Chapter II

REVIEWS OF RELATED LITERATURE

A review of related literature is a summary and synthesis of relevant literature to the research problem. It is an integral part of any research that equips the researcher with an understanding of previous work done in the field. In this chapter the literature confining the studies which are contributing towards the direction for present study are presented.

Kakram, S., (2015) conducted a comparative study on coordinative abilities among male softball players and cricketers. Purpose of the study is to find out the significance difference of coordinative abilities between male softball players and cricketers. Forty male subjects aged between 18-25 years, who participate in interuniversity competition from L.N.I.P.E., Gwalior, those who volunteered to participate in this study were selected for this study. The following variables were selected for the study coordinative abilities: reaction ability, orientation ability, differentiation ability, and rhythm ability. All the calculation of data and interpretation of data t-test were used and level of significance set at 0.05. Conclusion of the study was showed significant difference was found in reaction ability, orientation ability and differentiation ability the cricketers had better reaction ability, orientation ability and differentiation ability in comparison to softball players. The insignificance difference was found in rhythmic ability softball group had better rhythmic ability in comparison to cricket group.

Kar S., (2014) conducted a study on comparative study between coordinative abilities of artistic and rhythmic gymnasts. Purpose of the study was to analysis the selected coordinative abilities of university level artistic and rhythmic gymnasts. The subjects for this study were taken from All India Intervarsity Gymnastics Championship, Organized by Guru Nanak Dev University, Amritsar, 2003, who were participated in this Championship. Subjects – A total of forty (40) gymnasts (20 from artistic gymnastics and 20 from rhythmic gymnastics) were selected. The following variables were selected for the study coordinative abilities: balance ability, reaction ability and rhythm ability. Criterion measures- To measure the coordinative abilities of artistic and rhythmic gymnasts the following authentic tests were use. Reaction ability by ball reaction exercise test, Balance ability by long nose test and Rhythm ability by sprint at given
rhythm test. All the calculation of data and interpretation of data t-test were used and level of significance was set at 0.05. Results of the study revealed that significant difference was not found between artistic and rhythmic gymnasts in relation to reaction ability, balance ability and rhythm ability. The insignificant difference in reaction, balance and rhythm ability may be due to the fact that artistic and rhythmic gymnastics elements which may be difficult or easy required equal amount of selected coordinative abilities. The results indicated that insignificant differences in the coordinative abilities of both the groups because of both the activities were cyclic in nature.

Singh, A., and Gaurav, V., (2014) conducted a study on physical status and coordinative abilities among female football players in relation to different playing positions. The purpose of this study was to examine physical status and coordinative abilities among university level female football players in relation to different playing positions i.e. Goalkeepers, defenders, midfielders and attackers. A sample of forty (N = 40) female football players which includes ten each goalkeepers, defenders, midfielders and attackers, who participated in inter-college competitions of Guru Nanak Dev University, Amritsar, India, was selected. All the participants were informed about aim and methodology of the study and they volunteered to participate in this study. The study was conducted on selected coordinative abilities i.e. Orientation ability, differentiation ability, reaction ability and balance ability. One way Analysis of Variance (ANOVA) was applied to find out the significance of differences with regard to coordinative abilities among female goalkeepers, defenders, midfielders and attackers in football. Scheffe’s post-hoc test was applied to see the direction and significance of differences where ‘F’ value found statistically significant. The level of significance was set at 0.05. Conclusion of the study was showed that goal keepers had better orientation ability, reaction ability and balance ability than their counter parts; defenders, midfielders and attackers. It is also observed that attackers had better orientation ability, reaction ability and balance ability than their counterparts; defenders and midfielders. However, defenders showed better differentiation ability than goalkeepers, midfielders and attackers. Further, significant differences were found between football players of different playing positions with regard to orientation ability (p < 0.05) and balance ability (p < 0.05) but in significant differences were found with regard to differentiation ability (p > 0.05) and reaction ability (p > 0.05).
**Bhat et. al. (2013)** conducted a study on comparison of dynamic balance in collegiate field hockey and football players using star excursion balance test. A total thirty university level players, football (n=15) and field hockey (n=15) were participated in the study. Dynamic balance was assessed by using star excursion balance test. The testing grid consisted of 8 lines each 120 cm in length extending from a common point at 45º increments. The subjects were instructed to maintain a stable single leg stance with the test leg with shoes off and to reach for maximal distance with the other leg in each of the 8 directions. A pencil was used to point and read the distance to which each subject’s foot reached. The normalized leg reach distances in each direction were summed for both limbs and the total sum of the mean of summed normalized distances of both limbs were calculated. There was no significant difference in all the directions of star excursion balance test scores in both the groups. Additionally, composite reach distances of both groups also found non-significant ($P=0.5$). However, the posterior ($P=0.05$) and lateral ($P=0.03$) normalized reach distances were significantly more in field hockey players. Field hockey players and football players did not differ in terms of dynamic balance.

**Esfahankalati, A., & Venkatesh, C., (2013)** conducted a study on relationship between coordinative abilities and performance in elite female handball players. The purpose of this study was to determine the relationship between coordinative abilities and performance in elite female Handball players. 120 elite Handball players were selected as subjects and aged between 18 to 25 years. The following variables were selected for the study coordinative abilities: orientation ability, differentiation ability, and rhythm ability. All the calculation of data and interpretation of data descriptive statistics were used and correlation test was used for find out the relationship of coordinative abilities and performance. In conclusion there was a significant correlation between rhythm ability and orientation ability and performance in elite female handball players. Therefore coordinative abilities - rhythm ability and orientation ability- had effect on performance in elite female handball players.

**Kumar (2013)** conducted a study on comparison of coordinative abilities of kabaddi and kho-kho female players at college level. The sample of the study was 20 Kabbadi women players and 20 Kho-Kho women players of age ranging 17-21 years. These players of Kabaddi & Kho-Kho games had participated at university level tournaments.
For analysis of the data ‘t-test’ was used. The study concluded that the Kho-kho players possessed better balance ability as compared to the kabaddi player. It also concludes that there was no difference in terms of agility and differentiation ability between kho-kho and kabbadi games players.

Nigam (2013) conducted a study to compare the various coordinative abilities among artistic and rhythmic gymnasts. For the purpose of the study 40 gymnasts were selected from the All India Intervarsity Gymnastics Championship, G.N.D.U. Amritsar, 2003. Five subjects from each group were selected randomly to establish the reliability of the coordinative ability by using test-retest method. To find out the significant difference between artistic and rhythmic gymnasts on coordinative abilities T-test were used and level of significance was set at 0.05. The results of the study revealed that there is no significant difference between artistic and rhythmic gymnasts. The various coordinative abilities i.e. orientation ability, differentiation ability, reaction ability, balance ability and rhythm abilities did not vary in performing the skills or element. The finding may be due to the fact that artistic and rhythmic gymnastics elements which may be difficult or easy required equal amount of orientation, differentiation, reaction, balance and rhythm abilities. It was concluded that there is no significance difference between artistic and rhythmic gymnast on orientation ability, differentiation ability, reaction ability, balance ability and rhythm ability.

Singh (2013) conducted a study to find out the differences in coordinative abilities of All India Interuniversity, Inter collegiate and under-19 School basketball players. For the purpose of the study 150 Basketball players were selected as subjects (50 All India interuniversity players, 50 inter college players and 50 under-19 school players). The subjects were thoroughly acquainted with the testing procedure as well as the purpose and significance of the study. Technique of one-way analysis of variance (ANOVA) was used to study the significance of difference in selected coordinative abilities between three different competition levels. Scheffe Post-hoc test was applied to find out mean differences among different levels. In order to check the significance, level of significance was set at 0.05. It was concluded that there were significant differences between All India Inter University, Inter College and Under-19 School Junior Basketball players for their differentiation ability and orientation ability.
Anwar (2012) conducted a study to evaluate the effectiveness of mastering the skill performance for receiving serve to the level of motor coordinative abilities for volleyball players. The researcher used the descriptive method due to its relevance to the nature and search procedures. Sample consisted of 24 boys students (experimental sample of 14 students - 10 students exploratory sample), of fourth year, 2008/2009 session of Faculty of Physical Education, Zagazig University. They were specialized students in volleyball. Researcher selected tools and means of data collection in three main sections as follows: Motor coordinative abilities tests, the motor unit of analysis "Elite" tools, and measuring devices. The researcher used statistical processors: Coefficient t - test, correlation coefficient, and multiple regression analysis. As result and conclusions of the study showed us the values of the level of compatibility capacity tests were an important indicators suitable capacity in evaluating the level of interoperability of the volleyball players. The predictive equations to evaluate the effectiveness of mastering the skill performance was: the level of capacity compatibility = 0.19 + (-0.060 × vertical velocity of the center point of gravity body moment beginning to touch the ball of the arms) + (0.813 × angular velocity of the elbow joint moment beginning to touch the ball of the arms) +0.204 × speed horizontal moment end up of the arms) + -0.111x the horizontal displacement of the front foot touching moment for land) + (0.354 × angular change of the shoulder joint moment beginning to touch the ball of the arms).

Hosseini et. al. (2012) conducted a study on change in certain physical fitness factors after the whole-body vibration and strength training. The present research was a comparative study of the effect of whole-body vibration and strength training on dynamic balance in students. Only male students of IAU, Abhar Branch, 90 students voluntarily participated in the research. The participants were divided into three groups of 30 subjects– vibration training, strength training, and control. Star excursion balance test was used to estimate the dynamic balance of the subjects in the pretest and posttest. Accordingly, the reach distance of the subjects in the eight directions of Star excursion balance test was measured in cm, divided by leg length and multiplied by 100; yielding subjects' reach distance as an ability to maintain balance. Muscle endurance was estimated by sit-ups, agility by 36-meter run, and speed by 60-meter run. After obtaining the pretest data, the vibration training group undertook whole-body vibration exercises for six weeks and the strength training group performed strength exercises in a similar
period. During this period the subjects in the control group continued their normal daily activities. Descriptive statistics, one-way analysis of variance, and Tukey's post hoc test were applied for data analysis at the 0.05 significance level. The results of one-way ANOVA showed that in the pretest there was no significant difference between the subjects of the three groups in dynamic balance ($p > 0.05$), yet this difference was significant in the posttest ($p < 0.001$). Given the findings of the research, it can be recommended to physical fitness trainers and sport planners to make use of strength and vibration training for improving dynamic balance at different stages of general preparation, especially whole-body vibration training due to having greater effectiveness and reducing the risks of injury.

**Khetmalis (2012)** conducted study to compare the selected coordinative abilities and motor abilities of female athletes of international schools. In the present study Ninety female subjects age ranged from 15 to 17 years were selected from three international schools (Symbiosis International School, Victorious Kids and Mercedes Benz) of Pune, Maharashtra, India. Thirty subjects were selected from each of the schools. International Schools, female athletes of Pune. To compare the selected coordinative abilities and motor abilities of female athletes of international schools, the mean, standard deviation and analysis of variance was applied at 0.05 level of significance. The value of F ratio of different schools female athletes in relation to Reaction ability was less than the tabulated (3.09), whereas it was greater than the tabulated (3.09) for female athletes in relation to orientation ability. It was significant in case of orientation ability, differentiation ability, explosive strength and 12 min.run/walk. It was concluded that the nature of abilities at all the selected international schools are more or less similar in nature. Mercedes Benz female players possess better 12 min. run/walk and explosive strength than the other school athletes.

**Kumar (2012)** conducted a study to compare male judoka among different weight categories on selected motor abilities such as speed, muscular endurance, explosive strength, flexibility and coordinative abilities (five types of coordinative abilities) of Judo players among seven different weight categories, which were state position holder and participated in national judo championship. For the study seventy male judo players, who had won medals position in Delhi state judo championship or participated in
national judo championship in 2009 and 2010. Only ten Judo players of each seven categories were selected as subjects for the study. Keeping the feasibility criterion in mind, especially in the case of availability of instruments, the following motor abilities were selected i.e. Speed- 40m sprint, explosive jump by vertical jumping ability, muscular strength of abdomen muscles by one minute sit-ups, flexibility by sit and reach test and coordinative ability with its five different types like reaction ability, orientation ability, differentiation ability, balance ability and rhythmic ability. The necessary data was collected with standardized procedure by administering selected motor abilities tests as suggested by “Hardyal Singh”, Cooper and Peter Hirtz. The necessary work was done before the start of the test, the first practice sessions were administered several times of each test with the help of the Supervisor. All the tests were administered and explained to the subjects by the scholar categorically left no ambiguity. All the doubts of the subjects raised were clarified before taking the test. On the basis of the data analysis, limitations and finding of the present study the following conclusions were drawn: the significant difference was found in the speed motor abilities 40m sprint in relation to the various weight categories of Judo competition. The significance difference was found in the explosive vertical jumping ability in relation to the various weight categories of Judokas. The significant difference was found in the muscular strength- one minutes sit ups tests in relation to the various weight categories of Judo competition. The significance difference was found in the differentiation coordinative ability in relation to the various weight categories of Judokas. The significance difference was found in the reaction coordinative ability in relation to the various weight categories of Judo competition. The significant difference was found in the balance coordinative ability in relation to the various weight categories of Judokas. The significant difference was found in the rhythm coordinative ability in relation to the various weight categories of Judo competition. The significant difference was found in the flexibility- sit and reach test in relation to the various weight categories of Judo competition. There was not found any significance difference in different weight categories in relation to orientation ability. The smaller weight categories were found best in speed ability, abdomen muscular strength, balance coordinative ability and rhythm coordinative ability, differentiation.
Singh et. al. (2012) conducted a study to coordinative abilities of taekwondo players in different weight categories. The study was conducted on selected coordinative abilities on 80 school level boys from Madhya Pradesh state those participated in state as well as national level competition of taekwondo, 10 from each weight category with the purpose to compare the coordinative abilities of taekwondo players among different weight categories. The selected coordinative abilities were reaction ability, orientation ability, differentiation ability, balance ability and rhythm ability. To compare coordinative abilities of taekwondo players among different weight categories, analysis of variance (ANOVA) was employed at 0.5 level of significance. Researcher concluded that no significance difference was found in different weight categories in relation to orientation ability (1.874). Significant difference was found in different weight categories in relation to differentiation ability (6.659), reaction ability (7.279), balance ability (8.445) and rhythm ability (2.160). Significant difference in balance ability, reaction ability, rhythm ability in all weight categories might also be due to the same reasons i.e. difference in adiposity.

Sheikh et. al. (2012) conducted a pilot study on effect of functional training on physical fitness components on college male students. Nineteen male students from the Dr. Meghnad Saha College of the Gour Banga University, were randomly selected as subjects and their age were 19-25 years. Functional training exercises, its three days per week for the period of eight weeks were given. The functional training exercises was conducted in ladder forward & sideward, medicine ball throw overhead-2kg, 3kg & 4kg, hamstrings/leg curl with stability ball, lateral step ups, side punk/four point stabilizations series, forward step ups, modified pull-up, foot elevated hip lifting with medicine ball, press up with stability ball, medicine ball throw sideward direction-4kg, 3kg and 2kg etc. before functional training exercises the functional warming up was to applied for tuning up the all body parts. The selected subjects were measured of their physical fitness components, speed, endurance, muscular endurance, strength, explosive power, agility and flexibility. Descriptive statistics was used for analysis of study. The functional training exercises significantly increase speed, endurance, muscular endurance, strength, explosive power, agility and flexibility. The functional training significantly improved speed, endurance, muscular endurance, strength, explosive power, flexibility and agility.
Sterkowicz (2012) conducted a study on coordination motor abilities of judo contestants at different age. The study group was comprised of 25 judo contestants during the competitive season (7 seniors, 10 juniors and 8 cadets). A series of computer tests were carried out in order to evaluate kinaesthetic differentiation of movements, simple reaction time, complex reaction time, spatial orientation, visual-motor coordination, rhythmization, speed, accuracy and precision of movements, ability to adapt movements, eye-hand coordination. The study also tested global movement coordination (Starosta’s test) and balance (Flamingo test). Significance of differences was assessed by means of one-way ANOVA (p<0.05). In intergroup comparisons, the levels obtained in seniors were adopted as reference values. The factor of experience (age category and sport experience) has an overwhelming effect on the sense of balance, which is the highest in seniors, medium in juniors and the lowest in cadets. The category of juniors exhibited the most of beneficial differences in terms of global motor coordination compared to cadets, minimal complex reaction time compared to seniors, spatial orientation and indexes of reaction to moving objects. Seniors were characterized by longer minimal complex reaction time compared to juniors and stagnant results in the test of global motor coordination, spatial orientation and reaction to moving objects. The tests which differentiate between age categories should be taken into consideration in monitoring of the preparation of judo contestants.

Verma, Sardar et. al. (2012) conducted a study to compare the coordinative abilities of taekwondo players among different weight categories. For the purpose of this study eighty female taekwondo players of school level girls from Gujarat state those participated in state as well as national level competition of taekwondo competition (ten from each weight category) were selected as subjects for the study. Age of the subjects was range from 14 to 19 years. Keeping the feasibility criterion in mind, especially in the case of availability of instruments, the following co-coordinative abilities were selected: Orientation Ability, Differentiation Ability, Reaction Ability, Balance Ability and Rhythm Ability suggested by peter Hirtz (1985). The following weight categories were selected (a)Above 44 - 46(b)Above 46 - 49(c)Above 49 – 52(d)Above 52 – 54(e)Above 55 – 59(f)Above 59 – 63(g)Above 63 – 68 and (h)Above 68. To compare the coordinative abilities of taekwondo among different weight categories, analysis of Variance (ANOVA) was employed at .05 level of significance. No significant difference
was found among all weight categories in relation to orientation ability and on the other hand significant difference was found in all weight categories in differentiation ability, reaction ability, balance ability and rhythm ability. On the basis of results, the following conclusions were drawn: No significance difference was found in different weight categories in relation to orientation ability (1.874). Significant difference was found in different weight categories in relation to differentiation ability (6.659), Reaction ability (7.279), Balance ability (8.445) and Rhythm ability (2.160).

Gaurav et. al. (2011) conducted a study on comparison of physical fitness variables between individual games and team games athletes. A group of 30 sportspersons ‘A’ (Individual games athletes: N=15) and ‘B’ (Team games athletes=15) of age group 18-25 years were selected from department of physical education, Guru Nanak Dev University, Amritsar, Punjab, India. It was hypothesized that there may be significant differences with regard to selected physical fitness variables among individual and team games athletes. The between-group differences were assessed by using an independent samples t-test. The level of \( p \leq 0.01 \) was considered significant. An independent samples t-test revealed that individual games athletes had significantly higher muscular strength, agility, power, speed and cardiovascular endurance \( (p<0.01) \) than team games athletes. Further investigations are needed on the above studied variables along with physiological variables to assess relationships among them and with performances in team games and individual games.

Kumar et. al. (2011) conducted a comparative study on selected psycho-physical fitness components of kabaddi and kho-kho players of Delhi schools at senior secondary school level in regards to their psycho-physical variables. For the purpose of the study one hundred players- 50 from the game of Kabaddi and 50 from the Kho-Kho were selected on purposive and random basis, who had won medal/ position in Delhi Scholl Zonal, Inter-Zonal and participated in National School Games during the 2009 and 2010. All the subjects were regularly practicing and competing in their respective sports Competition. The difference among all the selected motor abilities and psychological variables, the data were collected and analyzed using the descriptive statistics and t-test. The level of significance was set at .05 level. Conclusion of the study was showing significant difference in the psychomotor ability in relation to the kabaddi and kho-kho players. The
kho-kho players group had better psychomotor ability or eye hand coordination, proving better mental and physical coordination ability than the kabaddi players group. There was not found any significant difference in relation to concentration ability namely grid test. The significant difference was found in the sports competition anxiety test (SCAT) in relation to the kabaddi and kho-kho players. The kho-kho players group had high anxiety level, but both the groups had optimum level of anxiety to perform better in the sports competition.

**Bakhik & Hamed (2010)** conducted a study on complex coordinative abilities as an indicator for selection of youngsters. The levels of complex coordinative abilities in children aged 9.5-10 who are applying for the national project for the preparation of youngsters as a selection indicator. The researchers used the descriptive method as it suits the nature of this research. The study was conducted on a sample of 60 children randomly drawn from among the children applying for the national project for the preparation of youngsters from three governorates, i.e., Sohag, Assiut and Hurghada (20 children from each Governorate). To collect data for the study, the researchers used the complex coordinative abilities test designed by ‘Kassel University’ in Germany in 1996, which assesses five coordinative abilities simultaneously under time pressure. The sample under study was assessed using the same specifications of the test during the period from 11/04/2009 to 23/04/2009. One of the most important results is that the times achieved by the children under study were relatively modest compared with the European criteria. The researcher recommends the inclusion of the complex coordinative abilities test in the tests administered to select the children applying for the National Project for the preparation of youngsters and development of programs to train children aged 6-10 in coordinative abilities, as this stage is best stage for developing these abilities and is of great importance for achievement in all sports.

**Lämmle. et. al. (2010)** conducted a study on a two-level model of motor performance ability. The study was multidimensional construct consisting of such specific components as endurance, strength, coordination, and flexibility. Method was used for this Motoric-Module conducted between 2003 and 2006 in Germany for the differentiated measurement of model of motor performance ability (MPA) from ages 6 to 17 ($N = 2,840$), made use of an eight-item performance test battery. This test battery was
assumed to assess the five motor dimensions of endurance, strength, coordination under time pressure, coordination under precision demands and flexibility. A two-level model of model of motor performance ability (MPA) with these five motor dimensions as first order factors could be confirmed using confirmatory factor analysis. Result of this study was the path coefficient \( p < 0.001 \) describing the direct effect from MPA to strength was 0.97, followed by the effect from model of motor performance ability (MPA) to coordination under precision demands \( (a = 0.73) \). The coefficient relating from model of motor performance ability (MPA) to coordination under time pressure was less \( (a = 0.64) \) and the lowest loadings shown for model of motor performance ability (MPA) are demonstrated for endurance \( (a = 0.36) \) and flexibility \( (a = 0.23) \). The First order factors showed significant direct effects on each of the observed variables. Therefore, a differentiated diagnosis of model of motor performance ability (MPA) in children and adolescents is possible. Conclusion of the study showed that the postulated dimensionality of model of motor performance ability (MPA) is valid for children and adolescents. This knowledge about the dimensionality of model of motor performance ability (MPA) for children and adolescents is very important for further research.

**Pacuraru & Preda (2010)** conducted a study on coordinative abilities of primary school (second grade) pupils in the rural and urban environments. The subjects of this study was represented by the pupils of the primary school in ‘Movilita’, the county of Vrancea, and School no. 12 galati, enrolled in the primary education system. Two classes in the rural environment and two classes in the urban environment were tested, with a total number of 89 pupils, 42 girls and 47 boys, aged 7-9 years. A number of 9 tests were operated in order to test the coordinative, ability, in the halls of the two schools. Coordinative ability is differently represented in children belonging to the rural environment as compared to children living in the urban environment. The different living standard of most children has led to deduce their motive activity, as they live in confined spaces, and without proper playing conditions. Restricting the vital space, by urbanization and the invasion of concrete results in disturbances in the motive development of children in the urban environment. The environment compels children to constantly adapt to new motor situations, thus stimulating new processes of motive learning. Children are thus animated by aeries of motivational factors, arousing their curiosity, preparing them for play and study, stimulating performance at all levels.
Srivastava (2010) conducted a study on effect of prandharana and tratak on selected coordinative abilities and physiological variables on cricketers. The subjects for this study were one hundred twenty male club cricketers of Dehradun. The age of the subjects ranged from 16-21 years. The subjects were equally divided into four groups namely three experimental and one control group. All experimental groups were equated based on their pre-test performance on all the selected coordinative abilities and physiological variables. Based on literary evidence and scholar's own understanding the following variables were selected for the purpose of this study: Coordinative abilities selected were: reaction ability, orientation ability, differentiation ability, balance ability and rhythmic ability. Physiological variables were: vital capacity, resting heart rate, breath holding capacity(Positive and Negative) and blood pressure(Systolic and Diastolic). The tests used in this study for the collection of data were found to be most reliable and have been used very often in the profession of physical education and sports all over the world. In order to study the effect of prandharna and tratak on selected coordinative abilities and physiological variables, analysis of co-variance was employed. It was also concluded that if a choice has to be made out of three treatments; prandharna, trataka and prandharna+trataka, anyone can be preferred for improving differential ability of coordination and selected physiological variables for cricketers.

Gstotnet et. al. (2009) conducted a study on balance ability and muscle response of the preferred and non preferred leg in soccer players. The study was to evaluate balance abilities and electromyographic (EMG) latency times of the preferred and non preferred leg in soccer players. Whereas side differences between the two legs in force, kicking speed, and joint laxity have been demonstrated in athletes in previous studies, no data are so far available on balance differences. Low balance ability is generally associated with an increased risk of ligament injuries, and the detection of a possible asymmetry in balance is important because a bilateral difference may be a contributing factor to injury. Twenty-one amateur soccer players were tested. Two different balance test instruments were used: the biodex stability system and the tetrax system. For the evaluation of muscle latency times, EMGs were recorded by means of the equitest system. None of the tests performed in this study revealed statistically significant differences in balance
ability between the preferred and the non preferred leg. The investigations of balance function and muscle response in amateur soccer players did not reveal significant differences between the preferred and non preferred leg in the current study. However, a certain tendency to better balance in the non preferred leg was observed.

Kostic et. al. (2009) conducted a study on the relations between anthropometric characteristics and coordination skills of girls and boys. A total of 91 boys and 85 girls made up the sample of subjects. They were all first grade elementary school students from NIS. Three measures for the evaluation of longitudinal dimensionality (body height, leg length, and arm length), three measures for the evaluation of transversal dimensionality (shoulder width, pelvic width and hip width), five measures for the evaluation of circular dimensionality and body mass (body weight, thorax volume, upper arm volume, thigh volume and calf volume) and five measures for the evaluation of subcutaneous fatty tissue (triceps skin folds, sub-scapular skin folds, abdominal skin folds, thigh skin folds and medial calf skin folds). The following measuring instruments were used for the evaluation of coordination skills: horizontal jump rope, 20 side steps with a baton, and running and rolling (a newly constructed test). A multivariate analysis of variance showed that there is a statistically significant difference between the coordination skills of the boys and girls at the p=0.003 level. There was statistically no significant connection between the anthropometric characteristics and coordination skills for the sample of boys, while there was one for the girls. The resulting canonical factor of anthropometric characteristics was defined as the factor of transversal dimensionality, circular dimensionality and subcutaneous fatty tissue, and the canonical factor of coordination skills was defined as the general factor of coordination.

Sardar (2008) conducted study to compare psychomotor and coordinative ability of football players of different level of achievement. The subjects’ selected for this research work were 90 football players (boys) from different levels. 30 players from district level, 30 players from state level and 30 players from national level, the subjects were randomly selected. The players selected had represented the district, state, national level. The subjects’ selected were in the age range of 20 – 25 years. To compare the selected psychomotor and coordinative abilities analysis of variance (ANOVA) test was employed at 0.05 level of significance. The finding showed national level football
players were better than state and district level kinesthetic perception, speed of movement, response time, balance ability, differentiation ability, and orientation ability. It was also observed in all above parameter that state level player were better than district level. The results of the study showed national level football players were better than state level and district level in kinesthetic perception and coordinative abilities.

**Bhardwaj, S. (2007)** conducted a study on coordinative abilities and physiological characteristics of badminton players of Delhi state at different levels. Selected coordinative abilities were: reaction ability, orientation ability, rhythmic ability, differentiation ability and physiological variables were: anaerobic power, vital capacity and resting heart rate. Total ninety subjects were selected from Delhi state. Thirty subjects were selected from each level. i.e; senior, junior, and sub junior. The data was analyzed using the mean, standard deviation and analyzing of variance the level of significance was set at 0.05 level. Conclusion of the study showed that the senior players were better in case of reaction ability, orientation ability and rhythmic ability whereas in case of differentiation ability junior players were better. In balance ability sub junior players had shown their excellence significant difference in case of vital capacity, resting respiratory rate, differentiation ability and rhythmic ability whereas no significant difference was found in case of anaerobic power, resting heart rate, total body fat percentage, lean body weight, positive breath holing capacity, negative breath holding capacity reaction ability, orientation ability and balance ability among different levels.(senior, junior, and Sub junior) of badminton players of Delhi state.

**Kumar, J., (2004)** co-ordinative abilities of Indian Kabaddi Players at different levels of participations. The following variables were selected for the study co-ordinative abilities: reaction ability, orientation ability, differentiation ability, balance ability and rhythm ability. The data collected on 120 male players who participated in year 2002-03 and 2003-04. All the kabaddi; players were divided in the 3 groups (senior, junior and sub-junior) having 40 subjects in each groups. One way Anova (ANOVA) was used for analysis of data and the level of significance set at 0.05. Conclusion of the study was showed as significant difference was found between the Kabaddi players of three different levels in relation to reaction ability, orientation ability, balance ability and rhythmic ability. On the other hand insignificant difference was found between the
Kabaddi players of three different levels in relation to differentiation ability. In all the four co-ordinative i.e. reaction ability, orientation ability, balance ability, and rhythmic ability the sequence of performance in all the four co-ordinative abilities has senior>junior>sub-junior. This might be due to the reason that senior Kabaddi players developed co-ordinative abilities by the long duration of participation and by the help of general and specific exercise. Additional means for improving execution, variation in external conditions combination of movement, change in information uptake, practice against time and due to practice under fatigue as discussed by H, Singh.

Singh, K., (2004) Conducted a study on comparison of selected co-ordinative abilities among sportsmen belonging to contact, semi contact and non-contact sports. The following variables were selected for the study co-ordinative abilities: reaction ability, orientation ability, differentiation ability, balance ability and rhythm ability. The subjects for this study were selected from different University of Delhi and Inter varsity competition and All India Inter University competition in various games and sports i.e. (contact, semi-contact and non- contact). A total 300 subjects were selected, 100 from each category i.e. (contact, semi-contact and non- contact). The necessary data was collected by administering co-ordinative abilities test as suggested by Peter Hirtz. To compare the selected co-coordinative abilities among sportsmen belonging to contact, semi- contact and non- contact sports. One way Anova (ANOVA) was used and the level of significance set at 0.05. Conclusion of the study was showed in relation to reaction ability no significance difference was found between contact semi-contact and non-contact sports. In case of orientation ability significance difference was found between contact semi-contact and non- contact sports. Insignificance difference was observed between contact semi-contact and non- contact sports with regard to differentiation ability. Balance ability showed insignificance difference between contact semi-contact and non- contact sports. In relation to rhythm ability significance difference was found between contact and semi-contact and sports besides semi- contact and non- contact sports.
Minz (2003) conducted study to determine the relationship of selected coordinative abilities of to the performance in badminton. For the purpose of the study 12 Badminton players of the Lakshmibai National Institute of Physical Education, Gwalior, were selected as the subjects. On the basis of coordinative abilities and their test, orientation abilities measured by numbered medicine ball run test and measured in 1/10 of seconds. Differentiation ability determines through backward medicine ball throw test and was measured in accordance with point scored by each subjects. Reaction ability measured by ball reaction exercise test was measured in meter and centimeters. Balance ability measured by long nose test was measured in meter and centimeters. Rhythm ability assessed by sprint at given rhythm test was measured in seconds. For analyzing the result of the study the rank order correlation (coefficient of correlation) method was employed. The scores of all the abilities and performance were correlated for analyzing the data. For testing the hypothesis the level of significance was set at 0.05 levels. The present study showed that there was no significance relationship between the selected coordinative abilities and badminton performance. All the selected coordinative abilities obtained values after statistically analyzing the data; it was found that none of calculated value was higher than required table value at 0.05 levels with 10 df. Following values were found after analyzing orientation ability (0.099), differentiation ability (-0.069), reaction ability (0.134), balance ability (-0.256), rhythm ability (-0.036) and composite coordination ability (-0.204) which were less than required values at 0.05 level of significance i.e. (0.576).

Davida et. al. (2000) conducted a study on understanding and measuring coordination and control in kicking skills in soccer: Implications for talent identification and skill acquisition. Although research on coordination and control of soccer skills is currently sparse, there are indications that the relationship between motor control and biomechanics could form a significant component of scientific programmes in talent identification and skill development. Further interdisciplinary work is needed to enhance understanding of coordination and control of soccer skills.
Sisodoa, (2000) conducted a study on effect of transcendental meditation on selected physiological variables and coordinative abilities in judo. The following variables were selected for the study, coordinative abilities: reaction ability, orientation ability, differentiation ability, balance ability and rhythmic ability. Physiological variables: anaerobic power, vital capacity, resting respiratory rate, resting heart rate and body composition, (i) total body fat percentage, (ii) lean body weight. Sixty subjects were selected with aged ranging 17 to 25 year. Sixty subjects assembled in the judo hall of LNIPE, Gwalior at 5:30AM six day per week. Two groups comprising of 30 subjects each were formed i.e. experimental group and control group. The data was examine by applying analysis of co-variance and ‘t’ test was applied with regarding to an experimental group and control group as the random group design was employed in this study. Conclusion of the study was showed insignificant effect in relation to selected physiological variables comparison to control group and in case of selected coordinative abilities significant difference were found in comparison to control group.