested by Peter Hirtz. To find out the significant difference ‘t’-ratio was employed at 0.05 level of significance. The results of the study were:

1. Basketball and Handball players differ significantly in balance ability and reaction ability.

2. Basketball players and handball players do not differ significantly in orientation ability, differentiation ability and rhythm ability.

Dey\(^2\) conducted a study to compare co-ordinative abilities among different gymnastic ability groups. 100 Gymnasts of Inter-varsity level were selected randomly who participated in All India Intervarsity Gymnastic Championship, Amritsar in 2001-2002. To find out the significant difference, the analysis of variance was employed for testing the hypothesis at 0.05 level of significance. The result of the study showed significant difference between the level of gymnasts in the reaction ability, whereas the orientation ability, differentiation ability, balance ability and rhythm ability showed no significant difference.

Ghosh\(^3\) conducted a study to compare the coordinative abilities between the athletes of track events and the athletes of field events. 30 athletes of LNIPE Gwalior were selected as subjects for this study. In order to find out the significant difference of five coordinative abilities between sprinters and jumpers, the two sample ‘t’ ratio test was employed for testing the hypothesis at 0.05 level. Results indicated that:

1. Significant difference was found between the sprinters and jumpers in reaction and orientation ability.


2. There was no significant difference between sprinters and jumpers in differentiation ability, balance ability and rhythm ability.

Bakshi\(^4\) conducted a study on two groups of sports persons on co-ordinative abilities. The two groups were the track & field athletes and swimmers. The two groups were chosen because both the activities involved cyclic type of movement. They were tested on the co-ordinative abilities test as suggested by Peter Hirtz. The subjects chosen were either of inter collegiate level or inter university level. The test revealed that there was no significant difference in co-ordinative abilities of swimmers and track and field athletes.

Manilal, Sebastian and Thomas\(^5\) conducted a study to compare the co-ordinative abilities of Junior Indian Basketball Players and Junior Indian Volleyball Players. Twenty-One Girls who had attended the Junior Indian Volleyball and Basketball Coaching Camp were selected as subjects. A test suggested by Peter Hirtz was administered to evaluate the co-ordinative abilities of subjects. The 't-test' was employed to determine the mean difference in different co-ordinative abilities between volleyball and basketball female players. The result showed that the volleyball

\(^4\) Reema Bakshi, "Comparison of Two Groups in Co-ordinative Abilities" (Unpublished Master's Thesis, Jiwaji University, Gwalior, 1994).

players have better space orientation ability and reaction ability than the basketball players.

Pal\textsuperscript{6} conducted a study to compare the selected differential motives among contact, semi-contact and non contact sports at three different levels. For the purpose of the study 540 male subjects were selected from three categories (contact, semi-contact and non contact sports) at three levels (District, State and National). A total of 180 subjects were selected from each category. Mean scores and standard deviation (S.D.) were calculated in order to study profiles of differential motives of three categories of sports at three different levels. To compare the differential motives in different category of sports and at different level, T-Ratio was used at 0.05 level of significance. The results of the study indicated that there was no significant difference between the performance of the subjects, in relation to different sports in case of all the three motivation variables i.e. power motive (POW) motive to achieve success (MAS) and motive to avoid failure (MAF). This clearly indicates that motivation does not differ due to the nature of sports.

\textsuperscript{6} Yashpal, "A Comparative Study of Selective differential motives of Players participating in contact, Semi-Contact and Non-Contact Sports in relation to their sports achievement" (Unpublished Ph.D. Thesis, Kurukshetra University, Kurukshetra, 2002).
Senan\textsuperscript{7} conducted a study to compare the co-ordinative abilities of B.P.E. Student of LNIPE, Gwalior. 90 boys of B.P.E., I, II and III year of LNIPE, Gwalior were selected as subject for this study for testing the significant difference among the means in different co-ordinative ability tests of various groups. One way analysis of variance was used which was followed by Post-hoc comparison test to determine the significance between paired means. It was found that in case of orientation ability, differentiation ability and reaction ability, there was significant difference between I, II and III Year. But in case of balance ability there was no significant difference between I, II and III Year.

Sawata\textsuperscript{8} conducted a study to cross sectionally study the selected co-ordinative abilities and flexibility test of under graduates of LNIPE, Gwalior. 75 subjects from each class level of under graduation were selected from LNIPE, Gwalior. To find out the significant difference the analysis of variance was employed for testing the hypothesis at 0.05 level of significance.

\textsuperscript{7} Shine C. Senan, "Comparative Study of Coordinative ability of Bachelor of Physical Education Students", (Unpublished Masters thesis, Jiwaji University, 1994).
\textsuperscript{8} K. Mahesh Sawata, "Cross Sectional Study of selected co-ordinative abilities and flexibility tests of under graduates of Lakshmibai National Institute of Physical Education" (unpublished Master's Thesis. LNIPE, Gwalior, 2000).
Findings of the study were:

1. There was significant difference between the class levels from I Year till III Year in differentiation ability.

2. There was no significant difference between the class levels of I, II and III Year in orientation ability.

Kumar\(^9\) studied the cross section analysis of coordinative abilities of boys from 10 to 16 years of age. 240 boys with all age groups of Kendriya Vidyalaya No.1, Gwalior were selected as subjects for the study. To find out significant difference of means among various groups, an analysis of variance (F-ratio) was applied, which was followed by Scheffe’s test of post hoc comparison to determine the significance between the paired means. The analysis of data revealed that variance existed among different age groups in different coordinative abilities.

Dixit\(^10\) investigated the interrelationship of the reaction time, speed of movement and agility and their comparison among players from selected sports. She studied 48 male college students, 12 subjects from each selected sports (football, volleyball, kho-kho and kabaddi) from


Lakshmibai National College of Physical Education, Gwalior in the year 1982.

She found that reaction time, agility and speed of movement showed that players from these sports did not differ significantly, which may be due to the fact that the selected sports put same demand on these qualities and involve the use of same training method for their development.

The purpose of the study undertaken by Slater and Hammel\textsuperscript{11} was:

1. To compare reaction time measures for arm displacement and visual stimulus.

2. To compare reaction time measures for selected group of physical education and liberal art.

Analysis of the data revealed that only a modest relationship existed between the two reaction time measures. Significant difference in reaction time existed among several group for both reaction measures.

Lal\textsuperscript{12} conducted a study to examine the status of reaction time, anticipation and depth perception among various games and sports of

\textsuperscript{11} A.T. Slater and Hammel, "Comparison of Reaction Time Measures to a Visual Stimulus and Arm Movement", Research Quarterly 26 (December 1995): 470
high and low level sports person. 60 male subjects from various games like Hockey, Basketball, Football, Badminton, Gymnastic and Volleyball were selected from L.N.I.P.E., Gwalior. Two way analysis of variance was used to find out the significant difference. Reaction time showed significant difference in the level of performance among the group of various games and sports.

Mol\textsuperscript{13} conducted a study to determine relationship of selected coordinative abilities to shooting performance in hockey. 20 intervarsity male hockey players of LNIPE Gwalior were selected as subjects for the study. To find out significant relationship of coordinative abilities to shooting performance, product moment co-relation was employed.

The analysis of data revealed that there was no significant relationship of coordinative abilities to shooting performance.

Gautam\textsuperscript{14} conducted a study to determine relationship of coordinative abilities to shooting performance in basketball. 25 female basketball players of L.N.I.P.E., Gwalior were selected as subjects for this study. The necessary date was collected by administering

\textsuperscript{13} Dinesh Chandra Lal, "A study of reaction time, Depth perception and anticipation among high and low level sports person from various games and sports" (unpublished M.Phil Thesis, LNIPE, Gwalior, 1999).

\textsuperscript{14} Jinsy Mol N.G., "Relationship of Selected Co-ordinative abilities to shooting performance in Hockey" (Unpublished Master's Thesis, LNIPE, Gwalior, 2001)

coordinative ability test as suggested by Peter Hirtz. To find significant relationship, product movement correlation was employed. The analysis of data revealed that there was no significant relationship of coordinative abilities to shooting performance in basketball.

Sarkar\textsuperscript{15} conducted a study to determine relationship of coordinative abilities to shooting performance in soccer. 25 male football players of LNIPE, Gwalior were selected as the subject of this study. Data was collected by administrating various coordinative abilities test as suggested by Peter Hirtz. To find significant relationship product movement correlation was employed. The result of the study was that there was no significant relationship between shooting performance and coordinative abilities of footballers.

Bhanot and Sidhu\textsuperscript{16} studied the visual and auditory reaction time of the right hand and right foot of 59 subjects including Hockey Players and Volleyball Players, Weight Lifters and Gymnasts. The weight lifters were found significantly faster than hockey players and Volleyballers and Gymnasts for both visual and auditory reaction time of hand and foot. Hockey players were faster than Volleyballers as well as gymnasts for

both visual and auditory reaction time of hand and foot. However the
difference was significant only in auditory reaction time of hand and foot.
Volleyballers were faster than Gymnasts but the difference was not
significant. Visual and auditory reaction time of hand were faster than the
corresponding reaction time of foot in player of all the four events.

Sisodia\textsuperscript{17} conducted a study to determine the effect of
transcendental mediation programme on selected physiological variables
and coordinative abilities. 60 students studying in LNIPE and Jiwaji
University, Gwalior were selected as subjects of the study. The necessary
data was collected by administrating various coordinative ability tests as
suggested by Peter Hirtz. The significant difference between the pre-test
and post-test means for the score in each of the variable within the group
were analysed by ‘t’ test and the significance of mean difference between
the pre-test and post test scores in each of the criterion variable among
the group were analysed by employing analysis of co-variance. Findings
were:

1. In case of reaction ability, transcendental mediation had shown
   significant change in comparison to control group.

\textsuperscript{17} Anurodh Singh Sisodia “Effect of Transcendental Mediation on selected
Physiological Variables and Co-ordinative abilities in Judo” (Unpublished Ph.D.
2. In case of orientation ability, transcendental mediation did not improve performance significantly in comparison to the control group.

3. Transcendental mediation was found effective in enhancing differentiation ability performance as compared to non-mediators.

4. Balance ability was improved significantly as compared to control group.

5. In case of Rhythmic Ability, transcendental mediation had improved performance significantly in comparison to the non-mediators.

The purpose of the study undertaken by Knapp\textsuperscript{18} was the comparison of Reaction Time Measures to a visual stimulus and arm movement of selected group of varsity athlete, music and liberal arts. Analysis of data revealed that only a modest relationship existed between the two reaction time measures. Significant difference in reaction time was found among the several groups for both reaction time measures to a visual stimulus and arm movement”.

\textsuperscript{18} Barbara N. Knapp, “Comparison of Reaction Time Measures to a Visual Stimulus and Arm Movement”, \textit{Research Quarterly} 26:4 (December 1975) : 470.
Taylor\textsuperscript{19} studied the effects of cerebral palsy on the ability to plan and execute a gross motor movement, as measured by the fractionation of simple reaction time into its pre-motor and motor components. The experimental task required subjects to grasp and move a stylar with the right hand as quickly and accurately as possible to depress on end point target immediately following the onset of a green light. Two target sizes were used to study the effect of accuracy demands on the planning and execution of a gross motor movement. A 2×2 split plot fractional design was used to analyze the dependent measures of pre motor time, motor time, SRT and movement time.

A significant main effect for promoter time was found between groups providing empirical support for the hypothesis that spastic hemiplegic cerebral palsied youth requires increased time to plan a gross motor response when compared to non-handicapped youth. No significant findings for motor time provided empirical support for the hypothesis that spastic hemiplegic cerebral palsied youth require increased time to execute a gross motor response when compared to non-handicapped youth.

\textsuperscript{19} Parks Susan Taylor, “Comparison of Fractionated Reaction Time Between Cerebral Palsied and Non-Handicapped Youth” \textit{Dissertation Abstracts International} 48:3 (September 1987): 595-A.
Lotter$^{20}$ investigated the interrelationship among reaction time and speed of movement in different limbs. Two movements basic to sports skills: a modified baseball throw and a football kick, were studied on one hundred and five-college athletes of various activities. There was only a moderately high correlation between the reaction ability of right and left leg and between right and left arm. Arms versus legs correlation were significant but low. A similar pattern of correlation between limbs was found for movement ability, but all co-relation was considerably lower and movement specificity was high. The reliability of individual difference was high in all measures.

Prakash$^{21}$ conducted a study to compare physical and physiological profile of basketball and handball players. 35 basketball and 35 handball players, who were selected as subjects attending Junior National Coaching Camp at National Institute of Sports Patiala in the year 1994. The selected physical variables were speed, agility, arm and shoulder strength and flexibility. Physiological variables were pulse rate, blood pressure, vital capacity, skinfold measurement and fat percentage.

The data was collected by standard test and measurement procedure. The data was submitted to 't' test at 0.05 level of significance.

The 't' ratio indicated statistically no significant difference in Physical Variables of agility, shoulder and arm strength, flexibility and cardio respiratory endurance. The 't'-ratio showed no significant difference in physiological variables of pulse rate, systolic and diastolic blood pressure. Significant difference was found in fat percentage and skin fold measurement.

Haley\(^{22}\) investigated the effects of age on physical performance of elementary school boys of grade 1-6. 180 boys were randomly selected from each grade. Their age ranged from 69 to 146 months, the test were designed to measure Sprint speed, Power, agility, Reaction time, Static balance, Dynamic balance, Hip flexibility, Elbow flexion and Strength. The result revealed significant differences between the grade one and two and between 5 to 6 with the middle providing a plateau effect. The performance score formed a curvilinear relationship for all variables.

John\textsuperscript{23} conducted a study to examine and compare static and dynamic balance between three distinct groups of elders. The three groups were as follows: Senior Olympians (SO, \(n = 20\)), Community dwellers (CD, \(n = 20\)), and Nursing home dependent (NHD, \(n = 20\)). Medial / lateral (M/L) anterior / posterior (A/P), and total (T) center of pressure movement (COP) were measured during 30 second static balance tests. A one-way analysis of variance was used for all dependent variables for the 30 second trials. A multivariate analysis of variance repeated measure design was used for the prolonged standing trials. Dynamic balance was measured via video analysis of gait.

Based on the results, the following conclusions were drawn: (1) M/L, A/P and COP movement was the highest in the NHD under all testing conditions for the 30 second static balance trials. (2) M/L, A/P and T COP movement was the highest in the NHD for each minute of the five minute prolonged standing trials. (3) The first minute of the prolonged standing trials presented the greatest values for total COP movement for all groups. (4) The magnitude of step width, foot angle and percentage of stance were greatest in the NHD for the dynamic balance trials.

\textsuperscript{23}Sigg, John A. "Static and Dynamic Balance in three groups of elders". Dissertation Abstracts International 55 No.3 (September 1994): 506-A.
Knapp\textsuperscript{24} investigated the reaction time of selected top class sportsperson and research students. Twenty top class male players from different sports were taken as subjects. The subject's reaction time was measured by his response to the cessation of light stimulus. The reliability of the test, ascertained by means of the parallel split halves technique (1) was +.846. The halves used were the means of the first 25 trials and those of the second 25 trials of each research students. He found that the reaction time of the sportsmen were significantly shorter than those of Research Students, and the variation in the reaction time of the sportsmen was significantly less than the variation in the reaction time of the research students.

Southard and Miracle\textsuperscript{25} conducted a study to determine the importance of timing during an auto-communicative ritual to successful performance. Eight members of a university basketball team served as subjects for this study. Each subject performed 15 free throws in each of four different conditions. Data were collected with a 16mm high speed camera. Types of behaviours, timing aspects of the ritual, successful attempts and shot mechanics were dependent measures. Analysis of variance (ANOVA) of dependent measures and Fisher's z scores from

\textsuperscript{24} Barbara N. Knapp "Simple Reaction Time of Selected Top Class Sportsmen and Research Students" Research Quarterly 32 (October 1961) p : 409.
correlation coefficients of dependent measures indicate that relative
timing of behaviour (rhythmicity) is more important to success than the
absolute time of rituals. Behaviours most important to free throw success
are those that may be totally controlled by the subject and yet remain
stable with changing conditions.

Youngen\textsuperscript{26} conducted a study to compare reaction and movement
times of women athletes and non athletes. Scores for reaction time and
movement time, as measured on an electronic apparatus, of 47 women
athletes were compared with similar scores of 75 women non-athletes.
The athletes were further studied by grouping them by sport specialities –
tennis players, fencers, swimmers and field hockey players. It was
concluded that women athletes were significantly faster than women non
athletes in speed of movement and reaction. Also, tennis players,
swimmers, fencers and field hockey players differ significantly in speed
of movement, but they do not differ in reaction time. In addition, a
statistically significant relationship was found between reaction and
movement time.

\textsuperscript{26} Lois Youngen, "Comparison of Reaction and movement times of Women Athletes and Non Athletes \textit{Research Quarterly} 30 No. 3 (October 1959) : 349.
Vance\textsuperscript{27} conducted a study on Dynamic Balance tasks. It was administered on 2 successive days to 180 male and females in 3 age groups 7 – 8, 11 – 12 and 15 – 16. Comparisons of mean performance levels using the t test indicated no sex difference in balance performance. A 1-Way ANOVA and Tukey’s HSD Test applied to group mean scores suggested that balance performance increases with age with some evidence of a decline or leveling off in performance during puberty. Generality levels were markedly higher for females than for males in of the groups (ages 11-12 and 15-16), suggesting that, these tasks, there was some sex difference in generality of balance performance.

Hodgkins\textsuperscript{28} conducted a study on 930 men, women and children, ranging in age from 6-84 years to determine the differences between male and females of various ages in their speed of reaction and movement time. Results indicated that:

a) Males were faster than females in both reaction and movement time.

b) Peak speed was maintained longer by males in movement time and longer by females in reaction time.


\textsuperscript{28} Jean Hodgkins, “Reaction Time and Speed of Movement in Males and Females of Various Ages” \textit{Research Quarterly} 34 (October 1963) : 335.
c) In the majority of groups studied no relationship exists between speed of reaction and speed of movement.

Wilkinson\(^{29}\) conducted a study of reaction time measures to a kinesthetic and visual stimulus for selected groups of athletes and non-athletes. The subjects were 50 non-athletes and 100 university athletes. The athletes were divided into four equal groups of wrestlers, baseball players, football players and basketball players. In completion of kinesthetic response, the sudden displacement of subjects supported arm served as the stimulus, and the lifting of near glow lamp constituted the visual stimulus. It was observed that the reaction time to visual stimulus of athletes were significantly faster than non-athletes. Wrestlers had significantly faster reaction time to kinesthetic stimulus than all other groups, baseball players and non athletes were not significantly slower than all other groups but were not significantly different from each other.

Lemon and Sherbon\(^{30}\) conducted a study on the relationships of certain measures of rhythmic ability and motor ability in girls and women. The tests of rhythm were administered with controlled technique to 100 college women, who were selected randomly from three groups.


There was definite although low correlation between rhythmic ability and motor ability in college women as measured by the four tests i.e. Brace Scale of Motor Ability, Carl Seashore Test of Perception of Rhythm, Robert Seashore Test of Motor Rhythm and an Original Rhythm Test.

Atwell and Elbel\textsuperscript{31} studied the voluntary or involuntary response of individuals to stimuli under various conditions. The study was conducted in an attempt to determine whether a significant difference in simple reaction time existed between age groups of male high school students. In this study 247 male high school students ranging in age from 14 to 17 years were used as subjects. They were divided into their respective age groups and tested individually by the same tests for speed of hand and body movement in response to stimulus. The data were presented in terms of mean scores for age groups based upon 7 trials for each subject for hand response. The coefficients of correlation between hand and body response for each group were also calculated. It was seen that for the hand response, there was more rapid mean responses with each successive age group. Also there was variation in response with increase in age.

\textsuperscript{31} William O' Atwell and Edwin R. Elbel, "Reaction Time of Male High School Students in 14-17 Years Age Groups". \textit{Research Quarterly} 19 (March 1948) : 22-29.
Keller measured the reaction time of 359 athletes and 274 non-athletes from two schools and university, whole body movement was made in response to light stimulation. Athletes group responded faster than non-athlete. He reported that Baseball, Basketball, Football and Track Athlete comprising a group, showed significantly faster reaction time than the group including Gymnastics, Swimming and Wrestling but no significant differences was found between the sports within these group.

57 skilled performers and 31 control subjects were measured for auditory and visual perception of rhythmic and motor response by Huff to both the auditory and visual rhythms. Greater variation was found in visual perception than auditory and athletes did not appear to have any greater ability to perceive either type of rhythm than a control group.

Anderson and Sidaway conducted a study to examine the changes in coordination associated with practice of a soccer kick. Video records were collected on 6 novice, right-footed soccer players prior to and after 20 regularly scheduled kicking practice sessions. Three experienced

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32 Luice B. Keller, “The Relationship of Quickness of Body Movement to Success in Athletics” Research Quarterly 13 (May 1940) : 146.
players were also videotaped for comparison. Movement of the right leg was digitized and analysed using motion analysis software. As a result of practice, subjects were able to significantly increase the maximum resultant linear velocity of the foot, and these increases were accompanied by changes in the pattern of coordination underlying the movement. These changes were assessed qualitatively through the topological characteristics of the relative motions of the hip and knee and quantitatively through three different timing variables.

Slottan and Harold\textsuperscript{35} conducted a study on the performance of selected motor coordination tasks by young boys and girls of six socio-economic groups and concluded that the task performance of children from the low socio-economic levels were superior to performance of children from average ad high socio-economic level.

Wilson\textsuperscript{36} found when a series of rhythmic signals were presented with equal probability that any of them might be accompanied by a stimulus to react, the average reaction time was 6% faster than when the signals were non-rhythmic. Further, he concluded that reaction time is faster when potential stimuli are presented in a rhythmic rather than non-

\textsuperscript{36} Don J. Wilson, "Quickness of Reaction and Movement Related to Rhythmicity and Non-rhythmicity of Signal Presentation" Research Quarterly 30:1 (1957) : 101.
rhythmic series during the development of fundamental motor skills at the elementary grade level than teaching and practice without rhythmic accompaniment.

Ethyre and Kinugasa\textsuperscript{37} conducted a study to compare reaction time (RT) and fractionated RT components (pre-motor and motor times) between normal and post-contraction conditions. Twelve participants performed 20 trials each of control and post-contraction RT conditions. Results indicated that the post-contraction condition was significantly faster than the control condition for the average RT, pre-motor time, and motor time. It was concluded that reaction time, processing time and muscular contraction time for a learned task could be significantly reduced following an isometric contraction.