CHAPTER - II

REVIEW OF LITERATURE AND RELATED STUDIES

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Day to day stress and faulty coping strategies have been widely accepted as one of the predominant cause of psychosomatic disorder. Number of studies have been conducted in stress and coping strategies in relation to physical illness. There are also a good number of studies conducted in Biofeedback, *Yoga*, and other relaxation techniques as effective treatment modalities for such physical problems. In other words, when psychological factors have affected the medical condition, interventions designed with Biofeedback, *Yoga* and other relaxation techniques have been proved to be effective.

2.1 REVIEW OF LITERATURE & STUDIES ON STRESS

Leonard S. Zegans (1982), in his article "Stress & the development of psychosomatic disorder" states - "Today we are beginning to develop a different perspective about mind - body issues. Exciting research in psychoimmunology, neuroendocrinology, and neurophysiology is encouraging us to take another look at the mind-body question and particularly at the issue of how psychological stress can effect pathological changes in body function". He reviews current concepts about stress and discusses the new data that help us understand how tensions, conflicts and losses contribute to the onset and progress of organic illness.

Toward a theory of stress and illness he explains, the final out come of the stress response is mastry, exhaustion or disorganization. Mastry occurs when the coping strategies of the individual are appropriate and adequate to resolve the stressful situation. Exhaustion indicate that the coping reaction was appropriate in kind but not in degree to handle the threat. This leads either to a search for a new strategy or to a confirmation of the old approach. Because of prolongation of the coping phase, fatigue occurs. This may result in feelings of depression or hopelessness, low arousal, inability to concentrate, physical inertia, and irregularities of autonomic and endocrine function. Disorganization occurs when either the deficient strategic repertoire or anxiety prevents an adequate integration and execution of coping responses.

He further points out that the organ system can be activated at any of the way stations of the stress response. This process can occur.

i. as a concomitant physiological response to a failure of coping (exhaustion, disorganization)
ii. as a concomitant physiological response to an appraisal of a threat to basic needs.
iii. as a nonspecific activation pattern during the state of orientation - alarm.
iv. as a physiological response when the stimulus has been correctly appraised but no adequate coping mechanism is either available or used (the individual is then vulnerable to the direct noxious impact of the stimulus).

Though the body does react during the different phases of the stress response, overt disease is not necessarily inevitable. The critical issue is what causes these transient events to become transformed into processes involving pathology of tissues and organs. A number of hypotheses exist.

i. The acute body response itself may cause damage, particularly if an already compromised organ is involved.
ii. The acute response may cause transient insult to a tissue, but repeated occurrence of the stress may cause permanent tissue damage.
iii. The acute physiological reaction can become chronic if it becomes conditioned to a benign stimulus resembling the stressor. Such a benign stimulus may be a more regular part of the individual's environment and provoke an unnecessary coping response.
iv. A coping strategy may be used successfully but the physiological component is not terminated when the challenge is mastered. A reverberating circuit is established, which puts unusual strain in the body.
v. A minor stress provocation releases an inappropriately severe physiological response. Modulation is lacking that grades the body's reaction according to the nature of the threat. When all stress are responded to, as major assaults, abnormal physiological reactions are possible.
vi. A physiological response, appropriate and adequate to cope with a given threat may result in damage to some other aspect of the body through inhibiting a benign but initial body process or stimulation an irritating one.

vii. Coping Strategies can misfire when the behavioral component is inhibited but the physiological aspect is expressed (fight behaviour inhibited but not its physiological component). The physiological aspects of a blocked action can be continuously repeated since no appropriate cut off signal is received.

Our knowledge of how these interfaces between cognitive affective components of the stress response and their physiological correlates produce serious tissue damage is limited. In man, when ever a stimulus is perceived to threaten or block a fundamental need, the stress response also will be initiated. Imagination can produce its own stressors and prompt a neuroendocrine - autonomic response that itself poses a real threat to the organism. Man, with his vast learning potential and vulnerability to neurotic conflicts, has an infinitely broad scope of concrete or fantasy stimuli that can provoke the stress response.

Although the brain itself ultimately identifies threats, activates alerting, appraising, and coping processes, integrates body reactions with thoughts and feelings, all parts of the body can experience a major stress response when coping breaks down. Some regions are particularly vulnerable :

- Hypothalamic-pituitary-endocrine axis.
- Autonomic nervous system - adrenal medulla.
- Immune system.
- Reticular activating system.
- Involuntary and striated muscle system.
- Cognitive - affective integrating centers of the brain.

By engaging these important integrative systems, stress can cause disease by

- Lowering or exaggerating the immune response (Sterin, Keller, & Schleifer,1981)
- Creating endocrine problems through either hypoactivty or hyperactivity(Lipton,1976)
- Altering the balance of autonomic control, resulting in changes in the cardiovascular, respiratory, secretory, and visceral system(Lisander, 1979)

- Affecting sleep patterns, with attendant impact in protein metabolism, hormone secretion, and other vegetative functions(Weitzman, Boyar, Kapen, & Hellman,1975)
- Changes in peptide release in extra CNS sites (Marx, 1979)

Affecting the neurotransmitter, neuromodulator, and neuroendocrine functions of the brain itself, which can have profound impact in health through a variety of mechanisms, including changes in eating and health habits (exercise, drug or alcohol consumption, and accident prone behaviour) (Antelman & Caggivla, 1977)

Brodal (1981) pointed out that the prefrontal cortex has two way connections with structures involved in "emotional and behavioural changes and in the regulation of the internal milieu of the organism. Lesions, particularly are the orbitofrontal region of the cortex, tend to create profound disturbances as emotional reactivity and to interfere with appropriate social behaviours. Lesions of the dorsomedial thalamic nucleus produce essentially the same alterations as do ablations in the orbitofrontal zone. This suggests a linkage between the highest centers of the cortex and the diencephalic region that may relate emotional responses to messages to peripheral body organs. Listing the structures that mediate between higher and lower centers of the brain, the amygdala, the hippocampus, the septum, and the cingulate gyrus were mentioned. These structures, with their connections to the hypothalamus and the neocortex, comprise the so-called limbic system. Brodal reported that the amygdala influences the secretion of hormones through its action on the hypothalamus. Recent studies have identified the role of this structure in modulating the secretion of gonadotrophic hormones adrenocorticotrophic hormone, thyrotrophin and vasopressin.

Isaacson (1974), in his review of limbic function, suggested that each structure with in this system may be highly specialized and tuned to specific changes in the internal and external environment.

Henry and Meehan(1981) speculated that the hippocampus is linked to the pituitary adrenal cortical system, which in turn is closely linked to depression and the

perception of loss of control, while the amygdala is associated with the fight - flight aspects of the sympathetic adrenal medullary response.

Ellendorf and Parvizi (1980) surveying extra hypothalamic centers in neuroendocrine integration, stated that the limbic system - midbrain circuit possibly represents the largest input to the hypothalamus and "encompasses components involved in neuroendocrine integrative mechanisms". The function of the limbic system may be to coordinate the cognitive aspects of stimulus appraisal with their effective components and integrate both with the appropriate bodily expression of emotion. Since lesions in the rostrohypothelamic area results in degenerative patterns in the amygdala, amygdala hypothalamic relations are considered to be reciprocal.

Schur (1955) estimated that 65% of the median eminence neurons alter their firing pattern in response to dorsal hypocampus stimulation. This effect is critical since the median eminence plays a major role in the transport of neuroendocrine releasing factors from the hypothalamus to the anterior pituitary. According to Ellendorf and Parvizi, it is well established that amygdala participates in the mechanisms that control gonadotrophin secretion. In addition, the amygdala appears to be one of the most important hypothalamic structures involve in regulation of growth hormone.(GH), while the hippocampus also appears to have a stimulatory effect on GH release.

Reichlin (1979), in his review of the anatomical and physiologic basis of anterior pituitary regulation, observed that "the functions of the central biogenic systems are under the domination of inputs from various parts of the 'visceral brain' and are there by responsive to stress and emotional disturbance". He reported that drugs that act as dopamine agonists also stimulate GH release and the release of gonadotrophins and thyroid stimulating hormone (TSH). On the other hand Serotonine agonists suppress TSH release.

Bioaminergic systems that influence pituitary hormone release are, as Reichlin(1979) pointed out, also involved in the determination of affective status, sleep and wakefulness, appetite, and drinking behaviour. Neuroliptic agents, widely used in psychiatry to modify mood or cognition, act in part by stimulating or suppressing central

bioaminergic pathways and thus may interfere with or modify anterior pituitary function. Thus stress may operate through an alteration of bioaminergic transmitters, not only influencing thought processes and affect but also changing pituitary secretion, with far reaching consequences for health.

Does stress effect neurochemical changes in the brain, which then influence vital neurotransmitter systems that may operate among the limbic system, hypothalamus, and pituitary? In a massive review of this literature, Anisman(1978) observed that there is good evidence for this sequence. For example :

i. Moderate levels of stress tend not to affect the endogenous level of norepinephrine (NE) and Serotonine(5-HT). It is probable that stress increases both synthesis and release of NE and 5-HT.
ii. With intense stress, a decline in endogenous levels of NE and 5-HT is seen. Presumably, synthesis does not keep up with utilization. The effectiveness of NE released apparently is also reduced by increased reuptake of NE.
iii. With mild stress, dopamine (DA) and acetylcholine (ACh) are unaffected. As stress severity increases, ACh levels rise. DA may decrease, but the effect of stress on DA is less pronounced than that of NE neurons.
iv. Under conditions of stress, activity of the anterior pituitary hormones increases, as do levels of Plasma Corticosterone.
v. Under conditions in which control over stress is possible, NE levels do not decline. Reports also indicate that with controllable stress neither ACh nor Corticosterone levels are affected.
vi. After repeated exposure to stress, neurochemical adaptation may occur.
vii. Stimuli associated with stress may come to elicit the same neurochemical changes as does the provocative stimulus itself.

Anisman's Conclusions are worth quoting :

"It seems evident that although stress of a physical nature may affect neurochemical activity, such factors as control (coping) over stress may be influential in determining neurochemical activity. As such it needs to be

considered that the physical stimulus per se does not influence neurochemical activity, but we are left with two alternatives that are not necessarily mutually exclusive. First, cognitive factors act as a modulator of the physiological response to stress; Second, under conditions in which the organism is unable to deal effectively with stress, subsidiary mechanisms(in terms of neurochemical activity) are called upon.

In the 1930's and 1940's, Alexander(1950) proposed a conflict - specific theory of psychosomatic disorders based in psychoanalytic investigation of patients with illnesses frequently observed to be related to psychological stress and conflict. He theorized that specific unresolved psychological conflict were accompanied by prolonged specific autonomic arousal, representing the somatic concomitant of repressed affects. When life situations (stress) activated or intensified the unresolved conflict, a psychosomatic disorder, such as peptic ulcer, would ensure, caused by tissue damage arising form the prolonged and intense autonomic arousal. For example, Alexander postulated that in the case of duodenal ulcer a life situation that activated conflicted longings for love would be accompanied by gastric hyper - activity and so contribute to peptic ulceration in the presence of constitutional vulnerability.

Wolff and Wolf (1947), who were Alexander's contemporaries made important contributions by using the research laboratory and experimental methods to investigate psychosomatic relationships. They argued that adoptive, defensive psychophysiologic patterns might result in tissue damage and illness if the stressful situation were prolonged. For example, the physiologic correlate of the psychological defensive wish to get rid of an unpleasant idea, which in turn, is precipitated by exposure to a certain person (stress), might be associated with hyperfunction of the organ of ejection - riddance, the colon, and resultant diarrhea.

The past three decades ushered in a new blossoming of investigations using experimental methods aided by newly gained knowledge in biochemistry and computer technology. For example, in the classic psychosomatic disorders, such as peptic ulcer, it becomes possible to define and investigate the relation between constitutional, or genetic,

vulnerability and psychological stress factors. Weiver, Thaler, Reiser, and Minsky (1957) showed in the late 1950's that the genetically determined trait, serum pepsinogen level, could be used as an indicator to vulnerability to peptic ulcer conditions under nonspecific stress like basic training in the army. In their study, those who developed peptic ulcer were found to have the personality configuration that followed Alexander's formulations. In addition, and with out exception, they also had constitutionally high serum pepsinogen level, and the stress of basic training for them were such that activation of the specific conflict described by Alexander ensured. It is now clear that predisposing constitutional factors are present in other disorders such as hyper-tension and coronary disease.

While these and other investigations in the 1950 showed the importance of constitutional factors in somatic diseases, it also became clear that stress arising from the environment plays a major role in the development of a number of somatic diseases, including those that had not been considered particularly psychosomatic. For example Henry, Stephens, Axelrod, and Mueller (1971) and Henry, Stephens and Watson (1975) were able to construct a psychosocial environment in which susceptible mice almost invariably developed hypertension and another environment in which susceptible mice strains invariably developed breast carcinoma. The hypertension environment system was a cage system in which the animals were under constant threat of dominance challenge and had to compete for food in a territorial manner. The cancer environment involved situation of forced breeding, in which the mice were kept in a constant state of readiness to reproduce, while offspring were always removed after delivery. This resulted in disorganization of the social structure and 100% incidence of mammary cancer with susceptible female subjects.

Epidemiologic studies repeatedly showed that environmental stresses, especially bereavement, have an important role in the development of disease as well as in illness behaviour. A 1967 study in Wales (Rees & Lutkins, 1967) showed that the mortality after loss of a first-degree relative was seven times that in an age matched control group. Other studies (Jacobs & Ostfeld, 1979) confirmed increased mortality after bereavement, although the risk may not be quite as high as sevenfold.

Engel and Schmale (1967); Schmale 1972) postulated that a specific psychological state, which they called the "giving up - given up complex", characterized by feelings of helplessness and hopelessness, may be a particularly favorable setting for pathogenesis of general medical disease. This state, of course is most likely to occur at a time of personal loss of severe stress.

Holmes and Rahe (1968) showed, in a member of populations, that those individuals who experienced a large member of life changes (such as bereavement, marriage, divorce, change in residence) had a higher risk of developing almost any kind of physical illness. They attempted to quantify the stress value of some commonly encountered life changes, developing the concept of life change units. Measured in various ways, life stress has been found to be related to wide variety of variables that reflect health status (physical as well as mental), adjustment and effectiveness of performance. Studies have fond life stress to be significantly correlated to heart disease, pregnancy and birth complications, seriousness of illness and the displaying of symptoms among people with chronic illness (Bedell et. al., 1977; Gorsuch and Key, 1974; Nuckolls et. al., 1972; Rahe and Lind, 1971; Theorell and Rahe, 1971; Wyler et. al., 1971); Psychiatric symptomatology (Dekker and Webb, 1974; Paykel, 1974), anxiety, depression, social maladjustment, neuroticism. Somatic preoccupation, aggression, paranoia and suicidal tendencies (Johnson and Sarason, 1979; Winokur and Selzer, 1975 ; Paykel et. al. 1969;1957; Brown et. al. 1973; Horowitz et. al., 1977; Jacob et. al., 1975; Sethi and Prakash, 1979; Prakash et. al., 1980; Bhatti and Channabasavanna, 1985; Sharma and Ram, 1988).

Shiv Gautam and Preet Kamal (1990) studied stressful life events preceding neurotic disorders, their impact on neurotic patients in comparison to normal subjects and relationship of impact of stressful life-events to depression and anxiety scores were studied prospectively in 100 consecutive neurotic patients, diagnosed according to ICD-9 and 100 matched normal subjects, by administering presumptive life event scale, Beck's depression inventory and Max Hamilton's anxiety rating scale, it was found that number of stressful life events were higher in neurotic patients and their impact was also perceived significantly higher in them.

Behavioural patterns of individuals significantly contribute to the pathogenesis of a number of diseases. The type A behaviour pattern, characterized by a hard-driving, unable to relax hurried, and deadlines oriented lifestyle, is associated with an increases risk to develop coronary disease (Friedman and Rosenman, 1959).

The association between Type A behaviour pattern and coronary Heart Disease has received major confirmation in prospective research. Rosenman et al.(1964) conducted the western collaborative group study (WCGS) a prospective epidemilogical study of 3154 initially well men, aged 39 - 59 years at intake in 1960 - 1961, who were employed by 10 participating California companies. Subjects were comprehensively studied for all risk factors.

The 8.5 years follow-up (Rosenman - 1976) fond coronary Heart disease in 257 men. Final result showed that men classified as type A at intake were 2.37 times as likely to develop CHD over the follow - up as were type B subjects (Rosenman et. al., 1975). When statistical multivariate adjustment for other risk factors was made, the relative type A - B risk of CHD decreased to 1.97, the small difference (0.40) between adjusted and non adjusted relative risk being the amount of risk conferred by other standard risk factors, which showed small correlation with the TABP (Rosenman et. al. 1976). The significant adjusted remainder (1.97) represented the relative risk for TABP that was independent of other risk factors. These findings indicated a synergistic pattern for CHD risk in which TABP operate with nearly a constant multiplicative effect applied to whatever background level results from other risk factors. Thus TABP appears to double the risk of CHD at all levels of other risk factors. The observed associations could not be attributed to chance fluctuation. Since both adjusted and non adjusted relative risk ratios achieved high statistical significance ($P<.001$) and were close to those later found at Framingham (Haynes, Feinleib, & Kannel, 1980).

The Framingham study (Kannel and Gordon, 1974) yielded multivariate risk equation for CHD prediction based on standard risk factors. The predicted risk levels in the WCGS highly correlated with those obtained with the Framingham data (Rosenman et al.,1976). Multiple logistic analysis of the direct association between CHD incidence and

behaviour pattern gave an approximate relative risk of 1.9 (P<.0006) and 2.1 (P<.0015) for type A to Type B men, aged 39 - 40 and 50 - 59 years respectively. Thus, substantial risk is associated directly with TABP and does not diminish in older, as compared with younger men.

2.2 COPING BEHAVIOUR :

Relatively little is known about the specific coping processes people use in adapting to stressful life circumstances. Several attempts have been made to classify appraisal and coping responses, no accepted method has yet emerged.

Rudolph H. Moos et. al. (1976) organized the dimension of appraisal and coping included in selected measurement procedures in to three domains Namely,

i. **Appraisal focused coping** :- involves attempts to define the meaning of a situation and includes such strategies as logical analysis and cognitive redefinition.
ii. **Problem focused coping** :- seeks to modify or eliminate the source of stress (destroying the alcoholic husbands liquor supply), to deal with the tangible consequences of a problem (taking the family responsibility when the head of the house hold is ill), or activity to change the seif and develop a more satisfying situation (learning new skills and enhancing independence.)
iii. **Emotion focused coping** :- includes responses whose primary function is to manages the emotions aroused by stressors and there by maintain equilibrium.

Moos (1993) has developed a Coping Response Inventory (CRI), Which assesses eight types of Coping responses that reflect focus and considers the orientation or focus of coping and divides coping responses into approach and avoidance responses.

Our "Cognitive glasses" - habitual patterns of perception and information processing - have formative effects on learning and adaptive processes. A considerable amount of early research was conducted on the construct of repression sensitization (Chabot , 1973).

Witkin, Oltman, Raskin, & Karp (1971), have worked extensively on field orientation, which is currently the most extensively studied cognitive style. A field dependent individual's perception of a figure are strongly influenced by the surrounding perceptual context, while those who experienced figures as separate and unaffected by the perceptual context are designated field independent. Initially field orientation was being measured by Rod and Frame test, now more widely assessed with embedded figures test which can be administered individually or in groups. People are highly consistent in field orientation, and women tend to be some what more field dependent than men.

Social learning approaches have emphasized the importance of effective problem solving behaviours for successful adaptation (Kendall & Hollon 1980). To quantify such behaviours, several studies have used Platt and Spivack's (1975) Means - Ends problem solving procedure (MEPS), a series of 10 written scenarios with only beginning and an end. A need, goal or problem is aroused in the protagonist at the beginning of each scenario, while at the end of the scenario the situation is successfully resolved. The individual responds by indicating the means by which the protagonist resolved the situation. The responses are coded as to the number and relevance of means, the amount of elaboration given for each mean, and the number of obstacles mentioned that might obstruct successful resolution. The MEPS originally covered only social interaction; Platt and Spivack(1977) later developed the Emotional Means - Ends Problem solving relating to strong emotional states. Similar in format to the initial MEPS, this procedure includes scenarios dealing with emotional states such as anxiety and depression.

The MEPS has been used to differentiate patient from non patient groups and to assess the effectiveness of clinical and educational interventions aimed at ameliorating problem solving deficits. Spivack, Platt, and Shure (1976) identified four key elements of problem-solving : recognizing the existence of a problem, defining the problem, generating possible solutions, and selecting the best solution after evaluating consequences of all alternatives. A training program organized around these element was shown to improve the problem solving skills of primary grade children and to lead to improved sociability with peers and more initiative and autonomy in the classroom, as measured by the MEPS (Spivack, Platt, & Shure,1976).

Intagiata (1978) found that the use of this program significantly improved the problem solving of hospitalized alcoholics as well as the specificity of their post hospitalization planning as assessed during a discharge interview.

Haan (1977) formulated a more general taxonomy of 10 generic ego processes that may be expressed in three modes : coping, defense or fragmentation. According to Haan, coping is the reality oriented, normative mode. Coping involves purpose, choice, flexibility, and coherence to consensual reality and logic; where as defensiveness is compelled, negating, and rigid and distorts logic and reality. Defense is emotion focused in that it allows covert impulse expression and focuses on the relief of anxiety without directly addressing the problem. Fragmentation is automated, ritualistic, effectively directed, and irrational.

Haan's (1977) 10 ego processes are divided according to form functions (1) Cognitive functions under lie the active, outward directed, instrumental aspects of problem - solving efforts and include the coping processes of objectivity, intellectuality, and logical analysis. (2) The attention focusing function of selective awareness includes the coping process of concentration. (3) The affective impulse regulation functions use such coping processes as sublimation and suppression to attempt to accommodate feelings and emotions that are not expressed directly. (4) The reflexive interceptive functions reflect the person's engagement with his/her own thoughts, feelings, and intuitions and include the coping processes of tolerance of ambiguity and regression in the service of the ego. Each of the coping processes has a defensive counterpart.

After summarizing the results of more than 40 studies that have been conducted using Haan's (1977) perspective, a general conclusion can be drawn, that coping processes are positively associated with intellectual functioning and development, adult Socioeconomic status and social mobility, intellectual and affective enjoyment of test situations, perceived internal control, and moral development. Coping processes also tend to be negatively related to obesity, problem drinking and acute adverse drug reactions. The direction of these relationship is typically reversed for defensive processes. Haans

process of assessment lacks in fragmentation as he has not included it because he works mostly with normal subjects, who do not fragment frequently.

Lazarus (1979) pointed out that coping responses may affect physiological reactivity and there by influence bodily resistance to illness. Coping styles may also involve habits that are directly injurious to health, such as excessive smoking or drinking in response to the death of significant other or maintaining high level of physical activity after experiencing myocardial infraction.

In an attempt to predict the course of recovery following myocardial infraction(MI), Hackett and Cassem (1974) constructed an interview based denial scale to explore an individuals response to having a heart attack. Hackett and Cassem suggested that denial (Cognitive avoidance) is the most common ego defense used by MI patients, while they are in the ICU and that it is positively related to the likelihood of survival in the immediate post - MI period. Other studies have shown that denying patients report less mood disturbance during the rehabilitation process and that blue-collar patients are more likely than white-collar patients to use denial in responding to heart attack (Hackett & Cassem, 1976).

Interested in the unique problems of cancer patients experience, Weisman(1979) described from psychological phases related to the stage, treatment and progression of cancer : existential plight, accommodation and mitigation, recurrence and relapse, and deterioration and decline. Weisman and Worden (1976-77) developed an interview rating procedure to obtain information about the coping strategies used by cancer patients throughout the four stages.

In studying the existential phase, Weisman and Worden found that less disturbed patients were likely to confront the problem by taking firm action, accept but redefine the situation, and seek medical direction and comply with treatment. More disturbed patients tended to use withdrawal and disengagement from others, externalization or projection of blame (cognitive avoidance), tension reduction through excessive use of alcohol or drugs, and passive acceptance or submission. Seeking information, talking with others, and thinking about other things (distraction) had equivocal relationships with problem

resolution and emotional functioning. Weisman and Worden explained the findings by noting that these strategies can be used either for coping or for defense. For instance, information seeking may be employed either to assist in decision making and problem resolution or to continue to question the facts, to search interminably for treatment alternatives, and to postpone selecting an acceptable course of action.

It has been assumed by some investigators (Menninger, 1963; Vaillant, 1977). that individuals have relatively stable preferences for particular coping strategies to handle different life situations.

Gleser and Ihilevich (1969) constructed the Defense Mechanism Inventory (DMI) to tap the relative intensity of usage of five groups of defenses. Namely, projection, intellectualization, reversal, turning against object, and turning against self (hostility - in). The first three categories fall under the category of appraisal focused coping categorized by Moos et al; turning against object represents problem focused; and turning against self, as mainly emotion focused.

The DMI subscales are predictably related to standard personality scales such as the Minnesota Multiphasic Personality Inventory (MMPI) and the Sixteen Personality Factors (16 PF). Persons who turn their hostility inward are likely to be higher on anxiety, guilt, and feminine sexual identity, to show greater decreases in estimates of their own ability after a failure experience, and to fail to take appropriate precautions against unwanted pregnancies (Cramer & Carter, 1978; Gleser & Sacks, 1973; Kendall, Finch, & Montgomery, 1978; Rader, Bekker, Brown & Richart, 1978).

The defense mechanism of intellectualization and reversal are associated with less anxiety, depression and psychopathology among alcohol abusers. In addition, alcoholic patients who prefer reversal defenses have been shown to be more likely to complete a long - term treatment program and less likely to be re-hospitalized after treatment (Rohsenow, Erickson, & O'Leary, 1978).

There is some evidence that individuals who are more consistent across the ten DMI situations show more predictable behaviour in an experimental setting (Gleser & Sacks, 1973)

There are theorist who believe that many (if not all) types of coping responses can be directed either at the problem or at the emotion. For instance Roskies and Lazarus (1981) noted that type A individuals may engage in problems solving action in order to reduce their anxiety, while Weisman (1979) pointed out that information seeking can be used for either instrumental or palliative ends. The fact that the problem often is an emotion (Such as loneliness after a recent separation) exemplifies the complexity of the issues involved in classification. A possible alternative to a classification system is a procedure to rate coping responses on a continuum of common dimensions (Such as the degree to which they are problem or emotion focused).

Fontana and his colleagues (Fontana, Hughes, Marcus, & Dowds 1979) found some overlap between the appraisal of events on the dimensions of desirability, adjustment, anticipation, and control. Undesirable events that required considerable adjustment tended to be those whose occurrence could not be anticipated; however the dimension of controllability was relatively separate from the other three aspects of cognitive appraisal. These findings highlight the need for clarification of both the dimensions of appraisal and coping processes and their interrelations.

Although there is evidence of considerable long - term stability in preferred ego processes and cognitive styles (Haan, 1977; Witkin & Goodenough, 1977), the degree of cross situational consistency in the use of specific domains of coping responses remains to be determined. Some investigators have tried to address this issue by assessing the same coping responses in different situations. For instance Sidle, Moos, Adams, and Cady (1969) examined individual and situational consistency in coping strategies try obtaining information about the use of 10 coping responses in each of three problem - story situations. They found some individual consistency (Respondents tended to use preferred coping responses irrespective of the problem situation), as well as some situational variability (the three stories elicited difference coping responses). The finding

that person - situation interactions accounted for as much of the variance in two of the DMI measures (Turning against object and reversal) as did stable individual differences led Richert and Kettering (1978) to Conclude that coping styles such as defensiveness should not necessarily be conceptualized as global traits. Folkman and Lazarus(1980) developed an inventory - 'Ways of Coping', composed of items that can be classified into problem-focused and emotion-focused categories. One hundred respondents were interviewed several times over a nine-month period and asked to respond to the inventory in terms of how they have coped with intervening life stressors. Both problem-focused and emotion-focused responses were used in nearly every coping episode. There was some stability in the use of specific coping responses for a person across episodes, but in general individuals were characterized more by variability than by stability in coping patterns. With respect to the context of the events, work situations were associated with more problem-focused coping and health situations with more emotion-focused coping.

In examining the consistency of individual appraisal across stressor, Dohrenwend and Martin (1979) found only minor variability in the degree to which different individuals anticipated and felt they controlled life events. Their conclusion that appraisal is more situational than personally determined (at least it was among their normal community respondents) has been further supported by evidence that appraised desirability is influenced primarily by the situation; that is most persons agree on which events are positive and which events are negative (Fontana et. al. 1979). In line with this conceptual framework, this body of research suggests that persons are likely to vary across situations in their appraisal and coping processes and that both personal and environmental factors need to be considered in examining the selection and use of specific coping responses. Moos & Schaefer (1993) developed the two forms of coping response inventory. It assesses eight types of coping responses that reflect focus and method of coping domains. The inventory considers the orientation or focus of coping and divides coping responses into approach and avoidance responses. Each of the two domains of coping responses is divided into two categories that reflect cognitive or behavioural coping methods.

The CRI (Coping Response Inventory) has two forms - one for adults (CRI-A) and one for youth(CRI-Y). The CRI-A may be used with healthy adults, psychiatric patients, and medical patients; it is suitable for assessing individuals from age 18. The CRI-Y, which is appropriate for youth between 12 and 18, may be used with healthy youth . Youth who are psychiatric or medical patients, and youth who have behaviour problem or conduct disorders. Both forms of the CRI may be administered as a self-report inventory, or structured interview.

Both the Adult and Youth Forms of the CRI have adequate Psychometric characteristics (Moos,1993a , 1993b). The Adult Form scales have moderate to high internal consistency (average Alpha = .65 for women and .67 for men), are moderately inter correlated (average r = .25 and .29 for women and men, respectively), and are moderately stable over 1 year (average r = .43 and .45 for women and men, respectively). The scales are only minimally associated with such socio-demographic, characteristics as age, education, marital status, and ethnic background (average r = about .15).

The Youth Form scales also have moderate to high internal consistency (Average alpha = .69 for girls and .68 for boys), are moderately inter correlated (average r = .31 and .37 for girls and boys, respectively) and are moderately stable over 12 - 15 months interval (average r = - .34 and .29 for girls and boys, respectively), The scales are only minimally associated with such sociodemographic characteristic age, education, ethnicity, and family size and socioeconomic status (Average r = about .20).

CRI has been successfully used in different areas of adjustment. Brinnan & Moos, (1991); Moos, Brinnan, et. al. (1990) found in general, distressed or dysfunctional adults and youth tend to employ avoidance coping strategies more heavily than normal individuals do. Compared with non problem - drinking adults, for example, problem - drinking adults are likely to rely on cognitive avoidance, resigned acceptance and emotional discharge strategies. Similarly, individuals who have had longstanding problems with alcohol rely more on resigned acceptance and emotional discharge.

Moos, Finney, & Cronkile, (1990), conducted a long term study of a group of patients in residential treatment for alcohol abuse, Patients coping responses to an

important life stressor were assessed at two years and ten years after treatment, as were the coping responses of matched normal drinking case controls. Patients who were considered relapsed at two years relied more heavily in avoidance coping than remitted patients or case controls did. The three groups also did not differ in cognitive approach or behavioural approach coping. The three groups also did not differ in their coping responses at the ten years follow up. These findings reflect an increasing "normalization" of coping responses among alcoholic patients who are stably remitted and who survive over the long term. In another study by Moos, (1991), conceptual and similar findings hold for depressed patients. Compared with case controls, depressed patients at treatment intake relied less on problem - solving coping and move on emotional discharge coping. Unexpectedly, the patients were also more likely to seek information and support; this may reflect rumination and an inability to take direct action. At a one year follow-up, non remitted patients still relied more on emotional discharge coping and less on problem solving coping; however remitted patients did not differ from controls. Thus, depressed patients can develop or resume normative patterns of coping when their disorder remits.

Holahan & Moos, (1987); Moos, Brennam et. al. (1990), had conducted studies focused on identifying the determinants of adults coping responses. The findings show that the type and severity of a focal stressor and individual's appraisal of stressors are associated with the selection of coping responses. In addition, social resources for family, friends, finances, and work are linked with more reliance on approach and less reliance on avoidance coping. Social resources may also lead to a temporary decline in problem solving coping among individuals in an acute health crisis. Personal resources such as self confidence and an easy going disposition may reduce individuals reliance on avoidance coping.

Moos, Brinnan , et. al. (1990), discovered predictable associations between coping responses and individual adaptation among both adults and youth. Overall, individuals who rely more on avoidance coping.

Comparable findings were obtained by Moos, Finney, & Cronkite, (1990), on the relationship between coping responses and the two year and ten year outcome of

treatment for alcohol abuse. More reliance on active cognitive coping was associated with better treatment outcome; the use of avoidance coping was associated with worse outcome : Information about coping responses added substantially to the prediction of two year and ten year treatment outcome even after demographic factors and intake functioning were considered. In longitudinal analyses, we found that active cognitive coping at two years predicted less alcohol consumption and physical symptoms at ten years. Thus even though coping responses are some what situation specific, they seem to capture an aspect of stable personal tendencies that is associated with long term functioning and treatment outcome.

Y.K. Satija, G.B. Advani and S.S. Nathawat (1997) studied the relationship between coping responses in 50 depressed and 50 non - depressed patients. It was observed that the depressives were using significantly fewer problem solving and more of avoidance coping behaviour as compared to their non-depressed counterparts.

Jayanti Basu, Saugata Basu and Somnath Bhattacharyya (1997), studied 60 normal and 60 depressed subjects aged between 19 to 40 years. Each was individually administered the presumptive stressful life events scale (Singh, Kaur & Kaur, 1983), Bengali adaptation of the Ego Function Assessment Scale (Bellak, 1989) and Bengali adaptation of the Beck Depression Inventory (Beck et al. 1961). Stepwise Multiple Regression Analysis and Hierarchical Multiple Regression Analysis were conducted to find out the relative impact of 12 ego functions on the amount of experienced depression. Results indicated that though the amount of total presumptive stress had inconsequential effect on depression, the combination of the total presumptive stress and some of the ego function played a significant role in determining the over all psychopathology of depression.

Suls & Mullen, (1981), have stressed on the individuals evaluation of life events as a critical factor in the stressfulness of that event, such investigations suggest that it is not the happening of life event per se, but rather the person's perception of the event which precipitates illness. In other words only those events that the person perceives to be undesirable and uncontrollable are linked with illness.

Kobasa (1979,1982) argued that the subgroup of individuals who experience life events without becoming ill can be differentiated from others by a set of attitudes or traits. This stress resistant personality style which she labels "hardiness" includes the attributes of commitments, positive response to challenge and an internal locus of control. Subsequent researches supported this observation. (Kobasa, et al. 1982).

2.3. STUDIES ON BIOFEEDBACK :

Use of Biofeedback for different purposes has been the latest fascination in the field of Biomedical Sciences & Psychology. There are innumerable studies conducted on Biofeedback. We are going to review few studies in which Biofeedback has been used to treat Hypertension and a few studies on use of EEG Biofeedback.

2.3.1. BIOFEEDBACK OF BLOOD PRESSURE :

Shapiro and his colleagues at Harvard developed a procedure for giving direct feedback of blood pressure on a beat by beat basis for short duration (approximately one min). The system, described in some detail by Tursky, Shapiro, & Schwartz (1972), utilizes a cuff which is automatically held near systolic or diastolic blood pressure and has come to be the "standard" apparatus in the field. It is even available commercially.

With this device, Shapiro and his Colleagues (Shapiro, Tursky, Gershon & Stern, 1969; Shapiro, Tursky & Schwartz, 1970; Shapiro, Schwartz & Tursky, 1972) have demonstrated that direct feed back of blood pressure could enable normotensive volunteers to gain some degree of control over their blood pressure. These reports led to a fairly wide spread effort to apply Biofeedback of blood pressure to the treatment of hypertension.

Miller, (1972) used Biofeedback of Blood Pressure for a systematic case study on an in and out patient by giving 26 base line sessions over a period of 6 weeks followed by 37 treatment sessions over a period of 3 months. It was found that diastolic BP decreased from 97 to 76 mmHg, and anti-hypertension medication stopped.

Benson, Shapiro Tursky, & Schwartz (1971) used Biofeedback of BP on 7 out-patients. Five to sixteen daily sessions were recorded as baseline, which came out on an average to be 11 sessions followed by on an average 22 treatment sessions. Average decrease in systolic BP was 16.5 mmHg 5 out of 7 patients showed significant response. Schwartz & Shapiro (1973) treated 7 out patients. Schwartz & Shapiro (1973) treated 7 out-patients with Relaxation instructions with Biofeedback of BP. No overall change in diastolic BP; 1 out 7 patients showed significant response.

Goldman, Kleinman, Snow, Bidus, & Koral, (1975) used Biofeedback of BP on seven out-patients without any baseline evaluation, patients were given nine treatment sessions. Average decrease in systolic BP was 6 mmHg and in diastolic BP it was 15 mmHg.

Kristt & Engel (1975), treated five in-patients with Biofeedback of BP, home monitoring of BP and home practice. Baseline study was done over five weeks with four measures per day. Base line records were available of four patients. Treatment was given for three weeks. Average decrease in systolic BP was 18 mmHg; in diastolic BP 7.5 mmHg. All five patients showed ability to reduce BP at home. After 2 - 3 months follow-up three out of four patient maintained gains.

Elder, Ruiz, Deabler, & Dillenkoffer (1973) conducted study on 18 inpatients by dividing them into 3 conditions. Namely one experimental and 2 control conditions 6 patients in each condition. Under first condition treatment modality was Biofeedback of BP and social reinforcement for lowering BP was used. In the second condition only Biofeedback of BP was used. For the 3rd condition only BP was monitored. There was one baseline session and 7 treatment sessions in 4 days. Reduction in systolic BP was same for all the three groups. Reduction in diastolic BP was 20% of base line in the first condition and 7 % in the 2nd condition 4 out of 6 patients in the first condition showed significant response. After one week differential dropout rate in Experimental groups apparently maintained gains.

Elder & Eustis, (1975) treated 22 out patients with Biofeedback of BP There was one baseline session and 20 treatment sessions in 12 & 82 days. Average decrease in

systolic BP was 7.8 mmHg; in diastolic BP, 6.5 mmHg. 9 out of 22 patients showed significant decrease. After two months on 4 patients there was no maintenance of gains.

Blanchard, Young, & Haynes (1975) conducted 4 single - subject experiments on 4 out patients. Using Biofeedback of BP with 4 base line sessions and 5 to 13 treatment sessions. All 4 patients showed decreases in BP during feedback training, ranging from 9 - 51 mmHg (average decrease 26 mmHg).

Shoemaker & Tasto, (1975) conducted a study on 15 out patients with controlled group out come. He divided the subjects in to 3 groups - namely two experimental and one control. One of the experimental group was treated with Biofeedback of BP and the other one was treated with progressive relaxation. Control group was only monitored. There were 3 baseline sessions followed by 6 sessions of 80 min each over a period of 2 weeks. Average change in systolic BP was 7 mmHg in the group provided with relaxation training, 0 mmHg in Biofeedback training group and 2 mmHg in the control group. Average change in diastolic BP in relaxation group was 8 mmHg, in Biofeedback group it was 1 mmHg and in control group it was 0 mmHg 4 out of 5 relaxation group improved.

2.3.2. BIOFEEDBACK OF OTHER RESPONSES TO REDUCE BP

In addition to the studies of direct feedback of blood pressure, there have been several other attempts to treat hypertension through the use of Biofeedback training with other responses.

The work of Patel et. al. (1973), is one of the most outstanding sets of studies in the whole field of clinical Biofeedback. She has reported 3 separate studies on groups of 17 to 20 patients in each. All the patients were clearly hypertensive and the vast majority were on anti-hypertensive medications. Treatment in the first two studies was a combination of Biofeedback of galvanic Skin responses (GSR) and a set of *Yoga* exercises which involve passive relaxation training and meditation. In the first study (Patel, 1973) systolic blood pressure was reduced by 25 mmHg and diastolic by 14 mmHg on the average; with 16 to 20 patients showing a significant degree of improvement. In the second group (Patel, 1975), a control group outcome study, similar

levels of change in blood pressure were found in the experimental subjects. More importantly, at a 12 months follow-up the blood pressure of the experimental subjects was maintained at its lower end of treatment level.

In the third study (Patel & North, 1975), more rigorous controls were imposed and treatment was shortened from 36 sessions over 3 months to 12 sessions over 6 weeks. All blood pressure measurements in this last study were made by a "Blind examiner". Decreases in blood pressure were again comparable to the levels seen before. An interesting feature of this study was that 4 months after the completion of a treatment the subjects in the control condition were given a similar treatment and also showed significant decreases in blood pressure, 28 mmHg systolic and 16 mmHg mercury diastolic. This use of half Cross-over design, in which the untreated controls are now treated and show a response similar to the treated subjects, is a very powerful demonstration of effects because it answers the possibility that the treatment effect was specific to the experimental group even with random assignment of subjects. The replication of effects on the controls rules out this possibility. Follow-up data on these subjects at 4 months and 7 months showed a maintenance of the gain obtained during treatment. Personal communication from Patel reported by Edward B. Blanchard indicates that the Biofeedback is a minor part of treatment and that the passive relaxation training and meditation are probably the more important aspects. She also introduces regular practice of this relaxation and seeks to teach her patients other ways of adapting a more relaxed attitude towards life, especially in her last study (Patel & North, 1975).

The studies by Love and his associates (Moeller & Love, 1974; Love, Montgomery & Moeller, 1974) while not as elegant as those of Patel, do seem to show that a combination of EMG Biofeedback training and various other relaxation training procedures leads to moderate reductions in blood pressure. One interesting finding in the study of love et al. (1974) was that at the eight months follow-up there had been further decreases in blood pressure in the treated subjects who continued to regularly practice their relaxation and no relapses had occurred among the 79 percent of subjects still available.

With regard to the other studies, it would appear that relaxation training, either of an active, Jacobsonian, progressive relaxation nature or a passive, meditative form, combined with frontalis EMG Biofeedback can lead to some improvement in hypertensive patients (a reduction in blood pressure of about 10 to 15 mmHg). Furthermore, another work by Benson and his associates (Benson, 1975; Benson, Rosner, & Marzetta, 1973; Benson, Rosner, Marzetta, & Klemchuck, 1974 a, 1974 b) has shown that "Regular elicitation of the relaxation response", or a passive meditative form of relaxation training alone, can lead to significant reductions in the stored pressure of hypertensive patients.

Interestingly, regardless of the method of psychological treatment , a consistent finding seems to be that the relaxation training or Biofeedback training must be regularly practiced (on almost a daily basis) for the benefits of treatment to be maintained. Discontinuation of practice at the end of treatment leads to a gradual return to the elevated level of blood pressure. Thus, psychological treatment of hypertension has some of the same problems present in pharmacological treatment, that is the treatment must be maintained over the rest of the patients life in order to give him the benefic of the reduced blood pressure. Similar compliance problems may be found in the psychological approach as are found in the pharmacological approach.

2.4. STUDIES ON CLINICAL APPLICATION OF EEG ALPHA FEEDBACK TRAINING :

The general rational, given by Kuhlman & Kaplan in electroencephalographic (EEG) feedback training as a therapy is, first that there is an orderly relationship between some aspects of brain electrical activity and clinical condition or associated behavioural state. Secondly feedback training is effective in the modification or control of that EEG pattern. If these two premises are true, it is logical to investigate whether feedback training can be used to modify the EEG in Such a way as to change a clinical condition. Several studies (including the present study) have been conducted following this general logic.

Since the original recording of alpha activity from the human scalp in 1929, it has repeatedly been shown that alpha is maximal in a quiet, relaxed non drowsy state when the eyes are closed, and that it is attenuated or blocked when the eyes are open. Alpha is also attenuated by mental activity such as arithmetic calculations and visual imagery. Alpha feedback training was first reported by Kamiya (1962,1969), and was later investigated by Nowlis and Kamiya(1970) and Brown (1970). These investigations were directed towards understanding subjective experiences associated with EEG activity. When subjects were given Alpha feedback and instructed to increase it they reported feelings of relaxed alertness, passive attention, and mental relaxation. These subjective reports subsequently came to be termed the "alpha state". The reports were similar to those associated with autogenic training (Luthe, 1963) and meditation. Studies in experienced *Yoga* meditators reported predominant alpha activity during meditation and no alpha blocking even when the hands were maintained in ice water for extended period (Anand, Chhina, & Singh, 1961). Zen meditators also showed enhanced alpha activity (Kasamatsu & Hirai, 1966).

In the early studies of subjective experience associated with alpha feedback training, it was assumed that the "alpha experience " arose as a consequence of enhancing alpha by training. The rational behind the clinical application of alpha enhancement training is that the subjective experiences of mental relaxation associated with increased alpha would be incompatible with the experience of pain, anxiety, depression and other clinical problems with psychogenic components.

Paskewitz, Lynch, Orne, and Costello(1970) have argued that subjects enhance alpha activity with feedback training by the process of "disinhibition" (ignoring stimuli which normally inhibit alpha) rather than by learning to increase alpha above maximal pre-training levels. Parkewitz and orne (1973) found it impossible for subjects to increase alpha above the level exhibited simply by closing the eyes in the dark. Although not explicitly stated, the implication of this finding was that such training had no unique physiological significance. However, the rationale of clinical applications of alpha feedback training has not involved an assumption of physiological benefit from the

occurrence of synchronous neural activity in occipital regions. Rather, the subjective experience associated with training is considered to be of main importance.

One of the first published reports of the clinical use of alpha feedback training was that of Gannon and Sternbach(1971), working with a patient with vascular headache pain. Across 67 sessions of alpha feedback there was no effect on the duration and frequency of headaches which could be separated from spontaneous variation. Although was no alleviation of pain during feedback, the patient did report that by producing an "alpha state" there was delayed on set of pain outside the laboratory in situations which normally precipitated headache occurrence.

Andreychuck and Skriver (1975) studied the effects of feedback training on migraine headache in 28 patients. Three groups received either alpha enhancement training, feedback training for hand warming or self-hypnosis training for 10 weekly sessions. A positive expectancy of benefit from treatment was encouraged for all patients. All three groups showed significant reductions in migraine headache during the last 5 weeks of training compared with 6 weeks of baseline data before training. However, there were no differences in improvement among the three treatment groups. Across groups, subjects scoring high on the Hypnotic Induction profile tended to show greater improvement in a headache (71 % reduction) than subjects scoring lower (41% reduction) The greater responses of highly suggestible subjects regardless of treatment supported a placebo explanation for the results.

Wargin and Fahrion (1977) reported improvement when "Synchronized alpha training" was added to a temperature (hand warming) training program to reduce headaches. One patient with tension and migraine headaches, anxiety, depression and obsessive thought disturbances showed minor improvement across 129 weeks of hand-temperature training, relaxation exercises autogenic phrases and analgesic medication. When eight sessions of training to simultaneously enhance alpha recorded from both hemispheres was then given (by a different therapist), there was a greater reduction in headaches, obsessive thoughts, and amount of drugs used. The authors suggested that

alpha feedback training combined with temperature or EMG feedback training may be more effective than these procedures alone.

Melzack and Perry (1975) compared the effects of alpha feedback training, hypnotic training, and a combination of these two procedures in the treatment of chronic pain of known organic origin in three groups of patients (total number = 24). All groups received positive placebo instructions to the effect that the procedures could reduce pain. The combination of hypnotic training and alpha training led to a 33 % or greater pain reduction in 58% of the patients. However, no significant change could be demonstrated with either of the procedures alone. Alpha training alone had the least effect on pain. Pain was assessed during the training sessions, although 10 patients reported a carryover effect from 15 minutes to 4 hours following the sessions. The authors concluded that the effects were not due to increased alpha, but to "distraction, suggestion, relaxation and a sense of control. " while emphasizing placebo effects, it was suggested that "multiple approaches are more effective in treating problems with multiple determinants" such as pain.

Mills and Solyom (1974) studied 5 neurotic patients with obsessive thought disturbances. It was thought that increased alpha activity with feedback training, if associated with a state of "mental relaxation" would be incompatible with obsessive ruminations. Reports of the frequency of obsessive thoughts were obtained during 7-20 sessions of feedback for alpha activity. Four subjects reported no ruminations, and one reported only a few during the feedback. Since no control procedures were employed, it was not know if simply listening to a noncontingent tone would be similarly incompatible with obsessive thoughts. However, since 3 of the 5 subjects showed no change in alpha, an increase in the quality of alpha was clearly unnecessary for therapeutic benefit.

Weber and Fehmi (1974) reported 10 cases with various neurotic disturbances who were given 20 sessions to enhance alpha activity recorded separately or simultaneously from five scalp locations. Therapeutic response in 6 patients was considered "good". The rationale for this approach was based on reported similarities between subjective status associated with alpha feedback training and those associated with therapeutic effects of autogenic training. It was suggested that the value of EEG

feedback training over autogenic training would be to "Simplify and Shorten the training".

Glueck and Stroebel (1975) Compared the effects of alpha feedback (26 patients), Transcendental Meditation (54 patients), and autogenic training (12 patients) as general relaxation procedures for lowering tension in psychiatric inpatients. All patients given autogenic training asked to withdraw from the exercises after 4 weeks. Although patients learned discriminative control over alpha density with 20 one-hour sessions of alpha feedback, this experience did not prove to be an effective means for improving these patients ability to relax, nor did it have a significant impact on their anxiety symptoms. On the other hand, patients who completed 8 weeks of Transcendental Meditation showed significantly greater improvement than a matched comparison group of untrained patients.

EEG feedback training in nine adolescent students with learning disabilities were reported by Murphy, Darwin, and Murphy (1977). With alpha training (feedback for dominant occipital EEG frequency lower than daily baseline) students showed improvement in arithmetic achievement tests compared to students given feedback training to enhance higher frequency ("beta") activity and no treatment controls. The difference in math grades was also significant between subjects given alpha feedback and 31 no feedback control subjects, although there was not a significant difference between alpha and beta feedback subjects. It was suggested that alpha training produced "reductions in anxiety, leading to better attention and concentration to aid arithmetic."

Benjamins (1976) reported that alpha feedback training and Jacobsonian progressive relaxation facilitated systematic desensitization in student volunteer subjects assessed as being fearful of snakes. Following 3 training sessions, 50 snake phobics were given 4 sessions in which a hierarchy of aversive scenes was presented in group and the "mental relaxation" alpha feedback group showed significant reduction in snake avoidance behaviour from pre-training levels compared to controls. However the alpha feedback group did show a greater decrease in trait anxiety than other groups.

Subsequently, Benjamins (1978) reported no significant difference in training effects between eyes-open and eyes-closed conditions.

In a report, Hardt and Kamiya (1978) provided 7 sessions of alpha feedback training to 16 student volunteer subjects. In each session, both enhancement and suppression training were given. For those in whom trait anxiety was reduced from pre training levels, the decreases correlated with increases in alpha activity. State anxiety decreased following enhancement and increased following suppression, but only in subjects with high trait anxiety. Although no EMG control group was run, a lack of change in forehead EMG levels suggested to the authors that alpha feedback may be more effective than EMG feedback training in treating high anxiety.

The therapeutic effectiveness of EEG plus EMG feedback training in the de-toxofication of methadone addicts has been evaluated in a thorough study by Cohen et. al. (1977). In an initial study, the daily dose of methadone was reduced to zero over a two-week period in 21 patients. During this period and the following week, 14 training sessions were provided for concomitant enhancement of alpha amplitude and reduction of forehead EMG activity, to facilitate detoxification by reduction of withdrawal symptoms. Detoxification, as verified by urine analysis was successful in 67% of the subjects and a large reduction in withdrawal symptoms were reported. Of these 14 successes however, there was no conclusive evidence of a learning effect on EMG activity in 8, and in no subject there was evidence of a learned increase in alpha activity. It was noted that as the study progressed, both the patient population and the experimenters developed positive expectations of the treatment, compared to previous attempts in detoxification.

To evaluate the influence of expectancy and nonspecific factors in the training effects, Cohen et. al. then compared non contingent (taped) feedback signals versus contingent feedback for EEG/EMG activity as a second group of 29 addicts. A clever double blind procedure was developed such that both contingent and subjects were treated identically in all respects other than the contingency, and such that the experimenters were unaware of the form of feedback being given. At the end of the experiment, it was determined that 14 subjects received contingent feedback and 15 non

contingent. Analysis was adequate to show that the integrity of the double blind procedure was maintained. In comparison to the uncontrolled study reviewed above, detoxification was achieved in only 34% of the subjects. As in the previous study, there was no evidence for a training effect on alpha activity. Only the subjects who received contingent feedback and who succeeded at detoxification showed evidence of a learned reduction in EMG activity. However, in terms of therapeutic outcome, there was no difference in the number of subjects detoxified between the contingent "active treatment" group and the non contingent control group.

The study of Cohen et. al. illustrate that placebo and nonspecific factors can account for a large component of therapeutic effectiveness. Few authors correctly pointed out that these results should not be generalized to other clinical applications of feedback training. However, the influence of these effects in studies involving alpha feedback thus far seems rather consistent.

In another study by Plotkin and Cohen (1976) investigating the extent to which occipital alpha during training is related to the subjective phenomena of the "alpha state" in normal subjects, it was concluded that "the three most definitive attributes of the alpha experience" (body relaxation, mental relaxation and tranquility) are not induced by *alpha per se.* Thus it appears that the major contribution that alpha feedback makes to the attainment of meditation like experiences are to supply a setting which is conducive to such states. It can also be concluded from the clinical studies reviewed that whatever therapeutic value the "alpha state" may have, it does not necessarily include the alpha rhythms.

2.5 STUDIES CONDUCTED ON USE OF YOGIC TECHNIQUES FOR IMPROVING MENTAL & PHYSICAL HEALTH

Yoga is not a therapy in the accepted sense of the term. *Yoga* as a process of education of the total personality, helps in steadying the mind and since an unsteady mind is the source of disease, it happens that the practice of *Yoga* helps in management of certain diseases. With the interest in psychosomatic medicine, the relevance of *Yoga* as a therapy is gaining momentum. There are a number of studies conducted on use of yogic

techniques for improving mental and physical health. Some of them that are relevant to the present study are reported here.

A study was conducted at the Department of Cardiology at Bombay Hospital by one of India's most eminent cardiologists, Brigadier K.K. Datey and it first appeared in the journal 'Angiology' in 1976. He trained 86 hypertensive men and women, average age 40 years, in yogic relaxation an *Shavasana.* Their average blood pressure was 186/115 mmHg. The patients were divided into 3 groups. Group One contained patients who had not received ant anti-hypertensive drugs before hand. Group Two consisted of patients who had been taking anti-hypertensive drugs for at least two years with adequate control of blood pressure. Group Three consisted of patients whose blood pressure remained inadequately controlled in spite of taking anti-hypertensive drugs. All patients were thoroughly trained in yogic relaxation at the cardiac clinic and asked to continue to practice *Shavasana* once or twice a day at home.

After three months, their clinical condition and blood pressure was reassessed. Significant results were recorded in all the three groups. The majority of patients reported a general feeling of well being with marked improvement in symptoms like headache, insomnia and nervousness. In group One, the average blood pressure dropped from 134 to 107 mmHg a fall of 27 mmHg. In group Two average blood pressure fell from 102 to 100 mmHg, but drug requirements were simultaneously reduced to 32% of the original dosage in 60% of the patients. In group Three, average blood pressure dropped from 120 mmHg to 110 mmHg, while the drug intake was simultaneously reduced to 29% of the original levels in 38% of patients. Furthermore patients who failed to respond were generally those who were irregular in attendance and daily practice.

Several other studies produced comparable results. A study by Brauer P. Horlick L. et. al. (`1979) conducted at Stanford University school of medicine, California, used 29 essential hypertensives who had been receiving medications for at least six months previously. They were divided into three groups. Group one received relaxation training directly from the instructor for ten weeks. Group two practiced relaxation training at home with the aid of audio cassette recording. Group three underwent psychotherapy

without yogic relaxation training. At the six month follow-up the therapist-conducted relaxation group fared best of all, revealing an average decrease of 7.8 mmHg in systolic blood pressure and 9.7 mmHg in diastolic blood pressure. Studies conducted by Patel C also reveal similar results.

Hypertension complicated by metabolic disturbances such as elevated blood lipid (fat) and cholesterol levels (hyper cholesterolemia), diabetes and thrombolism are complex areas of medical management, where various metabolic and degenerative processes are precipitating or complicating a simple finding of elevated blood pressure. Yogic management also becomes more complicated.

However, cholesterol levels do not depend solely upon dietary fat intake. They have been found to be elevated in stressful conditions including public speaking, race car driving and examination (Patel, C. 1977). As per Rosenman's finding (1977) cholesterol levels have also been found to be elevated in the serum of those who possess the typical coronary prone (type A) behaviour pattern of excessive aggression, competitiveness and self assertion. Studies by Cooper, T.J. and Aygen M.T. (1979) at University of Tel Aviv have shown that yogic relaxation practices (in this case transcendental meditation) lower the levels of cholesterol in the blood of hyper-cholesterolimic patients. Research by Udupa K.N. et. al. At Banaras Hindu University (1975) have found that serum lipid levels are reduced in normal subjects taking a normal diet, following training in yogic asans.

Asans also remove emotional and mental tension. The intensity of emotional status associated with our internal and external experience is reduced. The motor reactions associated with these states becomes far less violent. The cognitive (sensory awareness) and motor functions of the brain are soothed and integrated, increasing functional efficiency.

T. Pasek, Professor Romanowski, et. al. (1969) of Poland, and Vinekar (1963) of India, have conducted research and experiments which point to increased input to the brain from the various sensory receptors during *Asana* practice. This occurs because of increased pressure on particular muscle and organ groups, while the muscles remain relaxed. At the same time there is increased blood flow and oxygen to the brain, liver and

other organs combined with excitation of certain centers within the brain through mental concentration. This increases tissue health through a massaging effect on the muscles and external organs affected; stimulation of brain registering relaxation and removal of tension; and increase of *Prana* in the pranic body, all adding up to increasing health. After some time, there is the development of new pattern in the lower centers of the brain, harmoniously integrated with the higher cortex, and conducive to good health. This is the important difference between *Yoga* and ordinary exercise.

Pasek, and Romanowski, used physiological, biological and psychological methods in their tests. Their findings confirm that with systematic use of asans, better autonomic patterns and greater control and coordination evolve in the lower brain. This allows better integration of all the brain functions and emotional equilibrium. Control is established to an extent not found in conventional physical cultures.

To test the beneficial impact of the hypo-metabolic state induced by *Asana* and *Pranayama* (reduced cell work and cell fatigue) and the resultant mental quietude in the treatment of hypertension, K.S.Gopal et. al. (1975) conducted an experiment. Two groups of subjects were taken. One group consisted of people who have practiced asans regularly for six months and the other who were untrained. The subjects were connected to an EEG recorder, and recordings were also made to peripheral blood flow and respiration. Subjects in both the groups were made to perform a group of asans.

It was found that in the untrained people, the degree of muscle relaxation was less that the trained group, though both groups experienced maximum relaxation in *Shavasana*. Also in *Shavasana* the heart and respiratory rates were faster than the trained group and peripheral blood flow was lesser. This indicates that the regular practice of asans increases the individual's ability to relax and lower blood pressure by reducing the peripheral resistance. There was also increased alpha rhythm from the brain, correlating with relaxation of the nervous system.

In all the *Asanas*, the trained group needed less oxygen and gave out less carbon dioxide than the untrained group, showing that there was less effort involved and less metabolic activity. This indicates a deeper state of rest and relaxation. R.Wallace and H.

Benson (1972) have reported that there is a reduction of the sympathetic nervous stimulation in all trained meditators, resulting in decreased peripheral resistance and thus, increased peripheral 'blood flow'. This agrees with Gopal's work.

Gopal has reported on *Shavasana* that: "The electrical activity, heart rate and respiratory rate are minimal, and that peripheral blood flow is almost maximal". This represents a completely relaxed state of body and mind, and as such is recommended for the treatment of hypertension.

Pranayama or yogic breath control has various beneficial effects:

- The mind is relaxed, decreasing sympathetic arousal
- The Oxygen level of the blood increases and the efficiency of oxygen utilization by the tissues is maximized leading to deeper relaxation and more energy.
- The carbon in the system slowly increases and this has the effect of strengthening the nervous system leading to better overall health.

Hence *Pranayama* is not just a breathing exercise. Through *Pranayama* one can influence the basic cellular metabolism and the structure of nervous system, and in so doing, increase or decreases the energy until it is balanced. Abdominal or 'Yogic' breathing has been tested by Dr. Motoyama (1976), Director of the International association for religion and Parapsychology in Japan. He showed that contraction and relaxation of abdominal muscles heightens mental and physical vitality. The plethsymograph of subjects practicing deep abdominal breathing in an erect sitting position indicates an improvement in overall blood circulation.

EEG tracings of brainwaves during abdominal breathing show an increase in alpha waves, indicating deep relaxation of nervous system in this practice.

Motoyama states: "*Pranayama* is also seemingly able to hinder the occurrence of angina pectoris". Certain hospitals have been recommending their patients, particularly with angina pectoris, to begin abdominal breathing, when they feel an attack coming on. The reports are that this practice has been successful and that it is being continued.

Yogic techniques play a vital role in the treatment of hypertension. Short term suppression of symptoms is possible through medicines. Through *Yoga* it can be removed gradually with long term effect. Much evidence exists that *Yoga* can be utilized in the treatment of hypertension as a means gradually to reduce and then eliminate the use of drugs.

The Patanjali *Yoga* Institute (Hyderabad, India) 1972 tested a series of asans and *Pranayamas* used by a group of patients with essential hypertension. Almost all patients had been on anti-hypertensive medication and salt-free diet. After clinical assessment the patients commenced the *Asans* and *Pranayama* and their blood pressure were measured at intervals throughout the day before and after the practices. At the same time the drugs were tapered off, although if the patient did not respond adequately, ayurvedic medicines were used as well.

Of the cases reported, the first is that of a 50 year old man being treated with reserpine (now banned), a most powerful anti-hypertensive over a five year period. He started practicing *Yoga* and in only five days his blood pressure had reduced so much that he could not stop doing. After this there was a steady decline in blood pressure from the initial pre treatment level of 230/120 mmHg to a normal 130/80 mmHg.

Another example is that of a woman aged forty eight who was not using any drugs or salt restriction. Her initial blood pressure was 190/104 mmHg. *Yoga* alone brought it down to 140/90 mmHg. Thereafter she was given ayurvedic drugs and the pressure came down to 110/70 mmHg.

Dr. K.K.Datey et. al. (1969) at K.E.M. Hospital, Bombay, India have used a combination of *Shavasana* and abdominal breathing in treating hypertension. Datey states "The anti-hypertensive drugs available so far are by no means ideal, and have many disadvantages". Any other method for reducing blood pressure, therefore, is most welcome. In this connection, we present a new approach -- management of hypertension with *Shavasana* -- a yogic exercise.

Most of Datey's patients have been under observation for two years while there drug therapy was stabilized. Any attempts at reducing the drug dosage had led to an increase in blood pressure. Most of the patients also had one or more of the following symptoms: giddiness, headache, chest pain (a sign of heart disease), palpitations, breathlessness on exertion, insomnia, irritability and nervousness.

They were then taught *Shavasana*. This yogic technique is fully explained in the practice section and involves lying on the back and relaxing the whole body whilst concentrating on abdominal breathing. The whole exercise takes about thirty minutes and its technique is quite simple. Actually the ashrams inspired by Swami Satyanand Saraswati teach *Yoga Nidra* which is a similar but more powerful technique.

Dr. Datey;s experiment showed significant reduction in drug dosage and blood pressure in more than half the patients. Of the other half, those who had the evidence of hardening of arteries showed no response, demonstrating the importance of early treatment before the vicious circle has cemented. A significant proportion of the remainder had not done the exercise properly. When they were finally convinced of the necessity of correctness and regularity, they also improved.

The overall majority of patients improved in symptoms. Headache, nervousness, giddiness, irritability and sleeplessness (insomnia) had disappeared in almost all. The other symptoms were lessened and most of the patients felt a general sense of well being after performing *Shavasana*.

Dr. Datey stated: "The exercise is easy to perform, has no side effects and needs no equipment". There was symptomatic relief and a sense of well being in the vast majority of patients. This therapy opens up a new avenue for the treatment of hypertension.

2.6 OTHER RELATED STUDIES

There are several studies conducted with similar techniques for different types of functional problems. It is not possible to cover all of them. Hence a few selected such studies are presented here.

Blumenthal et. al. (1997) conducted studies on stress management and exercise training in cardiac patients with myocardial ishemia. This study examined the degree to which ischmeic induced by mental stress may be modified through exercise or stress management. Patients (N-107) with coronary artery disease and ishemia documented during mental stress testing ambulatory electrocardiographic monitoring were randomly assigned to a four month program of either stress management or exercise training. Patients living in geographically distant places formed nonrandom, usual medical care comparison group. Myocardial ischemia was reevaluated following treatment, and patients were contacted annually for as long as five years. On follow-up 30% of those who received routine medical care suffered at least one cardiac event (fatal or nonfatal myocardial infarction or progressive angina requiring coronary revascularization). In contrast, 21% of those who participated in four months of exercise training, and 9% of those who went through a stress management program experienced such problems. Only the stress management group was significantly different from the control group statistically. Compared to control group, stress management patients established greater reductions in Psychological distress and hostility. Stress management patients also showed less severe wall motion abnormalities during post-treatment mental testing ($p < 0.004$) compared with controls, while the patients in the exercise group showed somewhat less severe wall motion abnormality ($p=0.10$). However changes in ischemic group activity were not predictive of adverse cardiac events. Subjects in the exercise group showed lower levels of total cholesterol and LDL. The stress management group were taught cognitive therapy techniques for monitoring irrational thoughts and generating alternative explanations, were taught progressive muscle relaxation, and had at least two sessions of EMG Biofeedback training. Currently, as few as 10% of cardiac patients participate in psychological interventions as part of cardiac rehabilitation, but this study further demonstrates the efficacy of such interventions.

Nancy E. Schoenberger et. al. (1977) studied the effects of a multidimensional cognitive behavioural treatment for anxiety for public speaking was compared with the same treatment in which the relaxation training was referred to as a hypnotic induction, automatic thoughts were referred to as self suggestions, and some explicit hypnotic suggestions for improvement were added. Other than labeling the procedure as hypnotic and adding hypnotic suggestions for improvement, the two procedures were the same. Subjects (N 61, Ages 18-56) in both conditions improved more than wait-list control subjects. However, labeling the treatment as hypnotic (and adding suggestions) appeared to improve the treatment effectiveness, treatment generated greater expectancies for change than the non-hypnotic treatment, and the expectations were related to treatment outcome.

Wicks, G. (1977) a master clinician reports one of his treatments of a 12 year old boy with persistent, debilitating cough that had lasted three weeks. The cough had precluded school attendance and no organic cause could be found. Two sessions of hypnotically facilitated therapy were effectiveness through six month follow-up.

Dr. Tulpule T.H. and Dr. Tulpule A.T. (1980) conducted a study on 102 male patients of Myocardial Infarction (MI). They taught simple yogic postures and yogic type of breathing to patients who agreed to practice them regularly for one year. An equal number of MI patients, well matched for age, served as control. During yogic posture training emphasis was on relaxation of all the other groups of muscles, except those necessary for maintenance of that particular posture. Of the trial group, 96 patients were able to resume work -- previous vocation, within six months, 12 of these needed some assistance of Vasodilators or Betablockers. Three out of 102 in the trail group and 13 out of 102 in the control group died during the period ($p < 0.01$). From the study it was concluded that yogic postures and yogic type of breathing used for the study are easy to learn, need no medical supervision and can be practiced at home as a part of rehabilitation program after Myocardial Infarction. It reduces long term mortality and has a high rate of rehabilitation.

G.Shasi et. al. (1991) conducted a study with the aim of assessing the effectiveness of different relaxation techniques in management of anxiety. The study was undertaken to see:

i. How yogic relaxation technique and progressive muscular relaxation techniques compare and which method would be most effective among Indian population in reducing anxiety and changing personality, over a period of time.
ii. Would the change achieved be maintained over a period of time (3 months or more)

Forty one patients diagnosed as Anxiety Neurosis on the basis of DSM III criteria by a consultant Psychiatrist of the Psychiatry department of AIIMS, New Delhi, in the age range of 18-44 were included in the study. Twenty patients were assigned to group I and were taught the specific asans by one *Yoga* instructor. Twenty-one were assigned to group II and were taught progressive relaxation (PR) by the therapist. Both the groups were matched on age, education and occupation. Patients were asked to come regularly for one week after which they had to practice the asans/exercises at home. They were asked to report to the hospital once a week for three months when all the psychological tests were re- administered. Their subjective evaluation about the improvement in their condition was noted. Follow-up of all 20 patients in group I and 18 patients of group II were completed.

Results are based on follow-up done after 3 months and it was observed that the group undergoing *Yoga* showed improvement in 95% (i.e. 19 out of 20) cases compared to PR group for which it was 88% (16 out of 18).

- Patients from both groups showed reduction in their anxiety level. Significant differences were observed in this pre and post treatment scores ($p < 0.001$).
- *Yoga* group showed more significant decrease ($p < 0.001$) in the anxiety state than the PR group ($p < 0.01$).
- Trait Anxiety scores showed significant decline among both groups following treatment ($P < 0.001$).
- *Yoga* group patients showed positive changes in their personality compared to PR group.

On the basis of the patients subjective evaluation and the therapist's evaluation of the improvement in their condition it was seen that among the *Yoga* group 5% patients did not show any improvement. 15% showed marginal improvement, 30% moderate and in 45% good improvement was seen. Patients from PR group showed less improvement as compared to the *Yoga* group. 11.11% patients did not show any change in their condition and none reported complete recovery. Marginal improvement was seen in 16.66% while 38.88% showed good improvement. Follow-up rate among the first group was 100% (20 out of 20) and for the second group it was 85% (18 out of 21).

It was concluded that both the techniques generated positive expectations and produced decrease in a variety of self reported symptoms. Yogic techniques produced greater motivation to practice than progressive relaxation. The authors say with fair amount of certainty that although *Yoga* was advocated as a way of life and not as a therapeutic tool, following yogic way of life acts as psycho-prophylactic for those who are anxiety prone and definitely benefits others who are afflicted with the malady.

S.S.Khumar et. al. (1993) conducted a study with department of psychology, Punjab University , Patiala. The study was undertaken to examine the effectiveness of '*Shavasana*' as a therapeutic technique to alleviate depression as cases of severe depression with the help of two diagnostic tools (1) Amritsar Depressive Inventory, (2) Jung-Depression Scale. They were subjected to 30 sessions of '*Shavasana*'. A control group design with pre, mid and post assessments was used. Results revealed that 1) *Shavasana* was a useful technique even when it was used independently from other *Yogasans, Kriyas* and *Pranayama*, 2) continuation of the treatment for a longer period resulted in a significantly increased positive change in the patients.

Vihang N. Vahia et. al. (1993) concluded a study to compare the efficacy of meditation with that of imipramine and chlordiazepoxide in the treatment of Generalized Anxiety Disorders. At the end of five weeks, meditation was found as effective as pharmaco therapy in controlling symptoms of anxiety. It was superior in altering trait anxiety (TMAS Scores). Meditation is an easy to learn and cost effective therapy. It has a distinct edge over pharmacotherapy in that it does not have the associated problems of habit formation, withdrawal effects, over dosage or other undesirable effects.

Susan Joy and Krishna Prasad Shreedhar (1998), conducted a study to find out the effectiveness of guided somato-psychic relaxation on essential hypertension and related psychological factors like anxiety and depression. Seven females mild essential hypertensive (30-40 years) under medication, all with same drug and dose were repeatedly assessed for eight weeks. Four patients forming the intervention group underwent ten relaxation sessions and the three patients in the non-intervention group just presented themselves for the various assessments. Small-N design with pre assessment, mid assessment and post assessment was used for the study. The assessments included the measurements of blood pressures (both systolic and diastolic), anxiety and depression. The study also included a two week follow-up. The results show that there was an average reduction of 24.7 mmHg in the systolic blood pressure and 10.5 mmHg in the diastolic blood pressure of the patients in the intervention group who participated in the relaxation sessions. The levels of anxiety and depression also reduced by 56.7% and 77.6% respectively. The non-intervention group with medication alone showed a slight decrease of 1.3 mmHg in systolic blood pressure, but an average increase of 0.8 mmHg in diastolic blood pressure. Both anxiety and depression seemed to have slightly increased by 4.8% and 5.7% respectively. Guided somato-psychic relaxation was found to be effective in the management of essential hypertension and its related psychological factors like anxiety and depression.

From all the reviewed literature and studies, it can be noted that coping skills have got obvious impact upon physical health. Both Biofeedback and yogic techniques do improve physical problems through their impact upon patients coping ability. There has been lot of studies conducted on one or the other areas of coping on physical condition with Yogic technique or interventions through Biofeedback, but application of a combination of *Yoga* and Biofeedback training is rare. Especially use of EEG Biofeedback with *Yoga Nidra* for helping Essential Hypertension patients has not been done scientifically as yet. Hence the author was tempted to take up the present study.

Details about the methodology, Sample, tools used and procedure of the present study will be discussed in the next chapter.