CHAPTER II

REVIEW OF RELATED LITERATURE

A study of the relevant literature is an essential step to get a complete picture of what has been done and said with regard to the problem under study. Such a review brings about a deep insight and a clear perspective of the overall field. The present study is intended to investigate the effect of isolated and combined training of Dands Baithaks and Yogasanas on specific Physical and Physiological variables among school boys. The reviews of the related literature on various physical activities and Physical training such as Plyometric, Wrestlers exercises, Yogasanas and other similar activities, various physical and physiological variables related to this study are presented toward analysis.

“Dands give exercise to all limbs within a short time and deserve to be practiced by everybody. Western countries follow various forms of physical exercises in which some types of Dands are incorporated other countries also advocate Indian Dands exercises owing to their remarkable effect”.

The group of muscles involved in the performance of muscular strength and muscular endurance and exercise in Dands are more or less the same.

The following are the important muscles Gastrocnemius, hamstring, Abdominal muscles, lastisimus dorsi, trapezius, pectoralis major and pectoralis minor, deltoid, biceps, triceps, forearm muscles, wrist and palm muscles that are involved in the performance of muscular strength and muscular endurance.
According to Majumdar (1950), “Strength enables an individual to conquer kingdoms. Strength accompanied by skill attracts all the leads a person to self-confidence, courage and more acts.”

According to Hooks (1962), “The performance level depends upon various factors such as the amount of stress is applied to the muscles, the length of time the stress is applied and the frequency with which the stress is applied”.

According to Weber (1968), “Dynamic strength is considered to be one of the most important of such elements facilitating effective performance. In muscular strength and muscular endurance such physical fitness factors as extent flexibility, static strength, dynamic strength and explosive power have been identified as essential requirements for high proficiency in performance”.

Majumdar (1950) “Baithak exercise is supplementary to Dands. Dands give a prominent shape particularly to arms, chest and stomach white. Baithaks shape the calf muscles and thigh muscles. Generally Baithaks exercises develop quickness of body movements and repetition increase the stamina. Thigh muscles of the body and Baithaks, running and jumping make the muscles brown and strong”.

To quote Ward, “Much strength training can be should be done outside the framework of what is generally referred to as weight training. The differences may merely be one of terminology, for often the vaulted is using the body weight on his resistance. For the vaulted the strength is often developed as a result of the control of the body weight in coordinated movements. Other works in gymnasium may be pure strength work taking the form of rope climbing”.

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Mohimber (1952) studied on the effect of dands and baithaks on all round development of the body. He is inducted to find out the improvement of strength in the body. The practice was commonly done by wrestlers to strength the legs, and developing shoulder strength. The school boys may be taught during secondary stages for development of muscles and general strength. Dands and Baithaks should be practiced all over our country by those who are enthusiastic about their body development.

Hanson (2007) studied the acute effect of heavy and light load squat exercise on kinetic measure of vertical jumping. For the purpose of the study the subjects 30 were selected. He examined the acute performance enhancing the effect of the single light load, heavy velocity or heavy load, low velocity squat intervention (SIS) on stimulating activity dependent to vertical jumping performance. The jump performances were assessed using four dependent variables such as 1. Net impulse, 2. Time of Ground contact, 3. Normalized peak, 4. Normalized Minimum vertical ground reaction force. The resistance training conducted for three independent sessions separated by 3 to 7 days. It was concluded that the sub maximal work load of 50% during the SAS insufficient movement pattern specificity between the squat exercise and a CNJ or intervals of exercise duration. A single SIS provides no benefits to warm up protocol under current conditions.

Masamoto et al., (2003), examined the acute effects of plyometric exercise on maximum squat performance in male athletes. The maximum of one repetition was given in squat performance. Twelve men age ranges from 18-21 volunteers were participated in 3 testing sessions separately by at least 6 days of rest. The back squat exercise was assessed in each training
sessions. The subjects rested at least 4 minutes between trials. Before all 3 trails subjects warmed up cycle for 3 minutes and performed static stretching. The subjects were asked to perform 5 sub maximal set of 1 to 8 repetitions before attempting 1 repetition maximum. Each training session load is increased. During 2\textsuperscript{nd} and 3\textsuperscript{rd} training sessions subject performed in counter balanced order either three double leg tuck jump or two depth jump for 30secs before each 1RM attempt. It is concluded that depth jump performed before one repetition maximum testing may enhance squat performance in trained male athletes.

Kumar (1994) studied an effect of concentric, eccentric and combination of concentric and eccentric on muscular strength, muscular hypertrophy and muscular power. For the purpose of this study 60 school boys were selected at random and their age ranged from 14 to 16 years. They are divided into 3 experimental groups and a control group. Group A concentric group, Group B eccentric group, Group C as combination group and control group underwent no training. This training was given for 10 weeks for 3 days a week data’s were taken before and after training period. The statistical analyses were done using T-test and analysis of co-variance. For test of significance Scheffee’s post hock test is used. It was concluded that all the groups were significantly improved.

Hass (2000) made a study to determine that effect of increasing training volume from 1 set to 3 sets on muscular strength, muscular endurance and body composition in adult recreational weight lifter. For the purpose for the study 42 adult age 39.7 to 62 years and training given for 13 weeks were undergone resistance training circuit (RTC) for one set of 9
exercise they participated in this study for a minimum of one ear the muscular endurance were evaluated for chest press, over head press bicep curl, leg curl, as number of repetition to failure using 75% of pre training (1-RM) the body composition was also estimated using 7 skin fold measurements. The statistical analysis were made and found that both the group significantly improved in body composition and muscular fitness.

Maddalozza et al., (1999) were conducted a study towards the effects of moderate intensity resistance training programme to a high intensity programme using free weight exercise on regional and total body bone mineral density, lean body mass, muscular strength and power, and serum level of insulin like growth factor 1 in health order man and woman. For the purpose of the study 28 health man and 26 healthy non estrogen replaced women of age from 50 to 60 were selected for the study. The training period was limited to 12 weeks and intensity maintained to moderate to high intensity resistance training the pre and post test variables were measured and collected, it was conducted that high intensity but not moderate intensity resistance training produced regional changes in body mass at the hip, specifically high intensity free weight training produced a significant increase in trochanteric BMD for women (20%) and for men (1.3%) and a significant decreased in general.

Faigen baum (1999) conducted a study on the effect of different resistance training protocol on muscular strength and endurance development in children. The purpose deals with subject ages ranged from 5.2 to 11.8 years. 11 girls and 32 boys were selected for the study and resistance training was given for 8 weeks. The training constitutes low repetition, heavy load
resistance program and high repetition, moderate load resistance training program for twice a week. One set of 6 to 8 repetitions for 15 subjects and one set of 13 to 15 repetition with moderate load for 16 subjects, for control group 12 subjects were selected who did not participated any sort of training. The strength and muscular training such as leg extension, chest press was given. It was concluded that 1-RM leg extension test significantly increased in both the experimental group. For girls and boys 31% and 40.9% improvement were noticed for low repetition, heavy load and high repetition, moderate load groups finally it was observed that leg muscular endurance significantly increased in both the experimental group analysis of covariance.

Hass et al., (1998) studied on the effect of training volume on strength and endurance in experimented resistance for trained adults to fulfill the purpose of the study 40 trained adults subjects were selected. The training group consist of low volume strength training group and high volume strength training group were trained for 13 weeks and for 3 times a week, the training were given in leg extension, leg curl, chest press over head press, bicep curl performance and they are gain were measured before and after the training. That result showed that both groups increased in strength and muscular endurance and no difference between on any measure.

Hisaeda et al., (1996) studied the influence of two different modes of resistance training in untrained female subject. To ensure the purpose towards study the subject were selected at random from active exercising groups of women. One group underwent resistance training with low intensity and high volume training and another group in high intensity and low volume
training. It was statistically analyzed and changes were significantly group showed similar changes through the resistance training.

**Stone and cutler** (1994) conducted a study on effect of three resistance training protocol on strength endurance. For the purpose of the study 50 college women were randomly selected for the resistance training protocol these group were divided 3 resistance training protocol groups they were employed progressive resistance with high resistance – low repetition, medium resistance – medium repetition and low resistance – high repetition training these groups were trained for 9 weeks and the group same resistance exercise percentage were followed such as 3 sets of 6 to 8 RM, 2 sets of 15 to 20 RM and 1 set of 30 to 40 RM respectively. A significant improvement seen in strength both upper body strength test second absolute muscular endurance increased in positively high resistance – low repetition group achieved greater strength gain, low resistance – high repetition training group yielded higher muscular endurance gain and absolute endurance seems to better gain in all groups.

**Scharnhort** (1991) studied the effect of high and low intensity eccentric exercise on muscle soreness and strength to ensure the purpose related to this study 18 untrained college students were selected as subjects two eccentric exercise protocol on muscle soreness and strength of the bicep muscle. The training assigned for two groups interns of the high intensity high volume work load and another group performed low intensity high volume work load. The muscle assessed before the exercise and after the exercise interned of 0, 24, 48, 72, 144 hours, likerts scale was used measure muscle soreness, cybex isokinetic dynamometer was used to measure the strength
performance. Statistical interpretation of repeated measure analysis of conclusion showed that there is no significant difference between the workouts on muscle soreness. Significant differences were found between the means of strength measurements found in both the workouts at times 24 and 144 hours.

Benedict Tan (1999) studied on manipulating resistance training program variables to optimize maximum strength in men, in view of this study exercises appreciate for the sports, the essential variables to consider training intensity or load and training volume were considered. In addition intensity, training to failure speed of contraction psychological factor, recovery, order of exercise and number of session per day were followed, resulting that the maximum strength is developed with 1 to 6 repetition maximum load on combination concentric and eccentric muscle action, 3 to 5 days training per week and dividing the days in to two session gives long interest recovery time. The increase in maximum strength may be affected by neural hormonal and muscular adaption.

Chilibeck (1996) conducted the study on twenty weeks of weight training increases lean tissue mass but not bone mineral mass or density in healthy, active young women. Interview of this study 20 young women age ranges between 19 to 22 years were participated in weight training program twice a week for 20 weeks. Among them 10 were selected as control group. Training showed a significant improvement in 73% on arm-curl, 33% bench-press, 33% on leg curl. The whole body, trunk arm, leg lean mass also increased significantly. Leg lean mass also increased strength the training
program also increased strength. The training program also increased strength and lean tissue mass in young women.

Hetzler et al., (1994) contributed his study on the effect of 12 weeks of strength training on anaerobic power in pubescent male athletes for the purpose of this study controlled experimental and inexperience males’ age ranges from 13 to 16 years were selected. The training was followed 12 weeks on anaerobic power test such as sergeant jump, margarita test, 40 yard dash, leg press and bench press, the statistical analysis showed that the training significantly improved on anaerobic power tests.

Sanial Sabastian (1998) studied on relative analysis of progressive training and alternative high and low Intensity training on speed, flexibility and explosive power of boys. The study was conducted with the 60 boy subjects who were randomly selected after the completion of minimum strength requirement test. These subjects were subdivision in three groups. They were grouped as control group and two experimental groups. Experimental group I underwent conventional progressive training, Group II underwent alternative high and low intensity training. Both the groups’ were trained for 14 weeks. Pre and post test were tested on speed, flexibility and explosive power. It was statistically analyzed by analysis of covariance and conducted that both trainee group showed significance improvement and no significant between the training groups.

Haris et al., (2000) studied on short term performance effect of high power, high force or combination weight training methods. To conduct this study three training groups were given training on high force for 13 subjects high power for 16 subjects and combination training for 13 subjects. These
training groups were trained for 9 weeks and 4 days a week. High power group was trained in relative intensities variables were measured in prior and after the training. The result showed that high force group improved significantly in 4 variables, High power in 5 variables and Combination group in 7 variables. The variables such as one repetition maximum parallel squat, one repetition maximum mid thigh pall, vertical jump, Margaria Kalamen power test, 30 meter sprint, 10 yard shuttle run and standing long jump.

Jones et al., (1996) conducted a study on the effect of compensatory Acceleration on upper body strength and power, and comparing the effect of max concentric acceleration on strength training versus tradition upper body strength training. The study was conducted to football players, 30 subjects were tested in power with seated medicine ball throw, and 24 subjects were tested with pushup test. The upper body strength was measured and tested for 30 subjects using one repetition maximum bench press. Statistically the data’s were analyzed using two way analysis of variable. Result showed that use of maximum acceleration concentric concentration by college football players during upper body strength and power training.

Mazzetti et al., (2000) investigated on the influence of direct supervision of resistance training on strength performance. To fulfill the purpose to compare the variation in maximal strength, power, muscular endurance after twelve weeks of heavy resistance training, which was directly supervised by personal trainer and another non supervisor. The subjects were selected at random from trained men the age changed from 23 – 24 years. Among two groups supervised and non supervised group the training was infused in linear periodized resistance training programmes. These subjects
were tested in their pre and post training on maximal squat, bench press muscular endurance and body composition which found significant both training group. It was also concluded that body mass, fat mass, fat free mass significantly increased after training in supervision group.

Luebbers et al., (2003) examined on the effect of plyometric training and recovery on vertical jump performance and anaerobic power for the conduct of this physically active 19 college men were selected whose age ranged from 19 – 13 years were trained for 4 weeks of plyometric exercises and the experimental variables such as vertical jump height, vertical jump power and anaerobic (Margaria) power test in 4 weeks 7 weeks. It was concluded that vertical jump height increased and vertical jump power decreased in 4 weeks training. Anaerobic power is increased in 7 weeks group and 4 weeks programme may not show effective increase as 7 week programme if the recovery programme is not employed.

Subramanian (2002) studied on the effect of continuous running and combination of continuous running and interval training on selected physical physiological and hematological variables. Forth purpose of this study the investigator selected fourth bachelor degree men student were selected as subjects and mean age of 19 years. The testing subjects were divided into four group namely control group, continues running group, interval training group and combination of continuous running group and interval training group with ten subject in each group. The entire 4 groups were test before and after the 6 weeks of training programme. The result showed that testing heart rate was better in continuous running group than other two even in other variables.
Rahman Rahimi (2007) studied on the acute effect of heavy versus high load squats on sprint performance. The aim of the study is to determine whether performing heavy versus light load squats prior to sprinting would improve running speed. 12 elite soccer league players with the mean age of 22.4 subjects participated in 4 testing sessions randomized and counterbalanced over a 2 week period, involving 3 potentiating protocol (light load squat, moderate load squat versus high load squat) and the C protocol, in order to assess the effect of different squat training on 40m sprint. The statistical analysis method of one way analysis variance with repeated measures used to find the F-ratio. It was concluded that the running speed increased significantly after light load squat, moderate load squat and high load squat. However, in order to induce the optional running speed enhancement, it is necessary to set the intensity of the warming up protocol with high dynamic loading intensities.

Madam Mohan et al., (2003) studied on effect of yoga training on Hand Grip, Respiratory pressure and pulmonary junction. For the purpose of this study 27 volunteers were treated with yoga training for 12 weeks. They are tested with Reaction time, maximum expiratory pressure, maximum inspiration pressure 40mm Hg test breath holding time after expiration, Breath holding time after inspiration and hand group test. It was concluded that breath holding time for inspiration and expiratory are increased in training.

Harinath et al., (2004) contributed a study on effect of Hatha yoga and omkar meditation on Cardio respiratory performance on psychological profile and melatonin secretion. The purpose fulfilled by selecting 30 subjects and their age ranged from 25 -35 years. These groups are randomly sub divided
into two sub group of 15 numbers. Flexibility exercise group slow running and yogic asanas and pranayana were two groups. Testing variables are orthostatic tolerance, heart rate, Blood pressure, respiratory rate dynamic lung function (FVC, FVCI, FEVY, PEFR, MVV) and psychological profile were tested before and after the training. It was concluded a significant changes found in yogic group in all variables.

Ray et al., (2001) studied on effect of yogic exercise on physical and mental health of young fellowship course trainees. In this course of study the training period is limited to 5 months. 54 trainees of 20 – 25 years of age group where divided into 2 group such as yogic group and control group. In yogic group 23 males and 5 females out of 54 subjects were recruited for the study. Testing parameters are heart rate, blood pressure, oral temperature, and skin temperature in resting condition, responses maximal and sub maximal exercises, body flexibility were recorded. There was improvement found in performance of sub maximal level of exercise and in anaerobic threshold in yoga group.

Raju (1997) studied on the influence of intensive yoga training on physiological changes in adult women. To carryover the study investigator conducted 4 week intensive yoga practice for the age group adult women. The testing variable was maximal on tread mill test kept as physiological parameters level of oxygen conception was measured in pre and post test of training period. The statistical analysis showed that significant changes found powered heart rate, reduced minute ventilation reduced oxygen consumption and lower respiration increased cardio respiration. Insignificance also found in pulse rate, physical stress.
Guzel (2008) studied on the effect of callisthenic exercise on physical fitness values of sedentary women. The purpose of this study was to determine twelve weeks of training program on callisthenic exercise on aerobic power sit ups, pushups and hand grip strength the subject were 172 and training groups age are divided into three, group was 19 – 30 years, group II was 31 – 44 and group 3 as 45 – 56 years. All the subjects underwent 50 min of three times a week on aerobic and calisthenics program. Intensity of the exercise was determined by karvonen method. It was concluded that significant difference among all the groups on blood pressure. The physical fitness values decreased as age increased. Bat result showed improvement in long term calisthenics exercise improved the fitness level in women subjects.

Pratima (2011) studied the effect of surya namaskar practice on cardio respiratory fitness parameters. For the purpose of this study 78 subject (48 males and 30 females) are selected and trained for 6 months of surya namaskar practice. The experimental variable such as cardio respiratory efficiency and respiratory capacity as evaluated by cycle, ergometry and various lung functions test were administrated prior and after training period. It was concluded that surya namaskar practice can be advocated to improve cardio respiratory efficiency for patients as well as healthy people.

Anandha Bala yogi (2011) compared show and fast surya namaskar on physiological function. To pursue these study 42 school children in the age group of 12 – 16 years were randomly selected and divided into two groups for six months training on surya namaskar practice. Group 1 underwent slow surya namaskar and group 2 underwent fast surya namaskar. The following variables were tested on physiological function such as blood
pressure, isometric, hand grip strength, hand grip endurance, pulmonary function test such as maximum expiratory pressure, maximum inspiratory pressure. The statistical analysis showed that slow surya namaskar practice significantly decrease in diastolic increased in maximum inspiratory pressure. The fast surya namaskar practice showed significant increase in systolic pressure, isometric hand grip strength and endurance, pulmonary functions maximum inspiratory expiratory pressure. Finally it was concluded that the effect showed on fast surya namaskar resembles to aerobic exercise on physical and physiological function.

Fondran (2011) studied the effect of surya namaskar yoga practice on resting heart rate, blood pressure, flexibility upper body muscle endurance and perceived well lung in health hurdles. For the purpose of the study 30 subjects were selected (24 female and 6 male) and the age ranged mean of 34 years were trained in surya namaskar for 6 weeks. The pre and post measurements were taken on heart rate, blood pressure, harm string flexibility, upper body muscle endurance and perceived well being the statistical applications done using two-way analysis of variance. It was concluded that surya namaskar practice is effective in increasing harm string flexibility and improving upper body muscle endurance.

Senthil kumar et al., (2008) studied influence of aerobic and anaerobic interval training compared with yogic practices on selected physical fitness variable of high school football players. For this purpose the investigator selected to find out the influence of aerobic and anaerobic interval training you 90 foot ball players divided into 3 groups namely aerobic interval yogic group, anaerobic interval yogic group and control group 12 weeks of
training. F-ratio was statistically arrived and post hoc testing for significant also derived. It was concluded that aerobic interval training with yogic practices improved speed and agility than anaerobic power with yogic practices.

**Ekdahl and Broman (1992)** investigated on Muscle strength endurance and aerobic capacity in rheumatoid arthritis to compare with healthy subjects, to execute the study isometric or isokinetic muscle strength and isokinetic endurance of the lower extremities and aerobic capacity were tested for 67 patients, among them forty three females and twenty four male and their age ranges from 23 to 65 years, with classified rheumatoid arthritis. Testing on life style characteristics such as work load, exercise, diet smoking and alcohol habits for both the groups were done. Result showed that the group with RA had decreased functional capacity, Muscle Isometric strength, Aerobic capacity were reduced. ANCOVA showed that the rheumatoid group, compared with the healthy group, had significantly reduced function on all isometric and isokinetic tests of the extensors and flexors of the knee. Isometric hip muscle strength were similar—all tests but one yielding highly significant differences.

**Ibrahim and Azeem (2010)** studied examined the relationship between skill performance and selected physical fitness variables of hand ball players of Osmania University, Hyderabad, India. Thirty handball players of age ranged from 18 to 21 years were randomly selected who were undergoing for the All India Inter-University tournament. Defensive ability, passing ability and dribbling ability were assessed by defense movement test, passing test and control dribbling test. The tests selected for the physical fitness variables
were: speed, 50 m run; explosive power, sergeant jump; agility, 6×10 m shuttle run; cardio respiratory endurance, 12 min run/walk test; flexibility, bend and reach test. The statistical tool used was Pearson product moment correlation. Defensive ability was positively correlated with speed and agility, whereas explosive power, cardio respiratory endurance and flexibility were negatively correlated. Passing ability was negatively correlated with speed and agility, and positively correlated with explosive power, cardio respiratory endurance and flexibility. The skill of dribbling was positively correlated with speed and agility, and negatively correlated with explosive power; it was not significantly correlated with cardio respiratory endurance or flexibility. The results showed that defensive ability performance can be improved by good speed and agility. A player can excel in passing if he has good explosive power, cardio respiratory endurance and flexibility.

Ali Fahiminezhad (2010) study of anthropometric sizes and physical fitness factors of boy students aged from 12–14 in Shahrood city. The aim was to test anthropometric sizes and physical fitness factors. This cross-sectional study was performed on 368 boy students. Subjects were selected via random sampling. Anthropometric measurements included: height, weight, sitting height, arms span, body mass index (BMI), waist circumference (WC), waist to hip ratio (WHR), and percentage body fat (BF%) and physical fitness components included: cardio respiratory fitness (20-m shuttle run test), general strength (dynamometer back and leg), leg power (vertical jump test), flexibility (sit and reach test) and agility (Illinois test). The mean of height, weight, sitting height, arms span, BMI, WC, WHR and BF% subjects were 154.1, 43.4, 77.1, 155, 18, 67.6, 84 and 22, respectively. The mean of
VO₂ max (ml/kg/min), general strength (kg), leg power (kg/m), flexibility (cm) and agility (s) were 49.6, 92.1, 56.9, 30.5 and 18.97, respectively. There was significant negative correlation between VO₂ max and anthropometric measurements, agility with height, flexibility and leg power, while a significant positive correlation was found between general strength and leg power with anthropometric measurements subjects. Survey results showed that height, weight, BMI, general strength and leg power lower from adolescents of other countries and height, weight, BMI almost equal and general strength and leg power higher from adolescents of our country.

Fatouros et al., (2005) studied on Strength training and detraining effects on muscular strength, anaerobic power, and mobility of inactive older men are intensity dependent. To ensure the purpose the effect of intensity on strength, anaerobic power, and mobility of the subject were trained for 24 week. Fifty two inactive older men with the mean age 71.2 years were assigned to a control of 14 subjects, low intensity training with the 18 subjects or high intensity training with 20 subjects group. They carried out a 24 week, whole body (10 exercises, two to three sets/exercise) ST programme followed by a 48 week detraining period. Upper and lower body strength, anaerobic power (Wingate testing), and mobility (timed up and go, walking, climbing stairs) were measured at baseline and immediately after training and during detraining. Result concluded that anaerobic power, higher intensity training protocols induce greater gains in strength, anaerobic power, and whole body physical function of older men.

Melhim (2001) conducted a study on Aerobic and anaerobic power responses to the practice of taekwondo a practicing the martial art of
taekwon-do (TKD) has been proposed to have beneficial effects on cardiovascular fitness as well as general physical ability. Furthermore, TKD masters and participants have promoted TKD as a total fitness programme. Research studies substantiating this; however, seem to be lacking, perhaps because TKD is recognized more as a method of self defense than a fitness programme. For the purpose of the study nineteen TKD practitioners with an average age of 13.8 years and 10.4 months of TKD training experience were recruited to participate. Measurements included resting heart rate, aerobic power, anaerobic power, and anaerobic capacity. Result showed that the Paired t test analysis showed no significant differences in either resting heart rate or aerobic power after training. However, significant differences were observed in anaerobic power and anaerobic capacity (p= 0.05). The increases in anaerobic power and anaerobic capacity were 28% and 61.5% respectively. It was concluded that the practice of TKD promotes anaerobic power and anaerobic capacity, but not aerobic power, in male adolescents.

Kamar (2011) studied on the effect of maximal sprints performed with ball on anaerobic power and performance of footballers. The effect of sprints performed with a ball on the anaerobic power and performance was examined after RAST (Running-Based Anaerobic Sprint Test) that measures the anaerobic power was applied to 19 male footballers whose Mean age was 18± 1 years, height 74±6 cm, body mass 65.7±5.6 kg and maxVO2 53±5 ml/kg/min firstly in the normal procedure and then in the form of sprint with ball. Sprinting with the ball caused the anaerobic power average of the experiment group to decline by 23 % (P<0.001). While the average value was 5.5±0.4 s (501±97 W) in the normal procedure, this value was 6.0± 0.4 s
(388±83 W) in the one performed with the ball. When 6 sprints of subjects performed with ball and without ball were examined, the least loss of average power was observed in the 3rd runs (−20%). As for the maximum power loss, it was detected in the average of 5th runs (−28%), (P<0.001). When the fatigue index of the subjects was analyzed. The value obtained in the normal procedure without a ball was 7.5±2.4 W/s and the average value of the practice with ball was 5.8±2.0 W/s (P<0.001). In the study, sprint distance was analyzed in divisions of 5 m each and acceleration change of running within this distance was examined. While average acceleration naturally varied in the five meter parts of the sprint run of a total 35 m, the highest acceleration of both the normal procedure and the practice with ball was detected between 20th and 25thm (P<0.001). RAST (P<0.01) and with ball RAST (P<0.05) are correlated Vertical Jump and Standing Long Jump.

Umesh Muktamath (2010) studied on effects of two modes of resistance training on speed leg explosive power and anaerobic power of college men students. The purpose of the present investigation is to find out the effects of two modes of resistance training on speed leg explosive power and anaerobic power of male college students. To achieve this purpose, 45 male students were selected from Alagappa Arts College, Karaikudi, Tamil Nadu as subjects. Their age ranged from 18 to 25 years. They were divided into three equal groups of 15 subjects each and assigned to experimental group I, experimental group II and control group. In a week, the experimental group I underwent plyometric training, experimental group II underwent circuit training and control group was not given any specific training. All the subjects underwent the test of speed, leg explosive power and anaerobic power. They
were assessed before and after the training period of 8 weeks. The analysis of covariance was used to analyze the data. The study revealed that the speed, leg explosive power and anaerobic power were significantly improved due to the influence of two modes of resistance training.

Shilpa and Manish (2012) compared a study on the effects of yoga and swimming on pulmonary functions in sedentary subjects. The modality of exercise that is most beneficial and easy to perform has become a topic of research. Yogic exercises are being widely studied; however, postulated benefits of yogic exercises over other exercises must be scientifically explored. Prospective randomized comparative studies involving yoga and other endurance exercises are conspicuous by their absence. This study was, therefore, designed to assess and compare the effects of yogic training and swimming on pulmonary functions in normal healthy young volunteers. Around one hundred volunteers were inducted into the study and randomly divided into two groups: One group underwent 12 weeks training for yogic exercises and other for swimming. The training and data acquisition was done in small cohorts of 10 subjects each. The subjects were assessed by studying their anthropometric parameters and pulmonary function parameters (FVC, FEV1/FVC ratio, PEFR, FEF25-75%, FEF 0.2-1.2 l and MVV) both before and after training. Result showed that all parameters statistically significant improvements after both yoga and swimming. Comparison of these improvements for different parameters statistically analyzed by unpaired t test or Mann Whitney U test depicted a statistically better improvement in FVC, FEF 25-75% and MVV with swimming as compared to yogic exercises. It was concluded that the output of this study gives slight edge to swimming as a
preferred modality of exercise though either yoga or swimming can be advocated as an exercise prescription as both the modalities cause significant improvement of respiratory health.

Nemet et al., (2004) studied on effect of intense wrestling exercise on leucocytes and adhesion molecules in adolescent boys. In adults, exercise is a powerful and natural stimulator of immune cells and adhesion molecules. Far less is known about exercise responses during childhood and adolescence and whether or not exercises in “real life” activities of healthy adolescents influences immune responses. To determine if strenuous exercise leads to significant changes in leucocyte number and adhesion molecule expression in adolescent boys. Eleven healthy, high school boys, aged 14–18.5 years, performed a single, typical, 1.5 hour wrestling practice session. Blood was sampled before and after the session. Flow cytometry was used to evaluate changes in immune responses. Result showed that the exercise led to significant (p,0.05) and robust increases in granulocytes, monocytes, and all lymphocyte sub-populations. The data show that an intense wrestling bout in adolescent boys leads to profound stimulation of the immune system. The role of these common changes in overall immune status and the development of the immune and haemopoietic systems has yet to be determined.

Uday Sankar Ray (2011) studied on Hatha Yoga Practices towards energy expenditure, respiratory changes and intensity of exercise. The aim of this study was to critically observe the energy expenditure, exercise intensity and respiratory changes during a full yoga practice session. Oxygen consumption (V’ O2), carbon dioxide output (V’ CO2), pulmonary ventilation (V’ E), respiratory rate (Fr) and tidal volume (VT), were measured in 16
physical posture (asanas), five yoga breathing maneuvers (BM) and two types of meditation. Twenty male (age 27.3±3.5 years, height 166.6±5.4 cm and body weight 58.8±9.6 kg) yoga instructors were studied. Their maximal oxygen consumption ($V'\text{O}_2\text{max}$) was recorded. The exercise intensity in asanas was expressed in percentage $V'\text{O}_2\text{max}$. In asanas, exercise intensity varied from 9.9 to 26.5% of $V'\text{O}_2\text{max}$. Highest energy cost was 3.02 kcal min$^{-1}$. In BM highest $V'E$ was 53.7±15.5 l min$^{-1}$. VT was 0.97±0.59, 1.41±1.27 and 1.28±1 breath with corresponding Fr of 14.0±5.3, 10.0±6.35, 10.0±5.8 breaths/min. Average energy expenditure in asanas, BM and meditation were 2.29, 1.91 and 1.37 kcal min$^{-1}$ respectively. Metabolic rate was generally in the range of 1-2 metabolic equivalents (MET) except in three asanas where it was >2 MET. $V'O_2$ was 0.27±0.05 and 0.24±0.04 l min$^{-1}$ in meditation and Shavasana, respectively. Although yogic practices are low intensity exercises within lactate threshold, physical performance improvement is possible owing to both better economy of breathing by BM and also by improvement in cardiovascular reserve. Other factors such as psycho-physiological and better relaxation may contribute to it.

Nicola Maffulli (1992) conducted a case study of two mature elite Sambo wrestlers were studied during a 22-day pre-European Championship period, during which they were to lose weight and maintain their top physical performance characteristics. During this time the athletes underwent intensive training coupled with a hypocaloric diet. Both lost approximately 8% of their initial body weight, while maintaining their pre-weight loss maximum oxygen uptake, anaerobic threshold and maximum isometric strength. These variables therefore increased when expressed relative to the lower body
weight. Isometric endurance and short-term sprinting ability, however, were compromised by the weight-loss regimen, decreasing by up to 7% and 13% respectively. Following a well-planned weight-reduction programme coupled with serious training, aerobic power and isometric strength were unaffected and/or improved, but prolonged anaerobic exercise performance was impaired.

Martin (2010) studied on the effect of aerobic and strength-based training on metabolic health indicators in older adults. The weakening of the cardiovascular system associated with aging could be countered by increasing levels of physical activity and functional fitness. To investigate the training effect of sixteen weeks of moderate intensity, progressive aerobic and strength-based training on metabolic health of older women and men. Sixty three sedentary individuals (mean (SD) age 76 (8) years) were randomly assigned to control (n = 31) or exercising (n = 32) groups. The training group was separated to aerobic (n = 18) or strength-based (n = 14). Training took place three times a week. Subjects agreed not to change their diet or lifestyle over the experimental period. Results showed that the exercising group attained significant differences after treatment on body weight, waist circumference, body mass index, diastolic blood pressure, triglycerides, total cholesterol, HDL-cholesterol, LDL-cholesterol, total cholesterol/HDL-cholesterol relationship, high sensitivity C-reactive protein, and 6-minute walk distance. The control group only had significant differences on waist circumference. Conclusion: The training programs produced significant benefits on metabolic health indicators of sedentary older women and men.
Douris et al., (2004) studied on fitness levels of middle aged martial art practitioners. To quantify and compare fitness levels of middle aged practitioners of soo bahk do (SBD; a Korean martial art similar to karate) with those of sedentary subjects. Methods: Eighteen volunteers, 14 men and four women (aged 40–60 years), participated. Nine sedentary subjects (mean age 46.7 years) and nine SBD practitioners (mean age 46.8 years) were matched for sex and age. All subjects participated in a one day battery of fitness tests. The following dependent variables were tested on body composition, balance, flexibility, quadriceps strength, grip strength, muscle endurance, and aerobic capacity. Results showed that all dependent variables were analyzed using paired t tests. Body composition (% body fat) for the SBD group was 18.9% v 30.8% for the sedentary group (p = 0.004). The SBD group was able to balance for 61.8 seconds v 26.2 seconds for the sedentary group (p = 0.02). The result for the sit and reach flexibility test was 22.3 cm for the SBD group v 10.4 cm for the sedentary group (p = 0.01). The number of pushups performed in one minute was 47.0 for the SBD group v 18.6 for the sedentary group (p =0.0003), and the number of sit ups performed was 66.1 for the SBD group and 37.3 for the sedentary group (p = 0.00006). Aerobic capacity was 41.0 ml/kg/min v 31.1 ml/kg/min for the sedentary group (p = 0.04). Quadriceps strength was 99.5% (peak torque/body weight) v 83.0% for the sedentary group (p = 0.02). Only grip strength was not significantly different. It was concluded that there were significant differences between the groups for most of the physical fitness tests. The SBD practitioners displayed greater aerobic capacity, balance, flexibility, muscle endurance, and strength, and less body fat than the sedentary controls matched for age and sex. SBD can
be considered an excellent form of exercise for the promotion of fitness in adults. Health professionals should be aware that there are alternative methods to traditional exercise that can increase the physical fitness and health of the middle aged population.

Cook (2004) studied on anthropometry, physical performance, and ultrasound patellar tendon abnormality in elite junior basketball players: a cross-sectional study. This cross-sectional study examined the anthropometric and physical performance results of elite junior basketball players with normal or abnormal patellar tendons to see if any measures were associated with changes in tendon morphology. Methods: Agility, leg strength, endurance, and flexibility were measured in 71 male and 64 female players. A blinded radiologist ultrasonographically examined their patellar tendons and athletes were grouped as having normal or abnormal tendons. One-way ANOVA was used to test for differences in anthropometric and physical performance data for athletes whose tendons were normal or abnormal (unilateral or bilateral tendinopathy) on ultrasound. Results showed that females with abnormalities in their tendons had a significantly better vertical jump than those with normal tendons. This was not found in males. In males, the mean sit and reach in those with normal tendons was greater than in unilateral tendinopathy or in bilateral tendinopathy. In females, those with normal tendons (13.3±4.8 cm) and bilateral tendinopathy were distinctly different from those with unilateral tendinopathy. It was concluded that the flexibility and vertical jump ability are associated with patellar tendinopathy and the findings warrant consideration when managing young, jumping athletes.
Cochrane and Stannard (2005) studied that acute whole body vibration training increases vertical jump and flexibility performance in elite female field hockey players. To quantify the acute effect of whole body vibration (WBV) training on arm counter movement vertical jump (ACMVJ), grip strength, and flexibility performance. Eighteen female elite field hockey players each completed three interventions of WBV, control, and cycling in a balanced random manner. WBV was performed on a Galileo machine (26 Hz) with six different exercises being performed. For the control, the same six exercises were performed at 0 Hz, whilst cycling was performed at 50 W. Each intervention was 5 min in duration with ACMVJ, grip strength, and flexibility measurements being conducted pre and post intervention. Result showed there was a positive interaction effect (intervention 6pre-post) of enhanced ACMVJ (p<0.001) and flexibility (p<0.05) parameters following WBV; however no changes were observed after the control and cycling interventions. There was no interaction effect for grip strength following the three interventions. It was concluded acute WBV causes neural potentiating of the stretch reflex loop as shown by the improved ACMVJ and flexibility performance. Additionally, muscle groups less proportionally exposed to vibration do not exhibit physiological changes that potentiate muscular performance

Paige Holm (2004) studied on Endurance training of respiratory muscles improves cycling performance in fit young cyclists. Whether or not isolated endurance training of the respiratory muscles improves whole-body endurance exercise performance is controversial. Twenty fit (VO2 max 56.0 ml/kg/ min), experienced cyclists were randomly assigned to three groups.
The experimental group (n = 10) trained their respiratory muscles via 20, 45 min sessions of hyperpnoea. The placebo group (n = 4) underwent "sham" training (20, 5 min sessions), and the control group (n = 6) did no training. Result showed that after training, the experimental group increased their respiratory muscle endurance capacity by 12 %. It was concluded that the results suggest that respiratory muscle endurance training improves cycling performance in fit, experienced cyclists. The relative hyperventilation with no change in respiratory effort sensations suggests that respiratory muscle training allows subjects to tolerate the higher exercise ventilator response without more dyspnea.

Tsang et al., (2010), studied on Kung Fu Training which improves Physical Fitness Measures in Overweight/Obese Adolescents ‘The Martial Fitness’ Study” To examine the efficacy of a six-month Kung Fu (KF) program on physical fitness in overweight/obese adolescents. Subjects were randomly assigned to the KF or sham exercise (Tai Chi, TC) control group. Physical measurements in cardiovascular fitness and muscle fitness occurred at baseline and after 6 months of training thrice weekly. Twenty subjects were recruited. One subject was lost to follow-up, although overall compliance to the training sessions was $46.7 \pm 27.8\%$. At follow-up, the cohort improved in absolute upper ($P = .002$) and lower ($P = .04$) body strength, and upper body muscle endurance ($P = .02$), without group differences. KF training resulted in significantly greater improvements in sub maximal cardiovascular fitness ($P = .03$), lower body muscle endurance ($P = .28$; significant 95% CI: 0.37–2.49), and upper body muscle velocity ($P = .03$) relative to TC training. It was concluded that this short-term KF program improved sub maximal
cardiovascular fitness, lower body muscle endurance, and muscle velocity, in overweight/obese adolescents with very low baseline fitness.

Sandor Dorgo (2009) studied the effects of manual resistance training on fitness in adolescents. The purpose of this study was to document the physical changes in adolescents (N = 222) using MRT in school-based PE settings. Six fitness tests from the Fitness gram assessment tool were selected to assess students’ cardiovascular and muscular fitness and skin-fold tests were used to assess body composition. One Control and two Experimental Groups were defined. The Control group of students (N = 129) attended regular PE classes. One Experimental group (N = 63) attended PE that was complemented by the MRT system. A second Experiment group (N = 30) attended PE complemented by MRT and cardiovascular endurance training. Using the selected Fitness gram tests post-test measurements were done after 9 and 18 weeks of PE. At baseline, there were no significant differences between the three groups for most measures. When compared to baseline, experimental groups improved significantly in all six fitness measures and showed more improvements than the Control group in most fitness measures both at 9 and 18 weeks. None of the groups showed significant improvement in body composition. The results documented that an MRT complemented PE program was effective in improving adolescents’ muscular fitness.

Brandon (2012) studied on Ingesting a pre-workout supplement containing caffeine, B-vitamins, amino acids, creatine, and beta-alanine before exercise delays fatigue while improving reaction time and muscular endurance. The purpose of this study was to determine the effects of the pre-
workout supplement on upper and lower body muscular endurance, aerobic and anaerobic capacity, and choice reaction time in recreationally-trained males. Subjective feelings of energy, fatigue, alertness, and focus were measured to examine associations between psychological factors and human performance. Twelve recreationally-trained males participated in a 3-week investigation (mean +/- SD, age: 28 +/- 5 y, height: 178 +/- 9 cm, weight: 79.2 +/- 15.7 kg, VO2max: 45.7 +/- 7.6 ml/kg/min). Subjects reported to the human performance laboratory on three separate occasions. All participants completed a baseline/familiarization day of testing that included a maximal graded exercise test for the determination of aerobic capacity (VO2max), one-rep maximum (1-RM) for bench and leg press to determine 75% of 1-RM, choice reaction tests, and intermittent critical velocity familiarization. It was concluded that the Ingesting the SUP before exercise significantly improved agility choice reaction performance and lower body muscular endurance.

Monsef Cherif (2012) studied that the effect of a combined High-Intensity Plyometric and Speed Training Program on the Running and Jumping Ability of Male Handball Players. The aim of this study was to investigate the effect of a combined program including sprint repetitions and drop jump training in the same session on male handball players. Twenty-two male handball players aged more than 20 years were assigned into 2 groups: experimental group (n=11) and control group (n=11). The experimental group was subjected to 2 testing periods (test and retest) separated by 12 weeks of an additional combined plyometric and running speed training program. The control group performed the usual handball training. The testing period comprised, at the first day, a medical checking, anthropometric
measurements and an incremental exercise test called yo-yo intermittent recovery test. Two days later, participants performed the Repeated Sprint Ability test (RSA), and performed the Jumping Performance using 3 different events: Squat jump (SJ), Countermovement jump without (CMJ) and with arms (CMJA), and Drop jump (DJ). At the end of the training period, participants performed again the repeated sprint ability test, and the jumping performance. Result showed that the conventional combined program improved the explosive force ability of handball players in CMJ, CMJA and DJR. It was concluded that additional combined training program between sprint repetition and vertical jump in the same training session positively influence the jumping ability and the sprint ability of handball players.

Sasi kumar et al., (2011) studied the effects of suryanamaskar on cardio vascular and respiratory parameters in school students”. With increasing scientific research in suryanamaskar and yoga, its therapeutic aspects are explored in wide angle. In yoga the sun is represented by surya nadi, the pranic channel which carries the vital life-giving force. Suryanamaskar is the combination of asana and pranayama. Suryanamaskar has been integrated into physical education in many public and private schools across the country. The ultimate goal is to improve the physical health and increase the quantity of sportsmen with effective cardiorespiratory efficiency. This study was designed to evaluate the effects of a 45 days daily practice of suryanamaskar on blood pressure(BP), heart rate(HR), respiratory rate (RR), forced vital capacity(FVC) and peak expiratory flow rate (PEFR) in school students of both sexes.115 school students aged 10 to 14 years were recruited for the study. The participants were trained to perform
suryanamaskar for 45 days study period. The cardio vascular and respiratory parameters BP, HR, RR, FVC and PEFR were measured before and after practice of suryanamaskar. The results showed that the Systolic blood pressure, PEFR and FVC increased significantly and RR, HR and diastolic blood pressure decreased significantly after the practice of suryanamaskar. The beneficial effects of suryanamaskar can be applied to all schools to improve the physical health and sports activities of the students.

Sakthignanavel (1995) studied the effect of continuous running yogic pranayama and combination of continuous running and yogic pranayama exercises on cardio-respiratory endurance, selected physiological and psychological variables. Sixty male students were selected from one hundred eighty from the age group of fourteen to eighteen years from schools of Puducherry. Four groups were randomly divided as Group I to IV. The respective training on Continuous running group, Pranayama group, Continuous and Pranayama group and Control group were given. The control group did not undergo any training. The experimental variables such as Forced Expiratory volume in the First second and peak expiratory flow rate, respiratory pressure such as Maximum inspiratory pressure maximum expiratory pressure and 40mmHg test were measured, Rate pressure product, Cardio respiratory endurance by 12 minutes run/walk test were conducted. The Psychological variables such as mental health Self confidence State anxiety were also tested. The Analysis of covariance was used for significance. It was concluded that there were significant difference found in all the three experimental group in Peak expiratory flow rate, maximum inspiratory pressure and 40 mmHg , for continuous running and
combination of continuous running and Pranayama improved cardio respiratory endurance, Self confidence level and state anxiety, combined continuous running and Pranayama improved Mental health, continuous running improved Forced expiratory volume, Pranayama practices improved maximum expiratory pressure and there was no significant difference found in all experimental group for Forced Vital capacity, systolic, Diastolic, Mean pressure, pulse pressure and rate pressure.