

Original Research Article

ASSESSMENT OF RISK FACTORS FOR RELAPSE AMONG ALCOHOL-DEPENDENT INDIVIDUALS: A COMPARATIVE STUDY

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ABSTRACT

Background: Relapse remains a major challenge in the long-term management of alcohol dependence, with up to 90% of treated individuals relapsing within four years. The combined contribution of sociodemographic, personality, and psychosocial factors to relapse is poorly studied in resource-limited Indian settings. This study aimed to compare these factors between alcohol-dependent individuals with and without relapse and identify factors independently associated with relapse.

Materials and Methods: This case-control study was conducted in the Department of Psychiatry, Government Mohan Kumaramangalam Medical College Hospital, Salem, between Nov 2018 and Dec 2019. Sixty male outpatients aged 18–45 years with ICD-10 alcohol dependence were enrolled: 30 relapsed cases and 30 controls abstinent for at least 12 months. Sociodemographic data were collected using a semi-structured proforma, psychosocial stress with the Presumptive Stressful Life Events Scale, and personality with the International Personality Disorder Examination. Categorical and continuous variables were compared using chi-square and independent-samples t-tests. Variables significant on univariate analysis were entered into a binary logistic regression model to identify independent predictors of relapse; Firth's penalized logistic regression was used because of quasi-complete separation on the unemployment variable.

Results: Cases and controls differed significantly in education, occupation, marital status, family history of alcoholism, duration of dependence, and presence of a significant psychosocial stressor (all $p < 0.005$). Impulsive and anxious personality traits were more frequent among cases ($p < 0.05$ each). On adjusted analysis, low educational attainment independently predicted relapse (adjusted odds ratio [AOR] 10.90, 95% CI 1.15–103.61, $p = 0.038$), with a borderline independent association for longer duration of dependence (AOR 1.23 per year, 95% CI 1.00–1.51, $p = 0.053$); the model correctly classified 96.7% of participants (Hosmer–Lemeshow $p = 0.720$). Unemployment and financial loss were the leading precipitants of relapse.

Conclusion: Low education, unemployment, family history of alcoholism, longer duration of dependence, impulsive or anxious personality traits, and unresolved psychosocial stress characterized relapsed patients, with low education and duration of dependence remaining independent predictors after adjustment. Relapse-prevention strategies should adopt a multidimensional approach addressing sociodemographic, personality, and stress-related domains together rather than in isolation.

Keywords: Alcohol dependence; Relapse; Case-control studies; Personality; Psychological stress; Logistic regression; Risk factors.

INTRODUCTION

Alcohol use disorders remain among the leading contributors to the global burden of disease. Alcohol

consumption has been estimated to account for close to 6% of all deaths worldwide and a comparable share of disability-adjusted life years, with men disproportionately affected because of higher rates of

injury, violence, and alcohol-attributable cardiovascular disease.^[1] Alcohol dependence syndrome, as defined by the International Classification of Diseases, 10th Revision (ICD-10), is characterized by a cluster of behavioral, cognitive, and physiological phenomena: a strong desire to drink, impaired control over use, continuation despite harm, and tolerance or withdrawal that together entrench the disorder over time.^[2]

Although structured de-addiction programmes can achieve short-term abstinence, relapse, the resumption of the previous drinking pattern after a period of sobriety, undermines long-term recovery in a substantial proportion of patients. Reported relapse rates vary widely, from roughly one-third to as many as nine in ten treated individuals, with approximately half of detoxified patients returning to drinking within three months and up to 90% doing so within four years.^[3,4] This variability reflects genuine heterogeneity across patient populations as well as inconsistencies in how relapse and abstinence have been operationally defined from one study to another.^[3] Relapse is now understood as a multifactorial process rather than a single event.^[4] Distal, or predisposing, factors, including family history of alcoholism, illness severity, and psychiatric comorbidity, interact with proximal, situational triggers such as craving, cue reactivity, and acute psychosocial stress to precipitate a return to drinking.^[5] Cognitive-behavioral models of relapse emphasize the role of high-risk situations and the adequacy of an individual's coping response: patients who lack effective coping strategies experience reduced self-efficacy and an inflated expectation of positive outcomes from drinking, both of which raise the likelihood that an initial lapse will progress to a full relapse.^[5,6]

Personality has repeatedly been implicated as a determinant of treatment outcome. Traits associated with impulsivity and emotionally unstable or antisocial personality patterns have been linked with poorer prognosis and earlier relapse, whereas better-organized coping styles are associated with longer periods of sustained abstinence.^[7,8] Psychosocial stress operates through a related but distinct pathway: according to the tension-reduction hypothesis, individuals with alcohol dependence learn to drink to manage stress and are therefore more vulnerable to relapse when confronted with adverse life events, although the empirical evidence linking stress to relapse has not been entirely consistent.^[9] Much of the existing literature on relapse originates from high-income settings with treatment infrastructures, family structures, and socioeconomic conditions quite different from those prevailing in semi-urban and rural India. Sociodemographic determinants such as literacy, employment, and marital stability may carry different weights in these contexts, and dedicated Indian data remain limited. A clearer picture of how sociodemographic circumstances, personality traits, and psychosocial stressors jointly differentiate relapsed from non-relapsed patients could help

clinicians design more targeted relapse-prevention strategies. This study was therefore undertaken to assess and compare the sociodemographic profile, personality traits, and psychosocial stressors of alcohol-dependent individuals with and without relapse attending a tertiary care psychiatric outpatient service in southern India, and to identify, using multivariable logistic regression, which of these factors independently predict relapse after adjusting for the others.

MATERIALS AND METHODS

Study Design and Setting: This was a case-control comparative study conducted in the Department of Psychiatry, Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu, India, a tertiary care teaching hospital serving a predominantly semi-urban and rural catchment population. A case-control design was chosen because it allows efficient comparison of a relatively rare outcome (sustained relapse versus sustained abstinence) across multiple sociodemographic, personality, and stress-related exposures within a single clinical encounter, and it offsets the recall and selection bias that can arise when only relapsed patients are studied.

Study Period: Recruitment and data collection were carried out between Nov 2018 - Dec 2019.

Study Population and Sampling: Sixty male patients aged 18–45 years attending the psychiatry outpatient department and fulfilling ICD-10 diagnostic criteria for alcohol dependence syndrome were enrolled by consecutive sampling and allocated to two groups of 30 each:

Cases: 30 consecutive alcohol-dependent individuals who had relapsed, that is, resumed their previous pattern of drinking after completing a course of de-addiction treatment.

Controls: 30 consecutive alcohol-dependent individuals who had maintained continuous abstinence for at least the preceding 12 months.

For the purpose of this study, a relapsed patient was operationally defined as an individual diagnosed with alcohol dependence syndrome per ICD-10 criteria who had abstained from alcohol for a minimum of one month following treatment and subsequently resumed drinking.

Inclusion Criteria

1. Aged 18–45 years
2. Fulfilled ICD-10 criteria for alcohol dependence
3. Willing to provide informed consent and participate

Exclusion Criteria

1. Younger than 18 or older than 45 years
2. Did not meet ICD-10 criteria for dependence
3. Poly-substance use or dependence on a substance other than alcohol
4. Comorbid chronic physical illness
5. Declined participation

Ethical Considerations: The study protocol was approved by the Institutional Ethics Committee,

Government Mohan Kumaramangalam Medical College Hospital, Salem, prior to recruitment. Written informed consent was obtained from every participant after the purpose, procedures, and voluntary nature of participation had been explained in the participant's own language; participants were free to withdraw at any stage without any effect on their ongoing clinical care, and confidentiality of individual data was maintained throughout.

Assessment Instruments: Four instruments were used for data collection. First, a self-constructed semi-structured proforma captured sociodemographic and clinical details including age, sex, education, occupation, religion, marital status, family type, socioeconomic status, family history of alcoholism, age at first drink, and duration of alcohol use. Second, ICD-10 diagnostic criteria for alcohol dependence syndrome were used to confirm eligibility; a diagnosis required at least three of six specified criteria to have been present within the preceding year. Third, psychosocial stress was quantified using the Presumptive Stressful Life Events Scale (PSLES), a 51-item instrument developed for Indian populations by Gurmeet Singh and colleagues and adapted from the Social Readjustment Rating Scale of Holmes and Rahe; items are classified as desirable, undesirable, or ambiguous, and as personal or impersonal, and a cumulative score is derived from events endorsed within a defined recall period; use of this scale in Indian clinical populations, including considerations around its item content, has been discussed in the literature.^[13] Fourth, personality was assessed using the International Personality Disorder Examination (IPDE), a semi-structured clinical interview jointly developed by the World Health Organization and the United States National Institute of Health that provides a uniform approach to assessing personality disorders compatible with both ICD-10 and DSM classification systems and has established reliability for worldwide use.

Study Procedure: Eligible patients were screened at the outpatient clinic, and eligibility was confirmed against the inclusion and exclusion criteria before informed consent was obtained. Each participant then underwent a structured clinical interview during which the sociodemographic proforma was completed, and the ICD-10 diagnosis of alcohol dependence was verified. The PSLES was administered next to quantify the burden of psychosocial stressors, followed by the IPDE interview to characterize personality type. For patients in the case group, the specific psychosocial stressor judged to have precipitated the most recent relapse episode was additionally recorded under predefined categories (unemployment, financial loss, marital conflict, family conflict, and others).

Statistical Analysis: Data were entered and analyzed using SPSS version 23 (IBM Corp., Armonk, NY, USA). Categorical variables education, occupation, marital status, family type, family history, presence of a significant stressful event, and personality type

were summarized as frequencies and percentages and compared between cases and controls using the chi-square test; the Mann–Whitney U test was additionally used for the between-group comparison of individual personality-type categories. Continuous variables, age and duration of alcohol dependence, were summarized as mean $\pm$ standard deviation and compared using the independent samples t-test. To identify independent predictors of relapse while adjusting for potential confounding, the seven variables significant at $p < 0.05$ on univariate analysis educational status (illiterate/primary versus secondary or higher), occupational status (unemployed versus employed), marital status (separated/widowed/divorced versus other), family history of alcoholism, duration of alcohol dependence, presence of a significant psychosocial stressor, and impulsive and anxious personality traits, were entered simultaneously into a binary logistic regression model, with relapse status (case versus control) as the dependent variable. Because none of the 30 controls were unemployed, the unemployment variable produced quasi-complete separation between groups; conventional maximum-likelihood logistic regression under these conditions yields inflated, unstable coefficients and fails to converge. Firth's penalized (bias-reduced) logistic regression,^[14] which adds a Jeffreys-invariant penalty term to the likelihood function, was therefore used to obtain finite and stable parameter estimates, an approach recommended for exactly this situation in small-sample biomedical case–control data.^[15] Adjusted odds ratios (AOR) with 95% Wald confidence intervals are reported. Overall model significance was assessed with the likelihood ratio chi-square test, discriminative performance with the percentage of participants correctly classified, and calibration with the Hosmer–Lemeshow goodness-of-fit test and Nagelkerke R^2 . A two-tailed p value of less than 0.05 was considered statistically significant, and a p value of less than 0.005 was regarded as highly significant.

RESULTS

Sixty male patients meeting ICD-10 criteria for alcohol dependence were studied: 30 cases with relapse after de-addiction treatment and 30 controls who had sustained abstinence for at least 12 months. All participants were male; the mean age was significantly higher among cases (41.37 ± 9.62 years, range 25–45) than among controls (36.26 ± 6.37 years, range 25–45) (independent-samples t-test, $t=2.43$, $df=58$, $p=0.018$). Overall, cases were significantly older than controls and the two groups also diverged sharply across most of the sociodemographic, personality, and stress-related variables assessed. The baseline sociodemographic and clinical comparison between the two groups is summarized in [Table 1].

Table 1: Comparison of key sociodemographic and clinical characteristics between cases (relapsed) and controls (non-relapsed)

Variable	Cases (n=30)	Controls (n=30)	Test statistic	p-value	Interpretation
Age, years (mean ± SD)	41.37 ± 9.62	36.26 ± 6.37	t = 2.43, df = 58	0.018	Significant
Illiterate / primary education, n (%)	25 (83.3)	4 (13.3)	$\chi^2 = 32.531$	<0.005	Highly significant
Unemployed, n (%)	13 (43.3)	0 (0.0)	χ^2 test	<0.005	Highly significant
Separated / widowed / divorced, n (%)	13 (43.3)	1 (3.3)*	$\chi^2 = 15.205$	<0.005	Highly significant
Nuclear family type, n (%)	25 (83.3)	26 (86.7)	$\chi^2 = 0.131$	>0.05	Not significant
Positive family history of alcoholism, n (%)	23 (76.7)	7 (23.3)	$\chi^2 = 17.067$	<0.005	Highly significant
Duration of alcohol dependence, years (mean ± SD)	20.10 ± 8.90	9.03 ± 4.53	t-test	<0.05	Significant
Presence of significant psychosocial stressor, n (%)	23 (76.7)	5 (16.7)	$\chi^2 = 21.69$	<0.005	Highly significant

SD: standard deviation; χ^2 : chi-square statistic.

*Majority-category values reported for marital status; remaining participants were distributed between the married and unmarried categories. $p < 0.005$ was regarded as highly significant and $p < 0.05$ as significant.

Cases and controls differed significantly across most sociodemographic domains. Education showed the strongest divergence: the majority of cases were illiterate or educated only to primary level (25/30, 83.3%), whereas the majority of controls had completed high school or graduate-level education (26/30, 86.7%) ($\chi^2 = 32.531$, $p < 0.005$) [Table 2, Figure 1].

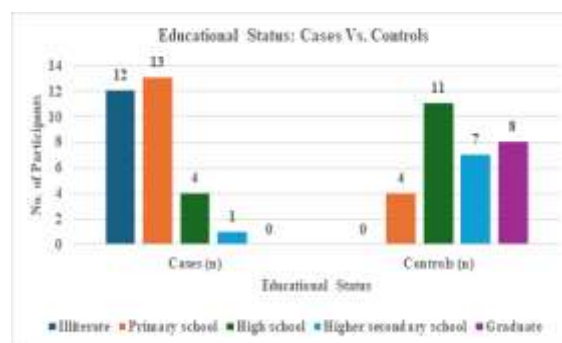


Figure 1: Educational status of cases and controls.

Table 2: Educational status of cases and controls

Educational status	Cases, n (%)	Controls, n (%)	Total, n (cases + controls)
Illiterate	12 (40.0)	0 (0.0)	12
Primary school	13 (43.3)	4 (13.3)	17
High school	4 (13.3)	11 (36.7)	15
Higher secondary school	1 (3.3)	7 (23.3)	8
Graduate	0 (0.0)	8 (26.7)	8
Total	30 (100.0)	30 (100.0)	60

Chi-square = 32.531, $p < 0.005$ (highly significant). Data are shown as n (%) within each group.

Bar chart comparing the distribution of educational categories between the 30 relapsed cases and 30 non-relapsed controls ($\chi^2 = 32.531$, $p < 0.005$).

A parallel pattern was evident for occupation, where unemployment predominated among cases (13/30, 43.3%) while skilled employment predominated among controls (16/30, 53.3%) ($p < 0.005$) [Table 3, Figure 2].

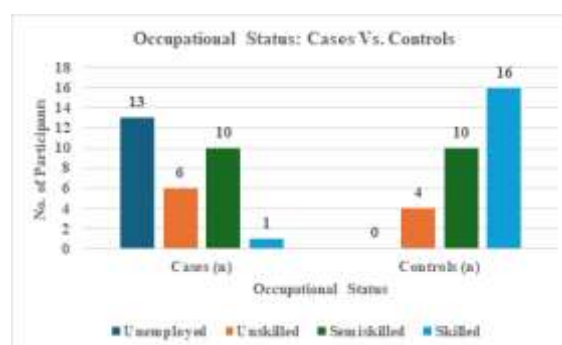


Figure 2: Occupational status of cases and controls.

Table 3: Occupational status of cases and controls

Occupational status	Cases, n (%)	Controls, n (%)	Total, n
Unemployed	13 (43.3)	0 (0.0)	13
Unskilled	6 (20.0)	4 (13.3)	10
Semiskilled	10 (33.3)	10 (33.3)	20
Skilled	1 (3.3)	16 (53.3)	17

$p < 0.005$ (highly significant, chi-square test). Data are shown as n (%) within each group.

Bar chart comparing the distribution of occupational categories between cases and controls ($p<0.005$). With respect to marital status, most cases were separated, widowed, or divorced (13/30, 43.3%), whereas most controls were currently married (24/30, 80%) ($\chi^2=15.205$, $p<0.005$). Family type did not differ significantly between groups, with a nuclear family structure predominating in both cases (25/30, 83.3%) and controls (26/30, 86.7%) ($\chi^2=0.131$, $p>0.05$). A positive family history of alcoholism was significantly more common among cases (23/30, 76.7%) than controls (7/30, 23.3%) ($\chi^2=17.067$, $p<0.005$). The mean duration of alcohol dependence was more than twice as long among cases ($20.10 \pm$

8.90 years) as among controls (9.03 ± 4.53 years), a difference that was statistically significant on independent-samples t-test ($p<0.05$). Personality type distribution is presented in [Table 4 and Figure 3]. On Mann–Whitney U testing, impulsive personality traits were significantly more frequent among cases (8/30, 26.7%) than controls (3/30, 10%) ($p<0.05$), as were anxious personality traits (cases 7/30, 23.3% versus controls 4/30, 13.3%; $p<0.05$). No significant between-group difference emerged for anankastic, dependent, paranoid, unspecified, or other personality categories (all $p>0.05$).

Table 4: Personality type distribution among cases and controls

Personality type	Cases, n (%)	Controls, n (%)	Total, n	p-value	Interpretation
Anankastic	1 (3.3)	1 (3.3)	2	>0.05	Not significant
Impulsive	8 (26.7)	3 (10.0)	11	<0.05	Significant
Anxious	7 (23.3)	4 (13.3)	11	<0.05	Significant
Dependent	5 (16.7)	4 (13.3)	9	>0.05	Not significant
Paranoid	6 (20.0)	6 (20.0)	12	>0.05	Not significant
Unspecified	0 (0.0)	1 (3.3)	1	>0.05	Not significant
Others	3 (10.0)	11 (36.7)	14	>0.05	Not significant

Mann–Whitney U test applied for between-group comparison of each personality category; $p<0.05$ considered significant.

Table 5: Type of psychosocial stressor precipitating the most recent relapse episode among cases

Type of stressor reported by cases (n=30)	Frequency, n	Percentage, %
Unemployment of self or family member	18	60.0
Financial loss or problems	11	36.7
Marital conflict	8	26.7
Family conflict / break-up with friend	6	20.0

Percentages exceed 100% because some participants reported more than one contributing stressor.

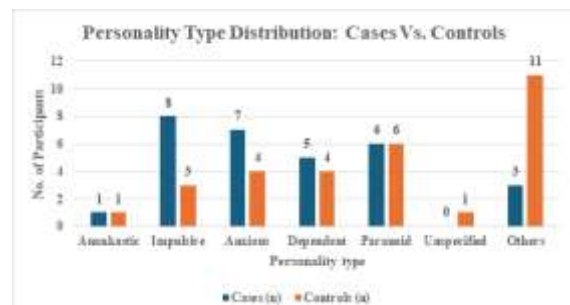


Figure 3: Personality type distribution among cases and controls.

Bar chart showing the number of cases and controls classified into each personality category on the International Personality Disorder Examination (IPDE). Impulsive and anxious personality types were significantly more frequent among cases ($p<0.05$ each).

A significant psychosocial stressor in the period preceding assessment was reported by 23 of 30 cases (76.7%) compared with 5 of 30 controls (16.7%) ($\chi^2=21.69$, $p<0.005$), confirming that unresolved life stress was strongly associated with relapse status [Table 1]. Among the relapsed cases, the specific stressors precipitating the most recent relapse episode are shown in [Table 5 and Figure 4]. Unemployment of self or a family member was the most frequently

cited precipitant (18/30, 60%), followed by financial loss or problems (11/30, 36.7%), marital conflict (8/30, 26.7%), and family conflict or breakdown of a close friendship (6/30, 20%); because several cases reported more than one contributing stressor, these category totals sum to more than 30.

Pie chart showing the relative frequency of stressor categories precipitating the most recent relapse episode among the 30 cases. Percentages are calculated on total stressor mentions and exceed 100% of cases because of multiple reporting.

Taken together, these findings show a consistent pattern across domains: relapsed cases were disadvantaged relative to controls on nearly every sociodemographic variable examined, carried a heavier burden of impulsive and anxious personality traits, and had substantially greater recent exposure to unresolved psychosocial stress, most often linked to unemployment, financial difficulty, and relationship conflict. Family type and several individual personality categories, anankastic, dependent, paranoid, and unspecified, were the only variables that failed to distinguish the two groups, indicating that not every sociodemographic or personality factor carries equal weight in predicting relapse in this population.

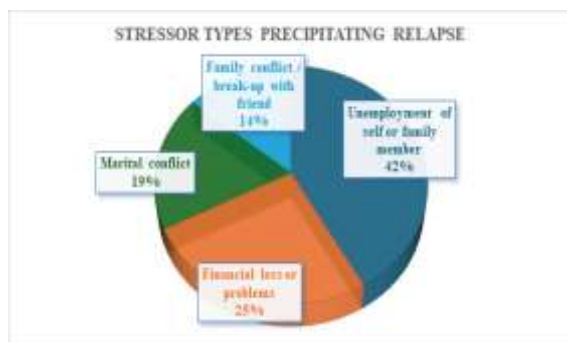


Figure 4: Distribution of psychosocial stressor types reported by relapsed cases.

To identify which of these seven significant univariate factors independently predicted relapse after adjusting for the others, they were entered simultaneously into a logistic regression model with relapse status as the dependent variable. Because none of the 30 abstinent controls were unemployed, standard maximum-likelihood logistic regression could not produce finite, stable estimates for this variable owing to quasi-complete separation; Firth's penalized logistic regression was therefore used to obtain the results shown in Table 6. The overall model was highly significant (likelihood ratio $\chi^2=67.56$, $df=8$, $p<0.001$), correctly classified 96.7%

of participants, and showed good calibration on the Hosmer–Lemeshow test ($\chi^2=3.68$, $df=6$, $p=0.720$; Nagelkerke $R^2=0.90$). After adjustment for the other six variables, low educational attainment (illiterate or primary schooling) remained an independent predictor of relapse, with more than a ten-fold increase in adjusted odds compared with participants with secondary or higher education (AOR=10.90, 95% CI 1.15–103.61, $p=0.038$). Duration of alcohol dependence showed a borderline independent association, with each additional year of dependence associated with roughly a 23% increase in the adjusted odds of relapse (AOR=1.23, 95% CI 1.00–1.51, $p=0.053$). Unemployment, marital separation/divorce, family history of alcoholism, presence of a psychosocial stressor, and impulsive or anxious personality traits, although individually significant on univariate analysis, did not retain independent statistical significance in the adjusted model, suggesting that part of their apparent association with relapse is explained by shared variance with educational attainment and chronicity of dependence. The wide confidence intervals around several adjusted odds ratios reflect the modest sample size ($n=60$) relative to the number of predictors and should be interpreted with caution.

Table 6: Firth's penalized (bias-reduced) binary logistic regression for factors independently associated with relapse

Variable	B (coefficient)	SE	AOR	95% CI	p-value
Low education (illiterate/primary vs. secondary+)	2.39	1.15	10.90	1.15–103.61	0.038
Unemployed (vs. employed)	0.99	1.65	2.70	0.11–68.61	0.547
Marital status: separated/widowed/divorced (vs. other)	2.28	1.54	9.82	0.48–200.41	0.138
Positive family history of alcoholism	1.58	1.27	4.86	0.41–58.21	0.212
Duration of alcohol dependence (per year)	0.21	0.11	1.23	1.00–1.51	0.053
Presence of significant psychosocial stressor	1.07	1.11	2.91	0.33–25.63	0.336
Impulsive personality trait	1.43	1.50	4.19	0.22–79.03	0.340
Anxious personality trait	-1.24	1.94	0.29	0.01–12.91	0.522
Constant	-6.18	1.97	—	—	0.002

SE: standard error; AOR: adjusted odds ratio; CI: confidence interval. Model likelihood ratio $\chi^2=67.56$, $df=8$, $p<0.001$; Hosmer–Lemeshow $\chi^2=3.68$, $df=6$, $p=0.720$; Nagelkerke $R^2=0.90$; overall correct classification=96.7%. Reference categories: higher-than-primary education, employed, married/unmarried (not separated/widowed/divorced), negative family history, no significant stressor, non-impulsive, non-anxious personality.

DISCUSSION

Relapse in alcohol dependence has been variably defined across the literature, with different authors emphasizing either the duration of abstinence preceding resumption of drinking or the process of warning signs that precedes the resumption event itself [5]. This inconsistency, together with reported relapse rates ranging from roughly one-third to nine in ten treated patients [3,4], makes cross-study

comparison difficult and underlines the value of a dedicated case–control comparison within a single, well-characterized Indian population, as was undertaken here. Education emerged as the sociodemographic factor most strongly associated with relapse status in this study, both on univariate comparison and, notably, as the only sociodemographic variable that remained an independent predictor after multivariable adjustment. The predominance of illiteracy and primary-level schooling among cases, contrasted with high-school-to-graduate attainment among controls, is consistent with earlier Indian findings; Korlakunta and colleagues similarly reported that around half of their relapsed sample had no schooling beyond primary level.^[11] Educated patients may be more receptive to psychoeducation and more likely to recognize the medical and social consequences of continued drinking, which could translate into better engagement with follow-up care. Occupation showed a comparable pattern, with unemployment

predominating among cases and skilled employment among controls, although this association did not persist independently once education and duration of dependence were accounted for in the adjusted model, likely reflecting the close inter-relationship between educational attainment and employability in this population. Marital status followed a similar logic on univariate analysis; controls were predominantly married, whereas cases were more often separated, widowed, or divorced, echoing the broader observation that an intact marital relationship can provide social support and behavioural monitoring that favour sustained abstinence, though this too lost independent significance after adjustment. Family type, by contrast, did not differentiate the groups, suggesting that the mere structure of the household, nuclear versus joint, is less relevant to relapse than the quality of specific relationships within it, such as marriage.

A positive family history of alcoholism was significantly more frequent among cases on univariate analysis, in keeping with the well-established genetic and environmental transmission of drinking behavior within families,^[4] although it did not remain an independent predictor after adjustment in the present sample. Duration of dependence was also markedly longer among cases and showed a borderline independent association with relapse in the adjusted model, consistent with the general observation that longer-standing alcohol use is associated with more entrenched neuroadaptive and behavioral patterns that are harder to reverse, and with cumulative erosion of the social and occupational supports that would otherwise buffer against relapse.

With regard to personality, impulsive and anxious traits were significantly more common among cases on IPDE assessment, while other personality categories did not differentiate the groups. This finding aligns with a substantial body of work linking impulsivity and poor treatment outcome in alcohol dependence; Loree and colleagues, in a systematic review, concluded that impulsivity is a consistent predictor of poorer substance-use treatment outcomes,^[7] while Czapla and colleagues found that impulsivity and related cognitive impairments independently predicted relapse in alcohol-dependent patients.^[8] Automatic approach tendencies toward alcohol-related cues have similarly been described as a marker of impaired self-regulation in alcohol dependence.^[10] Anxious personality traits may compound this vulnerability by lowering the threshold at which stress is experienced as intolerable, prompting alcohol use as a maladaptive coping strategy consistent with the tension-reduction hypothesis.^[9] Because the present sample size was modest, however, these personality associations should be regarded as indicative rather than conclusive.

Psychosocial stress showed one of the clearest associations with relapse in this study: more than three-quarters of cases reported a significant recent

stressor compared with fewer than one in five controls. This finding is consistent with the stress-vulnerability model, which links exposure to severe psychosocial stress with a heightened likelihood of returning to drinking,^[9] and with clinical evidence that adverse life events and associated psychological distress are closely linked to relapse in alcohol-dependent men.^[12] Unemployment and financial loss were the most frequently cited precipitants of relapse among cases in the present sample, echoing the interlinked role of occupational and economic strain identified elsewhere in the sociodemographic analysis; marital conflict and family breakdown were the next most common triggers, reinforcing the centrality of relationship stability discussed above. As with the other univariate associations, the presence of a psychosocial stressor did not remain independently significant once education and duration of dependence were adjusted for, again likely reflecting overlapping pathways rather than an absence of clinical relevance.

Taken together, these findings support cognitive-behavioral and stress-vulnerability models of relapse, which frame the resumption of drinking as the product of an interaction between a person's underlying vulnerability, sociodemographic disadvantage, personality traits and situational stressors that overwhelm available coping resources.^[5,9] The multivariable analysis suggests that educational disadvantage and chronicity of dependence may be the most robust independent drivers of relapse risk in this population, with occupational, marital, familial, and stress-related factors contributing largely through their association with these two variables rather than acting as fully independent risk factors. Because none of the domains examined operated in complete isolation, relapse-prevention programmes are likely to be more effective when they combine psychoeducation and vocational support for socioeconomically disadvantaged patients, personality-informed coping-skills training for those with impulsive or anxious traits, and structured stress-management or crisis-support pathways for patients facing acute financial, marital, or family difficulty. A synthesis of relapse-prevention approaches similarly emphasizes this combined, individualized model over single-factor interventions.^[5]

This study has several strengths, including its case-control design, which permits direct comparison between relapsed and non-relapsed patients from the same clinical population, and its use of validated instruments (PSLES and IPDE) for stress and personality assessment. Its limitations should nonetheless be acknowledged: the single-centre design and modest sample size of 60 male patients limit generalizability, the cross-sectional assessment cannot establish temporal causality between the studied factors and relapse, the sample was restricted to men, socioeconomic and cultural diversity across India was not captured within a single semi-urban catchment area, and although a multivariable binary

logistic regression was planned to adjust for confounding among the significant univariate factors, the associations reported here are otherwise unadjusted and should be interpreted with this in mind. Larger, multicentric, and longitudinal studies that include female patients and a broader range of sociocultural settings are needed to confirm and extend these findings.

CONCLUSION

This case-control study found that alcohol-dependent individuals who relapsed after de-addiction treatment differed significantly from those who sustained abstinence across several sociodemographic, personality, and psychosocial domains. Lower educational attainment, unemployment, marital separation or divorce, a positive family history of alcoholism, and a longer duration of alcohol dependence were all significantly more common among relapsed cases, as were impulsive and anxious personality traits, while other personality categories did not distinguish the groups. Most strikingly, more than three-quarters of relapsed cases reported a significant psychosocial stressor in the period preceding relapse, with unemployment, financial loss, and marital or family conflict emerging as the leading precipitants. On multivariable logistic regression, low educational attainment emerged as an independent predictor of relapse (AOR=10.90), with a borderline independent contribution from duration of dependence, while the remaining factors appeared to act mainly through their overlap with these two variables rather than independently. These findings reinforce the view that relapse in alcohol dependence is a multidimensional phenomenon in which sociodemographic disadvantage, particularly limited education, and the chronicity of dependence may be the most robust independent drivers, though they interact with personality traits and acute psychosocial stress to erode an individual's capacity to sustain abstinence after treatment. Clinical services working with alcohol-dependent patients may therefore benefit from routinely screening for these domains at the point of treatment completion and tailoring relapse-prevention planning accordingly, combining vocational and educational support, personality-informed coping-skills training, and structured stress-management input rather than relying on generic relapse-prevention advice alone. Larger,

multicentric, and longitudinal studies are needed to confirm these associations and to determine whether addressing them prospectively can reduce relapse rates in real-world clinical practice.

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