Original Article

Association of Personality Characteristics of Alcohol Dependent Individuals with their Liver Enzyme Levels

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ABSTRACT

Introduction: All over the world Alcohol Dependence Syndrome (ADS) is most significant health problem. Among different individuals, the severity of liver dysfunction related to alcohol varies and related to different factors including personality traits. **Aim:** To find the personality variables of alcohol dependent patients and to determine its association with liver enzymes level among them. **Materials and Methods:** Total of 100 patients were selected from psychiatry department of JNMC, Sawangi, Wardha, Maharashtra and they were assessed through socio-demographic proforma, 16 personality factor (16 PF) inventory and liver function tests. **Results:** Most of the participants scored high on factors warmth (56%), social boldness (56%), dominance (67%), vigilance (77%), sensitivity (70%), perfectionism (52%) and openness to change (65%); while comparatively scored lower on factors privateness (50%) and liveliness (35%). The personality factors emotional stability, dominance, sensitivity, abstractedness, apprehension, self-reliance, perfectionism and tension were significantly correlated with various liver enzymes; whereas, global factor Extraversion/Introversion, Tough-mindedeness/Receptivity and Independence/Accommodation were correlated with various liver enzymes when $p < 0.05$ considered significant. **Conclusion:** This study suggests that the personality factors affect the liver enzymes level in alcohol dependent subjects. Hence, the personality factors should be addressed by physician during intervention to improve outcome.

Keywords: Personality traits, Alcoholism, Liver enzymes level, Alcohol dependence.

INTRODUCTION

Allport in his book "Personality: A Psychological Interpretation states that personality is what lies behind specific acts and within the individual. The system that constitutes personality is in every sense determining tendencies and when aroused by suitable stimuli provide those adjustic and expressive acts by which personality comes to be known.[1] Personality consists of structures and traits that characterize the functions as well as personality that these structures and traits perform and the adaptive purposes, they serve.[2] Several studies have determined comorbidity rates between Personality Disorders (PDs) and Substance Use Disorders (SUDs). A large proportion of subjects with a diagnosis of PD meet criteria for SUD and similarly large proportion of SUD patients also have an axis II diagnosis.[3-5] The rates of prevalence vary between different PDs and different

types of substances.[6] In his study Grant *et al.* found that 29% of SUD patients using alcohol had at least one co-occurring PD while the rate was 48% among SUD patients using multiple or other substances. Borderline Personality Disorder (BPD) and Antisocial Personality Disorder (ASPD), are the most common PDs among patients with SUDs.[3,7-9] Externalization and Impulsivity, typical features of BPD and ASPD seem to be important factors for justifying the association between PDs and SUDs.[10,11] The pathological personality traits are generally associated with increased alcohol consumption, less favorable course of AUD, more delinquent consequences of drinking and earlier onset of alcohol problems.[12-14] Alcohol use, relapse and craving, in alcohol dependent patients are associated with novelty seeking and other traits such as sensation seeking.[15,16] Higher neuroticism scores and lesser conscientiousness scores has been associated with alcohol dependence.[17] Better prognosis found in people with more scores on Cooperation, Persistence, Reward Dependence and Auto-transcendence whereas worst prognosis found in those with more scores on search for Avoidance of Damage and Novelty.[18]

Among different individuals, the severity of liver dysfunction related to alcohol varies and even within any given individual at different times. It has been found that only 30% of individuals with alcohol abuse develops cirrhosis, suggesting that one or more additional factors require for the development of alcohol induced liver injury.[19] The hepatic enzymes ALAT (alanine-aminotransferase), ASAT (aspartate aminotransferase) and γGT (gamma-glutamyl transpeptidase) are commonly used for the assessment of alcohol induced liver damage and associated tissue injury.[20-23] The elevated liver enzymes are associated with increased alcohol consumption and more severity of alcohol use disorder. Though there is a lot of research on personality traits of alcohol dependent individuals but to the best of our knowledge studies on correlation of personality traits with liver enzymes among ADS is rare. The objectives of present study were to determine the personality variables of alcohol dependent individuals and to find association of personality traits with their liver enzymes level.

MATERIALS AND METHODS

The observational study was carried out at Psychiatry Department, Jawaharlal Nehru Medical College, Sawangi Wardha, Maharashtra from 2016 to 2018. Institutional Ethics Committee approved the study and written consent obtained from the study participants fulfilling criteria. Considering the prevalence of personality disorder 57% among ADS,[24] the sample size was calculated using the formula n = 4 pq/l2, therefore q = 43, p = 57, l = 11.4 (20% of p) and sample size thus calculated equals to n = 75. Finally total sample size 100 is taken, when drop-out rate of 20% considered and figure is rounded off.

The patients attending psychiatry department diagnosed as alcohol dependence syndrome as per International Classification of Disease-10th Edition (ICD-10) Diagnostic Criteria for Research (World Health Organization, 1993) criteria,[25] between 18 to 65 years of age, willing to provide consent and participate, able to read Hindi were included through simple random sampling, whereas those with serious physical illness, any other dysfunction interfering with assessment and substance abuse other than tobacco were excluded from study.

The following scales were used for assessment of patients

Semi-structured sociodemographic proforma: It includes age, gender, address, education status, marital status, socio-economic status, occupation, past history, family history.

16 PF Inventory:[26] It is an objectively scorable test devised by basic research in psychology to give the most complete coverage of personality possible in a brief testing time. The personality was assessed by the 16-personality factor test prepared by S. D. Kapoor in Hindi version. The 16 personality factors include reasoning, warmth, emotional stability, liveliness, dominance,

rule-consciousness, sensitivity, social boldness, vigilance, abstractedness, apprehension, privateness, openness to change, tension, self-reliance and perfectionism. In addition to the basic 16 primary traits, several other scores are obtained from various combinations of the primary scales. In general, these are known as composite scores and five of these have special interpretive meaning. They are known as global factors or second-order factors and provide the larger conceptual, organizing framework for understanding the functions and meaning of the primary traits, and explain personality in terms of more general, traits.

Laboratory investigations: The levels of ALAT, ASAT, γGT, Alkaline phosphatase AND Serum bilirubin were measured at the beginning of detoxification program using Bekman Coulter analyser.

Statistical analysis

Inferential and descriptive statistics with chi-square test were used for analysis. Further *p*-value < 0.05 considered significant and data were analyzed with SPSS version 22.0 software.

RESULTS

In this study, a total of 100 patients of ADS were selected with mean age was 36.51±11.46. There was only one female participant and 99 were males with majority of them belong to Hindu religion followed by Buddhist and Muslim. Majority of them were employed (75%); educated up to primary (50%) and secondary (37%) school; belonged to lower nuclear family (53%), socio-economic status (53%) and rural region (44%). Among them, 27% had past history and 25% had family history of psychiatric illness respectively. On 16 PF test, majority of the patients score high on factors A (56%), I (70%), H (56%), E (67%), L (77%), Q1 (65%) and Q3 (52%); average scores on factors B (53%), G (65%), C (46%), O (43%), M (52%), Q2 (48%) and Q4 (36%) while comparatively had low scores on factors N (50%) and F (35%). On global factors of 16 PF, majority of the patients had low scores on Extaversion/Introversion (50%) and Self-control/ Lack of restraint (53%); high scores on High anxiety/Low anxiety (65%); while average scores on Tough-mindedness/Receptivity (52%) and Independence/Accommodation (43%) (Table 1).

At the time of detoxification, Hepatic enzyme levels were found to be higher for AST (69%), ALT (38%), Bilirubin (30%), Alkaline phosphatase (33%) and GGTP (79%) respectively (Table 2). The personality factor C is significantly correlated with ALT, factor E is correlated with Alkaline phosphatase, factor I is correlated with GGTP, factor M is correlated with ALT and GGTP, factor O is correlated with GGTP, factor Q2 is correlated with GGTP, factor Q3 is correlated with bilirubin, and factor Q4 is correlated with Alkaline phosphatase with *p* value less than 0.05 (Table 3). The global factor Extraversion/Introversion is significantly correlated with Alkaline phosphatase, Tough-mindedeness/Receptivity

Table 1: Personality profile of ADS patients on 16 PF inventory (*n*=100).

16 PF variables	Low score (%)	Average score (%)	High score (%)
Warmth (A)	6(6%)	38(38%)	56(56%)
Reasoning (B)	22(22%)	53(53%)	25(25%)
Emotional Stability (C)	40(40%)	46(46%)	14(14%)
Dominance (E)	1(1%)	32(32%)	67(67%)
Liveliness (F)	35(35%)	31(31%)	4(4%)
Rule-Consciousness (G)	20(20%)	65(65%)	15(15%)
Social Boldness (H)	11(11%)	33(33%)	56(56%)
Sensitivity (I)	11(11%)	19(19%)	70(70%)
Vigilance (L)	10(10%)	13(13%)	77(77%)
Abstractedness (M)	20(20%)	52(52%)	28(28%)
Privateness (N)	50(50%)	36(36%)	14(14%)
Apprehension (O)	30(30%)	43(43%)	27(27%)
Openness to Change (Q1)	2(2%)	33(33%)	65(65%)
Self-Reliance (Q2)	20(20%)	48(48%)	32(32%)
Perfectionism (Q3)	2(2%)	46(46%)	52(52%)
Tension (Q4)	29(29%)	36(36%)	35(35%)
Extraversion/Introversion	50	32	18
High Anxiety/Low Anxiety	12	23	65
Tough-Mindedness/ Receptivity	20	52	28
Independence/Accommodation	30	43	27
Self-Control/Lack of Restraint	53	33	14

is correlated with ALT and Independence/Accommodation is correlated with GGTP respectively (Table 4).

DISCUSSION

This study aimed at determining personality characteristics of alcohol dependent patients and association of personality traits with their liver enzymes level. In this study, there was only one female participant out of 100 subjects, which may be due to the fact that alcohol intake by women is not socially acceptable in this region and in general hospital setting, they may not seek treatment openly. Most of the patients were found to be educated, married, employed, resided in rural areas, belongs to nuclear family and lower socio-economic status. The above findings are similar to that of previous studies.[27,28]

Personality of the participants assessed with 16 PF found to be warm, aggressive, dominant, bold, suspicious, distrustful, tender minded, critical, following self-image and experimenting (factors with high scores). They scored average on superego strength, emotional stability, practicle and imaginative issues, intelligence. Further they were found to be restrained, forthright, dependable, sober and unpretentious (factors with low scores). On global factors, they were found to be more introverts, highly anxious and had lack of control. Donadon and Osorio reported that alcoholic

Table 2: Liver enzyme levels among participants.

Liver Enzymes	Number (N=100)	Percentage
ALT	62	62
Normal	38	38
High		
AST	31	31
Normal	69	69
High		
GGTP	21	21
Normal	79	79
High		
BILIRUBIN	70	70
Normal	30	30
High		
ALKALINE PHOSPHATASE	67	67
Normal	33	33
High		

individuals scored lower on openness, conscientiousness, aggreableness, extraversion and neuroticism.[29] Alvarez *et al.*, in his study reported patients with alcohol use disorder suffered from more apprehension, more fearful or impulsive personality,

Table 3: Correlation of primary factors with liver enzyme's function.

16 PF variable	Liver enzymes									
	ALT		AST		GGTP		Bilirubin		Alkaline phosphatase	
	Normal	High	Normal	High	Normal	High	Normal	High	Normal	High
A										
Low	5	1	1	5	0	6	5	1	3	3
Average	26	12	13	25	7	31	29	9	26	12
High	31	25	17	39	14	42	36	20	38	18
χ2-Value	2.87, p=0.23, NS		0.77, p=0.68, NS		2.28, p=0.31, NS		2.10, p=0.35, NS		0.83, p=0.65, NS	
B										
Low	17	5	5	17	3	19	16	6	14	8
Average	33	20	19	34	12	41	41	12	34	19
High	12	13	7	18	6	19	13	12	19	6
χ2-Value	4.25, p=0.11, NS		1.39, p=0.49, NS		0.94, p=0.62, NS		5.30, p=0.071, NS		1.22, p=0.54, NS	
C										
Low	24	16	11	29	9	31	29	11	27	13
Average	25	21	12	34	8	38	31	15	31	15
High	13	1	8	6	4	10	10	4	9	5
χ2-Value	6.86, p=0.03, S		5.22, p=0.073, NS		0.89, p=0.63, NS		0.28, p=0.68, NS		0.05, p=0.97, NS	
E										
Low	1	0	0	1	0	1	1	0	0	1
Average	20	11	10	21	5	26	24	7	26	5
High	41	27	21	47	16	52	45	23	41	27
χ2-Value	2.34, p=0.50, NS		0.92, p=0.81, NS		1.31, p=0.72, NS		2.26, p=0.51, NS		8.12, p=0.04, S	
F										
Low	21	14	11	24	9	26	25	10	23	12
Average	24	7	6	25	4	27	21	10	22	9
High	17	17	14	20	8	26	24	10	22	12
χ2-Value	5.26, p=0.07, NS		3.61, p=0.16, NS		1.82, p=0.40, NS		0.11, p=0.94, NS		0.32, p=0.84, NS	
G										
Low	10	10	5	15	4	16	12	8	12	8
Average	42	23	19	46	14	51	46	19	43	22
High	10	5	7	8	3	12	12	3	12	3
χ2-Value	1.55, p=0.46, NS		2.15, p=0.34, NS		0.03, p=0.98, NS		1.68, p=0.53, NS		1.61, p=0.44, NS	
H										
Low	9	2	5	6	2	9	10	1	5	6
Average	19	14	8	25	6	27	25	8	21	12
High	34	22	18	38	13	43	35	21	41	15

16 PF variable	Liver enzymes									
	ALT		AST		GGTP		Bilirubin		Alkaline phosphatase	
	Normal	High	Normal	High	Normal	High	Normal	High	Normal	High
χ2-Value	2.14, p=0.34, NS		1.81, p=0.40, NS		0.37, p=0.82, NS		4.31, p=0.11, NS		3.45, p=0.17, NS	
I										
Low	7	4	3	8	4	7	8	3	7	4
Average	11	8	5	14	0	19	14	5	12	7
High	44	26	23	47	17	53	48	22	48	22
χ2-Value	0.17, p=0.91, NS		0.37, p=0.82, NS		7.07, p=0.029, S		0.23, p=0.89, NS		0.26, p=0.87, NS	
L										
Low	9	1	6	4	0	10	8	2	5	5
Average	8	5	5	8	3	10	7	6	10	3
High	45	32	20	57	18	59	55	22	52	25
χ2-Value	3.74, p=0.15, NS		5.17, p=0.075, NS		2.95, p=0.22, NS		2.16, p=0.33, NS		1.89, p=0.38, NS	
M										
Low	8	12	4	16	8	12	14	6	17	3
Average	32	20	16	36	9	43	35	17	33	19
High	22	6	11	17	4	24	21	7	17	11
χ2-Value	7.37, p=0.02, S		2.03, p=0.36, NS		4.06, p=0.044, S		0.51, p=0.77, NS		3.72, p=0.15, NS	
N										
Low	29	21	15	35	10	40	32	18	33	17
Average	24	12	12	24	8	28	28	8	26	10
High	9	5	4	10	3	11	10	4	8	6
χ2-Value	0.70, p=0.70, NS		0.15, p=0.92, NS		0.06, p=0.96, NS		1.90, p=0.38, NS		1.08, p=0.58, NS	
O										
Low	19	11	11	19	11	19	19	11	23	7
Average	27	16	13	30	7	36	29	14	27	16
High	16	11	7	20	3	24	22	5	17	10
χ2-Value	0.12, p=0.94, NS		0.78, p=0.67, NS		6.60, p=0.037, S		2.46, p=0.39, NS		1.81, p=0.40, NS	
Q1										
Low	2	0	1	1	0	2	1	1	2	0
Average	24	9	12	21	6	27	26	7	18	15
High	36	29	18	47	15	50	43	22	47	18
χ2-Value	4.04, p=0.13, NS		1.11, p=0.57, NS		0.85, p=0.65, NS		2.05, p=0.35, NS		4.12, p=0.12, NS	
Q2										
Low	12	8	7	13	9	11	11	9	16	4
Average	31	17	16	32	6	42	35	13	30	18
High	19	13	8	24	6	26	24	8	21	11

16 PF variable	Liver enzymes									
	ALT		AST		GGTP		Bilirubin		Alkaline phosphatase	
	Normal	High	Normal	High	Normal	High	Normal	High	Normal	High
χ2-Value	0.26, p=0.89, NS		0.81, p=0.66, NS		9.13, p=0.010, S		2.71, p=0.25, NS		1.99, p=0.36, NS	
Q3										
Low	1	1	0	2	1	1	0	2	2	0
Average	30	16	12	34	7	39	36	10	28	18
High	31	21	19	33	13	39	34	18	37	15
χ2-Value	0.456, p=0.7, NS		2.16, p=0.26, NS		2.44, p=0.29, NS		6.68, p=0.03, S		2.17, p=0.33, NS	
Q4										
Low	20	9	13	16	7	22	22	7	18	11
Average	19	17	11	25	7	29	24	12	30	6
High	23	12	7	28	7	28	24	11	19	16
χ2-Value	2.10, p=0.35, NS		4.57, p=0.10, NS		0.24, p=0.88, NS		0.69, p=0.70, NS		7.22, p=0.027, S	

Table 4: Correlation of global factors with liver enzyme's function.

Second order factors	Liver enzymes									
	ALT		AST		GGTP		Bilirubin		Alkaline phosphatase	
	Normal	High	Normal	High	Normal	High	Normal	High	Normal	High
Extraversion/Introversion										
Low	31	19	12	38	11	39	34	16	35	15
Average	16	16	11	21	8	24	22	10	26	6
High	15	3	8	10	2	16	14	4	6	12
χ2-Value	5.43, p=0.06, NS		2.83, p=0.24, NS		1.40, p=0.49, NS		0.63, p=0.72, NS		12.37, p=0.002, S	
High Anxiety/Low Anxiety										
Low	10	2	6	6	4	8	9	3	5	7
Average	14	9	6	17	5	18	16	7	16	7
High	38	27	19	46	12	53	45	20	46	19
χ2-Value	2.67, p=0.26, NS		2.38, p=0.30, NS		1.36, p=0.50, NS		0.16, p=0.92, NS		3.96, p=0.16, NS	
Tough-Mindedness/Receptivity										
Low	8	12	4	16	8	12	14	6	17	3
Average	32	20	16	36	9	43	35	17	33	19
High	22	6	11	17	4	24	21	7	17	11
χ2-Value	7.37, p=0.02, S		2.03, p=0.36, NS		5.54, p=0.06, NS		0.51, p=0.77, NS		3.72, p=0.15, NS	
Independence/Accommodation										
Low	19	11	11	19	11	19	19	11	23	7
Average	27	16	13	30	7	36	29	14	27	16
High	16	11	7	20	3	24	22	5	17	10
χ2-Value	0.12, p=0.94, NS		0.78, p=0.67, NS		6.60, p=0.037, S		2.46, p=0.29, NS		1.81, p=0.40, NS	
Self-Control/Lack of Restraint										
Low	34	19	15	38	8	45	36	17	38	15
Average	18	15	10	23	8	25	24	9	23	10
High	10	4	6	8	5	9	10	4	6	8
χ2-Value	1.41, p=0.49, NS		1.10, p=0.57, NS		3.15, p=0.20, NS		0.23, p=0.88, NS		4.32, p=0.11, NS	

had tendency to experience new emotions, had lack of objectives and attributed their problems to others.[18]

Results of this study also reported that personality factors such as emotional stability, dominance, sensitivity, abstractedness, perfectionism, self-reliance, tension and apprehension significantly correlated with the liver enzymes. Whereas global factors extraversion/introversion, independence/accommodation and tough-mindedness/receptivity had significant correlation with liver enzymes level. It means alcohol dependent individuals with personality traits such as emotionally less stable, easily annoyed, assertive, aggressive, stubborn, tender-minded, overprotected, imaginative, impractical, self-blaming, guilt prone, self-reliant, resourceful, socially precise, controlled, tense, frustrated, shy, introvert and less interpersonal contacts had high liver enzymes dysfunction. Canon *et al.*, in his study reported that Novelty Seeking (NS) had significant positive association with scores on ADS, while other Temperament and Personality Questionnaire (TPQ) dimension was not significantly associated.[30] Whereas, Foulds *et al.*, did not show association between average consumption per day and NS, while both heavy drinking days and percentage of abstinence days were associated positively with NS; self-directedness had negative correlation with percentage of abstinent days and Harm Avoidance (HA) had negative correlation with the daily alcohol consumption.[31] As per Soundararajan *et al.*, people with high scores on extraversion found to be more involved with drinking.[32] Alvarez *et al.*, showed that temperament traits of Search for Novelty and Avoidance of Damage associated with more degree of severity of alcohol use disorder. It means people who were more curious, impulsive, and fearful of change present with greater severity of Alcohol Use Disorders (AUD). However, high scores in Reward Dependency and Persistence were correlated with lower severity of disorder. It means people who were more sociable, ambitious and perfectionist had less severe AUD and less dependence intensity. On other hand, traits such as Self-Direction, Self-Transcedence and Cooperation were associated with a lesser severity of alcohol consumption and there is lesser dependence intensity.[18] The comorbid personality pathology may be associated with less favorable course of AUD, increased consumption of alcohol, earlier onset of problems related to the alcohol and more delinquent consequences.[33] Findings of previous studies also reported significant correlation between Severity of Alcohol Dependence Questionnaire (SADQ) scores and hepatic enzymes such as AST, ALT and GGTP. This supports the idea that liver dysfunction is associated with severity of dependence.[34,35] Hence, it can be concluded that the personality traits indirectly influence liver enzymes level in alcohol dependent individuals through intensity/ severity of alcohol drinking pattern among them. Therefore, these factors should be addressed at the time of intervention for alcohol use disorders.

CONCLUSION

The results of present study suggests that ADS patients scored high on personality variables such as social boldness, warmth, dominance, vigilance, sensitivity, perfectionism and openness to change whereas they scored lower on variables privateness and liveliness. The liver enzymes level found to be elevated at the time of detoxification and various personality traits were significantly associated with the hepatic enzymes. Hence, health care professionals need to address these factors at the time of management of alcohol use disorders for the better prognosis and treatment outcome.

LIMITATIONS

The limitation of this study is that only inpatients were included and it was a hospital based cross-sectional study and hence the results cannot be generalized. The other personality factors were not assessed, there was only single female participant and sample size was small. These parameters need to be addressed in future research for better results.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ADS: Alcohol Dependence Syndrome; **PDs:** Personality Disorders; **SUDs:** Substance Use Disorders; **BPD:** Borderline Personality Disorder; **ASPD:** Antisocial Personality Disorder; **ASAT:** Aspartate aminotransferase; **ALAT:** Alanine-aminotransferase; **γGT:** Gamma-glutamyl transpeptidase; **ICD10:** International Classification of Disease10[th] Edition; **16 PF:** 16 Personality factors; **NS:** Novelty Seeking; **TPQ:** Temperament and Personality Questionnaire; **HA:** Harm Avoidance; **AUD:** Alcohol Use Disorders; **SADQ:** Alcohol Dependence Questionnaire; **A:** Warmth; **B:** Reasoning; **C:** Emotional Stability; **E:** Dominance; **F:** Liveliness; **G:** Rule-Consciousness; **H:** Social Boldness; **I:** Sensitivity; **L:** Vigilance; **M:** Abstractedness; **N:** Privateness; **O:** Apprehension; **Q1:** Openness to Change; **Q2:** Self-Reliance; **Q3:** Perfectionism; **Q4:** Tension.

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