CHAPTER II
REVIEW OF LITERATURE
Growth and development of a child is affected by various factors, ethnic-racial differences have been observed by many researchers. Influence of socioeconomic status and sex on physical and cognitive growth has been reported by Bogin & Macvean, (1983). Evidence for relatively greater environmental influence on maturity of boys and greater genetic influence on maturity of girls has been reported by Bogin & Macvean, (1982). Mixed group girls were taller and heavier than other groups. Socioeconomic differences in height and body mass index was reported by Hakeem, 2001 chronic under nutrition pronounced by deficit in height decreased with increasing income level, although socioeconomic differences in weight status were not uniform among various age-sex groups. The influence of increasing affluences is likely to be seen both in terms of increased obesity among older female and under weight among children. Malian adolescent girls exhibited poor growth and development. Urban girls had better indicator of growth than rural girls. Malian girls also showed lower body fat and delayed menarche (Pawloski, 2002).

Dietary habit and life style has led to new health problems, Obesity and over weight in older children are some emerging nutritional problems that may be the consequences of pattern of life style and diet in response to social and cultural change (Wickramasinghe et al, 2004). Abalkhail et al, 2002 emphasized the need for community and school based programs for preventing and reducing obesity in school age through improving the nutritional status awareness, diet habits and life style in order to ensure health and longevity.

Association of weight status with social relationship, school experiences, physiological well-being, and some future aspirations have been observed (Falkner et al, 2001). The pattern of observation among girls indicates that the obese girls had some adverse social and educational correlates. Similar results were observed for under weight boys.

Delayed growth and development may be due to many factors, including a history of under nutrition poor socio economic status and increased energy demands.
Better indicators of growth in urban girls as compared to rural girls have been found (Pawloski, 2002) Malian girls reported to have low body fat than reference girls. Influence of climatic variation on growth and development has been reported by Tanner, (1977).

A reduction in the level of physical activity may lead to reduced intake of energy which ultimately influences motor, functional and morphological variables which determine physical fitness. There may be other component like social, psychological and intellectual which have an impact on growth and development, health and physical fitness. Inclusion of appropriate physical activity during alimentation will be very effective, beneficial and in enhancement of the catch-up growth and fitness. Kalita girls show adolescent growth spurt at age 12-13 years, Orriya urban girls have shown growth spurt between 12-13 years (Mahapatra, 1969). Racial differences in body dimension have been observed by Malina & Moriyana, (1991). Regional variation (eastern region and north eastern region) in height fat% and other motor quality parameters may be attributed to geographical variations, genetic factor, nutritional and socioeconomic status, habitual physical activity and other environmental factor (Dey et al 1997).

Poor socio economic status of the primitive tribe may be one of the reasons of the poor growth pattern observed by Mitra et al, (2002) in Kamar children. Kamar boys and girls of Chhattisgarh when compared with other tribes and the official data of all India (ICMR) indicated lower weight and height in all the ages i.e. from 5-18 years.

It has been observed that growth curves of various body dimensions vary from one population to another ( Tanner, 1962; Hiernaux, 1964,1968) while growth differences of this kind are primarily genetical origin, they may be considerably influenced by environmental factors. Mitra & Singhrol, (1982) found that growth pattern of Chhattisgarhi girls is observed to be superior to Manali Rajput girls, but inferior to
Orriya urban girls whereas age weight growth pattern of Chhattisgarh girls is inferior to Manali Rajput girls and some what superior to girls of south India.

Many factors are known which effect growth and development (Tanner, 1961; Johnston et al, 1980). Hereditary (Susanne, 1980) as well as environmental factors are important in the process of growth and development (White Law, 1971; Cook et al, 1973; Malcom, 1974; Lindgren, 1976; Johnston et al, 1980). Results of body composition have shown that children living under better social circumstances are not only heavier, because they have more developed skeleton and musculature but they have also more body fat (Bodzsar, 1999). Mayuri & Madhvilata, (2000), in a study of physical development of rural adolescents found that age, class and overall socio-economic status scores were significantly related to weight and stature. Singh & Singh, (2000) reported that there was difference in the body dimensions of affluent and non-affluent Meitei boys of Manipur aged 12-18 years. Similar results were reported by Bailey, (1970); Chang, (1969); Evelenth & Tanner, (1976) and Miller et al, (1972), in developing and developed countries. Similar results in Indian context, were reported by Banik et al, (1972); Garg, (1978); ICMR, (1972); Sharma & Kaul, (1970); Singh & Malhotra, (1991) and Udani, (1963).

Clinical vital signs in children (temperature, heart rate, respiratory rate, and blood pressure) are an integral part of clinical assessment of degree of illness or normality Wallis et al, (2005), have reported reference interval for the range of heart rate and respiratory rate of healthy resting children aged 4-16 years. Wallis and Maconochie, (2006) in a study compared respiratory rate and heart rate of school children aged 5-16 years of age in two distinct populations a South African township and UK city and, established that, despite their socio-economic and health disadvantages, the resting physiology of South African children is no different to UK derived reference ranges. Heart rate variability is an umbrella term for a variety of measures that assess autonomic influence on the heart, Katharine et al, (2006), reported
no race or sex differences for time domain variables, mean R-R, body mass index, or blood pressure. Compared with Caucasian children, Asian children displayed a higher adjusted (fitness, R-R interval) LF:HF ratio. Busi et al., (2003), reported that the Relli (SC) girls attained maximum mean annual increase between 10+ & 11+ years and boys between 14+ & 16+ years. Blood pressure and pulse rate increased with advancement in age with few fluctuations. Significant sex difference was recorded according to age. The Relli boys and girls were heavier and taller than ICMR (1984) national standards. Studies on Rural and Urban population have reported increase in all physical traits but for skinfold with incrementing age (Singh, 1980; ICMR, 1984; Nath, 1987; Bharati et al, 1991, Sharma and Shukla, 1991; Nath et al, 1991). Positive relation between blood pressure and age has been reported by Reddy etal, 1991. Similarly correlation of blood pressure with heredity has been reported by Nirmala & Reddy, (1991). Studies have shown relationship of blood pressure with body composition (Rao et al, 1997), social status (Srivastava et al, 1977) & sex (Celine & Mathur, 1970).

Hussain & Rao, (2003) in a study revealed adolescent growth spurt of Asur boys at 14 years of age. They also reported that all the measurements except body weight achieved beyond 89% growth and maturation at 14 years of age, and focused that 76.5% of the boys under study exhibited mild form of under nutrition. Kuczera et al, (2003) reported that low emission standards in industrial areas improve the health condition of children in terms of skeleton formation. Poverty uncontrolled development of tourism in formerly ecologically clean areas on the other hand is affecting skeleton development in school children. Kshatriya & Basu, (2004) in a study examined general pattern of growth and Somatotype of Kutia Khonds male and female of Orissa and indicated that they have small body frame, and slower growth rate as compared to all India boys and Girls, as their entire lifestyle depends on natural resources subsistence. Hossain et al, (2004) reported positive correlation between height & weight of Bangladeshi University female students. Rao et al, (2006) observed progressive
accelerating anthropometric, physical and physiological traits with increment in age, highest peak values in girls were recorded between 11 to 14 years & in boys between 13 to 15 years age. They also report that the Gadaba boys & girls were shorter, lighter and with broader chest & head circumference than ICMR, (1984) national standards.

Growth period between 10 to 18 years of age is very dynamic period of life. The adolescent period is of rapid growth and stress (Menon & Rao, 1983). Dahiya, (2003) reported that rural and urban adolescent consumed cereals, pulses, green leafy vegetables, fats and oils, sugar and jaggery significantly lower than RDA. Kumble et al, (2001) reported more than fifty percent of the adolescent girls were below normal values in all the indices of anthropometry. The percentage of adolescent girls with normal nutrition was high in the families below poverty line group. Effect on socio-economic status on nutrition is reported by many researchers viz. Naidu & Rao, (1994); Bharati, (1989); Urade & Mukherjee, (2000); Barua & Mallick, (2002); Bhattacharya, (2000). Poor nutritional status of adolescent of deprived section have been reported by Kumari & Singh, (2003); Rao, (2001) in a longitudinal study reported that rural children had lower attained values than British or Indian well-off children for all the linear component of stature growth, he further reported that under nutrition in rural children delayed adolescent growth spurt. Similar results about adolescent girls were reported (Simondon et al, 1998; Benefice & Cames, 1999; Benefice, 1992; Garnier & Benefice, 2001).

Several studies have been done in different parts of India on health and nutritional status of preschool children (NNMB, 1978; FNB, 1981; Mahapatra et al, 2000; Ghosh, 2001; Urade et al, 2004; Kaur et al, 2005) protein energy deficiency (Sengupta, 1980; Gopalan, 1997), as well as nutritional status among different tribal children of Madhya Pradesh and Chhattisgarh states in India (Rao et al, 1994; Kumar et al, 1993; Mitra and Tiwari, 1997; Mitra, 2001). Adak et al, (2006) in a study reported that the level of malnutrition is lowest among the general castes and highest among
the schedule caste and schedule tribe, they also observed variation in weight and BMI, but no variation in other anthropometric variables were marked amongst various population. Mitra et al, (2004) observed, pattern of protein-energy malnutrition which were of mild to moderate intensity among Brahmin and moderate to severe intensity in Rawat and Teli children. Such findings indicate towards various socio-economic and micro-environmental factors (Sharma et al, 2006). Mitra et al, (2007) reported that the Gond and Kawar tribal preschool children have insufficient nutrition intake, which may be due to mother’s illiteracy, lack of awareness and other socioeconomic and cultural factors.

Physical fitness – Motor variables

The ancient Greece attained high level of civilization as they were very much concern about nutrition, physical activity and intellectual development. The educational system of ancient Greece was oriented to develop healthy and fit citizen so that they are asset to the state. The difference in physical fitness or motor performance can be attributed to several factors whereas hereditary and environmental influences have been observed with motor development (Cratty, 1979; Harre, 1982; Sohi, 1986a, 1986b). Growth and motor fitness are influenced by varied factors interacting in a complex combination. The ethnic-racial influence has been observed in motor performance. Hutsinger, (1959) observed difference between American Negros and white children, similar result were recorded by Van Alstyne & Osborne, (1939); Ismail et al, (1963); McGregor and Buck, 1971; Rhodes, 1973 and Malina, 1969. Variation in physical fitness of healthy population has been observed due to environmental and genetic factor (Perusse, 1987).

Growth and development and motor ability can be observed in various perspectives. It is quite obvious that increment in growth and change in motor abilities indicate developmental changes but the changes are not uniform through out the development of an individual.
Various studies have been carried out to study relationship between growth, development and motor performance. Rarick & Oyster, (1964) found that skeletal maturity was a factor of little consequence in explaining individual difference in strength and motor efficiency. Ray, (1979) reported little difference between ethnic groups in physical and physiological variables. Significant difference was observed by Pokhriyal, (1991) in physical fitness component of boys and girls belonging to different regions of India. Relationship of anthropometric measurement and motor performance have been studied by many researchers (Wear & Miller, 1962; Richard, 1965; Craig, 1976; Pal, 1978; Brar & Srivastava, 1985; Simpson 1989, Thompson, 1959; Hatano, 1994; Fu, 1994; Bandhopadhyya, 1998). Various motor fitness components have different rate of improvement which is not always linear in relation to age. Height and weight have been found to be poor predictors of performance in boys and girls of different age (Smoll, 1967). Steady improvement in general motor ability from 8-18 years of age has been reported by Espenschade, (1968); Physical performance measure in children can be estimated with moderate success from a combination of skinfold and circumferences along with age and height (Slaughter et al, 1982). Low to moderate association of anthropometric measurements has been reported by many researchers (Cureton et al, 1975, Espenschade & Eckert, 1967; Eynon, 1958; Montoye et al, 1972; Parizkova, 1976; Ross & Dey, 1972 and Wear & Miller, 1962). Comparative studies of various groups have exhibited varied results. Sodhi & Singh, (1985) compared the Indian Nigerian children of 10 - 14 years and reported the Nigerian boys had a higher rate of growth as compared to Indian boys in motor performance the Nigerian boys out performed the Indian boys.

Correlation between anthropometric dimension and motor fitness variables has been observed. Score of broad jump was associated with calf girth and push up with arm girth, leg strength and endurance capacity depended on muscles mass of leg (Dhara et al, 1995). In the same study the author reported better motor fitness variables scores in tribal boys as compared to non tribal's.
Various studies have shown beneficial effect of physical activity. Katzmarzyk et al, (1998) reported significant relationship between activity and health related physical fitness. Gordon et al, (2000) in a study concluded that there were important association between modifiable environmental factors, such as participation in school physical education and community recreation programs, with activity patterns of adolescents. Gordon et al, (2002) examined the experimental effect of altering hours of TV/Video viewing and bouts of moderate to vigorous physical activity, and reported lower over weight among adolescent who watched was TV/ Week combined with frequent to moderate physical activity than those who watched more TV/ Week combined with fewer bouts of weekly moderate to vigorous physical activity. Hung and Malina, (2002) in a study found that physical activity is significantly and positively correlated with one mile run performance and the sit and reach test, but not with sit-ups and subcutaneous fatness.

Voorhess and Young, (2003) conducted a study on personal, social and physical environmental correlates of physical activity levels in urban Latinas and reported that the social environmental factors appeared to be the most important factors related to physical activity in this group of Latinas women. Physical environmental and personal factors, although not statistically significant, showed trends in expected direction. Levin et al, (2003) in a study of physical activity and body mass index among US adolescents reported that the adolescent boys who were under weight or overweight were less likely to be physically active than boys of normal weight similarly adolescent girls who were over weight or at risk of over weight were less involved with sports than girls of normal weight, and under weight girls were less enrolled in physical education. Weight status among high school students is correlated with selected physical activity behaviour especially among adolescent boys. Brosnahan et al, (2004) in a study reported beneficial effect of physical activity on feeling of sadness in Hispanic and Non-Hispanic white boys and girls. Peter et al, (2004) measured physical activity level of Canadian children and Youth and indicated
that approximately $2/3^{rd}$ of children and youth are physically inactive and there are distinct gender difference in physical activity level, intensity of physical activity and participation in sports. Patrick et al, (2004) examined 7 dietary and physical activity variables in a cross sectional study and indicated insufficient physical activity was the only risk factor for higher body mass index for adolescent boys and girls. Guerra et al, (2006) obtained result from a study that male who have a lower physical activity index (PAI) have an odds ratio of 2.1 of obesity, in comparison with males who have higher PAI.

The review of literature underscores the fact that there is paucity of research on growth pattern physiological, physical fitness and health status of the population of the Chhattisgarh especially, on the school going adolescent groups, thus the scholar felt need to study growth pattern, physiological, physical fitness and nutritional status of school going children.