CHAPTER II

REVIEW OF LITERATURE

In the present investigation, the researcher analysed the effect of perceptual and reasoning ability on motor coordinative ability of tribal adolescents. The researches in the past pertaining to the variables selected for this study are presented in this chapter.

The scientific studies conducted in the past by various researchers on motor coordination along with agility which is selected as a variable to measure coordination in the present study are presented chronologically.

Lee (1980) examined the cooperative relationship between vision and action how the optic flow field yields spatio-temporal information for guiding activity and how activity makes that information available. The central thesis is that the visual system and the motor system are functionally inseparable: they are components of a unified perceptuo-motor system, which is itself a component of the organism-environment system.

Goldstein et al. (1994) examined visual-motor coordination and intelligence as predictors of reading, mathematics, and written language ability. In the present study, scores on three tests of children's visual-motor coordination correlated moderately to highly with scores on a test of reading, mathematics, and written language for a sample of 44 elementary school children referred for learning difficulties. Multiple regression analyses indicated that visual-motor coordination scores accounted for little unique achievement test score variance when IQs were included in the equations.

Kioumourtzoglou et al. (1996) studied motor performance, motor coordination and motor ability on three groups of 20 elite rhythmic gymnasts (N = 60), 9 to 10 yr., 11 to 12 yr., and 13 to 15 years of age (national level), with children of the same size and age. To identify the important abilities for the achievement of excellence in this sport. Motor abilities (whole-body coordination, dynamic balance, static balance, sense of kinesthesis, whole-body movement time, and eye-hand coordination) as well as perceptual abilities (whole-body reaction time, anticipation of coincidence, and depth perception) were compared. Analysis showed that scores on measures of whole-body coordination, dynamic balance, and static balance were higher for elite groups of athletes than for corresponding control groups. Moreover, elite athletes in the oldest group scored higher than those in the youngest group on anticipation of coincidence, on eye-hand coordination, and on static balance.

Cummins (1998) explored the difficulties in empathic ability might be related to the poor visuo-spatial processing ability identified in children with developmental coordination disorder. The relationship between motor coordination, emotion recognition, and social behaviour was examined in a sample of 234 children. From this sample two groups of 39 children each, one group with motor difficulties and the other of control children, matched for age and sex, were compared using a set of six emotion recognition scales that measured both verbal and perceptual aspects of empathic ability. Children with motor difficulties were found to perform more poorly on scales measuring the ability to recognize static and changing facial expressions of emotion. This difference remained even when visuo-spatial processing was controlled. When controlling for

emotion recognition and visuo-spatial organization, a child's motor ability remained a significant predictor of social behaviour.

Ruiz et al. (2003) assessed the motor coordination in children with the movement ABC test: A comparative study among Japan, USA and Spain. The Movement Assessment Battery for Children (Movement ABC; Henderson and Sudgen, 1992) is one of the most popular instrument in the assessment of children with movement coordination problems. It is generally assumed that the published norms for the test are valid for the use with European children and one of the aims of this study was to compare the results of Miyahara's study with Japanese children (53 boys, 49 girls) and the American standardization (237 boys, 284 girls) with the Spanish sample (202 boys and 183 girls). The cross-cultural comparisons revealed that there are many differences in performance among children of these samples. These differences were distributed among tasks and countries in the two age bands. Gender differences in all samples shown that girls outperform boys in manual and balance tasks, and boys got better scores in ball skills This data and its analysis so far suggest different consequences: 1) The question of cultural differences in motor skill learning and performance; 2) The problem of gender differences in motor coordination; 3)The norms of the test. As a final consequence it will be necessary to study this test in a larger and more broadly based sample of Spanish boys and girls for being accepted as a useful test in the assessment of motor coordination in Spain.

Rolf et al. (2004) explored the link between fixational eye movements and postural sway in perception and motor control. During fixation, eye position is imperceptibly altered by small involuntary eye movements. Two important types of these 'fixational' eye movements (FEMs) are drift and microsaccades. Recently, we investigated statistical behaviour of FEMs using a random-walk analysis. Scaling exponents obtained by this analysis indicated a separation of time scales in FEMs. They investigated how microsaccades interact with postural sway in three conditions: sitting with the head positioned on a chin-rest, normal sitting, and standing. Using the same analysis, we replicated the findings of our first study in the sitting with chin-rest condition: microsaccades enhance fixation errors on a short time scale, a phenomenon known as persistence and control fixation errors on a longer time scale (antipersistence). On the short time scale, scaling exponents are very similar across conditions. On the long time scale, fewer fixation errors can be observed (more antipersistence), although postural sway contributes to the noise level in gaze position. The interaction of FEMs with postural control indicates a global coupling of perceptual motor systems. FEMs constitute visual fixation, the platform on which almost all visual perception depends -- understanding their properties has potential impact on fundamental mechanisms of perception.

Coksevim et al. (2005) found that there were statistically significant differences in the 60 and 200 meters races, maximal pull up, maximal sit up, vertical jump, standing long jump, ball throwing with right hand, horizontal bar, and agility between the male and female adolescents of Turkey. It was concluded that that although females were superior in the

60 and 200 meter race, males were superior in agility, horizontal bar, ball throwing with right hand, long jump, and vertical jump.

Planinsec (2006) investigated the relationship between motor coordination and intelligence level in adolescents. The sample was comprised of 550 adolescents from Slovenia, aged 13.1 years (SD = 0.87), who attended elementary schools. For assessment of motor coordination a battery of eight tests were used. Assessment of intelligence was carried out with test TN-20. Participants were divided into below average and above average intelligence groups based on their mean scores. ANOVA was used to determine the differences in motor coordination between above and below average intelligence groups. The most important finding was that adolescents of average intelligence performed motor coordination tasks more efficiently than did adolescents of below average intelligence. The difference is significant on seven of eight coordination tests. It was concluded that adolescents with higher level of intelligence was more efficient in performing coordination tasks.

Panagopoulou et al. (2008) evaluated the level of motor coordination in early school age children. The sample consisted of 150 students (72 boys and 78 girls) of ages ranging from 69 to 99 months (M=83.75, SD=7.43), who attended the organized educational program of their school and did not participate in any exercising program. For the evaluation of motor coordination Koerperkoordinationstest fuer Kindern, KTK, was used. The test is considered to be one of the most reliable (r=.90) and is comprises of four individual tests that measure: a) balance capacity, b) one- leg obstacle surmounting, c) side jump and d) side

locomotion and object replacement. The Two-Way Analysis of Variance did not present any statistically significant interaction of age and sex in any of the individual tests.

Flier, et al. (2010) investigated motor coordination problems in children and adolescents with ADHD rated by parents and teachers: effects of age and gender. The findings show that parents and teachers reported motor coordination problems in about one third of children with ADHD. Problems of fine and gross motor skills, coordination skills and motor control were all related to inattentive rather than hyperactive=impulsive symptoms. Relative to controls, motor coordination problems in ADHD were still present in teenagers according to parents; the prevalence diminished somewhat according to teachers. Boys and girls with ADHD were comparably affected, but motor performance in controls was better in girls than in boys. It was concluded that Motor coordination problems were reported in one third of children with ADHD and affected both boys and girls. These problems were also apparent in adolescents with ADHD. Clinicians treating children with ADHD should pay attention to co-occurring motor coordination problems because of the high prevalence and the negative impact of motor coordination problems on daily life.

Comuk and Erden (2010) investigated the relationship between triple performance of ice skaters (figure skaters) during jumpings and their agility and reaction time. Material and methods: The participants were 20 female elite figure skaters at junior and senior competitive levels, between the ages of 16 and 23, performing on figure skating at least for 5

years and 20 volunteer sedentary female subjects at the same ages as control group. Socio demographic and physical properties (age, height, weight) of all subjects and jumping and successful turnings during jumping of these athletes were recorded. Then agility test (squat thrust) and reaction time test were applied. Results: Agility and reaction time values of skaters showed significantly better results than the control group. All of the skaters were able to make at least one jumping type as single, 80% of skaters as double, 15% as triple. A negative correlation between agility and reaction time and a positive correlation between agility and triple jumping of skaters were found. No correlation was found between reaction time and triple jumping. The results brings up the issue of agility, reaction time, successful jumping and successful turnings during these jumping of ice skaters and shows that by agility training, triple turning performance can be enhanced.

Lopes et al. (2011) investigated the relationships among motor coordination (MC), physical fitness (PF) and physical activity (PA) in children followed longitudinally from 6 to 10 years. It is hypothesized that MC is a significant and primary predictor of PA in children. Subjects were 142 girls and 143 boys. Height, weight and skinfolds; PA (Godin-Shephard questionnaire); MC (Körperkoordination Test für Kinder); and PF (five fitness items) were measured. Hierarchical linear modeling with MC and PF as predictors of PA was used. The retained model indicated that PA at baseline differed significantly between boys (48.3 MET/week) and girls (40.0 MET/week). The interaction of MC and 1 mile run/walk had a positive influence on level of PA. The general trend for a decrease in PA level across years was attenuated or amplified depending on initial

level of MC. The estimated rate of decline in PA was negligible for children with higher levels of MC at 6 years, but was augmented by 2.58 and 2.47 units each year, respectively, for children with low and average levels of initial MC. In conclusion MC is an important predictor of PA in children 6-10 years of age.

The scientific studies on motor coordination which is essentially encompasses motor skill, motor learning etc. are presented chronologically.

Thomas & French (1985) in a meta analytical analysis on the gender differences of motor skill performance found that the differences in the fundamental motor skills performances of running, jumping, throwing, and catching were low to moderate prior to puberty, however after puberty the differences became large and in favor of males. Boys typically demonstrate a higher quality of overall motor skill performance and are more proficient in manipulative and gross motor skills then girls with improved performance being maintained in childhood and increasing in adolescence.

Haubenstricker and Seefeldt (1986) in their study found gender differences favoring boys, in motor performance had been verified for children as young as 2.5 years in the standing long jump and 3 years in the overhand throw.

Ulrich (1987) examined 250 children in kindergarten through 4th grade (25 boys and 25 girls from each grade) while performing a battery of motor skills. The battery consisted of nine items: 1) broad jump; 2) flexed arm hang; 3) sit-up test; 4) sidestep test; 5) sixty-yard shuttle run;

6) playground ball dribble; 7) soccer ball dribble; 8) softball repeated throw; and 9) soccer ball throw. The battery was also broken into two categories; items 1- 5 were considered motor ability items, and items 6 – 9 were considered sport specific-skill items. Each child completed a questionnaire concerning his or her participation in organized sport programs. Of the 250 children, 128 were classified as sport participants (K: 8 boys, 6 girls; Grade 1: 18 boys, 6 girls; Grade 2: 14 boys, 12 girls; Grade 3: 16 boys, 9 girls; Grade 4: 20 boys 13 girls) and 122 were classified as non-participants. Upon completion of the motor test, results indicated that children who participated in organized sport programs performed better then non participating children on each motor skill item, with the largest differences occurring among the sport specific skill items.

Aponte, R. et al. (1990) conducted a cross cultural study to investigate motor development of Puerto Rican children. The Test of Gross Motor Development was administered to 300 children, ages 5 to 7 yr., attending public schools in Puerto Rico. Statistical comparisons indicated that the test-manual norms for US children were applicable to Puerto Rican children except for 7-yr.-old girls. A 2 x 3 x 2 factor analysis of inter correlations of Puerto Rican scores indicated no significant difference between rural and urban children, expected age group differences, and sex differences favouring boys.

Xu Lechun (1994) explored the short-term motor memory storage and precision and the relationship between them and motor learning indices. The subjects were students and sportsmen of three age groups (10, 14, 18 year-old)respectively. The results showed that: 1) The limit of

short-term motor memory storage was“5±2”; Short-term motor memory storage was related to the practice frequency of the motor learning; Short-term motor memory precision was related to the accuracy of the first exercise.2) Short term memory storage tended to increase with age. 3)The practice frequency of motor learning between sportsmen and non sportsmen had significant difference.

Loko J. et al. (2000) in their cross sectional study aimed at establishing smooth curves of motor performance status in 10 to 17-year-old girls. Motor performance was tested in 902 girls with the aid of 30 m dash, standing long jump, vertical jump, pushing a stuffed ball (2 kg), standing quintuplet jump, isometric strength of back extensor muscles, trunk forward flexion and 1-min ergocycling at the highest possible rate. Statistically significant differences of all studied motor abilities between the age groups of 10-12 were indicated. In height and body mass the most pronounced differences (on average 6.5 cm and 7.7 kg, respectively) appeared between the age groups of 12 and 13. At the age of 13 the group results were statistically higher than those at 12 in pushing a stuffed ball, vertical jump, quintuplet jump, strength of back extensors muscle, 30 m dash and ergocycling test, but not in standing long jump and trunk forward flexion. At the age of 14 the performance was not higher than at 13, except in the vertical jump and quintuplet jump. From 14 to 16 years of age differences reappeared in the results of vertical jump, quintuplet jump, pushing a stuffed ball, 1-min cycling and trunk forward flexion but not in the 30 m dash and standing long jump. The lack of significant differences between the age groups of 16 and 17 indicated the final stabilization of tested motor abilities. The obtained results suggest the

existence of several periods in motor performance status in 10 to 17-year-old Estonian girls: 1) The biggest differences in the mean results of the tests on motor abilities occurred between ages 10-11, 11-12 and 12-13, which coincide with the biggest differences in height and weight at the same age. 2) The differences in the mean results of most tests on motor abilities stabilized between the age groups of 13 and 14. The mean results of 14-year-old girls were lower in some tests compared to the results of 13-year-olds. 3) The positive differences in the mean results remained between the age groups of 14-15 and 15-16 (excluding the sprint velocity and standing long jump). 4) The final stabilization of motor abilities occurred at the age of 16 to 17.

Jürimäe & Jürimäe (2000) identified and summarized several gender differences in fundamental motor skill acquisition. Boys perform in a superior fashion to girls in manipulative skills such as throwing, kicking, and catching. Girls perform better than boys on non-manipulative skills, such as balancing, hopping, and skipping. Girls often perform better at fine motor tasks while boys typically outperform girls in gross motor skills.

Wong and Cheung (2006) conducted a study and provided normative information on gross motor skills performance of the Hong Kong Chinese children. A total number of 1251 children aged from 3 to 10 years participated in the Test of Gross Motor Development-Second Edition (TGMD-2; Ulrich, 2000). Their results indicated that the 630 children aged from 3 to 5 years performed best in run, jump and leap in the locomotor subtest (run, gallop, leap, hop, horizontal jump and slide). For the object control subtest (striking a stationary ball, dribbling, kick,

catch, overhead throw and underhand roll), kick, dribbling and striking a stationary ball received the highest score. Wong and Cheung also found that boys did better in object control skills while boys and girls did almost the same on locomotor skills.

Ghai et al. (2007) compared the motor development patterns of trained and untrained Indian girls of 10-16 years of age. The results in general indicate a trend of improvement in all motor performance components of selected subjects. The trend of improvement is rapid up to 13 to 14 years of age, after that trend seems to be slow or stagnant.

Orit Bart (2007) assessed the relations between basic motor abilities in kindergarten and scholastic, social, and emotional adaptation in the transition to formal schooling. Seventy-one five-year-old kindergarten children were administered a battery of standard assessments of basic motor functions. A year later, children's adjustment to school was assessed via a series of questionnaires completed by the children and their class teachers. The results indicate that in addition to the already documented association between visual–motor integration and academic achievement, other motor functions show significant predictive value to both scholastic adaptation and social and emotional adjustment to school. The results further suggest a better prediction of scholastic adaptation and level of disruptive behaviour in school when using an aggregate measure of children's ability in various motor domains than when using assessments of singular motor functions. It is concluded that good motor ability may serve as a buffer to the normative challenges presented to

children in the transition to school. In contrast, poor motor ability emerges as a vulnerability factor in the transition to formal schooling.

Eunice, K.Y. M. (2008) studied to find out the relationship between the motor skill performance and the anthropometric measures of body segments in the kindergarten children. A total of 31 male (n = 31) and 29 female (n = 29) who aged 3 to 5 years old participated in the study. Twelve fundamental motor skills from the Test of Gross Motor Development-Second Edition (TGMD-2; Ulrich, 2000) and nine anthropometric measurements were examined on the K1, K2 and K3 children of the Hong Kong Baptist University Kindergarten. The result of the Bivariate correlation test indicated that there was a significant positive relationship between the locomotor subtest, the object control subtest and eight of the body measurements ($p < 0.05$): stature, body weight, thigh length, lower leg length, foot length, upper arm length forearm length, hand length. Moreover, two separate regression equations indicated that thigh length and hand length were the best linear combination of variables explaining the variance for the raw scores of the locomotor subtest ($r = 0.680$, $p < 0.05$); whereas foot length and thigh length were the best linear combination of variables explaining the variance for the raw scores of the object control subtest ($r =0.794$, $p < 0.05$).

Ann L. Weber et al. (2008) analysed the functional impact of amblyopia in children. The fine motor skills of amblyopes and age-matched control subjects were compared. The influence of visual factors that might predict any decrement in fine motor skills was also explored. Vision and fine motor skills were tested in a group of children with

amblyopia of different causes, and age-matched control children. Visual motor control (VMC) and upper limb speed and dexterity (ULSD) items of the Bruininks-Oseretsky Test of Motor Proficiency were assessed, and logMAR visual acuity (VA) and Randot stereopsis were measured. Multiple regression models were used to identify the visual determinants of fine motor skills performance. Amblyopes performed significantly poorer than control subjects on 9 of 16 fine motor skills subitems and for the overall age-standardized scores for both VMC and ULSD items. The effects were most evident on timed tasks. The etiology of amblyopia and level of binocular function significantly affected fine motor skill performance on both items; however, when examined in a multiple regression model that took into account the inter correlation between visual characteristics, poorer fine motor skills performance was associated with strabismus, but not with the level of binocular function, refractive error, or visual acuity in either eye. It was concluded that fine motor skills were reduced in children with amblyopia, particularly those with strabismus, compared with control subjects. The deficits in motor performance were greatest on manual dexterity tasks requiring speed and accuracy.

Williams H.G. et al. (2008) examined the relationship between motor skill performance and PA in preschool children. Participants were 80 three- and 118 four-year-old children. The Children's Activity and Movement in Preschool Study (CHAMPS) Motor Skill Protocol was used to assess process characteristics of six locomotor and six object control skills; scores were categorized as locomotor, object control, and total. The actigraph accelerometer was used to measure PA; data were expressed as

percent of time spent in sedentary, light, moderate-to-vigorous PA (MVPA), and vigorous PA (VPA). Children in the highest tertile for total score spent significantly more time in MVPA (13.4% vs. 12.8% vs. 11.4%) and VPA (5% vs. 4.6% vs. 3.8%) than children in middle and lowest tertiles. Children in the highest tertile of locomotor scores spent significantly less time in sedentary activity than children in other tertiles and significantly more time in MVPA (13.4% vs. 11.6%) and VPA (4.9% vs. 3.8%) than children in the lowest tertile. There were no differences among tertiles for object control scores. Children with poorer motor skill performance were less active than children with better-developed motor skills. This relationship between motor skill performance and PA could be important to the health of children, particularly in obesity prevention. Clinicians should work with parents to monitor motor skills and to encourage children to engage in activities that promote motor skill performance.

Kamenka Živčić et al. (2008) conducted their study on a sample of 96 children (57 children in the experimental group and 39 children in the control group), all at the age of four. Initial and final measurements were carried out with the aim out of determining their motor abilities. On the basis of the participation of the experimental group in the realization of the sport program assigned to the preschool children, at a rate of four days per week for 50-60 minutes, all of the possible differences in motor abilities between the experimental and control group during the initial and final check-up over a period of nine months were observed. The tests used to check the motor abilities were: the "shuttle run" (agility test), walking backwards, "school-hops", sit-ups, long jump, holding pull-ups,

V-sit and reach, the lateral split and lying extension. The obtained results pointed to valid metric test characteristics. The obtained results show that there is no difference between the groups in the initial check, while in the final check there was a statistically significant difference showing the advantage of the experimental group, which points out that the children who participated in the sport program improved their motor abilities.

Dorfberger S. et al. (2008) investigated gender differences in motor performance in 9-, 12-, and 17-year-olds. The tasks included simple thumb tapping, handwriting and finger-to-thumb opposition sequence learning. In sTT there was a significant advantage for the 17-year-old males. In HW, 12-year-old females were faster, initially, than the males, but this gap was closed by a single training session; in the 17-year-olds although no significant difference was found initially, the males became faster than the age-matched females post-training. In the FOS, there were no initial gender differences (speed or accuracy). However, males benefited more from training, with the 17-year-old males attaining a significant post-training speed advantage. Moreover, males, of all three age-groups, evolved significantly larger delayed ("off-line") performance gains in the FOS task compared to females; gains which were retained 6-weeks post-training. There may be a male advantage in motor learning rather than in motor performance per-se; this advantage is enhanced during adolescence.

Eva D'Hondt et al. (2009) investigated gross and fine motor skill in overweight and obese children compared with normal-weight peers. According to international cut-off points for Body Mass Index (BMI) from

Cole et al. (2000), all 117 participants (5–10 year) were classified as being normal-weight, overweight, or obese. Level of motor skill was assessed using the Movement Assessment Battery for Children (MABC). Scores for balance ($p < .01$) and ball skills ($p < .05$) were significantly better in normal-weight and overweight children as compared with their obese counterparts. A similar trend was found for manual dexterity ($p < .10$). This study demonstrates that general motor skill level is lower in obese children than in normal-weight and overweight peers.

Houwen, S. et al. (2010) compared the motor skills and physical fitness of school-age children (6-12 years) with visual impairments and sighted children. The relationships between the performance parameters and the children's body composition are investigated as well as the role of the severity of the impairment. The degree of VI did not differentially affect the outcomes. Compared to their sighted peers, the children with VI scored lower on the locomotor and object control skills as assessed with the Test of Gross Motor Development-2, and the Physical fitness (Eurofit) parameters of plate tapping, the standing broad jump, the modified 5 x 10-m shuttle run, and 20-m multistage shuttle run (20-MST). Their body mass and body fat indexes were inversely correlated with the standing broad jump and the 20-MST, but positively correlated with handgrip strength. Moreover, significant inverse correlations were found betweere their locomotor and object control skills on the one hand and plate tapping and the 5 x 10-m shuttle run on the other hand. Given, the relatively high proportion of overweight/obese children within the VI sample, educators are recommended to promote health-related activities and help enhance motor skills in this population.

Vanttinen, T. et al. (2010) monitored the development of general perceptual motor skills in non soccer-playing and soccer-playing groups, to examine the relationship between physical maturity and general perceptual motor skills (n = 41), and to compare the differences in general perceptual motor skills between groups with different soccer expertise. The measured variables were simple reaction time, peripheral awareness, eye-hand-foot coordination, and testosterone blood level. The results suggested that general perceptual motor skills improved with age, the development of these skills was related to participants' blood testosterone concentration (especially between 12 and 14 years), and general perceptual motor skills improved with soccer expertise.

Yasuhiro Kanakogi and Shoji Itakura (2011) compared gazing and grasping responses to interesting objects in 4- to 10-month-old infants and adults. The onset of infants' ability to predict the goal of others' action was found to be synchronized with the onset of their own ability to perform that action. Moreover, there was correspondence relationship between action-prediction ability and motor ability of same action. Our findings indicate that the ability to predict others' action goals requires a corresponding motor ability, providing ontogenetic evidence for a direct matching process by a mirror neuron system.

Gülay Yasemin Aldemir et al. (2011) aimed to demonstrate the effects of dance education on preadolescent children. A total of 114 students at preadolescent (aged 11±.0year) and adolescent (aged 14±.0 year) stages participated in the research. Prior to dance classes a variety of tests ranging from motor performance tests, flexibility (sit and reach),

dynamic balance (anterior/posterior and medial/lateral), strength (vertical jump and long jump), acceleration (10 m), speed (30 m), coordination (hexagon test) and agility (changing the line test) were conducted. It has been clearly demonstrated that dance education plays an important role on motor development of preadolescent and adolescent children, and comparisons between groups have indicated that children receiving dance education elicit a better line of development.

Kote, M.S. (2011) conducted a study which is comparative in nature to find out development of speed abilities in normal and deaf and dumb boys between 8 to 14 years on around 350 students of different schools who were taking formal education. Out of 350 students 175 were selected from normal category and 175 from physically challenged i.e., deaf and dumb category. In each 25 boys were selected (25 subjects in normal boys and in each age group i.e., 8, 9, 10, 11, 12, 13 & 14 years totaling to 175; 25 subjects in deaf and dumb in each age group i.e., 8, 9, 10 11, 12, 13 & 14 years totaling to 175). These subjects were tested initially in acceleration ability and locomotion ability and the same subjects were exposed to the same tests after exactly one year without any formal sports training and the development in their speed abilities was noted. After the statistical treatment of data by utilizing t-test and f-test the following findings were noted: The speed ability in which specifically the acceleration ability and locomotion ability is found increasing the most at 8th year and gradually reducing the rate of development of speed till 10th year and again increasing steadily till 14th year in normal boys. The rate of development of speed is observed unsteady in case of deaf dumb boys.

Vasilios Tsimaras et al. (2011) in their study estimated and compared gross motor ability of children aged 7 to 10 years, all from Roma minority families (Romas, Roma immigrants) and families of indigenous Greeks. The sample consisted of 180 children (60 natives, 60 Romas, 60 Roma immigrants) studying in Greek public primary schools. The Test of Gross Motor Development scores showed that the group of indigenous Greek children had significantly higher performance in terms of locomotion skills, handling skills, and general motor ability compared to the groups of Roma and Roma immigrant children. No statistically significant differences were observed between the two other groups.

Gülay Yasemin Aldemir et al. (2011) aimed to demonstrate the effects of dance education on preadolescent children. A total of 114 students (56 of whom in dance group/58 in control group) at preadolescent (aged 11±.0year) and adolescent (aged 14±.0 year) stages participated in the research. Prior to dance classes a variety of tests ranging from motor performance tests, flexibility (sit and reach), dynamic balance (anterior/posterior and medial/lateral), strength (vertical jump and long jump), acceleration (10 m), speed (30 m), coordination (hexagon test) and agility (changing the line test) were conducted. It has been clearly demonstrated that dance education plays an important role on motor development of preadolescent and adolescent children, and comparisons between groups have indicated that children receiving dance education elicit a better line of development.

Studies on perceptual and reasoning ability is also presented by the researcher in chronological order.

Williams H.G. (1969) studied systemic variation of speed and direction of object flight and of skill and age classification upon visual perceptual judgement of moving object in three dimensional space. The task requires the subject to make judgement of flight of the ball in terms of interception. Measure of visuo-perceptual judgement included reaction and movement items, and measures of special accuracy of judgement with reference to optimum point of interception. Results indicated that speed and accuracy with which flight of a moving objects was judged depended to a large extent, upon the particular speed and direction in which the object was moving at a time it was being judged, with highly skilled individuals being significantly superior to poorly skilled and age having little or no effect on the speed and accuracy of judgement among subjects from junior high school, senior school and college age males respectively.

Sinha (1974) studied deprivation and development of skill for pictorial depth perception. The impact of familial deprivation on the acquisition of skill for pictorial depth perception was studied on two groups of 125 children each from Indian nurseries and orphanages, ranging in age from 3 to 61/2 years. Ss were required to judge distance by interpreting each of the six common pictorial cues depicted one at a time in a set of pictures. Analysis of mean scores revealed a clear developmental trend in both the groups. Intelligence was significantly correlated with the scores. With intelligence controlled, significant

retarding effects of deprivation on the scores at the higher age levels but none at 3 to 4 years were found. Comparison of scores on each of the six cues revealed the same tendency. Lack of heterogeneity and absence of stimulation in orphanages had a general retarding influence on the development of the skill for pictorial depth perception.

Vermon P.A. (1982) conducted a study on the relationship between intelligence and speed of mental processing. One hundred university students were given a number of reaction time test designed to measure the speed with which they could execute specific cognitive processes. They were also given Wechsler Adult Intelligence Scale and the Advanced Raven's Progressive Matrices. There score or the test were submitted to a number or correlation analytic procedures, the result of which indicate that there was a general mental speed factor which correlated highly with I-Q scores could no longer be thought of simply as representing the amount of knowledge or strategies or individual had acquired, not how much opportunity as individual had old to learn. Rather, it was proposed that the speed and efficiency with which an individual could perform different mental processes common to all forms of intellectual behaviour will determine to a large extent how well he will perform or test's mental ability.

Tan, U. (1990) examined the relation of mental ability for spatial reasoning to hand performance was studied in male and female left-handers considering familial sinistrality and writing hand. Hand performance was assessed by a dot-filling test; hand preference was assessed by the Edinburgh Handedness Inventory (Geschwind scores).

Nonverbal intelligence (spatial reasoning) was measured by the Cattell's Culture Fair Intelligence Test. The relationship between IQ and hand performance was found to be more complicated than expected. This was associated with sex, familial sinistrality, and writing hand, which created different patterns in interactions between motor and cognitive systems. It was concluded that the brain benefits from different strategies by using both hemispheres in a competitive and complementary manner where necessary to achieve a high visual-spatial performance depending upon genetic preprograms.

Sparrow (1993) investigated the relation between intelligence and acquisition of motor skill using predictions from Zeaman and House's 1963 attention theory. 20 undergraduate students and 20 subjects of low IQ made linear positioning movements of long and short amplitude to the left and right of a central starting position. Four conditions (right-long, right-short, left-long, left-short) were created by specifying the corresponding target area on the positioning apparatus. One or both of the paired cues were varied, i.e., left, right, long, or short, while the dimensions of direction and amplitude remained unchanged across conditions. A shift from one condition to the next followed a criterion response of four consecutive movements to the target area. Results supported the hypothesis that subjects of low IQ would require more trials to criterion than subjects of normal IQ across all conditions of direction and extent. There was qualified support for the hypothesised interaction between intelligence and cue shifts.

Goldstein D.J. (1994) studied visual-motor coordination and intelligence as predictors of reading, mathematics, and written language ability. In this study, scores on three tests of children's visual-motor coordination correlated moderately to highly with scores on a test of reading, mathematics, and written language for a sample of 44 elementary school children referred for learning difficulties. Multiple regression analyses indicated that visual-motor coordination scores accounted for little unique achievement test score variance when IQs were included in the equations.

Norman J.F. et al. (2000) evaluated the ability of younger and older adults to perceive the 3-D shape, depth, and curvature of smooth surfaces defined by differential motion and binocular disparity in six experiments. The number of points defining the surfaces and their spatial and temporal correspondences were manipulated. For stereoscopic sinusoidal surfaces, the spatial frequency of the corrugations was also varied. For surfaces defined by motion, the lifetimes of the individual points in the patterns were varied, and comparisons were made between the perception of surfaces defined by points and that of more ecologically valid textured surfaces. In all experiments, the older observers were less sensitive to the depths and curvatures of the surfaces, although the deficits were much larger for motion-defined surfaces. The results demonstrate that older adults can extract depth and shape from optical patterns containing only differential motion or binocular disparity, but these abilities are often manifested at reduced levels of performance.

Hatzitaki, V. (2002) studied perceptual-Motor Contributions to Static and Dynamic Balance Control in Children. Fifty 11- to 13-year-old children performed a series of 1-legged balance tasks while standing on a force platform. Postural control was reflected in the maximum displacement of the center of mass in anterior–posterior and mediolateral directions. Simple visual, discrimination, and choice reaction times; sustained attention; visuomotor coordination; kinesthesis; and depth perception were also assessed in a series of perceptual and motor tests. The correlation analysis revealed that balancing under static conditions was strongly associated with the ability to perceive and process visual information, which is important for feedback-based control of balance. On the other hand, when greater task demands were imposed on the system under dynamic balancing conditions, the ability to respond to the destabilizing hip abductions–adductions in order to maintain equilibrium was associated with motor response speed, suggesting the use of a descending, feedforward control strategy. Therefore, like adults, 11- to 13-year-old children have the ability to select varying balance strategies (feedback, feedforward, or both), depending on the constraints of a particular task.

Raghuraj, P. et al. (2003) compared the effect of two programs (yoga and physical activity), each of one month duration on depth perception. Thirty two girls (age 10-11 years) in a residential school were assigned to the two groups. The groups practiced the assigned intervention as 75 minutes every day and for 7 days a week. Depth perception was assessed using a standard apparatus measuring errors in t

trials per subject. The result reveals significant decrease in errors in yoga group as compared to physical activity group, who showed no change.

Bonifacci, P. (2004) examined perceptual, visual-motor abilities and intellectual skills in children with low, average and above average motor abilities. The participants were 144 children (aged 6-10 years) attending elementary school. Three groups of children were identified on the basis of their performance at the TGMD (Test of Gross Motor Development; Ulrich, D.A. (1985). TGMD, Test of Gross Motor Development. Austin, Texas: PRO-ED. Edizione Italiana a cura di D. Ianes, TEST TGM. Test. Results highlight a significant difference in visual-motor integration between children with high and low gross-motor abilities, in the absence of significant differences in perceptual skills or intellectual ability.

Shahzada, G. (2011) investigated the differences between self-perceived multiple intelligences of urban and rural schools students. Measurement of central tendency, mean score, SD for the measurement of self-perceived multiple intelligences and one sample–t test was used for mean comparison of urban and rural schools students. Result showed that there is a significant difference between self-perceived verbal/linguistic, logical/mathematical, visual/ spatial and intrapersonal intelligence of urban and rural students and there is no significant difference between self-perceived, musical, bodily / kinesthetic, inter-personal and naturalistic intelligence of urban and rural students.

In the present study motor coordinative abilities of tribal adolescent girls have been assessed in the light of their perceptual and reasoning ability. Hence, while taking an aerial look at the studies on

tribal population of India, the researcher found quite a few studies namely by Barik A. and Banerjee A.K. (1999), Singh et al. (2001), Mitra, P. et al. (2002), Bhasin and Jain (2007), Chakrabarty, S. and Bharati, P. (2008) and Saheb et al. (2009) with tribal population as central theme but none of them addressed the motor coordinative abilities of tribal adolescents in the light of perceptual and reasoning ability, hence the present study was planned.