CHAPTER 5- DISCUSSION

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CHAPTER 5-DISCUSSION

5.1. CHANGES IN PARAMETERS BETWEEN CONTROL AND ALCOHOLICS

PHYSICAL FITNESS

Physical fitness is a set of attributes that relate to the ability of the people to perform physical activity. Physical activity is any body movement produced by muscles which involves increased energy expenditure. (Exercise is the physical activity that is planned, structured, repetitive and purposeful.)

The ability to sustain a high level of physical activity without undue fatigue depends on 2 factors: 1 The capacity and integration of the various physiological systems for oxygen delivery and 2 The capacity of the specific muscle cells to generate ATP aerobically.

The reduced physical fitness in alcoholics (Table 4.1, 4.2, 4.3, 4.4; Figure 4.2) as shown by the questionnaire, 6 minute walk test and Borg's scale could probably be explained by the reduced numbers of Glut 1 molecules on the hepatocytes in chronic alcoholics which could limit the glucose uptake in the perivenous hepatocytes so that less glucose is available for glycolysis. So chronic alcohol consumption impairs glycolysis and hepatocytes produce significantly less ATP. Alcohol's effect on the respiratory chain also reduces ATP. Because ATP synthesis, particularly in mitochondria, requires oxygen, oxygen deficits in the liver in chronic alcohol consumption can lead to reduced ATP production. This biochemical effect has caused the physiological consequence which we have demonstrated by the reduced physical fitness. Alcoholics also have reduced fat mass. Alcoholics thus have less fat to utilize during their exercise and hence show reduced physical fitness. The co-existent anemia would also reduce their exercise capacity due to reduced oxygen delivery to the exercising muscles. During exercise energy utilization is by 3 steps: 1. Glycolysis, 2. ATP Release and 3 Oxygen. Alcohol consumption has caused a deficit in all 3 steps.

Our study has shown reduced cardiac efficiency by the Harvard's step. This indicates a reduced functional ability of the heart in asymptomatic chronic alcoholics probably due to alcoholic cardiomyopathy. We have demonstrated a preclinical reduction in efficiency of the heart. The patients could develop a manifest heart disease if they continue to drink for few more years. A similar study abroad has
shown normal cardiac efficiency in manual workers who are alcoholics (Heitzler and Eremic, 1998) Our study included alcoholics none of whom where manual workers. The reduced efficiency and functional disruption of CVS of the heart could probably be due to autonomic disturbances

Muscle strength and endurance are significantly reduced in chronic alcoholics in comparison to the control subjects (Table 4.1, 4.8; Figure 4.2) The relative impact of alcoholism on the functional capabilities (strength, power) of the various muscle groups of the arms and legs has not been reported. Alcohol-induced defects in the muscle membrane with increase in cholesterol hydroperoxides and oxysterol, possibly reflecting free radical-mediated damage to the muscle membrane could have probably reduced the muscle strength and endurance. Measurement of muscle size and strength in heavy drinkers may provide a useful early indicator of health impairment in alcoholics

HEART RATE VARIABILITY

Changes in Heart Rate Variability was observed in chronic alcoholics when compared to normal subjects (Table 4.1, 4.9, 4.10, 4.11; Figure 4.4, 4.5, 4.6). There is a reduction in heart rate variability in alcoholics The changes in HRV have been noted in 3 parameters in supine/standing position, 30:15 ratio and Valsalva’s manoeuvre. Alcohol affects autonomic nervous system (ANS) and heart has a predominant supply by the ANS, sympathetic and parasympathetic. All the 3 parameters showed significant decrease in chronic alcoholics, suggesting that alcohol leads to autonomic imbalance especially a reduced parasympathetic (vagal) activity in alcoholics. This can cause alteration in heat rate variability.

The reduced HRV which has been noted has occurred before any manifest heart conditions like cardiomyopathy or heart failure Thus it can be a useful index to determine the reduced functioning of the heart even before there are manifested cardiac symptoms. Depressed HRV can be used as an early warning sign of impending heart failure due to alcoholic neuropathy In these cases, HRV can be used as a non-invasive method to assess the status of the cardiovascular autonomic tone

The increase in heart rate during inspiration and the fall during expiration is called sinus arrhythmia In chronic alcoholics there is an increase in sympathetic activity which causes an increase in stroke volume during inspiration resulting in
increase in blood pressure and decrease in heart rate. The increase in stroke volume could offset the increase in heart rate thereby decreasing HRV.

In alcoholics there is an increase in stroke volume (Goldberg, 1980) before the development of cardiomyopathy. The resultant increase in cardiac activity may contribute to an alteration in autonomic nervous system balance. There is an increase in sympathetic activity in alcoholics even in supine position when compared to normal subjects as reported by Lindgren et al., 1996. The increased sympathetic activity increases the heart rate and decreases the RR interval. As the longest RR interval (taken as numerator in 30:15 ratio) is lesser in alcoholics when compared to normal subjects, the 30:15 ratio is reduced. Also alcoholics have remarkably poor ability to modify their ANS axis.

Esko et al., 1985 reported Valsalva ratio is reduced in chronic alcoholics. Heart rate and blood pressure are inversely proportional. Failure of heart rate to decrease during the period of blood pressure overshoot shows parasympathetic dysfunction. In Valsalva’s manoeuvre in alcoholics, sufficient increase in venous return may not be able to cause tachycardia due to vagal dysfunction.

Similar reports by Suchitra et al., (2007 & 2009) have highlighted the probable use of the simple ECG recordings in prospective epidemiological studies.

Alcohol is associated with alterations in autonomic balance suggesting increased sympathetic activity and reduced vagal control. The detection of early autonomic impairment can be potentially important for predicting the heart failure in the coming years. The use of ECG machine to detect RR variability forms a cost effective platform for the poor alcoholics admitted to the Vailankanni Ward. The simplicity and applicability can be made utilized in remote primary health centers villages in India with no computers and software availability.

**COLD PRESSOR TEST**

In chronic alcoholics there sympathetic over activity was observed (Table 4 12, 4 13, 4 14, 4 15, Figure 4 7, 4 8, 4 9, 4 10.) CPT measures the vasoconstriction occurring. In chronic alcoholics there is severe vasoconstriction occurring and hence there is a rise in BP more than in normal subjects. The possible mechanism of higher blood pressure in drinkers, therefore, can be explained by increased activity of the sympathoadrenal system.
Brady et al., 2006 reported HPA axis reactivity to the cold pressor task (CPT) was enhanced among individuals with alcohol dependence. Bannan et al., 1984; Clark and Friedman, 1985 have reported that alcohol withdrawal may be accompanied by hyperactivity of the sympathetic nervous system and the adrenal glands, resulting in elevated levels of such hormones as renin, cortisol, aldosterone, and epinephrine. However, elevated blood concentrations of only two of them—cortisol (Bannan et al., 1984) and epinephrine (Clark and Friedman, 1985) have been reported. Hypertension associated with alcohol withdrawal: assessment of mechanisms and complications has been related to hypertension during withdrawal and even these associations are not strong. Those who had transitory hypertension during detoxification manifested an exaggerated blood pressure response to stress, when compared with those who were non-hypertensive (Clark and Friedman, 1985). The elevated blood pressure observed during alcohol withdrawal has been related to the severity of withdrawal symptoms, estimates of recent alcohol use, and biochemical markers of alcohol use (Beevers et al., 1982).

Stress is an experience common to all of us. The perception or expectation of environmental or physical changes activates the sympathetic nervous system and the hypothalamus–pituitary–adrenal (HPA) axis, the two major stress systems of the body. For decades, research has employed challenge tests to study stress and its effects on health, cognition and emotion in a laboratory setting. One of the most frequently used stress protocols in humans is the cold-pressor test (CPT) in which participants immerse their hand for a few minutes into ice water (first described by Hines and Brown, 1932). The CPT elicits profound activation of the sympathetic nervous system expressed for example as increased skin conductance (Buchanan et al., 2006) and elevated blood pressure (al’ Absi et al., 2002). However, the CPT is less capable to provoke the HPA axis. Several authors found only moderate increases in cortisol, the most important glucocorticoid in humans that indicates HPA axis activation, in response to the CPT (al’ Absi et al., 2002; Gluck et al., 2004), others obtained no cortisol elevation at all (McRae et al., 2006, Duncko et al., 2007). Stress effects are multi-faceted, with numerous neuromodulator and hormonal effects on different neural and peripheral systems. However, cortisol has been identified as a key stress component mediating stress effects on cognitive functioning and emotional processing (Erckson et al., 2003). Thus, the lack of cortisol responses to the CPT reduces the value of the CPT as a tool in stress research.
According to a recent meta-analysis, profound activation of the HPA axis reflected in large cortisol elevations is associated with tasks that contain social-evaluative elements (Dickerson and Kemeny, 2004), such as the Trier Social Stress Test (TSST; Kirschbaum et al., 1993) in which participants have to deliver a free speech and perform a mental arithmetic task in front of a camera and an audience.

It is recognized that the cold pressor test increases muscle sympathetic nerve activity MSNA and blood pressure (Calhoun, 1993; Jones, 1996, Victor et al., 1987). The increase in MSNA likely contributes to the increase in blood pressure. Thus it may be that baroreceptor inhibition of MSNA is overridden during the cold pressor test (Victor et al., 1987). However, Fagius et al. (1989) previously speculated that baroreflexes remain functional during a cold pressor test because MSNA still showed cardiac-rhythmicity during the test.

The mechanism for an increase in baroreflex sensitivity of MSNA during the cold pressor test is not clear (Jian et al., 2002). Sympathetic excitation during hand immersion in cold water occurs only when skin temperature falls to levels that produce a sensation of intense pain (Kregel et al., 1992). Fagius et al. (1989) reported a weak but statistically significantly correlation between the rating of perceived pain and the increase in MSNA during 1-min immersion of a hand in 2°C water. Pain induced with several methods is capable of elevating MSNA (Schobel, et al., 1996), and the increase in MSNA during the cold pressor test may be driven by painful sensation induced with ice water (Kregel et al., 1992).

**GALVANIC SKIN RESPONSE**

GSR value indicating sympathetic activity revealed significantly lower values in alcoholics when compared to normal subjects before Harvard’s step test. The GSR before Harvard’s test was 26.30 kilo ohms in normal subjects and 16.14 kilo ohms in alcoholics. Harvard’s step test is a measure of cardiac efficiency. The GSR after Harvard’s test was 10.36 kilo ohms in normal subjects and 2.90 kilo ohms in alcoholics (Table 4.27, Figure 4.23). Our hypothesis that GSR would be reduced in chronic alcoholics before and after Harvard’s step test was proved to be true. There are no similar studies in literature to compare with.

The possible mechanism could be as follows: In alcoholics, excessive sweating occurs causing a change in conductance and resistance and thus the fall in GSR. Hyperhydrosis (Valeria Tugnoli et al., 1999) have been reported in chronic
alcoholics without peripheral neuropathy. Increase sweating causes increase conductance across skin. As conductance is inversely proportional to resistance, a decrease in GSR has been observed in chronic alcoholics.

The alcoholics show a further fall in GSR after the Harvard’s test as there is activation of sympathetic nervous system during exercising (Maling et al., 1966). Exercise increases sympathetic discharge, causes vasoconstriction of all blood vessels (except the muscles). Thus the sweating is enhanced and there is further fall in GSR. The control values in normal subjects are higher than the values in chronic alcoholics as the autonomic activity is normal. On the other hand, a relaxed person has low conductance and high resistance.

This way of testing GSR before and after Harvard’s step test thus not only quantifies stress but it also helps to detect the extent of sympathetic damage by the chronic alcoholism. The significant reduction in GSR value after step test in alcoholics could indicate that the excessive sympathetic discharge which may lead to cardiac changes more quickly than normal subjects. Further grading of GSR changes in each individual may help us to counsel the patient on the severity of his autonomic imbalance.

REACTION TIME

The global sensory-motor slowing down has been repeatedly observed in alcoholism during the last decade (Mann et al., 1999, Pollim et al., 2006; Fama et al., 2007). Considerable controversy continues to exist concerning whether reaction time reduction is seen in adult alcoholics. Alcohol increases neuronal excitability (Gong Cheng et al., 1999) and causes intoxication, euphoria during acute alcohol intake. But long time effect of alcohol intake can cause decrease in neuronal conduction (Ryan and Butters, 1980).

Patterson et al. (1987), Pfefferbaum (1991) and Ramachandran (1996) have all reported that auditory P300 is reduced in male alcoholics. Other studies have not replicated these results (Lille et al., 1987; Keenan, 1997).

In the present study, it has been observed that both visual and auditory reaction time were longer in the alcoholic subjects compared to normal (Table 4.26; Figure 4.22).

The possible reason for increase in auditory reaction time and visual reaction time in alcoholics could be as follows.
Reaction time involves both the sensory and motor paths. The sensory paths involve the input of the visual and auditory signals which are sensed by the respective sensory receptors and carried through the optic nerve and auditory nerve. The processing of this information takes place in the brain and the motor pathways include the cranial nerves and the nerves which supply the muscles of the hand. If the person has good reflexes, these information processing is shorter and reaction time is shorter.

In alcoholics the nerve damage occurs which includes both the autonomic and peripheral nerves. The neuropathies can thus reduce the speed of the conduction of impulses and thus there is a reduction in the reaction time. The probable reason for reduced visual and auditory reaction time in alcoholics could be that the alcoholics cannot mobilize sufficient processing resources in terms of cognition and the poor motivation in alcoholics can cause insufficient effort to cognitive tasks.

The effects of increased processing time and reaction time were explained to the inpatients of the rehabilitation ward. The impact of direct demonstration and sharing of information of this simple procedure improves positive thinking and psyche of alcoholics. This enables the person to ability and power to heal herself. As Benjamin Franklin said, 'Those things that hurt, instruct.'

Observation of their reaction times was reported to be very useful by 68% of subjects in relapse prevention counseling and by 62% in motivational counseling. The confluence of motivating factors (probation/parole, family concerns) and attribution of cause within a medical episode appear to be important in assessing readiness for change among treatment-motivated persons and represent opportunities unique to the health care setting to further engage and motivate a person for behavior change. Robin Pollini et al. (2006) reports that physical health concerns were cited as important by over 80% of all respondents (alcoholic patients) and identified most often as the most important reason for wanting treatment. They have also reported that believing one would get sick again if substance use continued was independently associated with increased stage of change in alcoholics. These act as external motivators. Internal motivators like being "tired of using" and "wanting to do more with life" have been previously identified.

Awareness of physical health concerns as a motivator for substance abuse treatment has been reported by O'Toole et al., 2006 (Toole et al., 2006). Probably the visual impact of alcohol on their health acted as a motivational stimulus to give up alcoholism. Less number of patients reported for relapse.
Counseling involves focusing patient's attention on addiction and concentrate on those physical problems that are easily visible (Available from: www.unodc.org/pdf/india/publications/DAIM_Manual_TTK/61-65.pdf) Motivation can be increased by using concrete medical records of the patient, where available, diagnostic tools like blood reports, CT scans, and X-rays (evidence based motivation) Demonstration of physical derangements with proper explanations from a medical professional will create awareness in the patient about the physical damage caused by his chemical dependence

Motivation is an important factor in rehabilitation and frequently used as a determinant of rehabilitation outcome (Colombo et al., 2007). A demonstration based motivational approach for reducing alcohol problem thus has advantages of counseling in alcoholics is many Counseling can help in overcoming nameless fears, guilt, rejection, isolation, inadequacy, tension and depression It enhances acceptance and re socialization in alcoholics

Increase in CRP in non-drinkers with cardio-vascular disease indicates inflammatory state of the heart. Alcoholism is associated with cirrhosis of liver, pancreatitis, cardiovascular disease (Suh et al., 1992; Park et al., 2004) Previous studies have shown that alcohol consumption results in an increase in markers of inflammation (Imhof et al., 2001; Wannamethee et al., 2003)

In chronic alcoholics hs C-reactive protein shows further rise (Table 4.16; Figure 4.11) probably indicating the accelerated effect of alcohol on the heart and other organs. The primary estimation of hs-CRP can thus be carried out at the out patient settings and can be used as a global risk assessment. This can be used as an approach in primary prevention of cardio-vascular complications which may occur in chronic heavy drinkers Knowledge of hs-CRP levels can thus be used to distinguish patient sub groups into those needing conservative or aggressive treatment

The possible mechanism by which hs C-reactive protein increases in alcoholics could be as follows In chronic alcoholics inflammation of the heart takes place. Inflammation is a localized protective response elicited by injury or destruction of tissues C-reactive protein (CRP) is one of the acute phase proteins that increase during systemic inflammation Inflammation is probably involved in coronary microcirculation abnormalities and coronary endothelial dysfunction in alcoholics (Teragawa et al., 2004).
Measures for fibrinogen, a biomarker involved in both inflammation and thrombosis, remain poorly standardized. Other broad measures of systemic inflammation, such as the white blood cell count or the erythrocyte sedimentation rate, have proven unreliable in clinical settings. By contrast, high-sensitivity assays for hs-CRP would prove to be a major leap in the diagnosis of inflammation and cardiovascular diseases.

Studies conducted by Albert et al. (2003), Stewart et al. (2002), in US have measured hs-CRP in moderate and chronic alcoholics and have shown that the CRP level is the lowest in moderate alcohol consumption. Hsu-Ko Kuo et al. (2007) have reported that hs-CRP levels are inversely related to cardio-respiratory fitness and VO_2max and are important indicators of exercise tolerance. Heavy drinkers had higher CRP concentrations than moderate drinkers. The U-shaped association between hs-CRP and alcohol consumption has been reported from studies conducted in Russia (Averina et al., 2006). Light to moderate alcohol consumption was associated with significantly lower rates of cardiac events and longer survival (Meraldi et al., 2006).

**ERYTHROCYTE INDICES**

Our hypothesis that anemia is present in chronic alcoholics has been proved to be true (Table 4.16, 4.17; Figure 4.12, 4.13). Also the hypothesis that the severity of anemia increases with increasing number of years of alcohol consumption has been prove true. The macrocytic anemia from our observations is associated with increased MCV, variable MCH and MCHC, and is most often caused by Vitamin B12 deficiency (due to pernicious anemia) and folic acid deficiency.

George N et al. 2004 have reported that ineffective erythropoiesis and microcytic anemia to occur in alcoholics which is contradictory to our results. Significant malnutrition has been recorded in alcoholics (Elaine, 1973). Our results are similar to that reported by Colle and Ceschia, 1992, who have reported macrocytic anemia.

Our results from this study indicate that the anemia is macrocytic in nature. The macrocytosis was determined by a significant increase in MCV values in chronic alcoholics (Table 4.14) and an increase in the average diameter of the RBC in alcoholics (Table 4.24).
The possible mechanism could be as follows. The first reason is alcoholics increasing disregard of his dietary needs and compulsive drinking that leads to reduced consumption of food. A chronic alcoholic, in the long run, may turn to be either more or less susceptible to deficiency disease when subsisting on suboptimal diets. The second possibility could be that chronic alcohol ingestion can affect and destroy the mucosa of the ileum. The ileal cells are responsible for the absorption of vitamin B12—intrinsic factor. Deficiency of cyanocobalamin results in immature nucleus formation in the RBC. The RNA accumulates in the cytoplasm and the red cells are enlarged with a flimsy cell membrane. These red cells are called megaloblasts. The third reason could be that B12 deficiency occurs due to increasing demand in liver disease. The fourth possible mechanism could be as follows: B12 acts as a co-factor in 2 enzymatic reactions. One is conversion of methylmelonic acid to succinyl Co-A and another is conversion of homocysteine to methionine (betaine-homocysteine methyl transferase). These maturation enzymes are necessary for nucleus formation. Thus, B12 deficiency can disrupt DNA synthesis during cell division and cause megaloblastic anemia. The fifth reason could be that alcoholics have increased need for vitamin B12 (Norton, 1977; Baker, 1983; Schuckit, 1998) which could lead to B12 deficiency.

Long term intake of alcohol for more than 10 years could possibly have caused destruction of the parietal cell layer in the stomach which is responsible for the formation of Intrinsic Factor-B12 complex. One third of the subjects were also noted to have angular stomatitis, glossitis, irritability and tiredness.

Similar study has been conducted by Edward et al., 1971, in US who have reported frequently occurring megaloblastic erythropoiesis secondary to folic acid deficiency in alcoholism.

Lederer (1981) has reported that alcohol can have a toxic effect on the marrow, inhibit folic acid, leading to serum hypofolemia and megaloblastic anemia. The reduced folic acid level in alcoholics could be due to lower intake of foods containing folic acid or direct effect of alcohol on blood levels of nutrients or reduced absorption or increased elimination of folic acid (Romero, 1981; Simko et al., 1982; McMartin and Collins, 1983; McMartin et al., 1986, Gloria et al., 1997).

Only 3 patients showed microcytic anemia (MCV 72± 2.54 μm³). Iron overload has been reported in previous studies (Duane et al., 1992). Chronic alcohol misusers frequently accumulate significant amounts of excess iron, but the mechanism
of this loading is unknown. Unregulated increased iron absorption via the non-carrier-mediated para-cellular route contributes to the iron overload in chronic alcoholics.

The possible explanation of the underlying mechanism for the increasing severity of anemia with increasing years of consumption (Table 4.25) could be as follows. With increasing number of years of alcohol consumption there could be progressive more and more destruction of mucosa of the stomach and ileum, increased demand for B12 and folic acid, progressive reduced intake of food. Alcohol also reduces the parietal cell mass (Mazzeo et al., 1988.) There could be reduced binding of intrinsic factor- B12 (Marotta et al., 2000). This could alter the absorptive power of Vitamin B12 in terminal ileum leading to severe macrocytic anemia. The destruction of parietal cell increases with the number of years of alcohol consumption and hence the severity of anemia. Another mechanism could be that there is prolonged depression of enzymes succinyl CoA and methionine which are necessary for maturation of nucleus (Florence et al., 2006).

There are some contradictory reports to our explanation Chari et al., 1993 has reported that the effect of chronic alcohol abuse on gastric acid secretion is not as predictable. Chronic alcoholic patients may have normal, enhanced, or diminished acid secretory capacity; hypochlorhydria being associated in histology with atrophic gastritis.

Yoga
The promising effect of pranayama has been evaluated using galvanic skin response. The science of breath has its foundations in the control of prana or vital energy. The purpose of doing alternate breathing exercise or Anuloma Viloma Pranayama is that the breath alternates between two nostrils. By placing the palm near the nostrils this can be felt. One of the nostrils will always be partially blocked, and the flow of air in and out of the lungs will be mainly through only one of the nostrils. If a person is in normal health, the breath will alternate approximately every hour and fifty minutes. This normal period of breath alternation is established only when one has perfected pranayama, starting with alternate nostril breathing.

According to yoga, the breath in the right nostril is said to be hot, while the flow from the left is cool. Therefore, symbolically, the right channel is known as "sun breath," and the left channel is referred to as "moon breath." The energy that flows through the sun breath produces heat in the body; this is catabolic, efferent and acceleratory to the bodily organs. Conversely, the energy that flows through the moon
breath produces coolness in the body, this is anabolic, afferent, and inhibitory to the organs. When the breath continues to flow through one nostril for more than two hours, it is a symptom of derangement caused by excessive heat or cold. Consequently, if the sun breath is more active, the heat of the body increases and there can be mental and nervous disturbances. Conversely, when the moon breath is more active, the metabolic activity of the body becomes low, cold and lethargic, and mental activity is suspended. This Alternate Nostril Breathing Exercise is mainly for maintaining equilibrium in the catabolic and anabolic processes in the body. Anuloma Viloma Pranayama which aids in improved circulation and digestion removes impurities from the blood, and tones up the circulatory and respiratory systems. The residual air in the lungs is cleared and the blood saturation with oxygen is enhanced. Large amounts of carbon dioxide and toxins are released and this reduces the stress.

The probable mechanism of increase in GSR in chronic alcoholics could be as follows: It is also known that the sympathetic outflow to palmar sweat glands and cutaneous blood vessels change with the mental state (Steptoe, 1987). Since these nerves influence the GSR, we may speculate that reduced mental stress or arousal caused the increase in GSR (Table 4.22; Figure 4.18, 4.19). Galvanic Skin Response is one of the several electro dermal responses (EDR s). Electro dermal responses are changes in the electrical properties of a person’s skin caused by an interaction between environmental events and the individual’s psychological state. Human skin is a good conductor of electricity and when a weak electrical current is delivered to the skin, changes in the skin conductance of the skin can be measured. The variable that is measured is either skin resistance or its reciprocal, skin conductance. In alcoholics, excessive sweating occurs causing a change in conductance and resistance and thus the fall in GSR. Hyperhydrosis (Valeria Tugnoli et al., 1999) have been reported in chronic alcoholics without peripheral neuropathy. Increase sweating causes increase conductance across skin. As conductance is inversely proportional to resistance, a decrease in GSR has been observed in chronic alcoholics. The exact mechanism by which nostril breathing influences the function of the autonomic nervous system is not known, though it has been speculated (Keuning, 1968) that this is through a neural reflex mechanism in the superior nasal meatus.

Bhargava et al., 1988 have reported no conclusive change in GSR in 20 young healthy men after nadi shodhana (anuloma viloma) pranayama. The absence of change following nadi suddhi pranayama in this report could be due to the fact that the earlier
study described baseline changes after 4 weeks of practice, whereas in the present study, the immediate effect was assessed. Pranayama or breathing technique of yoga is thus very important in reducing stress.

5.2. CHANGES IN THOSE PARAMETERS BETWEEN ALCOHOLICS AND AFTER COUNSELING VALUES IN ALCOHOLICS:

The parameters which have shown significant changes in values after counseling are (Table 4.1): 6 minute walk test, resting heart rate, cardiac efficiency, cold pressor test, hemoglobin. All GSR values have shown significant changes before and after yoga for 10 consecutive days (Table 4.1; Figure 4.19).

The changes in 6 minute walk test following yoga and counseling are depicted in Table 4.3, Figure 4.2). The improvements in six minute walk test which have been cited in literature are as follows:

The six-minute walk test (6MWT) is a simple index of functional capacity in healthy people and it has been used to estimate exercise capacity. The authors Manscalco Mauro et al., 2006 concluded that weight reduction in the obese increases the walking distance and lung capacity during walking. The improvements are reflected in the patients' own assessment. Six-minute walk distance increased for all patients in all age categories across programs after Cardiac Rehabilitation in studies conducted by Verrill, 2006 as out patient programmes. The authors have also reported improvement in six minute walk test in men and women and no relation between six minute walk test and QOL questionnaire used for their study. The results of the 6MWT conducted by Olsson et al., 2005 were concordant with changes in symptoms, suggesting that it may be used as supportive evidence for symptom benefit in patients with chronic heart failure. Similarly in our study, an improvement in 6 MWT (P <0.001) has been noted by intervention of yoga and counseling.

Although there was an improvement in functional capacity as measured by the 6-minute walk, there was no correlation between improvement in quality of life and improvement in functional capacity in patients with COPD who had pulmonary rehabilitation (Fernanda et al., 2001).

The walk distance is an actual measure of a physical capacity, while quality of life involves patients’ perceptions of their physical capacity. There was a borderline correlation between improvement in energy/fatigue and improvement in the 6-min walk distance in the small sample, it is possible that the correlation may be significant.
in a larger study population with respiratory diseases as reported by Mc Gavin et al., 1978. Twenty of the 26 patients with both prerehabilitation and post rehabilitation testing had an increase in walk distance of > 30 m, the distance that has been suggested as the minimum change for a clinical improvement.

Elderly primary care patients can be encouraged to initiate and sustain a self-monitored walking for-exercise program through brief monthly human and automated telephone contacts (Patraca et al., 2002).

**Heart rate and cardiac efficiency improvements observed by other authors in their studies:**

The changes in heart rate and cardiac efficiency following yoga and counseling are depicted in Table 4.5, 4.6, Figure 4.2.

Worksite counseling may have a positive effect on energy expenditure and cardio respiratory fitness. Physical inactivity and obesity are two major risk factors for poor health (Proper et al., 2003).

The nonpharmacologic treatment (dietary modifications, lifestyle, physical exercise, and health care education) must be inserted in a multidisciplinary program organized by the physician in conjunction with the health system, the nurses, and, especially, the patients themselves, who must understand their disease and the many therapeutic options. Cardiologists should treat patients in a clear and comprehensible way, and other specialists (dietitians, physiotherapists, psychologists, nurses, and social workers), together with the patient’s family, should strive for the best living conditions for the patient. In this way, the treatment of Congestive Heart Failure can improve the quantity and quality of life and save a significant amount in health care costs (Colonna and D’Agostino, 2003). In our study an improvement in heart rate and cardiac efficiency was noted between pre counseling/yoga and post counseling/yoga values in chronic alcoholics. The significance and importance of newer managements can thus be emphasized in helping alcoholics to regain what can be recovered and to go in for remission.
Improvement in hemoglobin levels following interventions observed in certain pathological conditions:

The changes in hemoglobin levels following yoga and counseling are depicted in Table 4.5, 4.6, Figure 4.2.

It was expected that changes in general health measures would mirror changes in iron status, but this was not the case as reported by Duarte-Gardea and Acosta, 2005 General Health and Well-Being scores for the diet intervention group improved in a similar manner to those seen in the supplement intervention group, despite greater improvement in serum ferritin in the latter. This might represent a psychological advantage of dietary treatment over supplement treatment in terms of locus of control or a perception that diet is the healthier and more natural treatment option. Alternatively, the advantage for the diet over the supplement may lie with the diet itself because, although the diet was designed to improve dietary iron intake and iron absorption, it is impossible to alter one dietary component in isolation. A significant increase in hemoglobin levels was noted in chronic alcoholics in our study without any specific dietary intervention. As has been pointed out earlier by Duarte-Gardea and Acosta, 2005, a psychological advantage of vitamin supplements along with counseling and yoga could have possibly played a part in causing this improvement. More detailed interventions with vitamin and iron enriched food and dietary interventions and also longer lengths of interventions may be required to look at possible changes that can be brought about in macrocytic anemia prevailing in alcoholics.

Cold pressor test and GSR (Sympathetic parameters):

The changes in cold pressor test following yoga and counseling are depicted in Table 4.12, 4.13, 4.14, 4.15, Figure 4.7, 4.9, 4.10, 4.11, and 4.12. The changes in GSR following yoga and counseling are depicted in Table 4.22, Figure 4.18, 4.20.

It is interesting to note that sympathetic parameters like Cold Pressor Test and GSR have shown a change after yoga and counseling while parasympathetic parameters like HRV have not recorded changes.
Discussion

Cold Pressor Test:

Madanmohan et al., 2002 have reported that shavasan can enhance one's ability to withstand stress induced by CPT and this ability can be achieved even with seven days of shavasan yoga training Udupa et al., July 2002 studied on the topic entitled “Modulation of cold pressure-induced stress by shavasan in normal adult volunteers” and found a significant increase and deep breathing difference and appreciable but statistically insignificant increase in RR interval variation, suggesting and enhanced parasympathetic activity. Significant blunting of cold pressure-induced increase in heart rate, blood pressure and rate-pressure-product by shavasan was seen during and even five minutes after cold pressure test suggesting that shavasan reduces the load on the heart by blunting the sympathetic response.

A significant improvement in pre immersion and post immersion cold pressor values has been noted in our study, depicting the improved sympathetic responses following interventions of counseling and yoga.

Galvanic Skin Response

There was no significant change during meditation, for the group as a whole, in palmar GSR in normal individuals following Brahmakumaris Raja yoga meditation (Telles and Desiraju, 1993). In contrary our studies have revealed a significant change (P< 0.001) in GSR.

Yoga and other parameters:

The roles of yoga in various disorders have been reported. The positive effects of yoga on post-menopausal women (Vyas et al., 2008), essential hypertension (Mourya et al., 2009), asthmatic children (Chen et al., 2009), Chronic obstructive pulmonary disease (Pomidori, 2009), Blood pressure and heart rate (Pramanik, 2009), Verbal and spatial scores (Joshi and Telles, 2008), weight loss (Madanmohan et al., 2008), premenstrual syndrome (Dvivedi et al., 2008), Motor variability (Hart and Tracy, 2008) have been studied and reported.

Data from 20 personal journals were analyzed to examine the experience of a 12-week yoga treatment program for binge eating among a sample of 25 women who were obese. Qualitative analysis revealed a positive shift experienced by the women during the program, summarized by a general structural description: disconnection versus connection. Women's comments suggested that the program appeared to
encourage a healthy reconnection to food, as well as the development of physical self-empowerment, through cultivating present-moment awareness (Shane McIver et al., 2009).

**YOGA AND ALCOHOLICS:**

**THE POSSIBLE EFFECTS YOGA AND COUNSELING MIGHT HAVE PLAYED WHICH PROBABLY COULD HAVE ALTERED THE PARAMETERS ARE:**

Using basic principles of biomechanics and neurophysiology, yoga can improve strength, flexibility and fitness while maintaining joint stability and minimizing risk of injury.

The modern research efforts into understanding the physiological effects on the human body of the practices of yoga and meditation are still going on. Boyle, 2004 has discussed how yoga postures affect the biomechanics of joints and muscles. The hypothesis is that movements that are specifically employed in yoga postures align joints in the most optimal configuration, allow for the most efficient contractile mechanics of the muscle groups involved, allow for the optimal blood perfusion rates to these muscle groups, and on top of that provides an exercise modality that strengthens the muscle possibly through eccentric contractions.

A study was conducted to examine the effect of yoga on cardiovascular function in subjects above 40 yrs of age. Pulse rate, systolic and diastolic blood pressure and Valsalva ratio were studied in 50 control subjects (not doing any type of physical exercise) and 50 study subjects who had been practicing yoga for 5 years. From the study it was observed that significant reduction in the pulse rate occurs in subjects practicing yoga. The difference in the mean values of systolic and diastolic blood pressure between study group and control group was also statistically significant (Bharshankar et al., 2003, Hart and Tract, 2008).

More recent articles describe the effect of yoga on letter cancellation task (Telles, 2007), mirror tracing task (Chaya et al., 2006) and pregnancy outcome (Narendran et al., 2005).

Satyapriya et al., 2009, has reported on the effects of integrated yoga on heart rate variability in pregnant women. The systolic and diastolic pressure decreased after alternate nose breathing in studies conducted by Raghuraj and Telles, 2008. After kapalabhati, there was a significant reduction in high frequency power and an increase
in low frequency power expressed in normalized units compared to the 'pre' value. This contributed to a significant increase in low frequency/high frequency power ratio following kapalabhati practice. Following nadi-suddhi pranayama, there was no significant change, though a non-significant trend towards increase in high frequency power and low frequency power was observed. While attempting to explain the mechanisms underlying the changes, the respiratory sinus arrhythmia has to be taken into account. At typical respiratory frequencies near 0.20Hz (breath cycles per minute), the heart rate increases simultaneously with inspiration (Saul and Cohen, 1994). Most investigators have found that cardiac vagal efferents are involved in mediating the heart rate fluctuations that occur with respiration at this frequency. It was also observed that the modulation of cardiac sympathetic efferents also plays a role in generating respiratory sinus arrhythmia at lower respiratory frequencies below 0.15Hz (9 breath cycles per min). Separate polygraph recordings of respiration showed that the breath rate values before and after kapalabhati as well as before and after nadi-suddhi practice were in the range of 0.20-0.26Hz (Korbel, 1993). Within this frequency, the respiratory sinus arrhythmia is correlated with vagal activity. Hence the increase in cardio sympathetic tone following kapalabhati is probably due to other factors. In response to variations in breathing patterns a number of central and autonomic nervous system mechanisms as well as mechanical (heart) and homodynamic adjustments are triggered, thereby causing both tonic and phasic change in cardiovascular functioning (Papillo and Shapiro, 1990).

In our study, at breath cycles of 6 per minute, sympathetic improvement has been noted. Earlier studies by Saul and Cohen, 1994 have been conducted and changes observed in normal subjects and not on alcoholics.

Right nostril breathing increases metabolism perhaps by increasing the output of adrenaline from the adrenal medulla, (reflected in the significant increases in baseline oxygen consumption and heart rate) while sympathetic output to the sweat glands does not change (stable GSR). In contrast left nostril breathing produced a marked decrease in sympathetic activity to the sweat glands whereas other subdivisions did not change as much (relatively smaller changes subdivisions did not change as much (relatively smaller changes in baseline oxygen consumption and heart rate) (Shirley Telles et al., 1994).

Results of studies conducted by Raghuraj et al., 1998 suggested that kapalabhati modifies the autonomic status by increasing sympathetic activity with
reduced vagal activity. The study also suggests that HRV is a more useful psychophysiological measure than heart rate alone.

The exact mechanism by which nostril breathing influences the function of the autonomic nervous system is not known, though it has been speculated (Keuning, 1968) that this is through a neural reflex mechanism in the superior nasal meatus.

The effects of yoga and counseling on reducing alcohol consumption have been worked on and reported by many authors (Lohman, 1999; Swmyard et al., 1974, Barton, 2004, Murphy et al., 1986; Parker and Gilbert, 1978; Rana et al., 2001; Parker et al., 1978; Shafil et al., 1975) Four areas discussed under, "Yoga, the heart and breath", are 1. Effect of inverted postures on increasing the efficiency of the heart through compensatory physiological mechanisms, 2. Effect of yoga on sympathetic tone, through touch, heat or movement and the movements produced in yoga through breathing practices and twists can alter visceral function and sympathetic tone, 3. Humans exhibit a reflex which is described as diving and submersion response. Certain yogic practices activate this reflex, accounting for decreased oxygen consumption; 4. Physiological and behavioral effects of yoga practice are initiated through alterations in blood gas concentrations which results from various breathing practices like pranayama.

Yoga and autonomic control may be brought about by "coupling" of internally and consciously generated visual image to normally "uncoupled" physiological responses.

Stress is defined as a stimulus which causes the release of corticotrophic releasing hormones (CRH) above the normal levels from the hypothalamus. Two primary neural pathways initiate this response neurogenic (Psychological) and Peripheral (response to tissue damage) This system is regulated by negative feedback loop of glucocorticoids from the adrenal cortex (Figure 5.1).
Stress and yoga:

Psychological stress is a risk factor for hypertension (Levenstern et al., 2001; Rutledge and Hogan, 2002) and the Canadian Hypertension Society recognizes the role of stress management techniques in managing hypertension (Spence et al., 1999, Khan et al., 2007). Reduction of stress using transcendental meditation has been shown to decrease BP in African American hypertensive (Schneider et al., 1995; and Schneider et al., 2005). Various forms of yoga also claim to reduce stress by integrating the body and mind. Although there are several published studies investigating the effects of various forms of yoga on hypertension (Damodaran et al., 2002; McCaffrey et al., 2005), most of these were uncontrolled case reports or small cohort studies conducted in India with significant methodological limitations (Tulpule et al., 1971, Lakshmikanthan et al., 1979). There is only one randomized controlled trials of any form of yoga for alcoholics (Subrahmanyam et al., 1986) who has reported on alternate treatment for alcoholics as follows.

**ALTERNATE TREATMENT FOR ALCOHOLICS:**

Subrahmanyam et al., 1986, have reported improvement in alcoholics using yoga meditation, psychotherapy, stereotaxic surgery, nonvolitional biofeedback, and low frequency pulse magnetic field who were followed up for 1 year.
done were clinical, psychological, biochemical, neurochemical and electrophysiological.

Alternate treatment procedures like “assisted noxious odors” have not been found to be useful for alcoholism by Miller and Dougher, 1989.

No correlation was found between relative degree of sobriety and the consumption of tranquilizers or deterrent drugs, the number of follow-up interviews, or regular psychotherapy in 95 chronic alcoholic patients admitted to the Addiction Research Foundation hospital, Toronto, and in 63 of these follow-up information available (Sereny and Fryatt, 1966) Edward and Dill, 1974 have reported the usefulness of a combined disulfiram and group therapy.

The importance of teaching mothers to breathe in an alcoholic breathing, to adapt the correct pattern of breathing and details of pre natal yoga has been discussed by Ralph Tarter, 1989 Whether or not weight reduction, yoga, muscle relaxation, exercise help alcoholics to recover has been discussed in studies conducted by Glatt, 1982. He has reported that clearly alcoholics are not expected to recover and inevitably slide down hill with few if any recovering. Not surprisingly many doctors may meet recovered alcoholics. But treatment of alcoholics and observe their steady progress of quite a number of alcoholics, revealed one third recovered, one third improved and one third were unchanged Orward and Edwards, 1977 however reported that out patient treatment gave no better results than expert advice.

Alcoholic residents received psychiatric, psychological, nurse and social assistance one or two times a week in an outpatient service center located close to the residence. Volunteers from the community led activities involving arts and crafts, horticulture, ceramics and yoga therapy. The residents also went to church if they wished and walked in the morning, accompanied by agents in this study conducted by Alessandra and Ronaldo, 2008.

In a meta-analysis of yoga therapy BY Pilkington et al., 2005, five randomized controlled trials in adults suffering from depression, all reported positive effects of exercise.

COUNSELING:

Counseling has been used in other situations as behavioral treatment and for prevention in opioid addicts and HIV patients (Karin et al , 2009, Anna et al., 2008)
Counseling and alcoholics:

The usefulness of counseling has been debated in the recovery of alcoholics and no pre and post counseling values are available on the parameters affecting alcoholics. Literature search has revealed following works: Dawson et al., 2007 on the impact of partner alcohol problems on woman's physical and mental health; Zylstra, 2006 on the use of spirituality in alcohol recovery, Mason et al., 2006 on effect of oral acamprosate on patients motivation, Kienast and Heinz, 2005 on the therapy and supportive care of alcoholics' guidelines for practitioners.

In a cross-sectional retrospective survey of 4422 adults age 18 and up (who were classified prior-to-pass year alcoholic dependent according to the DSM-IV guidelines), researchers questioned what role help-seeking plays in recovery. Dawson, Grant, Stinson, and Chou (2006) looked at three different treatment methods. The methods were as follows: 12-step participation, 12-step and formal spiritual treatment, and formal treatment only. They performed 4422 at home interviews with a randomly selected from a list households.

Bogenshutz, Tonigan, and Miller also documented the findings of some other related studies. The most relevant of these was performed by the Project MATCH research group (1993, 1997, and 1998). They performed a study on 952 outpatients and 774 post-inpatient subjects who were randomized to one of three studies, CBT -cognitive behavioral therapy (Kadden et al, 1992), MET -Motivational Enhancement Therapy (Miller et al., 1992) and TSF -twelve step facilitation (Nowinski et al., 1992). The criteria only considered drinkers who drank an average of 21 days in a month and 17 drinks per day. The study found that a much larger difference exists between the initial self-efficacy of the two types. Not only are Type-A are more likely to stay sober, but they also found that it did not matter which treatment was used.

In a study of 100, 20-63 year old married men in Great Britain, Orford and Edwards (1977) found that participants who spent twelve months in alcoholics anonymous fared no better than those who had only one therapy session with a psychiatrist and their spouse. Each participant was properly diagnosed as an alcoholic by a psychiatrist then randomly assigned to one of the two treatment groups. Half went to the psychiatrist once with their spouse and discussed their disease. The other half were offered an array of services starting with alcoholics anonymous and the
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twelve-step program to inpatient treatment In the end there was no significant statistical difference between the groups

Heavy drinking young adults often have limited motivation to change their drinking behavior

**Motivational interviewing:**

The value of motivational interviewing is enormous. This essentially is an empathic, non-confrontational approach in which the counselor helps the patient identify his or her own reasons for change and strategies for achieving realistic goals. Essential components include sustaining commitment over time, involving the family when possible, acknowledging achievements, and dealing promptly with lapses. A patient's motivation to change his or her way of life fluctuates according to mood and circumstance, and counselor and doctor can feel deflated by early setbacks.

**Dependence and detoxification:**

Some patients will find it hard to cut down or stop drinking because they experience withdrawal symptoms. At first, these may not be recognised for what they are. Patients describe feeling nervous without a drink or not being able to function effectively until the first drink of the day. Other features in patients who are physically dependent vary in severity.

Mild symptoms can be dealt with by rest, relaxation, and reassurance. An explanation that withdrawal symptoms are evidence that the brain has adapted to living in an alcoholic environment and will take time to adjust to one that is alcohol free is helpful. Patients find it reassuring to know that symptoms, however unpleasant, will pass in a few days. This approach is often enough when patients are alcohol free at interview or recent drinking to relieve alcohol withdrawal.

When dependence is more advanced, the discomfort of withdrawal may necessitate medical detoxification. In patients whose symptoms are very severe and who have other prominent physical, psychological, and social factors, specialist treatment in hospital is required.

**Establishing a Counseling Relationship:**

When the counselor makes contact with an alcoholic, the first step in counseling is to begin to build a relationship-bridge with him. As in other counseling, this is done by listening in depth and relating with one’s full being. Listening requires
suppressing one's urge to interpret, reassure, or ask a series of informational questions. Listening in depth means listening with the "third ear" (or being sensitive to the feelings that are behind the words and the subtle messages communicated in mood, posture, and facial expression). "Psychotherapeutic listening" is a skill which the counselor learns through disciplined practice.

Intensive listening allows the counselor to begin to sense how the alcoholic feels about himself, others, and his problem. Gradually the counselor begins to grasp precious fragments of understanding of his inner world of hopes, fears, and pain. He begins to see how life looks through his eyes. Listening and responding with warm understanding serves to establish the first strands of the interpersonal bridge called "rapport" over which the counseling process moves back and forth.

As one becomes familiar with the typical experiences and feelings of many alcoholics, it is easier to pick up the feelings of a particular alcoholic more accurately and respond to them more precisely. Often one can sense what the person is feeling before he actually verbalizes it fully. As the counselor is able to stay on the alcoholic's emotional wavelength, the relationship is strengthened by the alcoholic's awareness of the caring attitude of the counselor.

Many alcoholics are plagued by low self-esteem and a sense of isolation (and differentness), as well as guilt and anxiety. These painful feelings make them defensive and increase the difficulty of establishing rapport with them. Because of this, the first interview may require more time than would be true in some other counseling. One must move slowly and work carefully in building the relationship. Because of his anxiety the alcoholic is hypersensitive to anxiety in others. The counselor should try to avoid saying anything that might be interpreted as criticism or passing judgment on him.

The counselor must "stay close to the alcoholic's ego" and let the alcoholic know that he is with him emotionally -- that he is reaching out to him as one human being to another.

In order to discover the nature of the alcoholic's motivation, questions such as these should be in the counselor's mind as he listens and talks with the alcoholic during the first interview:

What does he see as his problem?
From his point of view, is his drinking a problem or a solution?
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Does he see it as a cause of his other problems or simply a way of gaining relief from them?

Does he feel that he needs help from others? From me?

If so, what kind of help does he want? (Does he want someone to pacify his wife, intervene with his boss, help him learn to drink in moderation, or help him lick his drinking problem in whatever way is required?)

Why did he come for help now? (He has had the problem for several years)

Was he threatened or dragged into coming by his spouse?

Is there some special crisis that puts him under acute pressure at the moment, but which will pass?

Is his primary motivation for coming external pressure or internal pressure?

Why did he come to the rehabilitation centre?

Does this throw light on the kind of help he expects?

If, as the first interview progresses, the counselor finds that he is not getting clear answers to questions of motivation such as these, it is appropriate to ask enough of them to gain a picture of the alcoholic's reason for coming and the help he expects.

The fears faced by the alcoholic are: his fear of the pain of abstinence (life without his pain-killer), his fear of not belonging to a drinking group which he enjoys, his feeling that alcohol is all that "works" for him, the blow to his self-esteem of admitting loss of control and, in the case of a male, of his inability to "drink like a man", his fear of recognizing that he has a socially unacceptable condition, his fear of unsympathetic and punitive professional helping persons; his fear of what it might do to his job, family, church, or social relations to be identified as an "alcoholic." It is important that these inner barriers to admitting his need for help be discussed with understanding and empathy by the counselor. If the person can bring his fears into the open, the help of the counseling process becomes available for coping with them. Constructive confrontation may include saying to the resisting alcoholic that he appears to have some of the warning signs of addiction. Constructive confrontation means confronting the person with reality and helping him look at it squarely.

The alcoholic's ambivalence toward authority is a psychological characteristic which must be taken into account in counseling. The alcoholic may be relatively mature in many ways, but he is often like an adolescent in his relationship to authority, alternately craving and resenting dependence. He tries to make the counselor into an authority figure, upon whom he can be dependent and against whom he can then rebel.
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If the counselor falls into this trap, the counseling relationship will be seriously distorted.

In order to avoid becoming ensnared in assuming responsibility for the alcoholic's sobriety or lack of it, the counselor should strive not to become ego-involved in the outcome of the counseling process. If there is any kind of counseling in which a success drive on the part of the counselor is detrimental, it is in work with alcoholics.

The counselor who tries too hard and reveals that he must prove himself by succeeding as a counselor conveys a lack of concern and respect for the person whom he is counseling. The alcoholic with his low self-esteem catches this feeling of being manipulated and reacts to the counselor in the same way that he would to a mission worker who gives the alcoholic the impression that he is interested in him as an opportunity to save a soul. Thus, he respects the alcoholic's right to drink or not to drink, and he keeps the initiative where it must be if he is to stop.

Other than motivational enhancement and cognitive behavioral counseling, the couples are counseled together on the various problems they face and the ways to overcome them. The couple counseling is further strengthened by family counseling sessions to overcome the family troubles encountered. Advice on harmful effects of alcohol, smoking, drugs are highlighted. Psychological strengthening is enhanced by spiritual enhancement counseling. Information sought on various aspects of alcohol is also dealt with as an augmenting and expanding counseling requirement.

Relapse Preventing Counseling:

The drinker will need to devise strategies to cope with life without recourse to alcohol or with controlled drinking. Some people will find it relatively easy to change this habit; this is often most true of those who identified the problem early and have not developed severe physical, social, and psychological problems. Patients are encouraged to set their own goals and identify ways of dealing with triggers to relapse. If possible, involve the family in the plan and encourage persistence, even in the face of relapses. Sometimes major barriers to change that are not responding to motivational approaches will be obvious, and more specialist help will be required.

Withdrawal symptoms usually resolve in 4-6 days, after which time patients feel much better and optimistic about the future. They may believe they can now handle alcohol, but it needs to be made clear to patients and careers that on no account...
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should drinking (however little) be resumed. The counselor establishes a therapeutic alliance for the future and reinforces the need for continued abstinence. The counselor also reinforces to the family of alcoholics on the benefits of continued positive support.

5.3 The parameters which did not show significant changes in values after counseling are (Table 4.1): QOL, Borg’s scale, muscle strength, muscle endurance, heart rate variability, C reactive protein, RBC count, PCV, MCV, MCH, MCHC.

The effect of counseling and yoga may not be highly significant in many parameters because 1 The groups we have chosen was chronic alcoholics were most damage has taken place, 2. Counseling done only for 15 Days and on more practice some parameters may show recovery at a later stage, 3 Alcoholics due to their physical conditions cannot be expected to do yoga and undergo counseling very effectively like normal people (non-compliance) 4 Resistant cases 5. Inappropriate length of time for counseling: As the alcoholics were admitted for a short period of time, it was possible for administration of counseling and yoga for 10 days only. A longer duration of yoga and counseling could possibly have yielded better results. 6 Associated health problems like depression, weakness could possibly have hindered the effects of yoga and counseling to a full extent. (Sympathetic parameters have shown changes while parasympathetic hasn’t ) While hemoglobin has shown a change, RBC count has revealed no significant change. RBC production takes 120 days and hence with continued treatment, it may show changes for the alcoholics after their discharge

5.4 CORRELATION

The major parameters of alcoholics have co-related well among each other in the chronic alcoholics (Table 4.23). Physical fitness parameters in alcoholics have correlated well (P< 0.001) with cardiac efficiency Cardiac efficiency has correlated well (P< 0.001) with autonomic parameters (parasympathetic like HRV and sympathetic like GSR and CPT) Cardiac efficiency has also correlated well with blood parameters (Anemia). The less the hemoglobin and more severe the anemia, the worse is the cardiac efficiency

The interdependence of the various parameters studied has been reflected thus
A significant correlation has observed for Physical fitness and Cardiac efficiency \( (r = 0.816, P < 0.001) \), CRP and cardiac efficiency \( (r = 0.85; P < 0.001) \); Anemia and cardiac efficiency \( (r = 0.85, P < 0.001) \).

1. CARDIAC EFFICIENCY AND PHYSICAL FITNESS:

The most important cardiac parameter which is the cardiac efficiency has correlated significantly with all the parameters of physical fitness, namely 6 minute walk test, resting heart rate, muscle strength and muscle endurance. The cardiac parameters and physical fitness are essential factors in determining the health status of an individual. When the physical fitness reduces, the venous load to the heart also increases. To a certain physiological limit the starling law enhances the cardiac output, after which the heart fails. It can be observed that reduced physical fitness is closely associated with reduced cardiac efficiency and increased heart rate, and thus the general fitness of individuals can be related to the cardiac and autonomic parameters.

The role of physical fitness in maintaining a strong heart, vascular system has been reported by many authors (Guyatt et al., 1985, Takeshma et al, 1996, Miko et al, 2003 Mourot et al, 2004, Boettger et al, 2009) Cardiovascular fitness and heart rate response to exercise are reduced in young healthy smokers. In men, the adverse effects of smoking become stronger with increasing age but appear to be reversible at age 36 (Bernaards et al., 2003) The associations of physical activity and cardiovascular fitness with cardiovascular disease risk factors were studied and reported by James et al (1988).

2. FITNESS AND AUTONOMIC PARAMETERS:

Similarly the physical fitness of alcoholics has been found to be reduced. Parasympathetic parameters like reduced HRV and increase in HR co related significantly with the reduced fitness \( (P < 0.001) \) The cardiac efficiency has correlated significantly with the blood pressure recordings of cold pressor test \( (r= -0.49, -0.743, P<0.001) \) Thus sympathetic parameters GSR \( (P < 0.001) \) and CPT \( (P < 0.001) \) have revealed significant correlations with cardiac fitness (decreased GSR and increased CPT correlated with reduced cardiac efficiency/fitness) Short duration of physical training results in favorable cardiovascular performance and it may be ascribed to autonomic modulation (Rajesh and Deepak, 2004).
3. CRP AND CARDIAC EFFICIENCY: CE cardiac inefficiency and inflammatory markers correlated well.

The higher the hs-CRP values in chronic alcoholics, the lower the cardiac efficiency. This probably reveals the extent of damage of heart in chronic alcoholics. CRP levels, inversely related to cardiac fitness, are important indicators of exercise tolerance and may be useful in targeting individuals requiring endurance intervention to prevent loss of cardiovascular fitness and function. Fleming, 2004 in his book has described the step by step plan to prevent, treat and reverse inflammation which is the leading cause of heart disease.

4. ANEMIA AND CORRELATED PARAMETERS

The RBC values have correlated significantly with resting heart rate, breathlessness of Borgs scale, GSR and CRP values. The Cardio vascular parameters include heart and blood vessels Increases in heart rate and blood changes like anemia have correlated well

The RBC count has correlated well with resting heart rate (r= -0.866); Borgs scale (r = -0.743); GSR (r = 0.847), CRP (r = -0.842), HRV(r= 0.816). The more severe the anemia (lesser RBC); then the higher the heart rate, dyspnea level (Borg’s scale), sympathetic response (GSR), parasympathetic responses (HRV) and inflammatory markers (CRP) Mechanism. In the absence of adequate RBC, there is lack of oxygenation, which increases heart rate( to allow more stroke volume to provide oxygenation to the tissues) and the patient also increases the respiratory rate to draw in more oxygen ( John Halliwill et al., 2002).The cardiovascular parameters which include cardiac parameters like heart rate and vascular parameters like anemia, which have revealed significant correlation.

Anemia and raised CRP has been noted and correlated significantly in alcoholics. The probable reason could be that the liver inflammation in alcoholics could raise the CRP The Vitamin B 12 absorption in the terminal ileum could possibly lead to the associated anemia. The iron metabolism takes place in the liver and could also contribute to the associated anemia

Prompt change from baseline values may make CRP a more useful tool in predicting the acute presence of an underlying infection or inflammation than slower responding acute-phase reactants, such as ferritin, (Tietz, 1995) or the presence of clinical signs and symptoms In addition, data indicate that increases in CRP are
associated with a wide variety of negative clinical outcomes, and it has been used as a biomarker to predict the risk for anemia, malnutrition, and both overall and cardiovascular mortality and EPO resistance is usually attributed to iron or vitamin deficiency (Gunnell et al., 1999, Tietz, 1995)

Inflammation and the acute-phase response interact with iron metabolism at several levels. Inflammation reduces the serum concentrations of iron and transferrin. Kooistra et al (1998) found that iron absorption from the gut was impaired in patients with renal failure and elevated serum CRP levels. This is consistent with the notion that the synthesis of transferrin is reduced during the acute-phase response. Less apo-transferrin is secreted in the bile and delivered to the gut. As a result, less iron is delivered to the transferrin receptors of the mucosal cells (Jurado, 1997).

5. SYMPATHETIC AND PARASYMPATHETIC PARAMETERS:

Sympathetic and parasympathetic activity have been studied and correlated in other diseases like chorioretinopathy, diabetes mellitus, pre-prandial states and following heart transplantation (Carolin Freccero et al., 2004, Hem Kumar Tewari et al., 2006, Lucien et al., 2008). Nicolosi et al (2003) have reported no existence of a parallel involvement of peripheral somatic and autonomic cardiovascular nerve fibers in chronic alcoholism (Costa et al., 2000, Nicolosi et al., 2003). But quantification of sympathetic and parasympathetic activity has not been undertaken in chronic alcoholics. The significant negative correlation between sympathetic and parasympathetic (significant positive correlation between GSR and HRV) thus demonstrates the depressed vagal activity and corresponding increased sympathetic activity in alcoholics.

The possible mechanism by which alcohol damages the nerves could be increased oxidative stress, damage to the mitochondria, interference with the activity of growth factors, effects on glial cells, impaired development and function of chemical messenger systems involved in neuronal communication, changes in the transport and uptake of the sugar glucose, effects on cell adhesion, and changes in the regulation of gene activity during development (Guerin, 1998; Eriksen et al., 2000).

Anemia and chronicity of alcoholism. An interesting observation was that the years of consumption of alcohol revealed significant difference with the severity of anemia (Table 4.25). Anemia is classified as mild, moderate or severe based on the concentration of hemoglobin in the blood. Mild anemia corresponds to a level of
hemoglobin concentration of 10.0-10.9 gm/dl, moderate anemia corresponds to a level of 7.0-9.9 gm/dl, while severe anemia corresponds to a level of less than 7.0 gm/dl (Joseph et al., 2005). More the number of years of alcohol consumption, the hemoglobin level dropped severely. Mild anemia was observed in 5 to 6 years of alcohol consumption. It progressed to moderate anemia with more years. In chronic alcoholics consuming alcohol for 10 years or more, severe anemia was observed. Initially alcohol acts as a stimulant and enhances the hydrochloric acid production, but in chronic intake it destroys the lining of the stomach (Yonetci et al., 2003).

**RECOMMENDATIONS FOR RECOVERY AND REMISSION:**

1. **Recommendation** of a total package of yoga which includes asanas, breathing exercises, cleansing techniques, vegetarianism, relaxation and meditation along with counseling is advised. These procedures can be easily increased in intensity can bring about mind-body co-ordination and control. The alcoholic patient can slowly be encouraged to stop reaching out for a drink automatically and craving to buy alcohol.

2. Psychological stress alleviators like counseling and yoga to be continued.

3. Incorporation of daily exercise regimes in fit alcoholics of 1 hour duration along with yoga.

4. Good dietary supplements after going in for relapse

5. Stress management techniques like Exercise, Getting a hobby, Meditation, Relaxation techniques Fractional relaxation, Progressive relaxation, spending time in nature and Autogenic training

**Autogenic training** is a relaxation technique developed by the German psychiatrist Johannes Schultz and first published in 1932 (Stetter and Kupper, 2002). The technique involves the daily practice of sessions that last around 15 minutes, usually in the morning, at lunch time, and in the evening. During each session, the practitioner will repeat a set of visualizations that induce a state of relaxation. Each session can be practiced in a position chosen amongst a set of recommended postures (for example, lying down, sitting meditation, sitting like a rag doll). The technique can be used to alleviate many stress-induced psychosomatic disorders (Stetter and Kupper, 2002).

6. **Continued telephone based care for alcoholics and family support** has been recommended by Janell et al (2007). To have good communication with
alcoholics and to bring in their family support is vital to help the alcoholics to recover.

7 Therapeutic emails: Farrokh et al (2007) have recommended therapeutic email and online support for those patients who could afford it. In Indian set up though this may be useful, it may not be practical, considering the poor socio-economic conditions. Literate patients can try this as support groups formed online are highly motivated and bring about positive outcomes.

8. Counseling and primary care: Richard Sautz et al., 2008 have recommended the following:

   Although quality of primary care may not necessarily affect drinking, brief counseling for unhealthy alcohol use may enhance the quality of primary care. The primary outcome was quality of care received measured with the communication, whole-person knowledge, and trust scales of the Primary Care Assessment Survey (PCAS). The secondary outcome was drinking risky amounts in the past 30 days (measured with the Timeline Follow-back method). Alcohol counseling was significantly associated with higher quality of primary care in the areas of communication and whole-person knowledge. The quality of primary care was not associated with drinking risky amounts 6 months later.

9. Adding Drugs like Naltrexone to counseling methods has been advised by Robert Leeman et al., 2009. Heavy drinking young adults often have limited motivation to change their drinking behavior. Adding pharmacotherapy to brief counseling is a novel approach to treating this population. A small open-label pilot study was conducted to assess the feasibility of offering eight weeks of daily and targeted (i.e., taken as needed in anticipation of drinking) naltrexone with BASICS (brief motivational) counseling to heavy drinking young adults; to assess the tolerability of the medication in this population and to obtain preliminary efficacy data. Findings from this small pilot study suggest that naltrexone in combination with BASICS represents a promising strategy to reduce heavy drinking among young adults.
The health benefits of giving of alcohol and going in for remission and recovery would be:

- Reduction of susceptibility to depression and anxiety
- Better management of stress
- Enhancement of self-concept and esteem
- Socialization through participation in physical activities
- Improved overall general motor performance
- Improved energy
- Resistance to fatigue
- Mitigate the debilitating effects of old-age or retain a more desirable level of health for a longer period of time
- Enhanced cardiovascular function
- Reduction of many cardiovascular disease risk factors
- Increase ability to perform tasks of daily living
- Reduced risk of muscle and joint injury
- Improved work performance
- Improved physical appearance, self-image, and sound mental health

LIMITATIONS OF THE STUDY

The exact amount of alcohol consumed couldn’t be determined exactly, as the patient’s mental status was unstable. The relatives of the patients also couldn’t exactly give any particular amount of alcohol consumed.

There are several limitations that can affect interpretation of the data. Subjects enrolled in the trial were possibly less likely than the general population to be motivated to pursue a lifestyle modification such as yoga as a therapy for entering into relapse as they are under rehabilitation programme and under chronic effects of alcoholism affecting general health. People frequently underreport their alcohol consumption. Diet and psychosocial factors could also be taken into consideration. Acute and chronic alcoholics could be compared in future to see if there is any stimulatory effect on the heart in small dose consumption of alcohol in acute alcoholism.

There are several limitations for reaction time to acknowledge and consider when interpreting these findings. First, these are self-reported data. The possibility that respondents chose to provide a socially desirable response to the questions is a
source of potential bias. Second, the data reported do not necessarily correspond to actual changes in substance use, counseling seeking behavior. There are several factors including the availability of treatment slots upon hospital discharge, and family and social supports influencing treatment entry that must be considered when applying these findings to actual interpretation of data. Improper reporting and unexpected drop outs have to be taken into account for estimating the relapse rate. Finally, the data are from one inner city urban teaching hospital thus, the findings may not be replicable in other settings or in other parts of the country.

In summary, there are features unique to the acute hospitalization of medically ill substance using adults that make patients more amenable to change and willing to enter drug treatment. These data suggest specific interventions and roles for providers that may positively influence and take advantage of the unique circumstances inherent in an inpatient medical stay.