Chapter II

REVIEW OF RELATED LITERATURE

A review of the research report related to the present study that the research scholar could gather, is presented in this chapter in order to provide the background material to evaluate the significance of this study as well as to interpret its findings.

Lenhard et al.\(^1\) investigated the health related fitness level of elementary school children aged 5-9. Three thousand school students from the state of Miami were assessed on their current physical fitness by using AAHPER Health Related Fitness Test. These students scored higher than the national norms in these items, such as sit-ups, sit and reach and one mile walk/run test. However, their skinfold thickness measurements were significantly large.

Thomas\(^2\) investigated the health related fitness of school students of first through fourth grade. 348 students were assessed on AAHPER Health Related Fitness Test. Means, standard deviations and percentage were calculated by class and grade level. The best performance was achieved on hamstring flexibility, where 15 percent of students achieved the criteria. Boys performed significantly


on skinfold measurements and sit ups. Girls performed significantly on sit and reach, sit ups and body composition. No single group (class wise) met the health related criterion reference standard on one mile walk and run test items.

Simpson\(^3\) studied the effect of participation in physical education activity upon health related physical fitness. Subjects were 132 students engaged in various physical activities. Health related fitness component measured were cardio-respiratory endurance, body composition, flexibility and dynamic strength. The analysis of the pre-test and post-test scores indicated significant differences in the scores with respect to health related components among the students involved in the physical education programme. Significant changes were observed in body composition, flexibility, and dynamic strength for the weight and aerobic dance groups. The racket ball group experienced significant positive change in flexibility and dynamic strength, whereas the control group experienced significant negative changes in cardio-respiratory endurance.

Hua et al.\(^4\) administered the Asia Health Related Fitness Test to 3,168 Students 10-17 years of age, attending public schools in Shanghai. A questionnaire survey was administered to the same subjects. Information obtained

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dealt with sports and physical activities behaviour, feelings about sports and physical activities.

Descriptive status of the data in terms of means, standard deviations and range were computed with proposed names for Chinese boys and girls. The developmental tendency was generally observed in tests such as endurance run, 60 seconds sit ups, pull ups and sit and reach. Gradual increasing effects of growth were clearly observed among girls in terms of skinfold thickness; for boys, skinfold measurements stayed roughly the same throughout all tested ages, not increasing with age. Distribution of resulted data in terms of skewness and kurtosis was also examined for all the tested items, ages, and groups. Results of the sports and physical activity behaviour study revealed that junior high school boys and girls had the greatest amount of time per week to participate in sports as well as recreational activities, elementary and senior high school boys and girls had less time.

Tooshi\textsuperscript{5} investigated to determine the effects of three different duration of endurance training on serum cholesterol, body composition, and other fitness measures. Twenty four adult men between the age of 27-54 years were selected randomly. The men were divided on the basis of their cholesterol values into three

\textsuperscript{5}Ali Tooshi, “Effect of Three Different Duration-Endurance Training on Serum Cholesterol, Body Composition and Other Fitness Measures” \textit{Dissertation Abstracts International} 31 (March 1971): 4533-A.
experimental groups: (1) Group A exercised 15 minutes a day; (2) Groups B exercised 30 minutes a day, and (3) Group C, exercised 45 minutes a day for five days a week for a total of twenty weeks. The 45 minutes endurance training produced a significant reduction in serum cholesterol level and total body fat, while endurance training of 30 and 15 minutes a day did not appear to be significant to alter serum cholesterol and total body fat significantly. The adult men who participated in 15 minutes endurance training did not produce any significant improvement in serum cholesterol, body composition and cardiovascular variables, but they produced a significant change in motor fitness measures.

Fu et al. administered the ICHPER-SD Asian Health Related Fitness Test to 20, 304 Primary and secondary school students in Hong Kong during 1990-91. Norms were developed for the various age groups for future comparisons. Preliminary comparisons with norms from China and Japan suggested that Hong Kong norms were lower, especially males. It was comforting to know that Hong Kong school children were slimmer. The researchers concluded that implementation of the new test had met with acceptance and approval from from the local community, however, they emphasised the need for further studies to determine percent fat, a more informative indicator.

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6 Frank H. Fu. et al., “Implementation of ICHPER-SD, Asian Health Related Fitness Test in Hong Kong” ICHPER Journal (Spring, 1994): 22-26
Trahm\textsuperscript{7} selected forty female subjects to determine and compare the effects of two kinds of conditioning programme on nine fat deposits sites that is biceps, triceps, forearm, scapula, fifth rib, waist, abdomen, inner thigh and knee. A randomisation procedure was employed to design the subjects to one of the two experimental conditions, the strength exercise programme or endurance exercise programme. The subjects participated in the exercise programme three times per week for seven weeks. Endurance oriented exercise programme resulted in greater subcutaneous fat loss than the strength oriented exercise programme.

In their study relating to somatotype and body composition to physical performance on 7 to 12 years old boys, Salughter and associates\textsuperscript{8} concluded that somatotype was not highly related to physical performance. However, Ponderal index correlated better with performance scores. Somatotype components had lower correlation with running and jumping variables than body composition or body size variables.

\textsuperscript{7}Baverly Jean Trahm, “The Effects of Two Specific Exercise Programs on the Body Composition of Women”\textit{Dissertation Abstracts International} 34 (February 1974): 4878-A.

\textsuperscript{8}M.H. Salughter, T.G. Lohman and J. E. Misner “Relationship of Somatotype and Body Composition to Physical Performance in Seven to Twelve Year Old Boys”\textit{Research Quarterly} 48 (March 1977): 159.
Pollock and co-workers⁹ selected nine healthy sedentary men as subjects for their study. A control group of 10 men was also employed. The conditioning was 30 minutes each session, four times a week for 20 weeks. Initially, the subjects walked and jogged equal 110 yd. Segments and progressed gradually to a continuous run. Body composition assessment consisted of body weight, sum of six skin folds and abdominal, gluteal and thigh girth. The experimental group showed significant reduction in the sum of six skin fold measurement when compared to control group.

Uppal¹⁰ conducted a study to determine the effects of interval training and two continuous load methods on cardio-respiratory and selected physiological parameters. Eighty untrained subjects were divided into three experimental groups and control group. One group was given interval training, the second group Farlek and slow continuous running, for a period of ten weeks. The load was progressively increased, after every two weeks. Researcher found that all the three groups had equal training effects on maximal oxygen uptake, vital capacity, leg strength, breath holding time. Slow continuous and Fartlek method resulted in

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¹⁰ Arun Kumar Uppal, “Comparative Effects of Two Duration Load Methods and Internal Running Method on Cardio-Respiratory Endurance and Selected Physical Variables” (Unpublished Doctoral Dissertation, Jiwaji University, Gwalior 1980).
significantly higher improvement in cardio respiratory endurance when compared to interval training. Slow continuous method and interval training were superior to Fartlek in reducing resting pulse rate. However, all the three training methods did not show any significant difference in diastolic blood pressure after exercise, blood haemoglobin content and red and white blood corpuscles.

Jossey\textsuperscript{11} studied the knowledge retained, cardiovascular fitness and skinfold measurement of college age females before and after a physical fitness course. Ninety four female college students were involved in physical education classes during the fall and winter quarters. 47 subjects served as control group enrolled in a physical education course other than physical fitness, and 47 served as experimental group enrolled in a physical fitness course. Fitness knowledge, skinfold measurements, and cardiovascular fitness of each subject were measured at the beginning and end of the course. The data were subjected to an analysis of variance to determine if there were significant differences in mean gains between the experimental and control groups, the winter and fall academic quarter, and morning and afternoon classes. Results revealed significance for knowledge gained for the fitness group, the afternoon group and the winter quarter group.

Results also revealed no difference in skinfold measurement between any of the groups except the fall quarter group. There was also no difference between any groups in cardiovascular fitness. The .05 level was utilized to determine significance.

Boilean and Associates\textsuperscript{12} formed two groups from sedentary college men as subjects on the basis of their relative fatness. All subject walked or ran on a motor driven treadmill, 60 minutes per day, five days a week for nine weeks. The approximate energy expenditure prescribed was 600 kilocalories per day of physical conditioning. As a result of physical conditioning programme, significant decrease occurred in sum of 10 skin fold measurements.

Tufts\textsuperscript{13} investigated the effect of diet and physical activity upon obese college women enrolled in a weight control class, which met for 35 minutes three times a week for a semester. The diet applied was the “1000 Calories Exchange Plan” established by the American Dietetic Association. The physical activities varied from day to day but consisted of calisthenics, rhythmic, folk dance,


badminton, basketball, hiking jogging, bicycling and circuit training. Body weight and eleven skinfold measurements were taken to evaluate body composition. Analysis of data showed significant reduction in skinfold measurement.

Priest\textsuperscript{14} determined whether or not significant changes occur in flexibility, heart rate, body weight, selected anthropometric measurements, body fat and general physical condition as a result of participation in aerobic dancing and/or aerobics. Ninety-two female volunteers participated in the following pre-test and post-test procedures: Twelve minutes run, skinfold measurements, anthropometric measurements, sit and reach test, and resting heart rate. Class/Sections randomly assigned to one of the training regimens, exercised for fifty minutes, three times a week, for a period of six weeks. A third group participated as the control group. The following significant changes were recorded. The resting heart rate of aerobic group was significantly lower on the post-test. Flexibility of the aerobic group improved significantly. The aerobic group gained on the abdominal measurement and the aerobic dancing group gained in the gluteal and lost in both thighs. The aerobic dancing group lost body fat. Both dance groups showed a significant gain in distance covered in the twelve minutes run.

\textsuperscript{14}Nita Nelson Priest, "Comparative Effects of Two Progammes of Aerobics Dance on the Flexibility, Body Composition and General Physical Condition of Selected College Women," \textit{Dissertation Abstracts International}, 44 (January 1984): 2086-A.
Samuel\textsuperscript{15} conducted the study to determine if exercise and/or lecithin supplements had significant effect upon serum cholesterol, serum triglycerides and beta lipoprotein level of the blood. The subjects were forty-three female students, ranging from eighteen to twenty six years of age. They were divided into two groups and matched on pre-test of serum cholesterol, serum triglycerides and beta lipoprotein level. During the study half of the exercise group and half of the control group received a nineteen grains capsule of lecithin through out the ten weeks of experiment. The remaining subjects received a placebo. One way analysis of co-variance was used to statistically compare the effects of the experimental treatment among the four groups upon serum cholesterol, serum triglyceride and beta lipoprotein for each of the blood analysis and to determine the weekly changes in blood fats with in each group.

Within the limits of their study and on the basis of the statistical evidence discovered the following conclusions were drawn for women.

(i) An exercise regimen of thirty minutes a day on a bicycle ergometer, does not significantly reduce the blood lipid value of serum cholesterol, serum triglyceride and beta lipoprotein.

\textsuperscript{15} Krebs Paul Samuel, "The Effects of Exercise Training and/or Lecithin Supplement upon Serum Cholesterol, Triglycerides and Beta Lipoprotein", \textit{Dissertation Abstracts International} 39 (December 1979): 3451-A.
(ii) A dietary lecithin supplement of a nineteen grain does not produce significant reductions in serum cholesterol, serum triglyceride and beta lipoprotein among the groups studied.

(iii) A combination of exercise and lecithin supplement does not produce significant changes over control in the blood lipids of serum cholesterol, serum triglyceride and beta lipoprotein.

(iv) An exercise regimen of thirty minutes a day with a target heart rate of seventy five to eight five percent of maximum does not improve maximum oxygen consumption.

Panny and others\textsuperscript{16} have pointed out that the role of exercise (especially running) in raising the level of HDL-cholesterol has received considerable attention over the past few years and presently being researched in various laboratories throughout the world. Epidemiologic research indicated that a vigorous exercise programme may bring about an increased level of HDL-cholesterol in young and middle aged men, while at the same time exercise appears to bring about minor, if any decrease in total serum cholesterol levels.

Albert\textsuperscript{17} conducted the study to determine the effect of a 12 week quantitative aerobic training programme (jogging) on the fasting serum concentration of cholesterol (C) and triglyceride (TC) in the highdensity lipoprotein (HDL), low density lipoprotein (LDL) and very low density lipoprotein (VLDL) classes in middle aged men after 3, 6, 9 and 12 weeks. Using the $2 \times 3$ or $2 \times 5$ multivariate and univariate ANOVAS with repeated measures, no significant changes were observed in the concentration of total serum LDL-C HDL-C, TG, LDL-C, and the ratio of HDL-C/LDL-C). The jogging however, had significantly lower level of total serum triglyceride and VLDL-C. The analysis of covariance indicated that these changes in the lipoprotein fraction were independent of diet and alternation in weight and adipose tissue. The data supported the contention that aerobic training may aid in prevention of hypertriglyceridemia and suggests that a training threshold may exist with respect to exercise induced changes in the level of HDL-C.

Martin and asociates\textsuperscript{18} studied the effects of long-term, self monitored exercise on the serum lipid profile and body composition of middle-aged non-

\textsuperscript{17}Webster William Albert, "The Effect of a 12 weeks Quantitative Aerobic Training Progamme (Jogging) on the Serum Lipoprotein Fraction in Sedentary Middle Aged Men" \textit{Dissertation Abstracts International} (September 1978): 1424-A.

\textsuperscript{18}B. Martin et al., Effect of Long Term, Self-monitored Exercise on the Serum Lipoprotein and Apolipoprotein Profile in the Middle-aged Men \textit{Atherosclerosis} 1 (February 1990): 19-31.
serum lipid profile and body composition of middle-aged non-smoking males, a controlled study was conducted in 61 sedentary, middle-class Swiss men. Thirty-nine were randomly allocated to jog 2h/wk for 4 months on an individually prescribed heart rate-controlled basis, whereas 22 men served as controls. The net changes in endurance capacity and resting heart rate in favour of exercisers were significant as well, whereas no significant changes in apolipoprotein levels were seen. Exploratory analyses revealed, for example, associations of the increase in total physical activity with an increase in the HDL-C/Total Cholesterol ratio and of the changes in estimated body fat content with an opposed change in the HDL-C/Total Cholesterol ratio or an inverse relationship of the change in subcutaneous fat with a change in the HDL 2-C level. Multivariable regression analysis suggested that much of the effect of jogging on HDL-C level was apparently mediated through a decrease in body fat content. This study confirms that individually prescribed, unsupervised jogging can increase HDL-C levels and improve the serum lipoprotein profile in self-selected nonsmoking males. Although the effect is modest, it may be relevant to preventive cardiology, given the evidence for a reduction in cardiovascular risk even after apparently small decreases in risk factor levels.
Bauman and Owen\textsuperscript{19} studied the relationships between different levels of participation in physical activity and biological indices of cardiovascular risk were examined in a sample of 6814 male and female adults who took part in a national risk factor prevalence survey. Participation in physical activity was classified as “aerobic” (14.6\% of total), “moderate” (53.6\%) or “inactive” (31.8\%). Bivariate analyses found significant associations between level of exercise participation and diastolic blood pressure in men, but not in women; significant associations were found between reported physical activity and systolic blood pressure, total serum cholesterol, high-density lipoprotein (HDL) cholesterol, HDL/total cholesterol ratio and triglycerides for both men and women. Further analyses were controlled for age, education, and the survey sites, which were potential confounders of the association between physical activity and other coronary heart disease risk factors. After adjustment, significant association remained between levels of exercise participation and HDL cholesterol level, HDL/total cholesterol ratio and serum triglyceride levels for both sexes. In women, there was also a significant relationship between activity level and body mass index. In addition, for men only, there was a significant inverse relationship between physical activity and total cholesterol, and for older men between

physical activity and systolic blood pressure. It is well recognized that physical activity has an independent effect on reducing the risk of coronary heart disease. The results of this study suggest that there may be small supplementary effects mediated through the relationship between exercise and other biological cardiovascular risk factors.

Lloyd\textsuperscript{20} studied to determine the behaviour of each of selected serum lipids under different metabolic stages, namely at rest, at sub-maximal and maximal exercise and at recovery. He concluded, the serum total lipids, total cholesterol, free cholesterol and total cholestrol esters increased according to physical stress intensity and followed a pattern which started with a resting value that increased during sub-maximal exercise and maximal exercise, and then decreased during the recovery period. Significant changes in the lipid response patterns occurred as a result of chronic exercise as in the case of fitness programme and changes depended upon the fitness status of the individual and the stage of exercise observed.

A physical fitness level rather than chronological age was the important factor influencing total classes of lipids as well as individual cholesterol esters in the serum and physical fitness can be achieved by regular exercise.

Joseph\textsuperscript{21} conducted the study on sixty college women between the age of 18 and 28. One group consisted of numbers of physical education class engaged in a twelve week fitness programme employing the Aerokinetic programme developed by human performance system, Arkansas. The second experimental group consisted of subjects in physical education class engaged in a twelve weeks progressive running programme. An additional group of matched volunteers was also used to serve as a control. Participation in the aerokinetic programme yielded significant improvement in the cardio-vascular fitness, total cholesterol, triglycides, LDL-Cholesterol and the risk ratios.

No significant changes were observed in the control group. By comparison, participation in either the running or aerokinetic programme resulted in similar improvement in cardio-vascular fitness, total cholesterol LDL cholesterol and the lipoprotein risk ratios, while the running programme yielded greater improvement than the aerokinetic group in percent body weight and triglycerides.

Mann. et.al.\textsuperscript{22} had reported that regular exercise programme cause decreases in both blood cholesterol and triglyceride levels. This change is


\textsuperscript{22}G. Mann et al., “Exercise to Prevent Coronary Heart Disease,” \textit{American Journal of Medicine} 46 (1969): 12-27.
particularly apparent in individual who initially have very high blood levels prior to training. Of recent interest are the specific kinds of cholesterol found in the blood referred to a high density lipoproteins (HDL), low density lipoproteins (LDL) and very low density lipoproteins (VLDL).

Pilardeau\textsuperscript{23} studied and suggested two experiments on a group of 10 trained cyclists after giving the present facts in specialised works dealing with the increase in HDL-C on trained sportsmen. This work puts into light a significant increase of circulating VLDL and triglycerides at the beginning of the exercise. Using the arguments mispelled by Schefor on the regulation of the synthesis of HDL-C, they tried to explain the two most frequent variations usually noticed in trained sportsmen: an increase in HDL-C and a decrease in triglycerides. They gave the hypothesis that the repeated in triglycerides during heavy exercise could provoke the increase in the synthesis of HDL-C and a decrease in the synthesis of VLDL after several weeks.

Evaluation of 55 pre-adolescent males were made by Thorland and Cilliam\textsuperscript{24} to determine if difference existed in the serum levels of total


triglycerides, total cholesterol HDL-C or HDL cholesterol/total cholesterol ratio between groups with contrasting level fitness and physical activity habits. Statistical comparisons between these two groups indicated physical activity effects for two of four serum lipid traits. Greater exposure to activities classified as moderate to very highly intense was consistent with lower total triglycerides and higher HDL cholesterol/total cholesterol ratios in these 8 to 11 years old boys.

Deshais and Allard\textsuperscript{25} in their study pointed out that high density lipoprotein cholesterol (HDL-C) is negatively associated with the risk of cardiovascular disease, and high level of HDL-C have been reported for physically active people. During the 1976 Olympic games, held in Montreal, Canada, several physiology variables were measured in volunteer male and female Olympic athletes, from whom blood was collected. To compare these elite athlete with the general population and other physically active groups, HDL-C was measured in serum sample. Olympic athletes had approximately 20 per cent HDL-C than levels reported in the literature for the general population. Olympic athletes were comparable to those reported for elite world class runners of comparable age.

Burke\(^{26}\) compared males and females before and after an 8 week training programme in which all subjects exercised at a heart rate of 75 percent to 85 percent maximum with total distance run held equal. It was concluded that while heredity factors may limits the potential of females in relation to males, the average female can expect relative improvement in aerobic power similar to that of male.

Metternich\(^{27}\) determined the effect of aerobic training on the plasma lipids and lipoproteins, functional capacity and body composition of sedentary adult women. All participants were given a pre test (T1) intermediate test (T2) and post test (T3) on the following variables (i) blood test – measured high density lipoprotein cholesterol (HDL-C), low density lipoprotein cholesterol (LDL-C) triglycerides, total cholesterol, and the HDL-C/total cholesterol ratio (ii) body composition-percent body fat, (iii) body weight (iv) functional capacity. The result of fourteen weeks of aerobic training on sedentary adult women are significantly increased functional capacity and significantly decreased body fat. HDL-C, LDL-C, triglycerides, total cholesterol ratio were unchanged in this particular study.

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Michiell et al.,\textsuperscript{28} made a comparison of exercise training intensities on lipoprotein cholesterol fractions. Forty-nine middle aged men were studied to determine the effect of 12 week of bicycle ergometer training at 65%, 75%, and 85% of HR max. on lipoprotein cholesterol fractions in fasting venous plasma sample. Lipid values (total cholesterol, HDL-C, LDL-C, VLDL-C, and TG) showed no significant changes related to training. While exercise intensity cause a training effect, it did not significantly effect lipid levels in the blood.

Savage\textsuperscript{29} examined exercise training effect on serum lipids of pre pubescent boys and adult men. Training involved walking/jogging/running 3 days per week at a distance which progressed from 2.4 km. per day in the first week and 4.8 km. per day from the fifth week. Fasting blood samples, collected on two days during both pre and post-training, were assessed for triglycerides, total cholesterol and high density lipoprotein cholesterol. Maximum aerobic power was determined form a treadmill test. It was concluded that body and men did not differ in the changes in serum lipids and lipoproteins and cardio-respiratory fitness from 10 week of aerobic training.


Suter and Hawes\textsuperscript{30} studied the relationship of physical activity, body fat, diet and blood lipid profile in youths of 10-15 years. Blood lipid profile was examined in 39 boys and 58 girls aged 10-15 years. It was concluded that the association between beneficial lifestyle habits and blood lipid profile generally described in adults are already evident in children. Since there is an increasing evidence that risk factor levels have a fair persistency over years, promotion of physical activity at adolescent age seems to be warranted.

Thomas et al.,\textsuperscript{31} studied on the effect of different running programme on percent body fat and plasma lipids. Fifty nine untrained men and women, aged 18-32 years, were randomly assigned to one of four groups: (i) 4 mile: running continuously at 75\% of Max. HR (ii) 2 mile: running continuously at 75\% of maximum HR, (iii) 3 minutes of walking for eight sets, and (iv) Control: no exercise programme. The training was performed three times per week for 12 weeks. Analysis of covariance indicated that only the interval group improved more than the control in VO\textsubscript{2} max. Percent fat decreased in all exercise group, but no programme was superior. TG decreased in the exercise group, but cholesterol


was unchanged. However, the interval runners exhibited greater increase in HDL-C/LDL-C than the other exercise group. Although men and women differed on the pre-test in VO2 max, percent fat and HDL-C, their response to the training was similar.

Robert and Wallace\textsuperscript{32} determined whether 12 months of dynamic exercise conditioning modifies concentrations of plasma-lipids and lipoproteins in 22 previously sedentary men and women. Subjects were divided by sex and adherence to a programme of walking, jogging or swimming for three days per week, at 60 to 80 per cent of heart rate reserve. High adhering women (HAW) decreased concentration of total cholesterol and LDL-C. There were no changes in concentrations of HDL-C and VLDL-C in high adhering men (HAM) and high adhering women (HAW). Concentration of triglycerides (TG) were lower in HAM compared to low adhering men post conditioning. The findings demonstrated that dynamic exercise of the magnitude of this study increases VO2 max and favourably modified TC, TG and LDL-C but not HDL-C and VLDL-C.

Gerberich\textsuperscript{33} analysed the potential differences in cardio respirtaroy endurance, blood lipids levels, and body composition in twenty sedentary women.


Resulting from a 12-week period of miniature trampoline (rebound exercise). Exercise session consisted of two 15 minute periods (five days a week), for 12-week. No significant differences were observed between the groups for maximal heart rate, body weight, percent body fat, and HDL-C levels.

Moody et al.\textsuperscript{34} investigated the effect of a jogging programme on the body composition of normal and obese high school girls. The change in body composition resulting from physical training are (i) a sizable decrease in bdy fat, (ii) a small decrease in lean weight and (iii) a small decrease in total body weight.

Wilmore et al.\textsuperscript{35} conducted a study on body composition changes with a 10-week programme on jogging. The following conclusion was drawn that the change in body composition induced by training are as follows: (i) a decrease in total body fat, (ii) no change or slight increase in lean body weight, and (iii) a small decrease of total body weight. For the most part, these changes, particularly that of fat loss are more pronounced for obese men and women than for the already ‘lean’ individual.


Rochelle\textsuperscript{36} investigated plasma cholesterol changes during a physical training programme. Blood plasma cholesterol levels were followed in six experimental and six control subjects during a five-week training programme (two-mile run for time, five days per week) and an eight-week detraining period. Plasma cholesterol levels were determined by the Duboff-Stevenson ultramicro method. Plasma cholesterol levels were significantly reduced during the course of intensive training. A temporary rise in plasma cholesterol occurred during exercise, probably indicative of fat mobilization and ultimate utilization during physical exercise. Plasma cholesterol levels returned to pre-training levels within four weeks after training was stopped.