Chapter II

REVIEW OF RELATED LITERATURE

Review of literature is an essential component of any research study. The researcher will be guided by extensive and intensive literature search. It helps to understand the scope of the problem on hand, choose appropriate tools, decide line of thought while interpreting the data and arrive at appropriate conclusion. Therefore the researcher searched various sources of literature pertaining to his study, selected the ones which have bearing on his study, classified by them under various heads and has reproduced them in this chapter.

Fielding et al. (2002)\(^1\) conducted a study to find out the “Effect of high velocity resistance training and traditional low velocity resistance program on muscular power”. For this study thirty self reported disability women were selected as subjects. Training was given for sixteen weeks and the changes in skeletal muscle power and strength were measured. During training the subjects performed three sets of leg press and knee extension exercise at seventy percentage of one repetition maximum. High velocity resistance training program showed significantly better improvement than low velocity training program in the selected criterion variables.

Campos et al. (2002)\(^2\) conducted a study on “Influence of eight weeks of progressive resistance training on strength endurance”. For this purpose the selected subjects were equally divided into four groups viz., high repetition group, intermediate repetition group, low repetition group and control group. Before training the subjects were tested on muscular endurance, muscular strength and various cardiorespiratory parameters using respective tests and after eight weeks of training program the above variables were once again tested as post test. From the study it was observed that the low repetition group was better in maximal strength when compared to other training groups. High repetition group showed better improvement in terms of muscular endurance. Moreover for high repetition group maximum aerobic power and time for exhaustion showed significant improvement. From the study it was understood that physical performance and associated physiological adaptation are linked to intensity and number of repetition and performance.
Newberry et al. (1999)³ conducted a study to find out the “Effect of high repetition squat resistance training with combination of sprint in anaerobic conditioning”. For this purpose thirty six male were selected as subjects for the study. The selected subjects were divided into three groups of twelve each. Group I was given sprint training alone, group II was given strength training and sprint training and group III acted as control group. From the study it was observed that both the training groups have significantly improved better than the control group. When compared between group I and group II, group II i.e., resistance training combined with sprint training was superior in terms of percentage of maximal velocity and there was no significant difference in sprint speed. It was concluded that high repetition strength training improves muscular endurance when added with sprint training.

Hass et al. (2000)⁴ conducted a study on the “Effect of altering training volume from one set to three sets on muscular strength, muscular endurance and body composition”. For this purpose, forty two weight lifters who were already performing resistance training by using one set of nine exercise circuit resistance training for a minimum of one year were selected as subjects. The selected subjects were divided into two groups, group I was asked to perform three sets of eight to twelve repetition for the period of thirteen weeks and group II continued their regular one set using nine exercise resistance circuits. The result indicates that increasing training volume by altering one set to three sets does not lead to significant change in terms of muscular strength and muscular endurance and body composition for trained subjects.

Faignebaum (1999)⁵ conducted a study on “Influence of varying loads in resistance training on development of muscular strength and muscular endurance”. For this purpose, eleven girls and thirty two boys were selected as subjects and their age ranged from 5.2 to 11.8 years. The subjects were divided into two groups as low repetition heavy load resistance training program and high repetition moderate load resistance training program. The result of the study stated that high repetition moderate load resistance training program was better during initial adaptation period.

Fatouros, et al., (2001)⁶ conducted a study on “Effects of three different training protocols vertical jump performance and leg strength”. Forty one men were selected as subjects and they were divided into four groups as plyometric group,
weight training group, combination of plyometric group and weight training group and control group. The subjects were tested on maximal leg strength, flight time, and mechanical power on vertical jump before and after twelve weeks of training as pretest and post test respectively. Subjects of experimental groups were trained for three days per week and subjects of control group were not allowed to participate in any training activity. The collected data were analyzed statistically and the result states that all the training groups showed significant improvement in all the selected variables. Comparison between the experimental groups showed that combined training group produced better improvement in leg strength and vertical jump performance when compared with other two training groups.

Marx et al. (1998) conducted a study to find out the “Effect of altering training volume on physiological parameters”. For this study thirty untrained women were assigned as subjects. The selected subjects were divided into three groups, group I low volume, group II high volume and group III control group. The training was given for the period of twenty four weeks for three times per week. Low volume training group performed one set of eight to twelve repetitions. High volume training group performed the same exercise for three sets of six to twelve repetitions. From the study it was understood that low volume training does not provide any adequate physiological gains in untrained women over longer period of training.

Selig et al. (2004) conducted a study to find the “Effect of moderate intensity resistance training on strength, endurance, heart variability and forearm blood flow”. For this thirty nine chronic heart failure patients with an average age of 33.6 were selected as subjects and they were divided into two groups as resistance training groups and control groups. Training was given for a period of three months and the subjects were tested on selected criterion variables before and after training as pretest and posttest. From the study it was understood that all the selected variables have significantly improved for training groups when compared to control group. Therefore from the study it was understood that moderate intensity resistance training produces favorable changes in strength, endurance, heart variability and forearm blood flow.

Arciero et al. (1999) conducted a study on the “Effect of creatine on body composition, resting metabolic rate, strength and blood cholesterol”. For this thirty
subjects were selected and equally divided into three groups, group I creatine alone, group II creatine and weight training and group III placebo with weight training. From the results it was found that creatine supplementation along with weight training have produced better results in terms of cholesterol level, muscular strength and fat free mass when compared to weight training alone.

Marx et al. (2001)\textsuperscript{10} conducted a study on “Comparison of low volume circuit type vs. periodized high volume resistance training program on muscular strength, power, speed, endurance, anthropometric and resting hormonal concentration”. For this purpose thirty four untrained healthy women were selected as subjects. The selected subjects were divided into three groups, group I was given low volume single set circuit training, group II performed periodized high volume multiple set training and group three acted as control group. The selected variables were tested before training after twelve weeks of training and after twenty four weeks of training as T1, T2 and T3. The results showed that there was significant improvement in one RM bench press, local muscular endurance and leg press at T2. During T3 multiple set group was better than its counterpart. No changes were observed for growth hormone in any of this training group.

Luecke et al. (1998)\textsuperscript{11} conducted a study on the “Effect of three different resistance programs on cardiorespiratory function” The male subjects selected for the study were divided into four groups, group I performed resistance training with four sets of three to four repetitions, group II performed resistance training with three sets of nine to eleven repetitions, group III performed two sets of twenty two to twenty six repetitions and group acted as control. The training was given for a period of eight weeks. All groups improved their 1 RM in each training exercises but no significant changes were found in VO\textsubscript{2}max and VE. Group III showed significant increase in time to exhaustion and maximum power output. From the study it was concluded that for improving muscular endurance high repetition were required.

Pipes et al. (1978)\textsuperscript{12} conducted a study on “Influence of variable resistance and constant resistance strength training on body composition, anthropometric measures on strength”. For this thirty six male were selected as subjects. The selected subjects were divided into three groups, group I constant resistance, group II as
variable resistance and group III as control group. Training was given for a period of ten weeks three days per week and forty five minutes per day. The results show that both the training group has increased muscular strength. When compared between experimental groups, constant resistance group was better in strength when assessed by using constant resistance procedures while assessed using variable resistance procedure variable resistance group was superior. There was no significant improvement in terms of body composition and anthropometric measures for both the groups.

Reid et al. (1987)\textsuperscript{13} conducted a study on “Effect of weight training on strength, body composition on cardiorespiratory function of men”. For the study the subject were forty five men of age eighteen to thirty five years. The subjects were randomly divided into four groups as endurance group (2 set of 15 repetition maximum), explosive group (1 set of 15 repetition maximum), strength I (3 set of 6 repetition maximum) and strength II (1 set of 10 repetition maximum twice weekly and one set of three repetitions maximum once in a week). Training was given for a period of eight weeks. The entire group showed significant improvement in elbow and shoulder flexion strength. Strength II endurance and explosive group were better in elbow extension strength. Except strength group all other group shows significant in lean body mass. Regarding the physiology function, endurance and strength II program were most effective.

Costa et al. (2011)\textsuperscript{14} conducted a study on “Impact of resistance training on lipid profile of obese women”. For the purpose twenty eight sedentary obese women were selected as subjects. They were divided into two groups, resistance group and control group. Subjects were trained thrice in a week and the training was given for a period of nine weeks. Pretest and posttest were taken on variables such as HDL, LDL, triglycerides, TC/HDL. The data collected were analyzed statistically on using ANOVA with repeated measures. The training group showed significant improvement in all the selected variables except triglycerides and for control group no significant change was found.

Marques et al. (2009)\textsuperscript{15} compared two different exercise program for eight months of duration on lipid profile of older women. For this seventy seven women of
age sixty to seventy nine were selected as subjects. The selected subjects were divided into two groups, group I as multi component exercise and group II as resistance exercise. Before and after training the lipid profile of the subject were recorded as pre and post test respectively. Multi component exercise group was given training with aerobic exercises, muscular endurance exercises, exercise for improvement on flexibility and balance. Resistance training group was given training with leg press, curls, leg extension, lateral rise, overhead press and abdominal exercises. The training was given for a period of 8 months. The results were statistically analyzed and revelled that multiple exercise group is more effective than resistance training group in lipid profiles.

Maesta et al. (2007)\textsuperscript{16} conducted a study on body composition and blood lipids by administering soi protein and resistance training exercise for post menopause women. Forty six post menopausal women acted as the subjects for this study. They were divided into four groups, group I as soi protein, group II soi potein and resistance training, group III maltodextrine group with resistance training group. The training was given for a period of sixteen weeks. Subjects were trained thrice in a week. After sixteen weeks of training soi protein with resistance training group and maltodextrine with resistance group showed significant improvement in muscle mass and waist circumference. Regarding the lipid profile and total cholesterol significant decrease in total cholesterol and LDL were observed in soi protein group.

Verney et al. (2006)\textsuperscript{17} assessed the “Influence of lower body endurance training and upper body resistance training on blood lipid profile, body composition and strength in active older men”. Ten healthy active men of age 73 +/- 4 were as selected as subjects. The subjects were tested on selected criterion variables before and after the training program. Training was given for a period of fourteen weeks and the subjects were trained thrice in a week. The result of the study reveals that there was significant improvement in VO\textsubscript{2}max for the training group. Percentage of body fat and abdominal fat were decreased. There was significant decrease in total cholesterol and HDL. From the study it was concluded that the lower body endurance training and upper body resistance training can improve blood lipid profile even for healthy elders.
Banz et al. (2003)\textsuperscript{18} compared resistance training and aerobic training on cardiac risk factors. Twenty volunteers with obesity and cardiac risk factors were selected as subjects and they were randomly divided into two groups viz., aerobic training group and resistance training group. The subjects were tested in the selected criterion variables using respective test before and after training as pre and post test. Subjects were trained with respective training for a period ten weeks. The results revealed that there was significant reduction in waist to hip ratio, it also revealed that there was significant result body fat for resistance groups. There was no significant change in blood pressure for either group. The lipid profile of both groups remained unchanged.

Gonzalez_Badillo et al., (2006)\textsuperscript{19} studied the “Influence of three different volumes of high relative training intensity programs on maximal strength in clean jerk, snatch and squat on experienced junior weightlifters”. Twenty-nine junior weightlifters were randomly assigned into three groups’ viz., low intensity, moderate intensity and high intensity groups. The results revealed that the performance of weightlifters with short-term resistance training using moderate volumes of high relative intensity comparatively enhanced than low and high volume of high relative training intensities of equal volume.

Baker (2003)\textsuperscript{20} studied the “Effect of variable resistance during contrast or complex power training on upper body power output”. Sixteen rugby league players who had experience in power training were divided into control and experimental groups (eight subjects in each). The observations showed that the performance of the experimental group subjected to a set of heavy resistance training exercise acutely enhanced power output in the second power training set which may be due to combination of acute neural and mechanical adaptations.

Stone (2003)\textsuperscript{21} analyzed the “Relationship of one repetition maximum (1RM) squat to power output during counter movement and static weighted vertical squat jumps”. The subjects were divided into five strongest and five weakest subjects (P<or = 0.05) whose training experience ranged from seven weeks to fifteen plus years. Jumps were performed in two different sessions spaced one week apart with weights ranging from ten to one hundred percent of the 1RM squat. The subjects performed
each trial with maximum effort. A weight up to 90% of 1RM was used by the subjects for performing jumps. V-scope 120 was used to determine the Squat-jump power. The findings indicated strong correlations ($r = 0.77 – 0.94$) between the 1RM squat and both counter movement and static jump power up to 90% of 1RM. In both jump conditions the power output was highest at 10% of 1RM when the relative intensity was increased, squat jump power decreased. When compared between strong and weak subjects, 1RM percentage was influenced by maximum strength increase which also increased the peak power (40 vs. 10% of 1RM). The findings suggested that primary component of training programs should be to improve maximum strength and that the training intensity should progress from lighter (10% 1RM) to heavier (40% 1RM) loads.

**Takarada and Ishii (2002)**\(^{22}\) studied the impact of resistance training with low intensity exercises on strength and muscular size. For reducing metabolite clearance the rest period was shortened. Training was given to ten female subjects aged between 45.4 to 49.5 years. The subjects performed bilateral knee extension exercises on isotonic leg extension machine in seated position. The isokinetic dynamometer and magnetic resonance imaging (MRI) were used to examine the strength and the cross sectional area (CSA) of the knee extensors and flexors. From the study it was found that low intensity resistance exercise with a short interest rest period is substantially effective in inducting muscular hypertrophy and concomitant increases in strength.

**Rhea et al., (2002)**\(^{23}\) conducted a study for recreationally trained individuals on strength gains using single and multiple sets of weight training. For the purpose, sixteen men were randomly divided in to two groups as one set and three set groups. Training was given for twelve weeks (three days per week). One repetition maximum (1RM) for leg press and bench press was determined at pre test, mid test and post test. During training, the subjects performed leg press and bench press exercises between four repetition maximum and eight repetition maximum according to daily undulating periodization (DUP). Both the groups were trained at equal intensities. The experiment revealed that the three set group (S-3) was significantly superior than one set group on maximal strength gains.
Jones et al., (2001)\textsuperscript{24} used sports specific skills from intermediate to high velocity spectrum and compared changes in specific velocity adaptation using moderately resistance trained athletes. Thirty NCAA division I basket ball players were divided into two groups viz., low resistance (40 – 60\% of 1RM) and high resistance training group (70 – 90 \% of 1RM) showed better improvement than low intensity resistance group in terms of squat performance. The results of the study concluded that heavier training load increase 1RM strength of trained athletes in lower body.

Fincher (2001)\textsuperscript{25} studied the anaerobic performance gains of collegiate football players using single set high resistance training programme. Forty subjects were divided into two groups as single set high intensity maximally exhaustive training group and traditional multiple set group. Training was given for a period of ten weeks multiple set groups were not allowed to achieve maximum exhaustion by exhibiting extra lifts. Upper and lower body exercise improved significantly for both the groups. When compared between single set high intensity group and multiple set groups, single set high intensity group gained significantly more than its counter parts.

De Hoyos et al., (1998)\textsuperscript{26} conducted a long term study for extended period of 25 weeks for comparing the effects of three set resistance training versus one set resistance training. The researcher also recorded the similarity and differences persist over such duration. The result of the study reveals that muscular strength and muscular endurance were significantly improved in both the groups. It was found that for developing strength one set group was very effective. But in case of muscular endurance three set protocol was better than one set protocol.

Wilson et al., (1993)\textsuperscript{27} conducted a study to compare the effect of three resistance training modalities in enhancing the performance of series of dynamic athletic activities. For the purpose sixty four previously trained subjects were selected and they were randomly divided into four groups as traditional weight training group, plyometric training group, explosive weight training group and control group. Training was given for a period of ten weeks. During the training, subjects performed exercise such as squat lifts, depth jumps or weighted spot jumps. Subjects were tested before the training, after five weeks of training and at the end of training period as pre test, mid test and post test respectively. The results states that explosive weight
training group achieved better performance in dynamic athletic activities when compared to other two training modalities.

Faigenbaum et al., (1995) investigated the influence of eight weeks strength training and detraining in children. For the purpose of this study children aged from seven to twelve years were selected as subjects; training was given twice in a week. Control group was formed using children of same age group and maturity. The results showed that the leg extension and the chest press were significantly improved for the training group. Control group did not show any significant improvement. During detraining it was evident that there was strength loss after four weeks, strength loss was higher in legs than in the upper body.

Bishop et al., (1997) carried out a study on endurance performance of female endurance cyclists by administering resistance training. Twenty one female cyclists were selected as subject’s and were divided into two groups. Fourteen subjects acted as experimental groups and the remaining seven as control groups. The experimental group was given resistance training for twelve weeks for two days per week. The results revealed that there is no significant change in either group and was concluded that due to resistance training there was no improvement on endurance performance in female endurance cyclists.

Willardson and Burkett (2005) studied the difference between three different rest intervals on bench press and squat volume completed during a workout. In this study 15 college men were selected as subjects. The entire Subject performed four sets of squat and four sets of bench press with a load of eight repetition maximum for three testing sessions. The total number of repetitions completed over four sets for rest condition were termed as volume. The results were statistically analyzed for each rest condition. Highest volume was completed by five minute rest condition followed by two minute and one minute rest condition. Greatest strength adaptation may be stimulated by higher volume of training.

Cronin and Crewther (2004) studied the temporal, kinematic and kinetic characteristics of each set by differing the volume in equated training loads. Subjects were twelve experienced weightlifters who performed ballistic squats using a fine
squat machine. The subjects performed three sets (6 * 30% 1RM, 3* 60% 1RM and 2 *90% 1RM) of ballistic squats. It is suggested that the nature of the neuromuscular adaptations elicited by different loading parameters is achieved by the adoption of kinematic and kinetic analysis approach within the research design.

McLester et al., (1999)\textsuperscript{32} conducted a study on recreational weight trainers to determine the effect of one and three days per week of equal volume resistance training. For the purpose selected subjects were made into two groups as lifting once per week three sets to failure and lifting three times per week one set to failure. Pre test and post test were conducted before and after six and twelve weeks. The data were statistically analyzed and results revealed that both the group has significant improvement in terms of upper body and lower body strength. Three day group had greater improvement in body mass. Hence, the study concluded that three days per week training is superiorly significant than one day per week training.

Rhea et al., (2003)\textsuperscript{33} attempted to evaluate local muscular endurance and strength gains by comparing linear periodization (LP), daily undulating periodization (DUP) and reverse periodization (RLP). For the study sixty men and women were selected as subjects and they were randomly divided into three groups viz., linear periodization group, daily undulating periodization group and reverse periodization group. Pre, mid and post test were conducted on leg extension at fifty percentage of subject’s body weight. Maximal repetition was recorded for leg extension as a pretest, mid test and post test. The study concludes that the effective method for increasing muscular endurance was gradually increasing volume and gradually increasing the intensity.

Larry et al., (1995)\textsuperscript{34} conducted a study on body mass, performance and hormonal concentrations by altering training intensity on training volume. Subjects selected were tested before training and after every four weeks during training (W4, W8, W12, W16, W20 and W24). Every day training volume was recorded and after four weeks training volume was totaled. Hydrostatic weighing was used to determined line body mass (LBM) and percent fat (%fat). Kneeling shot (KS) and overhead shot (OS) was used to measure the performance. Anaerobic power (AP), vertical jump power (VJP) and anaerobic capacity (AC) were used to analyze anaerobic capacity.
Cortisol concentration and testosterone were analyzed using blood samples. Line body mass, over head shoot and kneeling shoot increased for both the sets due to training. Anaerobic capacity, percentage fat did not showed any marked changes during the training period. Cortisol and testosterone ratio was very low after four weeks interval with high intensity. From the study it was observed that line body mass, over head shot and kneeling shot increases with varying training volume and intensity. No marked alternations were found in hormonal concentrations.

Starkey et al., (1994) studied the “Effect of high intensity and high volume training on strength”. Subjects performed high intensity strength training for three days per week for fourteen days with either one or three sets. The results reveal that both one set and three set were effective. Much volume does not have much impact in high intensity strength training.

Sundaramoorthy (1999) conducted an experiment on the “Effects of isolated and combined weight and plyometric training on selected strength parameters, speed and power”. Forty five men students studying Master’s degree programme in physical education at Thiruchendur, were selected as subjects at random and were divided into three groups consisting of fifteen subjects each. Group I underwent weight training, Group II underwent plyometric training, Group III underwent combined weight and plyometric training. Arm strength, leg strength, explosive strength, strength endurance, speed and elastic power were selected as variables. At the end of the study, results indicated that the all the selected variables were improved significantly by weight training, plyometric training and combined weight and plyometric training programmers. There was no significant difference observed among the selected dependent variables from weight training, plyometric training and combined weight and plyometric training groups. This trend was in favour of combined weight and plyometric training group for explosive strength, strength endurance, speed and elastic power whereas the trend was in favour of weight training group for arm strength and leg strength.

Gopinath (2000) examined the “Effect of resistance training, plyometric training and combined resistance and plyometric training on strength, power and speed parameters”. Sixty men students were selected as subjects and divided into four
groups namely combined resistance and plyometric training group and control group. Arm strength, leg strength, back strength, explosive power, elastic power, anaerobic power, speed and stride frequency were selected as criterion variables. These experimental groups underwent their respective training programmes for twelve weeks for three sessions per week. ANCOVA was used to find out the effect of respective training programmes on selected criterion variables. The obtained results showed significant improvement in the resistance training plyometric and combined training on leg strength, back strength and speed. Resistance and combined training improved arm strength. The significant improvement due to plyometric training and combined training on explosive power, elastic power and also the combined training developed anaerobic power and stride frequency significantly.

Hass et al., (2000)\(^{38}\) found out the “Effects of increasing training volume from one set to three sets on muscular strength, muscular endurance and body composition in adult recreational weight lifters”. In this study, forty two adults had been performing one set using a nine exercise resistance training circuit for a minimum of one year participation. Subjects continued to perform one set and three set of eight to twelve repetitions for thirteen weeks using resistance training circuit. As a result of thirteen weeks training both these groups significantly improved muscular fitness and body composition. These results concluded that the one set programs were still effective even after a year of training and that increasing training volume over thirteen weeks does not lead to significantly greater improvements in fitness for adult recreational weight lifters.

Clutch et al., (1983)\(^{39}\) conducted studies to find out the effect of depth jumps and weight training on leg strength and vertical jump. Two studies were evaluated the effects of depth jump in plyometric and traditional weight training on performance of vertical jump and other measures of strength. First study on the three jumping activities were a) maximum vertical jumps b) 0.3 m depth jumps and c) 0.75 and 1.10 m depth jumps. In this group 16 individual subjects were selected and underwent weight training for three weeks and weights plus additional jumping for two days per week for four weeks. Second studies were imposed on the sixteen subjects and they underwent weight training for two days per week for sixteen weeks. These study results showed that the weight group alone has no significant improvement in vertical
jump but they have significant improvement on strength parameters due to weight training. Weight plus jumping groups have significant improvement on vertical jump.

**Lemmer et al.,** (2001)\(^{10}\) studied the “Effect of strength training on resting metabolic rate (RMR), energy expenditure of physical activity and body composition in comparison to age and gender”. Young men (N=11; 65-75 years) and older women (N=10) were selected as subjects. The subjects underwent twenty four weeks of strength training. This study finally revealed that they have significant improvement on RMR by nine percentages in men when compared to women. Energy expenditure of physical activity did not like changes and also indicated changes in absolute and relative RMR in response to strength training are influenced by gender but not age.

**LeMura et al.,** (2000)\(^{41}\) conducted a study to assess the “Effect of various training modes on changes in body composition, lipid profiles and cardiovascular fitness.” To perform study forty eight sedentary healthy women were randomly selected and divided into four equal groups of twelve each. Group I underwent aerobic training, group II underwent resistance training, group III was given aerobic as well as resistance training and group IV acted as control group. Training was given for a period of sixteen weeks and after training, subjects were detained for six weeks. After training aerobic training group significantly reduced triglyceride and increased high density lipoprotein. The VO\(_2\)max of aerobic training group also increased by twenty five percentages after detraining all the effects of aerobic training group disappear. For resistance training group and combined group, strength values were significantly greater. Both the group did not show any significant changes in either VO\(_2\)max and body composition. The result of the study revealed that aerobic type of exercise was better to improve lipid profile, cardiorespiratory fitness and body composition.

**Letley hatzel** (2010)\(^{42}\) conducted a study to find out “Effect of weight lifting and breathing technique on blood pressure and heart rate” in order to solve the problem they selected thirty subjects of each sixteen were men and fourteen were women. The subjects were tested for one repetition maximum on chest press and leg press using each of the two breathing techniques. Data were collected during the push
phase and again at one and five minute after lift. There was no elevation in both heart rate and blood pressure for subjects.

**Solanki (2007)**\(^{43}\) conducted a study to find out the “effect of high intensity and low intensity weight training on blood lipids and body fat for that sixty subjects were selected form Indore (Madhya Pradesh), the age of the subjects’ ranges from twenty to twenty eight. The subjects were divided into three groups as Experimental group I, II, and III. The subjects were given respective training for a period of twelve weeks and the results revealed that low intensity training group was found to be better in blood lipids when compare to the other two groups.

**Cornelissen and Fagard (2005)**\(^{44}\) conducted a study to find the “effect of resistance training on resting blood pressure” using meta analysis of randomized controlled trials. The results of the study stated that moderate intensity resistance training does not elevate blood pressure of trainings.

**Sowrirajan (2005)**\(^{45}\) conducted a study to find out “The influence of altering the volume and intensity of a resistance training program on selected physical and physiological variables”. For the purpose he selected forty five men students from Annamalai University Chidambaram and divided them equally in three groups. Group I high intensity low volume, Group II low intensity high volume, and Group III control group. The training was given for the period of twelve weeks and the results of the study showed that high intensity low volume group was better in strength and speed parameters, low intensity high volume group was better in endurance. Regarding the physiological variables there was no significant improvement.

**Libardi et.al., (2012)**\(^{46}\) conducted a study to find out the “Effect of sixteen weeks periodized resistance training in lipid profile in sedentary middle aged men and women.” For achieving this purpose fifty middle aged men and women were selected as subjects and they were divided into four groups as resistance training men, resistance training women, control group men and control group women. The subjects performed training for a period of sixteen weeks. The results of the study showed that there was significant decrease in total cholesterol and LDL for both the training groups. No significant change was found in HDL and triglycerides for all the four
groups. It was concluded that periodized resistance training decreases cardiac risk in middle aged men and women.

Elliott et al. (2002) studied the “Effect of eight weeks of supervised low intensity resistance training and detraining on muscle strength and blood lipid profiles in healthy sedentary postmenopausal women”. To solve the problem, fifteen women aged forty nine to sixty two were assigned as subjects. The selected subjects were divided into two groups as experiment group (n=8) and control group (n=7). Low intensity resistance training was given to the subjects of experimental groups for a period of eight weeks. After eight weeks of training the subjects experienced increase in muscular strength but the lipid profile values remained static for both the group.

Prabhakaran et al. (1999) conducted a study to find out the “Effect of supervised intensive resistance training program on lipid profile and body fat percentage in healthy sedentary women”. For this twenty four sedentary women acted as subjects and they were divided into two groups as experimental and control groups. Fourteen weeks of resistance training was given for the training group. The results revealed that there was significant decrease in total cholesterol, LDL and body fat percentage for the experimental group. No changes were seen in triglycerides and HDL values in both groups.

Konstantinos et al. (2009) “Responses of Blood Lipids to Aerobic, Resistance, and Combined Aerobic With Resistance Exercise Training: A Systematic Review of Current Evidence” for this they selected studies that involved aerobic and/or resistance and/or combined exercise training in healthy adults over a limit of twelve weeks and had examined the response of training to one or more of the following: triglycerides, total cholesterol, high density lipoprotein cholesterol, and low-density lipoprotein cholesterol. We selected a total of eighty four studies; fifty eight were randomized controlled trials. Comparisons between intensities of aerobic exercise programs resulted in favorable effects only for high intensity. The most frequently observed alteration was an increase in the high-density lipoprotein cholesterol, whereas reductions in triglycerides, total cholesterol, and low density lipoprotein cholesterol appeared less often. Moreover, the evidence of the positive effect of resistance exercise marks out a trend mainly for the low-density lipoprotein
cholesterol levels, whereas for combined exercise, results extracted from a short list of published studies show improvements in values of both the high-density lipoprotein cholesterol and the low-density lipoprotein cholesterol. High-intensity aerobic training results in improvement in high-density lipoprotein cholesterol. For resistance and combined exercise, the results are inconsistent. The heterogeneity between the types of exercise did not allow reliable comparisons.

Taaffe D. R et al., (1996)\textsuperscript{50} conducted a study to find out “effect of high and low intensity resistance training on thigh muscle strength, fiber area, and tissue composition in elderly women”. The subjects were divided into three groups as high intensity group, low intensity group and control group. Respective training was given for both the training groups for a period of fifty two weeks. The results of the study revealed that both the training group produced significant improvement in muscle strength. There was no significant effect on tissue composition for both the groups.
References


