CHAPTER – II

REVIEW OF RELATED LITERATURE

The review of literature is instrumental in the selection of the topic, formation of hypothesis and deductive reasoning leading to the problem. It helps to get a clear idea and more knowledge which supports the finding with regard to the problem under study.

The review of literature is instrumental in the formation of hypotheses and to get a full picture of what done with regard to the problem under study. Such a review brings about a deep and clear perspective of the overall field. Now a day the educational program of any type is characterized by reforms and innovative ideas. It seems to be necessary one to formulate such a reviews of various scholars’ works. This can bring out a deep insight and clear perspective of the overall field in such reviews. Such collected reviews have been presented in logical order, in order of importance and in sequence of merit. This chapter is a step to get full picture of what has been done and said with regard to the problem under study. The review of literature in given as follows.

2.1 STUDIES ON YOGA

Adam Bernstein et al. (2014) conducted a study on yoga in the management of overweight and obesity. The regular practice of yoga may assist the lifestyle management of overweight and obesity by (a) increasing energy expenditure during practice sessions; (b) facilitating exercise outside of the sessions by reducing back and joint pain; (c) heightening mindfulness, improving mood, and reducing stress, which
may reduce food intake; and (d) allowing practitioners to feel more connected to their bodies, leading to enhanced awareness of satiety and the discomfort of overeating. In addition, obese individuals have reported lower levels of pleasure during exercise than non-obese individuals, and exercise intensity is perceived to be higher in obese than normal-weight individuals. Yoga may be a stepping stone, or precursor, to more vigorous physical activities. Moreover, the commitment and discipline of regular yoga practice, as well as the sense of community and support of group classes, may prepare an individual for diet and physical activity changes.

Yoga may be most beneficial in the treatment of overweight and obesity before an individual begins a diet and exercise program. Although no guidelines currently exist for such a prescription, based on our experience, we propose the following: 3 months of formal, instructor led yoga classes of 45 to 60 minutes once or twice per week. This schedule allows for the individual to become comfortable with yoga and begin developing mindfulness and relaxation and physical benefits. The practitioner can do the yoga standing or sitting, depending on comfort and comorbidity conditions. She should practice on her own for 20 minutes each day on which there are no group classes. During these informal sessions, the individual can do an abbreviated program, beginning with a short period of meditation or relaxation (5 minutes) followed by a series of postures (15 minutes), and ending with a period of rest (5 minutes). As the practitioner becomes more comfortable and proficient with yoga, she may include additional postures and more frequent or longer periods of practice. She may start a diet and exercise weight loss program after 3 months, unless motivated to do so earlier. Ideally, the individual will continue with as much of the
formal and informal yoga sessions as possible once the diet and exercise changes begin.

Alyson Ross and Sue Thomas (2010) investigated the study on Health Benefits of Yoga and Exercise: These studies subsequently were classified as uncontrolled (n = 30), wait list controlled (n = 16), or comparison (n = 35). The most common comparison intervention (n = 10) involved exercise. These studies were included in this review. In the studies reviewed, yoga interventions appeared to be equal or superior to exercise in nearly every outcome measured except those involving physical fitness. The studies comparing the effects of yoga and exercise seem to indicate that, in both healthy and diseased populations, yoga may be as effective as or better than exercise at improving a variety of health-related outcome measures. Future clinical trials are needed to examine the distinctions between exercise and yoga, particularly how the two modalities may differ in their effects on the SNS/HPA axis. Additional studies using rigorous methodologies are needed to examine the health benefits of the various types of yoga.

Amy Wheeler and Linda Wilkin (2007) examined the Impact of Yoga Asana on Perceived Stress, Heart Rate, and Breathing Rate. The purpose of this study was to examine how practicing Yoga āsana influences perceived stress level and physiological indicators of stress, such as resting heart rate and breathing rate. The sample consisted of 79 moderately-stressed students enrolled in Yoga āsana classes at a university in Southern California. Students participated in Yoga āsana classes for ten weeks as part of the General Education (GE) Physical Education curriculum. Participants reported data pre- and post-class on resting heart rate, unregulated breathing rate, and perceived stress level. We hypothesized that the practice of Yoga
Yoga asana would be associated with decreased stress. Results: Yoga asana was associated with positive pre- to post-class changes on perceived stress, heart rate, and breathing rate. Participants' pre-class perceived stress and breathing rate decreased during the ten-week period. However, participants' pre-class resting heart rate did not change significantly over the course of the study.

Baldwin (1999) investigated the psychological and physiological differences between adult exercisers who added a weekly yoga class to their regular exercise program and those who did not. Subjects were pre tested and post tested for mood state, stress response, recovery heart rate and spinal / hamstring flexibility. Over a period of eight weeks, subjects in both groups continued their normal exercise habits and maintained exercise logs. Subjects in the Yoga Group added a weekly yoga class. Subjects in the Control Group received a yoga class at a later time. At the end of eight weeks, exercise logs were collected and post tests were conducted. The results suggested: (1) more positive mood change in the Yoga Group over eight weeks, (2) more immediate positive affect from yoga than from cardiovascular or resistance training activities, (3) more compliance with yoga than with cardiovascular or resistance training activities, (4) comparable perceived exertion ratings for ‘moderate’ Hatha Yoga and routine aerobic exercise, (5) an 8% gain in spinal and hamstring flexibility in the Yoga Group over eight weeks, and (6) decreased vulnerability to stress in the Yoga Group, at the same time that sources of stress for that group increased.

Bertisch Wee and Carthy (2008) studied on Use of Complementary and Alternative Therapies by Overweight and Obese Adults. He analyzed data on CAM use form the 2002 National Health Interview Survey (NHIS) Alternative Medicine
Supplement (n=31,044). We compared the use of CAM overall, within the past 12 months, between normal weight (BMI from 18 to <25), overweight (from 25 to <30), mildly obese (from 30 to <35), moderately obese (from 35 to <40), and extremely obese (>40) adults. For the primary analysis, our multivariable model was adjusted for socio demographic factors, insurance status, medical conditions, and health behaviours. We performed additional analyses to explore the association of BMI and the use of seven CAM modalities. We found that adults with obesity have lower prevalence of use of Simplified Kudnalini yogic practices, and similar prevalence of use of several CAM modalities, including relaxation techniques, natural herbs, massage, chiropractic medicine, tai chi, and acupuncture, compared to normal-weight individuals. After adjustment for socio demographic factors, insurance status, medical conditions and health behaviours, adults with obesity were generally less likely to use most individual CAM modalities, although the magnitude of these differences were quite modest in many cases. Even though adults with obesity have a greater illness burden and higher utilization of traditional medical care, adults with higher BMI were no more likely to use each of the individual CAM therapies studied. Additional research is needed to improve our understanding of CAM use by adults with obesity.

Dae Yun Seo and Sung Ryul Lee, et al. (2012) analyzed the Yoga Training Improves Metabolic Parameters in Obese Boys Yoga has been known to have stimulatory or inhibitory effects on the metabolic parameters and to be uncomplicated therapy for obesity. The purpose of the present study was to test the effect of an 8-week of yoga-asana training on body composition, lipid profile, and insulin resistance (IR) in obese adolescent boys. Twenty volunteers with body mass index (BMI) greater than the 95th percentile were randomly assigned to yoga (age 14.7±0.5 years,
n=10) and control groups (age 14.6±1.0 years, n=10). The yoga group performed exercises three times per week at 40~60% of heart-rate reserve (HRR) for 8 weeks. IR was determined with the homeostasis model assessment of insulin resistance (HOMA-IR). After yoga training, body weight, BMI, fat mass (FM), and body fat % (BF %) were significantly decreased, and fat-free mass and basal metabolic rate were significantly increased than baseline values. FM and BF % were significantly improved in the yoga group compared with the control group (p<0.05). Total cholesterol (TC) was significantly decreased in the yoga group (p<0.01). HDL-cholesterol was decreased in both groups (p<0.05). No significant changes were observed between or within groups for triglycerides, LDL-cholesterol, glucose, insulin, and HOMA-IR. Our findings show that an 8-week of yoga training improves body composition and TC levels in obese adolescent boys, suggesting that yoga training may be effective in controlling some metabolic syndrome factors in obese adolescent boys.

**Datar and Kulkarni (1997)** conducted a study on yogic practices and cardiovascular efficiency. The subjects were 48 males and 52 females of age group 16-24 years. Yoga training was given for a period of 21 days (3 weeks). Cardiac efficiency was measured using Harward step test, before and at the end of training period. There is a significant improvement in the cardio vascular efficiency measured in terms of fitness index both in males and females.

**Davendra Kumar Taneja (2014)** investigated Yoga has been the subject of research in the past few decades for therapeutic purposes for modern epidemic diseases like mental stress, obesity, diabetes, hypertension, coronary heart disease, and chronic obstructive pulmonary disease. Individual studies report beneficial effect
of yoga in these conditions, indicating that it can be used as nonpharmaceutical measure or complement to drug therapy for treatment of these conditions. However, these studies have used only yoga asana, pranayama, and/or short periods of meditation for therapeutic purposes. General perception about yoga is also the same, which is not correct. Yoga in fact means union of individual consciousness with the supreme consciousness. It involves eight rungs or limbs of yoga, which include yama, niyama, asana, pranayama, pratyahara, dharana, dhyana, and samadhi. Intense practice of these leads to self-realization, which is the primary goal of yoga. An analytical look at the rungs and the goal of yoga shows that it is a holistic way of life leading to a state of complete physical, social, mental, and spiritual well-being and harmony with nature. This is in contrast to purely economic and material developmental goal of modern civilization, which has brought social unrest and ecological devastation.

Dhara R.Doshi. & Dr.Yogesh A. Jogsan (2012) investigated the impact of Ten days yoga practice on thirteen obese women, more so 1) to study the effect of specific yogic programme on self control at psychological level in obese women and 2) to find the effect of a specific yogic programme for weight reduction in obese women.

Self-control is not just affected by how we are thinking at a specific moment that would be too easy. Everyone has a developed different amount of self-control. Some people seem to find it easy to resist temptation while others can be relied on, to always yield to self-gratification. To a certain extent we have to accept our starting point on the self-control sliding scale and do the best we can with it. It is observed in obese women that their self-control in different situations is not sufficient. Although a
few obese women have very high level of self-control but others have very low level. Due to lacking of self-control, they face many critical problems like Hypertension, Heart attack, poor family life, destroyed inter-personal relationship etc. at not only on physical level but on mental level also.

Yoga is worldwide accepted for its beneficial effects on different ailments. Asanas, Pranayamas, Kriyas, Bandhas, Mudras, Dhyana and chanting of Mantras are advantageous at all the levels of personality. Due to researches and advantages, now Yoga is being applied as a therapy around the world. It has observed that Yoga is very beneficial for obese people to remain healthy and also to reduce the weight. Yoga brings a very positive change in attitude and behavior and increases mental capacities. It can convert outlook towards the life and its complications in a positive direction, it may improve the level of self-control also.

Yoga Program was conducted for one and half an hour daily for 10 days under well qualified Yoga Instructors. The Yoga Program was:

1. Omkar - 10 times
2. Warm up with stretching, joints movements, rotation etc.
3. Surya Namaskar - 5 rounds
4. Shavasana
5. Pawan-Muktasana
6. Ardha-Halasna
7. Kati-Vakrasana
8. Ardha Dronasana
9. Setu Bandhasana
10. Ardha Naukasana
11. Bhujangasana
12. Shalbhasana
13. Dhanurasana
14. Parvatasana
15. Shanshankasana
16. Yoga-Mudra
17. Ushtrasana
18. Kati Chakrasana
19. Tadasana
20. Vrikshasana
21. Utkatasana
22. Trikonasana
23. Shavasana
24. Kapalbhati - 3 rounds each 60 strokes
25. Anuloma-Viloma Pranayama (Puraka-Rechaka)-15 rounds
26. Bhramri Pranayama (Puraka-Rechaka)-10 rounds
27. Omkar 3times

The result shows a very good impact of Yoga on obese women for weight-reduction. In fact, this is noticeable that the result is achieved within ten days which is comparatively very short time span. The result may more effectively present the beneficial effects of Yogic Program if it is followed for a long time and with dietary control and brisk walking etc. So, it is recommended that Yoga should be practiced for a long time for weight reduction and advised to reduce calories intake to get fruitful
result earlier. This study indicates to apply Yoga for a long time with patience and regularity so that obese women can receive more advantages at various levels of the personality.

**Malhotra Singh and Sharma (2005)** conducted study on the beneficial effect of yoga in diabetes. Twenty NIDDM subjects (mild to moderate diabetics) in the age group of 30-60 years were selected from the out patient clinic of G.T.B. hospital. They were on a 40 days yoga asana regime under the supervision of a yoga expert. 13 specific Yoga asanas ≤ done by Type 2 Diabetes Patients included. Surya Namaskar, Trikonasana, Tadasana, Sukhasana, Padmasana, Bhastrika Pranayama, Pashimottanasana, Ardhmatsyendrasana, Pawanmuktasana, Bhujangasana, Vajrasana, Dhanurasana and Shivasana are beneficial for diabetes mellitus. Serum insulin, plasma fasting and one hour postprandial blood glucose levels and anthropometric parameters were measured before and after yoga asanas. The results indicate that there was significant decrease in fasting glucose levels from basal 208.3 +/- 20.0 to 171.7 +/- 19.5 mg/dl and one hour postprandial blood glucose levels decreased from 295.3 +/- 22.0 to 269.7 +/- 19.9 mg/dl. The exact mechanism as to how these postures and controlled breathing interact with somatoendocrine mechanism affecting insulin kinetics was worked out. A significant decrease in waist-hip ratio and changes in insulin levels were also observed, suggesting a positive effect of yoga asanas on glucose utilisation and fat redistribution in NIDDM. Yoga asanas may be used as an adjunct with diet and drugs in the management of Type 2 diabetes.

**Malhotra Singh et al. (2002)** examined the study on yoga asanas in assessment of pulmonary function in NIDDM patients. Certain yoga asanas if practiced regularly are known to have beneficial effects on human body. These yoga
practices might be interacting with various, somato-neuro-endocrine mechanisms to have therapeutic effects. The present study done in twenty four NIDDM patients of 30 to 60 year old, provides metabolic and clinical evidence of improvement in glycaemic control and pulmonary functions. These middle-aged subjects were type II diabetics on antihyperglycaemic and dietary regimen. Their baseline fasting and postprandial blood glucose and glycosylated Hb were monitored along with pulmonary function studies. The expert gave these patients training in yoga asanas and were pursed 30-40 min/day for 40 days under guidance. These asanas consisted of 13 well known postures, done in a sequence. After 40 days of yoga asanas regimen, the parameters were repeated. The results indicate that there was significant decrease in fasting blood glucose levels (basal 190.08 +/- 90.8 in mg/dl to 141.5 +/- 79.8 in mg/dl). The postprandial blood glucose levels also decreased (276.54 +/- 101.0 in mg/dl to 201.75 +/- 104.1 in mg/dl), glycosylated hemoglobin showed a decrease (9.03 +/- 1.4% to 7.83 +/- 2.6%). The FEV1, FVC, PEFR, MVV increased significantly (1.81 +/- 0.4 lt to 2.08 +/- 0.4 lt, 2.20 +/- 0.6 lt to 2.37 +/- 0.5 lt, 3.30 +/- 1.0 lt/s to 4.43 +/- 1.4 lt/s and 64.59 +/- 25.7 lt min to 76.28 +/- 28.1 lt/min respectively). FEV1/FVC% improved (85 +/- 0.2% to 89 +/- 0.1%). These findings suggest that better glycaemic control and pulmonary functions can be obtained in NIDDM cases with yoga asanas and pranayama. The exact mechanism as to how these postures and controlled breathing, interact with somato-neuro-endocrine mechanism affecting metabolic and pulmonary functions remains to be worked out.

**Malhotra et al. (2002)** analyzed the effect of Yoga asanas on nerve conduction in type 2 diabetes. Twenty Type 2 diabetic subjects between the age group of 30-60 years were studied to see the effect of 40 days of Yoga asanas on the nerve
conduction velocity. The duration of diabetes ranged from 0-10 years. Subject suffering from cardiac, renal and proliferative retinal complications were excluded from the study. Yoga asanas included Suryanamaskar, Tadasan, Konasan, Padmasan Pranayam, Paschimottansan Ardhmatsyendrasan, Shavasan, Pavanmukthasan, Sarpasan and Shavasan. Subjects were called to the cardio-respiratory laboratory in the morning time and were given training by the Yoga expert. The Yoga exercises were performed for 30-40 minutes every day for 40 days in the above sequence. The subjects were prescribed certain medicines and diet. The basal blood glucose, nerve conduction velocity of the median nerve was measured and repeated after 40 days of Yogic regime. Another group of 20 Type 2 diabetes subjects of comparable age and severity, called the control group, were kept on prescribed medication and light physical exercises like walking. Their basal & post 40 days parameters were recorded for comparison. Right hand and left hand median nerve conduction velocity increased from 52.81 +/- 1.1 m/sec to 53.87 +/- 1.1 m/sec and 52.46 +/- 1.0 to 54.75 +/- 1/1 m/sec respectively. Control group nerve function parameters deteriorated over the period of study, indicating that diabetes is a slowly progressive disease involving the nerves. Yoga asanas have a beneficial effect on glycaemic control and improve nerve function in mild to moderate Type 2 diabetes with sub-clinical neuropathy.

McCaffrey and Ruth et al. (2005) assessed the effects of Yoga on Hypertensive Persons in Thailand. To determine the effectiveness of a yoga program on blood pressure and stress, a group of hypertensive patients in Thailand were studied, with the experimental group showing significantly decreased mean stress scores and blood pressure, heart rate, and body mass index levels compared with the
control group. Further studies are suggested to determine the effects of yoga on hypertension in Thailand.

Radhakrishnan, (2007) studied the effect of selected yogasanas on low back pain for a group of middle aged women. To achieve the purpose of the study among the women working as lecturers, teachers, typists and clerks who attended yoga class, a case history of the ailment (low back pain) were selected. Further a qualified medical officer who made a thorough medical examination to ascertain the possible causes for back and isolated those subjects who would not suffer any contra indication owing to administration of yogasanas screened the women. Using random sampling method, 45 women were selected for this study. Their age ranged from 35-40 years. Flexibility and range of pain were taken for this study. The subjects were divided into three groups and each group consisted of 15 women. Group – I was the control group. Group II underwent the training of general asanas and fitness exercises. Group III underwent selected therapeutic asanas. The subjects were tested on, low back pain, hip flexibility at the beginning (pre test) and at the end of the experimental period (post test). The conclusions of the study were that, yogasanas increase the hip flexibility, range of pain and it increases abdominal strength / endurance, the results of the study indicates that lack of physical exercise is also one of the causes for low back pain.

Ritu Chattha et al. (2008) studied on Treating the Climacteric Symptoms in Indian Women with an Integrated Approach to Simplified Kundalini Yogic practices: A Randomized Control Study One hundred twenty participants (ages 40-5 y) were randomly divided into two study arms, i.e., yoga and control. The yoga group practiced an integrated approach to Simplified Kundalini yogic practices comprising
Surya Namaskara (Sun Salutation) with 12 postures, Pranayama (breathing practices), and Avartan Dhyan (Cyclic meditation), whereas the Control group practiced a set of simple physical exercise under supervision of trained teachers for 8 weeks (1 h daily), 5 days per week). The assessments were made by Greene Climacteric Scale, Perceived Stress Scale, and Eysenck’s Personality Inventory before and after the intervention. Of the three factors of the Greene Climacteric Scale, the Maan – Whitney test showed a significant difference between groups (P<0.05) in the vasomotor symptoms, a marginally significant difference (P=0.06) in psychological factors but not in the somatic component. Effect sizes were higher in the yoga group for all factors. There was a significantly greater degree of decrease in Perceived Stress Scale scores (P<0.001, independent samples t test) in the yoga group compared with controls (between-group analysis) with a higher effect size in the yoga group (1.10) than the control (0.27). On the Eysenck’s Personality Inventory, the decrease in neuroticism was greater (P<0.05) in the yoga group (effect size = 0.43) than the Control group (effect size =0.21) with no change in extroversion in either the yoga or Control group. Eight weeks of an integrated approach to Manavalakalai yogic practices decreases climacteric symptoms, perceived stress, and neuroticism in perimenopausal women better than physical exercise.

Savita Singh et.al (2008) conducted the Influence of pranayamas and yoga-asanas on serum insulin, blood glucose and lipid profile in type 2 diabetes. A distinguishable feature of type 2 diabetes besides hyperglycemia and deranged lipid profile is an impaired insulin secretion, peripheral insulin resistance and obesity which has become a major health concern worldwide. India with an estimated 31million diabetics in 2000 and 79millions by the yr 2030 has the highest number of
type 2 diabetics in the world. In this study, we aimed to see if yoga-asanas and pranayamas have any influence in modifying certain biochemical parameters. Sixty patients of uncomplicated type 2 diabetes (age 35–60 yrs of 1–10 yrs duration) were divided into two groups: Group 1 (n=30): performed yoga along with the conventional hypoglycemic medicines and group 2 (n=30): patients who only received conventional medicines. Duration of the study was 45 days. Basal recordings of blood glucose (fasting and post-prandial), lipid profile and serum insulin were taken at the time of recruitment and the second reading after forty five days. Results showed a significant improvement in all the biochemical parameters in group 1 while group 2 showed significant improvement in only few parameters, thus suggesting a beneficial effect of yoga regimen on these parameters in diabetic patients.

**Virginia S. Cowen (2006)** compared on Heart rate in yoga asana practice: A comparison of styles Yoga is often recommended for stress relief, yet some of the more fitness-oriented styles of yoga can be vigorous forms of exercise. The purpose of this study was to investigate differences in heart rate during the physical practice of yoga postures, breathing exercises, and relaxation. Sixteen participants were led through three different styles of yoga asana practice. Polar S610 heart rate monitors were used to measure one minute average heart rates throughout each session. Repeated measures analysis of variance indicated that there was a significant difference (P<0.05) in heart rate between astanga yoga (M=95, SD=12.84) and the other two styles, but not between the hatha (M=80, SD=9.32) and gentle (M=74, SD=7.41) yoga styles. These results indicate that there may be different fitness benefits for different styles of yoga practice.
2.2 STUDIES ON ANOREXIA SYNDROME

Amy Ozie and Beverly Henry et.al (2011) evaluated Position of the American Dietetic Association: Nutrition Intervention in the Treatment of Eating Disorders – Abstract It is the position of the American Dietetic Association that nutrition intervention, including nutritional counseling by a registered dietitian (RD), is an essential component of team treatment of patients with anorexia nervosa, bulimia nervosa, and other eating disorders (EDs) during assessment and treatment across the continuum of care. Diagnostic criteria for EDs provide important guidelines for identification and treatment. In addition, individuals may experience disordered eating that extends along a range from food restriction to partial conditions to diagnosed EDs. Understanding the roles and responsibilities of RDs is critical to the effective care of individuals with EDs. The complexities of EDs, such as epidemiologic factors, treatment guidelines, special populations, and emerging trends highlight the nature of EDs, which require a collaborative approach by an interdisciplinary team of mental health, nutrition, and medical specialists. RDs are integral members of treatment teams and are uniquely qualified to provide medical nutrition therapy for the normalization of eating patterns and nutritional status. However, this role requires understanding of the psychologic and neurobiologic aspects of EDs. Advanced training is needed to work effectively with this population. Further efforts with evidenced-based research must continue for improved treatment outcomes related to EDs,

Carlos Plata and Salaman (2000) studied on central nervous system mechanisms contributing to the cachexia–anorexia syndrome. The cachexia–anorexia syndrome occurs in chronic pathophysiologic processes including cancer, infection
with human immunodeficiency virus, bacterial and parasitic diseases, inflammatory bowel disease, liver disease, obstructive pulmonary disease, cardiovascular disease, and rheumatoid arthritis. Cachexia makes an organism susceptible to secondary pathologies and can result in death. Cachexia–anorexia may result from pain, depression or anxiety, hypogeusia and hyposmia, taste and food aversions, chronic nausea, vomiting, early satiety, malfunction of the gastrointestinal system (delayed digestion, malabsorption, gastric stasis and associated delayed emptying, and/or atrophic changes of the mucosa), metabolic shifts, cytokine action, production of substances by tumor cells, and/or iatrogenic causes such as chemotherapy and radiotherapy. The cachexia–anorexia syndrome also involves metabolic and immune changes (mediated by either the pathophysiologic process, i.e., tumor, or host-derived chemical factors, e.g., peptides, neurotransmitters, cytokines, and lipid-mobilizing factors) and is associated with hypertriacylglycerolemia, lipolysis, and acceleration of protein turnover. These changes result in the loss of fat mass and body protein. Increased resting energy expenditure in weight-losing cachectic patients can occur despite the reduced dietary intake, indicating a systemic dysregulation of host metabolism. During cachexia, the organism is maintained in a constant negative energy balance. This can rarely be explained by the actual energy and substrate demands by tumors in patients with cancer. Overall, the cachectic profile is significantly different than that observed during starvation. Cachexia may result not only from anorexia and a decreased caloric intake but also from malabsorption and losses from the body (ulcers, hemorrhage, effusions). In any case, the major deficit of a cachectic organism is a negative energy balance. Cytokines are proposed to participate in the development and/or progression of cachexia–anorexia; interleukin-1, interleukin-6 (and its subfamily members such as ciliary neurotrophic factor and
leukemia inhibitory factor), interferon-γ, tumor necrosis factor-α, and brain-derived neurotrophic factor have been associated with various cachectic conditions. Controversy has focused on the requirement of increased cytokine concentrations in the circulation or other body fluids (e.g., cerebrospinal fluid) to demonstrate cytokine involvement in cachexia–anorexia. Cytokines, however, also act in paracrine, autocrine, and intracrine manners, activities that cannot be detected in the circulation. In fact, paracrine interactions represent a predominant cytokine mode of action within organs, including the brain. Data show that cytokines may be involved in cachectic–anorectic processes by being produced and by acting locally in specific brain regions. Brain synthesis of cytokines has been shown in peripheral models of cancer, peripheral inflammation, and during peripheral cytokine administration; these data support a role for brain cytokines as mediators of neurologic and neuropsychiatric manifestations of disease and in the brain-to-peripheral communication (e.g., through the autonomic nervous system). Brain mechanisms that merit significant attention in the cachexia–anorexia syndrome are those that result from interactions among cytokines, peptides/neuropeptides, and neurotransmitters. These interactions could result in additive, synergistic, or antagonistic activities and can involve modifications of transducing molecules and intracellular mediators. Thus, the data show that the cachexia–anorexia syndrome is multifactorial, and understanding the interactions between peripheral and brain mechanisms is pivotal to characterizing the underlying integrative pathophysiology of this disorder.

Caroline Davis et al. (1997) investigated the prevalence of high-level exercise in the eating disorders: Etiological implications – Abstract - There is increasing evidence both from animal experimentation and from clinical field studies
that physical activity can play a central role in the pathogenesis of some eating disorders. However, few studies have addressed the issue of prevalence or whether there are different rates of occurrence across diagnostic categories, and the estimates that do exist are not entirely satisfactory. The present study was designed to conduct a detailed examination of the physical activity history in patients with anorexia nervosa (AN) and bulimia nervosa (BN) both during and prior to the onset of their disorder. A sample of adult patients and a second sample of adolescent AN patients took part in the study. A series of chi-square analyses compared diagnostic groups on a number of variables related to sport/exercise behaviors both premorbidly and comorbidly. Data were obtained by means of a detailed structured interview with each patient. We found that a large proportion of eating disorder patients were exercising excessively during an acute phase of the disorder, overexercising is significantly more frequent among those with AN versus BN, and premorbid activity levels significantly predict excessive comorbidity. These findings underscore the centrality of physical activity in the development and maintenance of some eating disorders. They also have important clinical implications in light of the large proportion of individuals who combine dieting and exercise in an attempt to lose weight, and the increasing recognition of the adverse effects of strenuous physical activity in malnourished individuals.

David Currow et al. (2014) evaluated the Anamorelin hydrochloride in the treatment of cancer anorexia-cachexia syndrome. Anamorelin hydrochloride is an orally active ghrelin receptor agonist in development by Helsinn, for the treatment of non-small-cell lung cancer (NSCLC) cachexia. In preclinical and clinical studies, the potent affinity of anamorelin for the ghrelin receptor is associated with significant appetite-enhancing activity and resultant improvements in body weight, lean body
mass, and handgrip strength compared with placebo. The accompanying stimulatory effects on growth hormone and IGF-1 are not associated with tumor growth, and overall survival in patients with cancer is not compromised. Anamorelin is well tolerated with no dose-limiting toxicities identified to date. The findings of ongoing Phase III studies are needed to confirm the significant potential of anamorelin to treat NSCLC cachexia.

David Garner and Kelly Bemis (1982) investigated the cognitive-behavioral approach to anorexia nervosa – Abstract - The initial section of this paper presents a rationale for describing the development of anorexia nervosa in cognitive-behavioral terms. The limitations of conceptualizing the disorder simply as a behavioral pattern maintained by environmental contingencies or negative reinforcement are discussed. The remainder of the paper outlines a basic cognitive-behavioral model for intervention that is based on Beck's cognitive therapy. Recommendations particularly relevant to the management of anorexic clients are presented, including techniques for developing motivation for psychotherapy and for monitoring weight gain and food intake. Common irrational beliefs and systematic cognitive distortions are described. Assessment procedures and behavioral strategies that complement the cognitive approach are presented. Detailed examples are provided to illustrate the specific cognitive strategies that are recommended for evoking and modifying the irrational beliefs and assumptions of anorexic clients.

Davis, Carolin et al. (1998) investigated the Obsessionality in Anorexia Nervosa: The Moderating Influence of Exercise - Collapse Box Abstract - Objective: Research has confirmed substantial links between OCD and AN. Not only are there psychopathological similarities between the two syndromes, but a marked
neurochemical correspondence. Extensive exercising is a common feature of AN and also has relevance in its links with OCD. There is evidence from the exercise-induced weight-loss syndrome in animals that exercise and caloric restriction, in combination, tend to increase serotonergic activity in a synergistic manner. This syndrome has been proposed as a valid model of OCD as well as for AN. To date, little research has directly tested this theory in the human condition. Method: Fifty-three AN patients were categorized as high-level exercisers (N = 22) or moderate/nonexercisers (N = 31) based on the frequency of their physical activity over the year before assessment.

Results: Exercisers scored significantly higher on a measure of OC personality characteristics, OC symptomatology, and perfectionism—a personality factor associated with the development of Obsessive-Compulsive Personality Disorder. On the other hand, there were no group differences on other salient eating disorder characteristics such as body esteem, self-esteem, or weight preoccupation. There were also no differences in degree of emaciation as indicated by Body Mass Index.

Conclusions: Findings suggest that among AN patients obsessional personality characteristics are linked to high-level exercising, and that exercising is associated with a greater degree of OC symptomatology. Results are discussed in the context of current theories of AN, OCD, and some biological mechanisms.

Del Fabbro et al. (2015) examined the health professionals' attitudes toward the detection and management of cancer-related anorexia-cachexia syndrome, and a proposal for standardized assessment. The identification and management of patients with cancer anorexia-cachexia syndrome (CACS) can be a challenge despite recent international consensus on the definition of the condition. To describe the current views and practice patterns of community oncologists and oncology nurses in regard
to CACS and to propose a standardized, pragmatic assessment of CACS for oncological practice. Responses from 151 community oncologists and nurses obtained across 5 surveys were analyzed. Questions addressed CACS in general and in patients with non-small-cell lung cancer (NSCLC). Surveys 1-3 were directed at physicians, and surveys 4 and 5 were directed at nurses. Surveys 1, 2, 4, and 5 focused on the recognition and monitoring of CACS, and Survey 3 on symptom management. 67% of medical oncologists in Survey 3 selected weight loss as the most important criterion for diagnosing CACS and cited declining appetite and performance status (PS) as the most bothersome effects for patients and families. Weight maintenance/gain was the primary treatment objective for oncologists. Respondents to surveys 1 and 2 acknowledged the risk for CACS is high (60%) in NSCLC but considered the risk much lower (4%) in patients completing a first course of therapy with good PS. 91% of oncologists in Survey 3 reported that symptoms that had an impact on calorie intake were important/very important, and 73% were willing to consider a symptom assessment instrument that included appetite. Nurses in surveys 4 and 5 reported weight loss and appetite were most commonly used to identify cachexia. They considered responsibility for the initial assessment of cachexia was the oncologist's (32%), followed by the nurse practitioner (28%), and the nurse (16%). Most oncologists and nurses recognize the core criteria for the CACS, although there may be under-recognition of the condition's prevalence, particularly earlier in the course of treatment. There is considerable interest in adopting a brief assessment tool for screening, management, and referral of patients who are affected by or at-risk of CACS.
Eva Penas Lledol and Francisco et.al (2002) studied on Excessive exercise in anorexia nervosa and bulimia nervosa: Relation to eating characteristics and general psychopathology Objective - Excessive exercise is a well-known phenomenon in anorexia nervosa, but less is known about its role in bulimia nervosa. In addition, there is little evidence regarding the psychopathological processes that might act as predisposing, triggering, or maintaining factors for such exercise. The present study examined the presence of excessive exercise in different women with eating disorders, and its psychopathological correlates. – Methods - Case notes from 63 anorexia nervosa and 61 bulimia nervosa patients were examined. Two-way multivariate analyses of variance (diagnosis × use of excessive exercise) were used to determine the impact of the two factors upon eating characteristics (EAT-40 and BITE) and psychopathological symptoms (SCL-90-R). – Results - While high levels of depression were more likely among all patients who used excessive exercise, levels of anxiety and somatization were particularly high only among those anorexics who exercised excessively. – Discussion - Possible explanatory models are advanced to account for this pattern of findings, focusing on the possible use of exercise as an affect regulation strategy among anorexia nervosa patients. Further research is suggested to test and develop this model, and possible clinical implications are outlined.

Harrison Pope et al. (1993) Anorexia nervosa and “reverse anorexia” among 108 male bodybuilders two disorders of body image encountered in a study of 108 bodybuilders are described. In a study of the psychiatric effects of anabolic steroids, structured interviews were administered to 55 bodybuilders who had used anabolic steroids and 53 non-user controls. Three (2.8%) of the subjects reported a history of
anorexia nervosa—a rate far higher than the 0.02% rate typically reported among American men ($P < .001$). Nine (8.3%) of the subjects, two of whom were former anorexics, described a “reverse anorexia” syndrome, where they believed that they appeared small and weak even though they were actually large and muscular. Reverse anorexic subjects reported that they declined social invitations, refused to be seen at the beach, or wore heavy clothes even in the heat of summer because they feared that they looked too small. All nine reverse anorexia cases occurred among steroid users; none occurred among non-users ($P < .003$). Four subjects reported that their reverse anorexic symptoms contributed to their decision to start using steroids. Disorders of body image, including both anorexia nervosa and its reverse form, may occur frequently in men who lift weights regularly. Reverse anorexia may precipitate or perpetuate the use of anabolic steroids in some individuals.

Jean Kristellera and Ruth Woleverb (2010) evaluated the mindfulness based eating awareness training for treating binge eating disorder: The Conceptual Foundation This paper reviews the conceptual foundation of mindfulness based eating awareness training (MB-EAT). It provides an overview of key therapeutic components as well as a brief review of current research. MB-EAT is a group intervention that was developed for treatment of binge eating disorder (BED) and related issues. BED is marked by emotional, behavioral and physiological disregulation in relation to food intake and self-identity. MB-EAT involves training in mindfulness meditation and guided mindfulness practices that are designed to address the core issues of BED: controlling responses to varying emotional states; making conscious food choices; developing an awareness of hunger and satiety cues; and cultivating self-acceptance. Evidence to date supports the value of MB-EAT in
decreasing binge episodes, improving one's sense of self-control with regard to eating, and diminishing depressive symptoms.

Jennifer Daubenmier (2005) evaluated the relationship of yoga body awareness and body responsiveness to self-objectification and disordered eating. Study 1 tested whether yoga practice is associated with greater awareness of and responsiveness to bodily sensations, lower self-objectification, greater body satisfaction, and fewer disordered eating attitudes. Three samples of women (43 yoga, 45 aerobic, and 51 nonyoga/nonaerobic practitioners) completed questionnaire measures. As predicted, yoga practitioners reported more favorably on all measures. Body responsiveness, and, to some extent, body awareness significantly explained group differences in self-objectification, body satisfaction, and disordered eating attitudes. The mediating role of body awareness, in addition to body responsiveness, between self-objectification and disordered eating attitudes was also tested as proposed in objectification theory (Fredrickson & Roberts, 1997). Body responsiveness, but not awareness, mediated the relationship between self-objectification and disordered eating attitudes. This finding was replicated in Study 2 in a sample of female undergraduate students. It is concluded that body responsiveness and, to some extent, body awareness are related to self-objectification and its consequences.

Kate Tchanturia and Whitney (2013) examined the treasure can cognitive exercises help treat anorexia nervosa. Cognitive remediation therapy (CRT) is used as an intervention for people with brain lesions and psychosis. This case report demonstrates the possible benefits of introducing CRT into treatment packages for anorexia nervosa (AN). In our previous work, we reported that people with AN
demonstrate inflexibility in cognitive set-shifting tasks. Weight gain alone does not improve the neuropsychological profile in set-shifting tasks. This case report illustrates how training programmes can address problems in cognitive rigidity. We acknowledge the limitations of case studies, however, this is a starting point in exploring the possibilities of introducing CRT as part of the treatment of AN.

Laura Douglassa (2009) investigated the yoga as an intervention in the treatment of eating disorders. This article explores the uses of yoga as an experiential adjunct to other forms of therapy in the treatment of eating disorders in residential and outpatient settings. Supported by other treatment modalities, yoga can be an effective method for increasing self-awareness, reflection and the ability to self-soothe. Like other interventions, yoga has potential misuses. These misuses are uncovered with suggestions made as to how therapists can support the practice of yoga in residential and outpatient settings. Eating Disorders,

Melinda Scimea and Catherine Cook Cottonea et al. (2006) investigated the Group Prevention of Eating Disorders with Fifth Grade Females. Impact on Body Dissatisfaction, Drive for Thinness, and Media impact of a primary prevention program for eating disorders aimed at fifth-grade females. The curriculum was based on empirically validated risk and protective factors and incorporated interactive discourse, yoga, and relaxation into 10 weekly sessions. Pre- and post-test data from three groups conducted over the course of 13 months were combined for a total of 45 participants. Results indicate completion of the group resulted in a significant decrease on scales measuring body dissatisfaction and drive for thinness, as well as media influence. Implications for practice and future research are discussed.
Patton et al. (1999) studied on set of adolescent eating disorders, population based cohort study over 3 years - Objective: To study the predictors of new eating disorders in an adolescent cohort. - Design: Cohort study over 3 years with six waves. - Subjects: Students, initially aged 14-15 years, from 44 secondary schools in the state of Victoria, Australia. - Outcome measures: Weight (kg), height (cm), dieting (adolescent dieting scale), psychiatric morbidity (revised clinical interview schedule), and eating disorder (branched eating disorders test). Eating disorder (partial syndrome) was defined when a subject met two criteria for either anorexia nervosa or bulimia nervosa according to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV). Results: At the start of the study, 3.3% (29/888) of female subjects and 0.3% (2/811) of male subjects had partial syndromes of eating disorders. The rate of development of new eating disorder per 1000 person years of observation was 21.8 in female subjects and 6.0 in male subjects. Female subjects who dieted at a severe level were 18 times more likely to develop an eating disorder than those who did not diet, and female subjects who dieted at a moderate level were five times more likely to develop an eating disorder than those who did not diet. Psychiatric morbidity predicted the onset of eating disorder independently of dieting status so that those subjects in the highest morbidity category had an almost sevenfold increased risk of developing an eating disorder. After adjustment for earlier dieting and psychiatric morbidity, body mass index, extent of exercise, and sex were not predictive of new eating disorders. Conclusions: Dieting is the most important predictor of new eating disorders. Differences in the incidence of eating disorders between sexes were largely accounted for by the high rates of earlier dieting and psychiatric morbidity in the female subjects. In adolescents, controlling weight by exercise rather than diet restriction seems to carry less risk of development of eating
disorders. Key messages. Adolescent females who diet at a severe level are 18 times more likely to develop an eating disorder than those who do not diet, and those who diet at a moderate level are five times more likely to develop an eating disorder - High levels of psychiatric morbidity in females increase the risk of developing eating disorders by sevenfold - Around two thirds of new cases of eating disorder arise in females who have dieted moderately. The predominance of eating disorders in females is largely explained by the higher rates of earlier dieting and psychiatric morbidity. Daily exercise seems to be a less risky strategy for controlling weight in adolescents.

Rain Carei, et al. (2010) analysed randomized controlled clinical Trial of Yoga in the Treatment of Eating Disorders. This was a pilot project designed to assess the effect of individualized yoga treatment on eating disorder outcomes among adolescents receiving outpatient care for diagnosed eating disorders (anorexia nervosa, bulimia nervosa, eating disorder not otherwise specified). – Methods - A total of 50 girls and 4 boys aged 11–21 years were randomized to an 8-week trial of standard care vs. individualized yoga plus standard care. Of these, 27 were randomized to standard care and 26 to yoga plus standard care (attrition: n = 4). Standard care (every other week physician and/or dietician appointments) was required to meet ethical guidelines. The No Yoga group was offered yoga after study completion as an incentive to maintain participation. Outcomes evaluated at baseline, end of trial, and 1-month follow-up included Eating Disorder Examination (EDE), Body Mass Index (BMI), Beck Depression Inventory, State-Trait Anxiety Inventory, and Food Preoccupation questionnaire. Results - The Yoga group demonstrated greater decreases in eating disorder symptoms. Specifically, the EDE scores decreased
over time in the Yoga group, whereas the No Yoga group showed some initial decline but then returned to baseline EDE levels at week 12. Food preoccupation was measured before and after each yoga session, and decreased significantly after all sessions. Both groups maintained current BMI levels and decreased in anxiety and depression over time. Conclusions - Individualized yoga treatment decreased EDE scores at 12 weeks, and significantly reduced food preoccupation immediately after yoga sessions. Yoga treatment did not have a negative effect on BMI. Results suggest that individualized yoga therapy holds promise as adjunctive therapy to standard care.

**Thomas Le Blanc et al. (2015)** examined the correlation between the International Consensus Definition of the Cancer Anorexia-Cachexia Syndrome (CACS) and Patient-Centered Outcomes in Advanced Non-Small Cell Lung Cancer Context. The cancer anorexia-cachexia syndrome (CACS) is common in patients with advanced solid tumors and is associated with adverse outcomes including poor quality of life (QOL), impaired functioning, and shortened survival. To apply the recently posed weight-based international consensus CACS definition to a population of patients with advanced non-small cell lung cancer (NSCLC) and explore its impact on patient-reported outcomes. Ninety-nine patients participated in up to four study visits over a six-month period. Longitudinal assessments included measures of physical function, QOL, and other clinical variables such as weight and survival. Patients meeting the consensus CACS criteria at Visit 1 had a significantly shorter median survival (239.5 vs. 446 days; hazard ratio, 2.06, \( P < 0.05 \)). Physical function was worse in the CACS group (mean Karnofsky Performance Status score 68 vs. 77, Eastern Cooperative Oncology Group Performance Status score 1.8 vs. 1.3, \( P < 0.05 \) for both), as was QOL (Functional Assessment of Cancer Therapy-General [FACT-G]
Lung Cancer subscale of 17.2 vs. 19.9, Anorexia/Cachexia subscale of 31.4 vs. 37.9, $P < 0.05$ for both). Differences in the FACT-G and the Functional Assessment of Chronic Illness Therapy-Fatigue subscale approached but did not reach statistical significance. Longitudinally, all measures of physical function and QOL worsened regardless of CACS status, but the rate of decline was more rapid in the CACS group. The weight-based component of the recently proposed international consensus CACS definition is useful in identifying patients with advanced NSCLC who are likely to have significantly inferior survival and who will develop more precipitous declines in physical function and QOL. This definition may be useful for clinical screening purposes and identify patients with high palliative care needs.

Vincent Thien et al. (2000) investigated the pilot study of a graded exercise program for the treatment of anorexia nervosa - ObjectiveTo determine whether a graded exercise program used in the treatment of anorexia nervosa improves quality of life and does not decrease the rate of gain of body fat. – Methods A randomized controlled trial with outcome measures: change in percent body fat, body mass index (BMI), and Medical Outcomes Survey Short Form 36-item Quality of Life questionnaire. Results - Fifteen females and one male meeting the DSM-IV criteria for the diagnosis of anorexia nervosa were randomized. There was no difference in change in BMI or percent body fat at 3 months. Quality of life outcomes improved from baseline in the experimental group compared with the control group. However, this difference was not statistically significant. Discussion - Incorporation of a graded exercise program may increase compliance with treatment, but it did not reduce the short-term rate of gain of body fat or BMI. Longer studies with more subjects are
necessary to determine the usefulness of a graded exercise program in anorexia nervosa.

2.3 STUDIES ON PHYSIOLOGICAL VARIABLES

Bethany Butzer et.al (2014) examined the effects of a classroom based yoga intervention on cortisol concentrations and perceived behavior in children. A 10-week Yoga 4 Classrooms intervention was implemented in one second-grade and one third-grade classroom. Students’ salivary cortisol responses were assessed at 3 time points. Classroom teachers also documented their perceptions of the effects of the intervention on students’ cognitive, social, and emotional skills. Second, but not third, graders showed a significant decrease in baseline cortisol from before to after the intervention. Second and third graders both showed significant decreases in cortisol from before to after a cognitive task, but neither grade showed additional decreases from before to after a single yoga class. The second-grade teacher perceived significant improvements in several aspects his/her students’ behavior. The third-grade teacher perceived some, but fewer, improvements in his/her students’ behavior. Results suggest that school-based yoga may be advantageous for stress management and behavior.

Dhivya Laxmi and Murugavel (2013) studied the effects of varied combinations asanas, pranayama and core training practices on physiological, psychological variables of working middle aged women. The study was conducted at Vethathri Maharishi Trust in sirumugai. The sample consisted of sixty middle aged women age ranged between 35 and 50 years. They were divided into two equals groups, consisting of 30 each and named as control group and experimental group.
The investigator did not make any attempt to equate the groups. The control group was not given any treatment and the experiment group was given asanas, pranayama and core training programme was given six days per week for a period of 8 weeks. All the subjects were subjected for a pre-test and post test. Physiological variables of vital capacity level. Psychological variables of aggression were assessed by standard questionnaires. The obtained data from the experiment group and control group before and after the experiment period were statistically analyzed with dependent t-test to find out significant improvement and analysis of covariance for each variable separately in order to determine the differences, if any, among the adjusted post test means. The level of significance was fixed at 0.05 level of confidence for all the cases. Significant improvement was found on vital capacity and aggression of experiment group due to the effects of asanas, pranayama and core training when compared to the control group. This study was designed to determine the effects of eight weeks asanas, pranayama and core training on selected physiological psychological variables of working middle aged women. The total sample consisted of sixty middle aged women age ranged between 35 and 50 years. The result of this study indicated that the asana, pranayama and core training practiced significantly improvement in vital capacity and aggression level. The findings of the present study had similarity with the findings of the investigations referred in this study.

Based on the result of the study the following conclusion were derived

1. It was concluded that eight weeks of asanas, pranayama and core training practice significantly improved in vital capacity of working middle aged women.
2. It was concluded that eight weeks of asanas, pranayama and core training practice significantly reduced in aggression mood state of working middle age women.

3. And it was combination group is better improvement in vital capacity and asana and pranayama training significantly reduced aggression.

4. Further, it was combination of asanas, pranayama and core training appropriate training for working middle aged women.

**Farah Jindani et al (2015)** investigated the yoga intervention for posttraumatic stress. A Preliminary Randomized Control Trial Yoga may be effective in the reduction of PTSD symptomology. The purpose of this study was to evaluate the impact of a Kundalini Yoga (KY) treatment on PTSD symptoms and overall wellbeing. To supplement the current field of inquiry, a pilot randomized control trial (RCT) was conducted comparing an 8-session KY intervention with a waitlist control group. 80 individuals with current PTSD symptoms participated. Both groups demonstrated changes in PTSD symptomology but yoga participants showed greater changes in measures of sleep, positive affect, perceived stress, anxiety, stress, and resilience. Between-groups effect sizes were small to moderate (0.09–0.25). KY may be an adjunctive or alternative intervention for PTSD. Findings indicate the need for further yoga research to better understand the mechanism of yoga in relation to mental and physical health, gender and ethnic comparisons, and short- and long-term yoga practice for psychiatric conditions.

**Jillian Satie et al. (2013)** examined Yoga and Psychophysiological Determinants of Cardiovascular Health: Comparing Yoga Practitioners, Runners, and Sedentary
Individuals. The evidence of cardiovascular benefits of yoga is promising, but lacks demonstrations of specificity compared to other interventions. The present cross-sectional study examined cardiovascular health markers in long-term practitioners of yoga (yogis), runners, and sedentary individuals. We compared physiological, psychological, and lifestyle variables associated with cardiovascular health across groups. Yogis \( n = 47 \) and runners \( n = 46 \) showed favorable profiles compared to sedentary individuals \( n = 52 \) on heart rate, heart rate variability, depression, perceived stress, and cigarette smoking. Runners and male yogis showed superior aerobic fitness compared to the sedentary group. Runners reported greater social support compared to other groups. Yogis demonstrated a lower respiration rate compared to sedentary individuals and were more likely to refrain from eating meat compared to other groups. Yogis and runners demonstrated several cardiovascular health advantages over sedentary individuals. Our findings raise the possibility that yoga may improve aerobic fitness in men but not women.

Moliver et al. (2011) examined the extent to which Body Mass Index (BMI) and medication use in a sample of female yoga practitioners over 45 years varied according to the length and frequency of yoga practice. They administered online surveys to 211 female yoga practitioners aged 45 to 80 years. They used regression analyses to evaluate the relationship of extent of yoga experience to both BMI and medication use after accounting for age and lifestyle factors. They also conducted comparisons with 182 matched controls. Participants had practiced yoga for as long as 50 years and for up to 28 hours per week. There were significant inverse relationships between yoga experience and both BMI and medication load. These significant relationships remained after accounting for age and lifestyle factors. When they
computed yoga experience in terms of total calendar years, without accounting for hours of practice, significant relationships did not remain. However, there was no obesity in the 49 participants with more than 25 years of yoga practice. Yoga practitioners were less likely than non-practitioners to use medication for metabolic syndrome, mood disorders, inflammation, and pain. A long-term yoga practice was associated with little or no obesity in a non-probability sample of women over 45 years. Relationships showed a dose-response effect, with increased yoga experience predicting lower BMI and reduced medication use.

Mukesh Kumar Mishra et al (2015) analyzed the effect of eight weeks yogic training on selected physiological variables. The Purpose of the study was to find out the effect of yogic training on selected physiological variables. Selection of Subject: For the present study twenty five male students of 9 th and 10 th standard from Children Senior Secondary School, Azamgarh, Uttar Pradesh were selected randomly as the subjects for the study. The age of the subjects were ranging from 13 - 16 years. Selection of Variable: The variables selected for the present study were yogic training (independent variable), resting heart rate and vital capacity (dependent variables).The data was collected through the pre and post test. For the study single group design was used in which the pre test was taken prior to the yogic training and post test was taken after eight weeks of yogic training. Statistical Technique: For comparing pre and post test means of resting heart rate and vital capacity, descriptive analysis and paired t-test were applied at 0.05 level of significant. The result of the study showed that there was significant difference between pre and post test of resting heart rate and vital capacity. On the basis of the findings it was concluded that the
yogic training may be responsible for the improvement of selected physiological variables like resting heart rate and vital capacity

**Parthiban (2007)** conducted a study on the effect of yogic technique on blood pressure. Twenty women were selected randomly between the age group of 40-55 years. They were treated as experimental group, they underwent yogic technique (Jalandhar bandha) five days a week, for six weeks. Data were collected before and after yogic technique. The significance of the difference among the means of experimental group was found by pre test and post test. The data were analysed and dependent ‘T’ test was used with 0.05 level. The ‘t’ ratio for systolic blood pressure and diastolic blood pressure was significant and the improvement was due to the effect of yogic techniques.

**Sakthi Gnanavel and Buvaneswari (2006),** investigated the effects of selected psycho-physiological variables of working women. Fifteen normal female volunteers had undergone eight week training programme on Asanas, Pranayama and Meditation. The suitable psychological parameters (personal stress and health systems) and physiological parameters (pulse rate and heart rate) were taken before and after the yoga practice programme. The results showed that there is greater improvement in all aspects of experimental group than the control group.

**Schell et.al. (1994)** examined the Physiological and psychological effects of Hatha–Yoga exercise in healthy women. Heart rate, blood pressure, and the hormones cortisol, prolactin and growth hormone were measured in a yoga group and a control group of young female volunteers reading in a comfortable position during the experimental period. The yoga group had decreased heart rate during yoga. The yoga
group had higher scores on life satisfaction and lower scores on excitability, aggressiveness, openness, emotionality and somatic complaints and coping with stress and mood by the end of the experiment. The yoga group also had higher scores on high spirits and extravertedness.

Suchetha Kumari et al. (2011) examined the human beings are under threat from many chronic diseases and lifestyle disorders. A major cause of all these diseases was found to be improper lifestyle and stress leading to obesity and excessive lipid peroxidation, indicating increased production of reactive oxygen species. Yoga therapy concentrates on purification of body and mind through its integrated holistic approach one can overcome the different kinds of afflictions in life. Hence the present study was undertaken to find out the effect of intervention of yoga therapy in obese individuals.

Yoga has been shown to be a simple and economical therapeutic modality that may be considered as a beneficial adjuvant for many of the health problems. Yoga therapy is the two fold therapeutic system that prevents and cures various diseases through practice of yoga system. This system concentrates on purification of body and mind, through this integrated holistic approach one can overcome almost all kinds of afflictions in life. It is a kind of low-impact physical exercise, and is used for therapeutic purposes. Yogasanas have been practiced in India from Vedic period and was coordinated and organized in a systematic way, as known today, by Sage Pathanjali. He defined yoga as a systematic practice for purifying one's mind, intellect and body. The various asanas included in the present study are Swastikasana, Vajrasana, Suptavajrasana, Tadasana, Trikonasana, Parshwakonasana, Paschimotthanasana, Purvothanasana, Ardhabaddha padmasana, Janusirsasana,
Mahamudra, Pavanamuktasana, Bhujangasana, Dhanurasana, Viparitakarani and Uttanapadasana. The different pranayama techniques used were Ujjayi, Anuloma viloma and Bhastrika. The kriyas and relaxation techniques were Yoganidra and Agnisara respectively.

The prevalence of obesity is increasing among all ages, including the elderly. Research has shown that both high BMIs and low BMIs indicate increased morbidly and mortality. Yoga therapy is beneficial in maintaining good health by regulating BMI, Oxidative status by improving the biochemical functions of the body and helpful to overcome the complications of obesity. Hence, from our study, it is concluded that the efficacy of yoga therapy on Body Weight, Fasting and Post Prandial blood glucose, Lipid peroxidation and Total Antioxidant status in obese individuals. This may have direct impact on the use of yoga therapy as a safe therapeutic modality in combating obesity.

Tim Gard et al. (2014) investigated the fluid intelligence and brain functional organization in aging yoga and meditation practitioners. Numerous studies have documented the normal age-related decline of neural structure, function, and cognitive performance. Preliminary evidence suggests that meditation may reduce decline in specific cognitive domains and in brain structure. Here we extended this research by investigating the relation between age and fluid intelligence and resting state brain functional network architecture using graph theory, in middle-aged yoga and meditation practitioners, and matched controls. Fluid intelligence declined slower in yoga practitioners and meditators combined than in controls. Resting state functional networks of yoga practitioners and meditators combined were more integrated and more resilient to damage than those of controls. Furthermore, mindfulness was
positively correlated with fluid intelligence, resilience, and global network efficiency. These findings reveal the possibility to increase resilience and to slow the decline of fluid intelligence and brain functional architecture and suggest that mindfulness plays a mechanistic role in this preservation.

Brown et al. (1998) examined the explore associations between Body Mass Index (BMI) and selected indicators of health and well-being and to suggest a healthy weight range (based on BMI) for middle aged Australian women. Population based longitudinal study (cross-sectional baseline data). 13431 women aged 45-49 y who participated in the baseline survey for the Australian Longitudinal Study on Women’s Health. Forty-eight percent of women had a BMI>25kg/m². Prevalence of medical problems (for example, hypertension, diabetes), surgical procedures (cholecystectomy, hysterectomy) and symptoms (for example, back pain) increased monotonically with BMI, while indicators of health care use (for example, visits to doctors) showed a ‘J’ shaped relationship with BMI. Scores for several sub-scales of MOS short form health survey (SF36) (for example, general health, role limitations due to emotional difficulties, social function, mental health and vitality) were optimal when BMI was around 19-24 kg/m². Acknowledging the limitations of the cross-sectional nature of these data, the results firmly supor the benefits of leanness in terms of reducing the risk of cardiovascular disease, diabetes and gall bladder disease. The findings are moderated, however, by the observation that both low and high BMI are associated with decreased vitality and poorer mental health. The optimal range for BMI appears to be about 19-24 kg/m². From a public health perspective this study provides strong support for the recommended BMI range of 20-25 as an appropriate target for the promotion of healthy weight in middle aged Australian women.
2.4 STUDIES OF CLINICAL VARIABLES:

**A.D.A.M (2013)** reported that in U.S., obesity is at epidemic levels in all age groups. The effect of obesity on cholesterol levels in complex. Over weight individuals tend to have high triglyceride and LDL levels and low HDL levels. This combination is a risk factor for heart disease. Obesity also causes other effects (high blood pressure, increase in inflammation) that pose major risks to the heart. Lack of exercise can contribute to weight gain, decrease in HDL levels and increasing LDL and total cholesterol levels. Obesity is also strongly associated with type 2 diabetes, which itself poses a significant risk for high cholesterol levels and heart disease. Children who are overweight are at higher risk for triglycerides and low HDL, which may be directly related to later unhealthy cholesterol levels.

**Damodaran et al. (2002)** investigated therapeutic potential of yoga practices in modifying cardiovascular risk profile in middle aged men and women. Twenty patients with mild to moderate essential hypertension underwent yogic practices daily for one hour for three months. Results showed decreased blood pressure, blood glucose, cholesterol and triglycerides and improved subjective well-being and quality of life.

**Govindarajulu, et al. (2004)** examined the effect of yoga training on Biochemical changes among normal college students. Thirty under graduate (19-23 years) college men were selected randomly as subjects. They were observed for a period of 10 weeks in a self controlled study and then exposed to an experimental treatment of yoga training for a period of eight weeks. The training (a few compulsory and optional asanas) was programmed for a duration of six days per week in the
morning and evening sessions of one and half an hours for a total period of 10 weeks. Prior to self control and before and after experimental treatment, the data collected on Lactate Dehydrogenate (LDH), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Red Blood Cells (RBC) and White Blood Cells (WBC). Statistical analysis results by ANOVA revealed that there was significant mean gain in the selected bio chemical variables for the experimental groups.

Kavita Chandwani George Perkins et al. (2014) studied the randomized controlled trial of yoga in women with breast cancer undergoing radiotherapy previous research incorporating yoga (YG) into radiotherapy (XRT) for women with breast cancer finds improved quality of life (QOL). However, shortcomings in this research limit the findings. Patients with stages 0 to III breast cancer were recruited before starting XRT and were randomly assigned to YG (n = 53) or stretching (ST; n = 56) three times a week for 6 weeks during XRT or waitlist (WL; n = 54) control. Self-report measures of QOL (Medical Outcomes Study 36-item short-form survey; primary outcomes), fatigue, depression, and sleep quality, and five saliva samples per day for 3 consecutive days were collected at baseline, end of treatment, and 1, 3, and 6 months later. The YG group had significantly greater increases in physical component scale scores compared with the WL group at 1 and 3 months after XRT (P = .01 and P = .01). At 1, 3, and 6 months, the YG group had greater increases in physical functioning compared with both ST and WL groups (P< .05), with ST and WL differences at only 3 months (P< .02). The group differences were similar for general health reports. By the end of XRT, the YG and ST groups also had a reduction in fatigue (P< .05). There were no group differences for mental health and sleep quality. Cortisol slope was steepest for the YG group compared with the ST and WL
groups at the end ($P = .023$ and $P = .008$) and 1 month after XRT ($P = .05$ and $P = .04$). YG improved QOL and physiological changes associated with XRT beyond the benefits of simple ST exercises, and these benefits appear to have long-term durability.

Luke Peppone Michelle Jansens et al. (2015) investigated effect of YOCASC yoga for musculoskeletal symptoms among breast cancer survivors on hormonal therapy. Up to 50% of breast cancer survivors on aromatase inhibitor therapy report musculoskeletal symptoms such as joint and muscle pain, significantly impacting treatment adherence and discontinuation rates. We conducted a secondary data analysis of a nationwide, multi-site, phase II/III randomized, controlled, clinical trial examining the efficacy of yoga for improving musculoskeletal symptoms among breast cancer survivors currently receiving hormone therapy (aromatase inhibitors [AI] or tamoxifen [TAM]). Breast cancer survivors currently receiving AI ($N = 95$) or TAM ($N = 72$) with no participation in yoga during the previous 3 months were randomized into 2 arms: (1) standard care monitoring and (2) standard care plus the 4-week yoga intervention (2x/week; 75 min/session) and included in this analysis. The yoga intervention utilized the UR Yoga for Cancer Survivors (YOCASC) program consisting of breathing exercises, 18 gentle Hatha and restorative yoga postures, and meditation. Musculoskeletal symptoms were assessed pre- and post-intervention. At baseline, AI users reported higher levels of general pain, muscle aches, and total physical discomfort than TAM users (all $P \leq 0.05$). Among all breast cancer survivors on hormonal therapy, participants in the yoga group demonstrated greater reductions in musculoskeletal symptoms such as general pain, muscle aches and total physical discomfort from pre- to post-intervention than the control group (all $P \leq 0.05$). The
severity of musculoskeletal symptoms was higher for AI users compared to TAM users. Among breast cancer survivors on hormone therapy, the brief community-based YOCASC intervention significantly reduced general pain, muscle aches, and physical discomfort.

**Michael Schneider Mitchell Haas et al. (2014)** Compared the chiropractic manipulation methods and usual medical care for low back pain. A Randomized Controlled Clinical Trial. The primary aim of this study was to compare manual and mechanical methods of spinal manipulation (Activator) for patients with acute and sub-acute low back pain. These are the two most common methods of spinal manipulation used by chiropractors, but there is insufficient evidence regarding their comparative effectiveness against each other. Our secondary aim was to compare both methods with usual medical care. In a randomized comparative effectiveness trial, we randomized 107 participants with acute and sub-acute low back pain to: 1) usual medical care; 2) manual side-posture manipulation; and 3) mechanical manipulation (Activator). The primary outcome was self-reported disability (Oswestry) at four weeks. Pain was rated on a 0 to 10 numerical rating scale. Pain and disability scores were regressed on grouping variables adjusted for baseline covariates. Manual manipulation demonstrated a clinically important and statistically significant reduction of disability and pain compared to Activator (adjusted mean difference=7.9 and 1.3 points respectively, P<.05) and compared to usual medical care (7.0 and 1.8 points respectively, P<.05). There were no significant adjusted mean differences between Activator and usual medical care in disability and pain (0.9 and 0.5 points respectively, P>.05). Manual manipulation provided significantly greater short-term reduction in self-reported disability and pain compared to Activator and usual medical
Pal et al. (2014) assessed the effects of yogic practice on resting metabolism and redox status. Study was conducted on 64 physically trained male volunteers selected randomly at Airforce Academy, Dundigal. The yoga group (n=34) practiced yogasana, pranayama and meditation for 3 months and control group (n=30) performed physical training. Antioxidant variables in blood samples along with physiological parameters were estimated before and after 3 months. No significant difference was noted between baseline data of control group and yoga group. Reduced glutathione, vitamin C, vitamin E, the ratio of reduced to oxidized glutathione and total antioxidant status were increased significantly following yogic practice. Activities of superoxide dismutase, glutathione S-transferase and glutathione reductase were significantly increased, whereas activity of glutathione peroxidase significantly decreased following yogic practice. Oxidized glutathione decreased significantly following yogic practice. A non significant decrease of hydroperoxides, protein carbonyl, malondialdehyde and blood sugar was noted in the yoga group. Carbon dioxide elimination and peripheral oxygen saturation increased significantly following yogic practice. No significant changes were observed in the control group following 3 months of physical training. Regular yogic practice can improve resting metabolism and redox status of the practitioner.

Prasad et al. (2006) investigated the impact of pranayama and yoga on lipid profile in normal healthy volunteers. The present study was conducted on normal healthy volunteers, 41 men and 23 women, to evaluate the impact of pranayama and
yogasanas on lipid profiles and free fatty acids in two stages. In Stage –I, pranayama was taught for 30 days and in Stage-II Yogic practices were added to pranayama for another 60 days. A significant reduction was observed in triglycerides, free fatty acids and VLDL cholesterol in men and free fatty acids alone were reduced in women at the end of stage-I. A significant elevation of HDL cholesterol was seen only in the men at the end of stage-I. at the end of stage –II, free fatty acids increased in both men and women, and women demonstrated a significant fall in serum cholesterol, triglycerides, LDL and VLDL cholesterol. The results indicated that HDL cholesterol was elevated for men with pranayama, while triglycerides and LDL cholesterol decreased in women after yoga asanas.

Rao ChitharanjanKadam et al. (2014) conducted study on naturopathy and yoga in bronchial asthma. The aim of the study was to test the efficacy of a one month in-patient naturopathy and yoga programme for patients with asthma. Retrospective data of 159 bronchial asthma patients, undergoing the naturopathy and yoga programme, was analyzed for Forced Vital Capacity, Forced Expiratory Volume at the end of 1 second, Maximum Voluntary Ventilation and Peak Expiratory Flow Rate on admission, 11th day, on discharge and once in three months for three years. The paired sample t test results showed significant increase in the Forced Vital Capacity and Forced Expiratory Volume from the date of admission up to 6th month (P<0.0035) post Bonferroni correction. Maximum Voluntary Ventilation significantly increased from admission till the date of discharge (P<0.0035) and Peak Expiratory Flow Rate significantly increased from admission till the 36th month of follow-up (P<0.0035), post Bonferroni correction. This validated the beneficial effect of combining naturopathy and yoga for the management of bronchial asthma.
Sampath Gunda Arun Kanmanthareddy et al. (2014) investigated the Role of yoga as an adjunctive therapy in patients with neurocardiogenic syncope: a pilot study. Neurocardiogenic syncope (NCS) is a common clinical condition characterized by abrupt cardiovascular autonomic changes resulting in syncope. This is a recurring condition with mixed results from current strategies of treatment. Subjects with a diagnosis of NCS were screened and enrolled. All the participants were given a DVD containing yoga videos and were instructed to practice yoga therapy for 60 min, three times a week for 3 consecutive months. Syncope functional status questionnaire score (SFSQS) was administered at the beginning and the end of the study. The subjects were followed for 3 months and underwent repeat tilt table testing at the end of the study. Of the 60 patients screened, 44 subjects were enrolled, 21 in the intervention group and 23 in the control group. Most of the participants were females, and the mean age was 21 ± 3 years. In the intervention group, who finished the yoga regimen, there was a statistically significant improvement from control phase to the intervention phase, in number of episodes of syncope (4 ± 1 vs 1.3 ± 0.7, \( p < 0.001 \)) and presyncope (4.7 ± 1.5 vs 1.5 ± 0.5, \( p < 0.001 \)). The mean SFSQS also decreased from 67 ± 7.8 to 29.8 ± 4.6 (\( p < 0.001 \)). All subjects had positive head up tilt table (HUTT) study at the time of enrollment compared to only six patients at the completion of intervention phase (10/100 vs 6/28 %, \( p < 0.0001 \)). Yoga therapy can potentially improve the symptoms of presyncope and syncope in young female patients with NCS.

Shantha Meena (2007) examined the effect of yogasanas and aerobic training on the selected physiological and biochemical variables of middle aged women. Thirty middle aged women were selected and first 10 volunteers underwent 12 weeks
training programme on yogasanas. The second 10 volunteers underwent training programme on walking for 30 minutes. The third 10 volunteers acted as control group. The suitable physiological and biochemical parameters (blood pressure and cholesterol) were taken before and after the training programme for all the three groups. ANCOVA was used to analyse the data obtained. The results showed that there is greater improvement in blood pressure and cholesterol levels in the experimental groups.

Telles et al. (2010) examined the Short Term Health Impact of a Yoga and Diet Change Program on Obesity. A single group of 47 persons were assessed on the first and last day of a yoga and diet change program, with 6 days of the intervention between assessments. The assessments were: Body Mass Index (BMI), waist and hip circumferences, mid-arm circumference, body composition, hand grip strength, postural stability, serum lipid profile and fasting serum leptin levels. Participants practices yoga for 5 hours every day and had a low fat, high fiber, vegetarian diet. Last and first day data were compared using a t-test for paired data. Following the 6-day residential program, participants showed a decrease in BMI (1.6 percent), waist and hip circumferences, fat-free mass, total cholesterol (7.7 percent decrease), high density lipoprotein (HDL) cholesterol (8.7 percent decrease), fasting serum leptin levels (44.2 percent decrease) and an increase in postural stability and hand grip strength (p<0.05, all comparisons). A 6-day yoga and diet change program decreased the BMI and the fat-free mass. Total cholesterol also decreased due to reduced HDL levels. This suggests that a brief, intensive yoga program with a change in diet can pose certain risks. Benefits seen were better postural stability, grip strength (though a
‘practice effect’ was not ruled out), reduced waist and hip circumferences and a decrease in serum lepton levels.

**Udupa (1996)** conducted a study on biochemical changes following a selective combined practice of yoga namely yogic postures, pranayama and relaxation type of meditation of volunteers. Their age was 20 to 25 years. The volunteers who practiced the yoga practices showed that there was a reduction of blood sugar and serum cholesterol, on the other hand the serum protein improved during the same period.

**Uthirapathy (2005)** examined the effect of training in yogic practices and aerobic exercises on stress hormone, circulatory and metabolic responses among college players. 45 over stressed subjects were selected randomly for the study. They were divided into three groups namely control group, aerobic exercises group and yogic practice group respectively for an experimental period 12 weeks, six days a week and control group was not given any sort of special training. The training effect of yogic practices had better influence on resting heart rate, systolic blood pressure, diastolic blood pressure and blood sugar and serum cholesterol level.

**Zoe Hewett Birinder et.al (2015)** investigated the effects of bikram yoga on health critical review and Clinical Trial Recommendations. Bikram yoga is a style of hatha yoga involving a standardized series of asanas performed to an instructional dialogue in a heated environment (40.6°C, 40% humidity). Several studies evaluating the effect of Bikram yoga on health-related outcomes have been published over the past decade. However, to date, there are no comprehensive reviews of this research and there remains a lack of large-scale, robustly-designed randomised controlled trials
(RCT) of Bikram yoga training. The purpose of this review is to contextualise and summarise trials that have evaluated the effects of Bikram yoga on health and to provide recommendations for future research. According to published literature, Bikram yoga has been shown to improve lower body strength, lower and upper body range of motion, and balance in healthy adults. Non-RCTs report that Bikram yoga may, in some populations, improve glucose tolerance, bone mineral density, blood lipid profile, arterial stiffness, mindfulness, and perceived stress. There is vast potential for further, improved research into the effects of Bikram yoga, particularly in unhealthy populations, to better understand intervention-related adaptations and their influence on the progression of chronic disease. Future research should adhere to CONSORT guidelines for better design and reporting to improve research quality in this field.

Michael Schneider et al. (2014) Compared the chiropractic manipulation methods and usual medical care for low back pain: A Randomized Controlled Clinical Trial. The primary aim of this study was to compare manual and mechanical methods of spinal manipulation (Activator) for patients with acute and sub-acute low back pain. These are the two most common methods of spinal manipulation used by chiropractors, but there is insufficient evidence regarding their comparative effectiveness against each other. Our secondary aim was to compare both methods with usual medical care. In a randomized comparative effectiveness trial, we randomized 107 participants with acute and sub-acute low back pain to: 1) usual medical care; 2) manual side-posture manipulation; and 3) mechanical manipulation (Activator). The primary outcome was self-reported disability (Oswestry) at four weeks. Pain was rated on a 0 to 10 numerical rating scale. Pain and disability scores
were regressed on grouping variables adjusted for baseline covariates. Manual manipulation demonstrated a clinically important and statistically significant reduction of disability and pain compared to Activator (adjusted mean difference=7.9 and 1.3 points respectively, P<.05) and compared to usual medical care (7.0 and 1.8 points respectively, P<.05). There were no significant adjusted mean differences between Activator and usual medical care in disability and pain (0.9 and 0.5 points respectively, P>.05). Manual manipulation provided significantly greater short-term reduction in self-reported disability and pain compared to Activator and usual medical care. University of Pittsburgh IRB approval: PRO10040327. This work was supported by an award (R00AT004196) from the National Institutes of Health (NIH) National Center for Complementary and Alternative Medicine (NCCAM)

2.5 STUDIES ON PSYCHOLOGICAL VARIABLES

Ali BS et al. (2002) investigated the prevalence of and factors associated with anxiety and depression among women. A total of 1218 women between the ages of 18-50 years. Systematically every third household was identified from which a woman was randomly selected. The Aga Khan University Anxiety and Depression Scale and a socio-demographic questionnaire were administered verbally by trained interviewers for assessing the prevalence of, and associated factors for anxiety and depression. A prevalence of 30% was found. Increasing age, lack of education and verbal abuse were the associated factors found to have an independent relationship. Providing education and reducing domestic abuse could lead to decrease in the prevalence of anxiety and depression in women.
Anupama Tyagi et al. (2014) investigated metabolic responses to stress and different yoga practices in regular yoga practitioners (YP), non-yoga practitioners (NY) and metabolic syndrome patients (MS). YP (n = 16), NY (n = 15) and MS (n = 15) subjects underwent an experimental protocol that comprised of different 5-minute interventions including mental arithmetic stress test (MAST), alternate nostril breathing (ANB), Kapabhati breathing (KB) and meditation (Med) interspersed with 5 minutes of quiet resting (neutral condition (NC)). During the intervention periods continuous body weight adjusted oxygen consumption (VO2ml/min/kg) was measured using open circuit indirect calorimetry with a canopy hood. This is the first study to report oxygen consumption (OC) in yoga practitioners during and after MAST and the first to report both within and between different populations. The results were analysed with SPSS 16 using 3X9 mixed factorial ANOVAs. The single between-subject factor was group (YP, NY and MS), the single within-subject factor was made up of the nine intervention phases (NC1, MAST, NC ANB, NC3, KB, NC4, Med, NC5). The results demonstrated that the regular YP group had significantly less OC and greater variability in their OC across all phases compared to the MS group (p=.003) and NY group (p=.01). All groups significantly raised their OC during the mental arithmetic stress, however the MS group had a significantly blunted post-stress recovery whereas the YP group rapidly recovered back to baseline levels with post stress recovery being greater than either the NY group or MS group. Yoga practitioners have greater metabolic variability compared to non-yoga practitioners and metabolic syndrome patients with reduced oxygen requirements during resting conditions and more rapid post-stress recovery. OC in metabolic syndrome patients displays significantly blunted post-stress recovery demonstrating reduced metabolic resilience. Our results support the findings of previous randomised
trials that suggest regular yoga practice may mitigate against the effects of metabolic syndrome. Yoga practitioners have reduced oxygen requirements during resting conditions and greater metabolic flexibility compared to non-yoga practitioners and metabolic syndrome patients. Yoga practitioners are also better able to respond to and recover from the increased metabolic burden due to mental arithmetic stress, while metabolic syndrome patients have significantly blunted post-stress recovery. Further, long term studies are needed in order to establish, if regular yoga practices have an influential role in reducing resting metabolic demand.

Dhananjai et al. (2013) evaluated the effects of yogic practice on anxiety, depression associated with obesity. Yoga practice has been effectively prescribed in conjunction with other medical and yogic procedures in the management of severe psychosomatic diseases, including cancer, bronchial asthma, colitis, peptic and ulcer. It improves strength and flexibility, and may help control physiological variables such as blood pressure, lipids, respiration, heart rate, and metabolic rate to improve overall exercise capacity. Patients were recruited from the Department of Physiology, C.S.M. Medical University (erstwhile KGMU), Lucknow, Uttar Pradesh, India. A total of 272 subjects were divided into two groups: 1) group of 205 subjects (with yogic practice) and 2) a control group of 67 subjects (with aerobic exercise). Assessment of anxiety and depression were done by Hamilton Rating Scale. This study supports yoga as an effective tool with no diet restriction to improve anxiety and depression symptoms as well as obesity in obese subjects. Incorporating yogic asana in the treatment protocol of patients suffering from anxiety and depression may prove beneficial in the long run.
Kamakhya (2004) examined the yoga nidra and its impact on students well-being. The study aimed at finding out the effect of yoga nidra on stress, anxiety and general well-being on the students at the yoga clinic of Dev Sanskriti Viswavidyalaya. The practice time was 30 minutes daily for a total duration of 6 months. 40 students were taken from P.G. Yoga classes for observing the effects as well as 12 were in control group. The result shows a significant change as yoga nidra positively decreased the stress level of the subjects where as no significant change has been seen in anxiety level. Moreover, yoga nidra positively increased the general well being of the subjects.

Kimberley Bethany (2007) studied the impact of yoga on psychological health in older adults. Older adults (N-98; Mean age =77.04, SD = 7.28) were randomly assigned to 3 groups: Chair Yoga, Chair Exercise and no-treatment control group. Classes were held for 45-minute weekly sessions, over six weeks, and daily home practice was supported. All participants were assessed pre-intervention, post-intervention, and at one-month follow-up for anger, anxiety, depression, well-being, general self-efficacy, and self-efficacy for daily living. Time by group interactions was significant for all trait variables. Yoga participants improved more than both exercise and control participants, in anger (ES=1.01, 0.12 and 0.11 respectively, from pretest to post-test; and 0.89, -0.01 and 0.17 from pretest to follow-up), anxiety (ES=0.58, 0.31, 0.18 and 0.89, 0.28, 0.27), depression (ES = 0.53, 0.07, 0.05 and 0.54, 0.01, 0.04), well-being (ES=0.49, 0.36, 0.01 and 0.53, 0.28, -0.08) general self-efficacy (ES=0.98, 0.35, -0.12 and 0.73, 0.43, -0.12), and self-efficacy for daily living (ES = 0.87, 0.35, 0.07 and 0.51, 0.24, 0.09). Changes in self-control were associated
with changes in general self-efficacy and trait anxiety. Self-control is proposed as a mechanism underlying the impact of yoga on psychological health.

**Kirkwood et al (2005)** evaluated a study between March and June 2004, a systematic review was carried out of the research evidence on the effectiveness of yoga for the treatment of anxiety and anxiety disorders. Eight studies were reviewed. They reported positive results, although there were many methodological inadequacies. Owing to the diversity of conditions treated and poor quality of most of the studies, it is not possible to say that yoga is effective in treating anxiety or anxiety disorders in general. However, there are encouraging results, particularly with obsessive compulsive disorder. Further well conducted research is necessary which may be most productive if focused on specific anxiety disorders.

**Menezes Carolina et al. (2015)** investigated yoga and emotion regulation: A review of primary psychological outcomes and their physiological correlates. Discovering and promoting ways that help regulate emotions has been a recurrent concern in the field of psychology, given that how one feels and reacts to and expresses emotions can have both short- and long-term effects on physical and mental health. Many psychological strategies that can influence this process, such as reappraisal, attention allocation, and suppression, have been previously investigated. The aim of the present work was to review the emotion regulation potential of yoga practice, given that it combines techniques that foster positive psychological outcomes. The results suggest that yoga produces improvements in emotional functioning in healthy subjects and people who suffer from some physical illnesses, particularly in psychological self-reported variables. Evidence regarding behavioral and neurophysiological correlates remains less well-established. Mechanisms that
possibly mediate the relationship between yoga and emotion regulation are discussed and methodologies are considered, with suggestions for future studies. In summary, emerging evidence suggests that yoga may help foster healthier psychological responses, indicating its potential as an emotion regulation strategy. (PsycINFO Database Record (c) 2015 APA, all rights reserved

Nityananthan Kalpana (2014) examined the impact of yoga on cholesterol and triglyceride among the middle aged men. The randomly selected subjects (N=30) were grouped into two groups, namely control group and experimental group respectively, each consisting of fifteen subjects. Pre tests were conducted for all the subjects on selected psychological variables such as blood cholesterol and triglycerides. The experimental group participated in their respective treatment for six weeks. The post tests were conducted on the above said dependent variables after a period six weeks. The difference between the initial and final means was considered as the effect of respective effects on the subjects. The statistical significance was analyzed through ANCOVA. In all cases 0.05 levels was fixed to test the hypothesis of the study. Depended Variables: 1.Cholesterol (Total Cholesterol), 2.Triglycerides, Independent Variables: Yoga, Hypothesis: There would be significant improvement health conditions of middle aged men due to the yoga on biochemical variables such as, total cholesterol and triglycerides than the control group. Results: The results presented proved that the yoga improved overall health conditions of the middle aged men, assessed through biochemical variables blood cholesterol and triglycerides with significant improvement. 1. Cholesterol (Total Cholesterol): The pre test mean on experimental group was 127.54, and control group was 123.54 and the obtained ‘F’ value was 1.31, which was less than the required ‘F’ value of 4.20 to be significant.
2. Triglycerides: The pre test mean on experimental group was 183.01, and control group was 180.25 and the obtained ‘F’ value was 0.43, which was less than the required ‘F’ value of 4.20 to be significant.

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

Padmavati Maharana et al. (2014) investigated the General health of mid-career leaders. An objective and subjective observation through yoga Role and responsibility of a leader is vital in every industrial sector. For the sake of responsibilities, they compromise with their physical and mental health. The study is aimed at assessing the general health of mid-life leaders in addition to conventional physiological parameters. Eighty four leaders (mean age 52.01±5.73) underwent Self-management of Excessive Tension (SMET) intervention for 5 days and were assessed
with General Health Questionnaires and medical parameters. GHQ change was found
to be significant at p<0.001. Similarly, the trend in other clinical variables such as
SBP (expand all these) (p<0.001), PR (p<0.001), RR (p<0.001) and weight (p<0.05)
were lower whereas DBP (p>0.05) was higher. The general health was significantly
improved for top level leaders and is suggestive of better leadership development
through SMET intervention.

**Parthasarathy et al. (2014)** examined the implementation of yogic practices
has proven benefits in both organic and psychological diseases. Forty-five women
with anxiety selected by a random sampling method were divided into three groups.
Experimental group I was subjected to asanas, relaxation and pranayama while
Experimental group II was subjected to an integrated yoga module. The control group
did not receive any intervention. Anxiety was measured by Taylor's Manifest Anxiety
Scale before and after treatment. Frustration was measured through Reaction to
Frustration Scale. All data were spread in an Excel sheet to be analysed with SPSS 16
software using analysis of covariance (ANCOVA). Selected yoga and asanas
decreased anxiety and frustration scores but treatment with an integrated yoga module
resulted in significant reduction of anxiety and frustration. To conclude, the practice
of asanas and yoga decreased anxiety in women, and yoga as an integrated module
significantly improved anxiety scores in young women with proven anxiety without
any ill effects.

**Parthasarathy et al. (2014)** analyzed the effect of Integrated Yoga Module on
Selected Psychological Variables among Women with Anxiety Problem. The
implementation of yogic practices has proven benefits in both organic and
psychological diseases. Forty-five women with anxiety selected by a random
sampling method were divided into three groups. Experimental group I was subjected to asanas, relaxation and pranayama while Experimental group II was subjected to an integrated yoga module. The control group did not receive any intervention. Anxiety was measured by Taylor's Manifest Anxiety Scale before and after treatment. Frustration was measured through Reaction to Frustration Scale. All data were spread in an Excel sheet to be analysed with SPSS 16 software using analysis of covariance (ANCOVA). Selected yoga and asanas decreased anxiety and frustration scores but treatment with an integrated yoga module resulted in significant reduction of anxiety and frustration. To conclude, the practice of asanas and yoga decreased anxiety in women, and yoga as an integrated module significantly improved anxiety scores in young women with proven anxiety without any ill effects.

Shahrzad Hoveyda et al. (2014) analyzed the Effectiveness of Mindfulness-Based Stress Reduction Program and Group Conscious Yoga on Anxiety, Depression, Stress in Infertile Women. The present study aimed to examine the effectiveness of mindfulness-based stress reduction program and group conscious yoga on depression, Anxiety, stress in infertile women. With a quasi-experimental design, a randomized controlled trial with assessment in baseline, after intervention and two-month follow-up was conducted on participants of control group. A total of 24 female patients with infertility diagnosis among patients who referred to the Infertility Center of Shariati hospital in Tehran were selected in an available way and were assigned randomly into the experimental (n=12) and control groups (n=12). All participants completed Anxiety, depression and stress questionnaire (DASS-21), in three phases of baseline, after treatment and follow-up. Data were analyzed using multivariate repeated measurement variance analysis model. Finding showed that there was a significant
difference between experimental and control group after finishing mindfulness-based stress reduction program treatment sessions and 2-month follow up compared to the pre-test in terms of depression and stress. Depression and stress significantly decreased compared to the pre-test, but there was no significant difference in terms of anxiety. Group mindfulness-based stress reduction program has decreased depression and stress in infertile women after finishing the treatment sessions and 2-month follow-up but there is no change in anxiety.

2.6 SUMMARY OF REVIEW OF RELATED LITERATURE

In this chapter the researcher reviewed seventeen related reviews on Yoga, eighteen reviews on anorexia, twelve reviews on Physiological variables, thirteen reviews on psychological variables and fifteen reviews on Clinical variables. From the review of the related studies made, it was found that there is still much scope for further research to find out the effect of hatha yoga sadhana on selected physiological, clinical and psychological variables. The review of related studies enabled the researcher to select a suitable portion of the hatha yoga sadhana practices in this present study.