CHAPTER II

REVIEW OF RELATED LITERATURE
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The present research work has a new approach in the field of sociology of physiotherapy and physical education under the interdisciplinary approach. The scholar being a lecturer-cum physiotherapist in a very well established national institution (Deemed University), has realized the drawbacks of postural defects among school going children. These defects not only interfere with the normal growth and development of the young children but may also result in the severe bodily limitations at a later stage. The present work therefore, emphasizes the need to take proper care of the posturally defected boys studying in primary schools.

Although numerous researches have been conducted regarding the health, physical fitness and postural problems of the school going children, yet no proper and scientific research has been focused on the very postural problem of the school boys in relation to their family background. Therefore, the scholar has selected a new scientific and burning problem related to the postural defects of the young boys and examined their relationship with the family background of the individuals. However, out of the extensive search which the scholar has made to locate the related literature, the relevant reviews found are cited in this chapter.
Hardy\textsuperscript{1} conducted a study of health needs of 1068 Chicago children who received financial grants from A.D.C. and showed that out of all the children surveyed, 36 percent children had poor posture, 46 percent had foot abnormalities, 15 percent had spinal abnormalities, 38 percent had flabby muscles, 3 percent had leg deformities and 25 percent had rachitic chest deformities.

Dorothy et al.\textsuperscript{2} conducted two separate studies relating to the health problems of school children in 1980-81 and 1981-82 respectively. In the year 1980-81, scoliosis was found in 318 children out of a total of 12,997 children examined and similarly, in the year 1981-82, out of a total of 13,705 children examined, 521 children were found to be having scoliosis. In this study, the physical examinations were performed on the students in various grades with priority being given to the young children and to that of athletic physique. Majority of the children studied were from low income


families with limited access to medical services and the sites of studies were of rural, small town and urban settings.

Hardy, Boyle and Newcomb\textsuperscript{3} also conducted a similar study to assess physical fitness of children from different economic levels in Chicago and showed that out of 7500 children representative of the general child population, 14 percent children had pronated feet, 42-47 percent poor posture and 25-30 percent children had flabby muscles.

Michael and Salend\textsuperscript{4} examined the incidence and types of health related problems of 1000 randomly selected migrant children who received services at Mid-Hudson Migrant Education Centre, and found an incidence of 22 percent of the physical problems and 5.5 percent that of nutrition related problems. Out of all the physical problems, incidences


of foot and musculo-skeletal problems were 3.8 percent and 2 percent respectively. The age groups of the children studied were from newborn to 18 years of age and the migrant families of the sample were employed in agriculture related industries.

Kuhns\textsuperscript{5} found that 50 percent of children surveyed had some weakness or the other foot disorder and that about 80 percent of all adult persons examined, suffered from some sort of foot disorder. He also stressed on the necessity to teach good carriage of the body and good use of the feet.

Sharma\textsuperscript{6} conducted a study on the elementary school boys of Kendriya Vidyalyas of Greater Gwalior to detect the incidence of five common postural defects namely, flat foot, knock knee, lordosis, scoliosis and kyphosis. Total number of subjects studied was 1343 and their age group ranged from 6 to 11 years. The method of survey was spot observation and spot testing. He used Pedograph method for detecting flat foot, Alignometer


for lordosis, Plumber Line Test for scoliosis, Kiputh method for kyphosis, and Indian Military Test for the detection of knock knee. He concluded that a large proportion of the students population studied was having postural defects; 198 students (14.74 %) were found to be having flat foot, 235 students (17.42 %) suffered from knock knee, 137 students (10.2 %) had lordosis, 48 students (3.57%) had scoliosis and 89 students (6.62 %) had kyphosis. He further showed that some students suffered from more than one postural defect; 93(6.8 %), 41(3.05 %) and 16(1.18 %) students were found to be suffering from a combination of flat foot- knock knee, lordosis-kyphosis, and scoliosis- kyphosis respectively. Most of the surveyed students were from the middle class families.

The School Health Committee\textsuperscript{7} appointed by the Government of India had submitted the following in their report:

1. In Delhi state, over 8400 children examined in the year 1959-60, the percentage of defective children was as high as 84. These children were from both rural and urban areas. The common defects found were malnutrition, eye diseases, enlarged tonsils and dental caries.

2. In Uttar Pradesh, a clinical survey was carried out in the year 1949-51 where 6400 boys of various schools from 16 districts were examined. More than 3700 boys showed one or more defects. Out of the child population examined, 90 percent children were living in rural areas and the rest in urban areas.

3. In Calcutta, a survey was undertaken for the school children in the year 1954 to find out the nutritional status, and the survey revealed that less than 25 percent of the children examined had good nutritional status.

Katoch\(^8\) surveyed common postural defects namely, flat foot, scoliosis, kyphosis and lordosis in relation to their minimal strength in secondary school boys of Delhi, and also to develop a corrective programme to eliminate their identified postural deformities. Total number of subjects was 1006. They were from IX and X standards and belonged to age group 14-16 years. She used Spondylometer for detecting scoliosis, kyphosis and lordosis, and Pedograph for detection of flat foot deformity. In her study, she found that 20 subjects (1.98 \%) had flat foot, 24 subjects (2.38 \%) had scoliosis, 75 subjects (7.45 \%) were found to be having kyphosis, and

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41 subjects (4.07 %) suffered from lordosis. Out of a total of 1006 students examined, she found that only 67.79 percent subjects had normal posture, 15.90 percent subjects suffered from single deformities and 16.30 percent subjects were having multiple deformities. Most of the surveyed students were from the Government schools and belonged to either low strata of society or lower middle class.

Nissinen\(^9\) followed up a cohort of children annually from a mean age of 10.8-13.8 years to determine the development of their posture. Of the sample of 1060 children, 847 (79.9 %) participated in the final examination. Thoracic kyphosis and lumbar lordosis were measured annually with a spinal pantograph. The three year incidence of scheuermann's disease(thoracic kyphosis) was 0.4 percent. The mean thoracic kyphosis increased and the mean lumbar lordosis decreased with age in both sexes. Thoracic kyphosis was the most pronounced at a mean age of 12.8 years and lumbar lordosis was the least pronounced at a mean age of 13.8 years.

Jones\textsuperscript{10} headed a study on flat foot and found that, “flat feet may actually be protective whereas, high arches may be a risk factor for injury”. Generations of flat-footed candidates have been rejected by the military under the assumption that they were more prone to injury. But new data indicate that flat feet may actually prevent lower limb injuries. Researches at the U.S. Army Research Institute of Environmental Medicine, The Walter Reed Army Institute of Research and, The Nike Sports Research Laboratory collaborated on a study. In it, the feet of 248 infantry trainees were photographed before 13 weeks of basic training. The subjects grouped according to arch height, were then followed and monitored for training associated injuries. The findings; the higher the arch, the greater the risk of injury. The trainees with high arches were 2.4 times more likely to suffer a foot injury than were flat footed trainees.

Siemsen and Dolan\textsuperscript{11} conducted a study and reported the incidence of the postural defects among senior high school boys as:

\textsuperscript{10}Bruce Jones, “Flat foot Nonsense,” \textit{Reader's Digest} 137 (October 1990): 142.

faulty antero-posterior posture (56.6 %), scoliosis (49 %), unequal shoulders (41.5 %), flat feet (37.71 %), bow legs (13.2 %) and knock knee (7.5 %).

Davis\textsuperscript{12} made a study on the status of postural patterns. The study was an analysis of 750 physical examination record cards from 5 selected years. According to the study, postural patterns changed over the years. Significant differences between the percentage of occurrence were found for many factors. The most wide spread postural deviations still included: forward head, forward shoulders, protruding abdomen, pelvic tilt and pronated feet. Nearly all types of scoliosis decreased significantly over the years studied. The study proved that with advancing age, if other posture defects manifest significantly, scoliosis appears to be reduced.

Kumar\textsuperscript{13} conducted a survey of selected postural deformities of urban and rural area children between the age group of 7 to 9


\textsuperscript{13}Rabinder Kumar, “A Survey of Selected Postural Deformities of Urban and Rural Area Children Between the Age Group 7 - 9 Years at Midnapore District of West Bengal,” (Unpublished Master’s Thesis in Physical Education, Jiwaji University, Gwalior, 1987).
years at Midnapore district of West Bengal. The number of subjects constituted for the study was 800, the subjects were tested to detect the five common postural defects; flat foot by pedography foot print method, knock knee by observation method, kyphosis and lordosis by Woodruff body alignment posture test, and scoliosis by scoliometer method. The results showed the following deformities in urban and rural areas:

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<th>Urban</th>
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<td>Flat foot</td>
<td>53</td>
<td>31</td>
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<td>Knock knee</td>
<td>146</td>
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<td>Kyphosis</td>
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<td>Lordosis</td>
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<td>Scoliosis</td>
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The study concluded that out of 800 subjects, 578 subjects were found to be having postural defects. In other words, 72.22 percent subjects were detected as having postural defects. Some of the selected subjects were found to be having more than one defect in their body; 23 subjects in urban and 26 subjects in rural area had flat foot and knock knee; 2 subjects in urban and 11 in rural were detected as having both kyphosis and lordosis; 15 subjects in urban and 35 subjects in rural areas were found to be
having kyphosis and scoliosis. Other conclusion was that the maximum number of flat foot deformities was observed in case of urban areas but the total number of postural deformities was maximum in the rural areas.

Stirling et al.\textsuperscript{14} surveyed 15,799 children aged 6-14 years with the purpose to detect the prevalence of scoliosis and found that 431 children (2.7 \%) had scoliosis with a cobb angle of more than 5 degrees and 26 children (0.5 \%) had idiopathic scoliosis with an angle of more than 10 degrees.

Verma et al.\textsuperscript{15} in a study found the frequency of congenital malformations as 19.4 per 1000 births based on an analysis of 3,01,897 births from 25 hospitals in India. In another study, the frequency of 16.8 per 1000 live births was revealed for congenital malformations based on data obtained from 34,650 births in 18 centres in India.


\textsuperscript{15}Ishwar C. Verma et al., “Genetics in Paediatric Practice: An Indian Perspective,” \textit{Journal of Indian Paediatrics} 28:9 (September 1991): 978.
Munson\textsuperscript{16} found that critical changes occurred in the chest, abdominal and hip regions between grades 1 and 3 which were important for a well balanced anterior-posterior posture. The frequency of anterior-posterior deviations indicated a crucial need for re-emphasis on posture education.

Alderman\textsuperscript{17} made a study on posture by taking photographs of 83 girls at Blair High School Houston, Texas, and revealed that 93 percent girls had posture deviations. The most frequent faults were; forward head (62%), round shoulders (36%), bilateral asymmetry of shoulders (31%), hollow back (29%) and, pelvic tilt (21%). Subjects had little or no previous posture instructions and after 8 lessons in regular health education classes, 62 percent of the subjects showed improvement. He further showed that it was not necessary that posture correction could be done with exercises only. If we can correct their bad habits and teach them correct movement, we can achieve improvement in general.


\textsuperscript{17}Melba Kay Alderman, “An Investigation of the Need for Posture Education Among High School Girls and A Suggested Plan of Instructions to Meet These Needs,” \textit{Completed Research in Health, Physical Education and Recreation} 10 (1968): 117.
Ohtsuka, Yamagata and Arai$^{18}$ stated that the screening programme for scoliosis started by Chiba University in 1979, consisted of using moire topography, low dose roentgenography and a final ordinary X-ray examination. The number of children screened through the Chiba University Medical School (CUMS) screening programme in 1986 amounted to 12,46,798. The incidence of scoliosis of more than 15 degrees increased linearly according to age from the fifth grade primary school children 0.07 % in boys, 0.44 % in girls to the second grade junior high school students 0.25 % in boys, 1.77 % in girls. The female predominance of scoliosis cases with curvatures of more than 20 degrees detected during the total period was 10:1 and this female predominance was the same for primary school children and junior high school students. According to a study of the incidence of scoliosis by districts (areas were divided according to population density and urbanization), there were no significant differences in the fifth grade primary school children between the sparsely and densely populated areas.

In the case of children beyond the fifth grade primary school level however, the incidences in the densely populated areas were significantly higher than those in the sparsely populated districts. The incidence of scoliosis of more than 20 degrees decreased significantly every year among junior high school students, because they were screened periodically in schools, and the scoliotic students who had already been detected were left out of the next screening. The study established that screening for scoliosis by the CUMS screening programme was cost effective with a low risk of radiation hazards.

Martin\(^{19}\) determined the frequency of antecedents and family prevalence of idiopathic scoliosis during 1994-95 in first and second degree relatives of 100 school children with idiopathic scoliosis. The study showed that 25 percent of the patients investigated had one or more affected individuals in their family. Prevalence of idiopathic scoliosis in first degree relatives was 5.16 percent and in second degree relatives it was 4.31 percent.

David et al.\textsuperscript{20} surveyed 2940 school children aged 9-13 years from several Muslim-Arab villages in the Western Galilee and found that 55 \((1.9\%)\) children had some deformity on physical examination. 20 children of them were having scoliosis of more than 7 degrees. The prevalence of in-family marriage in those with deformities was 31 percent. The study suggested that the scoliosis may also have genetic origin.

Wickens and Kiputh\textsuperscript{21} investigated common postural defects of college freshmen. The purpose of the study was to point out those postural defects which were most prevalent at the onset of college life. It was also felt that the presentation of findings of the orthopedist on such a large group over a period of years was of value. Further more, the results should be of interest because of the selection and general health of the group as a whole. With a large percentage coming from preparatory schools where some attention must have been devoted to physical development and health education, many of these students should be posture conscious and should have had health habits above the average.


Pande and Gupta\textsuperscript{22} have pointed out that ectomorphs usually develop kyphosis, poor musculature and shyness whereas, endomorphs develop many deformities such as flat foot, knock knee and bow leg. Besides this, they have also shown the other causes of poor posture i.e., injury, nervous weakness, heredity, improper clothing and accidents.

Kumar et al.\textsuperscript{23} have proved that the higher the arch the better is the leverage action of foot and efficiency of functional activity especially, in running. High arch indicates better feet which are stronger, more elastic and more efficient in all natural uses of foot, therefore, high arched feet should be preferred for the best runners, whereas low arched feet indicate conditions which are associated with pain, early fatigue or inefficiency in all natural uses of foot.


Nissen et al.\textsuperscript{24} examined a total of 1060 children (515 girls, 545 boys) for screening of trunk asymmetry and scoliosis at an average age of 10.8 years. The physical examination involved measurements of height, sitting height, total arm length and leg length in equality determinations and moire topography. Trunk asymmetry was measured by forward bending test, and posteroanterior standing radiograph at the spine was taken of those 188 (17.7 \%) children who had a trunk hump $\geq$ 6mms. Only 20.1 percent of the children were found to be exactly symmetric in the forward bending test, 47.3 percent had a right sided hump and 32.6 percent had a left sided hump. Humps of 6mms. or more were significantly (P = 0.03) more prevalent among girls (21.7 \%) than boys (16.3\%). Moire fringe asymmetry was proved to be common; only 9 \% of the material was totally symmetric, two thirds had asymmetry of $\leq$ 1 fringe, 26.6 percent had a symmetry $>1$ and $\leq 2$ and 5.4 percent $>2$. The prevalence of scoliosis (trunk hump $\geq$ 6mms. and Cobb angle $\geq$ 10\textdegree) was 4.1 percent. The majority (72.1 \%) of the curves were left convex.

Koos\textsuperscript{25} found that different social classes appraise illnesses differently and accordingly either act or do not act on the symptoms when they appear. He studied percentage of respondents in each of the three different social classes recognizing specified symptoms as needing medical attention. Some of the selected symptoms included in the study were persistent backache, persistent joint and muscle pains and chronic fatigue. The subjects were asked whether the selected symptoms would motivate them to see their doctor or not. The responses of all three social classes differed for the same body symptoms. In the upper social class (N=51), 53 percent subjects recognized the need for medical attention if they had persistent backache, 80 percent for persistent joint and muscle pains and 80 percent for chronic fatigue. In the middle social class (N=335), the percentages of subjects found were 44 %, 47 % and 53 % respectively for the same three selected symptoms. In the lower social class (N = 128), the percentages of subjects further decreased to 19 percent, 19 percent and 19 percent respectively for all the three symptoms.

Chinn\(^{26}\) conducted a study to examine a direct relationship among health status, family and socio-economic factors and academic achievements. She found several significant inter-relations between health problems and school problems including emotional clues, educational ranking and social ranking. The study supported the assumption that health problems are related to classroom problems but it indicated that the relationship is unclear and needs further study. Findings moderately supported the assumption that health problems are related to classroom achievements. A close examination of this relationship revealed that it was compounded by other variables most of which can be grouped under family's socio-economic status. The analysis indicated that the students from low income families tended to have more problems related to nutrition and general health care, the students who repeated a grade had parents with lower educational levels and lower family incomes, and students who lived in homes with larger numbers or siblings made poorer scores on the reading test.

Bedi\textsuperscript{27} stated that cultural factors like caste, religion etc., influence nutrition and living habits in many ways. Culture operates on nutritional level through perpetuation of traditional customs, religious taboos and prescriptions, techniques and value systems. He further said that food habits are among the oldest and deeply entrenched aspects of any culture. Taboos against non-vegetarian foods and food stuffs such as garlic and onion, and rituals like fasting influence the food culture. Certain protective foods such as eggs, meat, fish etc., are prohibited in many castes, religions and cultures.

He also said that certain customs and mode of living may also condition the occurrence of deficiency diseases e.g., the pardah system may lead to osteomalacia in young women of the upper classes living in dark quarters.

Han\textsuperscript{28} studied the relationship between socio-economic status of Korean immigrant families and the kind and degree of children's recreational participation. The sample consisted of 200 children and 200 sets of parents who completed the questionnaire. Data were tested by chi-square analysis. The strongest results revealed by the data were that the relationship existed between children's participation and family income, and the amount of recreational equipment owned by the family. The latter variable can also be seen as a representative of socio-economic status since the purchase of equipment was dependent on what family can afford.

Stockhill\textsuperscript{29} in his study of junior high school boys related the physical fitness scores to the families' socio-economic status, its size and type of occupation. All boys in 12 physical education classes for grades VII, VIII, and IX (N = 420) were given the AAHPER Youth Fitness Test. The socio-

\textsuperscript{28}Lee Seok Han, “Socio-economic Status and Patterns of Recreational Pursuits of Known Immigrant Pre-adolescent and Adolescent Youth in New York City,” \textit{Dissertation Abstracts International} 51:4 (October 1990): 1156 - A.

economic status of parents was determined from the rank of their occupation in the detailed classification of the Bureau of Census, 1950. The co-relation between physical fitness and socio-economic status of parents was too low for predictive purpose.

Bressler\(^{30}\) conducted a study to verify the relationship between the body weight and flat feet. Out of total 4322 subjects (college men) verified, 2648 had structurally normal feet and 1674 had flat feet in some degree or the other. The study indicated that there was true relationship between body weight and flat feet. The flat feeted group was on the average 4.2 pounds heavier than the normal. The findings of the study were based on subjective judgement of the physician.

Moriarty\(^{31}\) conducted a study to establish relationship of certain physical and emotional factors to habitual posture. The subjects selected for the study were 4000 out of total community population of 80,000. The subjects (boys and girls) selected for the study belonged to 7


different communities and were selected from 23 different elementary schools of Massachusetts, studying in grades IV, V and VI. The 31 factors were considered for the analysis of posture; some of the factors were economic status, home environment, racial characteristics of the pupils, geographical locations within the state, size of the school systems etc. An analysis of each of the 31 factors was made in relation to posture. The study showed that there existed a significant relationship. The study concluded that there was a significant association between poor posture and certain physical and emotional factors namely; disease, fatigue, restlessness, timidity, underweight, heart defects, asthma and hearing defects.

Williams\textsuperscript{32} studied the relationship of race and socio-economic status to motor skills and athletic skills in elementary school children. Motor abilities and athletic skills were determined by administering the Cooper Adaptation Children's Physical Adaptation Scale and Athletic Survey of each subject. An analysis of data revealed that difference existed between blacks and whites and between socio-economic status levels on motor performance.

Blacks were found to be significantly superior to whites in motor ability scores and blacks at each level of socio-economic status consistently demonstrated higher motor ability scores than did the whites at comparable level. Further, analysis of data revealed that as the level of socio-economic status improved in case of blacks, motor ability scores also increased.

Hinrich\textsuperscript{33} studied the co-relation between health and scholastic record and found, without exception, health to be an important factor in scholastic achievement. Low health scores were found among the largest proportion of the students with low scholarship ratings.

Tillich\textsuperscript{34} conducted a study and held that health variables were more significantly related to school achievements. The data indicated that school districts should be encouraged to include instruction in health habits, nutrition and preventive medical care not only in public schools but also in adult and community education programme.

\textsuperscript{33}Marie A. Hinrich, "Some Co-relations Between Health, Intelligence Quotient, Extracurricular Activities and Scholastic Record," \textit{Research Quarterly} 12 (May 1941): 228.

Panthieux and Barker\textsuperscript{35} made an effort to investigate the relationship between socio-economic status and physical fitness measures. They tested 329 girls and 304 boys aged 10, 11 and 12 years and used seven item AAHPER Youth Fitness Test to measure physical fitness, and Warner, Meeker and Eell Index of status characteristics to measure socio-economic status. The relationships were determined by product moment co-efficient of co-relation between each measure of fitness and each measure of socio-economic status. There were indications that lower socio-economic status girls were faster, better co-ordinated and had more endurance, but that upper status girls were stronger in arm and shoulder girdle strength, in abdominal and hip flexor muscles, and in muscular explosiveness. Lower socio-economic status boys were faster and better co-ordinated but that higher status boys scored better in combined agility, speed and in strength of abdominal and hip flexor muscles.

\textsuperscript{35} N.A. Panthieux and D.G. Barker, "Relationship Between Socio-economic Status and Physical Fitness Measures," \textit{Research Quarterly} 36 (December 1965): 464 - 467.
Hasbrook\textsuperscript{36} study tested a theoretical explanation of low social class background influencing the kind and degree of sports participation. A self administered questionnaire was administered to 340 students (80 female athletes, 119 female non-athletes, 80 male athletes and 61 male non-athletes). Results indicated that social class and gender interact such that degree of sports participation is stratified along social class lines for females but transcends the social structure for males. No linkage between the kind of participation as indicated by either of the team/ combative versus individual/ dual nature of sport or by the expense of participation in sport, and the social class background of its participants was found.

Karuppaian\textsuperscript{37} tried to determine how far the socio-economic status of an individual is associated with participation in sports and games. For this purpose, he selected six hundred thirty nine university players in all


teams. After careful analysis he derived that individual’s socio-economic status influenced his opportunity for participation in games and sports. It was also found that some people growing in poverty ridden society play the games which incurred less expenditure and the people grown in upper class income society played the games which incurred more expenditure.