Chapter II

REVIEW OF RELATED LITERATURE

In the process of current research investigation, since attempt was made to broaden the spectrum of knowledge by going through the various sources of literature and acquainting oneself with various conclusions regarding the effect of physical fatigue on human performance, specifically when one is actively engaged in movement. Few similar studies have been conducted by different research scholar in the world. The research scholar has tried his level best to find out the relevant literature only few reviewed literature has been located underneath.

Yoga Nidra¹ is a very powerful process of meditation and relaxation. It is adopted by Paramhansa Swami Satyanand Saraswati of Bihar Yoga School, Munger. The practice of Yoga Nidra opens up deeper state of mind. Each time one practices Yoga Nidra, ones level of consciousness deepens and become more aware of subconscious mind and ultimately gives more relaxation. And also gets relieved of stress from the mind. The aim of the study was to study the effect of Yoga Nidra on the activity of brain with the help of Electro-Encephalograph (EEG), 20

subjects were chosen from Yoga Nidra class. They were given practice of Yoga Nidra daily for one month. EEGs were recorded prior to study, during Yoga Nidra & after one month. Initial EEG showed Beta activity prominently with intermittent Alpha activity. With the advancement of Yoga Nidra Beta activity was slowly replaced by Alpha activity and still further by smooth well formed Alpha activity. After 30 sessions of Yoga Nidra gain of alpha activity was better and with further advancement of Yoga Nidra intermittent theta activity was intermixed with alpha activity suggestive of deep state of relaxation. EEG measures minute electrical activity in the brain in the form of waves. The frequency of brain activity waves has been shown to alter according to the state of consciousness and state of mind the subject is in. beta activity is normally noted in the awake working state. With physical relaxation beta activity is taken up by alpha activity, and as the person goes into different stages of sleep the activity changes to theta and also may exhibit delta activity in deep sleep.

Sharma R, Gupta N, Bijlani RL. \(^2\) conducted a prospective controlled study to explore the short-term impact of a comprehensive but brief lifestyle intervention, based on yoga, on subjective well being levels in normal and diseased subjects. Normal healthy individuals and subjects

having hypertension, coronary artery disease, diabetes mellitus or a variety of other illnesses were included in the study. The outcome measures were 'subjective well being inventory' (SUBI) scores, taken on the first and last day of the course. The inventory consists of questions related to one's feelings and attitude about various areas of life, such as happiness, achievement and interpersonal relationship. There was significant improvement in the subjective well being scores of the 77 subjects within a period of 10 days as compared to controls. These observations suggest that a short lifestyle modification and stress management educational program leads to remarkable improvement in the subjective well being scores of the subjects and can therefore make an appreciable contribution to primary prevention as well as management of lifestyle diseases.

Ospina MB, and et.al ³ studied to provide a descriptive overview of the clinical trials assessing meditation practices for health care. Systematic review of the literature. Comprehensive searches were conducted in 17 electronic bibliographic databases through September 2005. Other sources of potentially relevant studies included hand searches, reference tracking, contacting experts, and gray literature

searches. Included studies were clinical trials with 10 or more adult participants using any meditation practice, providing quantitative data on health-related outcomes, and published in English. Two independent reviewers assessed study relevance, extracted the data, and assessed the methodological quality of the studies. Four hundred clinical trials on meditation (72% described as randomized) were included in the review (publication years 1956-2005). Five broad categories of meditation practices were identified: mantra meditation, mindfulness meditation, yoga, t'ai chi, and qigong. The three most studied clinical conditions were hypertension, miscellaneous cardiovascular diseases, and substance abuse. Psychosocial measures were the most frequently reported outcomes. Outcome measures of psychiatric and psychological symptoms dominate the outcomes of interest. Overall, the methodological quality of clinical trials is poor, but has significantly improved over time by 0.014 points every year (95% CI, 0.005, and 0.023). Most clinical trials on meditation practices are generally characterized by poor methodological quality with significant threats to validity in every major quality domain assessed. Despite a statistically significant improvement in the methodological quality over time, it is imperative that future trials on meditation be rigorous in design, execution, analysis, and the reporting of results.
Sharma R, Gupta N, Bijlani RL. Conducted a prospective controlled study to explore the short-term impact of a comprehensive but brief lifestyle intervention, based on yoga, on subjective well being levels in normal and diseased subjects. Normal healthy individuals and subjects having hypertension, coronary artery disease, diabetes mellitus or a variety of other illnesses were included in the study. The outcome measures were 'subjective well being inventory' (SUBI) scores, taken on the first and last day of the course. The inventory consists of questions related to one's feelings and attitude about various areas of life, such as happiness, achievement and interpersonal relationship. There was significant improvement in the subjective well being scores of the 77 subjects within a period of 10 days as compared to controls. These observations suggest that a short lifestyle modification and stress management educational program leads to remarkable improvement in the subjective well being scores of the subjects and can therefore make an appreciable contribution to primary prevention as well as management of lifestyle diseases.

---

Sivasankaran S, and et.al\textsuperscript{5} hypothesized that Yoga and meditation will improve parameters of endothelial function. They examined the effects of yoga and meditation on hemodynamic and laboratory parameters as well as on endothelial function in a 6-week pilot study. Systolic and diastolic blood pressures, heart rate, body mass index (BMI), fasting glucose, lipids, has C-reactive protein (CRP), and endothelial function (as assessed by brachial artery reactivity) were all studied at baseline and after 6 weeks of yoga practice. A course in yoga and meditation was given to the subjects for 1.5 h three times weekly for 6 weeks and subjects were instructed to continue their efforts at home. This prospective cohort study included 33 subjects (mean age 55 +/- 11 years) both with (30%) and without (70%) established coronary artery disease (CAD). There were significant reductions in blood pressure, heart rate, and BMI in the total cohort with yoga. None of the laboratory parameters changed significantly with yoga. For the total cohort there was no significant improvement in endothelial-dependent vasodilatation with yoga training and meditation compared with baseline (16.7% relative improvement from 7.2-8.4%; \( p = 0.3 \)). In the group with CAD, endothelial-dependent vasodilatation improved 69% with yoga training.

(6.38-10.78%; p = 0.09). Yoga and meditation appear to improve endothelial function in subjects with CAD.

Ospina MB, and et.al ⁶ mentioned that To review and synthesize the state of research on a variety of meditation practices, including: the specific meditation practices examined; the research designs employed and the conditions and outcomes examined; the efficacy and effectiveness of different meditation practices for the three most studied conditions; the role of effect modifiers on outcomes; and the effects of meditation on physiological and neuropsychological outcomes. Comprehensive searches were conducted in 17 electronic databases of medical and psychological literature up to September 2005. Other sources of potentially relevant studies included hand searches, reference tracking, contact with experts, and gray literature searches. A Delphi method was used to develop a set of parameters to describe meditation practices. Included studies were comparative, on any meditation practice, had more than 10 adult participants, provided quantitative data on health-related outcomes, and published in English. Two independent reviewers assessed study relevance, extracted the data and assessed the methodological quality of the studies. Five broad categories of meditation practices were identified

(Mantra meditation, Mindfulness meditation, Yoga, Tai Chi, and Qi Gong). Characterization of the universal or supplemental components of meditation practices was precluded by the theoretical and terminological heterogeneity among practices. Evidence on the state of research in meditation practices was provided in 813 predominantly poor-quality studies. The three most studied conditions were hypertension, other cardiovascular diseases, and substance abuse. Sixty-five intervention studies examined the therapeutic effect of meditation practices for these conditions. Meta-analyses based on low-quality studies and small numbers of hypertensive participants showed that TM(R), Qi Gong and Zen Buddhist meditation significantly reduced blood pressure. Yoga helped reduce stress. Yoga was no better than Mindfulness-based Stress Reduction at reducing anxiety in patients with cardiovascular diseases. No results from substance abuse studies could be combined. The role of effect modifiers in meditation practices has been neglected in the scientific literature. The physiological and neuropsychological effects of meditation practices have been evaluated in 312 poor-quality studies. Meta-analyses of results from 55 studies indicated that some meditation practices produced significant changes in healthy participants. Many uncertainties surround the practice of meditation. Scientific research on meditation
practices does not appear to have a common theoretical perspective and is characterized by poor methodological quality. Firm conclusions on the effects of meditation practices in healthcare cannot be drawn based on the available evidence. Future research on meditation practices must be more rigorous in the design and execution of studies and in the analysis and reporting of results.

Telles S, Naveen KV, Dash M\textsuperscript{7} conducted a test a month after the December 2004 tsunami the effect of a 1 week yoga program was evaluated on self rated fear, anxiety, sadness and disturbed sleep in 47 survivors in the Andaman Islands. Polygraph recordings of the heart rate, breath rate and skin resistance were also made. Among the 47 people, 31 were settlers from the mainland (i.e. India, ML group) and 16 were endogenous people (EP group). There was a significant decrease in self rated fear, anxiety, sadness and disturbed sleep in both groups, and in the heart and breath rate in the ML group, and in the breath rate alone in the EP group, following yoga (P < 0.05, t-test). This suggests that yoga practice may be useful in the management of stress following a natural

\textsuperscript{7} Telles S, Naveen KV, Dash M. "Yoga reduces symptoms of distress in tsunami survivors in the andaman islands", Evidence based complementary and alternative medicine:eCAM 2007 Dec;4(4):503-9
disaster in people with widely differing social, cultural and spiritual beliefs.

Coppola F.\textsuperscript{8} Natural Stress Relief meditation, a mental technique which is practiced for 15 minutes twice a day, aims to reduce stress and anxiety by eliciting a specific state of physiological rest along with mental alertness. The meditation is taught in a self-administered program, requiring one hour of training during the first three days, followed by the regular twice daily practice. Each 15-min. session consists in sitting quietly with closed eyes while applying a specific mental procedure. To test the effectiveness of meditation in reducing trait anxiety, Spielberger's State-Trait Anxiety Inventory was administered to 25 participants four times over a 3-wk. period: one week before starting to practice the meditation, a few hours before starting, 1 wk. after, and 2 wk. after. The difference in Trait Anxiety score between pretreatment and before starting the practice was not significant, while it was significant both after the first week of practice (Cohen \(d=.46\)) and after the first 2 wk. of practice \(d=.67\).

Chen KM, and et.al.\textsuperscript{9} conducted a study in 2005 and it had two phases. Phase I consisted of sending a survey to 10 experts to help develop the Silver Yoga Programme. A hard copy and a video containing detailed descriptions and demonstrations of the programme were then sent to the experts for review and critique regarding the clarity and feasibility of the yoga postures. Phase II was an enquiry into older adults' views on the programme using a quantitative evaluation and semi-structured qualitative inquiry. Fourteen women participants from a senior activity centre were interviewed individually after 1 month of Silver Yoga group practice, three times per week, 70 minutes per session. They were asked to evaluate the appropriateness of postures based on the criteria of difficulty, acceptability, feasibility and helpfulness. Five open-ended questions asked participants to reflect on their yoga experiences. Participants' mean ratings of the acceptability, feasibility and helpfulness of the four aspects of the programme (warm-up, Hatha yoga, relaxation and guided-imagery meditation) ranged from 8.8 +/- 1.9 to 9.3 +/- 1.5; mean ratings of the difficulty of the programme revealed that relaxation and guided-imagery meditation were fairly easy to follow (0.1 +/- 0.3 and 0.1 +/- 0.3 respectively), but the postures in the Hatha yoga were

relatively challenging (2.1 +/- 2.6). The Silver Yoga Programme should undergo further pilot-testing with larger samples of older adults before it is taken up internationally as a health-promotion activity for older adults.

Granath J, Ingvarsson S, von Thiele U, Lundberg U\textsuperscript{10} studied a stress management program based on cognitive behavioural therapy principles was compared with a Kundaliniyoga program. A study sample of 26 women and 7 men from a large Swedish company were divided randomly into 2 groups for each of the different forms of intervention; a total of 4 groups. The groups were instructed by trained group leaders and 10 sessions were held with each of groups, over a period of 4 months. Psychological (self-rated stress and stress behaviour, anger, exhaustion, quality of life) and physiological (blood pressure, heart rate, urinary catecholamines, salivary cortisol) measurements obtained before and after treatment showed significant improvements on most of the variables in both groups as well as medium-to-high effect sizes. However, no significant difference was found between the 2 programs. The results indicate that both cognitive behaviour therapy and yoga are promising stress management techniques.

Krisanaprakornkit T, Krisanaprakornkit W, Piyavhatkul N, Laopaiboon M\textsuperscript{11} investigated the effectiveness of meditation therapy in treating anxiety disorders. Electronic databases searched include CCDANCTR-Studies and CCDANCTR-References, complementary and alternative medicine specific databases, Science Citation Index, Health Services/Technology Assessment Text database, and grey literature databases. Conference proceedings, book chapters and references were checked. Study authors and experts from religious/spiritual organisations were contacted. Types of studies: Randomised controlled trials. Types of participants: patients with a diagnosis of anxiety disorders, with or without another comorbid psychiatric condition. Types of interventions: concentrative meditation or mindfulness meditation. Comparison conditions: one or combination of 1) pharmacological therapy 2) other psychological treatment 3) other methods of meditation 4) no intervention or waiting list. Types of outcome: 1) improvement in clinical anxiety scale 2) improvement in anxiety level specified by triallists, or global improvement 3) acceptability of treatment, adverse effects 4) dropout.

Data were independently extracted by two reviewers using a pre-designed data collection form. Any disagreements were discussed with a third

\textsuperscript{11} Krisanaprakornkit T, and et.al " Meditation therapy for anxiety disorders" Chchrane Database of Systematic review – online 2006 Jan 25,(1)
reviewer, and the authors of the studies were contacted for further information. MAIN Two randomized controlled studies were eligible for inclusion in the review. Both studies were of moderate quality and used active control comparisons (another type of meditation, relaxation, and biofeedback). Anti-anxiety drugs were used as standard treatment. The duration of trials ranged from 3 months (12 weeks) to 18 weeks. In one study transcendental meditation showed a reduction in anxiety symptoms and electromyography score comparable with electromyography-biofeedback and relaxation therapy. Another study compared Kundalini Yoga (KY), with Relaxation/Mindfulness Meditation. The Yale-Brown Obsessive Compulsive Scale showed no statistically significant difference between groups. The overall dropout rate in both studies was high (33-44%). Neither study reported on adverse effects of meditation. The small number of studies included in this review do not permit any conclusions to be drawn on the effectiveness of meditation therapy for anxiety disorders. Transcendental meditation is comparable with other kinds of relaxation therapies in reducing anxiety, and Kundalini Yoga did not show significant effectiveness in treating obsessive-compulsive disorders compared with Relaxation/Meditation. Drop out rates appear to be high,
adverse effects of meditation have not been reported. More trials are needed.

Schwickert M, and et.al. Between 60 and 90% of patients consult their family doctor for stress-associated complaints. Not infrequently, a considerable number of these patients already have elevated blood pressure. The positive effect on high blood pressure of relaxation techniques has been confirmed in various studies. Accordingly, stress management should now have a permanent place in effective antihypertensive treatment. Appropriate relaxation techniques include, for example, autogenic training, progressive muscle relaxation, visualization and breathing exercises, chi gong and yoga. These practices are incorporated in various lifestyle programs. They act in different ways, and can be offered to the patient in accordance with his/her individual wishes.

Bijlani RL, and et.al. studied the short-term impact of a brief lifestyle intervention based on yoga on some of the biochemical indicators of risk for cardiovascular disease and diabetes mellitus. The variables of interest were measured at the beginning (day 1) and end (day 10) of the

---


intervention using a pre-post design. The study is the result of operational research carried out in our Integral Health Clinic (IHC). The IHC is an outpatient facility which conducts 8-day lifestyle modification programs based on yoga for prevention and management of chronic disease. A new course begins every alternate week of the year. The study is based on data collected on 98 subjects (67 male, 31 female), ages 20-74 years, who attended one of our programs. The subjects were a heterogeneous group of patients with hypertension, coronary artery disease, diabetes mellitus, and a variety of other illnesses. The intervention consisted of asanas (postures), pranayama (breathing exercises), relaxation techniques, group support, individualized advice, lectures and films on the philosophy of yoga and the place of yoga in daily life, meditation, stress management, nutrition, and knowledge about the illness. The outcome measures were fasting plasma glucose and serum lipoprotein profile. These variables were determined in fasting blood samples, taken on the first and last day of the course. Fasting plasma glucose, serum total cholesterol, low-density lipoprotein (LDL) cholesterol, very-low LDL cholesterol, the ratio of total cholesterol to high density lipoprotein (HDL) cholesterol, and total triglycerides were significantly lower, and HDL cholesterol significantly higher, on the last day of the course compared to the first day of the
course. The changes were more marked in subjects with hyperglycemia or hypercholesterolemia. The observations suggest that a short lifestyle modification and stress management education program leads to favorable metabolic effects within a period of 9 days.

Kochupillai V, and et.al 14 Stress, a psychophysiological process, acts through the immune-neuroendocrine axis and affects cellular processes of body and immune functions, leading to disease states including cancer. Stress is also linked to the habit of tobacco consumption and substance abuse, which in turn also leads to diseases. Sudarshan Kriya (SK) and Pranayam (P), rhythmic breathing processes, are known to reduce stress and improve immune functions. Cancer patients who had completed their standard therapy were studied. SK and P increased natural killer (NK) cells significantly (P <0.001) at 12 and 24 weeks of the practice compared to baseline. Increase in NK cells at 24 weeks was significant (P <0.05) compared to controls. There was no effect on T-cell subsets after SK and P either in the study group or among controls. SK and P helped to control the tobacco habit in 21% of individuals who were followed up to 6 months of practice. We conclude that the inexpensive

and easy to learn and practice breathing processes (SK and P) in this study demonstrated an increase in NK cells and a reduction in tobacco consumption. When confirmed in large and randomized studies, this result could mean that the regular practice of SK and P might reduce the incidence and progression of cancer.

Pilkington K, Kirkwood G, Rampes H, Richardson J.\textsuperscript{15} Yoga-based interventions may prove to be an attractive option for the treatment of depression. The aim of this study is to systematically review the research evidence on the effectiveness of yoga for this indication. Searches of the major biomedical databases including MEDLINE, EMBASE, CINAHL, PsycINFO and the Cochrane Library were conducted. Specialist complementary and alternative medicine (CAM) and the IndMED databases were also searched and efforts made to identify unpublished and ongoing research. Searches were conducted between January and June 2004. Relevant research was categorized by study type and approved some improvements relative to control subjects on most measures, with the relative improvement in performance anxiety being the greatest. The results from this preliminary study suggest that yoga and meditation may

be beneficial as a routine practice to reduce performance anxiety in musicians.

Brown RP, Gerbarg PL.16 Yogic breathing is a unique method for balancing the autonomic nervous system and influencing psychologic and stress-related disorders. Part I of this series presented a neurophysiologic theory of the effects of Sudarshan Kriya Yoga (SKY). Part II will review clinical studies, our own clinical observations, and guidelines for the safe and effective use of yoga breath techniques in a wide range of clinical conditions. Although more clinical studies are needed to document the benefits of programs that combine pranayama (yogic breathing) asanas (yoga postures), and meditation, there is sufficient evidence to consider Sudarshan Kriya Yoga to be a beneficial, low-risk, low-cost adjunct to the treatment of stress, anxiety, post-traumatic stress disorder (PTSD), depression, stress-related medical illnesses, substance abuse, and rehabilitation of criminal offenders. SKY has been used as a public health intervention to alleviate PTSD in survivors of mass disasters. Yoga techniques enhance well-being, mood, attention, mental focus, and stress tolerance. Proper training by a skilled teacher and a 30-minute practice

---
every day will maximize the benefits. Health care providers play a crucial role in encouraging patients to maintain their yoga practices.

Kirkwood G, and et.al\textsuperscript{17} 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.

West J, Otte C, and et.al\textsuperscript{18} conducted a study to examine some of the psychological and neuroendocrine response to these activities. Sixty-nine healthy college students participated in one of three 90-min classes: African dance (n = 21), Hatha yoga (n= 18), or a biology lecture as a control session (n = 30). Before and after each condition participants


completed the Perceived Stress Scale (PSS), completed the Positive Affect and Negative Affect Schedule, and provided a saliva sample for cortisol. There were significant reductions in PSS and negative affect (ps < .0001) and Time x Treatment interactions (ps < .0001) such that African dance and Hatha yoga showed significant declines, whereas there was no significant change in biology lecture. There was no significant main effect for positive affect (p = .53), however there was a significant interaction effect (p < .001) such that positive affect increased in African dance, decreased in biology lecture, and did not change significantly in Hatha yoga. There was a significant main effect for salivary cortisol (p < .05) and a significant interaction effect (p < .0001) such that cortisol increased in African dance, decreased in Hatha yoga, and did not change in biology. Changes in cortisol were not significantly related to changes in psychological variables across treatments. There was 1 significant interaction effect (p = .04) such that change in positive affect and change in cortisol were negatively correlated in Hatha yoga but positively correlated in Africa dance and biology. Both African dance and Hatha yoga reduced perceived stress and negative affect. Cortisol increased in African dance and decreased in Hatha yoga. Therefore, even when these interventions produce similar positive psychological effects, the effects
may be very different on physiological stress processes. One factor that may have particular salience is that amount of physiological arousal produced by the intervention.

Bhattacharya S, Pandey US, Verma NS\textsuperscript{19} studied to assess the effect of yogic breathing exercises (pranayama) on the oxidatives stress. The study group consisted of 30 young male volunteers, trained for the purpose of this study and an equal number of controls were used. The free radicals and Super oxide dismutase levels were measured before the study and at the end of the study. The free radicals were decreased significantly in the study group but the SOD was increased insignificantly as compared to the control group. Yogic breathing exercises not only help in relieving the stresses of life but also improve the antioxidant status of the individual. An improvement in the antioxidant status is helpful in preventing many pathological processes that are known with impaired antioxidant system of body.

Majumdar M, Grossman P, Dietz-Waschkowski B, Kersig S, Walach H.\textsuperscript{20} Conducted the first systematic outcome evaluation to

\textsuperscript{19} Bhattacharya S, Pandey US, Verma NS. “Improvement in oxidative status with yogic breathing in young healthy males”, \textit{Indian J Physiol and Pharmacol}. 2002 Jul;46(3):349-54

examine the effects of an 8-week meditation-based program in mindfulness in a German sample. Twenty-one (21) participants with chronic physical, psychologic, or psychosomatic illnesses were examined in a longitudinal pretest and post-treatment design with a 3-month follow-up. Both quantitative and qualitative data were gathered. Emotional and general physical well-being, sense of coherence, overall psychologic distress, and satisfaction with life were measured with standardized instruments. Overall, the interventions led to high levels of adherence to the meditation practice and satisfaction with the benefits of the course, as well as effective and lasting reductions of symptoms (especially in psychologic distress, well-being, and quality of life). Changes were of moderate-to-large effect sizes. Positive complementary effects with psychotherapy were also found. These findings warrant controlled studies to evaluate the efficacy and cost effectiveness of mindfulness-based stress reduction as an intervention for chronic physical and psychosomatic disorders in Germany.

King MS, Carr T, D'Cruz C.\textsuperscript{21} studied to describe transcendental meditation and review research on its use in the treatment and prevention of coronary heart disease. Transcendental meditation shows promise as a

preventive and treatment method for coronary heart disease. Transcendental meditation is associated with decreased hypertension and atherosclerosis, improvements in patients with heart disease, decreased hospitalization rates and improvements in other risk factors including decreased smoking and cholesterol. These findings cannot be generalized to all meditation and stress reduction techniques as each technique differs in its effects. Further research is needed to delineate the mechanisms involved and to verify preliminary findings concerning atherosclerosis and heart disease and the findings of short term hypertension studies.

Manocha R.\textsuperscript{22} studied to define meditation, outline the broad types of meditation and give an overview of the extent and validity of available evidence for its efficacy. The basic question of what constitutes meditation and what separates it from relaxation therapy has been an impediment to formulating quality studies in order to research meditation techniques. Examining the literature using evidence based criteria reveals that, while meditation does appear to have therapeutic potential, there is a great need for further research before definitive conclusions can be made. Researchers have yet to systematically compare different techniques of meditation to compare their profiles.

Arambula P, and et.al. Studied to explore the physiological correlates of a highly practiced Kundalini Yoga meditator. Thoracic and abdominal breathing patterns, heart rate (HR), occipital parietal electroencephalograph (EEG), skin conductance level (SCL), and blood volume pulse (BVP) were monitored during prebaseline, meditation, and postbaseline periods. Visual analyses of the data showed a decrease in respiration rate during the meditation from a mean of 11 breaths/min for the pre- and 13 breaths/min for the postbaseline to a mean of 5 breaths/min during the meditation, with a predominance of abdominal/diaphragmatic breathing. There was also more alpha EEG activity during the meditation ($M = 1.71$ microV) compared to the pre- ($M = .47$ microV) and postbaseline ($M = .78$ microV) periods, and an increase in theta EEG activity immediately following the meditation ($M = .62$ microV) compared to the pre-baseline and meditative periods (each with $M = .26$ microV). These findings suggest that a shift in breathing patterns may contribute to the development of alpha EEG, and those patterns need to be investigated further.

---

Pettinati PM.\textsuperscript{24} presented an introduction to insight or mindfulness meditation, yoga, and guided imagery from theoretical and practical perspectives. She provides clear, easy-to-follow steps to begin using sitting meditation, walking meditation, and yoga for the health care provider and for the patient. She presents the material first for self-knowledge and self-care and secondarily for connecting to others in healing relationships.

Astin JA.\textsuperscript{25} examined the effects of an 8-week stress reduction program based on training in mindfulness meditation. Previous research efforts suggesting this program may be beneficial in terms of reducing stress-related symptomatology and helping patients cope with chronic pain have been limited by a lack of adequate comparison control group. Twenty-eight individuals who volunteered to participate in the present study were randomized into either an experimental group or a nonintervention control group. Following participation, experimental subjects, when compared with controls, evidenced significantly greater changes in terms of: (1) reductions in overall psychological

\textsuperscript{24} Pettinati PM. "Meditation, yoga, and guided imagery", The Nursing Clinic in North America. 2001 Mar;36(1):47-56

symptomatology; (2) increase in overall domain-specific sense of control and utilization of an accepting or yielding mode of control in their lives, and (3) higher scores on a measure of spiritual experiences. The techniques of mindfulness meditation, with their emphasis on developing detached observation and awareness of the contents of consciousness, may represent a powerful cognitive behavioral coping strategy for transforming the ways in which we respond to life events. They may also have potential for relapse prevention in affective disorders.

Telles S, Naveen KV.26 Stated that the use of yoga for rehabilitation has diverse applications. Yoga practice benefited mentally handicapped subjects by improving their mental ability, also the motor co-ordination and social skills. Physically handicapped subjects had a restoration of some degree of functional ability after practicing yoga. Visually impaired children showed a significant decrease in their abnormal anxiety levels when they practiced yoga for three weeks, while a program of physical activity had no such effect. Socially disadvantaged adults (prisoners in a jail) and children in a remand home showed significant improvement in sleep, appetite and general well being, as well as a decrease in physiological arousal. The practice of meditation was reported to decrease

the degree of substance (marijuana) abuse, by strengthening the mental resolve and decreasing the anxiety. Another important area is the application of yoga (and indeed, lifestyle change), in the rehabilitation of patients with coronary artery disease. Finally, the possible role of yoga in improving the mental state and general well being of HIV positive persons and patients with AIDS is being explored.

Cumming\textsuperscript{27} made an attempt to explore the correlation of stress and job satisfaction among urban special education teachers. Maslach Burnout Inventory, Minnesota Job Satisfaction Questionnaire and Demographic profile were used to survey over 292 special needs teachers. Results indicate that no significant differences were found among different classification of teachers. Depersonalization was found to be a significant factor in the extrinsic satisfaction, a teacher experienced in his/ her job.

Nelson\textsuperscript{28} studied personnel professionals and found that females reported significantly more stress from politics and higher levels of psychological and physiological distress, when compared with males. However, the females did not report more stress than males on variables concerning work/home, home conflicts or career progress.

\textsuperscript{27} Cumming, E.A. (). "Stress and Job Satisfaction among Special Education Teachers in Urban Districts in Texas", Dissert. Abst. 1995, p 2790-A.

Smeltzer\textsuperscript{29} used the stress diagnostic survey to determine the work stress among government and private industry. Results indicated that variables associated with communication at the group and individual, not organization level had the greatest effect on work stress. In addition a ‘type A’ behavioral style was significantly related to role overload and responsibility for people.

Brar\textsuperscript{30} investigated the psycho physiological performance variation of high and low fitness groups resulting from induced mental and physical fatigues, he conducted that:

1. Physical fatigue improved the reaction time whereas mental fatigue prolonged the reaction time, but fitness level and reaction time were independent.

2. Mental fatigue decreased the speed of movement whereas; physical fatigue did not affect it. Fitness and speed of movement were not related.

3. Mental fatigue and physical fatigue impaired the hand steadiness of the subjects.


4. Fitness was found to be an underlying factor of depth perception. Mental and physical fatigue impaired the depth perception.

Moffett’s\textsuperscript{31} study of summer faculty at the University of Iowa revealed that female, non tenure and probationary faculty experienced significantly higher levels of job stressors than male and tenure faculty. Academicians earning less than professors perceived greater stress. Faculty who classified themselves as ‘type A’ personalities had more job stress than those who classified themselves as ‘type B’. Full time professors and academicians who had greater departmental seniority had minimum levels of perceived of strains.

Holmes DS and et.al \textsuperscript{32} on four successive days, 10 highly trained and experienced meditators were asked to relax for 5 minutes, meditate for 20 minutes, and then relax for 5 minutes. In contrast, 10 other subjects who had no training or experience with meditation were asked to relax for 5 minutes, rest for 20 minutes, and then relax for 5 minutes. Physiological arousal (heart rate, skin resistance, respiration rate, systolic blood pressure, diastolic blood pressure) and subjective arousal (cognitive,

\textsuperscript{31} Moffett, M.A., “Implications of Job Stressors are Perceived by Summer Faculty at the University of Iowa (Doctoral Dissertation, University of Iowa, 1983), Dissertation Abstracts International 44 (1983): 3611-A.

somatic, relaxation) were measured throughout the experiment. Results indicated that (a) prior to meditating or resting, meditators tended to have higher heart rates and diastolic blood pressure than did nonmeditators, (b) meditation was associated with generally reduced arousal, but (c) while meditating, meditators did not evidence lower levels of arousal than nonmeditators did while resting. This investigation employed controls, which were not used in previous investigations, and the results place qualifications on previously reported results. The results have implications for the study of personality functioning, stress management, and psychotherapy.

Yesavage JA, Karasu TB. The purpose of this article is to present a review of the psychotherapy of the elderly, emphasizing traditional methods as well as some newer techniques. It will first review the literature on the process of psychotherapy in the elderly, then the rationale for such therapy will be discussed, and finally important technical points about such therapy will be listed, including information about the cognitive psychotherapies in the treatment of demented elderly.

---

Kamen\textsuperscript{34} investigated fractionated time in power trained and endurance-trained athlete under condition of fatiguing isometric exercise. For this purpose he assessed fractionated knee extensors and planter flexor RT components in a group of eight weight litters and eight long distances runners, following a four day period of baseline stabilization of each muscle group, a 505 maximum voluntary contraction (MVC) holding time exercise was administered. The result showed that the runner had longer pre motor time (PMT). Share the weight lifters in the knee extensions, but had much PMT's than the lifters in the planters flexor condition. Compare to previously reported investigation using non-athlete, the date for the present sample of athlete indicated faster total RTs in both knee extensors and the planter flexors. a resistance of 15\% MVC applied during the RT task, resulted in lengthening of the motor time(MT) component in both groups prior to exercise. However while knee extensor resisted motor time was lengthened by the exercise task, no such lengthening occurred in planter flexor resisted RT. It was concluded that power trained.

Gunner & Hans\textsuperscript{35} studied the variation of hand steadiness with physical stress for this purpose the performance of 12 subjects in a hand steadiness expressed in a form of value of hand shakiness was found not to increases linearly with work intensity, on the contrary the relation between hand shakiness and activation level induce by physical work, was found to be positively accelerated by an exponent of 1:6, subjective effort measured by a ratio estimation method grew, likewise according to a positively acceleration function with an exponent of about 1:6, while subjective effort according to "RPF" category scale, like heart rate grew linearly with work load.

Blackwell B, and et.al\textsuperscript{36} Seven selected hypertensive patients were stabilized on drugs at a research clinic. Subjects learned transcendental meditation (T.M.), were seen weekly, and took their own blood pressure several times daily. After 12 weeks of T.M. six subjects showed psychological changes and reduced anxiety scores. Six subjects also showed significant reductions in home and four in clinic blood-pressures. Six months later four subjects continued to derive psychological benefit


and two showed significant blood-pressure reductions attributable to T.M. at home and clinic.

Woolfolk RL. The scientific research that has investigated the physiological changes associated with meditation as it is practiced by adherents of Indian Yoga, Transcendental Meditation, and Zen Buddhism has not yielded a thoroughly consistent, easily replicable pattern of responses. The majority of studies show meditation to be a wakeful state accompanied by a lowering of cortical and autonomic arousal. The investigations of Zen and Transcendental Meditation have thus far produced the most consistent findings. Additional research into the mechanisms underlying the phenomena of meditation will require a shifting from old to new methodological perspectives that allow for adequate experimental control and the testing of theoretically relevant hypotheses.

Burk conducted a study to examine effect of different level of physical exertion, as measured by heart rate, on dynamic balance (DB). A Latin square arrangement was used to assign the levels of exertion: rest light (120bpm), medium (140bpm), heavy (160bpm) and severe (180bpm)

---

to each of 12 subjects (SS). A modification of Raynolds Balance Device (RBD) was used as the instrument to measure ergo-meter for 7 minutes and then took six trials at one minute interval on RBD. A trial consisted of the elapsed time from the onset of the first stimulus light. The faster DB scores were achieved on trials two, three, four after heavy and severe level of exertion. Consequently it seemed that prior physical exertion at 120 bpm and 140 bpm tends to enhance the DB performance on the RDB. In contrast prior exertion at 160 bpm and 180 bpm tends to induce slower DB scores up to 5 minutes after performance on the bicycle ergo-meter.

Cotten and others determined the effect of interpolated specific and total body physical fatigue upon the performance & banning of a gross motor skill. 75 male subjects were randomly assigned to one of three groups: group A(specific body fatigue), group B (total body fatigue) and group C (Control). The gross motor learning task was a modification of mirror target toss test (Mc gross, rq 22: 197-200). Each subject was given one initial trial (five throws). This was followed by the appropriate experimental condition: Group A –seven minutes of severe overall physical activity (stool stepping-60 complete step-ups per minute), Group

---

B-5 minutes. Of severe specific exercise (reverse curling 23 lb. Easy curl bar-30 re, per minutes.) and Group C -5 minutes. Of rest. Each subject was then given ten consecutive trials (50 throws) with the assigned physical fatigue interposed for 30 sec. following each two trials. On the subsequent day, the subjects were given three consecutive trials (no exercise condition on second day). The learning score was calculated by the present of possible improvement method:

\[
\text{Learning} = \frac{\text{final score} - \text{initial score}}{\text{Maximum possible score} - \text{initial score}}
\]

The score of the first trial served as the initial score while the x of the three trials for the second day served as the final score. The reliabilities for the learning task for each group were \( r_A = .89 \), \( r_B = .83 \) and \( r_C = .90 \). The learning scores for each group were analysed by simple ANOVA with the results indicating that fatigue had no significant effects (\( f=0.97 \)) upon the amount learned. The effect of either total body or specific fatigue upon performance curves (ten trials after the imposed condition with the condition interposed between every two trials) were analysed by discriminate analysis. Result indicated that the curve of group resting before and between trials was significantly different (mah alan obis \( D^2 = 68.79, df = 20, p < .01 \)) from the curves of other two groups. The result of this study indicated that while performance was impaired by
both specific and total body fatigue, the amount learned was unaffected by fatigue.

Wallace RK.\textsuperscript{40} States that Oxygen consumption, heart rate, skin resistance, and electroencephalograph measurements we rerecorded before during, and after subjects practiced a technique called transcendental meditation. There were significant changes between the control period and the meditation period in all measurements. During meditation, oxygen consumption and heart rate decreased, skin resistance increased, and the electroencephalogram showed specific changes in certain frequencies. These results seem to distinguish the state produced by transcendental meditation from commonly encountered states of consciousness and suggest that it may have practical applications.

Bryant\textsuperscript{41} undertook a descriptive case study analysis of basketball jump shots and the effect of fatigue on the jump shot. Five university of Missouri varsity basketball players were filmed (16mm, 64 t.p.s., 3 synchronous views, lower, upper and full body) for mechanical and cinematographic analysis through a descriptive case study approach of the motor skills of BB jump shots and the effect of fatigue on jump shot.

\textsuperscript{40} Wallace RK. "Physiological effects of transcendental meditation", Science. 1970 Mar 27;167(926):1751-4

\textsuperscript{41} James E. Bryant, "A Descriptive Case Study Analysis the Basketball Jump Shots and the Effect of Fatigue on the Shot". Completed Research in Health, Physical Education and Recreation 12(1970): 153.
Ss performed three sets of 10 m shots from 20 feet in front of the basketball, the first following minimal exertion and the second & the third after 30 min. controlled BB scrimmages, with a 109 ft. sprint preceding each jump shot was developed representing ranges of selected body measurements and application of mechanical principle and laws. Jump shot performances the effects of fatigue were found to be individualized. Six body measurements were found to be affected by fatigue between sets and four within sets. The variation of the jump shot did not reveal the mechanical reason for long range shooting skill on the basis of playing background. Superior shooter used a continuous style and long-levered play may have an advantage from 20 feet in front of the basketball.

Schwartz\textsuperscript{42} placed thirty male college subjects in two groups to discover if varying degree of muscular fatigue had any effect on depth perception. The experimental group pedaled a bicycle ergo-meter under condition of increasing work loads until a heart rate of 170 bpm was reached or until unable to pedal was required. The depth perception scores and heart rate were recorded simultaneously at pre-selected times during the experimental period. All subjects in the experimental groups were actively exercising during the time these data were collected. The data from the

control group were collected following the same procedure except that they did not perform physical work. ANOVA indicated no significant difference between the depth perception and scores during the experimental period and no significant inter-action effect. These findings were confirmed by the paired 't' test that indicated no significant differences between initial and final depth perception, scores of eight groups.

Schemidte\textsuperscript{42} examined the status of physical fatigue as a variable affecting performance and learning of gross motor skills. In this investigation three groups practiced ten 30 sec. Trials on the Buckman ladder with a 90 Sec. Intertrial interval (day1). Two fatigue groups rode a bicycle ergometer for two minutes. Prior to trial I and there after, for 75 sec. Between each sub sequential ladder trial work loads of 750(N=13) and 1200(N=14) kgm/mins respectively a control group (N=20) cancelled vowels between trials. All group returned two days later (day=2) for four trials with interval rest, the man of which was the criterion of amount learned. Fatiguing activity caused decrements in day-1 performance (F=3.32), but failed to affect day-2 performance (F=0.47), indicating that fatigue was a performance variable rather than a learning variable.

Locke⁴⁴ investigated the effect of fatigue on movement time of track filed athletes. The tests 22 subjects for speed of movement of lower extremists. The control group relaxed in a chair before they were tested. Subjects in a experimental group rode bicycle ergo meter until the HR of 180 was reached. It was found that the speed of movement increased as a result of that amount of fatigue.

Carron⁴⁵ in an attempt to study the effect of physical fatigue upon the learning of a motor skill assigned 75 college women students in a systematic rotation to either a control group or one of the two experimental group (N=25 in each group). All subjects were given a total 50 trials on the pursuit rotor. 25 trials on day 1 the practice session and 25 trials on day 2. The test session one of the experimental group was fatigued early in practice session while the other was fatigued late in the practice session. Fatigue interpolated early and late was detrimental to subsequent performance; improvements but had no effect on the amount learned.

Marshall\textsuperscript{46} divided 80 senior high school boys into two groups to study the immediate effect of fatigue upon selected measures of kinesthesia. The experimental group undertook 10 minutes sit up exercise. Just prior to performing on a stabliometer, without a fatigue bout. These were significant decrement in initial, final and overall performance of the experimental subjects, which supported the hypothesis that preliminary unrelated fatiguing exercises would causes a detrimental effect on performance.

Ware\textsuperscript{47} conducted a study on the effect of fatigue on tolerance, kinesthetic positioning and steadiness and used a work about of 15 squat thrust in one minute to induce mild fatigue. The difference between pre-test, post-test indicated a tendency to improve static balance but did not affect on kinesthetic positioning of the shoulder joint and increase in hand tumor. Mild fatigue appeared detrimental to performance in which steadiness was important.

Phillips\textsuperscript{48} Examined the influenced of fatiguing warm-up exercises on speed-up of movement and reaction latency. He concluded that related

\textsuperscript{47} Lanclia T. Ware, "A Study of the Effect of Fatigue on Balance Kinesthetic Positioning and Steadiness." Completed Research in Health, Physical Education and Recreation (1963): 73.
\textsuperscript{48} William H. Phillips, "Influence of Fatiguing Warm-Up Exercise on Speed of Movement and Reaction Latency" Research Quarterly 34:3 (Oct, 1963): 370
warm-up exercise of moderate intensity failed to improve arm speed in a large muscle criterion movement, while heavy but non-related warm-ups exercise did improve speed by 16%. Three groups each consisting 25 male college students, were measured under both test and control conditions.

Neither of warm-up exercises influenced reduction latency. The correlation between RT and MT scored was non significant (r=. 17), for the heavy exercise (stool stepping), highly reliable individual difference were observed in stepping rate drop off before fatigue (r= .93) and after 37 % fatigue (r=. 98), but two types of drop off scores were not significantly co-related (r=. 24). In the arm action warm-up exercise, the correlation between initial rate of movement and rate at 24% fatigue was non-significant (r=.08)

Morris conducted a study to examine fractionated reflex components (responses) after local fatiguing isotonic and isometric muscular exercise of the quadriceps musculature. He subdivided total reflex time into peripheral and central component by fractionated procedure. The central components (reflex latency) constituted the time for the monosynaptic reflex are whereas the peripheral component (reflex motor time) represented the time for muscular contraction. 12 male
university student were tested prior to and after severe isometric and isotonic exercise. Isometric exercises produce a strength decrement of 57 and isotonic exercise task produced strength decrement of 35 percent. Although differential strength decrements were shown, both exercise types significantly ($p < .01$) lengthened total reflex time. Additionally, both reflex latency and reflex motor time was increased. These results suggest that severe muscular fatigue of either isometric or isotonic origin adversely affect total reflex time specially the peripheral (muscular) components.