CHAPTER 2

Review Of Related Literatures
CHAPTER II

REVIEW OF RELATED LITERATURES

The literature in any field forms the foundation up on which all futures work will be build. The research scholar tackled his limits and sincere efforts to locate and collect literatures relevant to the study. A study of relevant literature is an essential step to get a good comprehension of what has been done with regard to the problem under study. The research scholar could locate and collect from the different library sources such as review will bring in a new insight and will help the development of research procedure.

The related literature were broadly classified into the following three categories:

1. Studies on Physical Fitness variables
2. Studies on Physiological variables
3. Studies on Psychological variables

2.1 STUDIES ON PHYSICAL FITNESS VARIABLES

Lee, Yi and Kim (2007) studied the comparison of the effects of an exercise program in non-obese and obese women. The purpose of this study was to compare the effects of an exercise program on physical fitness, obesity indices, and blood lipids in cases of non-obese and obese women. Data was collected from May, 2006 to November, 2006 in a public health center. All Subjects (37 women) participated in an exercise program that consisted of Latin
dance, muscular strength training, and dumbbell exercises. Thirty-seven women were divided into two groups (16 non-obese women and 21 obese women) by % body fat. After 8 weeks, the effects of treatment were compared between pre-test and post-test in each group. Physical fitness (abdominal muscle strength, muscle endurance, flexibility, agility, balance) was significantly different between the pre-test and post-test in the non-obese and obese group. Obesity indices (body weight, BMI) was significantly different in obese women after the 8-week exercise program. There was no decrease of blood lipids in either group. These findings indicate that an exercise program could be an effective nursing intervention to increase physical fitness in non-obese and obese women and to decrease obesity indices (body weight, BMI) in obese women.

Viskić, et.al. (2007) analyzed the impact of special programmed physical education including dance, aerobics and rhythmic gymnastics on the development of motor and functional abilities and morphological characteristics of female fourth-grade high-schoolers in Zagreb. A total sample of 220 high-schoolers aged 16-18 years were divided into two groups: experimental group of 115 students attending the program composed of dance structures and aerobics, and control group of 105 students attending classic program of physical education. A set of 3 morphological variables, 6 motor variables and one functional variable were applied in both groups on three occasions during an academic year (initial, transient and final measurements). Two-factor analysis of variance (MANOVA repeated measure design) showed the experimental program to significantly influence the development of coordination/agility and
specific rhythm coordination, functional aerobic ability, repetitive and explosive strength and flexibility, along with significant reduction of overweight and adipose tissue. Study results clearly indicate that the existing programs of physical education should be revised and replaced by more appropriate ones.

Mahrová, Bunc and Fischerová (2006) conducted the Motor skills testing in patients with chronic renal failure). The aim of our study was to choose an acceptable motor tests battery, which should target such components of motor performance, whose certain rate is necessary for self-sufficiency keeping and perform activities of daily living. He observed mixed group of 23 patients. For evaluation of the functional condition we used the "Senior Fitness Test Manual" (8), which measures these physical attributes: muscle strength, physical endurance, flexibility, agility and balance. The input results we compared with population standard specification used in the test battery. Results of the tests showed that the group of patients in comparison with the population standard specification have reached subnormal and risk performances, especially in tests requiring for its implementation muscular strength of lower extremities and physical efficiency. Normal and above normal performances we observed in patients that were physically active before and during regular dialysis treatment. After the evaluation of result, he consider the selected battery of motor tests as an acceptable choice for motor skills testing in renal dialyzed patients all age categories.

Tsourlou, et.al. (2006) examined the effectiveness of a 24-week aquatic training (AT) program, which included both aerobic and resistance components,
on muscle strength (isometric and dynamic), flexibility, and functional mobility in healthy women over 60 years of age. Twenty-two subjects were assigned randomly to either an AT (n = 12) or a control (C, n = 10) group. Volunteers participated in a supervised shallow-water exercise program for 60 minutes a day, 3 days a week; the exercise program consisted of a 10-minute warm-up and stretching, 25 minutes of endurance-type exercise (dancing) at 80% of heart rate (HR)(max), 20 minutes of upper- and lower-body resistance exercises with specialized water-resistance equipment, and a 5-minute cool down. Maximal isometric torque of knee extensors (KEXT) and knee flexors (KFLEX) were evaluated by a Cybex Norm dynamometer, grip strength (HGR) was evaluated using a Jamar hydraulic dynamometer, and dynamic strength was evaluated via the 3 repetition maximum (3RM) test for chest press, knee extension, lat pull down, and leg press. Jumping performance was evaluated using the squat jump (SJ), functional mobility with the timed up-and-go (TUG) test, and trunk flexion with the sit-and-reach test. Body composition was measured using the bioelectrical impedance method. The AT induced significant improvements in KEXT (10.5%) and KFLEX (13.4%) peak torque, HGR strength (13%), 3RM (25.7-29.4%), SJ (24.6%), sit-and-reach (11.6%), and TUG (19.8%) performance. The AT group demonstrated a significant increase in lean body mass (3.4%). No significant changes in these variables were observed in the C group. The results indicate that AT, with both aerobic and resistance components, is an alternative training method for improving neuromuscular and functional fitness performance in healthy elderly women.
Gappmaier et al. (2006) examined the aerobic exercise in water versus walking on land effects on indices of fat reduction and weight loss of obese women. To test this hypothesis 38 middle-aged obese women (25-47% body fat) participated in a 13 week exercise-diet program to compare the effects of aerobic exercise in water versus walking on land on indices of fat reduction and weight loss changes. Subjects were randomly assigned to 1 of 3 exercise groups: 1) walking on land (WL), 2) swimming (SW) at 27 degrees C water temperature and 3) walking in 29 degrees C water (WW) at the shallow end of a declining pool with the water at navel height. Subjects in the SW group alternated breast-, side-, and backstroke swimming without face immersion. Exercise parameters were kept constant for all three groups. Subjects participated in supervised exercise sessions for 40 min, 4 times a week at 70% of age-predicted maximum heart rate. Subjects were tested before and after the 13-week experimental period. Significant reductions in body weight (5.9 kg), percent body fat (3.7%), and skin fold and girth measurements, occurred in all groups. There were no significant differences between groups. The results of this study indicate that there are no differences in the effect of aerobic activities in the water versus weight-bearing aerobic exercise on land on body composition components as long as similar intensity, duration and frequency are used.

Burgess, Grogan and Burwitz (2006) investigated the effects of 6-week aerobic dance on these variables with 50 British schoolgirls aged 13-14 years. A cross-over design was used with two equivalent groups taught normal physical education and aerobic dance in a different order. The Body Attitude
Questionnaire (BAQ) and Children and Youth Physical Self-Perception Profile (CY-PSPP) were administered as pre, mid and post-test to each participant in each group before the first intervention, at the change over and after 12 weeks. The results of this study revealed that participation in 6 weeks of aerobic dance significantly reduced body image dissatisfaction (Attractiveness, Feeling Fat, Salience and Strength and Fitness) and enhanced physical self-perceptions (Body Attractiveness and Physical Self-Worth), although these improvements were not sustained.

Lewis (2005) had conducted a study to determine the effects of a home exercise program of combined aerobic and strength training on fitness with a 10.5-year-old girl with Down syndrome (DS). Measurements included cardiovascular variables, strength, body composition, flexibility, and skill. The subject participated in a home exercise program: 30 to 60 minutes of moderate- to high-intensity exercise five to six days per week for six weeks. The cardiovascular variables monitored were heart rate, respiration rate, and oxygen consumption during a submaximal treadmill stress test. Other measures included 10-repetition maximal strength of selected muscle groups, body mass index, flexibility, Gross Motor Scales of the Bruininks-Oseretsky Test of Motor Proficiency, and anaerobic muscle power. Improvements in submaximal heart and respiration rates, aerobic performance, muscle strength and endurance, gross motor skills, and anaerobic power were observed for this subject. Body weight and flexibility were unchanged.
Kraemer et al. (2001) conducted a study on resistance training combined with bench-step aerobics which enhances women's health profile. Thirty-five healthy, active women were randomly assigned to one of four groups that either a) performed 25 min of BSA only (SA25); b) performed a combination of 25 min of BSA and a multiple-set upper and lower body resistance exercise program (SAR); c) performed 40 min of BSA only (SA40); or d) served as a control group (C), only performing activities of daily living. Direct assessments for body composition, aerobic fitness, muscular strength, endurance, power, and cross-sectional area were performed 1 wk before and after 12 wk of training. All training groups significantly improved peak VO(2) (3.7 to 5.3 mL O(2).kg(-1).min(-1)), with the greatest improvement observed in the SAR group (P = 0.05). Significant reductions in preexercise heart rates (8-9 bpm) and body fat percent (5-6%) were observed in all training groups after training. Significant reductions in resting diastolic blood pressure were observed for the SAR and SA40 groups (6.7 and 5.8 mm Hg, respectively). Muscular strength and endurance only improved significantly in the SAR group (21 and 11% respectively). All groups demonstrated increased lower body power (11-14%), but only the SAR group significantly improved upper body power (32%). Thigh muscle cross-sectional areas measured via magnetic resonance imaging (MRI) increased primarily for the SAR group. BSA is an exercise modality effective for improving physical fitness and body composition in healthy women. The addition of resistance exercise appears to enhance the total fitness profile by improving muscular performances, muscle morphology, and cardiovascular
fitness greater than from performing BSA alone. Therefore, the inclusion of both modalities to an exercise program is most effective for improving total body fitness and a woman's health profile.

Obert P. et.al. (2001) had conducted a study on the effect of a 13 week aerobic training programme on the maximal power developed during a force velocity test in prepubertal boys and girls. Boys and girls (10 - 11 yr), participating in physical activities, served as subjects. One group (M=9, F=8) participated in an extra one hour aerobic training session twice a week for 13 weeks, while others (M=8; F=8) served as controls. A force velocity test (an anaerobic test) was performed on a friction-loaded cycle ergometer. Experimental training consisted on one set of interval runs (intensity = 90 + % of HR max) and a continuous run (intensity = 75-80% of HR max).

Maximal power increased significantly in the trained group even when muscle mass change was accounted for. The increase was due mainly to force production because velocity was not altered. No changes were noted in the control group.

It was concluded that aerobic training in prepubertal children actually altered the anaerobic performance factors of force and power production. Aerobic training in children influences anaerobic performances.

Engles, et.al. (1998) examined the effects of low-impact, moderate-intensity exercise training with and without wrist weights (0.68 kg-wrist⁻¹) on functional capacities and mood states in older adults (age 68.6 ± 5.6, mean ±
Twenty-three senior citizens residing in the community were randomly assigned to wrist weight (WW; n = 12) and no-wrist weight (NW; n = 11) exercise groups while 11 matched subjects served as non-exercise controls (NE). Exercise training was performed for 10 weeks, 3 days/week, for 60 min/session and consisted of low-impact aerobic dance (50-70% of maximal heart rate) combined with exercises to promote muscular fitness, flexibility, and balance. Before and after the intervention, each participant's aerobic fitness, muscular strength, flexibility, static and dynamic balance, skinfold thickness, and psychological mood states were assessed under standardized testing conditions. Exercise training resulted in significant improvements in peak oxygen uptake, lower extremity muscle strength, and psychological vigor (p < 0.05) but did not affect other fitness components (p > 0.05). There were no differences between the WW and NW exercise groups for any of the same variables studied (p > 0.05). No significant pre- to post-test changes were found for the NE control group (p > 0.05). It is concluded that 10 weeks of low-impact, moderate-intensity exercise training of the type that can be considered well-rounded in nature provides a sufficient stimulus to augment aerobic fitness, beneficially affects leg strength, and increases feelings of vigor in older adults. The present observations indicate that the use of light wrist weights has no beneficial or adverse effects on the measured training outcomes.

Scharff et al (1997) to determine the effect of vertical impact forces during bench-step aerobics: exercise rate and experience, randomly performed 8-min. protocols of the "basic" bench-stepping technique and a more advanced
"travel" technique at 30 and 33 cycles min\textsuperscript{-1}. Analysis showed that the faster exercise rate yielded significantly higher vertical impact forces on a reference (B-8) step height (20.3 cm). At 33 cycles min\textsuperscript{-1}, the instructors, and novices' responses were both higher than those at 30 cycles min\textsuperscript{-1}. The mean peak vertical impact force ranged from 1.54 times the body weight for the novice group at 30 cycles min\textsuperscript{-1} to 1.87 times the body weight for instructors at 33 cycles min\textsuperscript{-1}. A comparison of the groups' force curves showed a distinctive pattern in the loading of the impact forces. Specifically, the instructors consistently produced a transitory decrement in force prior to attaining peak force. In addition, the novices exhibited non-uniform increases in the production of vertical impact force across other step heights at the faster (33 cycles min\textsuperscript{-1}) speed. Thus, experience with bench-step exercise may afford an ability to make uniform and force-absorbing adjustments in the resultant vertical impact forces at increased speeds.

Frangolias, Rhodes, and Taunton (1996) compared the cardiovascular responses of maximal deep water running to treadmill running utilizing 22 endurance runners (8 female, 14 males, ages 21 to 35 yr) who were divided into experienced and inexperienced deep water running groups and given maximal exertion tests on the treadmill and in the water. Experienced deep water runners were classified as those doing at least 6 deep water running workouts per month for 6 months prior to the study. Results indicated that the more familiar subjects were with deep water running, the smaller the difference in maximal oxygen uptake values between water and land running. Experienced deep water runners
had VO_{2max} values on land and in water that were within 3.8 ml/kg/min whereas the difference in the inexperienced deep water runners was 10.3 ml/kg/min. Underwater video analysis revealed that inexperienced deep water runners were unable to maintain upright positions in the water and more likely to cup the water with their hands, propelling themselves slightly forward. Leg patterns of the inexperienced deep water runners adapted to a shorter stride cycle, similar to a swimming kick motion, which increased the contribution of the upper body. Maximal heart rate results indicated no significant differences in maximal heart rate in land vs. water in the experienced deep water runners. The researchers concluded that the more familiar individuals are with deep water running, the more closely matched the physiological responses of the two exercise mediums.

2.2 STUDIES ON PHYSIOLOGICAL VARIABLES

Savvas et.al. (2008) investigated the adaptations of a water-based training program as well as the detraining and retraining effects on physiological parameters in patients with coronary artery disease (CAD). Methods: Twenty-one patients were separated in an exercise group (n = 11) and a control group (n = 10). The exercise group followed three periods: training, detraining and retraining. Each period lasted 4 months. During the training and the retraining periods, the patients performed four sessions of water exercise (not swimming) per week. Results: The water-based program was well-accepted and no adverse effects were observed. The exercise group improved (p < 0.05) their stress-test time (+11.8%), VO_{2peak} (+8.4%) and total body strength (+12.2%) after the
training period; detraining tended to reverse these positive adaptations. Resumption of training increased the beneficial effects obtained after the initial training period (exercise stress: +4.5%; $\text{VO}_2\text{peak}$: +6.6%; total strength: +7.0%). The patients in the control group did not show any significant alterations throughout the study. Conclusion: Water-based exercise is safe and induces positive physiological and muscular adaptations in low-risk patients with CAD.

Takahashi, Ishihara and Aoki (2006) examined how the recovery of physiological functioning of the leg muscles after high-intensity eccentric exercise such as downhill running could be promoted by aqua exercise for a period until the damaged muscle had recovered almost completely. Ten male long-distance runners were divided equally into an aqua exercise group and a control group. From the first day (Day 0) to the fourth day (Day 3), the participants completed a questionnaire on muscle soreness, and serum creatine kinase activity, muscle power, flexibility, whole-body reaction time and muscle stiffness were measured. After measurements on Day 0, the participants performed downhill running (three 5 min runs with a 5 min rest interval at -10%, 335.7 +/- 6.1 m . min-1). The aqua exercise group performed walking, jogging and jumping in water on three successive days following the downhill running on Day 0 for 30 min each day. Muscle power was reduced on Day 1 in the control group ($P < 0.05$). Muscle soreness in the calf on Day 3 was greater in the control group than that in the aqua exercise group ($P < 0.05$). In the aqua exercise group, muscle stiffness in the calf was less than that in the control group over 4 days (time main effect: $P < 0.05$; group x time interaction: $P < 0.05$). We
conclude that aqua exercise promoted physiological functioning of the muscles in the legs after high-intensity downhill running for a period until the damaged muscles had recovered almost completely.

Starker, et.al. (2007) investigated the Motor Fitness Results of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS). Motor fitness was investigated in children and adolescents aged 4-17 using specific short tests. These tested the motor abilities: co-ordination, strength, cardio respiratory fitness and flexibility. Among the 4-10 year olds, the focus of the investigation was on recording coordination, strength and flexibility: in the age group of the 11-17 year olds it was on recording cardio respiratory fitness. The current investigation describes motor fitness based on the tested abilities according to age, sex and socio-demographic aspects. In all the test tasks, as expected, there are better results from older children and adolescents than from younger ones. Among the 4-10 year olds, girls display a slightly higher motor fitness in five out of the six tasks. In cardio respiratory fitness, the cycle ergo meter test for the 11-17 year olds shows better results for boys. The results indicate that there is a correlation between migrant status, social status and motor fitness. The shown differences point out that possible intervention programmes should be specifically attuned to age and sex as well as to the concerns of children and families with a migrant background and those of low social status. These collected data on motor fitness produced a database, representative of Germany. This will enable statements on state and development of motor fitness in children and adolescents in the future.
Opper, et.al. (2007) studied the module "Motorik" in the German Health Interview and Examination Survey for Children and Adolescents (KiGGS). Motor fitness and physical activity of children and young people. Motor fitness and physical activity are important aspects of a healthy development in childhood and adolescence. However, the assessment of motor fitness and physical activity is not subject to standardized criteria; furthermore, the samples investigated do not provide a representative image of the whole population. Therefore, the existing data only allow very limited statements on the state and development of motor fitness and physical activity. The "Motorik" module, as part of the German Health Interview and Examination Survey for Children and Adolescents (KiGGS), offers nationwide representative data on the motor fitness and physical activity of children and adolescents for the first time. Besides the baseline-analysis, another aim is to analyze the complex relationship between motor fitness, physical activity and health. Motor fitness, based on the systematization of motor abilities, was assessed using a test profile. The test profile consists of 11 items measuring cardio respiratory fitness, strength, coordination and mobility. Physical activity was assessed using a questionnaire containing 51 items on the duration, intensity and frequency of physical activity in everyday life, during leisure time, at school and in sports clubs. The above-mentioned questionnaire subtopics were supplemented by questions on the weekly prevalence of at least 60 minutes of daily physical activity, on material and local conditions, as well as on cognition and motivation for physical activity. In the years 2004 to 2006, the motor fitness and physical activity of 4,529
children and young people between the ages of 4 and 17 years was investigated on 168 sample points in the context of the "Motorik" module. Half of the children and adolescents investigated belong to the middle class; approximately 15% have a background of migration. The majority of the subjects come from small towns, about a quarter live in the city, and less than 20% are settled in rural areas.

García, et.al. (2007) studied the Lipid and metabolic profiles in adolescents are affected more by physical fitness than physical activity (AVENA study). To determine whether the level of physical activity or physical fitness (i.e., aerobic capacity and muscle strength) in Spanish adolescents influences lipid and metabolic profiles. From a total of 2859 Spanish adolescents (age 13.0-18.5 years) taking part in the AVENA (Alimentación y Valoración del Estado Nutricional en Adolescentes) study. 460 (248 male, 212 female) were randomly selected for blood analysis. Their level of physical activity was determined by questionnaire. Aerobic capacity was assessed using the Course-Navette test. Muscle strength was evaluated using manual dynamometry, the long jump test, and the flexed arm hang test. A lipid-metabolic cardiovascular risk index was derived from the levels of triglycerides, low-density lipoprotein cholesterol (LDLC), high-density lipoprotein cholesterol (HDLC), and glucose. No relationship was found between the level of physical activity and lipid-metabolic index in either sex. In contrast, there was an inverse relationship between the lipid-metabolic index and aerobic capacity in males (P=.003) after adjustment for physical activity level and muscle strength. In females, a favorable lipid-
metabolic index was associated with greater muscle strength (P=.048) after adjustment for aerobic capacity. These results indicate that, in adolescents, physical fitness, and not physical activity, is related to lipid and metabolic cardiovascular risk. Higher aerobic capacity in males and greater muscle strength in females were associated with lower lipid and metabolic risk factors for cardiovascular disease.

Baillie, Wyon and Head (2007) studied the physiological effects of performance in Highland-dance competition to consider whether the traditional methods used during class and rehearsal provide an appropriate training stimulus toward this performance. Nine championship standard, female Highland dancers (age 14.2 +/- 1.47 years) had their heart rate and blood lactate concentrations measured before and after 3 dances during a championship competition. Heart rate was also measured during the same 3 dances in rehearsal and during class. Repeated-measures analysis of variance showed significant differences in predance lactate concentrations between the first dance (Highland Fling, 1.4 +/- 0.3 mM/L), the second dance (Sword dance, 2.3 +/- 0.8 mM/L), and the third dance (Sean Truibhas, 3.5 +/- 1.8 mM/L; F2,16 = 11.72, P < .01. This, coupled with a significant rise in lactate concentration during the dances (F1,8 = 76.75, P < .001), resulted in a final post dance lactate concentration of 7.3 +/- 2.96 mM/L. Heart-rate data during competition, rehearsal, and class (195.0 +/- 6.5, 172.6 +/- 5.4, and 151.9 +/- 7.4 beats/min, respectively) showed significant differences between all 3 (F2,16 = 107.1, P < .001); these are comparable to research on other dance forms. Given the disparity between the anaerobic predominance of
competition and the aerobic predominance during class, it is suggested that the
class does not provide an appropriate training stimulus as preparation for
competitive performance in Highland dance.

Torre, et.al. (2005) determined the cardiovascular responses during
aerobic step dance using an overload strategy not yet investigated: appendicular
overload. Ten healthy and moderately trained women (mean+/-SD: age 27+/-3.4
years, height 167.8+/-4.6 cm, body mass 55.7+/-4.7 kg, body mass index 19.8+/-
1.6, VO2max44.4+/-6.1 mLxkg-1xmin-1) performed an incremental treadmill
test to determine VO2peak, the VO2-heart rate (HR) and rating of perceived
exertion (RPE)-HR relationships. Within 1 week from the laboratory test, the
subjects performed two identical aerobic step dance routines: one using a track
suit with loads placed in pockets close to the legs and arms and another without
overload. The appendicular overload (10% of body mass) significantly increased
the exercise intensity from 84.5% to 89.8% of HRmax corresponding to 68.9%
and 78.3% of VO2peak, respectively (P<0.01). Similarly, RPE increased from
12.1 to 15.7 (P<0.001). The estimated VO2 and the caloric expenditure rose
from 30.3 to 34.7 mLxkg-1xmin-1 and from 251 to 288 kcal, respectively. This
study shows that the use of appendicular overload significantly increases the
energy cost of aerobic step session similarly to other overload strategies already
reported in the literature.

Eckerson and Anderson (2004) examined the physiological response to
water aerobics. Heart rate (HR) and oxygen uptake (VO2) measured during water
aerobics were compared to maximal values obtained during an incremental
A treadmill test was performed to assess the energy demand and potential cardio respiratory training effects of LA. Sixteen college age females served as subjects (mean ± SD = 20.4 ± 1.6 years). WA elicited a mean HR of 162 b.min⁻¹ and a mean VO₂ of 18.4 ml.kg⁻¹, which represented 74% of HR reserve, 82% of maximal HR, and 48% of VO₂ max. Average caloric expenditure was 5.7 kcal.min⁻¹. HR for WA were consistent with guidelines established by the American College Of Sports Medicine for developing and maintaining CR fitness in healthy adults. However, the VO₂ fell just below the recommended minimum threshold level. It was concluded that WA may provide an attractive alternative to traditional modes of exercise for improving CR fitness, however, HR measures may overestimate the metabolic intensity of the exercise.

**Benelli, Ditroilo, Vito (2004)** conducted a study on Physiological responses to fitness activities: A comparison between land-based and water aerobics exercise. This study compared the heart rate (HR) and blood lactate (BL) responses in young healthy women performing the same routine of aerobics exercise in 3 different conditions: on land, in shallow water (0.8 m), and in deep water (1.4 m). The average age and body mass index (BMI) of the group were 27.4 years and 22.6 kg.m⁻², respectively. The highest HR and BL values were reached during land aerobics (median HR values were 138.0 and 161.5 b.min⁻¹, and lactate values were 3.10 and 5.65 mmol.L⁻¹ at slow and at faster pace, respectively). These parameters were progressively reduced going from shallow water (121.5 and 154.0 b.min⁻¹, 1.75 and 3.15 mmol.L⁻¹) to deep water (97.5 and 113.5 b.min⁻¹, 1.70 and 1.75 mmol.L⁻¹). The HR measured as percentage of
maximum HR varied from 48.43% to 77.53% depending on the water depth and the pace. These data indicate that exercise in water significantly reduces HR and BL production compared with the same exercise performed on land.

Grier, et.al. (2002) examined the metabolic and cardiovascular responses of aerobic dance bench stepping (ADBS) at commonly used cadences and bench heights, 30 women (19-47 years of age) performed a graded maximal treadmill test and four 8-minute sub maximal ADBS routines. Subjects followed identical videotape sequences of basic ADBS movements at cadences of 125 and 130 beats.min(-1) at bench heights of 6 and 8 in. Physiological measurements were taken during each minute of each test. Mean values calculated from the last 3 minutes were used for data analysis. Although there were no physiological differences between ADBS at the 2 cadences, there were significant physiological differences between ADBS at the 2 bench heights. On average, a 2-in. increase in bench height, increased heart rate, VO$_2$, and rating of perceived exertion by 10 beats.min(-1), 3.09 ml.kg (-1) min(-1), and 1.53, respectively. In conclusion, it appears that bench height is more of a factor than cadence in increasing metabolic cost of ADBS. From this study provide information about the energy cost of ADBS at the common bench heights and cadences used in this study and, therefore, may be used to help aerobic participants select the proper bench height and cadence combination to control body weight and develop cardio respiratory fitness safely and effectively.

Laukkanen, et.al. (2001) measured heart rate during floor and step aerobic classes at three intensity levels. A group of 20 female occasional exercisers
mean age 33 (SD 8) years, mean body mass index 21 (SD 2) kg.m-2 volunteered to participate in six aerobic classes (three floor classes, three step classes) and in a laboratory test as members of one of two groups according to their prestudy regular participation in aerobics classes. Subjects in group A had participated four or more times a week and those of group B less than twice a week. The characteristics of the groups were as follows: group A, n = 10, mean maximal oxygen uptake (VO2max) 38.7 (SD 3.6) ml.kg-1.min-1, mean maximal heart rate (HRmax) 183 (SD 8) beats.min-1; group B, n = 10, VO2max 36.1 (SD 3.6) ml.kg-1.min-1, HRmax 178 (SD 7) beats.min-1. Each class consisted of a warm-up, a 20 min period of structured aerobic exercise (cardiophase) and a cool-down. The cardiophase was planned and guided as light, (rate of perceived exertion, RPE 11-12), moderate (RPE 13-14) or heavy (RPE 15-17) by an experienced instructor. The mean heart rates during the light classes were 72 (step) and 74 (floor) %HRmax in group A and 75 (step) and 79 (floor) %HRmax in group B; during the moderate classes, 84 (step) and 80 (floor) %HRmax in group A and 82 (step) and 83 (floor) %HRmax in group B. and during the heavy classes 89 (step and floor) %HRmax in group A and 88 (step) and 92 (floor) %HRmax in group B. Differences in heart rate and %HRmax were not statistically significant between the groups. However, differences in heart rate and %HRmax between the intensities (light vs moderate, moderate vs heavy and light vs heavy) were significant within both groups (all. P < 0.01). Based on the results, we conclude that intensity management during the aerobics classes was generally successful regardless of the participants' prior participation in aerobics.
Hayakawa, et.al. (2000) evaluated the effect of music on the mood of women during exercise. 16 middle-aged women, aged 49.9 +/- 7.53 yr., performed 60-min. bench stepping exercise while listening to Japanese traditional folk song, aerobic dance music, or nonmusical. The subjects reported significantly less fatigue with aerobic dance music and Japanese traditional folk song than with nonmusic. Aerobic dance music was associated with significantly more vigor and less confusion than nonmusic.

Bushman, et.al. (1997) determined that four weeks of DWR had no impact on post-training sub maximal treadmill heart rate responses when compared to pre-training sub maximal values (pre = 158 ± 5.0 bpm; post = 158 ± 4.4 bpm). In contrast, after training subjects in shallow water. In shallow water running 1 meter deep (WR) Hamer and Morton found heart rates of sedentary subjects to be 10-12 bpm lower during sub maximal water running compared to treadmill running. Interestingly. The intensity of exercise increased towards VO2max. the disparity of heart rate response between the two modes of exercise were diminished to within only a 5 bpm difference (50% VO2max: WR 122 ± 8, TM 134 ± 10 bpm; 90% VO2max: WR 168 ± 11 bpm, TM 173 ± 8 bpm).

Morrow, Jensen and Peace (1996) divided 11 subjects into either DWR (female = 3, males = 3) or land-based (female = 2, male = 3) exercise groups. Subjects trained three days a week for 35 minutes a session at 80% of HRmax as determined by mode specific VO2max tests. Additionally, subjects performed a timed 2.4-k run. Both training groups significantly improved in VO2max (p < 0.01). DWR training also decreased run time (p = 0.06). No mode specific
differences between the two training methods (land vs. water) were observed indicating that DWR can improve VO2max in a similar fashion as land-based exercise.

Wilber et al. (1996) exercised aerobically trained subjects 5 days a week, alternating high intensity shorter workouts (90-100% VO2max for 30 minutes) with moderately intense longer sessions (70-75% VO2max for 60 minutes). Similarly, Bushman et al. (1997) employed a training regimen consisting of DWR 5-6 days a week integrating two long and short interval days, one long run and an easy recovery run. These training schedules not only reflect actual training routines of these competitive athletes but more importantly insure adequate exercise intensity for the maintenance VO2max. Only one published training study investigated the effects of DWR with older adults (mean age of controls 57.5 ± 2.3 yr. mean age of experimental group = 63.1 ± 1.6 yr). In this investigation Long et al. (1996) reported significant VO2max improvements in a group of 35 sedentary older women after a 10-week DWR program.

Quinn and colleagues (1994) found that untrained females were unable to sustain VO2max though DWR. In their study, 7 young untrained females (mean = 21.7 yr) performed 6 weeks of land-based training (LBT) followed by 4 weeks of DWR. Evaluation of VO2max occurred on three separate occasions: before and after the land-based running training and at the conclusion of the DWR program. Participants trained 4 days a week for duration of 30 minutes per day. Untrained subjects improved VO2max after 6 weeks of outdoor running (post-LBT = 42.9 ± 3.2 ml/kg/min) only to have these gains return to pre-
training baseline values after 4 weeks of DWR (pre-training = 39.9 ± 3.6, post-DWR 40.0 ± 1.8 ml/kg/min)

Bell and Bassey (1994) compared the oxygen uptake and heart rate in various styles of dance and in a graded step test in ten healthy women aged [mean (SD)] 34 (5) years. Dance was choreographed into progressively more energetic sequences typical of community classes, and videotaped. Oxygen uptake was assessed using a respirometer carried in a back-pack. Each of the two tests (dance and step) took 15-20 min and measurements were made in randomised balanced order on the same day. The mean oxygen costs of dance ranged from 1.29 l.min⁻¹ for low impact style to 1.83 l.min⁻¹ for high impact style with arm work: mean heart rates were 135 and 174 beats.min⁻¹ respectively. Low impact dance raised heart rates above 60% of predicted maximum and so would provide training; during high impact dance recorded heart rates sometimes exceeded recommended safe limits. The addition of arm work significantly increased heart rates in both high and low impact dance but when oxygen pulses for each style of dance were compared no significant differences attributable to arm work were found. Moreover calculated differences between oxygen uptakes in stepping and dance at the same heart rates (those recorded during dance) were not significant for any of the four styles. Analysis of variance confirmed that neither arm work nor impact contributed significantly to the differences, so there was no evidence that these forms of dance change the normal relation between heart rate and oxygen uptake found in dynamic activities with large muscle groups such as stepping.
Hertler et al. (1992) compared treadmill exercise to deep water running (DWR) training in 13 young runners (aged 18-26 yr). Subjects trained on land 3 days per week, for 4 weeks, and then half of the subjects began a DWR program while the rest continued to run on land. To equalize the training, groups were matched for total exercise time and RPE. Post-training maximal treadmill tests indicated no changes occurred in VO2max between the treadmill and DWR exercise training groups. This finding implies that DWR training can be effective in maintaining VO2max in aerobically trained subjects.

Hoeger et al. (1992) directly examined the training effects of an identical aerobics program performed on land (low-impact) and in the water. Forty-nine untrained female subjects (water n = 20; land n= 15; control n = 14) participated in the 8-week study with the experimental groups exercising 3 times per week. The aerobic portion of the training session was 20 minutes in duration with exercise intensity maintained between 70-85% of HRR. Both the land-based (low-impact) and shallow water aerobics groups made similar gains in aerobic fitness, with a 14.8% relative improvement in estimated VO2max using a Bruce protocol (pre = 31 ± 6.8, post = 35.6 ± 7.0 ml/kg/min) observed in the shallow water aerobics group. Total treadmill time was also significantly increased (by one minute) following shallow water training. In agreement with Hoeger et al., a smaller yet significant 5.6% increase in VO2max (34.8 ± 4.1 to 36.7 ± 5.2 ml/kg/min) and an improved run time to exhaustion (pre = 15.8 ± 3.7 min, post = 19.4 ± 5.0 min) was also observed by Abraham (1994) following eleven weeks of shallow water aerobics.
2.3 STUDIES ON PSYCHOLOGICAL VARIABLES

Edwards B, and Higgins DJ. (2009) compare the mental health and vitality of people caring for a family member with a disability with those of the general population. Second, to identify factors experienced by carers that put them at risk of poor mental health and vitality. Cross-sectional design where logistic and multiple regression analyses were used to compare rates of mental health problems and vitality between careers and the general population while controlling for demographic characteristics. In addition, logistic and multiple regression using data from the survey of careers were used to identify risk factors for poor mental health and vitality that were particular to care giving. A randomly selected representative survey of 1002 careers from the Australian Centre link administrative database (June 2006) who received government payments to care for a person with a disability or severe medical condition, or a person who was frail aged. A sample of 10,223 non-careers was drawn from the fourth wave of the Household, Income and Labor Dynamics in Australia Survey, a nationally representative household panel survey (August 2004 to February 2005). Mental health and vitality as measured by the Medical Outcomes Study 36-item Short-Form Health Survey. Compared with the general population, careers were at significantly greater risk of having a mental health problem and lower levels of vitality, even after controlling for demographic characteristics. For careers, the risk factors for poor mental health and lower levels of vitality were caring for a person with a disability with higher care needs, experiencing greater levels of financial stress, lower levels of support and worse family
functioning. Careers are at greater risk of mental health problems and lower energy levels than the general population.

**Mullen R, Lane A, and Hanton S. (2009)** examined the intensity and direction of the competitive state anxiety response in collegiate athletes as a function of four different coping styles: high-anxious, defensive high-anxious, low-anxious and repressors. Specifically, the study predicted that repressors would interpret competitive state anxiety symptoms as more facilitative compared to high-anxious, defensive high-anxious, and low-anxious performers. Separate Multivariate Analyses of Variance (MANOVA) were performed on the intensity and direction subscales of the modified Competitive State Anxiety Inventory-2 (CSAI-2). A significant main effect was identified for trait worry revealing that low trait anxious athletes reported lower intensities of cognitive and somatic anxiety and higher self-confidence and interpreted these as more facilitative than high trait anxious athletes. The prediction that performers with a repressive coping style would interpret state anxiety symptoms as more facilitative than performers with non-repressive coping styles was not supported.

**Kercher A, and Rapee RM. (2009)** study evaluates a pathway for depressive risk that integrates cognitive diathesis-stress and stress-generation theories, following Hankin and Abramson's (2001, Journal of Clinical Child and Adolescent Psychology, 31(4), 491-504) elaborated cognitive-diathesis transactional stress model. In this model, young adolescents with initial depressive symptoms were hypothesised to experience later stressors that were at least partly dependent on their behaviour. The interaction of cognitive
vulnerability, a tendency to make depressogenic attributions and to ruminate, with these dependent stressors was then hypothesised to predict depressive symptoms after 6 months. This model was supported in a sample of 756 young adolescents, with cognitive style and dependent stressors partly mediating the relationship between initial and subsequent depressive symptoms. Cognitive vulnerability was also linked with an increased likelihood of dependent stressors.

Barnow S, et. al. (2009) reported that the cognitive theory of personality disorders hypothesizes that the emotional dysregulation and interpersonal problems in individuals with borderline personality disorder (BPD) are, at least partially, caused by dysfunctional cognitive schemas. These schemas lead to biased evaluation of environmental and interpersonal stimuli. This study examined the interpersonal evaluations of individuals with BPD, depressive and healthy control participants with the thin-slice judgments paradigm. Participants were asked to evaluate six persons in six film clips, which showed these persons for 10s, during which these persons entered a room and took a seat. Interpersonal style of the BPD group was investigated with the Inventory of Interpersonal Problems (IIP-C) questionnaire. Individuals with BPD judged the persons as being more negative and aggressive and less positive than the healthy participants, and more aggressive than the depressive individuals. In addition, individuals with BPD reported more extreme interpersonal behavior relative to the controls. The findings indicate an aggressivistic evaluation bias and elevated levels of interpersonal problems in individuals with BPD as suggested in the cognitive theory.
Van der Gucht E, et. al. (2009) examined depressogenic psychological processes and reward responsivity in relation to different mood episodes (mania, depression, remission) and bipolar symptomatology. One hundred and seven individuals with bipolar disorder (34 in a manic/hypomanic or mixed affective state; 30 in a depressed state and 43 who were euthymic) and 41 healthy controls were interviewed with Structured Clinical Interview for DSM-IV and completed a battery of self-rated and experimental measures assessing negative cognitive styles, coping response to negative affect, self-esteem stability and reward responsiveness. Individuals in all episodes differed from controls on most depression-related and reward responsivity measures. However, correlational analyses revealed clear relationships between negative cognitive styles and depressive symptoms, and reward responsivity and manic symptoms. Separate psychological processes are implicated in depression and mania, but cognitive vulnerability to depression is evident even in patients who are euthymic.

Stine-Morrow EA, et. al. (2008) studied on cognitive training have suggested that the effects of experience are narrow in augmenting or maintaining cognitive abilities, while correlational studies report a wide range of benefits of an engaged lifestyle, including increased longevity, resistance to dementia, and enhanced cognitive flexibility. The latter class of evidence is ambiguous because it is possible that it is simply the case that those with relatively better cognitive vitality seek out and maintain a wider range of activities. The authors report data from a field experiment in which older adults were randomly assigned to participate in a program intended to operationalize an engaged lifestyle, built on
a team-based competition in ill-defined problem solving. Relative to controls, experimental participants showed positive change in a composite measure of fluid ability from pretest to posttest. This study, thus, provides experimental evidence for the proposition that engagement, in the absence of specific ability training, can mitigate age-related cognitive declines in fluid ability.

Von Guenthner S, and Hammermeister J. (2007) explored the relationship between wellness and athletic performance, this study assessed the link between wellness, as defined by a high score on five wellness dimensions of emotional, social, spiritual, intellectual, and physical well-being, with psychological variables thought to be related to athletic performance as measured by athletes' self-report of specific athletic coping skills. 142 collegiate athletes completed a survey composed of the Optimal Living Profile to measure wellness dimensions and the Athletic Coping Skills Inventory to measure specific psychological variables. Analysis indicated that athletes scoring higher on the dimensions of wellness also scored significantly higher on athletic coping skills. Specifically, male athletes who scored higher on wellness also reported higher scores on coach ability, concentration, goal setting/mental preparation, and peaking under pressure, and female athletes who scored higher on wellness also reported higher scores in coping with adversity, coach ability, concentration, goal setting/mental preparation, and freedom from worry. Various dimensions of wellness seem related to better performance by involving the athletic coping skills of intercollegiate athletes. Implications for coaches and sport psychologists are also discussed.
Carr CM. (2006) highlighted the area of sport psychology as it relates to performance psychology skills (mental training), including a historical overview and current topics overview. The use of mental training skills may be of interest to the practicing physical medicine and rehabilitation professional in the treatment of his or her patients. It is important that the physical medicine professional recognize what sport or performance psychology represents within the paradigm of psychological interventions. Referring to an individual based on his or her training (licensed psychologist versus mental training consultant) is essential for the appropriate management of psychological issues related to performance. The issues related to the psychological rehabilitation of the injured athlete are of importance to the medical staff; the overview of affective responses can assist in understanding the normal and adaptive responses of the injured athlete. Finally, a brief description of a psychologist's role within a sports medicine and rehabilitation practice is presented. The psychological issues that are present in the world of sport and elite performance are numerous, and not all are mentioned in this article. Issues of eating disorders, substance abuse, and psychological health with athletes should be further explored within the physical medicine and rehabilitation discipline as well as in the sports medicine discipline. The ever-evolving psychological dynamics of individuals involved in sport and elite performance are intriguing and unique. A specialized knowledge base, training, and experience in providing psychological services are required to treat this unique population. Counseling and clinical issues of the athlete and elite performer require further attention in the realm of psychological
interventions, including further exploration of the efficacy of interventions for performance enhancement. The field of applied sport psychology may offer the physical medicine professional a unique perspective into the care of patients who are athletes and elite performers.

Buckworth and Dishman’s (2002) review of the related literature concluded that positive associations between exercise and self esteem have been found, but effects are stronger for individuals initially lower in self esteem and the exercise has more potent effect on physical self concept and self esteem than on general self perceptions. Exercise induces a sense of competence and person’s physical characteristics. Positive self esteem is associated with good mental health. So linking exercises with improvement in physical self concept and with better self esteem offers another reason for adopting and maintaining a physically active lifestyle.

Wininger (2002) examined the anxiolytic (anxiety reducing) effects of exercise for elderly women engaging in a single bout of aqua aerobics. Volunteers (N=29) completed questionnaires immediately before and after participating in an aqua aerobics class. The average age of participants was 66.4 yr. A brief form of Spielberger's State Anxiety Inventory and a questionnaire on demographic items were administered prior to engagement in exercise, and the brief form of the State Anxiety Inventory was administered again immediately after the exercise session. There was a significant difference on a t test between participants' ratings of anxiety before exercise (M = 16.8) compared to after exercise (M= 13.9); participants' ratings of state anxiety were somewhat lower.

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after exercising. Weaknesses of the present study and suggestions for research are presented.

**Wilson J.R. et.al. (2001)** examined the effects on mood of two bouts of maximal aerobic exercise (Bruce and Ramp protocols) and one bout of anaerobic exercise (Wingate Test) was evaluated in college aged males. Mood was measured with the Activation De-Activation Adjectival Check List (AD-ACL). Physiological measures showed that the two aerobic protocols were similar. Pre and post exercise mood changed significantly in each exercise test in a similar manner. And it was concluded that the pre and post exercise mood is altered after maximal aerobic and anaerobic exercises.

**Berger and Motl (2000)** conducted a study on recent 25 years reviews of related research literature to the effect of exercise on Profile of Mood States (POMS). They concluded that there is unequivocal support for the mood enhancing effects of exercise, specifically on improved vigor and reduced tension, depression, anger, confusion and fatigue. With respect to exercise intensity, the authors recommend that unless a participant prefers low or high exercise intensity, optimal conditions for mood changes occur at a moderate intensity level. In summary, exercise, in particular moderate intensity aerobic exercise, reduced negative mood and improved positive mood state.

**Anies (1998)** studied the effect of exercise on mood states of sedentary females. 66 female students of All Saints College, Trivandrum participated in this study. Mood states was first induced by POMS questionnaire and responses
were collected prior to the training programme and the same questionnaire was administered after the exercise programme of a total of 12 sessions extending over a period of 4 weeks having 3 sessions per week with a duration of 45 minutes. Mood states was measured using POMS questionnaire before and after exercise. Results showed significant difference between pre test and post test where the sedentary female have positive influence upon their mood states due to the exercise programme given.

Berger, Owen and Man (1993) determined the exercise and mental health literature and then examined the influence of rational difference on the acute mood benefits of swimming on women college students (N=70) from Czechoslovakia and the United States. They completed the POMS before and after class on thee occasions. The United States swimming classes met for 50 minutes twice a week through out a 14 weeks semester Czechoslovakian swimming classes met for 90 minutes once a week throughout a biweek semester in comparison with their respective controls. Czechoslovakian swimmers reported greater mood changes than the United States swimmers. The Czechoslovakian and United States swimmers reported mood improvement on tension, depression, anger, vigor and confusion.

Stratton (1990) conducted a study to examine changes in mood states of college cross country runners across a competitive season. Also compare the mood state profiles of the men’s team and the women’s team. The POMS questionnaire was administered to the athletes every other week on Wednesday afternoon prior to practice throughout the season. Significant variations were
identified for both the teams. Result reveals that the fatigue score for the females was higher than that for the males.

**Berger and David (1988)** experimented stress reduction and mood enhancement in four exercise modes, swimming, body conditioning, hatha yoga and fencing. Students voluntarily enrolled in co-educational fencing, body conditioning, swimming and yoga administered the POMS, a measure of mood states and the state anxiety subscale of the STM before and after class on three different days, students were significantly more fatigued than before. In body conditioning, the interaction between pre and post means was significant. Yoga participants felt significantly better after exercising on four POMS subscales.

**Phol (1984)** assessed the effect of a 12 week aerobic dance class on body image, self esteem and fitness in female college students. 119 female college students participated in this study, 43 of those in the experimental group and the 76 to the control group. Self images were assessed using Journard’s Self Cathereis Scales and Fitness were assessed using Cooper’s 12 min run. Body image, self image and fitness were assessed on a pre test, post test basis with a minimum time between testing occasions of 12 weeks for all sessions. There is a positive and moderate correlation between body and self image.

### 2.4 SUMMARY OF LITERATURE

**Tsourlou, et.al. (2006)** examined the effectiveness of both aerobic and resistance components and found these as an alternative training method for
improving neuromuscular and functional fitness performance in healthy elderly women.

**Viskić, et.al.(2007)** analyzed the impact of special programmed physical education including dance, aerobics and rhythmic gymnastics on the development of motor and functional abilities and found significant development of coordination/agility and specific rhythm coordination. functional aerobic ability. repetitive and explosive strength and flexibility. along with significant reduction of overweight and adipose tissue.

**Obert, P. et.al. (2001)** found aerobic training programme developed on the maximal power among prepubertal boys and girls. Kraemer et.al. (2001) found bench-step aerobics which enhances body composition, aerobic fitness, muscular strength, endurance, power.


**Benelli, Ditroilo, and Vito (2004)** compared between land-based and water aerobics exercise and found that exercise in water significantly reduces heart rate and blood lactate production compared with the same exercise performed on land.
Hoeger et al. (1992) examined the training effects of an identical aerobics program performed on land (low-impact) and in the water and found both the land-based (low-impact) and shallow water aerobics groups made similar gains in aerobic fitness.

Engles, et.al. (1998) examined the effects of low-impact, moderate-intensity exercise training with and without wrist weights. They found that the use of light wrist weights has sufficient stimulus to augment aerobic fitness, beneficially affects leg strength, and increases feelings of vigor in older adults.

Gappmaier, et.al. (2006) examined the aerobic exercise in water versus walking on land. They indicated that there were no differences in the effect of aerobic activities in the water versus weight-bearing aerobic exercise on land on body composition components as long as similar intensity, duration and frequency are used.

Burgess, Grogan and Burwitz (2006) found aerobic dance significantly reduced body image dissatisfaction (Attractiveness, Feeling Fat, Salience and Strength and Fitness) and enhanced physical self-perceptions (Body Attractiveness and Physical Self-Worth).

Laukkanen, et.al. (2001) measured heart rate during floor and step aerobic classes at three intensity levels and found differences in heart rate and %HRmax between the intensities (light vs moderate, moderate vs heavy and light vs heavy) were significant within both groups (all, P < 0.01).
Torre, et.al. (2005) found aerobic step dance using an overload strategy significantly increased HR max and VO$_2$ max. Grier, et.al. (2002) examined the metabolic and cardiovascular responses of aerobic dance bench stepping and found bench height is more of a factor than cadence in increasing metabolic cost.

Hayakawa, et.al. (2000) found aerobic dance music was associated with significantly more vigor and less confusion than nonmusic. Frangolias Rhodes, and Taunton compared the cardiovascular responses of maximal deep water running to treadmill running. The researchers concluded that the more familiar individuals are with deep water running, the more closely matched the physiological responses of the two exercise mediums.

Eckerson and Anderson (2004) examined the physiological response to water aerobics and found that water aerobics may provide an attractive alternative to traditional modes of exercise for improving cardio respiratory fitness.

Wininger (2002) found that there was a significant difference on state anxiety after exercising. Wilson J.R. et.al. (2001) concluded that the pre and post exercise mood is altered after maximal aerobic and anaerobic exercises.


Berger and Motl (2000) reported that exercise, in particular moderate intensity aerobic exercise, reduced negative mood and improved positive mood state

Buckworth and Dishman’s (2002) review of the related literature concluded that positive associations between exercise and self esteem. Kercher A, and Rapee RM.(2009) found cognitive vulnerability was also linked with an increased likelihood of dependent stressors.

Van der Gucht E.,et.al.(2009) revealed clear relationships between negative cognitive styles and depressive symptoms. Stine-Morrow EA, et.al.(2008) found in the absence of specific ability training, can mitigate age-related cognitive declines in fluid ability.

Von Guenthner S, and Hammermeister J. (2007) found emotional, social, spiritual, intellectual, and physical well-being were related to better performance by involving the athletic coping skills of intercollegiate athletes.

Carr CM.(2006) highlighted the area of sport psychology as it relates to performance psychology skills (mental training). Edwards B, and Higgins DJ.(2009) found Careers are at greater risk of mental health problems and lower energy levels than the general population.
Above literature shows that there was significant change in physical, physiological and psychological variables due to aerobics, step aerobics and aqua aerobic exercises. From the review of related literature it was found there was scope for research in finding out the effect of aerobics, step aerobics and aqua aerobic exercises on selected physical, physiological and psychological variables among the teacher training institute students.

Based on the experience gained, the investigator formulated suitable methodology to be adapted in this research, which is presented in Chapter III.