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A STUDY OF MCV AND LIVER FUNCTIONS IN ALCOHOLICS WITH AND WITHOUT LIVER DISEASE.

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ABSTRACT

Aim: To assess the levels and find out the usefulness of MCV and Liver Function Tests in alcoholics with and without liver abnormality.

Methods: Sixty-five male patients who fulfilled DSM V criteria for Alcohol Dependence Syndrome attending psychiatry OPD of age 15-45 years are selected. Patients who are on anti-epileptics, anti-diabetic medication, antibiotics are excluded. Patients who had a recent attack of myocardial infarction,who had liver diseases other than alcoholic liver dysfunction and significant anemia (Hb<10 gm%) are also excluded from the study.

Results: Among the total cases, MCV was increased in 55.3%, S, bilirubin in 67.6%,AST in 46.1%, ALT in 47.6% and ALP in 46.1% of cases. However, these tests are known to have high specificity but low sensitivity and are of high value only in presence of history of alcohol intake.

KEYWORDS : Alcoholics, liver disease, MCV.

INTRODUCTION

Alcohol abuse and alcohol dependence is a problem in both developed and developing countries. Up to one-third of all psychiatric patients are likely to have an alcohol problem that either caused or exacerbated the clinical condition.[1]. Though alcoholism is a self limiting disease, its toxic properties lead to pathological changes in various organs causing high mortality rates. Problems that are related to temporary alcoholism might be different from those of severe and recurring problems of alcohol dependence[1]. Only phase of drinking a larger or intoxicating amount or regular drinking with consumption of ethanol above 60 grams a day lead to a state that meet the criteria for a psychiatric disorder[1]. Apart from history taking, there is a need to diagnose the quantity of alcohol intake by reliable biochemical parameters. The available biochemical parameters are Mean Corpuscular Volume (MCV), Aspartate Amino Transferase (AST), Alanine Amino Transferase (ALT), Gamma Glutamyl Transferase, Uric acid, Carbohydrate Deficient Transferrin and Triglycerides. The newer markers are mitochondrial isoenzyme of AST and isoenzyme 4 of GGT.

MCV is a hematological test, which has been used as a marker for alcoholism. It takes 60 grams daily intake of absolute alcohol for more than 42 days for MCV to become abnormal and about 60- 90 days of abstinence for it to become normal. Other conditions in which MCV is increased are folate deficiency, vitamin B_{12} deficiency and other liver diseases[2].This study is aimed at assessing the levels and usefulness of MCV and Liver function tests in alcoholics with and without liver abnormality.

Lewis and Patton[3] analyzed various markers and concluded that the most sensitive ones are MCV & GGT in assessing alcohol liver disease. Chalmers et al[4] found that best discrimination between the groups was provided by combination of MCV,GGT & ALP. Skinner et al[5] found that abnormal values of MCV,GGT and high density lipoproteins had only moderate sensitivity for identifying alcohol problems but high specificity. Booker et al[6] concluded that the MCV,GGT and Transaminase were very insensitive when compared to CAGE questionnaire & MAST(Michigan Alcoholism Screening Test). Mathrubootham et al[7] concluded that MCV and GGT can be used as a supplement to questionnaires in the community surveys. Mundle et al[8] found that MCV as a marker for alcoholism was superior in women alcoholics. A J Levi &D M Chalmers[9] concluded that early detection of alcoholic liver disease can be enhanced by a high level of suspicion, wider recognition of the significance of a high MCV.

MATERIALS AND METHODS

Sixty-five male patients diagnosed as alcohol dependent according to the DSM-V criteria, utilizing psychiatric services at the Department of Psychiatry, ASRAM Medical college, Eluru. There were no controls since the study was a comparative study.

Inclusion criteria

Male patients aged between 15 to 45 years who fulfilled DSM-V criteria for alcohol dependence with first contact (who had not undergone detoxification for the present episode) are included in the study.

Exclusion criteria

Patients of a recent attack of myocardial infarction, who had liver diseases other than alcoholic liver dysfunction or disease, who had significant anemia (Hb<10gm%) are excluded. Patients who are treatment with anti-epileptics, antibiotics, anti-diabetic medications are also excluded

Tools

- DSM-V criteria for alcohol dependence
- Proformas for psychiatric history taking and alcoholism
- B.G.Prasad's social classification of Indian family.

Methodology

Patients who attended psychiatry OPD, with a history of alcohol dependence, and fulfilled inclusion and exclusion criteria are selected. Informed consent from these cases are taken.66 male alcoholic patients are selected as per DSM-V criteria. The liver dysfunction in the study was defined as abnormal liver function tests or abnormal liver ultrasonography. The patients selected underwent general and systemic examination and their socio-economic status was determined by Prasad's socio-economic scale. Their psychiatric history and mental status examination was recorded in a proforma. Blood sample was drawn after overnight fasting. Sample was analysed for determining Hb%, TC, DC, LFT (S.bilirubin, S.Proteins, AST, ALT, ALP) and MCV. Lastly the patients were subjected to ultrasound examination of abdomen in the Department of Radiology. This study was approved by Institutional Ethics Committee.

Analysis of data

The data was recorded in the form of mean and standard deviation for continuous variables; frequency and percentage for categorical variables. Chi-square test/Fisher exact test were used for comparing categorical variables. Z test and t test were used for comparing continuous variables depending on the sample size. Pearson's correlation coefficient was calculated to predict correlation between biochemical variables. The statistical significance difference level was set at P value < 0.05.All statistical analysis were conducted using SPSS version 25.

RESULTS

A total of sixty-five patients were divided into two groups according to

the ultrasonographic findings. Thirty five patients, who had changes in the liver are labeled as group I. Thirty patients who had normal liver architecture were considered as group II. (Table-1)

Table- 1 General Characteristics Of The Sample

Characteristics	Group I (N=35)	Group I (N=30)
Age in years (mean & SD)	37±5.8	35±5.9
Place		
Rural	20	19
Urban	15	11
Religion		
Hindu	34	28
Muslim	1	2
Education		
Illiterate	2	5
Upto 10th std	18	19
Above 10th std	15	6
Occupation		
Agriculturist	17	11
Government	9	3
Others	9	16
Socio-economic status		
Class I	7	0
II	8	7
III	7	6
IV	9	15
V	4	2
Marital status		
Married	34	27
Unmarried	1	3
Type of family		
Nuclear	20	16
Joint	15	14

TABLE – 2 Drinking characteristics of the sample

VARIABLES	GROUP I (N=35)	GROUP II (N=30)	STATISTICAL SIGNIFICANCE
AGE OF STARTING	24±4.6	24±4.0	NS
DURATION OF ALCOHOL INTAKE	13±5	11±6	NS

TABLE – 3 Number and percentage of normal and abnormal biochemical variables in group I and group II

	Normal values	GROUP I (N=35)		GROUP II (N=30)	
		Normal (%)	Abnormal (%)	Normal (%)	Abnormal (%)
S.BILIRUBIN	< 1mg	10 (28.5)	25 (71.5)	11 (36.6)	19 (63.4)
S.PROTEIN	6.0-8.3gm/dl	34 (97.1)	1 (2.8)	29 (96.9)	1 (3.3)
ALBUMIN	3.8-4.4 gm/dl	26 (74.2)	9 (25.8)	26 (86.6)	4 (13.4)
GLOBULIN	2.5-3.8 gm/dl	29 (82.8)	6 (17.2)	28 (93.3)	2 (6.6)
ALP	<90	16 (45.7)	19 (54.3)	19 (63.3)	11 (36.6)
AST	<46	8 (22.8)	27 (7.2)	14 (46.6)	16 (53.4)
ALT	<50	11 (31.4)	24 (68.6)	23 (76.6)	7 (23.3)
MCV	<95	15 (42.8)	20 (57.2)	14 (46.6)	16 (53.4)

TABLE – 4 Biochemical variables(mean values) between group I and group II

	GROUP I (N=35)	GROUP II (N=30)	Z test	P
S.BILIRUBIN	1.9±1.1	1.3±0.6	2.67	<0.01
S.PROTEIN	7.0±1.06	6.8±0.9	0.81	NS
ALBUMIN	4.0±0.66	4.0±0.6	0	NS
GLOBULIN	3.1±1.07	2.8±0.7	1.31	NS
ALP	117.2±67.04	92.3±36.39	1.08	NS
AST	114.3±105.86	66.7±49.5	2.26	<0.05
ALT	74.8±45.8	47.2±40.3	2.56	<0.02
MCV	96.7±10.98	95±9.5	0.66	NS

TABLE – 5A Mean biochemical values in patients with duration of alcohol intake of less than and more than 10 years in Group I

VARIABLES	INTAKE LESS THAN 10 YRS (N=13)	INTAKE MORE THAN 10 YRS (N=22)	T TEST df_{33}
S.BILIRUBIN	1.8±1.1	1.92±1.12	0.31
S.PROTEIN	6.6±1.0	7.17±1.07	1.51
ALBUMIN	4.0±0.7	3.95±0.66	0.21
GLOBULIN	2.7±0.6	3.27±1.1	1.72
ALP	107.5±64.5	122.8±69.3	0.65
AST	103.3±119.0	120±99.7	0.47
ALT	75.2±55.7	74.6±40.3	0.04
MCV	98.9±14.5	95.4±8.40	0.91

TABLE – 5B Mean biochemical values in patients with duration of alcohol intake of less than and more than 10 years in Group II

VARIABLES	INTAKE LESS THAN 10 YRS (N=17)	INTAKE MORE THAN 10 YRS (N=13)	T TEST df_{33}
S.BILIRUBIN	1.4±0.7	1.2±0.4	0.92
S.PROTEIN	6.9±0.9	6.8±0.9	0.3
ALBUMIN	4.1±0.7	3.9±0.4	0.92
GLOBULIN	2.8±0.6	2.9±0.8	0.39
ALP	89.4±53.6	96.2±36.6	0.39
AST	67.24±54.8	64.5±43.7	0.15
ALT	46.2±37.2	48.5±44.9	0.15
MCV	96±6.1	94±13	0.56

When each group was subdivided into groups with history of alcohol intake of less than 10 years and more than 10 years,almost all the variables were raised in both groups with more than 10 years intake, but the increase was not statistically significant.(Table – 5A&5B)

When t values of biochemical variables were compared, group I patients with less than 10 years of intake are not statistically significant when compared to group II patients. When t values of biochemical variables were compared,group I patients with more than 10 years of intake had high levels of serum bilirubin than group II patients ($P < 0.05$) (Table-6)

TABLE – 6 t values of biochemical variables in patients with duration of less than and more than 10 years of alcohol intake in group I & II

	INTAKE LESS THAN 10 YRS		INTAKE MORE THAN 10 YRS	
	G- I vs G-II t,df_{28}		G- I vs G-II t,df_{33}	
S.BILIRUBIN	1.21	NS	2.22	P< 0.05
S.PROTEIN	0.86	NS	1.05	NS
ALBUMIN	0.39	NS	0.25	NS
GLOBULIN	0.45	NS	1.06	NS
ALP	0.84	NS	1.28	NS
AST	1.11	NS	1.89	NS
ALT	1.71	NS	1.78	NS
MCV	0.75	NS	0.39	NS

TABLE – 7A Mean biochemical values in patients aged below and above 30 years in group I

PARAMETERS	Below 30 yrs (N=6)	Above 30 yrs (N=29)	t test df33
S.BILIRUBIN	2.0±0.8	1.8±1.1	0.42
S.PROTEIN	6.7±1.3	7.0±1.1	0.59
ALBUMIN	4.2±0.54	4.0±0.7	0.66
GLOBULIN	2.7±0.77	3.1±1.1	0.84
ALP	98.8±61.9	116.5±68.7	0.58
AST	113.7±92.6	109±92	0.11
ALT	53±18.5	74.9±47.6	1.1
MCV	101.5±5.98	97.1±11.1	0.87

TABLE – 7BMean biochemical values in patients aged below and above 30 years in group II

PARAMETERS	Below 30 yrs (N=7)	Above 30 yrs (N=23)	t test df28

S.BILIRUBIN	1.5±0.9	1.2±0.4	1.27
S.PROTEIN	7.3±0.9	6.7±0.8	1.69
ALBUMIN	4.3±0.7	3.9±0.5	1.69
GLOBULIN	3±0.3	2.8±0.7	0.73
ALP	119±68.03	84.2±35.8	1.8
AST	70.14±49.7	64.8±50.2	0.28
ALT	49.7±37	46.4±41.6	0.19
MCV	97.6±6.3	95±10	0.65

TABLE – 8 t values of biochemical variables of patients aged below and above 30 years in group I & II

PARAMEETERS	BELOW 30 YRS G-I vs G-II t,df_{11}	ABOVE 30 YRS G-I vs G-II t,df_{50}
S.BILIRUBIN	0.37	2.48 P<0.02
S.PROTEIN	0.98	1.06
ALBUMIN	0.28	0.58
GLOBULIN	0.96	0.42
ALP	0.56	2.04 P<0.05
AST	0.09	2.07 P<0.05
ALT	0.2	2.27 P<0.05
MCV	1.14	0.92

When biochemical values of patients aged below 30 years in group I & II were compared,none of the values were significantly different. When patients above 30 years in group I & II were compared in both groups, S.bilirubin(P<0.02),ALP (P<0.05), SGOT (P<0.05),ALT(P<0.05) were significantly high in group I than group II (Table-8)

TABLE – 9 Intercorrelation of mean biochemical values of group I (N=35)

	MCV	S.BIL	T.PRO	ALB	GLO	AST	ALT	ALP
MCV		0.07	-0.08	0.17	-0.09	-0.21	0.21	-0.3
S.BIL			-0.09	-0.18	0.00	0.52	0.29	0.07
T.PRO				0.23	0.81	0.06	0.19	-0.11
ALB					0.33	-0.27	-0.10	-0.10
GLO						0.22	0.28	-0.03
AST							0.62	0.19
ALT								0.27
ALP								

TABLE – 10 Intercorrelation of mean biochemical values of group II (N=30)

	MCV	S.BIL	T.PRO	ALB	GLO	AST	ALT	ALP
MCV		0.01	0.20	0.11	0.16	-0.5	-0.14	0.16
S.BIL			0.06	-0.11	0.19	0.57	0.49	0.47
T.PRO				0.65	0.74	0.07	0.11	-0.02
ALB					-0.03	-0.08	-0.03	-0.17
GLO						0.18	0.17	0.11
AST							0.73	0.23
ALT								0.19
ALP								

On inter correlation of biochemical values there was no significant inter correlation among the biochemical values in group I. (Table-9)

On inter correlation of mean biochemical values in group II, there was positive correlation between serum bilirubin and AST (0.52), ALT(0.49) and ALP (0.47,total proteins and albumin(0.65) and globulin(0.65), AST and ALT(0.73) (Table-10)

DISCUSSION

Identifying progression of alcohol use to abuse and to dependence helps to prevent disability due to alcohol. Hence, it is useful if there are biological markers, which not only detect alcoholism but also determine the damage it may cause to target organs such as liver.

Dastych et al[10] found that in women, all the parameters studied presented a lesser diagnostic value, except for MCV with 100% specificity and +LR 20.0

Torruellas C[11] found that clinical and laboratory parameters are important for predicting the prognosis of Alcohol Liver Disease in more advanced and severe cases and for determining the therapeutic approach.

Among the total cases, MCV was increased in 55.3%, s, bilirubin in 67,6%, AST in 46.1%, ALT in 47.6% and ALP in 46.1% of cases. The literature supports that MCV,GGT and LFT have high specificity but low sensitivity and are of high value only in presence of history of alcohol intake.

Group I cases did not differ with one another regarding age, place of residence, religion, educational status, occupation, type of family, socio-economic status and marital status. Mean age of starting alcohol and mean duration of alcohol intake also did not have significant difference between groups.

In cases of group I, values of MCV,AST and ALT were statistically higher than cases of group II. As there were increased levels of biochemical parameters in cases with and without alcohol liver changes ultrasonographically, it may mean biochemical changes precede liver morphological changes. However, on intercorrelation there was positive correlation between serum bilirubin and AST,ALT & ALP, total proteins & albumin and AST & ALT in group II not in group I.

The strengths of present study are relatively large sample size, inter-correlation of biochemical parameters and liver abnormality and comparision between LFTs and ultrasonograghic liver abnormality. The limitations of the study are lack of control group and lack of follow up investigations, which might have revealed a decrease in levels of enzymes after control and/or cessation of drinking.

To conclude, combined estimation of biochemical markers like MCV,LFT are of immense value in discriminating cases of alcohol use, abuse and dependence at the earliest. In addition, where these biochemical markers are raised,it is worthwhile to do USG examination of liver for early identification of liver abnormality.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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PERIOD OF INVESTIGATION

August 2018-December 2018.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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