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Original Research Article

A Comparative Study of Autonomic Functions in Alcoholic Versus Non-Alcoholic

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Abstract:

Background: The central and peripheral neurological systems are known to be harmed by chronic, excessive alcohol use.

Objectives: To compare the autonomic nervous system functions between alcoholic and non-alcoholic adults by using short-term blood pressure and Heart Rate Variability (HRV).

Methods: The study involved 80 adults. These adults divided in two groups, alcoholics (n = 40) and non - alcoholic (n = 40) for this study aged 31-50 years. Among the subjects, 17 were females and 63 were males. A significant number of males were present in alcoholic cases, due to social stigma and cultural practices prohibiting females from attending OPD. Those included in this study had a significant history of alcohol consumption exceeding 210 grams per week in males and 120 grams per week in females for the past two years. Recording of blood pressure both (SBP and DBP) was done at Basal, 1 minute and 2 minutes undergoing isometric exercises and cold pressor test and the readings are recorded in a controlled ambient temperature of 23° C to 25°C. HRV was recorded and analyzed with the help of BIOPAC MP150.

The study excluded patients with a history of hepatitis, diabetes mellitus, thyroid disorders, heart disease, or who used drugs that may affect blood pressure. According to the history and physical examination of the controls, they report good health. All of them reported not having consumed alcohol or taking medication (self-reported), and none had smoked or consumed tobacco.

Results: The pressure is recorded at the Basal level, 1 minute and 2 minute intervals which shows a constant increase in systolic and diastolic blood pressure and it was statistically significant($p<0.05$).

But in group comparison, the constant increase in SBP and DBP after isometric exercises was higher in alcoholics as compared to non-alcoholics and it is significant. In group comparisons, however, the increase in SBP and DBP after the cold pressor test was significantly higher for alcoholics as compared with non-alcoholics. There was a mild positive correlation exists in both alcoholics and non-alcoholics in terms of HRV. In Non-Alcoholic group, SDNN (38.90 ± 22.14 vs 41.71 ± 20.81 ms, p=1.000), RMSSD (39.20 ± 25.14 vs 64.11 ± 156.74 ms, p=0.437) and pNN50 (13.37 ± 17.94 vs 18.56 ± 20.42, p=0.496) were lower than in alcoholic group. Frequency domain parameters like LF (614.20 ± 604.89 ms2 vs 595.81 ± 597.08 ms2, p=0.823) and HF(1190.68 ± 1330.87 ms vs 832.52 ± 1356.70 ms2, p=0.148 were higher for Alcoholic group compared to non-alcoholic group. The total power for Alcoholic group was higher compared to nonalcoholic group (2447.93 ± 2215.03 ms2 vs 1845.27 ± 1550.38 ms2, p=0.308). The LF/HF ratio in alcoholic group was higher than in non-alcoholic group (1.11 ± 0.69 vs 0.91 ± 0.77, p=0.162).

Conclusion: Evaluation of autonomic function should be given due importance in the management of alcoholics with a view to help in improving the prognosis. In this preliminary study, it may be concluded that overall sympathovagal modulation has decreased in the alcoholic group compared to the non-alcoholic group. Thus, regular monitoring of the HRV can be very useful in predicting cardiovascular risk for these patients

Evaluation of autonomic function should be given due importance in the management of alcoholics with a view to helping in improving the prognosis.

Keywords: Autonomic nervous system, Isometric exercises, Cold pressor test, systolic blood pressure, Valsalva.

Introduction

Chronic excessive consumption of alcohol adversely affects the central and peripheral nervous systems. Dementia, delirium tremens, peripheral neuropathy, and autonomic neuropathy are examples of such manifestations. [1,2]. The overall prevalence of alcohol use among ≥18 years of age was 9.7% and exclusively among males was 17.1%. A high rate of autonomic dysfunction amongst alcohol abusers with cardiovascular reflex measures of neuropathy producing rates ranging between 16% and 73%. 25 Currently, it is not known whether ethanol's toxic effects alone or other confounding factors contribute to the dysfunctional somatic and autonomic nervous systems. Also, there are very few studies concerning autonomic dysfunction in alcoholics in Central India's urban population. However, in the context of this article, "alcohol-related autonomic dysfunction" shall be defined as the impairment of autonomic nerve function associated with excessive consumption of alcohol over an extended period of time. The term "alcohol abuse" will be used to describe patterns of excessive, chronic, unhealthy consumption of alcohol.

While neuropathy more frequently manifests as somatic symptoms, autonomic dysfunction, which affects both the parasympathetic and sympathetic nervous systems, is another significant kind of neurological impairment in the context of alcohol misuse.[4] Autonomic dysfunction is of therapeutic importance since it is linked to higher mortality even in the absence of subjectively observed symptoms. Alcohol-related autonomic dysfunction's characteristics are currently in dispute in the literature, and its specifics have not yet been well analyzed.[5]

The motivation for this study was that previous studies on autonomic function have been performed on patients with cirrhotic liver disease, and the majority of comparisons have been based on classic cardiovascular reflex tests between alcoholics and non-alcoholics. But the present study was conducted to compare the autonomic nervous system function between patients with alcoholic and non-alcoholic backgrounds by using short-term blood pressure changes and heart rate variability (HRV) and to determine if any correlation exists.

Materials and Methods

The study was conducted on 80 patients (40 alcoholic- group 1 and 40 non-alcoholic-group 2) with age ranged from 31-50 years and were recruited from Out-patient Department of Medicine, of a tertiary care hospital. There were 17 females and 63 males in patients. In alcoholic only males were present since alcoholic females do not attend OPD due to social stigma/ culture.

Inclusion criteria:

Patients aged 31 to 50 years old, of either sex, history of alcohol consumption exceeding 210 grams per week in males and 120 grams per week in females for the past two years

Exclusion criteria:

- Patients with the following criteria to be excluded:
- Pregnancy
- Patients with history of other neurological or psychiatric illness.
- Patients with history of uncontrolled hypertension and diabetics.
- Patients with history of cardiac disorders (heart failure, arrhythmias, congenital heart disease and valvular heart disease).
- Patients with history of any endocrine disease (hypo and hyperthyroidism, Diabetes)
- Patients with history of autoimmune disorders or collagen disease.
- Patients with any significant visual loss or hearing impairment.

The study excluded patients with a history of hepatitis, or who used drugs that may affect blood pressure or HRV (eg., phenytoin, amiodarone, propranolol, methyldopa etc.,) Controls were healthy as reported by history, physical examination, and none of them had consumed alcohol or were on medications (self-reported).

The study was approved by Institutional Ethics Committee and prior to participation for the study, the purpose of the study was explained to all the subjects and informed written consent was taken.

Sample Size

Formula for sample size determination:

$$n=\left(1+\frac{1}{k}\right)\left[\sigma\frac{\left(\frac{Z\alpha}{2}+Z-\beta\right)}{\mu A-\mu B}\right]^2$$

n = sample size
α = 0.05 confidence level- 95%
β = 0.2 80PC POWER
σ = hypothesized standard deviation of difference
Deniz Yerdelen et al [20] and Ratna Manjushree Jayarama et al [21] have studied autonomic functions in Alcoholies.

Taking the above references and values into consideration and applying them into the formula, taking confidence level- 95%, power of study-80% the minimum sample size comes out to be 36, so we will take 40 as sample size.

Methodology

Demographic details like Age and Sex were recorded for both the groups. All the subjects were asked to come to Autonomic Laboratory in Physiology department. All tests conducted in the Autonomic Function Test (AFT) lab of the Department of Physiology, LHMC & SSK Hospital, and New Delhi.

All the tests carried out under thermo-neutral conditions and at the same time of day on all subjects i.e. in the morning hours in order to avoid response differences due to circadian changes. The subjects instructed to abstain from stimulants such as tea, coffee, smoking, alcoholic beverages prior to the day of the test and asked to have light breakfast in the morning. The equipment used for these tests are BIOPAC MP 150 and Student's Physiograph.

Body weight and height were assessed by using a standardized weighing machine and height scale. The recording of blood pressure both (SBP and DBP) variability was done at Basal, 1 minute and 2 minutes undergoing isometric exercises and cold pressor test and the readings are recorded in a controlled ambient temperature of 23° C to 25°C. The subject was asked to sit comfortably on chair to get the readings. The subjects were instructed to breathe regularly and calmly with normal breathing rate of 12-16 breaths per minute and stay awake to prevent artifacts in the recording of the Time domain parameters in Heart rate variability i.e the mean heart rate, standard deviation of all R-R intervals (SDNN), root mean square of successive R-R interval differences (RMSSD), number of intervals differing by >50 ms from the adjacent interval (NN50), and percentage of NN50 (pNN50). The frequency-domain analysis was performed using a nonparametric method of Fast Fourier Transform (FFT). The power spectrum was subsequently quantified into standard frequency-domain measurements as defined previously, [22] including total variance, LF (0.04–0.15 Hz), HF (0.15–0.40 Hz), LF/HF. The 0.15-0.4 Hz band of R-R power considered as high frequency (HF) ,that reflects parasympathetic nerve activity to the heart, whereas 0.04-0.15 Hz considered as low frequency (LF) band is believed to reflect at least in part, sympathetic nervous activity to the heart. The ratio of LF: HF represents a measure of the balance of sympathetic and parasympathetic function. [23]

These domains denote overall blood pressure and vagal activity respectively. Under frequency-domain, low frequency (LF: 0.04–0.15Hz) and high frequency (HF: 0.15–0.40Hz) power in absolute values of power (ms2) and E:I ratio were calculated. The high frequency power denotes parasympathetic activity, low frequency denotes combination of sympathetic and parasympathetic input while E: I and Valsalvas indicates sympathovagal balance.

Standard battery of cardiovascular reflex tests used for the assessment of sympathetic and parasympathetic reactivity.[34] Sympathetic reactivity was assessed by systolic blood pressure response during lying to standing test (LST), and diastolic blood pressure response during isometric handgrip test (IHT). The parasympathetic reactivity was assessed by E:I ratio (expiration to inspiration) during deep breathing test (DBT), Valsalva ratio during Valsalva maneuver (VM), 30:15 ratio during lying to standing. The BP is measured whilst the subject is lying down and then after standing up.

Handgrip is maintained at 30% of the maximum voluntary contraction using a handgrip dynamometer up to a maximum of 3min. The difference between the diastolic BP before release of handgrip and just before starting is taken as the measure of response.

The tests include:

Measurement of heart rate variability (HRV): for quantifying the tone of the autonomic nervous system to the myocardium.

Standard Ewings battery of cardiovascular reflex tests: for testing cardiovascular autonomic reactivity.

Protocol of tests:

Lying to standing test (LST): The supine blood pressure was measured and the subject will be asked to acquire a standing position in 3 sec. The maximum fall of systolic blood pressure within 5 min of orthostasis will be noted.

The 30:15 ratio was calculated from the maximum RR interval at around 30 sec and minimum RR interval at around 15 sec. A fall of less than 10 mmHg in systolic blood pressure and 30: 15 ratio more than 1.04 is considered normal.

Deep breathing test (DBT): A baseline recording of ECG was done for 30 sec. The patient was visually guided to breathe slowly and deeply at 6 cycles per minute. The E:I ratio was calculated from largest RR interval during expiration and smallest RR interval during inspiration. The average value of 6 cycles computed for each subject. E: I ratio of >1.21 is considered normal.

Valsalva maneuver (VM): The baseline ECG was recorded. The subject instructed to blow into a mouthpiece attached to sphygmomanometer to raise the pressure to 40 mmHg for 15 sec. The Valsalva ratio calculated from the maximal RR interval during phase IV and smallest RR interval during phase II. VR ratio >1.21 is considered normal.

Handgrip test (HGT): The baseline blood pressure measured. The subject asked to hold the handgrip dynamometer at 30 percent of their maximum voluntary contraction (MVC) for 3 min. The rise in diastolic pressure during the test will be measured. A rise of more than 10 mmHg in diastolic blood pressure is considered normal.

Heart rate variability:

All the subjects were made to lie down in a supine position. The electrodes for recording the ECG, in lead II will be placed. The subjects will be allowed to rest for 10-15 minutes following which the ECG was recorded for 5 minutes. During recording subjects instructed to close the eyes and to avoid talking, movement of the body, coughing, sleeping. Both time and frequency domain parameters determined.

Time-domain analysis: Parameters recorded by time-domain analysis were the mean heart rate, standard deviation of all R-R intervals (SDNN), root mean square of successive R-R interval differences (RMSSD), number of intervals differing by >50 ms from the adjacent interval (NN50), and percentage of NN50 (pNN50).

The frequency-domain analysis was performed by using a nonparametric method of Fast Fourier Transform (FFT). The power spectrum was subsequently quantified into standard frequency-domain measurements as defined previously,[32] including total variance, LF (0.04–0.15 Hz), HF (0.15–0.40 Hz), LF/HF. The 0.15-0.4 Hz band of R-R power considered as high frequency (HF) reflects parasympathetic nerve activity to the heart, whereas 0.04-0.15 Hz considered as low frequency (LF) band is believed to reflect at least in part, sympathetic nervous activity to the heart. The ratio of LF: HF represents a measure of the balance of sympathetic and parasympathetic function.[33]

Statistical Analysis

The data was entered in MS Excel and Statistical Package for Social Sciences (SPSS) version 25. The statistical analysis was done by applying descriptive statistics i.e., mean ± S.D. Comparison of blood pressure indices between patients was done by using unpaired Student's t test.

Correlation of HRV indices in patients with alcoholic and non-alcoholic was made by using Spearman's rho correlation test. For qualitative data, Chi-square test will be applied and Pearson / Spearman correlation done. The level of significance will be considered as $P<0.05$.

Results

Table 1: Demographic and Clinical characteristics among groups

Variables	Alcoholic (40)	Non-Alcoholic (40)	p-value
Mean age	47.3±6.2	46.3±4.5	0.19
Mean E:I ratio	1.23±0.192	1.52±0.20	0.11
Mean Valsalva	1.02±0.02	1.31±0.24	0.21
Mean 30:15 ratio	1.34±0.32	1.16±0.14	0.09
Weight (kg)	65.03±9.57	64.67±9.86	0.14
Height (cm)	158.76±4.22	157.16±4.28	0.17
BMI	25.97±3.01	26.15±3.65	0.31

As per table 1 the demographic profile of alcoholic and non-alcoholic with clinical ratio. The mean age, weight, height and BMI showed no significant differences between alcoholic and non-alcoholic. There was no significant difference in clinical ratio between patients alcoholic and non-alcoholic.

Table 2: Comparison of Blood pressure between groups in terms of Isometric exercises

Variables	Alcoholic (40)			Non-Alcoholic (40)			p-value
BP	Basal	1 min	2 min	Basal	1 min	2 min	
SBP	136.4±10.7	158±15.07	163.1±18.7	126.4±9.8	144±12.6	153±9.8	0.01
DBP	88.9±8.5	106.5±8.7	109±9.6	82.7±6.8	97±8.5	102±6.4	0.01

As per **table 2** during isometric exercises there were significant changes in mean systolic and diastolic blood pressure. The pressure is recorded at Basal level, 1 minute and 2 minutes interval which shows constant increase in systolic and diastolic blood pressure and it was statistically significant($p<0.05$). But in group comparison the constant increase in SBP and DBP after isometric exercises was higher in alcoholics as compares to non-alcoholics and it is significant.

Table 3: Comparison of Blood pressure between groups in terms of Cold Pressor test

Variables	Alcoholic (40)			Non-Alcoholic (40)			p-value
BP	Basal	1 min	2 min	Basal	1 min	2 min	
SBP	135±14.8	147.5±12.9	153.5±13	126.4±9.8	137±9.8	148±11.2	0.01
DBP	80.4±8.8	105±7	110.8±5.8	82.2±5.8	98±6	101.4±6.8	0.01

As per **table 3** during cold pressor test there were significant changes in mean systolic and diastolic blood pressure. The pressure is recorded at Basal level, 1 minute and 2 minutes interval which shows constant increase in systolic and diastolic blood pressure and it was statistically significant($p<0.05$). But in group comparison the

constant increase in SBP and DBP after cold pressor test was higher in alcoholics as compares to non-alcoholics and it is significant.

Table 4: Correlation of Heart rate variability between groups

Parameters	Non Alcoholic	Alcoholic	p Value
SDNN (ms) (Mean ± SD)	38.90 ± 22.14	41.71 ± 20.81	0.645
RMSSD (ms) (Mean ± SD)	39.20 ± 25.14	64.11 ± 156.74	0.437
pNN50 (%)	13.37 ± 17.94	18.56 ± 20.42	0.496

Time domain parameters

HRV - heart rate variability; SDNN - standard deviation of the normal to normal R- to-R interval; RMSSD - square root of mean squared differences of successive NN intervals; pNN50; ms - millisecond; *p value<0.05, statistically significant LF – low frequency; HF – high frequency; Alcoholic group showed higher mean LF, HF and Total power (TP) as compared to - Non Alcoholic group

Time Domain Parameters - Comparison of mean LF, HF and Total power in between patients of Alcoholic and Non Alcoholic groups statistically significant Table 4. In Non-alcoholic group, SDNN (38.90 ± 22.14 vs 41.71 ± 20.81 ms, p=0.645), RMSSD (39.20 ± 25.14 vs 64.11 ± 156.74 ms, p=0.437) and pNN50 (13.37 ± 17.94 vs 18.56 ± 20.42, p=0.496) were lower than in Non- alcoholic group as depicted in Table 4

Frequency Domain Parameters

Table 5:

Parameters	Non Alcoholic	Alcoholic	p Value
LF (ms2) (Mean ± SD)	595.81 ± 597.08	614.20 ± 604.89	0.823
HF (ms2) (Mean ± SD)	832.52 ± 1356.70	1190.68 ± 1330.87	0.148
LF/HF (ms2) (Mean ± SD)	1.11 ± 0.69	0.91 ± 0.77	0.162
Total Power (ms2) (Mean ± SD)	1845.27 ± 1550.38	2447.93 ± 2215.03	0.308

HRV- heart rate variability; LF – low frequency; HF- high frequency; LF/HF – ratio; ms² - millisecond squared; *p value<0.05, statistically significant, Non Alcoholic showed higher LF:HF ratio as compared to Alcoholic. Comparison of mean LF/HF between patients of Non Alcoholic and Alcoholic group. Frequency domain parameters -like LF (614.20 ± 604.89 ms2 vs 595.81 ± 597.08 ms2, p=0.823) and HF (1190.68 ± 1330.87 ms2 vs 832.52 ± 1356.70 ms2, p=0.148) were higher for alcoholic group compared to non-alcoholic group also the total power (TP) for alcoholic group was higher compared to non-alcoholic group (2447.93± 2215.03 ms2 vs 1845.27 ± 1550.38 ms2, p=0.308) as depicted in Table 5. The LF/HF ratio in non- alcoholic group was higher than in alcoholic group (1.11 ± 0.69 vs 0.91 ± 0.77, p=0.162) as depicted in table 5, although these differences were not significant Table 5.

Discussion

Numerous epidemiological and observational studies have examined the relationship between alcohol consumption and BP or hypertension. Most of these studies have shown that habitual drinkers have higher blood pressure and are more likely to suffer from hypertension than non-drinkers. These associations have been observed regardless of race, gender, age and the type of alcohol. Although some studies suggest the presence of a threshold regarding the pressure effect of alcohol. The relationship between the level of alcohol consumption and BP is usually linear.

In cross-sectional studies, the systolic BP increased by 3–4 mm Hg and diastolic BP increased by 1–2 mm Hg per three drinks per day (one drink contained 10–15 ml, or 8–12 g of alcohol).1 Intake of 10 ml per day of alcohol, therefore, seems to elevate the systolic BP by about 1 mm Hg in humans. It has been estimated that about 10% of hypertension in the general population can be attributed to alcohol. The relationship between alcohol and blood pressure appears to be independent of confounding factors. Increases in body weight and abdominal fat are associated with alcohol consumption. However, this increase in body weight and abdominal fat may have a role in alcohol-related hypertension. [6,7]

The hypertensive effect of alcohol has also been shown in longitudinal studies that reported that the probability of the development of hypertension in heavy drinkers (alcohol consumption ^46 g per day) was about twice that of the rest of the population after a 12-year follow-up among normotensive men. Few studies showed that the consumption of alcohol at ^30 g per day was an independent risk factor among participants in the Atherosclerosis Risk in Communities (ARIC) study and also observed that the risk for hypertension increased in a dose-dependent manner with increases in alcohol intake among Japanese men in a longitudinal study.[8,9,10]

Although epidemiological studies have clearly shown the hypertensive effect of alcohol, most studies did not consider the time-related effect of

alcohol on blood pressure. This fact may be important because Blood Pressure measurement has been carried out during the daytime, whereas alcohol is usually consumed at night. Despite this evidence supporting poor vagal ANS functioning in alcoholism, in our experiment, we cannot completely confirm abnormal vagal modulation in recently sober alcoholic men and women. In previous studies, we have found that the decreased variance in the E:I ratio has been explained in part by the overall reduction in the E:I ratio, which explains the non-significant variation in BP in alcoholics. Without direct measures of vagal functioning, we cannot conclude that in alcoholics there is a selective reduction in vagal outflow and thus a specific fall in the BP component. However, even if not selective, the fall in HF activity may still be due to a vagal factor mediating the overall drop in HRV.[11,12,13]

In a study, it was found strong associations of both lower cardiovagal tone and baroreceptor sensitivity (BRS) with increased hepatic fat content. They also reported an inverse association between liver fat content and several vagus-modulated HRV indices as well as lower BRS.[14,15] The hepatoportal vagal sensing of lipids may play a role in the pathophysiology of metabolic abnormalities such as hepatic insulin resistance apart from reflex regulation of feeding behaviour. Elevated levels of free fatty acids in the portal vein decrease insulin clearance by the liver and those who display a better ability to clear fat from the liver would be at lower risk of developing hepatic complications. Therefore, preserved vagal activity could be protective in the context of hepatic fat accumulation.[16,17,18]

Autonomic changes are associated with significantly higher blood pressure in alcoholics as compared to Non-alcoholics. No significant difference in Valsalva and E: I ratio has been observed between alcoholics and non-alcoholics. Increased blood pressure has been documented to be associated with cardiovascular events and poor prognosis. Hence, assessment of autonomic function should be given due importance in the management of alcoholics to help in improving the prognosis. The time and frequency domain parameters of HRV, namely SDNN and LF/HF ratio, are widely accepted as accurate predictors of cardiac autonomic status. [15] The standard deviation of the mean of R-R intervals (SDNN) represents a general measurement of autonomic nervous system balance. [15] In our study, the Non-Alcoholic group showed a decreased value of SDNN (38.90 ± 22.14 ms) as compared to the Alcoholic group (41.71 ± 20.81 ms), the trend being statistically not significant (p=0.645).RMSSD (root mean square of successive differences), which represents parasympathetic activity, was increased in Alcoholic (64.11 ± 156.74 ms) and 39.20 ± 25.14 ms for Non-Alcoholic) but the difference was not statistically significant (p=0.437).

The percentage of R-R intervals differing from each other by more than 50 ms, or pNN50, predominantly reflects parasympathetic activity. In our study, the alcoholic group had a decreased value of pNN50 (mean=13.37 ± 17.94) as compared to the Non-Alcoholic group (mean=18.56 ± 20.42), but this was not statistically significant (p=0.496). The findings in the time domain parameters imply a reduction in vagal activity in alcoholic

In the frequency domain, spectral analysis of R-R intervals can detect two major components: the high-frequency component (HF) of physiologic HRV (spectral components in the band from 0.16 Hz to 0.5 Hz), and the low-frequency (LF) component (spectral band from 0.04 Hz to 0.15 Hz). The former is modulated predominantly by the parasympathetic nervous system, whereas the latter is under the influence of both the parasympathetic and sympathetic systems.

In our study, the values in the LF band did not show a statistically significant difference (p=0.823) between the non-alcoholic and alcoholic groups (mean=595.81 ± 597.08 ms2 and 614.20 ± 604.89 ms2 respectively). Similarly, the HF band also did not show a statistically significant difference (p=0.148) between Non- Alcoholic group (mean=832.52 ± 1356.70 ms2) and Alcoholic group (mean=1190.68 ± 1330.87 ms2), though the values in Non-alcoholic showed a fall from the alcoholic group. The LF/HF ratio in the present study showed a higher value in the Non-Alcoholic group (mean=1.11 ± 0.69) as compared to the alcoholic group (mean=0.91 ± 0.77) but it was not statistically significant (p=0.162). This shows that overall; there was a parasympathetic deficit and predominance of the sympathetic modulation of the heart in the Alcoholic group as compared to the non-alcoholic group. The total power showed a marked decrease in the Non-Alcoholic group (1845.27 ± 1550.38 ms2) as compared to the Alcoholic group (2447.93 ± 2215.03 ms2) with a statistically insignificant (p=0.308). Bearing similarity with our observations, a study by Gass et al. [17] examined the HRV and found a reduced variability of the consecutive RR intervals in Non-Alcoholic, which reflects sympathetic overdrive and a reduced parasympathetic tone in Alcoholics. Yerdelen et al. [18] Examined a recovery in heart rate after exercise as an index of vagal parasympathetic activity in Non-Alcoholic and Alcoholic patients and controls and showed that sympathetic tone was increased in Alcoholics, although the parasympathetic function was not impaired in Non-Alcoholic and Alcoholic patients.

Our findings correlate with the above studies, that is, fall in SDNN, RMSSD and pNN50 in Non-Alcoholic, but these were statistically not significant.

Thus, regular HRV monitoring of Non-Alcoholic and Alcoholic patients may significantly improve the early detection of risk for the occurrence of stroke and cardiovascular events in the future. HRV can be used as a screening tool to detect autonomic (Sympathetic) dysfunction in both Non-Alcoholic and Alcoholic groups than in the Alcoholic group, suggesting that the sympathetic tone was increased compared to the parasympathetic in Non-Alcoholic. However, this was not significant.

Therefore, we conclude from the results that, in addition to the usual treatment practices for Non-Alcoholics and Alcoholics, which include regular exercise and medication, regular monitoring of HRV can be very useful in predicting cardiovascular risk for these patients.

Conclusion

All time domain parameters of the HRV (RMSSD, SDNN, pNN50) showed a decrease in the group of Non Alcoholics that was not statistically significant. In frequency domain, Total power showed a decrease in patients with Non Alcoholic. This showed that the overall sympathovagal modulation decreased in the group with Non Alcoholic compared to the group with Alcoholic. Although HF was reduced, the LF/HF ratio was increased in the Non-Alcoholic Patients.Further studies with an increased sample size are required to get a deeper insight.

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