International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

ISSN:2347-6567

IJAMSCR |Volume 7 | Issue 1 | Jan - Mar - 2019
www.ijamscr.com

Research article *Medical research*

The De Ritis (AST/ALT) ratio in alcohol dependence syndrome with and without alcoholic liver disease

Dev Shanker Yadav[1] M.Sc., Dr. Johnson Pradeep[2] MD, Dr.Vinod G. thykadavil l[3] P.hD.

[1]*M.Sc. MLT, Department of Biochemistry, St. John Medical College, Banglore-34, India*
[2]*Associate Professor, Department of Psychiatry, St. John Medical College, Banglore-34, India*
[3]*Associate Professor, Department of Biochemistry, St. John Medical College, Banglore-34, India*
***Corresponding Author**: **Dev Shanker Yadav**
Email id: dev2010shanker@gmail.com

ABSTRACT

Introduction

Alcoholism is characterized by an impaired control over drinking, preoccupation with alcohol and use of alcohol despite adverse consequences. Alcohol consumption is associated with a number of changes in cell functions and the oxidant-antioxidant system.

Aim and objectives

The main aim of the study is to estimate the Serum AST, Serum ALT, De Ritis ratio (AST/ALT ratio) and GGT in ADS with and without alcoholic liver disease patients.

Material and methods

It was a cross-sectional study performed in alcoholic patients in inpatients of the department of Psychiatry, at St. John's Medical College and Hospital. The total sample size was 60, out of which 30 were ADS subjects with alcoholic liver disease and 30 were ADS subjects without liver disease. The parameters including AST, ALT, GGT and BMI were performed on each groups and then compared statistically by Mann Whitney U test. Laboratory parameters were also correlated with alcohol related clinical variables.

Result

The analysis revealed a significantly elevated AST, AST/ALT ratio and GGT in ADS with ALD group than without ALD group; however there was no significant difference in ALT between both the groups.

Conclusion

This study has highlighted the importance of not only the individual markers such as AST or ALT but also the ratio of them. In the future, a combination of markers should be use to improve the specificity and sensitivity of these markers in identifying early damage of liver in Alcoholism. This will help in prevention of alcoholic cirrhosis which is the end stage of liver damage.

Keywords: Alcoholism, Liver Cirrhosis, Alcoholic Hepatitis, AST, ALT, GGT, BMI etc.

INTRODUCTION

Alcoholism is one of the most frequent substances of abuse among people leading to increased mortality. Alcohol intake causes a number of metabolic changes and disturbs homeostasis of macro- and micro-elements in the body. [1]

Alcohol dependence syndrome (ADS) is described as a cluster of physiological behavioral and cognitive phenomena in which the use of alcohol takes a much higher priority for a given individual than other behaviors that once had a greater value.

A National House hold survey conducted in India for estimating the extent of substance dependence for alcohol and opiates between March 2000, showed the prevalence of alcohol to be 21.4%, opium 0.4%, other opiates 0.1%, cannabis 3.0% and heroin 0.2%. [2] Although the prevalence of alcohol use in India has been calculated at 30% there has been a rapid and noticeable increase in the rates of alcohol use in the Indian population as a whole. [3]

Chronic alcoholism is the most psychoactive substance abuse after caffeine. Chronic alcoholism is a major public health problem and causes multi-organ diseases and toxicity. Although the liver metabolizes the majority of alcohol ingested, it has intoxicating effects in the brain. Chronic alcohol intake is associated with several degenerative and inflammatory processes in the central nervous system. Evidence is accumulating that intermediates of oxygen reduction may be associated with the development of alcoholic diseases. [4]

Alcohol consumption is associated with the number of changes in cell functions, oxidant-antioxidant system, body weight, BMI, percentage body fat. Hematological and biochemical parameter are also effected. Enzyme AST/ALT are protein that helps cells do their works, when cells are injured, enzyme tends to leak into the blood stream to produce higher than normal levels, in various clinical conditions like liver disease, jaundice, hepatitis, necrosis, cirrhosis, nephritic syndrome and malnutrition. Studies have also found that alcohol dependence syndrome patients without alcohol liver disease do not have high AST/ALT ratio. [5] We would like to study this hypothesis in our patient's population.

Physician have long sought for an accurate and inexpensive means to distinguish alcoholic liver disease from the non-alcoholic one as it has important implication for treatment and management. Several markers for high alcohol consumption per se have been studied example: carbohydrate deficiency transferrin (CDT), gamma glutamyl transferase (GGT) and Aspartate aminotransferase (AST) most have fairly low sensitive. [6]

MATERIAL AND METHODS

The study of AST, ALT and their ratio in alcohol dependence syndrome with and without alcoholic liver disease was performed on blood sample from inpatients department of psychiatry in St. John's Medical College Hospital.

Number of subjects chosen for study

60 patients of male group.

Subject population: 30 patients with known history of alcohol dependence syndrome with alcoholic liver disease.

Control population: 30 patients with known history of alcohol dependence syndrome without alcoholic liver disease.

Inclusion criteria

Consecutive alcohol dependence consenting subjects between 18-60yrs admitted in psychiatry ward for de-addiction with and without liver disease were recruited into the study.

Exclusion criteria

- Subjects with alcohol delirium, seizures, hepatic encephalopathy and chronic psychiatric disorders
- Subjects with multiple substance abuse
- Patients too ill to co-operate the study
- Subjects having history of blood loss or malena
- Chronic liver disease without alcoholism

Preparation of subjects

Patients were selected based on the criteria. They were administrated in a questionnaire to get detail about socioeconomic demographic data and alcohol intake details.

Anthropometric measurements

Body weight and height of the participants were measured in the standing position without shoes. BMI was calculated as weight in kilogram divided by the square of the height in meters. BMI was determined from the pre-formed BMI chart.

PROCEDURE

Patients were selected based on criteria. Blood samples were collected by venipuncture. The serum was separated and evaluated for total serum AST and ALT, GGT on Dade RxL System.

STATISTICAL METHOD

The data was not normally distributed. Hence median and interquartile ranges were used. Descriptive statistics was used to describe the sociodemographic data Independent sample t test (Mann Whitney U test) was used to show the difference between the groups. Spearman's Correlation was used for correlation analysis. SPSS version 15 software was used for the analysis. Probability value less than 5% was considered as statistically significant.

RESULT

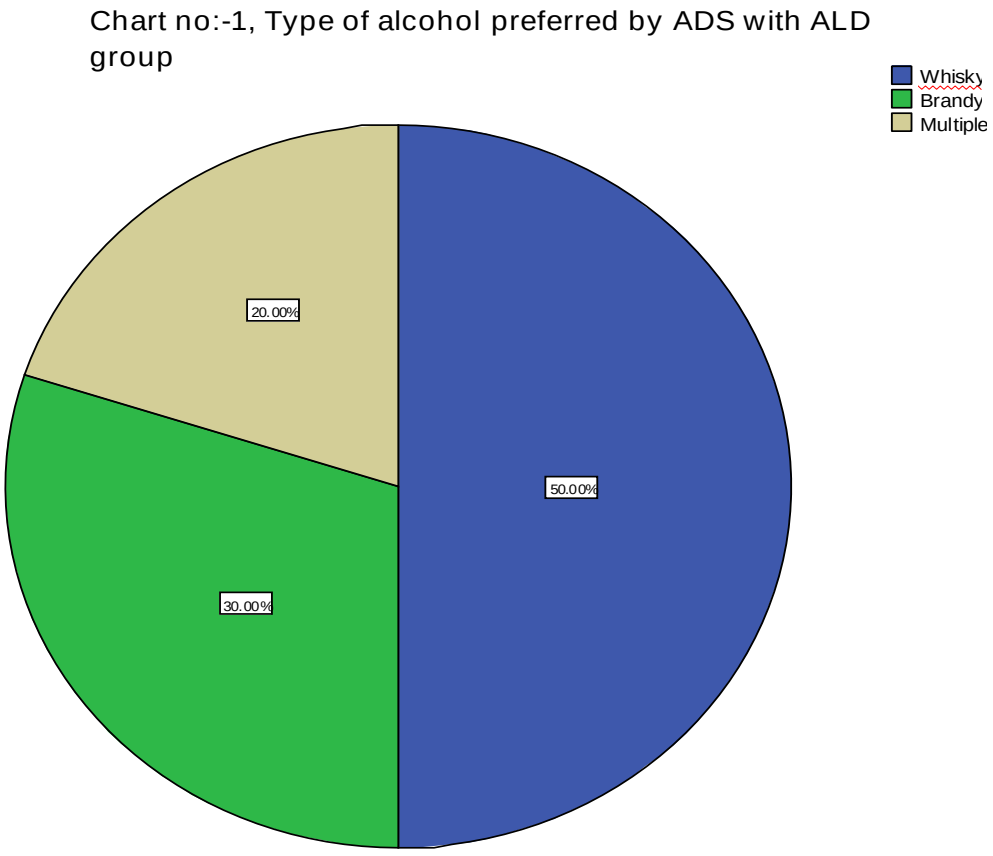

Chart No:--2 Preferred type of Alcohol in ADS without ALD

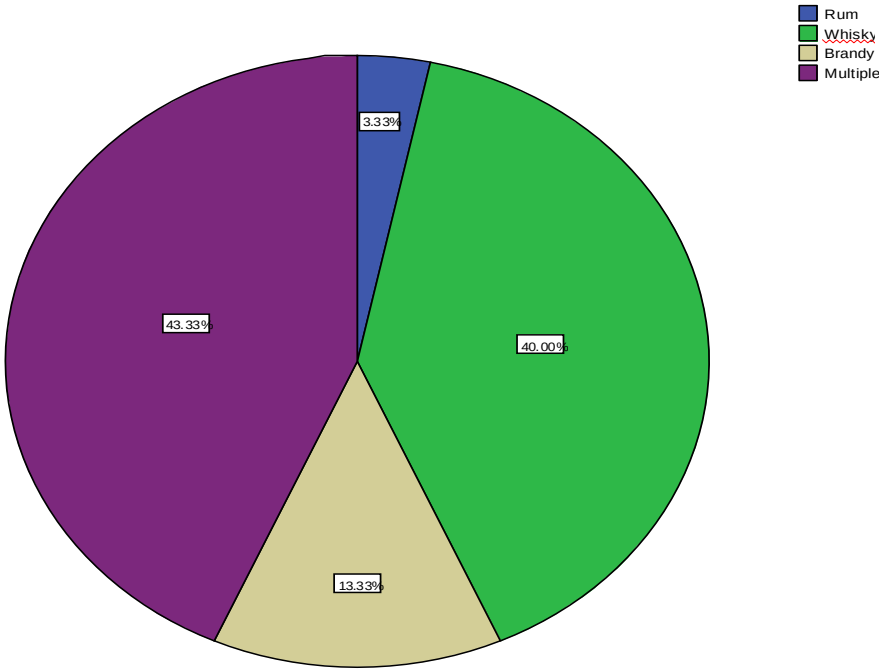

Table 1. Showing the sociodemographic data of both the groups

	ADS without ALD	ADS with ALD
Age	45.5 (36 to 51.25)	44.50 (40 to 49)
BMI	20.73 (18.80 to 23.87)	23.75 (21.20 to 26.86)
Family Size	4 (3.75 to 5)	5 (3.75 to 5.25)
Income	8500 (4000 to 20,000)	7500 (4750 to 10000)
Age of onset of starting	20 (19.5 to 28.25)	21 (18 to 25.75)
Quantity of Alcohol	300ml (180 to 360)	180 (172.5 to 360)

There was a significant difference in the BMI of both the groups (Table no.1) and hence, the data was controlled for the same.

Table 2. Shows the difference in LFT between the ADS groups with and without ALD

LFT	ADS with ALD (n=19)	ADS without ALD (n=25)	P value
AST	127 (78 to 184)	40 (27.5 to 48)	0.001
ALT	47 (30 to 86)	40 (29.5 to 52)	0.072
Ratio	2.30 (1.33 to 3.04)	0.95 (0.58 to 1.32)	0.001
GGT	195 (67 to 431)	75 (40 to 105)	0.016

Mann Whitney U test used. Data expressed in Median and Interquartile ranges (25^{th} percentile to 75^{th} percentile)

Mann Whitney U test was used to evaluate the difference in the LFT between the ADS with ALD group and without ALD group. The analysis revealed a significantly elevated AST, AST/ALT ratio and GGT in ADS with ALD group than without ALD group; however there was no significant difference in ALT between both the groups as shown in Table 2.

Table: - 3 showing the correlation of variables in ADS without ALD group

Correlations

			AST	ALT	Ratio	GGT	Age of starting	Quantity
Spearman's rho	AST	Correlation Coefficient	1.000	.262	.677**	.252	.146	.101
		Sig. (2-tailed)	.	.162	.000	.179	.441	.595
		N	30	30	30	30	30	30
	ALT	Correlation Coefficient	.262	1.000	-.489**	.471**	.183	.372*
		Sig. (2-tailed)	.162	.	.006	.009	.334	.043
		N	30	30	30	30	30	30
	Ratio	Correlation Coefficient	.677**	-.489**	1.000	-.169	.075	-.164
		Sig. (2-tailed)	.000	.006	.	.371	.694	.387
		N	30	30	30	30	30	30
	GGT	Correlation Coefficient	.252	.471**	-.169	1.000	.054	.118
		Sig. (2-tailed)	.179	.009	.371	.	.775	.536
		N	30	30	30	30	30	30
	Age of starting	Correlation Coefficient	.146	.183	.075	.054	1.000	.126
		Sig. (2-tailed)	.441	.334	.694	.775	.	.505
		N	30	30	30	30	30	30
	Quantity	Correlation Coefficient	.101	.372*	-.164	.118	.126	1.000
		Sig. (2-tailed)	.595	.043	.387	.536	.505	.
		N	30	30	30	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In the ADS without ALD group (Table no.3), AST correlated positively with Deritis ratio (r = .677, P =0.001). ALT correlated positively with GGT (r = .471, P =0.009) and quantity of alcohol use (r = 0.372, P =0.043); while it correlated negatively with Deritis ratio (r = - .489, P =0.006). Deritis ratio correlated positively AST (r = .677, P =0.001)

Table 4 showing the correlation of variables in ADS with ALD group

Correlations

			AST	ALT	Ratio	GGT	Age of starting	Quantity
Spearman's rho	AST	Correlation Coefficient	1.000	.829**	.345	.395*	.025	.275
		Sig. (2-tailed)	.	.000	.062	.031	.896	.141
		N	30	30	30	30	30	30
	ALT	Correlation Coefficient	.829**	1.000	-.146	.463*	.028	.265
		Sig. (2-tailed)	.000	.	.440	.010	.881	.156
		N	30	30	30	30	30	30
	Ratio	Correlation Coefficient	.345	-.146	1.000	.064	-.148	.190
		Sig. (2-tailed)	.062	.440	.	.737	.435	.315
		N	30	30	30	30	30	30
	GGT	Correlation Coefficient	.395*	.463*	.064	1.000	-.531**	.387*
		Sig. (2-tailed)	.031	.010	.737	.	.003	.034
		N	30	30	30	30	30	30
	Age of starting	Correlation Coefficient	.025	.028	-.148	-.531**	1.000	-.255
		Sig. (2-tailed)	.896	.881	.435	.003	.	.174
		N	30	30	30	30	30	30
	Quantity	Correlation Coefficient	.275	.265	.190	.387*	-.255	1.000
		Sig. (2-tailed)	.141	.156	.315	.034	.174	.
		N	30	30	30	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In the ADS with ALD group (Table no.4), AST correlated significantly with ALT (r = 0.829, P =0.001) and, GGT (r = 0.395, P =0.001) using Spearman correlation; while ALT correlated significantly with GGT (r = 0.463, P =0.001). There was also a significant correlation between

GGT and quantity of alcohol (r = .387, p =0.034) and a negative correlation with age of starting alcohol use (r = - .531, p = 0.003).

DISCUSSION

This was a comparative study of Deritis ratio in alcohol dependence syndrome with and without alcohol liver disease in a hospital based subjects. The mean age of our subjects was 45 yrs and had an age of onset of alcohol use by 20 yrs (early onset of alcoholism). Most of our subjects have studied up to secondary educational level and were married. The average amount of alcohol consumption was increased in the ADS without ALD and lesser in the other group. This reinforces the theory that ADS group who are more vulnerable for liver disease react to even lower levels of alcohol use and leads to liver injury faster. The ADS with ALD group (Chart no. 1) preferred predominantly Whisky (50%) while the other group preferred a mixed type of beverage. This is in consonance with a report by WHO study where the predominant use was Whisky in urban Bangalore [7]

AST was significantly elevated in the ADS with ALD group, while the ALT was not significantly elevated. This leads us to an important question of whether single or multiple lab markers are needed to predict alcohol induced liver disease. Most authors prefer a combination of lab markers rather than single lab markers such as AST, ALT, Mean Corpuscular volume (MCV) and gamma glutamyl transferase (GGT). But most of them have low specificities and low sensitivity (Conigrave et al., 2002)[6]. Hence the important of a combination of markers or ratio's using the lab markers have been found be very cost effective and useful. Increased AST in relation to ALT has been called as Deritis ratio. The predominance of AST over ALT in alcohol-related liver disease was first reported by Harinasuta et al. in 1967. [8] However, it became more widely recognized only with the paper by Cohen and Kaplan in 1979. The diagnostic significance of a high AST/ALT ratio for alcoholic liver disease was recently underscored in the Practical Guidelines for Alcoholic Liver Disease published by the American College of Gastroenterology in 1998 (McCullough and O'Connor, 1998) [9].

The Deritis ratio of more than 1.5 indicates that the cause of liver disease is mainly due to alcohol (Correia *et al*., 1981; Salaspuro, 1987) [10, 11]. In our study, only ADS subjects with ALD had Deritis ratio of more than 2.30; which was significantly more compared to those without ALD. This assumes importance of Deritis ratio in ADS with ALD. Increased Deritis ratio is usually seen in advanced stage of alcoholism compared to early use; even though some authors report that it is sensitive during any phase of alcoholism [12]. This assumes importance since the mortality with alcoholic cirrhosis peaked in patients aged 45 to 54 years [13]. Some of the theories for a high AST/ALT ratio are reduced hepatic ALT, depletion of pyridoxal 5-Pyrophosphate in the livers of alcoholics and increased mitochondrial damage leading to increased mitochondrial activity of mitochondrial aspartate (Matloff *et al*., 1980; Diehl *et al*., 1984; Nalpas *et al*., 1984) [14, 15, 16].

Even though there was a significant differences in the Deritis ratio between both the groups; there was no correlation with AST or ALT. AST correlated significantly with ALT (r = 0.829, P =0.001) and GGT (r = 0.395, P =0.001); ALT correlated significantly with GGT (r = 0.463, P =0.001) in the ADS with ALD group. There was also a significant correlation between GGT and quantity of alcohol (r = .387, p =0.034) and a negative correlation with age of starting alcohol use (r = - .531, p = 0.003). Also there was a significant difference in GGT between both the groups, highlighting the importance of GGT as a lab marker of alcoholism.

In the ADS group, AST was correlating with the Deritis ratio but there was no correlation with ALT. However, the ALT was correlating negatively with Deritis ratio, positively with GGT and Quantity of alcohol. This highlights the important of Deritis ratio even in the ADS group without ALD. Not only has a combination of lab markers used but questionnaires also had been combined to improve the sensitivity and specificity. In a study by Dolman et al (2005) [17], they found that using a combination of AUDIT, AST and GGT, the sensitivity increased to sensitivity 70.6%, specificity 98.8%, PPV 54.5% and NPV 99.4% compared to other combinations.

CONCLUSION

This study has highlighted the importance of not only the individual markers such as AST or ALT but also the ratio of them In the future, a combination of markers should be use to improve the specificity and sensitivity of these markers in identifying early damage of liver in Alcoholism. This will help in prevention of alcoholic cirrhosis which is the end stage of liver damage.

Acknowledgment

We acknowledge our sincere thanks to all colleagues, staff, Department of Biochemistry, psychiatry, Doctors who helps directly and indirectly to publish this research.

REFERENCES

[1]. Woodman R Ferrucci, Guraiink. J. Anemia in older adults. Curr Opin Hematol. 12, 2005, 123-28.
[2]. Ray R Mondal AB, Gupta K, Chatterjee A, Bajaj P. The extent pattern and trends of drug abuse in India: National survey. New Delhi. United Nations Office on Drugs and Crimes and Ministry of Social justice and empowerment Government of India.
[3]. Bengal V, Velayudhan A, Jain S, Social costs of Alcoholism: A Karnataka pertspective. NIMHANS Journal. 18(1 & 2), 2000, 67.
[4]. Das SK, KR. Hiran, S. Mukherjee and D. M Vasudevan. Oxidative stress in the primary event: Effects of ethanol consumption in brain. Ind. J. Clin. Biochem. 22(1), 2007, 99-104.
[5]. SK Das and D.M.Vasudevan, Biochemical diagnosis of Alcoholism Ind. J.Clin. Biochem, 20(1), 2005, 35-42.
[6]. Conigrave KM, Degenhardt LJ, Whitefield JB, Saunders JB., Helander A. and Tabakoff B. CDT, GGT & AST as markers of alcohol use Alcoholism: clinical & experimental Research 26, 2002, 332-39.
[7]. Burden and Socio-Economic Impact of Alcohol — The Bangalore study (Alcohol Control Series No. 1). World Health Organization 2006.
[8]. H.nyblom,U.Berggren,J.balladin and R.Olsson. High AST/ALT ratio may indicate advance alcoholic liver diseases rather than heavy drinking .alcohol and alcoholism 39(4), 2004, 336-339.
[9]. McCullough,A.J and O'Connor,J.F.B Alcoholic liver diseases :Proposed recommendation for the American College of Gastroenterology .The American journal of Gastroenterology 93, 1998, 2022-2036.
[10]. Correia,J.P.,Alves ,P.S and Camilo ,E.A.SGOT-SPGT ratio .Digestive diseases and Science 26, 1981, 284.
[11]. Salaspuro,M.Use of enzyme for the diagnosis of alcohol-related organ damaged Enzyme. 37, 1987, 87-107.
[12]. Majhi S. Baral N, Lomsal M, Mehta KD, Deritis ratio as diagnostic marker of ALD. 2006, PMID-16827089, Sharpe PC Bioichemical detection of monitoring of alcohol abuse and absteinence Ann Clin Bioch 38, 2001, 652-64.
[13]. MannRE, Smart RG, Govoni R. The epidemiology of alcoholic liver diseases. Alcholic Res Health. 27(3), 2003, 209-19
[14]. Maltoff, D.S.,Selinger,M.J. and Kaplan,M.M. Hepatic transaminase activity in alcoholic liver .Gastroenterology. 78, 1980, 1389-1392.
[15]. Dielhi,A.M.,potter,J.,Boitnott,vaDuyun,M.A.,Herlong,H.F. and Mezey,E. Relationship between pyrodoxal 5'-phosphate deficiency and aminotransferse level in alcoholic hepatics. Gasteroenterology, 86, 1984, 632-636
[16]. Nalpas,B.,Vassault,A.,LeGuillou,Lesgourgues.B.,Ferry.N.,Lacour.B.and Berthelot, P.serum activity of mitochondrial aspartate Aminotranferase: A sensitive marker of alcoholism with or without alcoholic hepatitis.Hepatoloy. 4, 1984, 893-896.
[17]. Jonath M.Dolman, Neil D.Hawkes. Combining the Audit questionnaire and biochemical Marker to assess Alcohol use and risk of alcohol withdrawal in medical inpatients. Alcohol and Alcoholism 40(6), 2005, 515-519.

How to cite this article: Dev Shanker Yadav, Dr. Johnson Pradeep, Dr.Vinod G.Thykadavil. The deritis (AST/ALT) ratio in alcohol dependence syndrome with and without alcoholic liver disease. Int J of Allied Med Sci and Clin Res 2019; 7(1): 163-169.