CHAPTER - II

REVIEW OF THE RELATED LITERATURE

A critical review of the related literature in the concerned field of investigation leads to the selection of a major sub-areas for further investigation on the one hand, and the confirmation or rejection of the established facts on the other. In the present study both the functions have been clearly carried out. A careful survey of related contemporary literature is a huge but crucial contribution to the research work and also a wise investment for it helps in having a clearer and deeper understanding of concerned research problem.

Investigator has tried best to collect whatever possible literature was available at Kurukshetra University library and various other libraries located within the approachable distance. To create a deeper perception and understanding of the problem, nature and scope of the problem, all available related literature including thesis works, dissertations, Research Journals, magazines and books, internet etc. were considered and all concerned studies were classified for the sake of convenience as under:
1. Studies related to motor fitness variables.

2. Studies related to Yoga and motor fitness variables.

3. Studies related to Yoga and psychological variables.

4. Studies related to Isometric exercises and motor fitness variables.

5. Studies related to Isometric and Isotonic exercises and motor fitness variables.

In India, as far as known to the investigator, no systematic studies on the effect of Yogic training and isometric training on the motor fitness of male students have been done. Some studies of course have been carried out in different countries on the effect of physical training in general and isometric in particular.

**Fleishman (1964)** has done considerable research in the area of physical fitness and he recommended nine physical fitness components such as extent flexibility, explosive strength, static strength, dynamic strength, trunk strength, gross body coordination, gross body equilibrium and cardiovascular endurance. The results and references of such studies have systematically been incorporated in this chapter.

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1. **Studies related to motor fitness variables.**

   According to Buklow (1971)\(^4\) cited that however, physical education is non-verbal in nature and has the primary purpose of teaching gross motor skills rather than verbal oriented skills. The unique function of physical education is the education of youth through the improvement of motor behaviour perceptual development information feedback and communication play important roles in the development of physical skills.

   Leonard (1980)\(^4\) conducted a study to analyse a number of motor ability tests designed to measure the elements of motor ability for their primary components to develop regression equation for the prediction of each primary components and to determine the significance of each combination in terms of a criterion measure of motor ability. The zero-order correlation range was from 0 to .85. This study verified the general motor ability for college men and motor ability was highly correlate high with dynamic strength and comparatively low with static strength.

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Landise (1986)\textsuperscript{44} presented an analysis of the effect of eight physical education activities on physical fitness and motor ability scores of male freshman. The mean gain was computed for each group on both tests and individual test items. The mean gain of every group was compared with each of the other group and significance of differences determined. The results seemed to indicate that activities studies tumbling gymnastics and conditioning tests developed those abilities measured by physical fitness test while tumbling gymnastics and wrestling tests seemed to develop abilities measured by the motor ability.

Kammeyer and Shirtey (1988)\textsuperscript{45} determined reliability and validity of an adaptation of the Humiston Motor ability test, when he used with high school girls. The reliability was determined by four traits administered the fresh and sophomore girls. The validity was determined by two criteria and criterion was based on performance in a battery of athletic skill tests and the second on participation in extra-curriculum activities. The test was found to be a reliable one and valid general motor

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ability test for high school girls. The battery of the two trials on this motor ability test provided reliable scores for high school girls. The test has been shown to be a valid measure of general motor ability for high school girls.

**Yazdi (1988)** examined the study generally versus specifically in motor performance was very evident. Before that time, it was believed that a singular general motor ability exists within individuals. A better of sixteen gross motor test was given to each subject individually. It was found that there is no general motor ability with retarded studies.

**Wag (1990)** studied the relationship of lateral dominance to general motor ability and to skill test scores in archery badminton, bowling and tennis. The results indicate that the majority of college women have definite lateral performance that women who have mixed eye-hand and foot dominance are superior in motor ability to those who have home lateral or contra-lateral performance that laterality seems to be of importance in activities stressing accuracy of direction towards a

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fixed target. Since, all relationships showing significances and combinations melding foot resulted in higher motor ability scores.

**Edwards (1996)** compared the effects of two instructional approaches upon the motor ability and physical education attitude levels of low motor ability college freshman. The three items of barrow motor ability test for college men was used with the experimental group. Improvement in general motor ability from pre to post testing was significantly greater than the corresponding improvement from pre to post testing was slightly greater than the attitude improvement of group. Any how the difference between the attitudes was not significant.

**Gill (1998)** made a detailed study, ‘A Comparative Study of Motor Ability of Primary School Children at Different age Levels’, included 400 (200 males and 200 females) students of primary schools belonging to both rural and urban areas. There are significantly differences on the five items of motor ability i.e.

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shuttle run, zig-zag run, dashes run, soft ball throw and standing broad jump on the basis of sex. The boys are better in all the five components of motor ability than the girls. Significantly differences exist between rural and urban children on all the five test items of motor abilities even in the case of boys and girls separately. Significant differences exist between rural and urban children on composite motor abilities. Rural children have proved to be better than the urban children. Further he added that conditioning the body through regular exercise enables the individual to meet emergencies more effectively, to preserve health and to avoid disability. The fit or conditioned person lives a more productive and satisfactory life. He is better able to cope with the exigencies of modern living, is more resistant to degenerative disease.

Rathore B.S. et al. (2009) done a research on “Critical Analysis of Cardiovascular and Motor Fitness Abilities of Inter-University Players”. The study contains the following. The purpose of this study was to examine cardiovascular and motor fitness profile (abilities) of inter-university players of University of

Rajasthan. An insignificant difference between individual game and team game players (t value of .06 was less than the table value of 1.96 required for 't' test to be significant at 0.05 level with 118 degree of freedom) was observed in cardiovascular endurance, explosive strength, muscular strength and endurance of arms and shoulders, agility and total J.C.R. scores.

Key Words: diovascular profile, motor fitness, individual game players and team game players.

Sharma and Tyagi, (2011) investigated the effect of specific training programme on physiological and fitness components of Table tennis players. For the study Table tennis players from Delhi were identified as subjects randomly. To conduct the study in accordance of the thodology the subjects were given a pre test for the physical and physiological Parameters. The physiological parameters selected were systolic blood pressure, diastolic blood pressure, pulse rate, vital capacity, cardio respiratory endurance and breathing holding rate. The physical parameters were speed, flexibility, power, balance and agility. The subjects underwent the programme of the specific training designed for the players. Pre test and post

test comparisons were done to find the effect of the specific training on the players. The result reveals that significant difference were on physiological (systolic blood pressure, pulse rate, and breathing holding rate) and fitness (speed and agility) components on the comparisons of means within the components on the comparisons of means within the control group.

2. Studies related to Yoga and motor fitness variables.

Herbert (1961)\textsuperscript{52} evaluated the (static) stretching procedure of Hatha - yoga (technically called yogasanas) for improvement of flexibility. Comparing the effects of static stretching for seven periods of 30 minutes each, he found the method improved flexibility.

In a study Gharote (1962)\textsuperscript{53} evaluated psychophysiological effects of selected yogic exercises on the adolescent high school boys. He used Wenger’s battery of tests for studying anatomic balance on the hand and Mccurdy-Larson Organic efficiency test on the other to test the effects of yogic training. He found significant achievement in the anatomic balance shifting it towards, increased para-sympathetic function while encouraging

\textsuperscript{52} Hubert, D.R (1961), ‘Yoga and Physical Fitness’, G.J.Y. Souvenir.
trend was observed in the cardio-respiratory efficiency. A residual effect of this training was also observed even after discontinuing the practice of a period of two months.

Gharote (1964)\(^ {54} \) studied the effect of the yoga programme for 6 weeks on the five tests of national physical efficiency drive viz. 80 meters sprint, 400 meters run, cricket ball throw, pull ups and running, broad jump. He found significant improvement among experimental group in all the five tests as a result of yoga training. However when the groups discontinued the practice of yoga exercises for the same period of six weeks, the effect gained was significantly lost.

Roy (1965)\(^ {55} \) made a Comparative Study of ‘Effect of Asanas and Ballistic Exercises on Running Broad Jump’, in which he did comparative study of the effect of asana and ballistic exercises on running broad jump. The main objective of the study was to determine the relative training effect of selected yogasanas and analogous ballistic exercises on the performance in running broad jump. Thirty-four male students were taken


randomly. Measurements in running broad jump were taken at the beginning and at the end of the experiment of both the groups separately. The mean gains of group-A and group-B were tested for the significance by t-test. Gains made by both the groups were found to be significant at 0.1 level of confidence. The difference in the gain by group-A and B was also tested by comparing them with t-test. The difference was not found to significant at 0.5 level of confidence. It was found that the performance in running broad jump could be improved significantly by both the yogasanas and ballistic exercises.

**Pratap (1969)**\(^{56}\) compared the response level using heart rate, respiration, palmer conductance and the movement in erect sitting posture (yogic condition) and reclining posture (non-yogic condition). He reported the response level to be lower and the movement lesser in the yogic condition than in the non-yogic condition. Bhole and Karambekar have presented an interesting record of heart control through employing some yogic practices. Intra gastric pressure changes were studied in yogasanas and most of these studies evaluated the effect of yogic training having the same set of yogic exercises.

Gharote (1970)\textsuperscript{57} found that yogic practice of three weeks duration brought about significant improvement in strength and endurance of the abdominal muscles of twelve females as judged through sit up test for these components.

Desirajis (1974)\textsuperscript{58} also confirmed the results about the improvement in flexibility through yogic exercise and also help to relieving tension as side effect of physical improvement in psychological dimension.

Bhole and Karambelkar (1971)\textsuperscript{59} proved that in Servangasana, Matsyasana, Halasana, Ardha-Shalabhasana, Vakrasana, Yoga Mudra, positive (higher than atmospheric) of a small magnitude of 5 to 20 mm. Hg. were developed in the stomach. In Bhajangasana, Ardha-Matasyendrasana, Chakrasana, the positive pressures developed up to 50 mm. Hg. While those Dhanurasana, Shalabhasana, Naukasana and Mayurasana were as high as 60 to 100 mm. Hg. These data are useful in preparing training schedule of asanas where pressure manipulations are to be taken as the guiding principle.


Mathias (1973)\(^{60}\) studied effects of two weeks Hatha Yoga programme on the ability to learn motor skill. She conducted this study on fresh college women who received instructions in Hatha Yoga for 35 minutes a day, 5 days a week for two weeks. At the end of yogic instructions, the experimental group and control group were instructed in how to judge, after fifteen days 5 minutes practice session was given. In the end no significant difference in performance was observed between the two groups.

Ganguly and Gharote (1974)\(^{61}\) in his study “Cardiovascular Efficiency Before and After Yogic Training”, this study was conducted to know the effects of yogic training on cardiovascular efficiency before and after yogic training. In the maintenance of proper health, physical fitness and motor fitness cardio-vascular fitness plays a vital role. So this study was conducted with the purpose to determine the effect of long-term yogic training program on cardiovascular capacity. Harvard Step Test was used to measure the earlier vascular fitness. The test was administered to eleven male students of G.G.S. college of


Yoga and cultural synthesis, Kaivalyadhama, Lonavala before the yogic training started in order to determine their level of cardio. Results shown significant positive change in experimental group members.

Gharote (1976) conducted a study on forty residential students of a high school. They were randomly selected and divided into experimental and control groups, and were matched on the basis of the physical fitness index derived from Fleisman Battery of basic fitness tests. The experimental group was given training in selected yogic exercises. T-test was applied and experimental group was found significantly improved on the scale of physical fitness index derived from Fleisman Battery.

Mukherjee, Chahal and Giri (1977) conducted a research “impact of yogic exercise on the Indian hockey team winner of third world cup (1975). The study showed reduction of tension and stress. But three players exhibited a relaxed state which steadily improved their performance in the field. Yogic exercise contributes towards the decrease of pulse rate resting

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metabolism and certain lungs perimeters.

**Kocher (1977)**\(^{64}\) cited from own study that out of 114 patients of bronchial asthma, 76% showed an all round improvement through clinical and laboratory assessment, 20% showed improvement according to laboratory investigations, but clinically they improved little and 4% of the patients continued to get mild attack in spite of clinical improvement at the end of four and six weeks of yoga training cum treatment respectively.

**Vishal and Madhu (1988)**\(^{65}\) conducted a study on a study of the effect of yogic practice on certain physiological parameters. The purpose of this study was to determine the effect of yogic practice on certain physiological parameters. The data for this purpose was collected by administering certain physiological tests, pre-tests and post tests. These trainees were not having any previous training of yogic practices. These subjects were given a regular training of yogic practices for a period of six months. The twenty male subjects were taken between the age of

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18 to 30 years age group. All subjects were asked to relax for a minimum of 15 minutes by lying in Shavasana. Then one by one, each subject was asked to sit in a chair and the pulse was palpitated in the radial artery in the lower port of forearm by passing it against the underlying bone. Thus breath holding time, oral temperature, blood pressure, body weight was recorded. Through the same pattern and opted in pre-tests and it was found that the yogic exercise had favourable effect on breath holding time and body weight but not on pulse rate, oral temperature and blood pressure.

Chamoli (2007) stated that modern techniques teach muscles and body development but neglect concentration and confidence part. By combining yoga these fault could be corrected. Even sports persons who require heavy muscular activities do not know the technique of relaxation which is defined in yoga. Yoga stretching and relation can render additional advantage for significant gain in sports performance. Contribution of yoga to sports has been depicted with a view to emphasize the importance of yogasanas for better promotion of

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different aspects of sports. Yoga therefore not only contributes to other sports but is a sport by itself which is excellent in nature.

To Parmar, Sharma et al (2007)\textsuperscript{67}, physical fitness is a must for any good performance in sports. Different sports require different types of fitness emphasizing on a particular fitness factor. The law of use and disuse, that if you want to be fit you must exercise. The yogic stretching exercises not only prevent sport injuries but also cure certain sports injuries in the form of muscle spasm. The tightness of muscle is relaxed by steady stretching.

Rana (2007)\textsuperscript{68}, asserted that for sport person, Yoga can be a powerful enhancement in regular training exercises. Adding yoga in routine training programme helps develop strength, flexibility, range of motion, concentration, and cardiovascular health and reduce stress, tension. The most significant benefit of adding yoga of training programme is its effect on performance. It allows an athlete to train harder and at a higher level because range of motion is greater and the fear of injury is less.


Lohan, Khanna et al (2007)\textsuperscript{69} reported research-work to find out the effect of yogic exercises on Physical fitness. For this study seventy girls students from Urban High School in Harayana were randomly selected as subjects. The student were homegenously divided into two groups of 35 students each. These subjects underwent training of selected yogic Asanas and Pranayamas for one month. The students were pretested and post-tested for physical fitness variables on AAPHER Youth Physical Fitness Test Battery (1976). The data was collected and statistically analysed. The results thus found show that the training of selected yogic exercises i.e. asanas and pranayamas has statistically significant effect on all the variables of physical fitness. Improvement has been recorded in the physical fitness variables of subjects.

Lohan and Dolly (2007)\textsuperscript{70}, aim of study was to explore the effectiveness of an intervention programme of yogic asana and Pranayamas on Physical fitness of adolescents. Selected yogic asanas and pranayamas were chosen for training programme. The study was conducted on 60 adolescents of age group


between 12 to 16 years. Physical fitness components i.e. abdominal strength, endurance, power, speed and agility were analysed before and after the training programme. The obtained data was analysed by applying t-test. The results thus found show that the training of yogasanas and Pranayamas have improved significantly almost all the physical fitness components chosen in the present study.

**Nagendra and Nagendra (2008)**\(^71\) cited Ray et al. (1986) study that body flexibility and the muscular efficiency improved after six months of yogic training. The improvement in muscular efficiency was reflected as an increase in endurance time probably due to alternate recruitment of motor units.

**Karunakaran and Ramesh (2009)**\(^72\), conducted study on effect of raja yoga and pranayama on selected physical and physiological variable of adults. The objectives of this study were to find out the physical and physiological variable. The selected variables of Flexibility in measure the sit and reach box. For this study thirty boys in the age group of 23 to 27 years were selected


form Pondicherry University, Pondicherry. The Experiment group had a significant improvement on the selected physical and physiological variables except systolic and diastolic blood ressure than control group.

Mody (2010)\textsuperscript{73} assessed the cardio-respiratory and metabolic responses of four rounds of Surya Namaskar, a typical amount performed by practitioners, to determine its potential as a training and weight loss tool. Six healthy Asian Indian men and women (18–22 years) who had trained in Surya Namaskar for over two years participated in the study. Testing was completed in a single session lasting about 30 min. To measure heart rate and oxygen consumption while performing the four rounds, participants were connected to a heart rate monitor and the Oxycon Mobile Metabolic System. Regular practice of Surya Namaskar may maintain or improve cardio-respiratory fitness, as well as promote weight management.

Asai and Rane (2011)<sup>74</sup> conducted an experiment study on asanas and lezium programme on selected physical fitness variables of school boys. The objectives to measure over all physical fitness level of the 70 school boy of age 14 to 16 years. The health related physical fitness test was considered as dependent variable. The subjects of the experimental group were then put under six weeks of lezium and yogic exercises training programme. The authors conclude that there was significantly changes in health related physical fitness such as, cardio-respiratory endurance, abdominal strength and endurance and flexibility increase the performance. However, the body 71 fat percentage significantly reduces performance for due the asana and lezium training programme.

On the other hand, a number of studies have found no relationship between motor performance and intellectual achievement. Singer reported very low correlations between intelligence tests and physical and perceptual-motor tests with sixth graders. Jones also found practically no correlation between intelligence and motor performance.

Although the evidence is by no means conclusive, studies

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have shown that the skilled performer in a specific activity tends to score higher on kinesthetic tests than the less skilled. Two studies found no significant difference between boys and girls in kinesthetic perception. Athletes score higher in kinesthetic performance than non-athletes; however, most studies have failed to find any appreciable relationship between kinesthesisa and ability in sports such as gymnastics, bowling and basketball.

3. **Studies related to Yog and Psychological variables.**

**Vinekar (1957)** has made a study on “Asanas in everyday Life”. Asana can be done as exercise and as posture. Through the practice of both types of asana, one can achieve organic and functional promotion of health and fitness as some postures they worked on postural substrate and muscles tone and thus helped to develop body awareness through perception and vestibular senses. Sensation of pleasant pain is felt by the individual.

**Pratap and Kocher (1968)** have studied the effects of short term course of yogic training for three weeks duration on

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the mental health and found the yogic practices bringing favourable results.

**Sri Aurobindo (1969)** described the aim of yoga as the conscious union with the divine in the super mind and transformation of nature. The ordinary yoga go straight from mind into same featureless condition of the cosmic silence and through it try to disappear upward into the highest. The object of this yoga is to transcend mind and enter into the divining truth of Sachhidananda which is not only static but dynamic and raise the whole being into the truth.

**Desmukh (1971)** worked upon yoga in management of psychoneurotic, psychotic and psychosomatic conditions. The patients attending the yoga institute, Santa Cruz were taken up for the study. In all 106 patients were taken up. Each patient 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 cardio-graphic examination whenever indicated. At the

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

**Palsane and Kocher (1973)**\(^7^9\) reported in a study on the school children that significant improvement in immediate memory score as a result of start routine yogic exercises.

**Choudhary (1976)**\(^8^0\) describing the ways of Hatha Yoga, that it is the system which starts with the body. Body and mind being closely inter-related it aims at mastery over the body with a view to secure corresponding mystery over the mind. Control of nerves and vital energies produces control of mental function. This mind-body complex being brought under perfect control, the indwelling spirit shines out and the higher self is realized.

**Mall, Chaudhary, Giri et al (1978)**\(^8^1\) conducted a study entitled “Effect of Yogic Relaxo-Concentration Training on Two Psycho-Motor Tasks, After Submaximal exercises. The results of

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the study revealed that yogic relaxo-concentration training can be used as an effective method to hasten the psychic and physical restoration progresses after sub-maximal exercises. Heart rate and eye movement increased significantly during Kapalbhati. No significant change was found in ECG and blood pressure. An open condition was observed immediately after kapalbhati.

Varandani (1979)\textsuperscript{82} says that the ultimate object of the ancient sages of India, who practiced yoga was attainment of the super conscious state, the medium through which they could do so was necessarily the body. The higher intellectual per suit was not possible without the body being in a state of positive health and the being completely tranquillised. In his view this state of both body and mind is also ideal requisite for education and from this stand point it is justified that yoga be taught in the schools to raise the human qualities.

Gupta (1979)\textsuperscript{83}, Yoga is an education and its primary aim is to develop the inherent capabilities of life, thus making life

\textsuperscript{82} Varandani, Narain (1979) ‘Yogia Chikitsa’ (Yoga Therapy) ed. by R.K. Shingravy, Yoga Science and Philosophy, Varanasi,

\textsuperscript{83} Gupta, Ram Chander (1979), ‘Yogic Culture and Modern Man’, Sadhu Viswani Mission, p. 12.
fuller, richer, and more efficient. It brings total change in mental attitudes and thus promotes better understanding and interpersonal relationship by inculcating habit of serenity, honesty, self introspection and other similar virtues contributing to health happiness and harmony in life. He further stressed that yoga education inculcates the spirit of self- respect and true national feeling of the link with this past heritage.

Moorthy (1983) and Bhole (1976) proved Yoga technique could be utilized in the management of psychosomatic disorders like bronchial asthma, diabetes obesity, constipation, chronic sinusitis, rhinitis and headaches, hyperacidity, hypertension as they have a psycho-physical base relaxation asanas for tackling and correcting postural substrate, breathing awareness, sequential practices, cleansing processes, pranayams, meditation, mantras etc. are useful for taking care of interpersonal relations and reactions, value system and attitude to life as a whole and are helpful for patients of psychosomatic disorders.

Bhole and Karambelkar et al (1991)\textsuperscript{85} recorded the normal respiratory statute for 2 to 3 min. Two successive attempts of Uddiyana, central, left and right nauli were performed with suitable rest of two minutes in between the kymograph was examined on more than one day. It was observed that sub effect of yogic exercise on strength and endurance of abdominal muscles of the females. Twelve females were selected for the study and their strength and endurance. Performers were selected before starting their training programme, their strength and endurance was tested and significant improvements in abdominal muscle of all the female in both the components were found.

Oak and Bhole (1993)\textsuperscript{86} say that very slight decrease in pulse rate was observed during three attempts of bahya kumhhaka while it was found increase slightly with protected condition of the abdominal wall. It almost remained unchanged during the first minute after 3 cycles of pranayama breathing.

Raja Purkar (1995)\textsuperscript{87} concluded that physiological

\textsuperscript{85} Bhole, M.V and Karambelkar, P.V (1991 ), ‘Respiratory Studies during Kapalbhati for 1, 2, 3 and 5 minutes’, Yoga Mimamsa, Vol. 27, p. 69-74.


functions were studied in 12 healthy and trained subjects (7 male and 5 female) in the age group of 23 to 35 of G.S. College of Yoga and Cultural Synthesis, Kaivalyadhama, Lonevala (Pune) before and after 10 minutes Kapalbhati.

In the New Behrain times, 1\textsuperscript{st} May, 1996 by Sarang \textit{(1996)}\textsuperscript{88}, the scientist’s research tells that meditation and yoga can treat so many diseases. The regular practice of it enables the person to become mentally strong and emotionally balanced. Mental stress can be easily removed by it. Concentration, will power and working capacity increase. Gupta (1979) has said that in yoga there is a complete synthesis of body, mind and spirit and exactly this is what the aim of all education is. From the educational point of view a stressed that yoga is the most significant scientific technique for development of an integrated personality ever evolved by human mind.

Kamakhya, \textit{(2004)}\textsuperscript{89} examined Yoga nidra and its impact on students well being. The study aimed at finding out the effect of yoga nidra on stress, anxiety and general well being on the students at the yoga clinic of Dev Sanskriti Viswavidyalaya. The

\textsuperscript{88} Sarang, Santosh Kumar (1996), In the New Behrain times, 1 May 1996.

practice time was 30 minutes daily for a total duration of 6 months. 40 Students were taken from P.G. Yoga classes for observing the effects as well as 12 were in control group. The result shows a significant change as yoga nidra positively decreased the stress level of the subjects where as no significant change has been seen in anxiety level. Moreover, Yoga nidra positively increased the general well being of the subjects.

**Kirkwood, et.al., (2005)**

Between March and June 2004, a systematic review was carried out of the research evidence on the effectiveness of yoga for the treatment of anxiety and anxiety disorders. Eight studies were reviewed. They reported positive results, although there were many methodological inadequacies.

Owing to the diversity of conditions treated and poor quality of most of the studies, it is not possible to say that yoga is effective in treating anxiety or anxiety disorders in general. However, there are encouraging results, particularly with obsessive compulsive disorder. Further well conducted research is necessary which may be most productive if focused on specific

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anxiety disorders.

Padmadevi, (2007) investigated the effects of yogic practices, physical exercises and combination of both the trainings on selected physiological and psychological variables of college girls. The resting pulse rate, cardio respiratory endurance and breath holding time as physiological variables and anxiety, aggression, achievement motivation and self confidence as psychological variables. A hundred and twenty college women students were selected as subjects at random the age group of 17 to 21 years. Further, they were divided into four equal groups and the treatment was given as follows. group I- Physical training, group II –yogic practices, group III- Combination of both the training, and group IV- control group. Pre test was conducted for the entire four groups prior to the training and the post test was conducted after six weeks of experimental treatment. Analysis of covariance was used to find out the significant effects of the treatment groups. Scheffe’s post hoc

test was used to find out the paired mean significant difference. It was concluded that combination of both trainings improves all the variables.

**Hayes M and Chase S. (2010)**, done a research on Prescribing Yoga”. The study contains the following. More than 15.8 million people in the United States now practice some form of yoga, and nearly half of current practitioners stated they began yoga practice as a means of improving overall health. More broadly understood in a modern context, yoga is a set of principles and practices designed to promote health and well-being through the integration of body, breath, and mind. This article outlines the history of yoga and describes several forms, including asana-based yoga, which is becoming popular in the United States. Research findings related to use of yoga as a therapy for various health problems are reviewed. Guidelines for finding a yoga teacher are offered, as are a number of book and Internet sources of further information.

4. **Studies related to Isometric Exercises and Motor Fitness variables.**

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Buford (1966)\textsuperscript{93} investigated the effects of isometric exercises on underhand throwing ability. Eighty college males were tested before and after a six week training period in throwing a softball for maximum distance, 80 times at a rate of one throw every six seconds. Arm strength in a throwing position and leg strength in the push off position for underarm throw were also measured before and after the training period. Equated groups trained with isometric exercises only, the throwing test three days a week, throwing test plus isometric exercises or no special practice (control). Additional isometric exercise increased strength significantly and throwing alone produced a significant increase in leg strength.

Baley (1967)\textsuperscript{94} carried out the study on 30 university of Connecticut freshmen in two physical education classes who were asked to indicate their attitudes towards isometric exercises. Eighteen of these thirty students did 10 min. of isometric exercises with a belt three times each week for eight weeks, while twelve did 10 min. of the same exercises twice each

\textsuperscript{93} Buford, Bars (1966) ”The Effect of Isometric Exercises on Underhand throwing Ability, Completed Research in Health, Physical Education and Recreation 8 (1966): 341.

week for eight weeks." Selected anthropometric and physical fitness measures were made at the beginning and again at the end of 8 week period. Students were constantly urged to make all out contractions in each of the 30 exercises. The instructor performed the exercises with the students who were arranged in circular formation with the instructor in the centre. After the questionnaire, being marked it. was found out that: 1) There was a significant relationship between motor ability and both static and dynamic strength, 2) dynamic 'strength was more highly related to motor ability than static strength.

Morehouse (1967)\textsuperscript{95} investigated primarily with the amount of strength increase, and little attention has been given to either the rate at which strength is developed or to the maintenance of newly developed isometric strength. 104 male college students ranging in age from 17 to 28 years with diverse initial elbow flexion strengths were trained four days each week for nine weeks. The strength development period was followed by an eight week period of strength maintenance during which the intensity and frequency of performing single isometric

\textsuperscript{95} Morehouse, C.A. (1967), "Development and Maintenance of Isometric Strength of Subjects with Diverse Initial Strength, Research Quarterly 38:3 (October 1967): 449
contractions were varied. The results indicated that groups of subjects with different beginning strength levels make about the same absolute gains in strength at about the same rate. Intensity of isometric contractions seemed to be greater importance in the maintenance of newly developed strength than the frequency at which contractions were performed.

Cotton (1967) investigated to determine if an increase in the duration of a sustained voluntary isometric contraction is more closely related to changes in cardiovascular endurance or changes in strength. Subjects were tested before and after a training programme to determine their endurance (oxygen consumption) and strength. The training programme consisted of one daily sustained voluntary isometric contraction of the left forearm flexors at a prescribed percentage of the subject’s maximum isometric strength.

A group which trained with contractions of 50, 75 and 100 percent of a maximum voluntary contraction showed significant increase in strength, but not in endurance. The group which trained with a 25 per cent contraction increased significantly in

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endurance, but not in strength. The increased duration of contractions at percentage greater than or equal to 50 percent of maximum voluntary contraction appeared to be due to increased strength. Hence, measuring cardio-vascular endurance by the duration of a sustained voluntary isometric contraction at percentage -greater than 25 percent seems unjustified.)

**Carlson and McCraw (1971)** examined the relationship between isometric strength and relative isometric endurance of the right forearm flexor muscles on thirty-six male college students for a period of six weeks. The isometric strength was measured through a cable tensio-meter. Two statistical techniques, correlation coefficient and ANOVA, were used to fulfil the purpose of the study. Pearson product moment correlations were used to indicate the relationship between muscular strength and relative muscular endurance. Significant negative correlations were found between isometric strength and relative isometric endurance. The weak subjects performed significantly better than the strong subjects on the light weight loads, with no difference existing between the endurance performances on the heavy loads.

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Byrd and Hills (1971) trained six adult males for four weeks by daily isometric bouts, exerting maximum grip strength and folding it until a 50% strength decrease was observed. Time held and maximum strength were recorded for each bout. Pre and post training resting blood flow, flow during 15 sees, 50% maximum grip strength contraction, and recovery hyperemia following the test bout were measured.

Findings included significant improvements in strength, endurance, and exercise of blood flow. Strength and endurance are both enhanced by isometric training used in this study.

Cooper (1972) has shown that isotonic exercises have been quite effective in giving strength, power and endurance which are important components of physical fitness. He has further revealed that player's nervous system is more excited and reflexes are sharpened by the exercises, which is important in competitive swimming, where records are made or lost by 100th of seconds.

McGlynn (1972) after lots of study has pointed out that isometric training increases the "level of performance" in the

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individual concerned. There is much evidence to indicate that regimens of isometric exercises will lead to gains in strength. He concluded that the re-evaluation of influence of isometric training on strength and fatiguability in the skeletal muscles is vital in order to formulate a valid basis for the establishment of rational training programme on the athletic field and in the physical education class. Such information will also be valuable in furthering understanding and eliminating the ignorance and apathy that has gained a foot-hold in training programme.

**Thomas (1972)**

defined physical fitness as a total functional capacity of an individual to perform a task without any fatigue or exhaustion bearing always energy to meet heavier demands made on the individual during stress and strain and accordingly a player works hard to improve his total functional capacity.

Every coach and trainer feels that his subject should get such type of training which may prepare him to meet any challenge during the competitions.

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Hetherington (1976)\textsuperscript{102} conducted two experiments on grade 5 boys to monitor the effects of isometric training. In the first experiment, subjects were trained twice per week for 8 weeks, with one group training with elbow at 90° and the other at 60°, 90° and 120°.

In the second experiment, subjects were trained for 6 weeks with the elbow at 90° only. One group trained twice per week and the other 5 times. The training programmes were all ineffective in producing a little training effect as gains in strength varied from only 0.15% to 0.75% per week and no experimental group improved significantly more than its respective control group. The results of these two experiments are generally exposed to those previously reported, although results of at least 2 other experimental programmes have suggested that young boys exhibit less positive response to isometric training than would be expected with other subjects.

According to Fumburg (1980)\textsuperscript{103}, swimmers though believe in improving their overall fitness to meet the challenges


yet they concentrate to improve their strength and power in the arms and legs for which they put more efforts. Young generation believe in gaining the same quickly, whatever efforts they have to put forth. Delorme and Watkins (1988) believed that isometric and isotonic exercises are believed to be fast resulting exercises and, therefore, players perform such type of exercises.

Clarkson (1981)\textsuperscript{104} conducted the test on eight female distance runners to whom two different isometric exercises regions were administered: "10 sec. contractions separated by 5 sec- initial test (10:5), designed to elicit a rapid rate of fatigue, and 10 sec. contractions separately by 20 sec intertrial rest (10:20), designed to induce less fatigue. Each subject completed eight experimental sessions within a 10:12 days period. Four of these sessions involved isometric knee extension strength while the other four session series consisted of five maximal isometric contractions. Four days of baseline strength measures were given for both planter flexion and knee extension in order to establish established strength measures. Pearson's Product-moment correlations were calculated to assess the reliability of strength over the four testing days and it is reasonable to

\textsuperscript{104} Clarkson, P.M. (1981) "Isomolric Knoo Extension and Planter Flexion Muscle Fatigue and Fibro Type Composition in Female Distance Runners, Research Quarterly 52 (March 1981): 200
exclude that daily baseline isometric strength had adequate reliability. The factors of fibre type composition, muscle mass, and strength level, either alone or in combination, are not, sufficient to account for the fatigue patterns, observed for knee extension and planter flexion muscle groups.

**Sharp and Costill (1982)**\(^{105}\) stated that the effects of training are specific i.e. confined not only to the muscle groups being used but also to the way in which those muscles are used in sports skills. Force is the tension created at a particular part of the pull; work is the force applied throughout the entire pull and power is the rate at which this work is done. By reducing body drag to a minimum the force requirement is reduced. Reduction of body drag is accomplished by developing most efficient stroke mechanics. Work is important to the swimmer because he must not only overcome drag but do this for a certain distance. Finally, he must attempt to do this in the least amount of time, which introduces the concept of power. Sharp and Costill confirmed that the power is the magic component of strength in competitive swimming. In every case whenever

subjects showed improvement in power as measured on the bio-kinetic swim bench there was concomitant improvement in speed regardless of whether the swimmer improved his power with free weights, Nautili’s equipment, swim training etc.. They say that the bio- Kinetic swim bench displays such predictability of performance that it is an excellent mode of swim training. However, they conclude that more research is needed to develop an appropriate combination of force work (power) and speed work.

**Bhatia (1987)**\(^{106}\) however, in the study on the isometric and isotonic exercises in particular related to swimming sports is very meager. There seems no discipline in sports where weight training has not been accepted, tried and used in good results. Practically all record holders have had sessions over their barbells or other aides and machines.

**Hettinger and Muller (1987)**\(^{107}\) established that strength can be achieved quickly through isometric contraction. Delorme et. al. (1988)\(^{88}\) have shown that keeping the level as constant

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and applying same force to the contraction of the muscle again a constant force throughout the range of motion improve the strength component.

**Mc Ardle and Foglia (1989)**\(^{108}\) have further shown that isotonic exercises improve the deltoids, biceps, quadriceps and gluteus maxims to a great extent and as these muscles play a vital role in swimming. These exercises have been very much preferred by the swimmers of world fame. During preparation of these muscles the rate of the muscle contraction has to be given more importance because this will improve the muscle without any fatigue. **Gambetta (1981)**\(^{109}\) state that the rate at which the stretch (contraction) of the muscle is performed is more important than the magnitude of the stretch. **Yessis and Hatfield (1988)**\(^{110}\) in one of the studies mention that in strength gains eccentric contractions are a very few effective way of developing strength by itself or in conjunction with the other muscle contraction regimes. In fact, the eccentric contraction creates the greatest amount of electrical activity.

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Although difference exists in performance, all swimmers have been considered to have the same physiological requirement as well as similar training adaptations. Jokle’s (1994) contention that exercises never caused death in a normal heart may be helpful consideration. He says that organic capability increases for high function, stimulates development of pulmonary functions. Studies have further proved that isometric and isotonic exercises did not cause any danger but have proved successful in increasing the size of organs and stimulate the development of pulmonary functions.

Jokle (1994) further reveals that the body of a player is a wonderful machine with sophisticated built-in controls and instinctive limits. He believes that in the next few years’ research will come up with a better dry land training formula and that it will help swimmers considerably. Counsilman (1975) remarked that the improved techniques of building strength has improved swimming timings throughout the world. Most of the

teams including the Russia, West German and American have also used it for getting successful results.

**Hoffman (2000)**\(^{114}\) says that the players who have probably done most to popularise weight training are Dick Cleveland and A. Wiggins of Ohio State University, both of whom set world records after vigorous weight training periods. Both men were very good athletes before they began weight training but only after they had improved their muscular strength, did they set world records. The fact that Cleveland and Wiggins trained with weights is important to all individual sports. Even more important is the fact that they give weight training a lion’s share in the credit for their record breaking performances. Wiggins went so far as to say “I have proved that training with weights is the most beneficial thing a player can do out of water”.

Physical fitness also prepares a person to meet the energy demand at the time of need. It means having the best Isometric and isotonic exercises help a lot in gaining strength and endurance.

According to Owen (2003)\textsuperscript{115} weight training has been used by many outstanding major league baseball players in USA to build powerful arms for hitting and throwing. It is no secret that Ted Williams and Jakie Jenson two of the all times great of the Boston Red Sox base-ball team have used weights or resistive apparatus for wrist and arm development. Williams, probably the greatest hitter of all time, practiced Calisthenics, while Jensen used a variety of weight exercises to build up an injured arm. He gives weight training much of the credit for his athletic accomplishment.

Higgins (2004)\textsuperscript{116} has expressed that the value of weight training for football players has been proved many times in recent years and success of some of the nation’s outstanding players and teams has been attributed to the strength and power gained through lifting weights. Countless other football players have used weight training to improve their strength and power.

Weight training has completely revolutionized all track and field training methods. Where only few years ago weight training was strictly taboo with track man, today it is extremely popular. The list of weight trained track and field champions is endless.

\textsuperscript{115} Owen, L (2003), ‘Six Sluggers of Se’, Strength and Health.
\textsuperscript{116} Higgins, ( 2004), ‘Football Weight Training’.
Foreign track and field stars are using weight training with spectacular success. In Australia, England and Russia, the use of weight is reportedly a basic part of their training programme. As a result, the assault on world track and field records has been little short of fantastic. As weight training methods in track and field are improved and woven into the basic training routine, the present records will continue to fall.

Liederman (2004) in a sport such as Handball where one would hardly think strength to be specially important, it is noted that the 1960 National AAU Champion Jummy Jacobs, trains with dumbbells three days a week. He works with moderate weights at the conclusion of his handball workouts. Other sportsmen have used weights to train for boxing, cycling, rowing, soccer, water polo and wrestling. In almost any sport that can be mentioned some of the top performers have practiced with weight training. In each of these sports the general weight training programme for athletes can be used with good results, modifying and supplementing the programme with special exercises when needed.

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Ray (2004)\textsuperscript{118} says that the outstanding golfer on the professional tour in 2004 Arnold Palmar, was a young man who played in his college days at Wake Forest. Not only is Palmar one of the best golfers of all times he is one of the most muscular. Much of the credit for his phenomenal success must be attributed to his tremendous power gained by weight training. Jery Barber a great Golfer included 120 push-ups and exercise with 25 lbs dumbbells in his daily conditioning schedule. His exercise programme has given him the additional strength; he needs to hit the ball out against bigger players. According to Vankleef for a number of years, the Australian Tennis players have been the best in the world. A large percentage of the Australian players have trained regularly with weights. In India though, similar studies has been done on the physical fitness of the players, as well as on the effects of different exercise schedules on various games.

In the study conducted by Nuzzo et al (2008)\textsuperscript{119} an isometric squat force was measured at, a knee angle of 1400


because this angle is closely associated with maximal force when assessing isometric squats at various knee angles. Following the test administrator’s verbal instruction, subjects pushed with maximal effort as quickly as possible against the immovable bar that was located on their shoulders Isometric Bench Press

Aleksander et al (2009) performed the measurement of maximal muscle strength and Rate of Force Development under isometric conditions on specially designed isometric equipment. The subjects were tested in the bench press machine while the bar with a dynamometer was placed in two different positions. In the first position, the bar was fixed at a 2.5cm distance from the chest and in the second position the bar was fixed at a 30-50 cm distance from the chest, depending on the position where the elbow joint angle was 135° (180° full extensions). These two positions represent critical spots during the bench press.

Vertical jump height was measured using two types of jumps

Requenna et al, (2009) Squat Jump SJ and

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Countermovement Jump CMJ. In the Static Jump upon stepping onto the force plate, athletes were instructed to get in the “ready position,” which consisted of assuming a squat position with a 90° knee angle measured with a handheld goniometer. Once in position, a countdown of “3, 2, 1 Jump” was given. A 3-s hold of the bottom position was used to eliminate the involvement of the stretch-shortening cycle (Nuzzo et al, 2008). Countermovement jumps were performed without a pause to a self-selected countermovement depth.

The bench press was used as an assessment of upper body strength by McGuigan et al (2010) and was performed in the standard supine position. The subjects lowered the bar to midchest and then pressed the weight until the elbows were fully extended. No bouncing of the weight was permitted. For estimation of the subjects 1RM Aleksander et al (2009) used a regression equation (Bryzcki, 1993). The formula permits one to "assess muscular strength in a safe, efficient manner, without requiring subjects to attempt maximum lifts.

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5. **Studies related to Isometric and Isotonic exercises and motor fitness variables.**

**Mathew and Kruse (1957)**\(^{123}\) examined the effects of isotonic exercises of the elbow flexor muscles on the ergograph (load of three-eighths strength at 30 repetitions per minute continued to exhaustion) and isometric exercise of the same muscles (three consecutive 6 seconds maximum pulls on a strap); the training period were for four weeks. The experimenters concluded that individuals like to exercise in a manner peculiar to themselves. A common regression (prediction) line did not occur within either of the two exercise regimens and individual regression equation exhibited- lack of uniformity as related in increase of strength.

**Lietuvietis (1960)**\(^{124}\) tested the subjects on the front and back flutter kicks and the scissors kick using a modified form of the Fox Swimming Power Test. On the basis of the sum of T scores, three equated groups were formed. The subjects were also tested for hip joint flexor and extensor and knee joint

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\(^{124}\) Lietuvietis, Kaija (1960), "The Effect of Isotonic and isometric Leg Exercises on Selected Swimming Kicks' Completed Research in Health, Physical Education and Recreation 2 (1960) :45.
extensor strength. All subjects were enrolled in life saving or intermediate swimming classes. Sixteen subjects in one group did isometric exercises, consisting of six second maximum muscle contractions against the experimenter's resistance. Thirteen subjects did progressive high resistance leg exercises while 18 subjects were used as controls and took no additional exercise. All subjects exercised twice weekly for four and one half weeks. At the end of the experimental period, the isometric group showed statistically significant strength gains but the 't' test was not significant. None of the groups showed significant gains in the composite swimming power test scores. There was little correlation between strength gains and swimming kicks gains in the two experimental groups.

Clarke(1960)\textsuperscript{125} after lots of experiments, done by the different physical educationists, came to the conclusion that in isotonic exercise, the greatest tension The purpose of the study of Dennison; Howell and Morford(1961)\textsuperscript{126} was to determine the relative effects of an isometric exercise program, the commander set (a series of static exercises developed by the late commander


Giauque, USN, and Arthur H. Steinhaus); and a regular isotonic exercise programme of weight training, upon muscular endurance as measured by the Arm Strength Index. Two groups of ten subjects, each enrolled in the required programme, were equated on the basis of the scores on the Arm Strength Index. Group A participated in a weight training program, and Group B performed the 13 exercises of the Commander set, both groups meeting twice a week for eight weeks. Both groups showed statistically significant improvements in chinning and dipping ability and consequently in the Arm Strength Index. The difference between the means of improvement of the two groups was not statistically significant.

**Hettinger and Muller (1961)**\(^{127}\) published the results of their investigation on nine subjects who trained muscles in 71 different ways. They concluded that for strength increase, isometric contractions were the most valuable and that the tension should be 668 of the maximum, held for 6 secs. And that once a day was adequate.

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Marley (1963)\textsuperscript{128} studied the comparative effectiveness of isometric and isotonic exercises in the development of muscular strength, endurance and girth. Three groups were used. One group trained with isometric exercises, the second group used isotonic exercises, and the third group served as control. Subjects were tested several times before and after the ten week training programme. Isometric and isotonic exercises appeared equally effective in developing strength but isotonic exercise was more effective in developing muscle size, although size as measured was not necessarily proportional to strength.

Tony (1965)\textsuperscript{129} conducted a study on comparison of the effects of selected exercises, isometrics, and isotonics on explosive power and leg strength. Dynamometric leg strength and Sergeant Jump Tests were given to 22 Springfield college freshmen basketball candidates who were randomly divided into three groups that practised separate exercise programmes three times a week for four weeks before being retested. Group A with


\textsuperscript{129} Tony, Scolnick (1965),"A Comparison of the Effects of SeTected Exercises, Isometric, and Isotonic on Explosive Power and Leg Strength, Completed Research in Health, Physical Education and Recreation 7 (1965): 63.
eight subjects practised squat jumps, back board touches, run in place, and jumping rope; they increased 40 pounds in leg strength and 9" in jumping, on the average. Group B (75) practised isometric heel raises and three quarter knee bends and increased 43 pounds and 1.2", Group C (75) with isotonic heel raises and three quarter squats, increased 151 pounds and 1.6 inches. Analysis of co-variance indicated that the moan gains were not significant at the .05 level.

Antone (1966)\textsuperscript{130} undertook a comparative study of the effects of a combination of isometric and isotonic exercises (weight training) on the shot put and static strength. High school fieldmen (19) were divided into two equated groups on the basis of a standing shot put test and a cable tensiometer test of elbow extension strength. Retest after their six week training programmes showed, that both groups improved significantly at the .01 level, but the difference in improvement was not significant.

Thornton (1967)\textsuperscript{131} conducted a study on sixteen boys in

\textsuperscript{130} Antone, G (1966)."A Comparative Study of the Effects of a Combination of Isometric and Isotonic (Exergenic) Training with Isotonic Exercises (Weight Training) on the Shot put and Static Strength," Completed Research in Health, Physical Education and Recreation 8 (1966): 89.

\textsuperscript{131} Donald, Thornton (1967)."The Effects of Isotonic and Isometric Strength Training on Pull-up Achievement," Completed Research in Health, Physical Education and Recreation 9 (1967):82.
Grade VI who exercised five times a week for six weeks on either an isometric training apparatus or a horizontal bar (isotonic). To find the effects of isotonic and isometric strength training on pull-ups achievements, each group was divided initially into four sub-groups on the basis of chinning ability. They were retested midway and at the end of the training. Both highest sub-groups made significant gains but the difference between the methods was not significant.

Robinson (1969)\textsuperscript{132} classified eighty college subjects according to the initial performance on Larson's Muscular Strength Test for secondary school and college males and divided into two samples of 40 each. One group was trained isometrically the other isotonically. After the training period, the two groups were retested. It was found that both groups increased their strength but there was no significant strength differences between the groups.

McKethan (1973)\textsuperscript{133} studied the effect of a training


program involving isometrics, isotonics or a combination of
isometrics, isotonics on quadriceps strength and vertical
jumping ability was studied. Male subjects (N=24) were assigned
to 1 of 3 experimental groups or to a control "condition. Vertical
jumping performances were evaluated by the jump and reach
procedure and cable tension tests were used to measured
quadriceps strength. The training for the isometric group
involved 16 seconds maximum isometric bout at each of 90°,
110° and 130° of knee extension. The isotonic groups trained by
utilising maximum knee extensions. The combined group
training by performing an isometric contraction at 90° and then
completing the knee extension against isotonic resistance. The
results were: at the conclusion of training, the quadriceps
strength of the isometric exercise group was greater than that of
the control group. Other among groups comparisons were non-
significant, within group gains in quadriceps strength occured
for each of the three training procedures and there were no
differences among or within the groups in relation to vertical
jumping ability.
Burton (1973) compared and determined the effects of various feedback conditions on muscular strength development: One hundred eighty male students were the subjects and after pretesting by isometric and isotonic procedures, all subjects were ranked by the total strength index. The subjects were kept unknown about the type of exercise they had to undergo. A three factor factorial analysis of variance was used to analyse the data and the three factors were method of training, initial strength, and feedback conditions. The result of the study was that, i) isometric and isotonic procedures were effective methods for developing strength, ii) isotonic training procedures yielded greater gains than did isometric training regardless of test method feedback conditions or initial strength of the subjects; and iii) there was no relationship between initial strength and feedback conditions. It is concluded that the isotonic training yields greater strength gains per maximum contraction than does isometric training and subjects experience greater strength gains when knowledge of results is available.

James (1974)\textsuperscript{135} investigated the effects of isotonic and isometric exercises on heart rate and blood pressure and setecs to determine the relationship of these effects to physical work capacity. 31 male university students located an isometric work load which would be equal in oxygen cost to a ten-repetition isotonic exercise with 60 percent of the maximum strength. Systolic blood pressure rose significantly and returned to normal rapidly. However, it was significantly higher as a result of isotonic exercise. The pattern of response was somewhat different and decreased significantly more as a result of the isometric exercise; Pulse pressure rose significantly as a result of both exercises and returned to the normal rapidly. The response was significantly greater for the isometric exercise. Systolic blood pressure was significantly greater as a result of the isotonic exercise, the only significant difference. It is marked that either isometric or isotonic exercise results insignificant in heart rate.

Muller and Rohnest (2001)\textsuperscript{136} produced evidence that strength will increase more rapidly with isometric when the


\textsuperscript{136} Muller, B.A & Rohnest, J (2001), 'The Regulation of Muscular Strength', Journal of the Association for Physical and Mental Rehabilitation, p. 41.
muscle contracted is near maximum and 5 to 10 repetitions are done. Isometric exercises though have proved successful while these are performed when contraction is held for 6 seconds with 2/3 of the maximum has been agreed by different authors and accepted through controversies still persist.

According to Holmes (2002)\textsuperscript{137}, Rowdey Gains of USA who became world record holder of 100 meters at 49.36 seconds at Austin on April 3, 1981 and 200 metres at 1.49.16 seconds at Austin Texas on April 11, 1980 gave much importance to weight training for thrice a week. According to him both of his world records were set after swimming short courses all year besides lifting weights in one hour and a half routine, three times a week. He further adds that as the season went on, he cut the repetitions and added the weight. Sweetanham AIS Coach (1982) who was awarded the Churchil scholarship for the first time given to a sportsman, emphasised (isotonic training) weight training as the main programme for conditioning. He was involved in on a deck observation of swimming group coached by Eddy Reese and Paul Bergen of university of Texas. He

concluded that Isotonic exercises given to the subjects resulted in unexpected success.

Liederman (2004)\textsuperscript{138} in a sport such as Handball where one would hardly think strength to be specially important, it is noted that the 1960 National AAU Champion Jummy Jacobs, trains with dumbbells three days a week. He works with moderate weights at the conclusion of his handball workouts. Other sportsmen have used weights to train for boxing, cycling, rowing, soccer, water polo and wrestling. In almost any sport that can be mentioned some of the top performers have practiced with weight training. In each of these sports the general weight training programme for athletes can be used with good results, modifying and supplementing the programme with special exercises when needed.

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of the best golfers of all times he is one of the most muscular. Much of the credit for his phenomenal success must be attributed to his tremendous power gained by weight training. Jery Barber a great Golfer included 120 push-ups and exercise with 25 lbs dumbbells in his daily conditioning schedule. His exercise programme has given him the additional strength, he needs to hit the ball out against bigger players. According to Vankleef for a number of years, the Australian Tennis players have been the best in the world. A large percentage of the Australian players have trained regularly with weights. In India though, similar studies has been done on the physical fitness of the players, as well as on the effects of different exercise schedules on various games.

CONCLUSION AFTER REVIEW:

Investigator did a mountainous job of review of related literature focusing on the problem under investigation. More than hundred studies were reviewed in all sections. Most of studies found very supportive but still exceptions exist, where study showed that exercise trainings could not bring significant changes in performances. Most of studies checked efficacy of Yogic Exercises or Isometric separately. Further there are many
studies which study efficacy but in training isometric exercises or meditation and pranayamas are also included. Only grossly conclusion may be drawn that any system of exercises supposed to enhance fitness and performance. Further present research work find out the effects of specific Yogic and Isometric Training particularly in relation of selected factors of motor fitness. Researcher could not find any study quite similar and to answer the problem of present research work. This provides challenge to researcher but uniqueness to the present study. Further, long enough duration of training is (about 3 months) contemplated to make this study a very precious piece of research work’.