CHAPTER : II

REVIEW OF RELATED LITERATURE

A serious attempt was made by the research scholar to go through the literature related to the present study. Brief reviews of this study are enumerated in this chapter.

Kelly¹ has pointed out that persons having pain and strain in the feet could develop, pronated feet and its correction is gigantic task among the school children. He also noticed that low positive significant correlations were found between flexibility of the arch and criteria of pronation and low negative correlation between flexibility of the arch and degree of out toeing. He reported that functional foot complaint is relatively un-common among children and very common among adults. Fifty to sixty percent of the child population has shown promotion to greater or lesser degree.

Goldthwaite² suggested a strong relationship between posture and circulation and indicated that the good circulation in the vital organs is


impossible with a slumped chest because of resultant poor breathing and mechanical blockage. He mentioned further that ulcered stomach, postural diabetes, gasteroptosis and enteroptosis are traceable to poor posture, many researchers of this problem described the harmful effect on health of visceroptosis, the abnormal falling downward of the abdominal viscera. Extreme cases of this problem show lack of endurance and are usually affected with constipation, headache and offensive breath.

Lotter\(^3\) investigated to determine the interrelationship among reaction time and speed of movement in different limbs. Two movements basic to sport skills, a modified base balls through or football kick were studied in 105 college athletes of various activities. There was only a moderate high correlation between the reaction ability of right and left lege and between right and left arms. Arms vs. legs correlation were significant but low. A similar pattern of correlation between the limbs was found for movement ability but correlation’s were considerably lower and movement specificity was high in all measures. Brown\(^4\) has found through his investigation which was designed to determine the


\(^4\) Gaydena M. Brown, “Relationship Between Body Types and Static Posture of Young Adult Women”, *Research Quarterly*, 31 (October 1960), P. 403.
relationship between body type and body alignment and center of balance. Each subject was classified into body type components of endomorphy, mesomorphy and ectomorphy. Methods used for measurement were Sheldons technique for somatotyping a modified technique of Hawland’s ailgonometer for body alignment and the Lovett – Reynolds techniques for determining the center of balance. Statistically, somatotype was not significantly related with body alignment or with the center of balance. However, significant correlations were found to exist between height and trunk length measures and between a ratio of trunk measures and body alignment.

Barry and Cureton have observed three type factors of physique, 1st related to growth in transverse directions and adipose tissue, and 2nd related to growth in vertical dimensions, and 3rd related to motor performance, were isolated: power, endurance, dynamic shoulder strength. The morphological and performance measurement were found to be essentially unrelated.

1. As one related to growth in-transverse directions and adipose tissue characterized by bulkiness, prominent girths (upper arms)broad hips, narrower shoulders and thick fat covering.

2. One related to growth in vertical dimensions and characterized by a lean frame and attenuated limb.

3. One related to dysplastic growth in vertical dimensions and characterised by disproportionate development of trunk and legs.

Three factors related to motor ability were isolated: (i) Power dominated by jumping events and distinguishing those with high, from those with low ability to handle the body weight. (ii) Endurance, distinguishing individuals with high from those with low organic efficiency. (iii) Dynamic shoulder strength, which separate those with high muscular endurance in activities requiring strength of the shoulders from those with low muscular endurance. This factor was more closely related to the morphological variables than was the case with the other two motor fitness factors and may be related to muscular growth. (iv) The second order factors were extracted: general size, differentiating between those who are above and those below average in total body mass.

Rodell\(^6\) has found out that pelvic tilt had significant but slight relation with hip flexibility and essentially zero relation with the other measures. Abdominal muscle strength was substantially correlated with

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abdominal muscle endurance, but ankle pronation and hip flexibility were essentially uncorrelated. The leg span, leg length measurement of hip flexibility was a reliable and easily administered test. The evidence indicated that the pelvic tilt of a person with normal musculature and flexibility was due largely to postural training and habit.

Adolph\textsuperscript{7} studied some effective outcomes accompanying camping experience of physically handicapped adults. The study group consisted of all first and second year adult compares (N = 26) who attended a two week, compression. An additional group (N =11) who have a toll years of continuous camping experience at the same were included during the second stage of the study. The result indicate that there was a high degree of similarity between all campus in terms of changes in self acceptance, in patterns of interest over the investigation period and in positive changes in social participation during the camping experience. However, the compress upon their return to their home environment returned to their original social and psychological limitation.

Anderson\textsuperscript{8} has surveyed hand and eyes dominance, hip and eye elevation, dropped or forward shoulder, anterior and lateral cervical tilt, and whether or not glasses were worn were determined on 31 male subjects with the aid of a posture screen and has found that individuals with glasses have very low level of postural deformities. And there was no direct relationship between posture and laterality. It was a general notion that wearing of glasses affect posture whereas it is not so.

Alderman\textsuperscript{9} has made study on posture by taking photographs of 83 girls revealed that 93 per cent had posture deviations. Subject had little or no previous posture instruction and after 8 lessons in regular health education classes, 62 per cent of the subject showed improvement. It is not necessary that posture correction can be done with exercises only. If we can correct their bad habits and teach them correct movement of the posture, can achieve improvement in general.


\textsuperscript{9} Melba Kay Alderman, “An Investigation of the Need for Posture Education Among High School Girls and A Suggested Plan of Instruction to Meet these Needs”, \textit{Completed Research in Health, Physical Education and Recreation}, 10 (1968), p. 117.
Devis¹⁰ has made the study on the status of postural patterns. The study is an analysis of 750 physical examination record cards from 5 selected years. Postural pattern changed over the years. Significant differences between the percent of the occurrence were found for many factors. The most widespread postural deviations still include forward head, forward shoulders, protruding abdomen, pelvic tilt, and pronated feet. Nearly all types of scoliosis decreased significantly over the years studied. This study proven that with advancing age if other posture defects manifest significantly scoliosis appears to be reduced.

Cannon¹¹ Surveyed Physical education programme for physically handicapped pupils in public elementary school of state Washington. He analyzed the data according to district enrolment figures only 1.5% of the pupils were reported on physically handicapped. Only 65% of district used physical examination by a physician and 35% of then used a physical fitness testing. As a part of their health appraisal most district placed most physically education programme.


Minotti\textsuperscript{12} has made study of S.S. for 3\textsuperscript{rd} and 4\textsuperscript{th} grade students with postural deviations. S.S. was randomly assigned to either an experiment (E) or control (c) group. The S.S. in the E group were assigned individual exercises for correction and the E group did the exercises in addition to regularly attending physical education classes for 3 months. During this time of period the C group attended only physical education classes, when both the group tested for postural deviations. Ancora showed that the total posture and anterior-posterior component of the E group were significantly better than that of the C group. But there was no difference between the 2 groups in the latenal.

Deshmukh\textsuperscript{13} worked upon yoga in management of psychoneurotic, psychotic and psychomastic conditions, the patients attending the yoga institute Santa cruz were taken up for the study. In all 106 patients – each patients was first interviewed by the psychiatrist given psychological test and also examined, by the physician if and when necessary. The patient was also subjected to pathological, radiological and electro cardiographic examination whenever indicated. At the end of 6 weeks each patient was


again tested. From the data presented, it appeared that there was a high rate of improvement among patients.

Munchow and Alber\textsuperscript{14} have found that in adolescent children in the age group 14-19 years ossification of spine had not completely ended. Thus scoliosis and formation of transitional vertebrae was excited by the training which was more in the case of athletes than the weight lifters. He has therefore observed that it would be important to exclude such adolescents at the beginning of the training whose ossification of spine had not completely set-in.

According to Beulah France\textsuperscript{15} feet grow for twenty years. Almost every arrives in the world with the making of perfect feet. Before the first year is indeed, eight percent of all babies have the beginning of foot trouble, by two years twenty two percent are on the wrong path. At the age of five, forty one percent are headed in the wrong direction more than half the children who reach the age of ten are future padal cripples to some degree.


Kumar, saronwala, Thapar and Mathur\textsuperscript{16} have proved that the higher the arch the better is the leverage, action of foot and efficiency of functional activity especially in running. High arch indicated better feet which are stronger, more elastic and more efficient in all natural uses of foot, therefore, high arched foot should be preferred for the best runners, whereas low arched feet indicate conditions which are associated with pain, early fatigue or inefficiency in all natural uses of foot.

Morehouse and Miller\textsuperscript{17} have pointed out that standing increases fatigue by cerebral anemia and reduction I cardiac out-put. Local fatigue of the feet, which frequently interferes with production in job that require prolonged standing, change in posture from the upright to varying degrees of the recumbent position and periodic elevation of the feet serve as practical measures to reduce cardio-vascular strain and fatigue, especially in hot environment.

Sortland, Tysvear and Stroli\textsuperscript{18} have noticed that mostly football players develop slight or moderate scoliosis due to degenerative changes


in the cervical spine. Few players “headers” reported to have suffered from cervical complaints pain and stiffness for years, and some of the players develop spondylosis.

Rich\textsuperscript{19} studied one hundred twenty physically disabled boys 9 – 15 years age who were subjected to a comprehensive anatomical and physiological evaluation in an effort to determine.

1. Extend to which the dependent variables investigated changed between age, and

2. How the variables differed between normal and physically disabled children, across age group. After medical examination and orientation session each subject was submitted to battery of test in order to determine: - I). height, ii). Weight, iii) Arterial blood pressure iv). Serun cholesterol, v) Body composition, vi) pulmonary ventilation, vii) Grip strength, viii) physical work capacity.

The same pattern of change with age for normal children although lower value for pulmonary function, Grip strength and physical work capacity were obtained.

Watson\textsuperscript{20} pointed out that lumbar lordosis was significantly higher in individuals who specialized in soccer. Scoliosis and abducted scapula were more common in the hurdlers. The flat feet were high in the footballers and hurdlers. Abducted scapulae were uncommon in rugby players. In a group of footballers and soccer players who were studied longitudinally, the degree of lumbar lordosis increased during the course of two playing seasons. Groin strain and back injury were found to be more common in sports men with lordosis. It is suggested that athletic activity may sometimes lead to postural defects which are probably a predisposing factor in certain types of sports injury.

Mekenzie, Clement and Taunton\textsuperscript{21} have pointed out that the runners with excessively pronated feet have features which predispose him/her to injuries that most frequently occur at the medial aspect of the lower extremity: tibial stress syndrome; patellofemoral pain syndrome; and posterior tibialis tendonitis. These problems occur because of excessive motion at the subtalar joint and control of this movement can be made through selection of appropriate foot wear, plus orthotic foot


control. As runner with curve feet often has a rigid foot and concomitant problems of decreased ability to absorb the force of ground contact. The shoes should be board-lasted, straight lasted, have stable heel counter, extra medial support and wider flare than the shoes for the curve foot.

Herbert and Boke Chako\textsuperscript{22} more than ten years ago, they began the night time treatment of early scoliosis in growing children with implanted muscle stimulators. The early devices were radio frequency (RF) compiled units with an implanted receiver and external transmitter antenna which the patient used at night to power and activate the implant. Compliance with this treatment was 95 per cent. Recent developments have led to the use of a new, totally implantable stimulator for the treatment of scoliosis curves. The unit has no external components, is programmed and interrogated by telemetry and is externally, switched by the patient using a magnet. Compliance with it continues at a high level, product reliability to date has been perfect and the clinical results continue to be good.

Ohtsuka, Yamagata and Arai\textsuperscript{23} have stated the screening program for scoliosis started by Chiba University in 1979 consists of using moiré topography, low dose roentgenography and a final ordinary X-rays examination. The number of children screened through this Chiba University Medical School (CUMS) screening program to 1986 amounted to 1,246,798. The incidence of scoliosis of more than 15° increased linearly according to age from the fifth grade primary school children (0.07 per cent) in boys, (0.44 per cent) in girls to the second grade Junior High School Students (0.25 per cent) in boys, (1.77 per cent) in girls. The female predominance of scoliosis cases with curvatures of more than 20° detected during the total period was 10:1 and this female predominance was the same for primary school children and junior high school students. According to a study of the incidence of scoliosis by districts (area were divided according to population density and urbanization) there were no significant differences in the fifth grade primary school children between the sparsely and densely populated areas. In the cases of children beyond the fifth grade primary school level, however, the incidence in the densely populated areas were significantly higher than those in the sparsely populated districts. The incidence of

scoliosis of more than 20° decreased significantly every year among Junior High School students, because, they were screened periodically in school and the scoliotic students who had already been detected were left out of the next screening. This study establishes that screening for scoliosis by the CUMS Screening Program is cost-effective with a load risk of radiation hazards.

Zanandrea\textsuperscript{24} Screening was performed to detect Scoliosis, lateral Pelvic Tilt (L.P.T.) and Lodosis among 4681 males, Grades 5 through 11, from Public School in Sao Paulo City, Brazil. There were 30 randomly selected school from four different socio economic levels. Scoliosis was seen in 310 students (6.6\%) with greater (P < 0.05) incidence among grade 9 through 11, L.P.T. in 49 (1.0\%) with greater (P > 0.05) incidence among the Grade 5 and 6, Both statistically totaled 3,942 observation (84.2\%) with equal occurrence among three grade groups (5 and 6, 7 and 8, and 9 through 11). It was concluded that musculoskeletal deviations do exist among males grades 5 through 11 in Sao Public City, regardless of Socioeconomic level. Programmes for screenings students from such age groups were deemed important and necessary.

\textsuperscript{24} Zan Andrea Hemes Luis. The Incidence of Scoliosis, Lateral Pelvic Tilt and Lodosis Among the Fifth to Eleventh Grade in Sao Paul City, Brazil, \textit{Dissertation Abstracts International, Vol. 50 No. 4} (October 1989), p.898.
Jones\textsuperscript{25} headed the study on flat-foot had found that “Flat Feet may actually be protective whereas high arches may be a risk factor for injury.” Generations of flat-footed candidates have been rejected by the military under the assumption that they were more prone to injury. But new data indicate that flat feet may actually prevent lower-limb injuries. Researchers at the US Army Research Institute of Environmental Medicine, the Walter Reed Army Institute of Research and The Nike Sports Research Laboratory Collaborated on a study. In it, the feet of 248 infantry trainees were photographed before 13 weeks of basic training.

The subjects, grouped according to arch height, were then followed and monitored for training associated injuries. The findings was the higher the arch, the greater the risk of injury. Trainees with high arches were 2.4 times more likely to suffer a foot injury than flat-footed trainees.

Singer, Jones and Breidahl\textsuperscript{26} have surveyed the sagittal plane curve characteristics of the thoracolumbar spine which were evaluated from 286 lateral chest radiographs comparing the cobb technique with a computer-aided digitizer. Thoracic kyphosis and curve apex were measured from T-

\textsuperscript{25} Bruce Jones, “Flat-Foot Nonsense,” \textit{Reader’s Digest} 137 (October 1990), p.142.

3 to T-11 segments, and in 120 cases, the level of thoracolumbar curve inflexion point was determined. An age related increase in curve magnitude was similar for both measurements, although computer generated kyphosis angles were generally larger. The apex of thoracic kyphosis was consistently located near T-7 for males compared with greater variability with age for females. The thoracolumbar inflexion point shifted caudally with increasing years, being most marked for females. The ability to describe quantitatively the thoracolumbar curve characteristics, calculate angles between selected segments, determine points of inflexion and maximum curvature, indicates that radio-graphic evaluation of sagittal spinal curvature is improved with the use of computer-aided measurement.

Sward et al.\textsuperscript{27} have made studies on the changes in thoraco-lumbar of athletes. Back pain and radiological changes of the thoraco-lumbar spine were investigated in 142 top athletes, representing wrestling, gymnastics, soccer and tennis (age range 14-25 years). All groups of athletes reported back pain at high frequencies (50-85 per cent). Male gymnasts had significantly increased incidence and severity of back pain as compared to the rest of the athletes. Radiological abnormalities

occurred in 36-55 per cent of the athletes. Reduced disc height, schmorl’s nodes and change of configuration of vertebral bodies correlated with back pain (P < .05, P < .01, P < .05). Significant co-variation between these types of abnormalities was found. Athletes with great demands on the back are thus subjected to an increased risk of symptomatic damage of the spine.

The spine of athletes, at least in some vigorous sports is subjected to frequent and considerable loads with subsequent risks to back injuries and back pain. An increased frequency of radiological abnormalities of the spine has been found among young athletes in certain sports, such as wrestling (55 per cent), gymnastics (42 per cent) and water ski-jumping (45 per cent.) In the general population, most radiological abnormalities are considered non relevant or of questionable significance in individuals with back pain. Reports on the correlation between back pain and radiological thoraco-lumbar abnormalities in athletes are sparse and contradictory.

The aim of the this study was to investigate the occurrence of back pain among athletes in various sports and to analyze its correlation to radiological changes in the thoracolumbar spine.
Belgesundeu and Rottker\textsuperscript{28} have found out that Radiograms were taken of subjects with no symptoms of cervical spine problems; the cervical spine was evaluated in the spontaneous posture and at maximal flexion and extension. The position and movement of the vertebra intervertebral height and gliding were calculated. The results showed that (1) Lordosis in women occurred less pronounced than in men, and that there was an increase with age; (2) C 2-3 was the least flexibility segment and mobility increased in the caudal direction; mobility decreased with age and the segment of the lower cervical spine with the highest mobility decreased the most; (3) all posterior and ventral intervertebral heights showed a decreased with age at C 5-6 and C 6-7; (4) Vertebral gliding decreased with age.

Madanmohan et.al,\textsuperscript{29} assessed the effect of yoga training on reaction time, respiratory endurance and muscular strength. Twenty seven male medical students were randomly selected from Jawaharlal institute of postgraduate medical education and research in Pondicherry and their aged from 18 to 21 years. They were given yoga training on 12


weeks of 30 minute for six days. Muscular strength was measured using by hand grip dynamometer. The results of pre-test and post-test were compared by using t ratio test. There was significant improvement on reaction time, respiratory endurance and muscular strength among male students after the intervention.

Goldfine and Naha\textsuperscript{30} This investigation ascertained effects of exposing high school students to classroom health-related fitness instruction involving a curriculum focused on the relationship of exercise to cardio respiratory fitness, body composition, flexibility, strength (particularly as it relates to abdominal and lower-back muscoskeletal function), and muscular endurance. The curriculum included lectures, labs, and readings as part of the physical education course work. Ninety ninth and 10th grade students were assigned randomly to one of three physical education classes, which met daily for one, 12-week semester. Each class received the same skill-related instruction; however, the two experimental classes, in lieu of skill activities, were exposed to classroom instruction and readings dealing with health fitness topics on a one or two day per week basis. The third class of students, the control group, was engaged strictly in skill activities daily. Students exposed to health-

related fitness classroom instruction displayed significantly more positive attitudes toward physical activity and a better understanding of health-related fitness than students who did not receive such information.

According to Miller and Allen\textsuperscript{31} there are many causes of poor posture and poor body mechanics including environmental influences, psychological condition, pathological conditions, growth handicaps, congenital defects, and nutritional problems. Any of these may have an adverse effect on the posture of the growing child, the adolescent, on the adult. Extended periods are needed to establish good body mechanics.

Schell, Allolio and Schonecke\textsuperscript{32} Hatha-Yoga have become increasingly popular in western countries as a method for coping with stress. However, little is known about the physiological and psychological effects of yoga practice. We measured heart rate, blood pressure, the hormones cortisol, prolactin and growth hormone and certain psychological parameters in a yoga practicing group and a control group of young female volunteers reading in a comfortable position during the experimental period. There were no substantial differences

\textsuperscript{31} D.K Miller and T.E. Allen \textit{Adopted Physical Education and Recreation}, 7\textsuperscript{th} Ed. (London Mosby Company, 1993), p. 306.

between the groups concerning endocrine parameters and blood pressure. The course of heart rate was significantly different; the yoga group had a decrease during the yoga practice. Significant differences between both groups were found in psychological parameters. In the personality inventory the yoga group showed markedly higher scores in life satisfaction and lower scores in excitability, aggressiveness, openness, emotionality and somatic complaints. Significant differences could also be observed concerning coping with stress and the mood at the end of the experiment. The yoga group had significant higher scores in high spirits and extravertedness.

Dongwoo The purpose of this study was to investigate the relationship between postural configuration during bipedal stance and performance on manual Constraints imposed on perceptual motor workspace. The manipulation of any constraints would bring the individual to change the body configuration to maintain stable and efficient body configuration for a given task. It was assume that when they need to change their body configuration, organisms strive to adopt a control strategy in which minimum energy is expended to maintain a postural that is consistent with the task goal.

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Hendwrson and bedini\textsuperscript{34} explored the experiences and meaning of physical activity for women with disabilities and to interpret the implications of physical activities especially for women with mobility impairments. Qualitative interviews were associated with physical activity women with mobility experienced physical activity and leisure. Four values were associated with physical activity and leisure therapy, maintenance or perceived little value. Attitudes towards one’s disability and physical activity resulted in conforming, resisting or adjusting behavior. Energy/ stamina, low pain level, transportation, removal of social fears, accessibility and social support were the individual or combined conditions that influenced and values and attitudes regarding physical activities. The result of the study highlighted the need to consider and improve opportunities for physical activities for women with mobility impairments.

Raghu et.al\textsuperscript{35} conducted study to determine whether breathing through a particular nostril has a lateralized effect on hand grip strength. 130 right hands dominant, school children between 11 and 18 yrs of age


were randomly assigned to 5 groups. Each group had a specific yoga practice in addition to the regular program for a 10 days yoga camp. The practices were: (1) right, (2) left, (3) alternate- nostril breathing (4) breath awareness and (5) practice of mudras. Hand grip strength of both hands was assessed initially and at the end of 10 days for all 5 groups. The right, left-and alternate- nostril breathing groups had a significant increase in grip strength of both hands, ranging from 4.1% to 6.5%, at the end of the camp though without any lateralization effect. The breath awareness and mudra groups showed no change. Hence the present results suggest that yoga breathing through a particular nostril, or through alternate nostrils increases hand grip strength of both hands without lateralization.

Walsakom\textsuperscript{36} evaluated the response of selected asanas on balance, flexibility, muscular endurance and reaction time among school boys. Thirty healthy, untrained school boys were selected from kalapet in Pondicherry and their age ranged from 10 to 15 years. The subjects were equally divided into two groups namely control and experimental group. The experimental group underwent selected asanas practice for one hour duration for ten weeks. Balance was measured using by stoke stand, flexibility was measured with the reliable equipment sit and reach box.

Muscular endurance was measured using bent knee sit ups and reaction time was measured using nelson hand stick. The results of pre-test and post-test were compared by using Analysis of Covariance (ANCOVA). The results revealed that Balance, flexibility, muscular endurance variables were significantly improved after practice of asanas.

Tran et.al\textsuperscript{37} studied the effects of hatha yoga practice on the health-related aspects of physical fitness. Ten healthy, untrained volunteers (nine females and one male), selected ranging in age from 18-27 years. The health-related physical fitness variables are muscular strength and endurance, flexibility, cardio respiratory fitness and body composition selected. Subjects were required to attend a minimum of two yoga classes per week for a total of 8 weeks. Each yoga session consisted of 10 minutes of pranayamas (breath-control exercises), 15 minutes of dynamic warm-up exercises, 50 minutes of asanas (yoga postures), and 10 minutes of supine relaxation in savasana (corpse pose). The subjects were evaluated before and after the 8-week training program. Isokinetic muscular strength for elbow extension, elbow flexion, and knee extension increased by 31%, 19%, and 28% respectively, whereas isometric muscular endurance for knee flexion increased 57%. Ankle flexibility,

shoulder elevation, trunk extension, and trunk flexion were also increased relatively there was increase in maximal oxygen uptake.

Miyakoshi, Itoi, Kobayashi, Kodama. The objective of the study was to evaluate the impact of postural deformities and spinal mobility on quality of life (QOL) in patients with spinal osteoporosis. A total of 157 postmenopausal women aged over 60 years with osteoporosis were divided into five groups according to their postural deformities: round back (RB, n=41), hollow round back (HRB, n=33), whole kyphosis (wk, n=40), lower acute kyphosis (LAK, n=18) and normal posture (NP, n=25), QOL was evaluated using the Japanese Osteoporosis QOL Questionnaire (JOQOL) proposed by the Japanese Society for bone and Mineral Research. This questionnaire contains six domains, with higher scores indicating higher levels of QOL. The number of vertebral fractures, thoracic kyphosis and lumbar lordosis angles, and spinal range of motion (ROM) during maximum flexion and extension were also measured with radiographs. Total QOL scores in RB, HRB, WK, and LAK groups were significantly lower than those in the NP group, and those in WK group were even lower compared with the other groups.

(P<0.05). All the groups with postural deformities, but not the NP group, showed significant positive spinal correlations between total QOL score and spinal ROM (0.521 < r < 0.747, P<0.05). Total QOL score showed a significant correlation with age, number of vertebral fractures, lumbar lordosis angle and ROM in a total of 157 patients. However, multiple regression analysis revealed that spinal ROM best correlated with the total QOL score. We concluded that QOL in patients with osteoporosis was impaired by postural deformities, especially by whole kyphosis, and that spinal mobility has a strong effect on QOL in these patients.

Bhatia and Premlata study “Effect of selected Yogic Exercises on Balance and Perception of college level Players.” The major responses we make, to maintain our posture and balance, are excellent examples of movements based on integrated sensory information. Both vision and kinesthetic provide information for balancing, but during infancy and early childhood we sometimes rely more on visual information than kinesthetic information. Performance on various balance tasks improves throughout childhood and adolescence, although, the

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timing of these improvement depends on the type, static or dynamic, and the nature of the task. Keeping this in view, the investigators have made an experimental study on the balance and perception of female players, to find out the effect of yogic exercises on balance and perception, this experiment was made on forty female players of college level. For this, players were selected, as subjects, from university college of Kurukshetra University. The sample was further divided into two groups, the group A and B. the test of balance (static and dynamic) and of perception, were taken as criterion, measures. Group a was given a programme of selected yoga asanas for a period of six weeks, while group B was kept controlled. The analysis of data shows that yogic exercises were found effective, to develop perception and balance.

Carson, Carson, Porter, Keefe and Seewaldt\(^{40}\) many interventions for the management of low back pain exist, however most have modest efficacy at best, and there are few with clearly demonstrated benefits once pain becomes chronic. Therapeutic exercise, on the other hand, does appear to have significant benefits for managing patients with chronic low back pain (CLBP) in terms of decreasing pain and improving function.

In addition, because chronic pain is complex and does not fit a simple model, there have also been numerous trials investigating and demonstrating the efficacy of multidisciplinary pain programs for CLBP. It follows that interventions that treat more than one aspect of LBP would have significant benefits for this patient population. Yoga and Pilates which have, both been gaining in popularity over the last decade are two mind–body exercise interventions that address both the physical and mental aspects of pain with core strengthening, flexibility, and relaxation. There has been a slow evolution of these nontraditional exercise regimens into treatment paradigms for LBP, although few studies examining their effects have been published. The following article will focus on the scientific and theoretical basis of using yoga and Pilates in the management of CLBP.

Madanmohan et.al,\(^{41}\) studied the effect of six weeks yoga training on weight loss following step test, respiratory pressures, hand grip strength and handgrip endurance in young healthy subjects. Out of 46 healthy subjects (30 males and 16 females, aged 17–20 yr), 23 motivated subjects (15 male and 8 female) were given yoga training and the

remaining 23 subjects served as controls. Weight loss following Harvard step test (an index of sweat loss), maximum inspirit or pressure, maximum expiratory pressure, 40 mm endurance, handgrip strength and handgrip endurance were determined before and after the six week study period. In the yoga group, weight loss in response to Harvard step test was 64±30 g after yoga training as compared to 161±133 g before the training and the difference was significant (n = 15 male subjects<0.01). In contrast, weight loss following step test was not significantly different in the control group at the end of the study period. Yoga training produced a marked increase in respiratory pressures and endurance in 40mm Hg test in both male and female subjects (P<0.05 for all comparisons). In conclusion, the present study demonstrates attenuation of the sweating response to step test by yoga training. Further, yoga training for a short period of six weeks can produce significant improvements in respiratory muscle strength and endurance.

Bal and Kaur\textsuperscript{42} the present study was conducted to determine the effects of selected asanas in hatha yoga on agility and flexibility level. The subjects for the study were selected on the basis of random group design. Thirty (N=30) male students were selected as subject for the

present study from D. A. V. Institute of Engineering and Technology, Jalandhar (Punjab), INDIA. All the subjects ranged between the chronological age of 18-25 years. The selected subjects were further divided into two groups. Experimental treatment was then assigned to group “A” while group “B” acts as control. “Hexagonal Obstacle Test” was used to measure Agility whereas “Sit and Reach Test” was used to measure Flexibility.

The subjects were subjected to the six week yogasanas training programme that includes Swastikasana, Mayurasana, Matsyendrasana, Paschimottanasana and Gomukhasana. The difference in the mean of each group for selected variable was tested for the significance of difference by “t” test. The level of significance was set at 0.05. The results have shown the significant improvement in flexibility, since cal. t (= 8.122) > tab t .05 (14) (= 2.145). The treatment of six week yogasanas training programme also shown significant improvement in case of agility, since cal. T (= 7.376) > tab t .05 (14) (= 2.145).

Chen et.al,\textsuperscript{43} studied the effects of yoga exercise intervention on health related physical fitness in school-age asthmatic children. 31 voluntary children (exercise group 16; control group 15) aged 7 to 12

years were purposively sampled from one public elementary school in Taipei County. The yoga exercise program was practiced by the exercise group three times per week for a consecutive 7 week period. Each 60-minute yoga session included 10 minutes of warm-up and breathing exercises, 40 minutes of yoga postures, and 10 minutes of cool down exercises. Fitness scores were assessed at pre-exercise (baseline) and at the seventh and ninth week after intervention completion. A total of 31 subjects (exercise group 16; control group 15) completed follow-up. There was improved BMI, flexibility, muscular strength, and cardiopulmonary fitness after yoga practice among yoga group, where as no changes were noticed among control group subjects.

Benavides and Caballero\textsuperscript{44} the objective of this pilot study was to determine the effect of yoga on weight in youth at risk for developing type 2 diabetes. Secondarily, the impact of participation in yoga on self-concept and psychiatric symptoms was measured. A 12-week prospective pilot Ashtanga yoga program enrolled twenty children and adolescents. Weight was measured before and after the program. All participants

completed self-concept, anxiety, and depression inventories at the initiation and completion of the program.

Fourteen predominately Hispanic children, ages 8–15, completed the program. The average weight loss was 2 kg. Weight decreased from $61.2 \pm 20.2$ kg to $59.2 \pm 19.2$ kg ($p = 0.01$). Four of five children with low self-esteem improved, although two had decreases in self-esteem. Anxiety symptoms improved in the study. Ashtanga yoga may be beneficial as a weight loss strategy in a predominately Hispanic population.

Kim E. Innes\textsuperscript{45} from the Center for the Study of Complementary and Alternative Therapies conducted a systematic of published literature regarding the effects of yoga on specific anthropometric (body measurement) and physiologic indices of cardiovascular disease. This comprehensive study underscored the need for effective primary prevention efforts targeted at common risk factors.

Among these risk factors are those associated with the insulin resistance syndrome or IRS. IRS, also referred to as the metabolic syndrome, is a combination of metabolic disorders that increase the risk of developing cardiovascular disease. Prominent features of IRS include

\textsuperscript{45} Kim E. Innes, “Yoga and Cardiovascular Disease”, \textit{A-B-C of Yoga}, 8, (September 2009).
insulin resistance, atherogenic dyslipidemia (lipid abnormalities), glucose intolerance, high blood pressure, and visceral adiposity, or common belly fat. In addition to metabolic disorders, there are psychosocial factors that play a huge role in the development of both IRS and CVD. Most everyone has had experience with a Type a personality – those with character traits that lead to a high stress response to their environment. Generally speaking, psychosocial factors are those that affect a person both socially and psychologically. And there is a strong correlation between these factors and CVD.

It is because of these facts that mind-body therapies such as yoga may have considerable potential with regards to the prevention and treatment of CVD. Yoga is an ancient mind-body discipline that has been used extensively in India for the management of chronic insulin resistant conditions. So the question is why shouldn’t yoga have equally positive results in the U.S. as well? Yoga originated in India over 4000 years ago. In recent decades the practice of yoga has enjoyed rising popularity in Western industrialized countries. The most widely practiced forms are Hatha (or forceful) yoga, Raja (or classical) yoga, and Mantra yoga. Mantra yoga emphasizes the use of specific sounds or chants with the purpose of bringing about mental and spiritual transformation.
Both Hatha and Raja yoga emphasize specific postures (asanas), breath control (pranayama), concentration, and meditation. In the Western world, Hatha yoga is the most commonly practiced. The advantages of yoga run broad and deep. In the United States specifically, yoga is practiced to alleviate stress, improve health, and increase fitness. What makes it so attractive is the fact that yoga is economical, has no significant side effects, yet the lifestyle benefits are substantial. It’s safe, easy to learn and even the elderly or disabled can practice yoga. But most importantly, there is growing evidence that suggests that yoga may reduce IRS related risk factors for CVD and may actually improve the prognosis of those suffering from cardiovascular disease. However, systematic review to support this evidence has been lacking. But that’s all changed now. The study conducted by Innes critically reviews the published scientific literature regarding the effects of yoga on IRS-related indices of CVD risks. This article explains the methodology employed in the review, the substantial results, and the eye-opening conclusion.

Sugumar\textsuperscript{46} study was framed find out the effect of yogic practices on body composition among the college men students. Thirty healthy, untrained male subjects were selected from various Departments of

Gandhigram Rural Institute, Deemed University, Gandhigram, Dindigual and their age ranged from 18 to 25 years. The subjects were equally divided into two groups namely the control and the experimental group. The experimental group underwent selected asanas and pranayama for five days per week for six weeks. Control group did not undergo any training programme rather than their routine work. Body composition was measured by using BIA method in the three sites. Prior to and after end of practice period all subjects were tested. The results of pre-test and post-test were compared with using Analysis of Co-variance. Finding of body composition shows significant improvement due to the six weeks yogic practice when compared to the control group.

Sultana\textsuperscript{47} studied the effects of yoga practice on dominate hand grip strength of female students. Forty female subjects were selected from various Departments in Pondicherry University and their age ranged from 18 to 25 years. The subjects were divided into four groups’ namely Right nostril breathing group (Asanas and Suriya Bhedana), Left nostril (Asanas and Chandra Bhedana), Alternate nostril breathing group (Asanas and Nadisudhi) and control group. The experimental group underwent selected asanas and pranayama practice for ten days. Control

\footnotesize{\textsuperscript{47} D. Sultana, “Effects of Yoga Practice on Dominate Hand Grip Strength of Female Students”, \textit{Recent Treads in Yoga and Physical Education}, Vol. I, (August, 2011) p.360.}
group did not undergo any training programme rather than their routine work. Hand grip strength was measured through hand grip dynamometer. Prior to and after end of practice period all subjects were tested. The results of pre-test and post-test were compared with using Analysis of Co-variance. The yogic practices three groups significantly improved hand grip strength, Alternate nostril breathing group (Asanas and Nadisudhi) is better improved compared than other groups.

Priya and Gopinath\textsuperscript{48} studied the effect of yogic practice on flexibility among school boys. Forty subjects were selected from A.R.R Matriculation higher secondary school and their age ranged from 15 to 17 years. The subjects were divided into two groups namely the control and the experimental group. The experimental group underwent selected asanas and pranayama for five days per week for twelve weeks. Control group did not undergo any training programme rather than their routine work. Flexibility was measured by using sit and reach box. Prior to and after end of practice period all subjects were tested. The results of pre-test and post-test were compared with using Analysis of Co-variance. Finding of flexibility shows significant improvement due to the twelve weeks yogic practice when compared to the control group.