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Physical Education, Health Education and Sports Science

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"I believe that no matter what amount of work one has, one should always find time for exercise, just as one does for one's meals".

—Mahatma Gandhi

Introduction

Mahatma Gandhi advocated that physical exercise is an important daily activity equivalent to taking of one's meals by each individual. Physical education and sports are no exception to modern scientific approach. The National Policy on Education (1986) demands that physical education, sports and health education should be an integral part of education.

Due to the general ignorance of the educated people about the essential components of education, majority of the universities have not paid any attention to this compulsory subject related to all round education of children. Only 46 universities out of about 300 Indian universities and deemed universities, have post graduate teaching in physical education, health education, sports, and/or sports sciences (Sharma, 1999, Negi, 2000). This is in spite of the fact that optional subjects like history, physics, chemistry, legislative law etc. are taught at graduation level in almost all the universities of India.

This review of research trends analysis in physical education, health education and sports science has been conducted on behalf of NCERT mainly to find out whether the direction of research is in line or not in line with the implementation of policies, conceptual framework and recommendations of various professional, administrative and national committees and commissions.

The collection of research work presented is by no means inclusive of all researches but may certainly be considered as widely representative of research progress in India in the field of health and physical education and sports sciences.

RESEARCH TRENDS (1993-2000)

In all 236 Indian research studies carried from 1993 to 2000 have been reviewed, out of which 133 are doctoral dissertations while the rest are research papers, national committee's reports, general articles or relevant books. However, abstracts of some of these studies could not be incorporated in this research trend report due to financial and time constraints to visit concerned universities and libraries for laying hands to rest of the referenced studies. However, as far as indicative from the topics of their research, these studies have been referred in the appropriate section for the benefit of the readers so that the requisite information becomes available to future researchers.

The report is divided into following parts as per the NCERT recommended structure for the analysis of research trend during the period from 1993-2000:

I. Studies relevant to all levels of Education.
II. Studies relevant to Pre-school Education.
III. Studies relevant to Elementary Education.
IV. Studies relevant to Secondary Education.
V. Studies relevant to Higher Education.
VI. Studies relevant to Open Systems.
VII. Emerging concerns and gaps.
VIII. Concluding comments.

STUDIES RELEVANT TO ALL LEVELS OF EDUCATION

Studies undertaken on subjects belonging to more than one level of education have been classified in this category.

Chandrasekhar et al. (1993) studied the prevalence of anaemia in 400 rural families and 420 urban slum dwellings of Coimbatore, comprising both males and females. The study having subjects ranging in age from 4 years to adulthood dealt with informatic measurements, heamoglobin content and various clinical examinations. It has been reported that anaemia was a significant health problem both in urban slums and rural families studied, more so in joint families and families with bigger sizes where the food gets distributed among larger number of subjects leading to the dilution of per capita food intake.

Rao et al. (1993) studied the relative merits of some antropometric indices of children and adolescents ranging in age from 5 to 18 years, belonging to high and low socio-economic groups in both male and female sexes. It was found that height and weight is more in children of better socio-economic status and weight for height index was well co-related with muscle and fat reflective measurements, arm circumference and triceps skinfold.

Mazumdar (1994) studied the effect of various levels of competition on psychological and physiological parameters of anxiety on 30 male soccer players ranging in age from 12 to 25 years. There were significant differences in heart rate, respiratory rate, systolic blood pressure and sport competition anxiety test scores between two times of testing i.e., one day before and one hour prior to the competition for all three levels of soccer competitions namely, sub-junior national, junior national and all India-intervarsity. The level of pre-sport competition anxiety differed significantly among the soccer players belonging to three different levels of competition. Significantly low anxiety level was observed in the case of junior national soccer players in comparison to sub-junior and all India intervarsity soccer players.

Sudan (1994) studied nutritional status of 1443 male and 1443 female rural school children and adolescents ranging in the age group 6-18 years and belonging to 37 villages of Jammu province, divided into 13 groups of 111 male and 111 female subjects each. It has been reported in anthropometric measures that males were taller and heavier than females. Skinfold thickness values were found to be higher in females than males and the head circumference values were higher in males than females. Chest circumference was also higher in males upto 11 years than that of females and not so among children above 11 years of age. Mid upper arm circumference presented higher value in female as compared to males.

Kansal (1995c) reported the status of physical education in the overall educational process. It has been pointed out that there is a great paucity of qualified manpower in physical education. Referring to a meeting dated 16.5.1994 of major Associations of physical education and sports sciences held in the office of the Minister of State, Department of Youth Affairs and Sports, Ministry of HRD, it has been reported that a decision was made to create an All India Council of Physical Education (AICPE) for ensuring the co-ordinated development of physical education all over the country especially by creating proper infrastructure and qualified manpower in all the educational institutions of the country. A detailed proposal for the job avenues in physical education and for the suggested composition of AICPE has been presented.

Narayanan (1995), the then vice president of India expressed that the need for interfacing sports with health care and physical fitness should be highlighted. Such an integrated approach will help in modernizing the development of sports and encourage the youth to imbibe the true spirit of sportsmanship.

Singh (1995b) presented a new horizon of sports promotion through the role of parents. Physical education and sports are passing through one of the most exciting and critical period in its history. The goal of education in 21st century will be autonomy of the child and its interdependence with others in the society. The role of parents in the promotion of sports is very helpful in changing the sports performance of their children, by keeping themselves (parents) well aware about the demands of high performance and sports competitions and by encouraging their children for sports participation.

Shankar (1995) explained the role of yogic practices in health fitness and sports promotion. Yoga has gained worldwide popularity, as is evident from recent research trends. Yoga can serve as an applied science in a number of fields such as education, physical education, sports health and family welfare. Yogic practices not only help to strengthen each organ and develop every muscle of the body but also regulate the circulation of blood, purify the lungs, inspire the mind and help achieve a harmonious development of human personality. Yogic science, thus needs to be given proper place in the educational and physical education teacher training curricula.

Vijay (1995) expressed that a multidisciplinary approach is needed for sports promotion. Sports performance depends on effective production and utilization of 'Energy'. For effective production we should have a type of body through genetic inheritance and scientific training and the effective utilization of energy depends on psychological make up, training, use of legal ergogenic aids etc. We have to adopt a multidisciplinary approach for the achievement of all this and for this we require experts in various fields like scientific selection, sports specific training, sports medicine, sports psychology, exercise physiologist, sports genetics, exercise physiotherapy, sports nutrition etc. Till date we do not have the provision for the production of experts in the above fields.

Wakharkar (1995) presented a detailed account of proposed syllabi in health and physical education for classes I to X based on the aims and objectives of education; nature, needs and characteristics of individuals; facilities, time available, financial sources; desired outcomes. The National Sports Policy (1984), Central Govt. document on Youth and Sports in the National Policy on Education (1986) and its programmes of action, 1992, being indicative of the need to introduce physical education and sports as a regular and compulsory activity in the daily school time table. Some important areas of physical education teaching include health education, physical education, talent selection and nurturing. The author emphasizes the need to implement the 'programme of action-1992' on National Sport Policy, 1984 advocating the opportunity to be provided to all students of schools and colleges to participate in the programmes of physical education. Accordingly, the details of graded contents for the syllabi in 'Health and Physical Education' for classes I to X have been presented by the author.

Bal (1996) studied selected kinanthropometric and motor performance variables in upper elementary and secondary school girls of age range 10 to 16 years, belonging to Jat-Sikh community of Punjab. The growth patterns as well as percentile norms for major kinanthropometric variables like body weight, height, sitting height, upper arm circumference, shoulder breadth have been tabulated and illustrated. It has been found that skeletal and lean body kinanthropometric variables have a positive significant linear relationship with standing broad jump, vertical jump and sprint running performance. The researcher has recommended that growth patterns in kinanthropometric and motor performance variables should be included in the measurement and evaluation paper of physical education teacher training programmes.

Khan (1996) has presented a monograph dealing with scientific base of sports under the series of profusely illustrated and specially written popular science booklets on the judicious mix of scientific and technological subjects. A glimpse of the impact of science in the field of sports has been illustrated in this monograph. The contents deal with sports as a way of life, playing tricks, winning diet, playing pains, drug game, technology at play etc. In the words of the author, "Sports is a delightful mix of a high level of physical performance, mental agility and turbulent emotions. Sports Science has become a well recognised discipline in itself. The single most important force responsible for the performance explosion of this century is the application of science and technology to sports. This unsung band of nurtures comprises of anthropometricians, coaches, orthopaedists, sports medicine experts, biomechanists, exercise physiologists, sports psychologists, sports biochemists, physiotherapists, talent searchers, physical fitness and wellness experts.

Kahlon (1996) studied the growth pattern in selected 23 anthropometric variables and jumping ability of 120 basketballers, 120 volleyballers and 240 non-playing boys, all ranging in age from 11 to 18 years. The study revealed that the possibility of predicting jumping ability from linear anthropometric measurements is quite high during 8 to 11 years of age where after the relationship between body measurements and performance is found to decrease. It has been further illustrated that jumping ability of boys is a function of one's anthropometric measurements rather than that of one's age.

Sharma (1997) studied the effect of selected yogic practices on cardio-respiratory variables of 240 subjects ranging in age from 6 to 18 years who were exposed to M.I.C. gas which leaked from Union Carbide Limited in the night between 2nd and 3rd December, 1984. The findings of the study indicated that practices of yoga exercises had high significant effect for increasing vital capacity and cardio-vascular efficiency of the subjects of the experimental group.

Singh (1997) studied the physical growth patterns of psychomotor performance of 389 Jat boy students of Delhi ranging in age from 10 to 20 years. Growth patterns have been studied in 20 anthoropometric variables (including weight, height, sitting height, skeletal diameters, regional circumferences and skinfolds) and four athletic performance variables. The researcher has presented specific growth norms in the form of percentiles for Jat boys of Delhi. It has been revealed that anthropometric status rather than age, is a better indicator of one's general athletic performance. The scientific selection criteria for spotting sports talent in Jat boys at young age and to evaluate physique and physical fitness of Jat boys of Delhi in the form of 'Do it yourself kits' have been reported in this study.

Singh (1997a) explained the role of certain yogic asanas and physical exercise on selected coordinative abilities.

Sharma and Singh (1997) have authored a common book entitled physical and health education to be used by students of schools and colleges. The common focus of the 186 page book to satisfy requirements of the subject for all school and college students itself speaks volumes about the level of this subject at all levels of education. The book contains many quotations also, one of these pointing out the need of immediate attention for the promotion of this subject has been reproduced here, "He who is soft and weak-minded like the puffed rice soaked in milk, is good for nothing. He cannot achieve anything great. But the strong and virile one is heroic. He is the accomplisher of everything in life". Sri Ramakrishna.

Wangwad (1997) explained the failure of physical education programmes to promote sports in India. It has been concluded that we are very far away from implementing the programmes of physical education in educational process in schools, colleges and teacher training programmes. He, further adds that we have been successful in failure to fulfill the all-round development of goals.

Mokha et al. (1998) studied the comparison of physical fitness of 202 urban and 202 rural school girls of Ludhiana district of Punjab. It was found that the urban girls were slightly taller, significantly heavier than the rural girls, whereas rural girls were faster in running than the urban girls. Urban-rural differences are found to decrease as the age increases.

Malvai (1998) points out that Reiki – a system of using hands as healing instruments– is finding wide application as a tool for personal and spiritual health. Reiki healing works on our 'Aura' or bio-energy body and charkas of our body. It roots out the cause of the disease and there is no danger of overdose. The author has explained the Reiki treatment for many common diseases like diabetes, high blood pressure, burns, AIDS, epilepsy, fatigue, gout, glaucoma, obesity, hemophilia, hernia, hepatitis, heart attack, headache (tension) ulcers etc.

Singh et al. (1998) studied somatotypes and skeletal maturity of 444 sports and 401 non-sports boys ranging from 11 to 19 years. It was found that the sports boys are significantly advanced in their maturity status and are taller, heavier and more mesomorphic as compared to non-sports boys.

Singal et al. (1998) studied the morphological profile of 697 athletes (347 boys and 350 girls) and 699 controls (350 boys and 349 girls) ranging in the age from 10 to 18 years. A regular increase in weight and other body measurements was found in both boys and girls

of athlete and control group. In weight, the adolescent spurt had occurred earlier in athlete as compared to control group. The athlete as well as control group boys are significantly heavier and taller with bigger trunks and upper extremity length as compared to athlete and control girls of the corresponding ages.

Verma and Kumar (1998) studied the factors influencing the jumping ability in 140 young boys ranging in age from 10 to 17 years. It was found that the length of the thigh played a greater role in influencing the ability of the boys to jump forward rather than vertically upward. Height, sitting height and weight are found to be significantly related to various strength measures, almost at all age levels studied in yearly groups from 10 to 17 years. Body weight and jumping ability tests demonstrated significant relationship between 12 to 17 years.

Das (1999) in his compilation entitled, "Sri Aurobindo on Education" explained the need of providing strong foundation to Education by enriching its insufficient knowledge of physical education so as to implement the Aurobindo's concept of integral education. It has also been stressed that such an integral education requires to include an educational programme following which one can build a body beautiful in form, hormonious in posture, supple and agile in movements, powerful in its activities and resistant in its health and organic function.

NCTE (1999) published a compilation of Gandhi's works entitled 'Gandhi on Education' that contains an important abstract about education of the whole child, ideal education, real education and making the whole man. Gandhiji had amply emphasized that true education of the intellect can only come through a proper exercise and training of the bodily organs. It has been pointed out that majority of us are careless about diet, exercise, health education and physical education but caring properly for these is as important and essential to mankind as are air, water and meals. It has been stressed that one cannot enjoy really good health without exercise. It adds that exercise does not necessarily mean playing of games or sports, it means any combined physical and mental activity. Gandhiji pointed out that balanced food is necessary for the mind as much as for bones and flesh, so also is exercise necessary both for body and mind. Consequently, physical training and games rather than physical education and health education are strongly recommended as an integral part of education for all.

Kumar (2000) studied the development and evaluation of speed and strength of lower extremities of 180 school boys aged 8 to 16 years. Age changes have been reported in body weight, height, sitting height, leg length, grip strength, leg and back lift strengths; vertical jump, standing broad jump; stride length, stride rate, contact and flight times and speed of running. The study provides baseline data on the development of stride characteristics associated with sprinting action as well as with body measurements. The inter-relationships between strength, speed and physical measurements of school boys have also been presented in this study.

Pichaiappa (2000) constructed age specific norms for the predicted fundamental volleyball skills of boys of Tamil Nadu studying in elementary and secondary schools.

Rajput et al. (2000) have prepared a detailed document consisting of recommendations for the updating and modification of curriculum of all the subjects including health and physical education and art of healthy and productive living for higher secondary, secondary, and primary classes. It has been stressed that health and physical education has to be concerned with total health of the learner and the community. It should aim to develop desirable understanding, attitude and practices with regard to nutrition, health and sanitation, physical strength and fitness of the learner, family and the community. Games and sports have to find a prominent place in the total scheme of things. The general education of the first ten years must help develop a system that promotes an integral development of body, mind and spirit. Health and physical education including games and sports should be considered an integral part of the learning process and be included in the evaluation of performance. Health, physical and mental, has been expressed as the primary wealth in life. Therefore, health and physical education must be perceived as an integral part of curriculum at all stages of education.

Sharma and Gautam (2000) have reviewed the sports policy of India to prepare guidelines for the development of physical education and sports. The contents of their work relate to historical perspectives of physical education and sports, national sports policy, sports authority of India, promotion of yoga education and practices in universities, women participation in physical education and sports, grants for the creation of sports infrastructure, promotion of games and sports in India, role of national sports federation and association etc. Many schemes of the department of youth and sports, UGC, SAI have been presented to help the readers to get financial assistance under various schemes. It has been stressed by the authors that the organized sector like universities, colleges, schools deserve utmost attention as these can play a major role in sports promotion.

STUDIES RELEVANT TO PRE-SCHOOL EDUCATION

Only three studies could be covered in this section, all of these are related to health and nutrition.

Yegammai and Nivargi (1993) worked on the nutritional status, nutritional knowledge awareness and attitude of women towards the feeding programme and its effect on the nutritional status of children and women. They studied 200 beneficiaries and 100 non-beneficiaries of Integrated Child Development Scheme (ICDS) randomly selected from 20 ICDS centers of Coimbatore and Hyderabad. It was found that girls of Coimbatore have better mean weights than that of girls of Hyderabad. Similarly majority of the women beneficiaries in Hyderabad had poor knowledge and negative attitude towards ICDS programme and they did not go in person to receive the food.

Husain (1994) studied the dietetic management of malnutrition in relation to the development of 130 pre-school children ranging from 1-3 years from 20 slums of Indore city, divided into three groups i.e. control group, Wheat Meal feeding (WM) and Wheat, Soyabean and Groundnuts mix feeding (WSG). It was found that WM and WSG group increased all anthropometric measurements as well as blood heamoglobin, serum total proteins and serum albumin levels significantly more than the control group. WM and WSG mixes cured neuromuscular losses and increase motor mental functions significantly more than the control group.

Karanpuria (1995) made a comparative study of health and nutrition status of 500 children and education of their mothers, of ICDS area and 475 children and mothers of Non-ICDS area of Indore. The children of non-ICDS area were found weaker from both health and nutrition status point of view in comparison to the nutrition of ICDS area. The knowledge regarding health and nutrition among the mothers of ICDS area was much better than those of non-ICDS area.

STUDIES RELEVANT TO ELEMENTARY EDUCATION

Banerjee et al. (1993) studied body composition and physical activity of 175 sedentary and 120 active sports girls ranging in age from 10-16 years. It has been reported that there is a significant correlation between the body parameters with the education of fathers and socio-economic status in both sedentary and active sports girls.

Karir et al. (1993) observed nine somato-metric measurements and three physical performance tests of 154 urban and 150 rural Punjabi school going girls ranging in age from 11-15 years. It was found that the urban girls are slightly taller, heavier and with longer linear body dimensions than the rural girls. However in physical performance tests, urban girls performed slightly better in standing broad jump and sargent jump whereas rural girls (upto 13 years) have shown better performance in shot put event.

Sahney and Hanna (1993) studied the nutritional status, physical fitness and personality traits of sports versus non –sports girls. It was found that majority of the sports girls belonged to rural areas and they started playing at the age of 12 to 14 years. Sixty per cent of them were vegetarian. Majority of the respondents in both the groups had satisfactory habits of health and personal hygiene. Sports girls were taller and heavier and had better BMI values than the non-sports girls. A positive

correlation was found between calories, carbohydrates, protein and iron and physical fitness and also between anthropometry and fitness index.

Kaur (1994) worked on the skeletal maturity and motor performance of 212 sports and 172 non-sports girls of 12-17 years in age. Morphological and motor performance data indicated that sports girls were significantly taller, heavier with greater explosive power of legs, endurance of arms and abdominal muscles and were more agile and faster than the other group. Skeletal age was found to be significantly related to chronological age in both sports and non-sports girls.

Anuradha and Roy (1996) studied the attitude towards physical activities of 57 children ranging in age from 9 to 11years. It was found that the children of different age groups differed significantly in their attitude towards physical activity.

Singh (1997b) examined the assessment of nutritional status of 1553 tribal children (745 girls and 808 boys) ranging in age from 4+ to 10+ years. It was found that there was no significant difference between boys and girls for the mean and percentile values of all anthropometric measurements. Majority of children were in the below normal haemoglobin level and showed signs of anaemia of various degrees.

Dhanasekaran (1998) studied the role of 10 teachers and 305 students in developing school health programme in the primary schools. It was found that there was no significant mean difference in awareness level of students with respect to their fathers/mothers educational level, and occupation and economic status. There was a significant improvement in the level of awareness regarding health promotion of teachers in experimental schools. A significant improvement at the post-test level among students was also found in the level of their awareness.

Kaur (1998) studied the intelligence and creativity of 400 pre-adolescent children (200 boys and girls each) at different level of physical fitness. It was reported that boys were superior to girls at the three levels of physical fitness. Girls were superior to boys on total creativity and its dimensions. Physical fitness and intelligence, irrespective of sex was positively correlated.

STUDIES RELEVANT TO SECONDARY EDUCATION

Barik and Benerjee (1993) studied the effects of six weeks conditioning programme on selected anthropometry variables of 17 tribal and 21 non-tribal male students. It was found that the Tribal (santhal boys) group had significantly higher values than the non-tribal in all girth measurements, both before and after training programme. But there was no significant 6-weeks differential training effect in any of the anthropometric variables studied.

Goon et al. (1993) worked on the motor responses in relation to intelligence, age, sex and locality of 120 boys and 120 girls of the age group of 13+ to 16+. It has been found that the motor creativity of rural subjects were better than the urban subjects. However, no sex differences in motor creativity were observed. Girls were slightly higher in intelligence than the boys, whereas no significant effect was observed in motor responses.

Verghese (1993) studied the effect of nutritional education as well as diet supplementation in selected physical fitness components in 1000 rural and 1000 urban adolescent girls aged 13 to 18 years belonging to two districts of Tamil Nadu. It was found that the heamoglobin content as well as the physical fitness components were better in rural girls as compared to their urban counterparts.

Bose (1994) examined the comparative effect of three types of training loads on jumping ability of 80 boys, equated into three experimental groups and one control group of 20 boys each. It was found that the experimental groups differed significantly on jumping ability with respect to differing training loads.

Prakash (1994) studied physical fitness of secondary school girls in relation to their somatotyping, body composition and socio-economic status. It has been revealed that physically fit girls have higher lean body mass and a higher rating in mesomorphic component.

Tyagi (1994) constructed physical fitness norms for boys and girls of the age group of 14,

15 and 16 years studying in Grade IX through XII of 50 schools in Delhi. It was found that there was no significant difference in Physical Fitness across age in both boys and girls. In case of boys, height was significantly and negatively related to Physical Fitness while weight was significantly and positively correlated with Physical Fitness. Percentile scale of six sigma scales have been provided age wise for Indian boys and girls for each item of Youth Fitness Test of American Association for Health, Physical Education and Recreation. Similar fitness norms for high and higher secondary students of Ladakh have been constructed by Angchok (2000).

Deb (1995) studied the views and attitudes of 100 (50 male + 50 female) high school teachers-cum-guardian of 20 schools in Calcutta. It was found that the teacher-cum-guardian population irrespective of genders, prefer punishment approach to treat habitual delinquent children while they preferred community treatment approach for a social type of delinquents and has suggested a well planned and scientific community awareness programme for meaningful understanding of the problem.

Gupta et al. (1995) studied the comparative effect of isotonic and isometric training on the sprint performance of 60 school boys studying in ninth and tenth classes. The subjects were divided into three equal groups, one for isotonic training one for isometric training and one as control group. Six weeks respective trainings were conducted and initial, second, third and final tests were conducted for 50 meter dash performance. The results revealed that the training either dominated by isotonic or isometric is significant in improving sprinting speed performance of secondary school students.

Tomar (1995) reported the effects of conditioning programme with and without yogic exercise on selected physical and physiological variables of Haryanvis. Effects of 12 week physical and yogic programmes on selected physical, physiological and psychological variables of mentally retarded students have been reported by Tripathi (1998).

Bal (1996) studied kinanthropometric variables and motor performance of Punjabi school girls in the age range of 10 to 16 years. A significant relationship has been reported between height, weight, shoulder breadth with performance variables, Growth patterns in both kinanthropometric and motor performance variable have been presented in the form of distance and velocity curves as well as with the help of percentile norms.

Kaur et al. (1996) studied the age changes in height, weight and motor performance of 212 sports and 171 non-sports girls (control) of Punjab ranging in age from 12 to 17 years. The gain in height and weight with age was found in both sports and non-sports girls. The age changes in motor ability tests, a decrease in performance has been noticed in non-sports girls whereas in sports girls a continuous trend of improvement in performance has been reported while growing from 12 to 17 years in age.

Mishra (1996) studied the attitude of 412 (245 boys and 167 girls), studying in Class IX from four categories of schools-urban government, rural government, urban private and rural private, towards physical education. It was found that none of the sub-groups of subjects had high or very high positive attitude towards physical education; however, the students of govt. school had better attitude towards physical education as compared to their private school counterparts. Similarly, the students of urban schools possessed better attitude towards physical education than rural schools. As regard to sex differences, the boys had significantly higher attitude towards physical education as compared to their girl counterparts.

Purnima (1996) studied the health, personal hygiene and nutritional status of 300 rural teenage girls aged 13 to 18 years. The anthoropmetric measurements showed an increase with age, which was in accordance with psychological change taking place in adolescence. Most of the girls were found to be immunized against diseases and were aware that consuming a nutritious, balanced diet kept good health. A clear relation was found between nutrient consumption and the height and weights of the girls. The most common clinical sign found was anemia and grade I, II and III malnutrition with respect to proteins, iron, calcium and total calories consumed.

Singh (1996d) studied the existing conditions of **games and sports for the promotion of health programme in the senior secondary schools** from eight districts of Haryana. It was found that a majority of the schools recognised physical education activities as part of academic work. Schools did not organize annual sports and prize distribution function due to the insufficient budget and the physical education teachers were not satisfied with their positions in schools. It has also been revealed that schools neither made annual calendar for sports nor had sports activities during holidays.

Sidhu et al. (1996) studied the morphological characterstics of 444 sports boys and 401 non-sports boys ranging in age from 11 to 19 years. It was found that the sports boys are taller, heavier, having greater trunks, wider shoulders, hips, slightly thinner fatfolds at triceps and sub-scapular sites than the non-sports boys.

Kumar (1997) reported the development of an indigenous computer-based somatotyping technique for studying shape characteristics of athletes. This software will help in keeping the records of the measurements and somatotypes of the athletes for future use in research related to sports and physical education.

Verma and Srivastava (1997) studied the academic achievement and value pattern of 539 best athletes (312 boys and 227 girls) of Vidya Bharati. It was found that female athletes taken together at national level were significantly higher in their academic achievement in comparison to the male athletes. It was also found that at national as well as state levels patriotism, social and knowledge values occupied the top three ranks, respectively in schools run by Vidya Bharati. On economic values, boys belonging to Bihar, M.P. and Rajasthan were significantly higher than their female counterparts from the same states.

Gupta (1998) formed physical fitness test battery for school boys Delhi ranging in age from 15 to 18 years. The test battery has been based on half squat and jump test, cross movement run test, standing forward extent bending test, 50 meters run test, push up test and 1500 meters run/walk test. The percentile norms were prepared for each of the above test based on 2000 school boys for each yearly age group namely 15, 16, 17, and 18 years.

NCTE (1998) developed a curriculum framework for quality teacher education based on need-based research and expert advice whereby the present one year B.Ed. programme has been recommended to be converted to two year B.Ed. programme so as to **incorporate health and physical education activities** on compulsory basis in addition to other modifications in core course structure. This revised programme has already been started on experimental basis in the Regional Institutes of Education (NCERT).

Singh et al. (1998b) studied the relationship of selected anthropometric measurements with motor ability in 455 male school boys of Punjab ranging in age from 13 to 16 years. It was found that all boys grew proportionately with the increase of age and the motor ability also increased with age. A significant relationship has been reported between anthropometric measurements and motor ability.

Khandelwal (2000) reminded that the national sports policy (1984) emphasized the need for making physical education and sports as an integral part of the **curriculum as regular subject in the schools** and calls for making these components as important parts of the learning process by including these in the evaluation of child's performance. In consonance with the directions provided in the national policy, many organizations including the CBSE have ensured to give a fillip to the comparatively new yet important discipline of health and physical education. A team of very experienced competent professionals have been commissioned for writing a book on physical education and health based on the revised CBSE syllabus.

Uppal and Gautam (2000) have studied the curriculum of physical education and sports revised by CBSE for higher secondary students and have accordingly written a book containing modern updated contents enlisted under fifteen topics namely concept of physical education; physical fitness and wellness; training methods in physical education; health education, occupational health, posture, school health programme, athletic care; family life education; Olympic movement; sports awards; and

importance of yoga. It is a pioneering work in making latest authoritative educative material available to students of physical and health education as per the course contents recently revised by CBSE.

STUDIES RELEVANT TO HIGHER EDUCATION

Bhagwat (1993) recommended that sports should be made an integral part of education in colleges and universities. It has been stated that importance of physical education and sports in colleges and universities needed to be re-emphasized and that Vice-Chancellors of universities have to be the moving force for encouraging mass participation in sports and physical education activities. Physical fitness norms should be laid down and all college/ university students every year should be asked to qualify the physical fitness norms. Theory of sports, physiology, health, nutrition etc. could constitute the theoretical content of the syllabi and the performance/participation in sports could constitute the practical part of the subject.

Mohan et al. (1993) examined personality characteristics of 119 male sportsmen with reference to their sports specificity and 250 male non-sportsmen. It was found that significant differences existed between the athletes and gymnasts, on Thrill and Adventures seeking on Neuroticism. Significant differences emerged between athletes and lawn tennis players. Athletes scored higher than lawn tennis players. On psychoticism, swimmers scored significantly higher than lawn tennis players.

Saini (1993) studied motor ability as predictor of performance of hockey players. The data collected with the help of 25 coaches, related to the game performance on a rating scale, by 76 judges. Motor ability test, hockey skill test along with the rating scale showed that the score of male hockey players in motor ability as well as skill stress were higher than those of their female counterparts. Significant and positive relationship between motor abilities and game performance has been reported.

Sharma et al. (1993) conducted a study on 100 state level players in the age group of 18-25 years in order to find out sex differences as well as individual and team game differences. It was reported that the feelings of competition were significantly higher among the female players where as no significant differences with respect to feeling of co-operation was found among male and female players.

Agarwal et al. (1994) developed a test for measuring co-operation and competition among the players of team and individual games based on ten competition and ten co-operation items standardized on a sample of 50 male and 50 female state level players ranging the age from 18 to 25 years. Percentile norms have been presented for both male and female players along with test-retest reliability, face validity, internal and content validity.

Bali (1994) conducted a comparative study of sports orientation behavioural coping and emotional coping among winners and non-winners of inter-varsity competitions in contact and non-contact games. A total of 443 male and female athletes formed the total sample. On the average, the male intervarsity athlete was found to be significantly better than their female counterpart in competitiveness and win-orientation. Female athletes were found to excel in goal orientation. Athletes in non-contact sports had greater emotional coping and behavioural coping ability in comparison to the athletes of contact sports. Athletes in team events had more emotional coping and behavioural coping ability than individual event athletes of contact sports.

Reddy (1994) studied the profile of achievements of P.M. Joseph as a pioneer of scientific approach to physical education in India. The researcher, using the biographical study method, pooled the relevant information about P.M. Joseph with the help of Rating Questionnaire and Cattell's 16 Personality Factors Questionnaire. According to the rating of the students and colleagues of P.M. Joseph, he was a successful and a reputed teacher. His qualities of punctuality, sincerity, truthfulness, discipline, dedication and concern for others received high ratings. It has been reported that his loyalty to the finest principles of physical education and deep belief in the importance of its **scientific foundations** have contributed immeasurably to the profession.

Sidhu (1994) did a comparative analysis on performance of 36 physical education students of Punjab, Punjabi and Gurunanak Dev

Universities on selected motor abilities. It was found that the physical education students of Gurunanak Dev University, Amritsar had performed better than those of Punjabi Univ. Patiala and Punjab Univ. Chandigarh on agility but no significant differences had been found between the physical education majors of Punjabi University, Gurunanak Dev Univ. and Punjab University on endurance variable of motor ability.

Shenbagavalli (1994) studied effects of intensive and extensive interval training on muscular performance, cardiovascular efficiency and body composition in 90 randomly selected students divided into 3 groups on the basis of their muscular performance, cardio-vascular efficiency and body fat percentage. Two of these groups were considered as intensive interval training group respectively and extensive interval training group and the third one as the control group for a period of 10 weeks of practice session. The control group did not show any significant improvement in any of the selected variables whereas the intensive and extensive interval training groups made significant improvement in muscular performance, cardio-vascular efficiency and percentage of body fat.

Vaz (1994) did an investigation of selected anthropometric characteristics and physical fitness components of 80 Judokas (Ten from each weight categories upto first ten positions) ranging in age from 18 to 25 years from various Indian universities during their participation in the All India Inter University Championship in 1990. It was found that physical fitness variables such as abdominal strength, agility, speed, flexibility and endurance were significantly related to Judo performance in various weight categories. However, shoulder strength, leg strength, back strength and grip strength did not show any significant relation with Judo performance, Among anthropometric variables, arm girth contributed more significantly to the prediction of Judo performance followed by calf girth, crural ratio, arm length, height, weight, leg length and ponderal index.

Datta (1995) reported the effects of an explosive rope jumping weight training exercises and resistive running conditioning programme on the time of 100 m run and standing broad jump performance.

Gupta (1995a) expressed the emerging career opportunities in sports media. Fast growing interest and influence of the sports in the society, due to technological advances and growth in the mass-communications media, have paved the opportunities for a person, who is interested to opt for career in sports-media. This growth has opened a number of career opportunities in sports-media. Interested persons in sports-media may select anyone, out of several careers. These careers include Sports-Broadcasting, Sports-Writings, Sports-Journalism, Sports-Photography and Sports-Information, Physical-educators interested in working in sports-media careers may improve their professional marketability in several ways.

Gupta (1995b) described the role of mass media in the development and promotion of games and sports. The electronic media extends the scope to radio, television, microwave, video, disc-antenna, telephone, satellite, telex and the fax, etc. and the print media to newspapers, magazines, journals and periodicals, etc. Mass-media is one of the strongest, effective and motivational factors of the modern world of sports. The print-media imparts general as well as specific information on the health education, physical education and other related subjects of the games and sports. The critical movements of the sports can be depicted by slow motion or action re-play of television to show accuracy of the activity for advanced excellence.

Kansal (1995a) studied the profile of inputs and outputs of institutions imparting instructions in health, sports and physical education. Significant findings state that the implementation of national sports and education policies are being delayed due to the absence of initial requirement of experts; the existing scenario of general health, physical and sports education is based on extremely non-uniform curriculum and admission criteria; implementation of 1990 UGC decision of creating a full fledged faculty of physical education and sports sciences in each university needs serious planning; adequate teachers who could effectively teach health, fitness and sports are not being produced in India and that there is a need to integrate health, sports and physical

fitness teacher training courses by introducing four year integrated programme after 10+2 stage.

Kansal (1995b) explained the steps to be adopted for modernizing physical education and sports with proper emphasis on human resources development. It has been recommended that teacher training course structure in physical education needs to be uniformly regularized by following 10+2+3+1 system instead of 10+2+3 to make it comparable to teachers of all other subjects; physical education and sports courses curriculum needs to be updated and modernised; concept of sports promotion needs to be modernized and all universities which do not conduct teaching of physical education subject need to start the same immediately.

Kansal (1995c) explained with facts and figures that schools, colleges and universities in India have only few thousand physical education teachers as against the required number of around 7.0 lacs, that too produced through courses of physical education varied in duration, content and admission criteria. Some physical education teacher production courses deal mainly with sports skill training, some with theoretical aspects of physical education, some include considerable part of health education and none deals with practical training of physical fitness, health and sports evaluation techniques. There is a need to focus attention to formulate a uniform core course of producing required number of physical educators through an integrated approach to health, sports and physical fitness components in the course contents along with practical teaching methods.

Manral (1995) advocated the need for an integrated approach to physical fitness. In our country, there is still a lack of proper awareness about the role of diet in the physical activity of the sports person. Physical fitness obviously cannot be considered in isolation. An integrated approach to physical fitness, dietetics, health and all the interrelated sub-disciplines is the need of the hour.

Mukhopadhyay (1995) studied the type of injuries at inter-university, district and intra-college levels of cricket tournaments. About 60 matches were observed within a span of three months to identify the type of injuries in relation to the level of cricket tournament. Possible causes of injuries were identified and protective measures were suggested.

Ruhal (1995) studied physical and kinematic variables on the performance of 90 male university basketball players in long range shots. It was found that the leg length of the players exhibited negative significant relationship in long range shots. Arm strength of the subject showed comparatively higher values of coefficient of correlation which establishes the importance of arm strength for success in long range shots. The beginners performance in long ranges shots was significantly related to the angular kinematic variables i.e. ankle joint at moment stance release, hip and wrist joint at moment stances, where as the group performance was significantly related with elbow joint only at moment release.

Sharma (1995) surveyed sports facilities and programmes in context of their utilisation in 88 Indian universities. Many of the affiliated colleges do not participate in inter-college/inter-department competitions in football, volleyball, cricket, badminton, table-tennis, and athletics, in 11.36 to 18.18 per cent of the universities; in basketball, hockey, tennis, kabaddi, and kho-kho, in 22.73 to 39.77 per cent of the universities in handball, swimming, wrestling, and weight lifting, in 46.59 to 56.81 per cent of the universities; and in gymnastics, judo, and boxing, in 64.77 to 73.86 per cent of the universities. As per this study, the participation of affiliated colleges in inter-college/inter-department competitions is sufficient only in 11.36 to 18.18 percent of universities in gymnastics, athletics and boxing, in 23.86 to 37.50 per cent of the universities in handball, swimming, tennis, wrestling and weight lifting, in 51.13 to 59.09 per cent universities in basketball, hockey, kabaddi and kho-kho and in 67.04% to 73.86% of the universities in case of football, volleyball, cricket, badminton and table-tennis competitions.

Sohal et al. (1995) studied Vitamin-C deficiency in 25 male football players of Punjab with special reference to physical performance. It was found that players not showing any symptoms of over training had significantly higher level of Vitamin-C in blood as compared to those of over trained players.

Singh (1995a) explained that success of a profession depends on the quality, competence and character of the personnel who handle the programmes and policies. The university sector in India, by and large lacks adequately qualified and competent sports organisers, coaches and teachers. Over the years, the scientific research in the field of sports has provided us with very little knowledge of practical value that could contribute to identifying and grooming talent on scientific lines for achieving high performance.

Tyagi and Vashisht (1995) dealt with issues and challenges in physical education and sports in 21st century. The current developments of the discipline are helping to put the field of physical education on a better academic footing. We need to interpret the physical education programmes to public and secure appropriate support. Physical educator must place more emphasis on teaching ethical and moral values through physical education and sports programmes. The manner in which the profession deals with these issues will influence the future of physical education and sports in India.

Ali (1996) studied the influence of self-concept, body image and adjustment on the performance of 224 hockey players of 14 universities of Uttar Pradesh. The self-concept, body image, adjustment and performance of hockey players were found to be significantly correlated. The players who had achieved high level of performance, scored higher on self-concept, body image and adjustment as compared to the low level performers.

Deol (1996) reported the development of cognitive and psychomotor evaluation criteria in volleyball for professional physical education students.

Kansal (1996) wrote a book presenting recent approaches and scientific developments with proper historical perspective in test and measurement in physical education and sports. It is the first Indian book dealing with practical measurement of sports skills, body physique, kinanthropometry physical fitness and its components including strength, stamina, flexibility, power, co-ordination, body balance which are already a part of core curriculum of physical education teacher training course. Special emphasis has been given to practical use of test and measurement as experimental tool for teaching and research in physical education and sports.

Ruhela (1996) examined the social back-grounds and psychological characteristics of 288 college sports women of Delhi participating in inter-college volleyball and basketball tournaments. There was no significant difference in the socio-economic status, neuroticism, extraversion and anxiety among the volleyball players as well as the basketball players.

Nagar (1997) studied the effect of mental practice on acquisition of weight lifting techniques in 60 male under-graduate students of Madhav College, Ujjain. The sample was divided into three groups i.e experimental-A and B and Control-C. Significant differences in pre-test and post-test scores in group-A, B and C were found. The acquisition of weight lifting techniques was more in group-A than group-B, and in group-C than group-B.

Bandyopadhyay (1998) has advocated the computerized management of physical education and sports in India. Imagination of researchers, capability of programmes as well as availability of funds were the very important factors for the introduction of computer managed studies in India. Overcoming such limitations may enable to collect athletes performance data while running to measure wind resistance, surface conditions as well as to report results with the photo-finish accuracy.

Central Council for Research in Yoga and Naturopathy (1998) has presented a detailed printed booklet on syllabus and curriculum for a proposed bachelor's degree in yoga and naturopathic sciences with the financial assistance from the ministry of health and family welfare of the Govt. of India. The health promotion through such a clinical medical degree is based on the philosophy of the father of the nation (Mahatma Gandhi) who advocated, "Human body, the living temple of God, and a living miraculous machine, is self-reliant in maintaining health as well as curing ill health (diseases) through the natural medicines produced in its own factory," and "Modern education in this country has no relation with our every day life. Thus it leaves us almost utterly ignorant about our body".

Gupta and Debnath (1998) explained the career opportunities in physical education and sports. Lots of career avenues were unfortunately not known to the majority of the people who often think about expensive professions (like engineering, medical) for their children. Various courses available in India in physical education and sports along with the corresponding job avenues along with tentative salary structure, have been enlisted by the authors.

Helina (1998) constructed the norms for the physical education students of Tamil Nadu for validating the use of AHPERD youth fitness test variables with the help of 1524 physical education professional college, men and women students ranging in age from 19 to 25 years. Norms of pull-ups, sit-ups, shuttle run, standing broad jump, 50 yards dash, 600 yard run /walk for men and flexed arms, sit-ups, shuttle run, standing broad jump, 50 yards dash, 600 yards run/walk for women have been prepard in this doctoral research work.

Kapoor (1998) studied the effect of physical conditioning programme on the physical fitness for the factors related to 100 long distance and middle distance runners at university level ranging in age from 17 to 25 years; 50 non-sports students of the same age group formed a control group. Significant improvement in endurance was found. Leg and arm strength as well as shoulder flexibility agility were improved significantly with physical conditioning.

Verma (1998) studied the sports achievement motivation among 100 inter collegiate level sports women. It was found that athlete, cyclying and kabaddi sports women were having moderate sports achievement motivation whereas cricket and hockey sports women were having low sports achievement motivation. Significant differences in achievement motivation have been found between athletic vs hockey and cycling vs cricket.

Mahalwal et al. (1999) compiled a manual for a pre-entry test for physical education teachers to be appointed in colleges and universities. While doing so, it has been emphasised that there is neither any co-ordination nor any integration of kunzuru committee report to introduce the national fitness course on a compulsory basis in all high and higher secondary schools in the country. The recommended time table allotment to exercise and sports programmes, circulated to all the schools in the country is yet to be implemented. The colleges of physical education in the country are required to reformulate their syllabi for various training classes so that teachers who could handle the national fitness programmes could be produced. It has been pointed out that no Indian state as yet has declared national fitness as compulsory subject nor has given it a curricular shape. The biological foundations of physical education especially the physical growth and development patterns and talent selection at young age as well as consequences of physical exercise are yet to find proper emphasis and place in the physical and health education curriculum followed nation wide.

Sharma (1999) studied research trends in physical education and sports in India with the help of 237 Ph.D. topics on which various Indian universities had awarded doctorate degrees upto 1996. It has been revealed that research is carried only in a few selected research areas in physical education due to limited facilities available in Indian universities. Instead of any planned research, the studies are incidental and circumstantial. There is a great need of planning expert manpower production in physical education and sports through standard institutes of higher education in each region of India. Only 18.52% of the universities have ever awarded doctorate degree in this field upto 1996. Moreover 74% of the total degrees have been awarded by five universities namely Jiwaji, Punjab, Punjabi, Kurukshetra and Nagpur universities.

Shaw and Tomar (1999) studied the doctoral research in physical education in India since independence to 1997 on the basis of listing of the titles of doctoral dissertations. It has been reported that in all only 16.6 percent (i.e. 31 of the 187) of the Indian universities are awarding doctoral degrees in physical education and sports. Further 83.84% of all doctoral degrees in physical education have been awarded by only 10 universities while the rest of 21 universities have contributed for the award of only 16.16%

of degrees. Only 226 doctoral degrees have been awarded in India till 1997.

Mishra (2000) stressed that better knowledge and understanding of concepts constitute a cutting edge to winners. Ancient sages and *gurus* have been pointed out as rightly saying that knowledge leads to enlightenment. It is information and knowledge revolution that shall shape the destiny of humankind in the 21st Century. **The universities have been requested to redesign syllabi and to insist on uncompromising quality and excellence of teachers.** The biggest opportunity that India has is her tremendous youth power and the biggest challenge that India faces is to tap the full potential of that youth power.

Shaw and Tomar (2000) studied doctoral research in physical education and its sciences in developed countries on the basis of listing of topics of doctoral dissertation from 1980 to 1996. In all 2746 references have been compiled from dissertation abstract international where as only 226 doctoral researches were reported in India for the period from 1980 to 1997.

STUDIES RELEVANT TO OPEN SYSTEMS

This section presents those research studies where the subjects are not necessarily in educational institutions and the work has been carried in open sports competitions.

Debnath and Bawa (1993) examined the height, weight and age of women gymnasts (6 Indian women gymnasts belonging to 1986 Asian Games and 6 best Gymnasts of 1991 National Gymnastic Championship). It has been reported that National Gymnasts of 1991 were significantly older and heavier than their 1986 Asian Games counterparts.

Chakraborty (1993) studied the behavioural, motivational and emotional characteristics of male and female gymnasts at different levels of performance.

Goswami (1993) studied nutritional status of 535 sportsmen out of which 419 were international players. Significant intra-sportive and inter-sportive differences were reported. It has been revealed that athletes belonging to short duration activities had larger overall body size and weight as compared to those of athletes belonging to long duration events. For instance sprinters and throwers have shown heavier bodies as compared to marathon and other long distance runners. It has been found that sportsmen consumed 50% calories greater than their actual requirements. The comparison between Indian and Montreal Olympic athletes revealed that Indian players were significantly lower in almost all measurements except percentage body fat which had high values in Indians.

Hanna et al. (1993) studied physiological effect of 3 months training in 10 Indian national volleyball players attending 3 months preparatory camp at Sports Authority of India prior to international competition. Statistical analysis revealed that 3 months of training significantly improved the lean body mass, VO_2 Max., O_2 pulse and forced vital capacity. Sub maximal heart rate showed significant decrease after the training. It was reported that 3 months training was adequate for cardio-respiratory adaptation.

Kang (1993) studied the best performance in the field events at the I, II and III world championships in Athletics held in 1983, 1987 and 1991 respectively. The results showed that men and women gold medal winners have more improved performance in jumps as compared to that of throws. The women Gold Medal winners dominated the men winners in discus throw. The percentage differences in throws is found to be less than that of jumps.

Prakash (1993) analysed the physical fitness components and socio-economic status of wrestlers in Haryana state.

Singhal et al. (1993) and **Mokha et al.** (1993) studied the inter-sportive differences in anthropometric measurements, physique and body composition of national university women players. The studies were conducted on 31 hockey, 22 basketball, 18 gymnastic, 18 volleyball players, 12 kho-kho, 12 kabaddi and 18 athletes. It was found that basketball women were significantly taller and heavier with bigger trunk and broad diameter than other sports women. The Gymnasts were the shortest, lightest with narrowest body diameters as compared to other categories of all sportswomen studied.

Sharma (1994) studied the influence of casual attribution on success and failure among 216 gymnasts (108 successful and 108

unsuccessful) representing different states and union territories of India in sub-junior, junior and senior national gymnastics championships during 1991 to 1993. The casual attribution was measured by the Roberts' paper pencil test of attribution (win and lose) questionnaire. It has been reported that successful gymnasts attribute their outcomes to the internal attribution (ability and effort) whereas the unsuccessful gymnast attribute their outcomes to the external attribution (task difficulty and luck). Most of the attribution are motivationally based. Training programme did improve scoring on internal attribution and decrease the score on external attribution, but it did not affect the luck and task difficulty dimension.

Amatya and Sodhi (1995) studied skinfold patterns of 237 Nepalese track and field athletes. It was found that discus, hammer and shot throwers have thickest skinfold values and the marathoners, the thinnest at all the sites. The skinfold values of middle distance runners have been found gradually decreasing in a gradient as the running distance increases from sprinters to marathoners.

Gakhar and Saini (1995) studied the difference among 20 drug users and 20 non - users each on the basis of their personal and family variables. It was found that most of the drug users belonged to the nuclear family, studied upto secondary level, and their parents showed normal interest while the non-users belonged to average size family and whose parents showed keen interest towards their studies/career. A majority of grandparents were hostile and so were parents and siblings in case of drug users while among non-drug users, a majority of grand parents had harmonious relationship and so were parents and siblings.

Hanna and Saha (1995) studied the effect of four week altitude training on cardio-respiratory variables in national cyclists. Maximum aerobic capacity as similar to relative Ventilatory O_2 mx,O_2 pulse, breathing equivalent maximum heart rate, recovery heart rate were significantly improved. Ventilatory max and O_2 debt did not change significantly. The respiratory parameters do not show any significant change. Improvement in Ventilatory O_2 max may be due to increase in stroke volume capacity as reflected by O_2 pulse. An aerobic capacity do not change with four week of training at altitude. The study revealed that four weeks of training at an altitude of 3000 M can lead to adaptations in the cardio-vascular system.

Kumardhas (1995) conducted an exploratory investigation of the relationship between the cognitive and affective characteristics and clinical supervision of student nurses by 25 nursing teachers. It was found that the nursing teachers who were on different levels of intelligence did not differ significantly on the clinical supervision of student nurses. But nursing teachers who were on different levels of anxiety differed significantly on clinical supervision of student nurses. There was significant difference between high intelligence and low intelligence nursing teacher in their amount of time spent on different categories of student teacher interaction.

Mokha et al. (1995) studied a comparison of auditory and visual reaction times of hand and foot of 135 female players including 11 swimmers, 41 runners, 64 basketballers and 19 kho-kho players of Punjab. It was found that the swimmers are the fastest followed by runners, basketballers and kho-kho players both in visual and auditory reaction time of hand and foot. It has also been shown that auditory and visual reaction time of hand is faster than that of the foot.

Nagar (1995) studied the physiques of 100 (50 basketballers and 50 gymnasts) male university level players based on the principles of Astrology. By analysing the horoscopes, it was found that the heights of the players can be determined on the basis of their Ascendents (rising signs) as the major rising signs amongst basketball players were Gemini, Sagittarius, Libra and Leo, while Tarus, Pisces, Capricorn and Cancer were the major signs in Gymnastics. The height of basketballers was significantly more than that of gymnasts.

Sharma and Chakraborty (1995) studied the comparative casual attribution of 24 (12 boys and 12 girls) best Asian Gymnasts in relation to gender diffrences. It was found that the boys and girls scores on casual attribution following winning does not differ significantly. Moreover, the boys and girls gymnasts attribute their winning to the internal causes more than the external causes.

Sachdeva and Verma (1995) studied the physiological analysis of Asian and Olympic records for freestyle swimming events falling in the category of short term endurances (STE), medium term endurances (MTE) and long term endurances (LTE). An improvement in performances in swimming records has been noticed for both Olympic Games from 1846 to 1984 and those of Asian Games from 1951 to 1986. The 400 m free style swimmers have shown the maximum improvement of 55.14% in males while 100 m Olympic swimmers in females have shown an improvement of 33.34%. On comparing improvements of Olympic with Asian Games, Olympic Swimmers have shown more improvement.

Thange (1995) studied the prevalence of anaemia among the 1020 expectant mothers in coimbatore and its impact on the foetus. It was found that 29.6% of expectant mothers were non-anaemic and 70.4% were suffering from different degrees of anaemia. Prevalence and severity of anaemia decreased as the maternal education increased. The social class to which the women belonged also appeared to be an important factor in the occurance of anaemia during pregnancy, as 78.30% economically weaker section were anaemic in comparison to 40.54% of high income group. The anaemia was found to be high in the age group of below 20 years i.e. teenage pregnancy. The birth of premature babies were much more common among the anaemic mothers than the non-anaemic mothers and the velocity of growth was little faster in the non-anaemic term babies as compared to the other groups.

Vijayalakshmi (1995) studied the impact of transfer to modern agricultural technology on health and nutrition of 500 farm (250 were beneficiaries and 250 non-beneficiaries) women and 500 children ranging in age from 1 to 6 years. The socio-economic conditions of the beneficiary families were found better than those of non-beneficiary families. Income from agriculture and sericulture was more in case of the beneficiaries families. The nutrient intake and anthropometric measures of majority of beneficiary women were better than those of non-beneficiary group. The diet of 1-3 and 4-6 years of children of beneficiary were better than that of the non-beneficiary group.

Debnath and Bawa (1993) studied pre-competition anxiety level of 40 men and 27 women gymnasts with seven coaches of men teams and 5 coaches of women teams during National Gymnastic Championships. Relationship between level of aspiration and pre-competition anxiety was found significant. It was also found that coaches had significantly higher pre-competition anxiety level than the gymnasts.

Bale and Goodway (1996) studied physique and performance injuries and training of young gymnasts, particularly female gymnasts. It was found that children are starting training for gymnastics at a younger and younger age now; the injury rates in gymnastics are common and they vary with the level of performance and participation and the majority of injuries occur in training particularly on landing. The female gymnasts strive for thinness to improve their shape and agility and were reported to be more flexible, lower in body fat than their male counterparts.

Chandrakumar (1996) reported the results of motivation for sports and its effects on health, personality and sports performance.

Das (1996) studied the transformation of sports training into sports technology by reviewing the methods of sports training adopted by sports trainers from the time of ancient Olympics to modern times. Profound changes have been found in sports training due to the involvement of science, and factors, such as technology, playing surface, equipment, dress and sports gears have greatly been changed and the sports training has been transformed into sports technology giving an advantage to sportsmen belonging to countries which have better developed sports technology. It has been reported that unnatural procedures for improvement of sports performance are gaining acceptance but inviting hazards.

Manna and Bhowmick (1996) studied fourteen personality factor profiles of tribal and non-tribal male children. Deviation was found in six factors out of fourteen. The tribal (santhal) males were observed to be more dull, assertive, competitive, aggressive, sober, timid and indisciplined than the non-tribal as non-tribal (Mahishya) males were intelligent, obedient, mild, accommodating, reflective, controlled on the other hand.

Sodhi (1996) studied nations' economy and Olympic medals from 1896 to 1992 with the help of statistics of grand national product (GNP) per capita of each medals winning nation. It was found that the distribution of medals in different class-intervals shows a generalized trend of increasing GNP among the nations that won greater number of medals. Generally, the more the GNP of a nation, significantly more are the number of Olympic medals won by the nation.

Sodhi and Singh (1996) studied the age determination of 2517 boys and 1792 girls during All India Rural Sports Competition from 1992 to 1995. It was found that 21.3 % boys and 6.3% girls were overage. The percentage of overage male and female athletes dominated in some sports categories namely athletics, volleyball and kabaddi.

Sodhi et al. (1996) studied 18 kinanthropmetric variables of 237 male track and field athletes of Nepal. It was found that the Napalese middle distance runners were the youngest and eldest with an average age of 24.7 years and 29.4 years respectively. The marathoners were found to be lightest and shortest with average values of 54.2kg and 167.3 cm for weight and height respectively. Napalese athletes were found more aged, lighter in body weight and shorter in stature as compared to corresponding variables of Olympic athletes.

Sachdeva (1996) evaluated the Olympic and Asian sprinting performances in 100 m and 400 m runners who participated in Olympics of 1896 to 1984 and Asian Games of 1951 to 1986. It was found that there is an improvement in all sprint performances with the passage of time; the male athletes showed maximum improvement in 400 m event while female athletes showed maximum improvement in 100 m event. The performance lag was more in case of female athletes than the male athletes.

Barik and Banerjee (1997) studied the effect of training on cardio vascular adaptation among 17 tribals and 21 non-tribals. It was found that the tribal students had significantly higher value of Hb%, WBC total count, diastolic BP and post exercise HR whereas the non-tribals had significantly higher value in RBC count only. After training, significant decrement in tribals were found in Hb%, BP and HR whereas RBC, WBC and Blood sugar level were decreased in non-tribal group. The training effect was more pronounced on the tribal boys.

Jain et al. (1997) studied the validity of (McDonald's) Soccer test on state level 34 women soccer players ranging in age from 18 to 26 years. It was found that a significant inter-relationship exists among all the selected soccer playing ability variables thereby confirming the validity of the McDonald's soccer test on Indian population.

Pushpa and Sheela (1997) studied the impact of mass media on health of 240 mothers of rural and urban areas. The study revealed that 59% of rural respondents and 81% of urban respondents were reached by television. Print media was accessible mainly to urban women. It was found that radio and contact with extension worker were more popular in rural than in urban. It was found that in the pregnant women of rural group the media participation was more than the urban pregnant group. Women of urban group had medium and high medium participation as compared to rural group. Mother having pre-school child had low media participation in rural women than in urban women.

Sehgal (1997) reported a software for computerised treadmill monitoring and data analysing technique for studying heart rate, blood pressure, body temprature, respiration rate while walking, running or combination of both, on the treadmill. The technique is expected to assist in establishing the athletes current physical conditions and in developing exercise prescriptions to the subjects to be studied with the help of above computerised technique.

Antony (1998) studied a comparative analysis of selected psychological variables of 180 male national volleyball players (60 in each group of senior, youth and junior level) ranging the age from 16 to 32 years. Locus of control, sports competitive anxiety, level of aspiration, intelligence, trait sports, self confidence and state sports self confidence were found to be significant. Neuroticism, extraversion and sports confidence were found to be insignificant. Playing ability was significantly related to intelligence, trait sports self confidence and state sports self confidence at Sr. National Level.

Bhanot (1998) studied kinanthropometric potentialities of discuss, hammer and shotput throwers at different levels of competitions.

Kenchappanavar (1998) studied the health modernity and educational intervention in 200 educated and un-educated, married and un-married rural women ranging in age from 15 to 45 years. It was found that educated women had higher health modernity than un-educated women. There was no significant influence of marital status on health modernity of educated women as the un-educated women's marital status had a significant influence on the health modernity.

Rathee (1998) studied the analysis of swimming performance of men and women participants of Olympics from 1972 to 1992. It was found that there was variation in differences in percentages event wise/Olympic wise in various events in swimming in between men and women gold medal winners but these differences were not significant even at 0.05 level of confidence. A detailed review of inter country swimming winners has also been presented in this study.

Mukhopadhyay (1999) studied the comparison between juvenile delinquent (JD) and non-delinquent (NJD) adolescents with respect to selected personality characteristics and motor fitness. The study was based on 8 juvenile delinquents from Borstal institution, 8 juvenile non-delinquents from observation home and 8 juvenile delinquents from an educational institution. It was found that JDs showed significantly more introversion as compared to that of NJDs groups. No significant differencewas found in neuroticism and self sufficiency traits.

Sachdeva (1999) studied the muscle interactions of seven male and seven female gymnasts to analyse the muscle involvement pattern during selected gymnastic activities using electromygraphic (EMG) techniques at Netaji National Subhash Institute of Sports of the Sports Authority of India. Out of 14 subjects, 2 were international, 7 national and 5 state level (who participated in Jr. National) Gymnastic Competitions. The electrical signals of the muscles during the selected different categories of gymnastic activities and those during maximum voluntary contraction of the muscles have been recorded using a multi-channel sensor medics, R6/2, recorder. Details of muscle interaction during various gymnastic activities have been illustrated and discussed in the present study. The specific group of muscles involved during specific gymnastic activities have been identified and reported. It has been recommended that there is a need of strong interaction between the gymnastic trainer and the sports scientists for the individualization of the gymnasts training schedules.

Verma (1999) studied the comparison of adjustment and physical fitness variables of hockey, volleyball and basketball women players. It was found that the hockey players were more superior in speed, abdominal strength, trunk flexibility and cardio-vascular endurance than the players of the other two groups. Volleyball players were better in leg strength as the basketball players were superior in shoulder strength and agility. The differences were significant at 0.01 level of significance.

EMERGING CONCERNS AND GAPS

The review of researches in the presently dealt thematic area has established quite clearly the following emerging concerns and gaps to be attended by the educationists at the appropriate levels:

(a) There is a need for involving multi-disciplinary and inter-disciplinary experts for the effective progress of physical and health education teaching and research (Sharma, 1993; Gupta, 1995; Kansal, 1997; Srivatsan, 1995; Prasad, 1996; Prakash, 1998; Sharma, 1999; Negi, 2000).

(b) The admission criteria as per NCTE recommendations for producing teachers needs revision so that some of the persons interested in this area without getting sports medals could also get admission and play a positive role for the promotion of national physical health (prevention of diseases), fitness and active lifestyle (Kansal, 1995b; Srivatsan, 1995; Nadgir, 1999).

(c) The utilitarian existing knowledge of physical education and sports is not even being brought to the notice of majority of the school and college students inspite of the fact that it forms an integral component of fuller education (Kansal, 1993; State Agenda, 1997; Baweja, 1999; Sharma, 1999; Negi, 2000).

Some of the research abstracts indicative of the above are presented below:

Kansal (1993) studied critically the National Sports Policy and presented practical guidelines for making physical education an integral part of school curriculum as a regular examination subject as per resolution number (v) of National Sports Policy of 1984. Quoting the then Prime Minister of India's stress on the importance of having appropriate human resources to make best use of modern technologies, the author has illustrated and explained the need of practical steps including the preparation of prescribed text books as per syllabi of physical education, health education and sports for school classes and teacher training courses; starting of new model physical and health education teacher production units; creating a central institute of research and development in improving existing physical education teacher training institutes; introducing a graduation degree course for sports coaches and conducting time bound orientation and refresher courses for existing school teachers.

Sharma (1993) advocated the need for multi-disciplinary approach for successful implementation of national sports policy in a national seminar. It has been emphasized that hardly any concerted efforts have been made in India to involve experts from the fields of bio-mechanics, sports psychology, motor learning, sports medicine, morphology, physiotherapy, sports management, sports genetics, environmental conditions and sports training methods in physical education teaching. Presently all these branches of abovementioned sciences are being mainly looked after by sports and physical education teachers who belong mainly to arts channel of academics. The creation of a central sports culture university has been recommended to produce specialized experts for the promotion of multidisciplinary and interdisciplinary areas in sports teaching and research.

Bhanot and Shankar (1995) have advocated the need for integrating yoga in the national education policy. There is a growing consciousness among educationists for promoting interest in learning and teaching of yoga. In fact, the interest in yoga at present is growing worldwide. Almost every country is starting teaching of yoga either informally or formally. There are many *Gurukuls* in India which are imparting yoga education formally. Many Indian universities have included the teaching of yoga in physical education teacher training courses.

Gupta (1995) has explained the importance of introducing physical fitness as a national need just like other needs namely wealth, knowledge, security, power, prestige etc. Health is a fundamental human right. It is really a crime against society to neglect one's body and diminish its capacity of production and of resistance to disease. Sports have now emerged as one of the most influential social forces. It should be fully utilised as a potential vehicle for raising, promoting, maintaining health and physical fitness of people. In the existing system of education, awareness of above facts among the society, may be accomplished through a crash programme of "Educating the educated" so as to eradicate myths and misconceptions about participation in physical activity programmes. He has also emphasized the contents of Luther Gulick's saying, "The advance of Physical Education (as a profession) will depend more upon the kind of men who take up this work as a profession than upon any other one factor. If it is largely taken up by men of little education and small abilities, the work will never become of the greatest value, nor will it be favourably known to the general public. If, however, on the contrary, men of collegiate training, philosophic minds of broad purposes and earnest hearts are induced to enter this field, the profession will show that it is intrinsically a broad, scientific, philosophic field, and it will be recognized by thinking men as one of the departments in education, fundamental in the up-building of the nation".

Srivatsan (1995) explained with examples and justification the need for diversification of courses in physical education so as to give scientific approach to this field of education. Professional preparation of leaders in physical education today does not confine to historical, organisational and methodology courses. Much of scientific aspects from allied disciplines such as biomechanics, physiology of exercise, sports medicine, sports psychology etc. are included to make the professional preparation very

comprehensive, scientific and purposeful. To develop physical education workers for the present and future, there is a need to update physical education teacher education to make it relevant to social conditions and the latest scientific knowledge, and to make professional programmes worthy of continuing teacher education emphasis for sustainable updating.

Prasad (1996) studied the playing facilities in the institutions of higher learning based on the information obtained from a sample of 200 players and 20 sports experts belonging to all the three universities and 45 colleges of Himachal Pradesh. It was found that the playing facilities in all the three universities and 45 colleges are highly inadequate and the experts as well as players are dissatisfied with the existing provision of playing facilities in their respective institutions.

Kansal (1997) stressed the need of science background for studying the postgraduate courses of physical education and sports sciences. It has been explained that there is a need of multidisciplinary approach to physical education by involving academic experts from many allied disciplines like human psychology, biology, physiology, anatomy, nutrition. Similarly, the importance of interdisciplinary approach has also been outlined by involving an academic expert of an allied discipline to get acquinted with more than one discipline needed for the study of physical education and sports. It has been recommended that each college of physical education must have atleast one faculty member each with post-graduate degree, from the fields of human biology, physiology, nutrition, biomechanics, psychology, sports science and biochemistry. Due to the lack of such a multidisciplinary and interdisciplinary approach to the subject of physical and health education, the teaching and curriculum of this thematic area has been quite inadequate and underdeveloped resulting in very slow progress of taking the foundations and philosophies of the subject to masses.

The State Agenda of the Government of National Capital Territory of Delhi (1997) for the promotion of sports and development of physical education refers to the lack of physical and sports teaching and hence presents a comprehensive educational plan which should be centred around the child in a manner to enabling the child to attain good health, high degree of fitness and all round development by improving all of his physical, mental, social, emotional and spiritual faculties. It emphasizes compulsory teaching of physical education to all children and making it compulsory to participate either in sports or in physical fitness programme. But its implementation could neither be done nor is likely to be done soon due to lack of required manpower and teaching posts in physical education.

Prakash (1998) presented a critical analysis of three year degree course in physical education and sports in colleges and universities in India. It has been reported that most universities which started B.Sc. in physical education, health education and sports on UGC's recommendation have reverted back to routine B.P.Ed. course.

Baweja (1999) critically evaluated the curriculum of physical education as implemented in various schools of Delhi as an elective subject. A large number of inadequacies in the effectiveness of the curriculum have been discussed.

Nadgir (1999) studied new thrust areas in physical education professional curriculum. It was found that several courses in cognitive, psychomotor and affective domains might constitute each of these areas, which necessitates restructuring the post-graduate curriculum in universities. By identifying specialised areas diversification of profession was also implied. With the help of curriculum development, the horizon of the services as well as the population that the profession serves, can be greatly expanded. It is felt that the profession can reach out to every segment of the society.

Negi (2000) studied the physical education and sports science programmes in Indian universities and reported that only 46 universities out of about 300 universities/ deemed universities have post-graduate teaching and research in physical education, sports and/or sports sciences. The details of programmes in north Indian universities reveal that there is no uniformity of syllabi and courses and many universities have not implemented the 1990 recommendations of UGC with respect to starting of common course. There is no

uniformity even in admission process of universities for admitting students in physical education courses. 93.3% of the universities of northern India do not have the minimum UGC recommended playgrounds and 26.7% of universities do not have even a single book on sports or physical education.

CONCLUDING COMMENTS

1. It is encouraging to note that the present survey has reported 133 doctoral studies as compared to only 49 studies reported in the Vth survey research trend report.
2. The research in this thematic area has been circumstantial and unorganised without any reference to planning as per national or local needs.
3. Only about 15% of the Indian universities and institutes of higher education (deemed universities) have been conducting the teaching of physical education, health education and sports at post-graduate and research level.
4. Although at the policy level, the intention is very clear and the focus is on the essentiality of physical education and sports in both schools and colleges, but adequate attention is not yet being paid by the universities and other concerned organisations to achieve it. This is probably due to the absence of any system to bring recommendations of research trend reports to the notice of either curriculum development committees or planning and development boards of universities or other education management institutions.
5. Inspite of the recommendations of UGC, the majority of the Indian universities are without any independent separate department or faculty of physical education and sports sciences.
6. The research trend reports indicate that teacher training programmes in India do not pay due stress to the need for prommotion of health, physical education and sports sciences.
7. The admission criteria to various graduate and post-graduate courses is based on skill aptitude of candidates in sports performance but the proper promotion of the subject needs highly knowledgeable multidisciplinary faculty of resource persons having a clear understanding and indepth qualities of designing effective curriculum cutting across many parent disciplines required for physical education and sports for all. The present trend of limiting this important thematic area of research only to a few elite sportspersons thus needs to be changed.
8. All teachers in Physical Education Teacher Training Institutes can not teach all the multidisciplinary vastly different branches (namely exercise physiology, sports medicine, sports nutrition, exercise prescription, sports psychology, sports biomechanics, kinesiology, kinanthropometry etc.). Hence, the universities should consider creating specialisations at post-graduate level in physical education and sports.
9. To facilitate making physical education an integral part of school, college and university education, it may be advisable for the NCTE/ universities to prepare a model course content for health and physical education teachers in all teacher training programmes in the area of physical education and sports sciences.

RECOMMENDATIONS

On the basis of the findings of these researches, the following specific recommendations are being made:

1. The copies of present report be sent to UGC, AIU, NCTE etc. for appropriate action with a view to promote physical education, health and sports in India.
2. The NCERT may prepare a panel of physical education authors for getting textbooks prepared as per courses proposed by it in NCFSE 2000 for various grades of elementary and secondary education, on priority.
3. There is need to produce qualified resource manpower in all branches of multidisciplinary field of physical education namely exercise physiology, sports psychology, sports medicine, sports biomechanics, sports nutrition, human growth and development, sports genetics, measurement

and evaluation, sports biochemistry, wellness and active lifestyle etc. This may be achieved by introducing specialisations at master's degree level.

4. Appropriate Govt. and autonomous organisations may take action as suggested in the following table.

The concerted efforts of NCERT in reviewing research trends should act as a mirror of introspection of the Indian education scenario and should act as an eye opener to appropriate agencies which can bring positive change of effectiveness at least to start implementation of national education policy on the above scientific lines.

It is finally suggested that some time bound steps by different organizations will not only improve future direction of research in physical education, health education and sports but will also help remove the slow development of physical education, health education and sports education.

S.No.	Research Revealed Facts	Action Needed
1.	About 80% of Indian universities do not conduct the teaching of physical education at post-graduate and research level.	More and more universities should be encouraged to conduct teaching of physical education in accordance with the UGC recommendations.
2.	There is a need to make physical, health and sports education an integral part of school curriculum.	More and more Boards of School Education should take appropriate action on the lines of the National Curriculum Framework of the NCERT.
3.	Physical education is a multi-disciplinary and inter-disciplinary field. It is difficult for a general physical education teacher in a physical education teacher training institute to teach all the branches of its components like kinesiology, sports medicine, exercise physiology, sports nutrition, exercise prescription, scientific talent selection criteria, basic anatomy and physiology etc.	NCTE may advise physical education teacher training institutes to have as far as possible some teachers with masters/doctorate degree in allied disciplines of physical education namely physiology, anatomy, nutrition, psychology, human biology or sports science. This should be followed till these specialisations are started at M.P.Ed. level.

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