CHAPTER - II

REVIEW OF RELATED LITERATURE

2.1 REVIEW OF RELATED LITERATURE

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area. It gives an overview of what has been said, who the key writers are, what are the prevailing theories and hypotheses, what questions are being asked, and what methods and methodologies are appropriate and useful. As such, it is not in itself primary research, but rather it reports on other findings.

The study of the relevant literature is an essential step to get a full picture of what has been done with regard to the problem under study. Such a review brings new insight and helps the development of research procedure. The investigator has gathered the related studies from research quarterly, journals, magazines and thesis and has listed down such studies in this chapter to add further dimensions and scope for this study. The present review is based upon the available literature in respect to the study under investigation and therefore confined to the studies to which the investigator has accessed. All the relevant literature thus obtained by the researcher has been obstructed in this chapter to furnish necessary background material to evaluate the significance of the study. While going through the various sources of literature, it has been observed that very little work has been done on the training packages undergone in this study. However, the scholar has also gone through the literatures of allied studies that are related to this study to collect the necessary information for making a proper shape of the study.

The reviews of the literature have been classified under the following headings:
Studies on physiological variables and yogic practices
Studies on biochemical variables and yogic practices
Studies on psychological variables and yogic practices
Studies on diet in hypertension
Summary of the literature

2.2 STUDIES ON PHYSIOLOGICAL VARIABLES AND YOGIC PRACTICES

Yadav R et.al., (2017) studies the aim of this study was to evaluate the efficacy of a short-term yoga-based lifestyle intervention program in lowering Framingham Risk Score (FRS) and estimated 10-year cardiovascular risk. This was a single-arm, pre-post interventional study including data from a historical cohort with low to moderate risk for cardiovascular disease (CVD). It was conducted in a tertiary-care hospital. Participants with low (0 or 1 CVD risk factors) to moderately high risk (10-year risk between 10% and 20% and two or more CVD risk factors) were included. Participants with previously diagnosed CVD, defined as a history of myocardial infarction, congestive heart failure, or cerebrovascular accident, were excluded from the analysis. However, those with controlled hypertension were included. Intervention included a pretested short-term yoga-based lifestyle intervention, which included asanas (physical postures), pranayama (breathing exercises), meditation, relaxation techniques, stress management, group support, nutrition awareness program, and individualized advice. The intervention was for 10 days, spread over 2 weeks. However, participants were encouraged to include it in their day-to-day life. Outcomes included changes in FRS, and estimated 10-year CVD risk from baseline to week 2. A gender-based subgroup analysis was also done, and correlation between changes in FRS and cardiovascular risk factors was evaluated. Data for 554 subjects were screened, and 386 subjects (252 females) were included in the analysis. There was a significant reduction in FRS (p<0.001) and estimated 10-year cardiovascular risk (p<0.001) following the short-term yoga-based intervention. There was a strong positive correlation between reduction in FRS and serum total cholesterol (r=0.60; p<0.001). There was a moderate positive correlation
between reduction in FRS and low-density lipoprotein cholesterol \( (r=0.58: p<0.001) \), and a weak but positive correlation between reduction in FRS and triglycerides \( (r=0.26: p \leq 0.001) \), serum very-low-density lipoprotein cholesterol \( (r=0.29: p<0.001) \), and systolic blood pressure \( (r=0.20: p \leq 0.001) \). This yoga-based lifestyle intervention program significantly reduced the CVD risk, as shown by lowered FRS and estimated 10-year CVD risk. Further testing of this promising intervention is warranted in the long term

**Bokslag A et.al., (2017)** studied the effect of early-onset preeclampsia on cardiovascular risk in the fifth decade of life. Women with hypertensive disorders in pregnancy, in particular early-onset preeclampsia, are at increased risk of developing cardiovascular disease later in life. In a prospective observational study cardiovascular risk assessment was performed in women with early-onset preeclampsia \((<34 \text{ weeks gestation})\) and normotensive controls \((\geq 37 \text{ weeks gestation})\) 9-16 years after their index pregnancy. Medical records of two tertiary hospitals in Amsterdam, The Netherlands, were consecutively screened and all eligible women were invited. Cardiovascular risk assessment consisted of a questionnaire, blood pressure measurement, anthropometrics, blood and urine for fasting lipids, lipoproteins, glucose levels, HbA1c, renal function, NT-proBNP and albuminuria. Past history of cardiovascular diseases (i.e. myocardial infarction and stroke) was determined. Women with a history of early-onset preeclampsia \((n=131)\) had significantly higher systolic- and diastolic blood pressure, higher body mass index, had more often an abnormal lipid profile (lower HDL levels, higher triglycerides), higher HbA1c and higher levels of albuminuria compared to controls \((n=56)\). None of the women with a history of early-onset preeclampsia was diagnosed with cardiovascular disease: 38.2% were diagnosed with hypertension: 18.2% were diagnosed with metabolic syndrome. A total of 42% met the criteria for the window of opportunity for preventive measures.

**Xu B et.al., (2017)** studied association of female reproductive factors with Hypertension, Diabetes and LQTc in Chinese Women. The association of female reproductive factors (FRFs) with cardiovascular risk factors among different population was variable and inconsistent. The objective of this study was to examine
the association between FRFs and hypertension, type 2 diabetes mellitus (DM), and long heart-rate-corrected QT interval (LQTc) in Chinese post-menopausal women (Post-MW). A total of 8046 Post-MW from the China Chaoshan Biobank Cohort Study were included for analysis. Logistic regression and general linear regression models were used to estimate the association between FRFs and hypertension, DM, and LQTc. Compared with women with 0 or 1 live birth, increasing risk of hypertension (odds ratio [OR], 1.51: 95% confidence interval [CI], 1.16-1.96), DM (OR, 1.65: 95% CI, 1.22-2.22), and LQTc (OR, 1.45: 95% CI, 1.01-2.09) were observed in women who had five or more live births. Further analysis demonstrated that the association between parity and hypertension, DM, and LQTc was mediated by lifestyle and dyslipidemia. Women with more live births had increased body mass index and waist circumstance, and were inclined to consume more salty food, animal fat, and alcohol, but less meat, vegetable, fish, plant oil, and tea, compared with that had fewer live births (all P<0.05).

**Papp ME et.al., (2016)** studied the effects of High-Intensity Hatha Yoga on Cardiovascular Fitness, Adipocytokines, and Apolipoproteins in Healthy Students. Knowledge about the physiologic effects of performing high-intensity Hatha yoga exercises over a longer time period remains limited. To investigate the effects of high-intensity yoga (HIY) on cardiovascular fitness (maximal oxygen consumption, estimated from the Cooper running test), ratings of perceived exertion (RPE), heart rate (HR), heart rate recovery (HRR), blood pressure (BP), adipocytokines, apolipoprotein A1 (ApoA1), apolipoprotein B (ApoB), and glycosylated hemoglobin (HbA1c) in healthy students. The 44 participants (38 women and 6 men: median age, 25 years [range, 20-39 years]) were randomly assigned to an HIY or a control group. However, ApoA1 and adiponectin levels increased significantly in the HIY group. This finding suggests that HIY may have positive effects on blood lipids and an anti-inflammatory effect.

**Cohen DL et.al., (2016)** studied Blood Pressure effects of Yoga, Alone or in Combination with Lifestyle Measures: Results of the Lifestyle Modification and Blood Pressure Study (LIMBS). The authors conducted a study to assess the effects of yoga on blood pressure (BP). Patients were randomized to yoga (Blood Pressure
Education Program (BPEP)), or a combined program (COMBO). Ambulatory BP was measured at baseline and at 12 and 24 weeks. Data are presented for all enrolled patients (n=137) and for completers only (n=90). Systolic BP (SBP) and diastolic BP (DBP) were significantly decreased within all groups at 12 and 24 weeks (P<.001) for enrolled patients and completers. SBP was significantly reduced in the yoga and COMBO groups as compared with the BPEP group at 12 weeks in all enrolled and completers. SBP differences were no longer significant at 24 weeks between groups in all enrolled patients; however, there was a greater reduction in SBP at 24 weeks in completers favoring BPEP over yoga. No differences in DBP between groups or in BP between the yoga and COMBO groups were present. The authors did not observe an additive benefit from combining yoga with BPEP measures. Reasons for this are unclear at this time. BP lowering with yoga, however, was similar to that achieved with lifestyle measures.

**Goldstein MR et.al., (2016)** studied the improvements in well-being and vagal tone following a yogic breathing-based life skills workshop in young adults: Two open-trial pilot studies. While efficacy of Sudarshan Kriya Yoga (SKY) has been demonstrated in a number of prior studies, little is known about the effects of SKY taught as part of the Your Enlightened Side (YES) workshop designed for college students and other young adults. This study aimed to assess the effects of YES, a yogic breathing-based life skills workshop, on multiple measures of well-being and physiological stress response. 2 nonrandomized open-trial pilot studies were conducted with a total of 74 young adults (age 25.4 ± 6.6 years: 55% female). Study 1 collected a variety of self-report questionnaires at baseline, post workshop, and 1-month follow-up. Study 2 collected self-report questionnaires in addition to electrocardiography with a stationary cycling challenge at baseline and 1-month follow-up. Study 1: Improvements in self-reported depression (P's ≤ 0.010), perceived stress (P's ≤ 0.002), life satisfaction (P's ≤ 0.002), social connectedness (P's ≤ 0.004), and gratitude (P's ≤ 0.090) were observed at post workshop and 1-month after workshop relative to baseline. Study 2: Improvements in self-reported emotion regulation were observed at 1-month follow-up relative to baseline (P = 0.019). Positive and Negative Affect Schedule-Expanded Form positive affect increased (P = 0.021), while fatigue and sadness decreased (P's ≤ 0.005). During the stationary
cycling challenge, rate to recovery of electrocardiography inter-beat interval also increased from baseline to 1-month follow-up ($P = 0.077$). These findings suggest that a life skills workshop integrating yogic breathing techniques may provide self-empowering tools for enhancing well-being in young adults.

**Wolff M et.al., (2016)** studied to evaluate yoga's impact on blood pressure (BP) and quality of life (QOL) and on stress, depression and anxiety in patients with hypertension in a primary care setting and conducted a multi-centre randomized controlled trial with follow-up after 12-week intervention completion. Adult primary care patients diagnosed with hypertension were randomly allocated to yoga. The intervention group performed a short home-based Kundalini yoga programme 15min twice-daily during the 12-week intervention period. Data obtained from 191 patients (mean age 64.7 years, s.d. 8.4) allocated to yoga intervention (n=96) and control group (n=95), with a total proportion of 52% women, showed a significant reduction in systolic and diastolic BP for both groups (-3.8/-1.7mmHg for yoga and - 4.5/-3.0mmHg for control groups, respectively). However, the BP reduction for the yoga group was not significantly different from control. There were small but significant improvements for the yoga group in some of the QOL and depression measures ($P<0.05$, Hospital Anxiety and Depression scale, HADS-D) compared with control. The findings of our study, which is the largest study from an OECD country (Organization for Economic Co-operation and Development) to date, do not support the suggestion from previous smaller studies that yoga lowers the BP.

**Carter KS et.al., (2016)** studied the Stress can be associated with many physiological changes resulting in significant decrements in human performance. Due to growing interests in alternative and complementary medicine by Westerners, many of the traditions and holistic yogic breathing practices today are being utilized as a measure for healthier lifestyles. These state-of-the-art practices can have a significant impact on common mental health conditions such as depression and generalized anxiety disorder. However, the potential of yogic breathing on optimizing human performance and overall well-being is not well known. Breathing techniques such as alternate nostril, Sudarshan Kriya and bhastraika utilizes rhythmic breathing to guide practitioners into a deep meditative state of relaxation and promote self-awareness.
Furthermore, yogic breathing is physiologically stimulating and can be described as a natural "technological" solution to optimize human performance which can be categorized into: (1) cognitive function (i.e., mind, vigilance): and (2) physical performance (i.e., cardiorespiratory, metabolism, exercise, whole body). Based on previous studies, we postulate that daily practice of breathing meditation techniques play a significant role in preserving the compensatory mechanisms available to sustain physiological function. This preservation of physiological function may help to offset the time associated with reaching a threshold for clinical expression of chronic state (i.e., hypertension, depression, and dementia) or acute state (i.e., massive hemorrhage, panic attack) of medical conditions. However, additional rigorous biomedical research is needed to evaluate the physiological mechanisms of various forms of meditation (i.e., breath-based, mantra, mindfulness) on human performance. These efforts will help to define how compensatory reserve mechanisms of cardiovascular and immune systems are modulated by breath-based meditation. While it has been suggested that breath-based meditation is easier for beginning practitioners when compared to other forms of meditation more research is needed to elucidate these observations. A breath-based meditation sequence such as Sudarshan Kriya has the potential to help develop an individual's self-awareness and support better integration of the brain (i.e., mind) with other organ systems (i.e., body) for enhanced human performance.

Cramer H (2016) studied the efficacy and Safety of Yoga in Managing Hypertension. Hypertension is a major public health problem and one of the most important causes of premature morbidity and mortality. The impact of yoga as a complementary intervention for hypertension has been investigated in a number of randomized controlled trials: with an overall effect of about 10mmHg reduction in systolic and about 8mmHg reduction in diastolic blood pressure. Breathing and meditation rather than physical activity seem to be the active part of yoga interventions for hypertensive patients. These practices can increase parasympathetic activity and decrease sympathetic activity, arguably mainly by increasing GABA activity: thus counteracting excess activity of the sympathetic nervous system which has been associated with hypertension. Yoga can thus be considered a safe and effective intervention for managing hypertension. Given the possibly better
risk/benefit ratio, it may be advisable to focus on yogic meditation and/or breathing techniques.

**Jones SM et.al., (2016)** randomized controlled trial for vasomotor symptoms. Heart rate variability (HRV) reflects the integration of the parasympathetic nervous system with the rest of the body. Studies on the effects of yoga and exercise on HRV have been mixed but suggest that exercise increases HRV. We conducted a secondary analysis of the effect of yoga and exercise on HRV based on a randomized clinical trial of treatments for vasomotor symptoms in peri/post-menopausal women. Randomized clinical trial of behavioral interventions in women with vasomotor symptoms (n=335), 40-62 years old from three clinical study sites. 12-weeks of a yoga program, designed specifically for mid-life women, or a supervised aerobic exercise-training program with specific intensity and energy expenditure goals, compared to a usual activity group. Time and frequency domain HRV measured at baseline and at 12 weeks for 15min using Holter monitors. Women had a median of 7.6 vasomotor symptoms per 24h. Time and frequency domain HRV measures did not change significantly in either of the intervention groups compared to the change in the usual activity group. HRV results did not differ when the analyses were restricted to post-menopausal women. Although yoga and exercise have been shown to increase parasympathetic-mediated HRV in other populations, neither intervention increased HRV in middle-aged women with vasomotor symptoms. Mixed results in previous research may be due to sample differences. Yoga and exercise likely improve short-term health in middle-aged women through mechanisms other than HRV.

**Buckingham SA et.al., (2016)** studied Home-based versus Centre-based cardiac rehabilitation: abridged Cochrane systematic review and meta-analysis. To update the Cochrane review comparing the effects of home-based and supervised Centre-based cardiac rehabilitation (CR) on mortality and morbidity, quality of life, and modifiable cardiac risk factors in patients with heart disease. The Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, PsycINFO and CINAHL were searched up to October 2014, without language restriction. Randomized trials comparing home-based and Centre-based CR programmes in adults with myocardial infarction, angina, heart failure or who had undergone
coronary revascularization were included. 17 studies with 2172 patients were included. Home-based and Centre-based CR provide similar benefits in terms of clinical and health-related quality of life outcomes at equivalent cost for those with heart failure and following myocardial infarction and revascularization.

**Kuppusamy M et.al., (2016)** studied the immediate effects of bhramari Pranayama on Resting Cardiovascular Parameters in Healthy Adolescents. In yoga, Pranayama has a very important role in maintaining sound health. Still, there exists a dearth of literature on the effect of Bhramari pranayama (Bhr.p) on physiological systems. To assess the immediate effect of Bhramari pranayama (Bhr.P) practice on the resting cardiovascular parameters in healthy adolescents. 60 apparently healthy adolescents of both sex participated in the study. They were randomly divided into Bhr.P (n=30) and control (n=30) group. Bhr.P group practiced Bhramari pranayama for 45 min (5 cycles) and control group was allowed to do normal breathing (12-16 breath /min). Heart rate (HR) was assessed by radial artery palpation method and blood pressure was recorded in supine position after 5 minutes of rest by sphygmomanometer. The HR reduced significantly \( p<0.001 \) in Bhr.P group. BP indices, Pulse Pressure (PP), Mean Arterial Pressure (MAP), Rate Pressure Product (RPP) and Double Product (DoP) significantly decreased after Bhr.p practice compared with control. Pre and Post inter group analysis also showed that significant reduction in HR and BP indices in Bhr.P group. Present study showed that Bhr.P practice produces relaxed state and in this state parasympathetic activity overrides the sympathetic activity. It suggests that Bhramari pranayama improves the resting cardiovascular parameters in healthy adolescents.

**Dinesh T et.al., (2015)** studied comparative effect of 12 weeks of slow and fast pranayama training on pulmonary function in young, healthy volunteers. Pranayama are breathing techniques that exert profound physiological effects on pulmonary, cardiovascular, and mental functions. The aim was to compare the effect of 12 weeks of slow and fast pranayama training on pulmonary function in young, healthy volunteers. This study was carried out in Departments of Physiology and ACYTER, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry. 91 healthy volunteers were randomized into slow pranayama group
Supervised pranayama training (SPG: Nadisodhana, Pranav pranayama and Savitri pranayama: FPG: Kapalabhati, Bhastrika and Kukkriya pranayama) was given for 30 min/day, thrice/week for 12 weeks by certified yoga instructors. No significant change was observed in CG. 12 weeks of pranayama training in young subjects showed improvement in the commonly measured PFT. This indicates that pranayama training improved pulmonary function and that this was more pronounced in the FPG.

Thiyagarajan R et.al., (2015) studied additional benefit of yoga to standard lifestyle modification on blood pressure in prehypertensive subjects. High blood pressure (BP) is a known risk factor for cardiovascular disease morbidity. Considering the growing evidence of non-pharmacological interventions in the management of high BP, we designed a randomized, parallel active-controlled study on the effect of yoga and standard lifestyle modification (LSM) on BP and heart rate in individuals with pre-hypertension (systolic BP 120-139 mm Hg and/or diastolic BP 80-89 mm Hg). Volunteers (20-60 years) of both genders without any known cardiovascular disease were randomized into either LSM group (n = 92) or LSM + yoga group (n = 92). After 12 weeks of intervention, we observed a significant reduction in the BP and heart rate in both the groups. Further, the reduction in systolic BP was significantly more in LSM+yoga group (6 mm Hg) as compared with LSM group (4 mm Hg). In addition, 13 prehypertensives became normotensives in LSM + yoga group and four in LSM group. The results indicate efficacy of non-pharmacological intervention and the additional benefit of yoga to standard LSM.

Kwong JS et.al., (2015) studied Yoga for secondary prevention of coronary heart disease. Coronary heart disease (CHD) is the major cause of early morbidity and mortality in most developed countries. Yoga has been regarded as a type of physical activity as well as a stress management strategy. To determine the effectiveness of yoga for the secondary prevention of mortality and morbidity in, and on the health-related quality of life of, individuals with CHD, we considered studies that compared one group practicing a type of yoga with a control group receiving either no intervention or interventions other than yoga. 2 authors independently selected studies according to pre-specified inclusion criteria. We found no eligible RCTs that met the
inclusion criteria of the review and thus we were unable to perform a meta-analysis. The effectiveness of yoga for secondary prevention in CHD remains uncertain. Large RCTs of high quality are needed. Yoga is the secondary prevention of coronary heart disease.

**Bharshankar JR et.al., (2015)** studied autonomic Functions In Raja-yoga Meditators. Stress, an inevitable and constant feature throughout the lifetime, induces autonomic dysfunctions, for which meditation is considered to be an antidote. So the case control study was planned including 50 Raja-yoga meditators practicing meditation for 5 years and 50 age matched non-meditators. Mean values of resting HR, SBP and DBP were less in meditators. Galvanic Skin Response in meditators was significantly more (p < 0.001). Mean increase BP response to Hand Grip Test and Cold Pressor Test was significantly less in meditators than non-meditators (p < 0.001). Standing: Lying ratio, Valsalva ratio, Inspiration: Expiration ratio and 30:15 ratios were significantly increased in meditators than non-meditators. From the results, there was shifting of the autonomic balance to parasympathetic side in Raja-yoga meditators, which suggests its utility to combat the ill effects of stress.

**Pate JL and Buono MJ (2014)** studied the physiological responses to Bikram yoga in novice and experienced practitioners. This study intends to determine energy expenditure, heart rate, and sweat rate in novice and experienced practitioners from a standardized Bikram yoga class. Data were collected in the environmental chamber of the Exercise Physiology Laboratory at San Diego State University in California, USA. Male (n = 5) and female (n = 19) participants between the ages of 18 and 57 were recruited through flyers in yoga studios throughout San Diego. Participants were classified as experienced or novice practitioners, having completed ≥20 or <20 sessions, respectively. Participants were guided through a standardized 90-min yoga class performed in a hot environment using Bikram's Standard Beginning Dialogue, while expired gas was collected and heart rate was recorded. Mean (±SD) relative VO2 for the entire 90-min session was 9.5 ± 1.9 mL × kg-1 × min-1, ranging from 6.0 to 12.9 mL × kg-1 × min-1. Mean absolute energy expenditute was 286 ± 72 kcals, ranging from 179 to 478 kcals. Independent sample t tests revealed significant differences (P < .05) in relative energy expenditure, heart rate, ending core
temperature, and sweat rate between experience levels. Mean relative energy expenditure was 3.7 ± 0.5 kcal/kg in novice practitioners and 4.7 ± 0.8 kcal/kg in experienced practitioners. Percentage of predicted maximum heart rate and sweat rate were 72.3% ± 10.6% and 0.6 ± 0.2 kg/h in novice practitioners and 86.4% ± 5.2% and 1.1 ± 0.5 kg/h in experienced participants. Bikram yoga meets requirements for exercise of light-to-moderate intensity and, theoretically, could be used for weight maintenance or weight loss if practiced several times per week.

Sieverdes JC et al., (2014) studied the effects of Hatha yoga on blood pressure, salivary α-amylase, and cortisol function among normotensive and prehypertensive youth. Evidence is accumulating, predominantly among clinical trials in adults, that yoga improves blood pressure (BP) control, with downregulation of the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system (SNS) projected as underlying mechanisms. This pilot study assessed whether Hatha yoga has the potential to reduce BP among youth and whether dampening of the SNS and/or HPA activity is a likely pathway of change. 31 seventh graders were randomly assigned to a Hatha yoga program (HYP) or attention control (AC) music or art class. Baseline and 3-month evaluations included resting BP, overnight urine samples, and saliva collected at bedtime, upon awakening, and at 30 and 60 minutes after awakening for α-amylase and cortisol assays. A school-based Hatha yoga program demonstrated potential to decrease resting BP, particularly among prehypertensive youth. Reduced SNS drive may be an underlying neurohormonal pathway beneficially affected by the program. A large-scale efficacy/effectiveness randomized clinical trial is warranted.

Cramer H et al., (2014) studied a systematic review and meta-analysis of yoga for hypertension. The aim of this systematic review and meta-analysis was to evaluate the quality of evidence and the strength of recommendation for yoga as a therapeutic means in the management of prehypertension and hypertension. Randomized controlled trials (RCTs) on the effects of yoga interventions (≥8 weeks) compared with usual care or any active control intervention on blood pressure in patients with prehypertension (120-139/80-89 mm Hg) or hypertension (≥140/≥90 mm Hg). Risk of bias was assessed using the Cochrane risk of bias tool: quality of
evidence was assessed according to the GRADE recommendations. Seven RCTs with a total of 452 patients were included. Compared with usual care, very low-quality evidence was found for effects of yoga on systolic (6 RCTs, n = 278: mean difference (MD) = -9.65 mm Hg, 95% confidence interval (CI) = -17.23 to -2.06, P = 0.01: heterogeneity: I² (2) = 90%, χ²(2) = 48.21, P < 0.01) and diastolic blood pressure (6 RCTs, n = 278: MD = -7.22 mm Hg, 95% CI = -12.83 to -1.62, P = 0.01: heterogeneity: I² (2) = 92%, χ²(2) = 64.84, P < 0.01). Subgroup analyses revealed effects for RCTs that included hypertensive patients but not for RCTs that included both hypertensive and pre-hypertensive patients, as well as for RCTs that allowed antihypertensive co medication but not for those that did not. Compared with exercise, no evidence was found for effects of yoga on systolic or diastolic blood pressure. Larger studies are required to confirm the emerging but low-quality evidence that yoga may be a useful adjunct intervention in the management of hypertension.

Hagins M et al., (2007) found that does practicing Hatha yoga satisfied recommendations for intensity of physical activity which improves and maintains health and cardiovascular fitness. Little is known about the metabolic and heart rate responses to a typical Hatha yoga session. The purposes of this study were 1) to determine whether a typical yoga practice using various postures meets the current recommendations for levels of physical activity required to improve and maintain health and cardiovascular fitness: 2) to determine the reliability of metabolic costs of yoga across sessions: 3) to compare the metabolic costs of yoga practice to those of treadmill walking. In this observational study, 20 intermediate-to-advanced level yoga practitioners, age 31.4 +/- 8.3 years, performed an exercise routine inside a human respiratory chamber (indirect calorimeter) while wearing heart rate monitors. The exercise routine consisted of 30 minutes of sitting, 56 minutes of beginner-level Hatha yoga administered by video, and 10 minutes of treadmill walking at 3.2 and 4.8 kph each. Measures were mean oxygen consumption (VO2), heart rate (HR), percentage predicted maximal heart rate (%MHR), metabolic equivalents (METs), and energy expenditure (kcal). 7 subjects repeated the protocol so that measurement reliability could be established. Mean values across the entire yoga session for VO2, HR, %MHR, METs, and energy/min were 0.6 L/kg/min:93.2 beats/min: 49.4%: 2.5: and 3.2 kcal/min: respectively. Results of the ICCs (2, 1) for mean values across the entire
yoga session for kcal, METs, and % MHR were 0.979 and 0.973, and 0.865, respectively. Metabolic costs of yoga averaged across the entire session represent low levels of physical activity, are similar to walking on a treadmill at 3.2 kph, and do not meet recommendations for levels of physical activity for improving or maintaining health or cardiovascular fitness. Yoga practice incorporating sun salutation postures exceeding the minimum bout of 10 minutes may contribute some portion of sufficiently intense physical activity to improve cardio-respiratory fitness in unfit or sedentary individuals. The measurement of energy expenditure across yoga sessions is highly reliable.

Abel AN et al., (2013) studied the effects of regular yoga practice on pulmonary function in healthy individuals: a literature review. Yoga is a popular form of exercise in the Western world, and yoga's effects on pulmonary function have been investigated previously. The purpose of this article is to review this research systematically and determine if regular yoga training improves pulmonary function in apparently healthy individuals. Using the Alternative Health Watch, the Physical Education Index, databases: and the keywords yoga, respiration, and pulmonary function, a comprehensive search was conducted that yielded 57 studies. Yoga improved pulmonary function, as measured by maximum aspiratory pressure, maximum expiratory pressure, maximum voluntary ventilation, forced vital capacity, forced expiratory volume in 1 second, and peak expiratory flow rate, in all (N=9), but 1, study. Overall, pulmonary function appears to improve with a minimum of 10 weeks of regular yoga practice, and the magnitude of this improvement is related to fitness level and/or the length of time the subjects spend practicing pranayama (i.e., breathing exercises).

Turankar AV et al., (2013) studied the effects of slow breathing exercise on cardiovascular functions, pulmonary functions and galvanic skin resistance in healthy human volunteers - a pilot study. This pilot study was planned to evaluate the short term effects of pranayama on cardiovascular functions, pulmonary functions and galvanic skin resistance (GSR) which mirrors sympathetic tone, and to evaluate the changes that appear within a short span of one week following slow breathing techniques. 11 normal healthy volunteers were randomized into Pranayama group
(n=6) and a non-Pranayama control group (n=5): the pranayama volunteers were trained in pranayama, the technique being Anuloma-Viloma pranayama with Kumbhak. All the 11 volunteers were made to sit in similar environment for two sessions of 20 min each for seven days, while the pranayama volunteers performed slow breathing under supervision, the control group relaxed without conscious control on breathing. Pulse, GSR, blood pressure (BP) and pulmonary function tests (PFT) were measured before and after the 7-day programme in all the volunteers. While no significant changes were observed in BP and PFT, an overall reduction in pulse rate was observed in all the eleven volunteers: this reduction might have resulted from the relaxation and the environment. Statistically significant changes were observed in the Pranayama group volunteers in the GSR values during standing phases indicating that regular practice of Pranayama causes a reduction in the sympathetic tone within a period as short as 7 days.

Cornelissen VA et.al., (2013) studied Exercise training for blood pressure: a systematic review and meta-analysis. We conducted meta-analyses examining the effects of endurance, dynamic resistance, combined endurance and resistance training, and isometric resistance training on resting blood pressure (BP) in adults. The aims were to quantify and compare BP changes for each training modality and identify patient subgroups exhibiting the largest BP changes. Randomized controlled trials lasting ≥4 weeks investigating the effects of exercise on BP in healthy adults (age ≥18 years) and published in a peer-reviewed journal up to February 2012 were included. Random effects models were used for analyses, with data reported as weighted means and 95% confidence interval. BP reductions after dynamic resistance training were largest for pre hypertensive participants (-4.0 [-7.4 to -0.5]/-3.8 [-5.7 to -1.9] mm Hg) compared with patients with hypertension or normal BP. Endurance, dynamic resistance, and isometric resistance training lower SBP and DBP, whereas combined training lowers only DBP. Data from a small number of isometric resistance training studies suggest this form of training has the potential for the largest reductions in SBP.

Psychological risk factors such as anxiety and depression have been associated with coronary heart disease (CHD). Stress can have an impact on the risk factors for the disease, such as high blood pressure (BP), physical inactivity and being overweight. Examine the effect of the Mindfulness-Based Stress Reduction (MBSR) program on symptoms of anxiety and depression, perceived stress, BP and body mass index (BMI) in patients with CHD. All patients completed intervention in the MBSR group. Significant reduction was observed in symptoms of anxiety and depression, perceived stress, BP and BMI in patients of the MBSR group after the completion of intervention assessment. At 3-month follow-up, therapeutic gains were maintained in patients of the MBSR group. The MBSR program is effective in reducing symptoms of anxiety and depression, perceived stress, BP and BMI in patients with CHD.

Bhavanani AB et.al., (2012) studied immediate effect of chandra nadi pranayama (left unilateral forced nostril breathing) on cardiovascular parameters in hypertensive patients. The present study was designed to determine immediate effects of 27 rounds of exclusive left nostril breathing, a yogic pranayama technique known as chandra nadi pranayama (CNP) on cardiovascular parameters in patients of essential HT. 22 patients of essential HT under regular standard medical management were individually taught to perform CNP by a qualified yoga instructor with a regularity of 6 breaths/min throughout a performance of 27 rounds of CNP. Pre and post intervention heart rate (HR) and blood pressure (BP) measurements were recorded using non-invasive semi-automatic BP monitor and Students t test for paired data used to determine significant differences. 27 rounds of CNP produced an immediate decrease in all the measured cardiovascular parameters with the decrease in HR, systolic pressure (SP), pulse pressure, rate-pressure product and double product being statistically significant. We recommend that this simple and cost effective technique be added to the regular management protocol of HT and utilized when immediate reduction of BP is required in day-to-day as well as clinical situations.
Markil N et al., (2012) studied Yoga Nidra relaxation increases heart rate variability and is unaffected by a prior bout of Hatha yoga. The measurement of heart rate variability (HRV) is often applied as an index of autonomic nervous system (ANS) balance and, therefore, myocardial stability. No studies, to the authors’ knowledge, have examined the acute response in HRV to interventions combining relaxation and mind-body exercise. The objective of this study was to compare the acute HRV responses to Yoga Nidra relaxation alone versus Yoga Nidra relaxation preceded by Hatha yoga. This was a randomized counter-balanced trial. The trial was conducted in a university exercise physiology laboratory. Subjects included 20 women and men (29.15±6.98 years of age, with a range of 18-47 years). Participants completed yoga plus relaxation (YR) session and a relaxation only (R) session. These changes demonstrate a favorable shift in autonomic balance to the parasympathetic branch of the ANS for both conditions, and that Yoga Nidra relaxation produces favorable changes in measures of HRV whether alone or preceded by a bout of Hatha yoga.

Sukhsohale ND et al., (2012) studied the effect of short-term and long-term Brahmakumaris Raja Yoga meditation on physiological variables. Effect of short-term and long-term Brahmakumaris Raja Yoga meditation on physiological variables like heart rate (HR), respiratory rate (RR), systolic blood pressure (SBP) and diastolic blood pressure (DBP) was evaluated in 100 subjects practicing Raja Yoga meditation. All 100 subjects (33 men and 67 women) were aged 30 years and above (mean age 52.06 +/- 12.76 years). Short-term meditators (STM) (n = 27) practiced Raja Yoga meditation for duration of six months to five years (mean duration 3.37 +/- 1.67 years) and long-term meditators (LTM) (n = 73) practiced Raja Yoga meditation for more than five years (mean duration 11.19 +/- 5.13 years). Comparison between STM and LTM showed that the changes from baseline values (from premeditation to post-meditation at 15 and 30 minutes) in LTM were not statistically significant with those in STM (P > 0.05). However, within group differences in LTM revealed that changes in the physiological variables were statistically significant when compared between pre and post meditation both at 15 and 30 minutes. The study suggests that the long-term practice of Raja Yoga meditation improves basic cardio-respiratory
functions due to shifting of the autonomic balance in favor of parasympathetic instead of sympathetic system.

Lau HL et.al., (2012) studied Yoga for secondary prevention of coronary heart disease. Heart disease (CHD) is the major cause of early morbidity and mortality in most developed countries. Secondary prevention aims to prevent repeat cardiac events and death in people with established CHD. Yoga has been regarded as a kind of physical activity as well as stress management strategy. To determine the effectiveness of yoga for secondary prevention of mortality, morbidity, and health related quality of life of patients with CHD. Men and women (aged 18 years and above) with a diagnosis of acute or chronic CHD were included. We included studies with one group practicing a type of yoga compared to the control group receiving either no intervention or interventions other than yoga. Two authors independently selected studies according to the pre-specified inclusion criteria. Disagreements were resolved by consensus or discussion with a third author. We found no eligible RCTs that met the inclusion criteria of the review and thus we were unable to perform a meta-analysis. The effectiveness of yoga for secondary prevention in CHD remains uncertain. Large RCTs of high quality are needed.

Cohen DL et.al., (2011) studied Iyengar Yoga versus Enhanced Usual Care on Blood Pressure in Patients with prehypertension to Stage I Hypertension: a Randomized Controlled Trial. The prevalence of prehypertension and Stage 1 hypertension continues to increase despite being amenable to non-pharmacologic interventions. Iyengar yoga (IY) has been purported to reduce blood pressure (BP) though evidence from randomized trials is lacking. We conducted a randomized controlled trial to assess the effects of 12 weeks of IY versus enhanced usual care (EUC) (based on individual dietary adjustment) on 24-h ambulatory BP in yoga-naïve adults with untreated prehypertension or Stage 1 hypertension. In total, 26 and 31 subjects in the IY and EUC arms, respectively, completed the study. There were no differences in BP between the groups at 6 and 12 weeks. In the EUC group, 24-h systolic BP (SBP), diastolic BP (DBP) and mean arterial pressure (MAP) significantly decreased by 5, 3 and 3mmHg, respectively, from baseline at 6 weeks (P < .05), but were no longer significant at 12 weeks. In the IY group, 24h SBP was
reduced by 6mmHg at 12 weeks compared to baseline (P = .05). 24h DBP (P < .01) and MAP (P < .05) decreased significantly each by 5mmHg. No differences were observed in catecholamine or cortisol metabolism to explain the decrease in BP in the IY group at 12 weeks.

Bhavanani AB et.al., (2011) studied immediate effect of sukha pranayama on cardiovascular variables in patients of hypertension. Hypertension is one of the most common health disorders, and yoga has been shown to be an effective adjunct therapy in its management. This study was undertaken to determine the immediate cardiovascular effects of sukha pranayama in hypertensive patients. Twenty-three hypertensive patients attending the Yoga OPD at JIPMER were recruited for the study and instructed to perform sukha pranayama for 5 minutes at the rate of 6 breaths per min. This pranayama involves conscious, slow and deep breathing with equal duration for inhalation and exhalation. Heart rate (HR) and BP were recorded before and immediately after the intervention. Post-intervention statistical analysis revealed a significant (p < .05) reduction in HR and a highly significant (p < .001) reduction in systolic pressure, pulse pressure, mean arterial pressure, rate-pressure product, and double product with an insignificant fall in diastolic pressure. It is concluded that sukha pranayama at the rate of 6 breaths/minute can reduce HR and BP in hypertensive patients within 5 minutes of practice. This may be due to a normalization of autonomic cardiovascular rhythms as a result of increased vagal modulation and/or decreased sympathetic activity and improved baroreflex sensitivity. Further studies are required to understand possible mechanisms underlying this beneficial immediate effect and to determine how long such a beneficial effect persists.

Cheema BS et.al., (2011) studied the effect of an office worksite-based yoga program on heart rate variability: outcomes of a randomized controlled trial. Chronic work-related stress is an independent risk factor for cardiometabolic diseases and associated mortality, particularly when compounded by a sedentary work environment. The purpose of this study was to determine if an office worksite-based hatha yoga program could improve physiological stress, evaluated via heart rate variability (HRV), and associated health-related outcomes in a cohort of office workers. 37 adults employed in university-based office positions were randomized.
upon the completion of baseline testing to an experimental or control group. The experimental group completed a 10-week yoga program prescribed 3 sessions per week during lunch hour (50 min per session). An experienced instructor led the sessions, which emphasized asanas (postures) and vinyasa (exercises). The primary outcome was the high frequency (HF) power component of HRV. Secondary outcomes included additional HRV parameters, musculoskeletal fitness (i.e. push-up, side-bridge, and sit and reach tests) and psychological indices (i.e. state and trait anxiety, quality of life and job satisfaction). All measures of HRV failed to change in the experimental group versus the control group, except that the experimental group significantly increased LF: HF (p = 0.04) and reduced pNN50 (p = 0.04) versus control, contrary to our hypotheses. Flexibility, evaluated via sitand reach test increased in the experimental group versus the control group (p < 0.001). No other adaptations were noted. Post hoc analysis comparing participants who completed ≥70% of yoga sessions (n = 11) to control (n = 19) yielded the same findings, except that the high adherers also reduced state anxiety (p = 0.02) and RMSSD (p = 0.05), and tended to improve the push-up test (p = 0.07) versus control. A 10-week Hatha yoga intervention delivered at the office worksite during lunch hour did not improve HF power or other HRV parameters. Future investigations should incorporate strategies to promote adherence, involve more frequent and longer durations of yoga training, and enroll cohorts who suffer from higher levels of work-related stress.

Pramanik T et.al., (2009) studied immediate effect of slow pace bhashrika pranayama on blood pressure and heart rate. The objective of this study was to evaluate the immediate effect of slow pace bhashrika pranayama (respiratory rate 6/min) for 5 minutes on heart rate and blood pressure and the effect of the same breathing exercise for the same duration of time (5 minutes) following oral intake of hyoscine-N-butylbromide (Buscopan), a parasympathetic blocker drug. Heart rate and blood pressure of volunteers (n = 39, age = 25-40 years) was recorded following standard procedure. First, subjects had to sit comfortably in an easy and steady posture (sukhasana). The subject is directed to inhale through both nostrils slowly up to the maximum for about 4 seconds and then exhale slowly up to the maximum through both nostrils for about 6 seconds. These steps complete one cycle of slow
pace bhastrika pranayama (respiratory rate 6/min). The pranayama was conducted in a cool, well-ventilated room (18-20 degrees C). After 5 minutes of this breathing practice, the blood pressure and heart rate again were recorded in the aforesaid manner using the same instrument. Slow pace bhastrika pranayama (respiratory rate 6/min) exercise thus shows a strong tendency to improving the autonomic nervous system through enhanced activation of the parasympathetic system.

Harinath K et.al., (2004) studied the effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychological profile, and melatonin secretion. Evaluate the effects of Hatha yoga and Omkar meditation on cardiorespiratory performance, psychological profile, and melatonin secretion. 30 healthy men in the age group of 25-35 years volunteered for the study. They were randomly divided in two groups of 15 each. Group 1 subjects served as controls and performed body flexibility exercises for 40 minutes and slow running for 20 minutes during morning hours and played games for 60 minutes during evening hours daily for 3 months. Group 2 subjects practiced selected yogic asanas (postures) for 45 minutes and pranayama for 15 minutes during the morning, whereas during the evening hours these subjects performed preparatory yogic postures for 15 minutes, pranayama for 15 minutes, and meditation for 30 minutes daily, for 3 months. Orthostatic tolerance, heart rate, blood pressure, respiratory rate, dynamic lung function (such as forced vital capacity, forced expiratory volume in 1 second, forced expiratory volume percentage, peak expiratory flow rate, and maximum voluntary ventilation), and psychological profile were measured before and after 3 months of yogic practices. Serial blood samples were drawn at various time intervals to study effects of these yogic practices and Omkar meditation on melatonin levels. Yogic practices for 3 months resulted in an improvement in cardiorespiratory performance and psychological profile. The systolic blood pressure, diastolic blood pressure, mean arterial pressure, and orthostatic tolerance did not show any significant correlation with plasma melatonin. However, the maximum night time melatonin levels in yoga group showed a significant correlation (r = 0.71, p < 0.05) with well-being score. These observations suggest that yogic practices can be used as psycho physiologic stimuli to increase endogenous secretion of melatonin, which, in turn, might be responsible for improved sense of well-being.
2.3 STUDIES ON BIOCHEMICAL VARIABLES AND YOGIC PRACTICES

Rani K et.al., (2016) studied Psycho-Biological Changes with Add on Yoga Nidra in Patients with Menstrual Disorders: a Randomized Clinical Trial. Menstrual disorders are common problems among women in the reproductive age group. The present study was aimed to assess the effect of Yoga Nidra on psychological problems in patients with menstrual disorders. A total number of 100 women recruited from the department of obstetrics and gynecology and were then randomly allocated into two groups: a) intervention received yogic intervention and medication for 6 month, and control group received no yogic intervention and they only received prescribed medication). Psychological General Well-Being Index (PGWBI) and hormonal profile were assessed at the time of before and after six months on both groups. The mean score of anxiety, depression, positive well-being, general health, and vitality scores, as well as hormonal levels, in posttest were significantly different in intervention group as compared with pretest. Yoga Nidra can be a successful therapy to overcome the psychiatric morbidity associated with menstrual irregularities. Therefore, Yogic relaxation training (Yoga Nidra) could be prescribed as an adjunct to conventional drug therapy for menstrual dysfunction.

Himashree Get.al., (2016) studied Yoga Practice Improved Physiological and Biochemical Status at High Altitudes: A Prospective Case-control Study. Context High altitude (HA) is a psycho-physiological stressor for natives of lower altitudes. Reducing the morbidity and optimizing the performance of individuals deployed in an HA region has been attempted and reported with varied results. The present study intended to explore the effects of comprehensive yogic practices on the health and performance of Indian soldiers deployed at has the research team designed a prospective, randomized, case-control study. The study was done at Karu, Leh, India, at an altitude of 3445 m. Participants. A wide and comprehensive range of anthropometrical, physiological, biochemical, and psychological parameters were measured: height and weight: body fat percentage (BFP): heart rate (HR): respiratory rate (RR): systolic and diastolic blood pressure (DPB): peripheral saturation of oxygen: end tidal CO2 (EtCO2): chest expansion: pulmonary function: physical work capacity (VO2Max): hematological variables: lipid profile: serum urea:
creatinine: liver enzymes: blood glucose: and anxiety scores. Measurements were made at baseline and postintervention. Two-hundred soldiers took part in the study. The yoga group showed a significant improvement in health indices and performance as compared with the control group. They had lower weights, BFPs, RRrs, DBPs, and anxiety scores. They also had a significantly higher EtCO2, forced vital capacity, forced expiratory volume in the first second (FEV1), and VO2Max. Also, the yoga group showed a significant reduction in serum cholesterol, low-density lipoprotein, triglycerides, and blood urea as compared with their pre-yoga levels and with the exercise group. Practice of yoga facilitates improvements in health and performance at HAs and is superior to routine training with physical exercises. Comprehensive yogic practices are an effective modality for improving health and performance at HAs.

Dubroff R (2015) studied a Coronary heart disease is the leading cause of death worldwide, and its incidence is rapidly accelerating in developing nations. Patients often search for therapies that are alternatives to traditional treatments, such as heart medicines, coronary bypass surgery, or coronary stenting. Ayurveda is an ancient, East Indian, holistic approach to health care, and its use has never been formally evaluated for patients with coronary heart disease. The study intended to examine the feasibility and effectiveness of comprehensive Ayurvedic therapy—incorporating diet, meditation, breathing exercises, yoga, and herbs—-for patients with established coronary heart disease. The study was a prospective, single-group, pilot study. The participants were adults with a history of a prior heart attack, coronary bypass surgery, or a coronary intervention (ie, a coronary angioplasty and/or stent). All enrolled patients were evaluated by a single ayurvedic physician with >40 y of experience, and each received therapy consisting of a calorically unrestricted ayurvedic diet: instruction in yoga, meditation, and breathing: and use of ayurvedic herbs. The primary endpoint was arterial pulse wave velocity, a marker of arterial function and vascular health. Secondary endpoints included the following measurements: (1) body mass index (BMI); (2) blood pressure (BP) and amount of reduction in BP medications: and (3) levels of total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides. All parameters were measured at baseline and after 90 d of therapy.
Twenty-two patients were enrolled in the study, and 19 patients completed it. The research team observed significant improvements in arterial pulse wave velocity (P = .015), and favorable reductions in BMI (P < .0001), total cholesterol (P = .028), LDL cholesterol (P = .024), and triglycerides (P = .046). HDL cholesterol did not change significantly (P = .90). A majority of hypertensive patients were able to reduce or eliminate their antihypertensive medications (P = .0058). The study's results suggest a favorable effect for Ayurveda on arterial function and multiple risk factors in patients with established coronary heart disease.

Siu PM et.al., (2015) Metabolic syndrome (MetS) is a clustering of cardiovascular risk factors, which is associated with diabetes mellitus and cardiovascular disease. Lifestyle interventions applied to people with MetS has considerable beneficial effects on disease preventive outcomes. This study aimed to examine the effects of 1-year of yoga exercise on the cardiovascular risk factors including central obesity, hypertension, dyslipidemia and hyperglycemia in middle-aged and older Hong Kong Chinese adults with MetS. Adults diagnosed with MetS using National Cholesterol Education Program criteria (n = 182: mean ± SD age = 56.9 ± 9.1) were randomly assigned to a 1-year yoga intervention group or control group. Systolic and diastolic blood pressure, waist circumference, fasting plasma glucose, triglycerides, and high-density lipoprotein cholesterol were examined at baseline, midway, and on completion of the study. Physical activity level and caloric intake were assessed and included in the covariate analyses. A reduction of the number of diagnostic components for MetS was found to be associated with the yoga intervention. Waist circumference was significantly improved after the 1-year yoga intervention. A trend towards a decrease in systolic blood pressure was observed following yoga intervention. These results suggest that yoga exercise improves the cardiovascular risk factors including central obesity and blood pressure in middle-aged and older adults with MetS. These findings support the complementary beneficial role of yoga in managing MetS.

Inagaki N et.al., (2015) studied a sodium glucose co-transporter 2 inhibitors decrease hemoglobin A1c (HbA1c) and blood pressure (BP) and slightly increase low-density lipoprotein cholesterol (LDL-C) in patients with type 2 diabetes mellitus
The effects of baseline BP and LDL-C on the safety and efficacy of canagliflozin in patients were analyzed post hoc in a phase III study. Japanese patients with T2DM were classified by baseline systolic BP (SBP) of <130 or $\geq 130$ mmHg, diastolic BP (DBP) of <80 or $\geq 80$ mmHg, and LDL-C of <120 or $\geq 120$ mg/dL. Canagliflozin was administered daily to patients for 52 weeks at doses of either 100 mg (n = 584) or 200 mg (n = 715). The effects of canagliflozin on the incidence of adverse events (AEs), BP, and LDL-C were evaluated. No clear differences were observed in overall safety among the subgroups classified by baseline SBP, DBP, or LDL-C, except for a slight imbalance in AEs associated with volume depletion with 200 mg of canagliflozin. The decrease in mean SBP and DBP was evident in subgroups with baseline SBP $\geq 130$ mmHg and DBP $\geq 80$ mmHg. Mean LDL-C was decreased in subgroups with baseline LDL-C $\geq 120$ mg/dL at both canagliflozin doses, and they were slightly increased, but did not exceed 120 mg/dL in subgroups with baseline LDL-C <120 mg/dL. The changes in HbA1c and body weight from those observed at baseline were not different between subgroups classified by SBP, DBP, and LDL-C at either dose. The present post hoc analysis indicates that canagliflozin is well tolerated irrespective of baseline BP and LDL-C in patients with T2DM.

Lau C et al., (2015) studied to determine the efficacy of a 12-week Hatha yoga intervention to improve metabolic risk profiles and health-related quality of life (HRQoL) in Chinese adults with and without metabolic syndrome (MetS). Conducted a controlled trial within a university-affiliated hospital. 173 Chinese men and women aged 18 or above were assigned to either the yoga intervention group (n = 87) or the control group (n = 86). Primary outcomes included 12-week change in metabolic risk factors and MetS z score. Secondary outcome was HRQoL (Medical Outcomes Short Form Survey at 12 weeks). The mean age of participants was 52.0 (SD 7.4, range 31-years. Analysis involving the entire study population revealed that the yoga group achieved greater decline in waist circumference (p<0.001), fasting glucose (p<0.01), triglycerides (p<0.05), and MetS z score (p<0.01). Yoga training also improved general health perceptions (p<0.01), physical component score (p<0.01), and social functioning (p<0.01) domains score of HRQoL. However, no significant differences between groups were observed in the mean change of systolic/diastolic blood pressures or high-density lipid protein cholesterol (all p>0.05). There were no
significant differences in the intervention effects on waist circumference and MetS z score between the MetS subgroups (both p>0.05). A 12-week Hatha yoga intervention improves metabolic risk profiles and HRQoL in Chinese adults with and without MetS.

Hartley L et.al., (2014) studied Yoga for the primary prevention of cardiovascular disease. A sedentary lifestyle and stress are major risk factors for cardiovascular disease (CVD). Yoga was found to produce reductions in diastolic blood pressure (mean difference (MD) -2.90 mmHg, 95% confidence interval (CI) -4.52 to -1.28), which was stable on sensitivity analysis, triglycerides (MD -0.27 mmol/l, 95% CI -0.44 to -0.11) and high-density lipoprotein (HDL) cholesterol (MD 0.08 mmol/l, 95% CI 0.02 to 0.14). There was no clear evidence of a difference between groups for low-density lipoprotein (LDL) cholesterol (MD -0.09 mmol/l, 95% CI -0.48 to 0.30), although there was moderate statistical heterogeneity. There is some evidence that yoga has favorable effects on diastolic blood pressure, HDL cholesterol and triglycerides, and uncertain effects on LDL cholesterol. These results should be considered as exploratory and interpreted with caution.

Yadav RK et.al., (2014) studied High-density lipoprotein cholesterol increases following a short-term yoga-based lifestyle intervention. The objective of the study was to assess the effect of a brief but comprehensive yoga-based lifestyle intervention on high-density lipoprotein cholesterol (HDL-c). This prospective interventional study was performed at the Integral Health Clinic (IHC), an outpatient facility at All India Institute of Medical Sciences, New Delhi, a tertiary health care centre, conducting yoga-based lifestyle intervention programmes for prevention and management of chronic diseases. The study included apparently healthy normal weight, overweight and obese subjects who underwent a pretested 10-day yoga-based programme including asanas (postures), pranayama (breathing exercises), meditation, group discussions, lectures and individualized advice on stress management and healthy diet. The primary outcome measure was change in serum HDL-c at day 10 versus day 0. 238 participants (147 women, 91 men, 38.81±11.40 years) were included in the study. There was a significant increase in HDL-c levels from baseline to day 10 (42.93±5.00 vs 43.52±5.07 mg/dL, P = 0.043). Notably, HDL-c was
significantly improved in those for whom the baseline HDL-c levels were lower than the recommended values. Also, there was a reduction in blood pressure, fasting blood glucose, and improvement in other lipid profile variables. This yoga-based lifestyle intervention significantly increased HDL-c levels in a short duration of 10 days. This has additional clinical relevance as HDL-c is suggested to be one of the strongest statistically independent predictors of major cardiovascular events.

Dhameja K et.al., (2013) studied Therapeutic effect of yoga in patients with hypertension with reference to GST gene polymorphism. Hypertension, a chronic medical condition of increased blood pressure, is a serious public health problem. The present study was designed to investigate the association of glutathione S-transferases (GST) gene polymorphism with oxidative stress in hypertensive patients and the possible beneficial effect of yoga on them. 60 hypertensive individuals, between 30 and 60 years of age, were divided into two groups of 30 each. The yoga group was subjected to 50-60 minutes of yogic practices daily for 42 days, while the control group included the remaining 30 age- and sex-matched hypertensive individuals. GST gene polymorphism was analyzed using multiple allele specific polymerase chain reactions, and oxidative stress parameters were assessed biochemically. Assessment of blood pressure showed a statistically significant though modest reduction (p<0.05) in the yoga group as compared to the control group. Malondialdehyde was observed to be significantly low (p<0.05), while antioxidant capacity in the form of GST showed an increasing trend and ferric-reducing ability of plasma was significantly increased (p<0.05) in the subjects who practiced yoga. In conclusion, yoga has been found to decrease blood pressure as well as the levels of oxidative stress in patients with hypertension.

Kumar A et.al., (2013) studied the many women report an increased level of anxiety, irritability and mood swings during their perimenopausal state. Studies show that physically active people can reduce their anxiety and depression by practicing yoga. Serum minerals such as calcium, copper and magnesium and the ferro-oxidase, ceruloplasmin play an important role in the body during the perimenopausal period. The objective of this study is to assess the serum mineral status, anthropometric parameters and climacteric symptoms in perimenopausal women before and after
yoga intervention. A total of 30 subjects with perimenopausal symptoms, aged between 40 and 60 years (49.43 ± 6.15) were included in the study. Yoga intervention was given on a daily basis (45 minutes duration) for 12 weeks. The climacteric symptoms were assessed by Greene's climacteric scale and biochemical parameters were analyzed spectrophotometrically. A significant decrease in the waist hip ratio (P = 0.036) and body mass index (P < 0.036) was observed after yoga intervention. Systolic (P < 0.064) and diastolic (P < 0.082) blood pressure (BP) showed marginal decrease after yoga therapy. Climacteric symptoms improved significantly (P < 0.001) after yoga intervention. A significant increase (P < 0.001) in serum calcium and copper and a marked decrease in serum magnesium (P < 0.05) and ceruloplasmin (P < 0.028) levels was observed, post yoga therapy. Serum magnesium negatively correlated (r = -0.467, P < 0.035) with systolic BP after yoga intervention. The overall changes observed in the mineral status and climacteric symptoms suggest that yoga therapy protocol can be effectively used to improve the quality of life in perimenopausal women.

Shantakumari N (2013) studied the present study was conducted to assess the effectiveness of yoga in the management of dyslipidemia in patients of type 2 diabetes mellitus. This randomized parallel study was carried out in Medical College Trivandrum, Kerala, India. Hundred type 2 diabetics with dyslipidemia were randomized into control and yoga groups. The control group was prescribed oral hypoglycemic drugs. The yoga group practiced yoga daily for 1 h duration along with oral hypoglycemic drugs for 3 months. The lipid profiles of both the groups were compared at the start and at the end of 3 months. After intervention with yoga for a period of 3 months the study group showed a decrease in total cholesterol, triglycerides and LDL, with an improvement in HDL. Yoga, being a lifestyle incorporating exercise and stress management training, targets the elevated lipid levels in patients with diabetes through integrated approaches.

Ruth MR et.al.,(2013) studied consuming a hypocaloric high fat low carbohydrate diet for 12 weeks lowers C-reactive protein, and raises serum adiponectin and high density lipoprotein-cholesterol in obese subjects. High fat, low carbohydrate (HFLC) diets have become popular tools for weight management.
We sought to determine the effects of a HFLC diet compared to a low fat high carbohydrate (LFHC) diet on the change in weight loss, cardiovascular risk factors and inflammation in subjects with obesity. Obese subjects (29.0-44.6 kg/m²) recruited from Boston Medical Center were randomized to a hypocaloric LFHC (n=26) or HFLC (n=29) diet for 12 weeks. The age range of subjects was 21-62 years. As a percentage of daily calories, the HFLC group consumed 33.5% protein, 56.0% fat and 9.6% carbohydrate and the LFHC group consumed 22.0% protein, 25.0% fat and 55.7% carbohydrate. The change in percent body weight, lean and fat mass, blood pressure, flow mediated dilation, hip waist ratio, hemoglobin A1C, fasting insulin and glucose, and glucose and insulin response to a 2h oral glucose tolerance test did not differ (P>0.05) between diets after 12 weeks. The HFLC group had greater mean decreases in serum triglycerides (P=0.07), and hs-CRP (P=0.03), and greater mean increases in HDL cholesterol (P=0.004), and total adiponectin (P=0.045) relative to the LFHC. Secreted adipose tissue adiponectin or TNF-α did not differ after weight loss for either diet. Relative to the LFHC group, the HFLC group had greater improvements in blood lipids and systemic inflammation with similar changes in body weight and composition. This small-scale study suggests that HFLC diets may be more beneficial to cardiovascular health and inflammation in free-living obese adults compared to LFHC diets. AUC: BMI: Cardiovascular: DXA: ELISA: FMD: HDL: HFLC: HMW: HOMA-IR: HbA1C: Inflammation: LDL: LFHC: Macronutrients: OGTT: TNF-α: Weight loss: area under the curve: body mass index: dual energy x-ray absorptiometry: enzyme-linked immunosorbent assay: flow mediated dilation: hemoglobin A1C: high density lipoprotein: high fat low carbohydrate: high molecular weight: high sensitivity-C-reactive protein: homeostatic model assessment-insulin resistance: hs-CRP: low density lipoprotein: low fat high carbohydrate: oral glucose tolerance test: tumor necrosis factor-alpha.

Lee JA et.al., (2012) studied a regular and continuous yoga exercise is one of the most important nonpharmacological methods of improving serum lipid concentrations, adipose tissue, and metabolic syndrome factors. The purpose of this study was to analyze the effects of yoga exercise on serum adiponectin and metabolic syndrome factors in obese postmenopausal Korean women. Sixteen healthy postmenopausal women aged 54.50 ± 2.75 years with more than 36% body fat were
randomly assigned to either a yoga exercise group \((n = 8)\) or to a "no exercise" control group \((n = 8)\). The variables of body composition, visceral fat, serum adiponectin, and metabolic syndrome factors were measured in all the participants before and after the 16-week study. Body weight, percentage of body fat, lean body mass, body mass index, waist circumference, and visceral fat area had significantly decreased. High-density lipoprotein cholesterol and adiponectin had significantly increased, but total cholesterol, triglycerides, low-density lipoprotein cholesterol, blood pressure, insulin, glucose, and homoeostasis model assessment-insulin resistance had significantly decreased. Serum adiponectin concentrations were significantly correlated with waist circumference, high-density lipoprotein cholesterol, diastolic blood pressure, and homoeostasis model assessment-insulin resistance in the postyoga exercise group. Our findings indicate that yoga exercise improves adiponectin level, serum lipids, and metabolic syndrome risk factors in obese postmenopausal women. Consequently, yoga exercise will be effective in preventing cardiovascular disease caused by obesity in obese postmenopausal Korean women.

**Heran BS et.al., (2010)** studied blood pressure lowering efficacy of potassium-sparing diuretics (that block the epithelial sodium channel) for primary hypertension. Blood pressure low efficacy of potassium-sparing diuretics (that block the epithelial sodium channel) for primary hypertension. Potassium-sparing diuretics, which block the epithelial sodium channel \((\text{ENaC})\), are widely prescribed for hypertension as a second-line drug in patients taking other diuretics (e.g. thiazide diuretics) and much less commonly prescribed as monotherapy. Therefore, it is essential to determine the effects of \(\text{ENaC}\) blockers on blood pressure \((\text{BP})\), heart rate and withdrawals due to adverse effects \((\text{WDAEs})\) when given as a first-line or second-line therapy. To quantify the dose-related reduction in systolic blood pressure \((\text{SBP})\) and diastolic blood pressure \((\text{DBP})\) of \(\text{ENaC}\) blocker therapy is used as a first-line or second-line drug in patients with primary hypertension. Double-blind, randomized, controlled trials in patients with primary hypertension that evaluate, for a duration of 3 to 12 weeks, the BP lowering efficacy of: 1) fixed-dose monotherapy with an \(\text{ENaC}\) blocker compared with placebo; or 2) an \(\text{ENaC}\) blocker in combination with another class of anti-hypertensive drugs compared with the respective monotherapy (without an \(\text{ENaC}\) blocker). The addition of low doses of amiloride and
triamterene in these trials did not reduce BP. An estimate of the dose-related BP lowering efficacy for ENaC blockers was not possible because of a lack of trial data at higher doses. ENaC blockers do not have a statistically or clinically significant BP lowering effect at low doses but trials at higher doses are not available.

Habib SS et.al.,(2006) studied the aim of this study is to compare lipid and lipoprotein (a) profiles in patients with type 2 diabetes mellitus (DM) on insulin and oral hypoglycemic therapy. The study took place in the Department of Physiology, Army Medical College, Rawalpindi, Pakistan, during 2002. Ninety-seven type 2 DM patients participated in the study. We divided the patients according to the type of treatment into sulphonylurea (n=40), sulphonylurea plus metformin (n=33) and insulin (n=24) therapy groups as well as 40 healthy subjects served as controls. Fasting blood samples were analyzed for lipoprotein (a) [Lp (a)], total cholesterol (TC), triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), glucose, glycosylated hemoglobin (HbA1c) and insulin. Different groups of diabetic patients showed elevated fasting blood glucose (FPG) levels (p<0.0001 for all), HbA1c (p<0.0001 for all) compared with controls. Meanwhile, fasting insulin levels were elevated only in insulin treated group compared with oral hypoglycemic treated groups and controls (p<0.0001 for all). Patients on sulphonylurea and on sulphonylurea plus metformin groups showed significantly elevated TC (p<0.001, p<0.0001), TG (p<0.001, p<0.01), LDL-C (p<0.01, p<0.001) and LDL-C/HDL-C (p<0.0001, p<0.0001) compared with controls. Insulin therapy group showed significantly decreased TC, TG, LDL-C, LDL-C/HDL-C levels compared with sulphonylurea and sulphonylurea plus metformin treated groups, however, no significant difference was noted in the levels of above mentioned parameters and controls. Meanwhile, HDL-C levels were significantly lower in all diabetic groups compared with controls and were higher in insulin treated group compared with sulphonylurea plus metformin therapy group (p<0.05). Lipoprotein (a) levels were significantly higher in different diabetic groups compared with controls. While there was a non-significant difference in Lp (a) levels between different diabetic groups. Patients with type 2 DM who are being treated on insulin have a better lipid profile (TC, HDL-C, LDL-C, TG) compared with those patients on oral
hypoglycemic agents. Meanwhile, Lp (a) levels were raised in all diabetic patients and seem not to be affected either by insulin or by oral hypoglycemic treatment.

Obarzanek E et al., (2001) studied the effects on blood lipids of a blood pressure-lowering diet: the Dietary Approaches to Stop Hypertension (DASH) Trial. Effects of diet on blood lipids are best known in white men, and effects of type of carbohydrate on triacylglycerol concentrations are not well defined. Our goal was to determine the effects of diet on plasma lipids, focusing on subgroups by sex, race, and baseline lipid concentrations. The subjects were 436 participants of the Dietary Approaches to Stop Hypertension (DASH) Trial [mean age: 44.6 y; 60% African American; baseline total cholesterol: ≤ 6.7 mmol/L (≤ 260 mg/dL)]. The intervention consisted of 8 wk of a control diet, a diet increased in fruit and vegetables, or a diet increased in fruit, vegetables, and low-fat dairy products and reduced in saturated fat, total fat, and cholesterol (DASH diet), during which time subjects remained weight stable. Relative to the control diet, the DASH diet resulted in lower total (-0.35 mmol/L, or -13.7 mg/dL), LDL- (-0.28 mmol/L, or -10.7 mg/dL), and HDL- (-0.09 mmol/L, or -3.7 mg/dL) cholesterol concentrations (all P < 0.0001), without significant effects on triacylglycerol. The net reductions in total and LDL cholesterol in men were greater than those in women by 0.27 mmol/L, or 10.3 mg/dL (P = 0.052), and by 0.29 mmol/L, or 11.2 mg/dL (P < 0.02), respectively. Changes in lipids did not differ significantly by race or baseline lipid concentrations, except for HDL, which decreased more in participants with higher baseline HDL-cholesterol concentrations than in those with lower baseline HDL-cholesterol concentrations. The fruit and vegetable diet produced few significant lipid changes. The DASH diet is likely to reduce coronary heart disease risk. The possible opposing effect on coronary heart disease risk of HDL reduction needs further study.

2.4 STUDIES ON PSYCHOLOGICAL VARIABLES AND YOGIC PRACTICES

Cramer H et al., (2017) studied Yoga for improving health-related quality of life, mental health and cancer-related symptoms in women diagnosed with breast cancer. Breast cancer is the cancer most frequently diagnosed in women worldwide.
Even though survival rates are continually increasing, breast cancer is often associated with long-term psychological distress, chronic pain, fatigue and impaired quality of life. Yoga comprises advice for an ethical lifestyle, spiritual practice, physical activity, breathing exercises and meditation. It is a complementary therapy that is commonly recommended for breast cancer-related impairments and has been shown to improve physical and mental health in people with different cancer types.

To assess effects of yoga on health-related quality of life, mental health and cancer-related symptoms among women with a diagnosis of breast cancer who are receiving active treatment or have completed treatment. Randomized controlled trials were eligible when they (1) compared yoga interventions versus no therapy or versus any other active therapy in women with a diagnosis of non-metastatic or metastatic breast cancer, and (2) assessed at least one of the primary outcomes on patient-reported instruments, including health-related quality of life, depression, anxiety, fatigue or sleep disturbances. Two review authors independently collected data on methods and results. Moderate-quality evidence supports the recommendation of yoga as a supportive intervention for improving health-related quality of life and reducing fatigue and sleep disturbances when compared with no therapy, as well as for reducing depression, anxiety and fatigue, when compared with psychosocial/educational interventions. Very low-quality evidence suggested that yoga was as effective as other exercise interventions and might be used as an alternative to other exercise programmes.

Rao M et.al., (2017) studied effects of Mind Sound Resonance Technique (Yogic Relaxation) on Psychological States, Sleep Quality, and Cognitive Functions in Female Teachers: A Randomized, Controlled Trial. Several studies have revealed a high rate of physical and psychological problems from stress among schoolteachers. Yoga is one of the mind-body interventions known to alleviate stress and effects. The mind sound resonance technique (MSRT), a yoga-based, mindfulness relaxation is recognized as having a positive influence on physical and psychological health. The study intended to examine the effects of an MSRT intervention for 1 mo on perceived stress, quality of sleep, cognitive function, state and trait anxiety, psychological distress, and fatigue among female teachers. The study was a randomized, controlled trial. The study occurred at 2 primary schools in Bangalore City, India. 60 female
teachers, aged between 30 and 55 y, from the 2 schools were enrolled in the study. The participants were randomly divided into an MSRT group (n = 30) and a control group (n = 30). Participants in the MSRT group participated in MSRT for 30 min/d, 5 d/wk, for the duration of 1 mo. The participants in the control group followed their normal daily routines. Perceived stress, sleep quality, cognitive function, anxiety, psychological distress, fatigue, and self-esteem were assessed using standardized assessment tools at baseline and after 1 mo of the intervention. In the current study, the practice of MSRT facilitated a reduction in the levels of stress, anxiety, fatigue, and psychological distress. The relaxation technique also enhanced the levels of self-esteem and quality of sleep among female teachers working in primary schools.

Ramanathan M et.al., (2017) studied effect of a 12-week yoga therapy program on mental health status in elderly women inmates of a hospice. This study was undertaken to evaluate the effectiveness of yoga on the mental health status of elderly women inmates residing in a hospice in Puducherry. Forty elderly women were randomly divided into yoga and wait-listed control group. A yoga therapy program of 60 min was given twice a week for 12 weeks. Hamilton anxiety scale for measuring anxiety, Hamilton rating scale for depression, and Rosenberg self-esteem scale to measure self-esteem were administered to both groups before and after the 12-week study period. Overall, intra- and inter-group comparison of pre-post data showed statistically significant (P < 0.001) differences for all three parameters. There was an overall improvement in the scores indicating decreased levels of depression and anxiety coupled with an increase in the level of self-esteem after the yoga therapy program. The influence of yoga in the reduction of depression and anxiety scores and improvement in self-esteem scores in elderly women subjects is evident from this study. As reported in earlier studies, this may be attributed to changes in central neurotransmitters such as gamma-aminobutyric-acid coupled with increased parasympathetic tone and decreased sympatho-adrenal activity. It is recommended that yoga should be a part of health-care facilities for elderly as it can enhance the quality of life by improving their overall mental health status. It could provide a healthy and positive alternative from depressing negative thoughts, and give them a sense of purpose and hope.
Timlin D and Simpson EE (2017) studied the preliminary randomized control trial of the effects of Dru yoga on psychological well-being in Northern Irish first time mothers the transition to motherhood can be stressful, especially for first time mothers. Recent research has shown that yoga can be effective for enhancing psychological well-being. The purpose of this study was to establish if a postpartum Dru yoga intervention improves psychological well-being in first time mothers. A randomized controlled study was conducted. First time mothers were recruited from a Sure Start Community Centre and included in the study if they had a baby aged between 6 weeks to one-year-old. Exclusion criteria were the presence of sciatica, bulging discs, heart disease or whiplash and if they already practiced yoga. Participants were randomized into a Dru yoga group (n=16) who received a one-hour Dru yoga session each week for 4 weeks and a 20-minute DVD for practice at home. The control group (n=16) who did not receive an intervention. Baseline and follow up measures of perceived stress, mood and coping were assessed in each group. A repeated measures factorial Analysis of Variance showed that in comparison to the control group, the Dru yoga intervention group had improved psychological well-being as indicated by reductions in stress, negative effect, and dysfunctional coping and increases in problem focused coping at follow up (P<0.05). The current study shows that Dru yoga is beneficial for the psychological well-being of first time mothers. Further research is needed using large scale replication studies with a longer follow up period and including multifarious women. This study extends the support for yoga with postpartum mothers.

Muehsam D et.al., (2017) studied the embodied mind. A broad range of mind-body therapies (MBTs) are used by the public today and a growing body of clinical and basic sciences research has resulted in evidence-based integration of many MBTs into clinical practice. Basic sciences research has identified some of the physiological correlates of MBT practices, leading to a better understanding of the processes by which emotional, cognitive and psychosocial factors can influence health outcomes and well-being. In particular, results from functional genomics and neuroimaging describe some of the processes involved in the mind-body connection and how these can influence health outcomes. Functional genomics and neurophysiological correlates of MBTs are reviewed, detailing studies showing
changes in sympathetic nervous system activation of gene transcription factors involved in immune function and inflammation, electroencephalographic and neuroimaging studies on MBT practices, and persistent changes in neural function and morphology associated with these practices. While the broad diversity of study designs and MBTs studied presents a patchwork of results requiring further validation through replication and longitudinal studies, clear themes emerge for MBTs as immunomodulatory, with effects on leukocyte transcription and function related to inflammatory and innate immune responses, and neuromodulatory, with effects on brain function and morphology relevant for attention, learning, and emotion regulation. By detailing the potential mechanisms of action by which MBTs may influence health outcomes, the data generated by these studies have contributed significantly towards a better understanding of the biological mechanisms underlying MBTs.

Larun L et.al., (2017) studied Exercise therapy for chronic fatigue syndrome. The objective of this review was to determine the effects of exercise therapy (ET) for patients with CFS as compared with any other intervention or control. Exercise therapy versus 'passive control' (e.g. treatment as usual, waiting-list control, relaxation, flexibility). Exercise therapy versus other active treatment (e.g. cognitive-behavioral therapy (CBT), cognitive treatment, supportive therapy, pacing, pharmacological therapy such as antidepressants). 7 studies consistently showed a reduction in fatigue following exercise therapy at end of treatment, even though the fatigue scales used different scoring systems. Investigators compared exercise therapy with CBT in two trials (351 participants). One trial (298 participants) reported little or no difference in fatigue at end of treatment between the two groups using an 11-item scale with a scoring system of 0 to 33 points (MD 0.20, 95% CI -1.49 to 1.89). Both studies measured differences in fatigue at follow-up, but neither found differences between the two groups using an 11-item fatigue scale with a scoring system of 0 to 33 points (MD 0.30, 95% CI -1.45 to 2.05) and a nine-item Fatigue Severity Scale with a scoring system of 1 to 7 points (MD 0.40, 95% CI -0.34 to 1.14). Serious adverse reactions were rare in both groups (RR 0.67, 95% CI 0.11 to 3.96). With regard to other comparisons, one study (320 participants) suggested a general benefit of exercise over adaptive pacing and another study (183 participants) a benefit of
exercise over supportive listening. The available evidence was too sparse to draw conclusions about the effect of pharmaceutical interventions. Patients with CFS may generally benefit and feel less fatigued following exercise therapy, and no evidence suggests that exercise therapy may worsen outcomes. A positive effect with respect to sleep, physical function and self-perceived general health has been observed, but no conclusions for the outcomes of pain, quality of life, anxiety, depression, drop-out rate and health service resources were possible.

Mobini Bidgoli M et.al., (2016) studied the effect of sukha pranayama on anxiety in patients undergoing coronary angiography. This study sought to examine the effects of a pranayama exercise on CA candidates' anxiety. This double-blind randomized controlled trial was undertaken in 2015 on 80 eligible patients. The patients were randomly allocated to a control and an experimental group. Before undergoing angiography, patients in the experimental group performed sukha pranayama exercises. They were trained to breathe slowly and rhythmically at a rate of ten breathing per minute for 5 consecutive minutes. Data collection tools were a demographic questionnaire and the Spielberger State Anxiety Inventory. The level of patients' anxiety in both groups was measured before, half an hour after, and one hour after the intervention. The data were analyzed through doing the independent-sample t and the chi-square tests. Before the intervention, the mean of anxiety score in the experimental group was 53.37, which significantly decreased to 40.75 after the intervention (P = 0.0001). In the control group, the mean of anxiety score decreased from 54.27 to 51.4. This decrease was not statistically significant. Moreover, between-group comparisons revealed significant differences between the groups regarding between-measurement mean differences of anxiety score (P < 0.01). Sukha pranayama is effective in alleviating CA candidates' anxiety.

Curtis K et.al., (2016) studied evaluation of a specialized Yoga Program. The purpose of this study was to evaluate a specialized yoga intervention for inpatients in a rehabilitation and complex continuing care hospital. Participants (N = 10) admitted to a rehabilitation and complex continuing care hospital were recruited to participate in a 50-60min Hatha Yoga class (modified for wheelchair users/seated position) once a week for eight weeks, with assigned homework practice. Repeated measures
ANOVA revealed a significant main effect of time indicating improvements over the course of the yoga program on the (1) anxiety subscale of the Hospital Anxiety and Depression Scale, $F(2,18) = 4.74, p < .05$, and $\eta^2 = .35$, (2) Self-Compassion Scale-Short Form, $F(2,18) = 3.71, p < .05$, and $\eta^2 = .29$, and (3) Magnification subscale of the Pain Catastrophizing Scale, $F(2,18) = 3.66, p < .05$, and $\eta^2 = .29$. The results suggest that an 8-week Hatha Yoga program improved pain-related factors and psychological experiences in individuals admitted to a rehabilitation and complex continuing care hospital.

Mahlo L and Tiggemann M (2016) studied Yoga and positive body image: A test of the Embodiment Model. The study aimed to test the Embodiment Model of Positive Body Image (Menzel and Levine, 2011) within the context of yoga. Participants were 193 yoga practitioners (124 Iyengar, 69 Bikram) and 127 university students (non-yoga participants) from Adelaide, South Australia. Participants completed questionnaire measures of positive body image, embodiment, self-objectification, and desire for thinness. Results showed yoga practitioners scored higher on positive body image and embodiment, and lower on self-objectification than non-yoga participants. In support of the embodiment model, the relationship between yoga participation and positive body image was serially mediated by embodiment and reduced self-objectification. Although Bikram practitioners endorsed appearance-related reasons for participating in yoga more than Iyengar practitioners, there were no significant differences between Iyengar and Bikram yoga practitioners on body image variables. It was concluded that yoga is an embodying activity that can provide women with the opportunity to cultivate a favorable relationship with their body.

Nejati S et.al., (2016) studied the effect of group mindfulness-based stress reduction and consciousness Yoga program on quality of life and fatigue severity in Patients with MS. The present research aimed to study the effect of group Mindfulness-based Stress Reduction (MBSR) and conscious yoga program on the quality of life and fatigue severity among patients with MS. The statistical population included all members to MS Society of Tehran Province, 24 of who diagnosed with MS were selected as the sample based on the inclusion criteria. The subjects were randomly assigned into the test group (12 patients) and the control group (12
patients). Subjects in the test group underwent a MBSR and conscious yoga program in 8 two-hour sessions. The data were analyzed using the SPSS ver.13 software. The study findings showed that there was a significant difference between subjects in the experimental and control groups in terms of mean score of some subscales of quality of life including physical health, role limitations due to physical and emotional problems, energy, emotional well-being, health distress, health perception, and satisfaction with sexual function, overall quality of life, and fatigue severity. The results show that the program is effective in reduction of fatigue severity and improving some subscales of quality of life in MS patients. Hence, this supportive method can be used as an effective way for improving quality of life and relieving fatigue in MS patients.

Morone NE et al., (2016) studied a mind-body program for older adults with chronic low back pain. The score on the Roland and Morris Disability Questionnaire was the primary outcome and measured functional limitations owing to LBP. Pain (current, mean, and most severe in the past week) was measured with the Numeric Pain Rating Scale. Secondary outcomes included quality of life, pain self-efficacy, and mindfulness. Intent-to-treat analyses were conducted. Of 1160 persons who underwent screening, 282 participants enrolled in the trial (95 men [33.7%] and 187 women [66.3%]; mean [SD] age, 74.5 [6.6] years). The baseline mean (SD) Roland and Morris Disability Questionnaire scores for the intervention and control groups were 15.6 (3.0) and 15.4 (3.0), respectively. Compared with the control group, intervention participants improved an additional -1.1 (mean, 12.1 vs 13.1) points at 8 weeks and -0.04 (mean, 12.2 vs 12.6) points at 6 months (effect sizes, -0.23 and -0.08, respectively) on the Roland and Morris Disability Questionnaire. By 6 months, the intervention participants improved on the Numeric Pain Rating Scale current and most severe pain measures an additional -1.8 points (95% CI, -3.1 to -0.05 points: effect size, -0.33) and -1.0 points (95% CI, -2.1 to 0.2 points: effect size, -0.19), respectively. The changes in Numeric Pain Rating Scale mean pain measure after the intervention were not significant (-0.1 [95% CI, -1.1 to 1.0] at 8 weeks and -1.1 [95% CI, -2.2 to -0.01] at 6 months: effect size, -0.01 and -0.22, respectively). A mind-body program for chronic LBP improved short-term function and long-term
current and most severe pain. The functional improvement was not sustained, suggesting that future development of the intervention could focus on durability.

**Humberstone B and Stuart S (2016)** examined the lived experience of older women participants in (a) a low-impact exercise to music (ETM) class and (b) a yoga class to uncover what is important for them in taking part in these classes. Researcher S is the instructor of the ETM group and draws upon individual and focus group interviews and participant observation. Researcher B is a member of the yoga class where she interviewed the women and undertook participant observations. Both authors are a similar age to the older women interviewees. Through a phenomenological interpretative approach, the paper examines the women's perceptions of their exercise class and yoga experiences, highlighting pleasurable experiences and features that contribute to this enjoyment. The paper considers relationships between pleasure, wellbeing, the senses, physical activity, and aging, drawing upon a variety of analyses. It pays attention to the contextual features of the ETM and yoga classes in making available and accessible pleasurable physical activity experiences for the women and draws, in part, on 'typologies' of pleasure to frame the debate around older women, physical activity, and senses of pleasure. Our research highlights the considerable wellbeing affects for women when physical activity provision takes account of context (the spatial, cultural, social, and sentient).

**Raghavendra BR and Singh P (2015)** studied immediate effect of yogic visual concentration on cognitive performance. The objective of cleansing techniques is to purify and prepare the body for the practice of yoga postures, breath regulation, and meditation. Yogic visual concentration technique (trataka) is one of these techniques. A previous study showed an increase in critical flicker fusion (CFF) following yogic visual concentration (trataka). The present study planned to assess the immediate effect of trataka on cognitive performance using the Strop color-word test. Performance on the Strop color-word test was assessed in 30 healthy male volunteers with ages ranging from 18 years to 31 years old (22.57 ± 3.65 years). The participants were tested before and after yogic visual concentration (trataka) and during a control session on two separate days. There was a significant improvement in performance on the Strop color-word test after trataka compared to the control session [repeated
measures analysis of variance (RM ANOVA) with Bonferroni adjustment: p < 0.001]. Performance on the Strop color-word test was better after trataka compared to the control session suggesting that the trataka technique increased the selective attention, cognitive flexibility, and response inhibition.

**Rahmani S and Talepasand S (2015)** studied the effect of group mindfulness-based stress reduction program and conscious yoga on the fatigue severity and global and specific life quality in women with breast cancer. The aim of this study was to examine the effectiveness of the mindfulness-based stress reduction program and conscious yoga on the mental fatigue severity and life quality of women with breast cancer. This was a quasi-experimental study with a pre-test, post-test and control group. In this study, 24 patients with the diagnosis of breast cancer were selected among the patients who referred to the Division of Oncology and Radiotherapy of Imam Hossein hospital in Tehran using available sampling method, and were randomly assigned into the experimental and control groups. Findings revealed that the mindfulness-based stress reduction treatment significantly improved the overall quality of life, role, cognitive, emotion, social functions and pain and fatigue symptoms in global life quality in the experimental group. It also significantly improved the body image, future functions and therapy side effects in specific life quality of the experimental group compared to the control group. The results showed that the mindfulness-based stress reduction treatment can be effective in improving global and specific life quality and fatigue severity in women with breast cancer.

**Doria S et.al., (2015)** studied anti-anxiety efficacy of Sudarshan Kriya Yoga in general anxiety disorder: A multicomponent, yoga based, breath intervention program for patients suffering from generalized anxiety disorder with or without comorbidities. Surdashan Kriya Yoga (SKY) is a procedure that in various studies has shown evidences of efficacy in alleviating Depression and Anxiety disorders, but in Europe and USA it has not been studied yet on a Caucasian population as an adjunct therapy for psychiatric Disorders. The study involved a sample of consenting women and men (n = 69) who received SKY therapy for a six-month time period. They were assessed at recruitment, after 2 weeks, after 3 months and after 6 months using Hamilton Rating Scale for Anxiety (HRSA), Hamilton Rating Scale for Depression
(HRSD), Zung Self-Rating Anxiety Scale (ZSAS), Zung Self-Rating Depression Scale (ZSDS) and Symptom Checklist-90 (SCL-90). All the analyses have shown that SKY therapy significantly reduces the scores of Anxiety and Depression. It was found that SKY effects lead to a significant convergence between the self-assessment (Zung Self-Rating Scale) and hetero-assessment (Hamilton Rating Scale). Participation in SKY adjunct therapy 10 days intense workshop and follow-ups, coupled with daily individual and independent practice of a simplified protocol of breathing techniques (30 min), can lead to significant reduction in levels of Anxiety and Depression.

Fox KC et.al., (2014) reviewed and meta-analyzed 123 brain morphology differences from 21 neuroimaging studies examining ~300 meditation practitioners. Anatomical likelihood estimation (ALE) meta-analysis found eight brain regions consistently altered in meditators, including areas key to meta-awareness (frontopolar cortex/BA 10), exteroceptive and interceptive body awareness (sensory cortices and insula), memory consolidation and reconsolidation (hippocampus), self and emotion regulation (anterior and mid cingulate: orbitofrontal cortex), and intra- and interhemispheric communication (superior longitudinal fasciculus: corpus callosum). Effect size meta-analysis (calculating 132 effect sizes from 16 studies) suggests a global 'medium' effect size (Cohen's $\bar{d} = 0.46$: $\bar{r} = 0.9$). Publication bias and methodological limitations are strong concerns, however. Further research using rigorous methods is required to definitively link meditation practice to altered brain morphology.

Cramer H et.al., (2013) studied Yoga for schizophrenia. The aim of this review was to systematically review and meta-analyze the effects of yoga on symptoms of schizophrenia, quality of life, function, and hospitalization in patients with schizophrenia. Randomized controlled trials (RCTs) comparing yoga to usual care or non-pharmacological interventions were analyzed when they assessed symptoms or quality of life in patients with schizophrenia. Cognitive function, social function, hospitalization, and safety were defined as secondary outcomes. Risk of bias was assessed using the risk of bias tool recommended by the Cochrane Back Review Group. Standardized mean differences (SMD) and 95% confidence intervals (CI) were calculated. Five RCTs with a total of 337 patients were included: 2 RCTs had
low risk of bias. Two RCTs compared yoga to usual care: 1 RCT compared yoga to exercise: and 2 3-arm RCTs compared yoga to usual care and exercise. No evidence was found for short-term effects of yoga compared to usual care on positive symptoms (SMD = -0.58: 95% CI -1.52 to 0.37: P = 0.23), or negative symptoms (SMD = -0.59: 95% CI -1.87 to 0.69: P = 0.36). Moderate evidence was found for short-term effects on quality of life compared to usual care (SMD = 2.28: 95% CI 0.42 to 4.14: P = 0.02). These effects were only present in studies with high risk of bias. No evidence was found for short-term effects on social function (SMD = 1.20: 95% CI -0.78 to 3.18: P = 0.23). Comparing yoga to exercise, no evidence was found for short-term effects on positive symptoms (SMD = -0.35: 95% CI -0.75 to 0.05: P = 0.09), negative symptoms (SMD = -0.28: 95% CI -1.42 to 0.86: P = 0.63), quality of life (SMD = 0.17: 95% CI -0.27 to 0.61: P = 0.45), or social function (SMD = 0.20: 95% CI -0.27 to 0.67: P = 0.41). Only 1 RCT reported adverse events. This systematic review found only moderate evidence for short-term effects of yoga on quality of life. As these effects were not clearly distinguishable from bias and safety of the intervention was unclear, no recommendation can be made regarding yoga as a routine intervention for schizophrenia patients.

Kanojia S et.al., (2013) studied the effect of yoga on autonomic functions and psychological status during both phases of menstrual cycle in young healthy females. Premenstrual stress affects 75% of women of childbearing age and yoga has been found to be beneficial in many psycho-somatic disorders to investigate the effect of integrated yoga on autonomic parameters and psychological well-being during both pre and post phases of menstrual cycle in healthy young female subjects. Present study is a randomized control trial and was conducted in the Department of Physiology, Lady Hardinge Medical College, New Delhi, India. Fifty apparently healthy females in the age group of 18-20 years were randomized into two groups: Group I (n=25) consisted of subjects who practiced yoga 35-40 minutes per day, six times per week for the duration of three menstrual cycles. Group II (n=25) subjects acted as controls. There was significantly higher BW, resting SBP, DBP, sympathetic activity and blunting of parasympathetic reactivity and also, significantly higher scores of anger, depression, anxiety and decreased score of well-being in premenstrual phase as compared to postmenstrual phase in both the groups in initial
cycle. There was significantly higher percentage decrease in BW, HR, SBP and DBP in yoga group as compared to control group in both the phases from initial to second and onwards between second and third menstrual cycle. Our study shows that there was significant alteration of autonomic functions and psychological status in premenstrual phase when compared with postmenstrual phase in young healthy females. Also, regular practice of yoga has beneficial effects on both phases of menstrual cycle by bringing parasympathodominance and psychological well-being probably by balancing neuro-endocrinal axis.

Saeed SA et.al., (2010) studied Exercise, yoga, and meditation for depressive and anxiety disorders. Anxiety and depression were among the most common conditions cited by those seeking treatment with complementary and alternative therapies, such as exercise, meditation, tai chi, qigong, and yoga. The use of these therapies is increasing. Several studies of exercise and yoga have demonstrated therapeutic effectiveness superior to no-activity controls and comparable with established depression and anxiety treatments (e.g., cognitive behavior therapy, sertraline and imipramine). High-energy exercise (i.e., weekly expenditure of at least 17.5 kcal per kg) and frequent aerobic exercise (i.e., at least three to five times per week) reduce symptoms of depression more than less frequent or lower-energy exercise. Mindful meditation and exercise have positive effects as adjunctive treatments for depressive disorders, although some studies show multiple methodological weaknesses. For anxiety disorders, exercise and yoga have also shown positive effects, but there are far less data on the effects of exercise on anxiety than for exercise on depression. Tai chi, qigong, and meditation have not shown effectiveness as alternative treatments for depression and anxiety.

Servant D et.al., (2009) studied heart rate variability, applications in psychiatry. The autonomic nervous system sends messages through the sympathetic and parasympathetic nervous system. The sympathetic nervous system innervates the cardio accelerating center of the heart, the lungs (increased ventilator rhythm and dilatation of the bronchi) and the non-striated muscles (artery contraction). It releases adrenaline and noradrenaline. As opposed to the sympathetic nervous system, it innervates the cardiomoderator center of the heart, the lungs (slower ventilator rhythm
and contraction of the bronchi) and the non-striated muscles (artery dilatation). Reduced HRV seems indicate decreased cardiac vagal tone and elevated sympathetic activity in anxious and depressive patients and would reflect deficit in flexibility of emotional physiological mechanisms. A few studies have also revealed that biofeedback using respiratory control, relaxation and meditation techniques can increase HRV. Approaches may result in increased HRV and parasympathetic activity.

Brown RP et.al., (2009) studied Yoga breathing, meditation, and longevity. Yoga breathing is an important part of health and spiritual practices in Indo-Tibetan traditions. Considered fundamental for the development of physical well-being, meditation, awareness, and enlightenment, it is both a form of meditation in itself and a preparation for deep meditation. Yoga breathing (pranayama) can rapidly bring the mind to the present moment and reduce stress. In this paper, we review data indicating how breath work can affect longevity mechanisms in some ways that overlap with meditation and in other ways that are different from, but that synergistically enhance, the effects of meditation. We also provide clinical evidence for the use of yoga breathing in the treatment of depression, anxiety, post-traumatic stress disorder, and for victims of mass disasters. By inducing stress resilience, breath work enables us to rapidly and compassionately relieve many forms of suffering.

Tsang HW et.al., (2008) studied effects of mindful and non-mindful exercises on people with depression: a systematic review. The purpose of this study is to examine the effectiveness of mindful and non-mindful physical exercises as an intervention in managing depression or depressive symptoms based on a systematic literature review. Our review was conducted among 5 electronic databases to identify randomized controlled trials (RCTs), which tested the effects of mindful or/and non-mindful physical exercises on depression. Studies were classified according to the baseline depression status of participants and its relation to allocation concealment, blinding at outcome assessment, follow-up, and whether intention to treat analysis was employed. The results based on 12 RCTs indicated that both the mindful and non-mindful physical exercises were effective in their short-term effect in reducing depression levels or depressive symptoms. Specific comparisons between RCTs on
mindful and non-mindful exercises were not performed because of the limitations on the designs. We recommend that more well-controlled studies have to be conducted in the future to address the short- and long-term effects of physical exercise on alleviating depression.

Ospina MB et. al., (2007) studied Meditation practices for health reviewed and synthesized the state of research on a variety of meditation practices, including the specific meditation practices examined: the research designs employed and the conditions and outcomes examined: the efficacy and effectiveness of different meditation practices for the three most studied conditions: the role of effect modifiers on outcomes: and the effects of meditation on physiological and neuropsychological outcomes. Evidence on the state of research in meditation practices was provided in 813 predominantly poor-quality studies. The three most studied conditions were hypertension, other cardiovascular diseases, and substance abuse. Sixty-five intervention studies examined the therapeutic effect of meditation practices for these conditions. Meta-analyses based on low-quality studies and small numbers of hypertensive participants showed that TM(R), Qi Gong and Zen Buddhist meditation significantly reduced blood pressure. Yoga helped reduce stress. Yoga was no better than Mindfulness-based Stress Reduction at reducing anxiety in patients with cardiovascular diseases. No results from substance abuse studies could be combined. The role of effect modifiers in meditation practices has been neglected in the scientific literature. The physiological and neuropsychological effects of meditation practices have been evaluated in 312 poor-quality studies. Meta-analyses of results from 55 studies indicated that some meditation practices produced significant changes in healthy participants. Many uncertainties surround the practice of meditation. Scientific research on meditation practices does not appear to have a common theoretical perspective and is characterized by poor methodological quality. Firm conclusions on the effects of meditation practices in healthcare cannot be drawn based on the available evidence. Future research on meditation practices must be more rigorous in the design and execution of studies and in the analysis and reporting of results.
Krisanaprakornkit T et al., (2006) studied Meditation therapy for anxiety disorders. Anxiety disorders are characterized by long term worry, tension, nervousness, fidgeting and symptoms of autonomic system hyperactivity. Meditation can reduce arousal state and may ameliorate anxiety symptoms in various anxiety conditions. Types of interventions: concentrative meditation or mindfulness meditation. Comparison conditions: one or combination of 1) pharmacological therapy 2) other psychological treatment 3) other methods of meditation 4) no intervention or waiting list. Types of outcome: 1) improvement in clinical anxiety scale 2) improvement in anxiety level specified by trial lists, or global improvement acceptability of treatment, adverse effects 4) dropout. Two randomized controlled studies were eligible for inclusion in the review. Both studies were of moderate quality and used active control comparisons (another type of meditation, relaxation, bio feedback). Anti-anxiety drugs were used as standard treatment. The duration of trials ranged from 3 months (12 weeks) to 18 weeks. In one study transcendental meditation showed a reduction in anxiety symptoms and electromyography score comparable with electromyography-biofeedback and relaxation therapy. Another study compared Kundalini Yoga (KY), with Relaxation/Mindfulness Meditation. The Yale-Brown Obsessive Compulsive Scale showed no statistically significant difference between groups. The overall dropout rate in both studies was high (33-44%). Neither study reported on adverse effects of meditation. The small number of studies included in this review does not permit any conclusions to be drawn on the effectiveness of meditation therapy for anxiety disorders. Transcendental meditation is comparable with other kinds of relaxation therapies in reducing anxiety, and Kundalini yoga did not show significant effectiveness in treating obsessive-compulsive disorders compared with Relaxation/Meditation. Dropout rates appear to be high, and adverse effects of meditation have not been reported.

Brown RP and Gerbarg PL (2005) studied Sudarshan Kriya Yogic breathing in the treatment of stress, anxiety, and depression. Part II--clinical applications and guidelines. Part I of this series presented a neurophysiologic theory of the effects of Sudarshan Kriya Yoga (SKY). Part II will review clinical studies, our own clinical observations, and guidelines for the safe and effective use of yoga breath techniques in a wide range of clinical conditions. There is sufficient evidence to consider
Sudarshan Kriya Yoga to be a beneficial, low-risk, low-cost adjunct to the treatment of stress, anxiety, post-traumatic stress disorder (PTSD), depression, stress-related medical illnesses, substance abuse, and rehabilitation of criminal offenders. SKY has been used as a public health intervention to alleviate PTSD in survivors of mass disasters. Proper training by a skilled teacher and a 30-minute practice every day will maximize the benefits. Health care providers play a crucial role in encouraging patients to maintain their yoga practices.

Shannahoff-Khalsa DS (2005) studied patient perspectives Kundalini yoga meditation techniques for psycho-oncology and as potential therapies for cancer. The ancient system of Kundalini Yoga (KY) includes a vast array of meditation techniques. To date, 2 clinical trials have been conducted for treating obsessive-compulsive disorder (OCD). The first was an open uncontrolled trial and the second a single-blinded randomized controlled trial (RCT) comparing a KY protocol against the Relaxation Response and Mindfulness Meditation (RRMM) techniques combined. Both trials showed efficacy on all psychological scales using the KY protocol: however, the RCT showed no efficacy on any scale with the RRMM control group. These techniques have not yet been subjected to formal clinical trials but are described here as potential adjunctive therapies. A case history demonstrating rapid onset of acute relief of intense fear in a terminal breast cancer patient using a KY technique specific for fear is presented.

Damodaran A et.al., (2002) studied Therapeutic potential of yoga practices in modifying cardiovascular risk profile in middle aged men and women. To study effect of yoga on the physiological, psychological well being, psychomotor parameter and modifying cardiovascular risk factors in mild to moderate hypertensive patients. 20 patients (16 males, 4 females) in the age group of 35 to 55 years with mild to moderate essential hypertension underwent yogic practices daily for 1 hour for 3 months. Biochemical, physiological and psychological parameters were studied prior and following period of three months of yoga practices, biochemical parameters included, blood glucose, lipid profile, catecholamine, MDA, Vitamin C cholinesterase and urinary VMA. Results showed decrease in blood pressure and drug score modifying risk factors, i.e. blood glucose, cholesterol and triglycerides decreased.
overall improvement in subjective well-being and quality of life. There was decrease in VMA catecholamine, and decrease MDA level suggestive decrease sympathetic activity and oxidant stress. Yoga can play an important role in risk modification for cardiovascular diseases in mild to moderate hypertension.

2.5 STUDIES ON DIET MODIFICATION

Charradi K et.al., (2017) studied dietary supplementation of grape seed and skin flour mitigates brain oxidative damage induced by a high-fat diet in rat: Gender dependency. It is unknown whether gender has an impact on brain injury in obesity, and, if so, whether treatment with grape seed and skin flour could exert a protective effect. Both male and female rats were fed a standard diet (SD) or a high fat diet (HFD) during eight weeks and treated with high dosage grape seed and skin flour (GSSF). Fat-induced oxidative stress was evaluated into the brain with a special emphasis on transition metals determination. HFD induced male-cholesterol overload (+78.12%) and an oxidative stress status characterized by increased lipoperoxidation (+68.97%), carbonylation (+40.28%), decreased antioxidant enzyme activities as glutathione peroxidase (-61.07%) and manganese-superoxide dismutase (-35.47%) but not catalase. Additionally HFD depleted the brain from manganese (-71.31%) and dropped glutamine synthetase activity (-36.16%), without affecting copper nor iron nor their associated enzymes. HFD also altered intracellular mediators as superoxide anion (+36.12%), calcium (+44.41%) and also calpain (+76.54%) a calcium dependent protease. Importantly all these alterations were detected exclusively in male brain and were efficiently corrected upon GSSF treatment. In conclusion, GSSF has the potential to alleviate the deleterious lipotoxic effect of HFD treatment that occurred in male brain and perhaps in post-menopausal female brain.

Rysz J et.al., (2017) studied Hypertension current strategies to lower blood pressure. The prevalence of hypertension (HTN) worldwide is high and is constantly rising. HTN is considered to be a silent killer since often there are no obvious symptoms but long-term, HTN significantly increases the risk of coronary heart disease and cerebrovascular diseases. Those with diagnosed HTN or at high risk of its development, should start blood pressure (BP) lowering therapy based on natural
methods including: lifestyle, regular physical activity, respiratory training, reducing body mass, lowering sodium intake with food, potassium supplementation, balanced diet enriched with herbs, reducing caffeine and alcohol intake, smoking cessation, stress avoidance and regular monitoring of the BP. This review focuses on several most common methods of natural BP lowering since it is not possible to consider all of them.

Wei M et.al., (2017) studied fasting-mimicking diet and markers/risk factors for aging, diabetes, cancer, and cardiovascular disease. Calorie restriction or changes in dietary composition can enhance healthy aging, but the inability of most subjects to adhere to chronic and extreme diets, as well as potentially adverse effects, limits their application. We randomized 100 generally healthy participants from the United States into two study arms and tested the effects of a fasting-mimicking diet (FMD)-low in calories, sugars, and protein but high in unsaturated fats-on markers/risk factors associated with aging and age-related diseases. We compared subjects who followed 3 months of an unrestricted diet to subjects who consumed the FMD for 5 consecutive days per month for 3 months. Three FMD cycles reduced body weight, trunk, and total body fat: lowered blood pressure: and decreased insulin-like growth factor 1 (IGF-1). No serious adverse effects were reported. After 3 months, control diet subjects were crossed over to the FMD program, resulting in a total of 71 subjects completing three FMD cycles. A post hoc analysis of subjects from both FMD arms showed that body mass index, blood pressure, fasting glucose, IGF-1, triglycerides, total and low-density lipoprotein cholesterol, and C-reactive protein were more beneficially affected in participants at risk for disease than in subjects who were not at risk. Thus, cycles of a 5-day FMD are safe, feasible, and effective in reducing markers/risk factors for aging and age-related diseases. Larger studies in patients with diagnosed diseases or selected on the basis of risk factors are warranted to confirm the effect of the FMD on disease prevention and treatment

Au LE et.al., (2017) studied evaluation of online and In-Person Nutrition Education Related to Salt Knowledge and Behaviors among Special Supplemental Nutrition Program for Women, Infants, and Children Participants. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) differs
from other federal nutrition programs in that nutrition education is a required component. WIC programs traditionally provide in-person education, but recently some WIC sites have started offering online education. Education focused on reducing salt intake is an important topic for WIC participants because a high-sodium diet has been associated with high blood pressure, and low-income populations are at increased risk. Our aim was to examine the impacts of traditional in-person and online nutrition education on changes in knowledge, self-efficacy, and behaviors related to reducing salt intake in low-income women enrolled in WIC. Although a comparison of groups was not the primary focus, a randomized trial examining the impact of online and in-person nutrition education on participant knowledge, self-efficacy, and behaviors related to salt intake was conducted. Five hundred fourteen WIC participants from three Los Angeles, CA, WIC clinics received either in-person (n=257) or online (n=257) education. Questionnaires assessing salt-related knowledge, self-efficacy, and behaviors were administered at baseline and 2 to 4 months and 9 months later from November 2014 through October 2015. Positive changes in knowledge and self-efficacy were retained 2 to 4 months and 9 months later for both groups (P<0.05). Both groups reported significant changes in behaviors related to using less salt in cooking (P<0.0001) and eating fewer foods with salt added at the table or during cooking (P<0.001) at 2 to 4 months and 9 months. Both online and in-person education resulted in improvements during a 9-month period in knowledge, self-efficacy, and reported behaviors associated with reducing salt intake in a low-income population. Offering an online education option for WIC participants could broaden the reach of nutrition education and lead to long-term positive dietary changes.

Liang YF et al., (2017) studied Hydrogen sulfide in paraventricular nucleus attenuates blood pressure by regulating oxidative stress and inflammatory cytokines in high salt-induced hypertension. Hydrogen sulfide (H2S) is an important gaseous signaling molecule in neuro-modulation, anti-inflammatory, anti-oxidant and anti-hypertensive effects. The paraventricular nucleus (PVN) is a major integrative nucleus in regulating BP and SNA. The aim of this study is to explore whether endogenous or exogenous H2S changed by hydroxylamine hydrochloride (HA) or GYY4137 infused in the PVN affects RSNA and MAP by regulating oxidative stress
or the balance between pro-inflammatory cytokines (PICs) and anti-inflammatory cytokines in high salt-induced hypertensive rats. Male Dahl rats were fed by high-salt or normal-salt diet. At the end of the 4th week, GYY4137, HA or vehicle was microinjected into bilateral PVN for 6 weeks. The levels of MAP, HR, plasma norepinephrine (NE), reactive oxygen species (ROS), NOX2, NOX4 and IL-1β were increased significantly in high salt-induced hypertensive rats. Higher levels of these parameters were detected in the group treated by HA, but lower levels in the GYY4137 group. The trends of H2S, CBS, IL-10 and Cu/Zn SOD were opposite to the parameters described above. These findings suggest that endogenous or exogenous H2S in the PVN attenuates sympathetic activity and hypertensive response, which are partly due to decrease of ROS and PICs within the PVN in high salt-induced hypertension.

Ferreira TD et.al., (2016) found that no difference in acute effects of supplemental v. dietary calcium on blood pressure and microvascular function in obese women challenged with a high-fat meal: a cross-over randomized study. Recent studies suggest that supplemental Ca (SC) increases the risk of cardiovascular events, whereas dietary Ca (DC) decreases the risk of cardiovascular events. Although frequently consumed with meals, it remains unclear whether Ca can mitigate or aggravate the deleterious effects of a high-fat meal on cardiovascular risk factors. This study aimed to evaluate the effects of SC or DC on blood pressure (BP) and microvascular function (MVF) in the postprandial period in obese women challenged with a high-fat meal. In this cross-over controlled trial, sixteen obese women aged 20-50 years were randomly assigned to receive three test meals (2908 kJ (695 kcal): 48 fat): high DC (HDCM: 547 mg DC), high SC (HSCM: 500 mg SC-calcium carbonate) and low Ca (LCM: 42 mg DC). BP was continuously evaluated from 15 min before to 120 min after meals by digital photoplethysmography. Before and 120 min after meals, participants underwent evaluation of serum Ca and microvascular flow after post occlusive reactive hyperaemia (PORH) by laser speckle contrast imaging. Ionized serum Ca rose significantly only after HSCM. Systolic BP increased after the three meals, whereas diastolic BP increased after LCM and HDCM. Hyperaemia peak, hyperaemia amplitude and AUC evaluated after PORH decreased with LCM. After HDCM, there was a reduction in hyperaemia peak and hyperaemia
amplitude, whereas HSCM decreased only hyperaemia peak. However, comparative analyses of the effects of three test meals on serum Ca, BP and MVF revealed no significant meal×time interaction. This study suggests that in obese women SC and DC do not interfere with the effects of a high-fat meal on BP and MVF.

Schwingshackl L et.al., (2013) studied long-term effects of low-fat diets either low or high in protein on cardiovascular and metabolic risk factors: a systematic review and meta-analysis. Meta-analyses of short-term studies indicate favorable effects of higher protein vs. lower protein diets on health outcomes like adiposity or cardiovascular risk factors, but their long-term effects are unknown. A random effect meta-analysis was performed using the Software package by the Cochrane Collaboration Review Manager 5.1. Sensitivity analysis was performed for RCTs with a Jadad Score ≥ 3, and excluding type 2 diabetic subjects (T2D). 15 RCTs met all objectives and were included in the present meta-analysis. No significant differences were observed for weight, waist circumference, fat mass, blood lipids (i.e. total cholesterol, LDL-cholesterol, HDL-cholesterol, triacylglycerols), C-reactive protein, diastolic and systolic blood pressure, fasting glucose and glycosylated hemoglobin. In contrast, improvements of fasting insulin was significantly more pronounced following high protein diets as compared to the low protein counterparts (weighted mean difference: -0.71 µIU/ml, 95% CI -1.36 to -0.05, p = 0.03). Sensitivity analysis of high quality RCTs confirmed the data of the primary analyses, while exclusion of studies with diabetic subjects resulted in an additional benefit of high-protein diets with respect to a more marked increase in HDL-cholesterol. According to the present meta-analysis of long-term RCTs, high-protein diets exerted neither specific beneficial nor detrimental effects on outcome markers of obesity, cardiovascular disease or glycemic control. Thus, it seems premature to recommend high-protein diets in the management of overweight and obesity.

Ruth MR et.al.,(2013) studied consuming a hypocaloric high fat low carbohydrate diet for 12 weeks lowers C-reactive protein, and raises serum adiponectin and high density lipoprotein-cholesterol in obese subjects. High fat, low carbohydrate (HFLC) diets have become popular tools for weight management. We sought to determine the effects of a HFLC diet compared to a low fat high
carbohydrate (LFHC) diet on the change in weight loss, cardiovascular risk factors and inflammation in subjects with obesity. Obese subjects (29.0-44.6 kg/m²) recruited from Boston Medical Center were randomized to a hypocaloric LFHC (n=26) or HFLC (n=29) diet for 12 weeks. The age range of subjects was 21-62 years. As a percentage of daily calories, the HFLC group consumed 33.5% protein, 56.0% fat and 9.6% carbohydrate and the LFHC group consumed 22.0% protein, 25.0% fat and 55.7% carbohydrate. The change in percent body weight, lean and fat mass, blood pressure, flow mediated dilation, hip waist ratio, hemoglobin A1C, fasting insulin and glucose, and glucose and insulin response to a 2h oral glucose tolerance test did not differ (P>0.05) between diets after 12 weeks. The HFLC group had greater mean decreases in serum triglycerides (P=0.07), and hs-CRP (P=0.03), and greater mean increases in HDL cholesterol (P=0.004), and total adiponectin (P=0.045) relative to the LFHC. Secreted adipose tissue adiponectin or TNF-α did not differ after weight loss for either diet. Relative to the LFHC group, the HFLC group had greater improvements in blood lipids and systemic inflammation with similar changes in body weight and composition. This small-scale study suggests that HFLC diets may be more beneficial to cardiovascular health and inflammation in free-living obese adults compared to LFHC diets.

Srivastava M et al., (2011) studied the effect of Meditation training on patients with adjustment disorder with anxiety and depression. In a pre-test/post-test control group design, patients (N = 30) with adjustment disorder with mixed anxiety and depression, were screened through a Clinical Global Impression-severity/Improvement Scale, Beck's Anxiety, Beck's Depression Inventory, and Global Assessment of Functioning. Sessions of meditation training (28 weeks) were held using the model of Yoga Meditation. The difference of means (pre- and post-assessment) was tested using a paired t-test method. Experimental group and control groups were similar at base line, whereas after concluding the 28th week of meditation practice a significant mean difference (t value: CGI-S 2.47 > .05: CGI-I2.82 > 0.05: BAI 17.58 > 0.05: BDI 10.13 > 0.05: GAF 12.29 > 0.05) was found between both groups. There was an incremental change in selected assessment parameters in both groups. But changes were more significant in pre- and post-assessment of experimental group.
Lin PH et al., (2007) studied the intervention helps participants follow the Dietary Approaches to Stop Hypertension dietary pattern and the current Dietary Reference Intakes recommendations. To examine the influence of the premier study lifestyle interventions on dietary intakes and adherence to the Dietary Approaches to Stop Hypertension (DASH) dietary pattern and the Dietary Reference Intakes (DRI). An 18-month multicenter randomized controlled trial comparing two multicomponent lifestyle intervention programs to an advice only control group. A total of 810 participants were recruited from local communities and randomized into the study. Individuals were eligible if they were aged 25 years or older, had body mass index between 18.5 and 45.0, not taking antihypertensive medication, and had prehypertension or stage 1 hypertension (systolic blood pressure 120 to 159 mm Hg and diastolic blood pressure 80 to 95 mm Hg). The two active intervention programs were a behavioral lifestyle intervention that implements established recommendations, and an established intervention plus the DASH dietary pattern. Established intervention plus DASH dietary pattern group participants increased intakes of fruits, vegetables, dairy, and many vitamins and minerals: these increases were significantly greater than that of the control and established intervention groups. A majority of established intervention plus DASH dietary pattern group participants achieved at least two thirds of the DRI recommendations for most nutrients at 6 months, despite their reduction in total energy intake. Some but relatively small recidivism occurred at 18 months. The established intervention and established intervention plus DASH dietary pattern group intervention were effective in helping participants follow established recommendations to control blood pressure. The advice-only control group also made some behavior changes, mainly decreasing energy and sodium intake. Only the established intervention plus DASH dietary pattern group significantly increased intakes of DASH-specific food groups, including fruits, vegetables, and dairy products, and nutrients, including protein, fiber, calcium, potassium, and magnesium. Most of the increases did not reach the levels consumed in the original DASH feeding studies. Whereas the established intervention plus DASH dietary pattern group intervention provides a useful platform to achieve the DASH dietary pattern and current DRI recommendations, intervention enhancements, including a greater emphasis on nutrient-dense foods, would likely improve this
intervention. Showing results for the effect of meditation training on patients with adjustment disorder with anxiety and depression. Your search for the effect of Meditation training on patients with adjustment disorder with anxiety and depression retrieved no results.

Miller ER et.al., (2006) studied the effects of macronutrients on blood pressure and lipids: an overview of the DASH and OmniHeart trials. Macronutrients are those nutrients (protein, fat, and carbohydrate) that provide energy. The purpose of this review is to highlight findings of three large-scale, isocaloric feeding studies: the Dietary Approaches to Stop Hypertension (DASH) trial, the DASH-Sodium trial, and the Optimal Macro-Nutrient Intake to Prevent Heart Disease (OmniHeart) trial. Each of these trials tested the effects of diets with different macronutrient profiles on traditional cardiovascular disease (CVD) risk factors (i.e., blood pressure and blood lipids) in the setting of stable weight. The DASH and DASH-sodium trials demonstrated that a carbohydrate-rich diet that emphasizes fruits, vegetables, and low-fat dairy products and that is reduced in saturated fat, total fat, and cholesterol substantially lowered blood pressure and low-density lipoprotein cholesterol. OmniHeart demonstrated that partial replacement of carbohydrate with either protein (about half from plant sources) or with unsaturated fat (mostly monounsaturated fat) can further reduces blood pressure, low-density lipoprotein cholesterol, and coronary heart disease risk. Results from these trials highlight the importance of macronutrients as a determinant of CVD risk. Furthermore, these results also document substantial flexibility that should enhance the ability of individuals to consume a heart-healthy diet.

Marshall DA et.al.,(2006) studied a ultralow-fat diets are known to reduce high-density lipoprotein cholesterol (HDL-C) levels. In the setting of a multicomponent lifestyle intervention program, relationships between exercise variables and HDL-C levels were examined to determine whether exercise moderates this dietary effect on serum lipids and apolipoproteins. We performed a 3-month, prospective, nonrandomized lifestyle intervention study (< or = 10% dietary fat: aerobic exercise [180 min/wk], group support, and yoga [60 min/day]) in 120 subjects with or at risk for coronary artery disease. After 3 months, dietary fat intake was
reduced to 8.7% +/- 2.6% of total intake and the median weekly exercise time was 194 minutes. High-density lipoprotein cholesterol levels decreased by 8.3 +/- 11.3 mg/dL (P < .001), and triglycerides levels increased by 17.6 +/- 102.7 mg/dL (P = .026). A small dense low-density lipoprotein cholesterol (LDL-C) phenotype emerged indicated by a 13.8% LDL-C reduction accompanied by only a 2.3% reduction in apolipoprotein B levels (P = .064). Among subjects with exercise amounts less than those of the group median, HDL-C reductions were greater in those with more than (-13.5 +/- 16.0 mg/dL) versus less than (-2.5 +/- 7.5 mg/dL) the median reductions in fat intake (P = .026). Even among subjects who exercised > 194 min/wk, HDL-C was reduced compared with baseline (-7.4 +/- 7.9 mg/dL, P < .001). An ultralow-fat diet as a component of a comprehensive lifestyle intervention induces reductions in HDL-C and the emergence of a dyslipidemic lipid profile. Aerobic exercise only partially mitigates this effect.

**Craddick SR et al., (2003)** studied the DASH diet and blood pressure. High blood pressure (also called hypertension) was one of the most important and common risk factors for atherosclerotic cardiovascular disease (CVD) and other chronic diseases. National guidelines recommend that all individuals with blood pressure readings of 120/80 mm Hg or higher adopt healthy lifestyle habits, including the Dietary Approaches to Stop Hypertension (DASH) diet, to manage their blood pressure. The DASH diet, which is high in fruits, vegetables, and low-fat dairy products and reduced in fat, has been shown in large, randomized, controlled trials to reduce blood pressure significantly. The DASH diet also has been shown to reduce blood cholesterol and homocysteine levels and to enhance the benefits of antihypertensive drug therapy. The DASH diet should be promoted, along with maintaining healthy weight, reducing sodium intake, increasing regular physical activity, and limiting alcohol intake, for lowering blood pressure and reducing the risk of CVD.

**Yalin S et al., (2001)** studied the effects of the short-term regular exercise-diet program on lipid profile in sedentary subjects. Regular aerobic exercise leads to changes in plasma lipids, lipoprotein and apoprotein levels. The aim of this study was to examine the training effects of the intervention program consisted of regular
exercise and low fat diet on plasma lipid profile. Effects of the four weeks intervention programme which consisted of walking and dietary restriction on lipid profile in sedentary subjects were investigated. Subjects, who had dyslipidemia or obesity, were instructed to walk (consecutive 60 minutes, one times daily) and to consume no more than 20% total fat and 300 mg/d of cholesterol for four weeks. At the end of fourth week, 41 subjects who had implemented exercise-diet programme, were assigned to study (intervention) group: 21 subjects who had remained sedentary, non-dieting, were included into the control group. Total-C, triglycerides, LDL-C, HDL-C, Lp (a), apo A1 and apo B100 were measured in fasting blood samples before and after 4 weeks of intervention programme. The end of four weeks, subjects in the exercise-diet group, as compared with the control group, showed a significant reduction in body weight (respectively 1.67 +/- 2.36 kg versus -0.21 +/- 1.36 kg, p = 0.001), total cholesterol (35 +/- 37 mg/dl vs -20 +/- 25 mg/dl, p < 0.001), triglycerides (30 +/- 68 mg/dl vs -10 +/- 52 mg/dl, p = 0.024) and LDL-C (29 +/- 41 mg/dl vs -18 +/- 25 mg/dl, p < 0.001) levels. However, at the end of programme, in the exercise-diet group, as compared with the control group, the changes in HDL-C (respectively -0.85 +/- 7.30 mg/dl vs 1.05 +/- 5.64 mg/dl, p = 0.302), Lp (a) (1.59 +/- 3.06 mg/dl vs -0.09 +/- 3.96 mg/dl, p = 0.069), apo A1 (0.61 +/- 22.69 mg/dl vs -0.66 +/- 17.27 mg/dl, p = 0.822) and apo B100 (5.41 +/- 19.33 mg/dl vs -4.00 +/- 20.51 mg/dl, p = 0.080) were not significant. The data of this study demonstrate that the four weeks programme based on regular daily aerobic exercise and low fat diet is capable of decreasing total cholesterol, triglycerides and LDL-C levels and that this short-term intervention is insufficient in increasing HDL-C, in decreasing Lp (a) and improving apoprotein levels.

Hata Y and Nakajima K (2000) studied life-style and serum lipids and lipoproteins. In reviewing the trends and influences of life-style in this country on health and disease in the latter half of 20th century, we focused our attention on 4 major habits of smoking, drinking, exercise and diets, and collected data on the Japanese to conduct a meta-analysis of their relationship with serum lipids and lipoproteins, which are the metabolic risk factors most closely related to atherosclerosis. The percentage of smokers was 54.0% in adult males and 14.5% in adult females in 1999. In the data of 7,256 subjects (mean age 47 years) in 16 papers,
smoking increased triglycerides by 13 mg/dl (0.15 mmol/L) or in 559 non-drinkers with a mean age of 49 years in 3 papers by 18 mg/dl (0.20 mmol/L), and decreased HDL-cholesterol by 3.5 mg/dl (0.09 mmol/L) with every 20 cigarettes smoked according to the regression equation. As for drinking, the annual ethanol consumption per adult was 8.5L. In 1996, the effects of alcohol on serum lipids were analyzed for 27,035 males (mean age 47 years) in 24 studies. Drinking elevated triglycerides by a mean of 10 mg/dl (0.11 mmol/L), and also HDL-cholesterol by 2.5 mg/dl (0.06 mmol/L) per 23 g of alcohol intake (corresponding to 1 go of sake or 1 large bottle of beer). Concerning exercise habit, 25% of males and 21% of females (mean age 47 years) regularly performed exercise such as jogging, swimming, aerobics, and tennis. However, walking was regarded as an easy exercise to be practiced by subjects of all ages. The effect of walking on serum lipids was studied with a total of 46,074 subjects (mean age 47 years) over eight population. The mean total cholesterol level of the Japanese increased by 28 mg/dl (0.72 mmol/L) in the past 30 years and reached 204 mg/dl (5.28 mmol/L) in a survey in 1990. 5) Concerning dietary habits, total cholesterol was lower by a mean of 13 mg/dl (0.34 mmol/L), triglycerides lower by 40 mg/dl (0.45 mmol/L), and HDL-cholesterol higher by 5 mg/dl (0.13 mmol/L) in the group who ate 7 or more Japanese-style meals in the 9 meals during 3 days than in the group who ate 3 or less Japanese-style meals in the 9 meals. When serum lipids were compared among individuals living in cities (8 groups: 3,613 subjects: mean age 51 years), agricultural villages (13 groups: 5,364 subjects: mean age 51 years), and fishing villages (9 groups: 1,071 subjects: mean age 52 years). Total cholesterol was lower by a mean of 10 mg/dl (0.26 mmol/L) in fishing villages than in cities, and triglycerides lower by a mean of 15 mg/dl (0.17 mmol/L) in fishing villages than in cities and agricultural villages. HDL-cholesterol was 5 mg/dl (0.13 mmol/L) higher in agricultural villages and 3 mg/dl (0.08 mmol/L) higher in fishing villages than in cities. 6) The effects of dietary therapy or guidance were evaluated in 585 subjects (mean age, 53 years) in 12 papers. Total cholesterol was reduced by 20 mg/dl (0.52 mmol/L), triglycerides by a mean of 40 mg/dl (0.45 mmol/L), and HDL-cholesterol was increased by 5 mg/dl (0.13 mmol/L) by restriction of fat intake or restriction of the intake of saturated fat and dietary cholesterol. The results of these meta-analyses are considered to indicate the extent to which abnormalities of serum lipids are caused
by a distorted life-style and the extent to which they are improved by correction of the life-style and exercise or dietary therapy. Correction of the life-style as a non-drug therapy may clearly improve hyperlipidemias or hypo-HDL-cholesterolemia so that this approach should be aggressively employed as part of the prevention and treatment for hyperlipidemias.

Appel LJ (1999) studied nonpharmacologic therapies that reduce blood pressure. Traditional approaches to control the epidemic of blood pressure-related atherosclerotic cardiovascular disease (ASCVD) had largely focused on drug therapy in persons with hypertension. Still, nonpharmacologic therapy, also termed lifestyle modification, had an important and expanding role that complements drug therapy. Specifically, nonpharmacologic therapies can serve as initial therapy in Stage 1 hypertensive patients, facilitate medication step down or withdrawal in patients with well-controlled hypertension, prevent hypertension in high-risk populations, and reduce blood pressure in normotensive individuals and thereby lower their risk of ASCVD. Traditional lifestyle modifications that reduce blood pressure include sodium reduction, weight loss, moderation of alcohol intake, and increased physical activity. Such strategies have been prominently advocated in the Fifth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Recommendations to increase potassium, magnesium, and calcium intake were based primarily on general health considerations, not for control of high blood pressure. In its sixth and most recent report (JNC VI) published in 1997, the Joint National Committee has extended its recommendations. In addition to the traditional lifestyle recommendations, the JNC VI advocates increased potassium intake for control of high blood pressure. Furthermore, this policy-making body now recommends a healthy dietary pattern, that is, one that is rich in fruits, vegetables, and low-fat dairy products, and reduced in saturated fat, total fat, and cholesterol. This diet, which was rigorously evaluated in the Dietary Approaches to Stop Hypertension (DASH) clinical trial, substantially lowered blood pressure in normotensive and hypertensive individuals. These recent developments reinforce the hypothesis that multiple dietary factors influence blood pressure. Nonpharmacologic approaches have enormous potential as a means to reduce blood pressure and control hypertension, thereby preventing the occurrence of ASCVD. The current challenge to health care
providers, government officials, and the general public is to develop and implement effective clinical and public health strategies that lead to desirable lifestyle modifications.

**Campbell NR et al., (1999)** studied lifestyle modifications to prevent and control hypertension. For people at risk for hypertension, there are a number of lifestyle options that may avert the condition—maintaining a healthy body weight, moderating consumption of alcohol, exercising, reducing sodium intake, altering intake of calcium, magnesium and potassium, and reducing stress. A Medline search was conducted for the period January 1996 to September 1996 for each of the interventions studied. Reference lists were scanned, experts were polled, and the personal files of the authors were used to identify other studies. Lifestyle modification by means of weight loss (or maintenance of healthy body weight), regular exercise and low alcohol consumption will reduce the blood pressure of appropriately selected normotensive and hypertensive people. Sodium restriction and stress management will reduce the blood pressure of appropriately selected hypertensive patients. The side effects of these therapies are few, and the indirect benefits are well known.

It is recommended that health care professionals determine the body mass index (weight in kilograms/height in meters$^2$) and alcohol consumption of all adult patients and assess sodium consumption and stress levels in all hypertensive patients.

To reduce blood pressure in the population at large, it is recommended that Canadians attain and maintain a healthy body mass index. For those who choose to drink alcohol intake should be limited to 2 or fewer standard drinks per day (maximum of 14/week for men and 9/week for women). Adults should exercise regularly. (3) To reduce blood pressure in hypertensive patients, individualized therapy is recommended. This therapy should emphasize weight loss for overweight patients, abstinence from or moderation in alcohol intake, regular exercise, and restriction of sodium intake and, in appropriate circumstances, individualized cognitive behavior modification to reduce the negative effects of stress. They are similar to those of the World Hypertension League and the Joint National committee, with the exception of the recommendations on stress management, which are based on new information.
2.6 SUMMARY OF THE LITERATURE

The review of literature helped the investigator to spot out relevant topics and variables. Further the literature helped the investigator to frame the suitable hypothesis leading to the problems. The latest literature also helped the investigator to support his finding with regard to the problem. Further the literature collected in the study also helped the research scholar to summarize his study. The researcher has presented the reviews in the related subjects by depending upon the highly authentic sources. Each review has been written in details in related to my subject. Finally the researcher puts to an end to this chapter after giving all relevant details to each reviews of this chapter.

Total numbers of 93 reviews were presented under the following sections, 33 reviews on Physiological, 16 reviews on Biochemical, 27 reviews on Psychological and 17 reviews on diet on Hypertensive. All the research studies presented in the section proved that the training programmers contribute significantly for better development of dependent variables. The critical and allied research reviews were 73 and 20 respectively. The research studies reviewed were collected from journals available in the websites and some university libraries.

Based on the experience gained through review of the studies, the investigator formulated suitable methodology to be followed in this research which is presented in Chapter III.