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Psychological Variables in Alchoholic Abstinent and Relapsed People

Anish Mathew[1], Sridevi Godishala[2] and Kumar K.B.[3]

[1]Clinical Psychologist, Head of the Department, Sacred Heart Hospital, Paynkulam, Kerala.

[2] Research Scholar, Department of Psychology, Osmania University, Hyderabad.

[3]Department of Clinical Psychology, Sweekaar Academy of Rehabilitation Sciences, Hyderabad.

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ABSTRACT

Substance use disorders include substance abuse and substance dependence. Abuse refers to a maladaptive pattern of substance use not amounting to dependence, but lending to harmful consequences in personal, situational, social and interpersonal areas. The term substance dependence is related to physiological and behavioral symptoms of substance use. It is a cluster of physiological, behavioral and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviors that once had greater value. Substance abuse may lead to addiction or substance dependence. Dependence almost always implies abuse, but abuse frequently occurs without dependence, particularly when an individual first begins to abuse a substance. Dependence involves physiological processes while substance abuse reflects a complex interaction between the individual, the abused substance and society. This study aimed to examine the prevalence of general self-efficacy, stressful events, style of coping and perceived support in a group of treated alcohol dependents but currently having a relapse to determine whether or not they differ from non-relapsed, on any of the measures. In sample, one group consists of forty patients who were diagnosed as ADS according to ICD – 10 criteria and currently either admitted at Alcohol De-addiction Centers, or seen at the OP Clinic for a relapse formed the experimental group (RLPS Group). In second group of forty patients who were met ADS criteria and currently abstinent for more than one year formed the control group (N-RLPS Group). The tools used in this study are Michigan Alcohol Screening Test, The General Self-Efficacy Scale, Presumptive stressful life events scale, Ways of Coping scale (revised) and Multi dimensional Scale of perceived social support were used for both the groups. The results indicated that, statistically significant positive correlation found between social support on self efficacy and significant negative correlation found between social support and stressful life events. It provided further evidence in support of the importance of certain clinical and psychosocial factors in relapse in substance dependence.

Introduction

Alcohol dependence is a major problem worldwide, India being no exception. Although short-term treatment of this condition is quite effective, preventing relapse often proves to be far more challenging. A majority of such patients relapse within a year of starting treatment, with the first three months being the most vulnerable period (Saunders & Allsop, 1987). Relapse can be a frustrating experience and usually has several adverse consequences for patients, caregivers and therapists. Relapse is a complex and dynamic phenomenon that appears to be determined by both neurobiological and psychosocial processes. The risk of developing substance dependence is closely associated with the degree of genetic relationship to a substance dependent parent. Children of alcoholics are 3-4 times more vulnerable to alcoholism than non alcoholic children. Higher concordance rate in monozygotic twins (58%) than in dizygotic twins (Kay, 1982). Offspring of alcoholic parents have an increased risk of developing alcoholism, a relationship which holds even when the children are raised separately from each other and from the biological parents (Schuckit et al., 1985).

Patients with substance abuse or substance dependence diagnoses who have antisocial personality disorder are likely to use more illegal substances; to have more psychopathology; to be less satisfied with their lives; and to be more impulsive, isolated, and depressed than patients with antisocial personality disorders alone. Depressive symptoms are common among persons diagnosed with substance abuse or substance dependence and substance use is also a major precipitating factor for suicide. Persons who abuse substances are about 20 times more likely to die by suicide than the general population. Stress, operationalized as negative life events, is implicated in treatment failure (Benfari et. al., 1982) or as a cause of relapse (Shiffman, 1982). Social support can either assist in the maintenance of abstinence or foster relapse (Todd, 1984). In one of the most influential social-cognitive behavioural models proposed (Marlatt & George, 1984; Larimer et. al., 1999), relapse has been viewed as an unfolding process in which resumption of substance use is the last event in a long sequence of maladaptive responses to internal or external stressors. It has been reported that negative mood states and other high-risk situations, self-

Tele:
E-mail address: sridevirehab.psy@gmail.com

efficacy, coping resources, etc, are singly or jointly predictive of relapse (Miller et. al., 1996., Larimer et. al., 1999). A dominant hypothesis in the literature is that social support functions as a buffer to stressful life experiences--i.e., the negative consequences of stressful life events--are mitigated by social support. Social support can either assist in the maintenance of abstinence or foster relapse (Todd, 1984). In few studies, Sinnghal and Nagalakshmi (1992) reported that relapse is more associated with interpersonal conflict with spouse and misunderstanding with family members, where as abstinence is associated with higher seeking social support coping behaviour. Desai et al. (1993) in a treatment outcome study of alcoholics found that among those who relapsed, the most common factor for drinking was negative emotional states. Prasad (1996) in a treatment outcome study reported a relapse rate of 41% at 6 months follow up. Prakash et al. (1997), a study on relapse in alcoholism found that negative emotional states as a major triggering factor for relapse. Pandian (1999) in a treatment outcome study of alcoholics reported that the family environment of those cases that abstinent for about 7 months has less dysfunction and better quality of marital life that cases that relapsed before 7 months. Rejani (1999) in a comparative study of early relapsers (2 months) and late relapsers (4 months) subsequent to de-addiction treatment did not find any significant difference in their age, education, and occupation and also found that the 2 groups did not differ significantly on drink refusal self efficacy.

In other studies, Kodandaram and Abraham (1999) in a treatment outcome study compared the effect of training in coping behaviours on the outcome of follow-ups at 3 and 6 months. They have reported that the therapy group had longer duration of abstinence compared to the control group. They reported in their study that the treatment outcome is significantly influenced by social support and family network. Abraham (2001) reported that temptation to drink, high-risk situations, negative alcohol expectancies, dysfunctional attitudes and deficits in coping behaviours are the major psychosocial determinants associated with relapse. Attending self- help groups, involvement in non drinking network and higher self efficacy are associated with abstinence.

Alcoholism is a major social, economic and public health problem throughout the world. Alcohol dependence is much more widespread today and casus several fold higher mortality and morbidity rate than other psychoactive substance dependence. The World Health Organization estimates that about 140 million people throughout the world suffer from alcohol dependence. Many alcoholics are trying to get rid of this disease condition, but one or the other way they are slipping from this goal even after a period of abstinence. The current study is an attempt to make sure that how psychosocial variables correlate with relapse and abstinence among alcohol dependents. Therefore this study attempted to examine the association between demographic variables, clinical parameters, stressful life events, self-efficacy, coping strategies and perceived social support, and relapse among patients with alcohol dependence. Based on predictions of the models of relapse and previous literature in this area it was expected that these variables would demonstrate significant associations with relapse.

Methodology

Aim

Aim of the present study is to examine the prevalence of general self-efficacy, stressful events, style of coping and perceived support in a group of treated alcohol dependents but currently having a relapse to determine whether or not they differ from non-relapsed, on any of the measures.

Sample

For the purpose of the study one group consists of 40 patients who were diagnosed as ADS according to ICD – 10 criteria and currently either admitted at Alcohol Deaddiction Centers, or seen at the OP Clinic for a relapse formed the experimental group (RLPS Group). In second group 40 patients who were met ADS criteria and currently abstinent for more than one year formed the control group (N-RLPS Group). The sample was collected from Sweekaar Rehabilitation Institute for Handicapped, Samatha Foundation, Aashra foundation, Secunderabad.

Inclusion Criteria

The age range of the sample is from 20-55 yrs who diagnosed as ADS (ICD-10) and currently seeking help either on IP or OP basis, duration of 3 to 12 months interval between episodes and abstinent for not less than 1 year were included in this sample.

Exclusion Criteria

ADS with other psychoactive substance use/abuse, other Psychological illness and other chronic physical illness were excluded from the sample.

Tools Used

Michigan Alcohol Screening Test developed by Bech P, Denker S. J in 1993, The General Self-Efficacy Scale developed by Matthias Jerusalem and Ralf Schwarzer in 1979, Presumptive stressful life events scale developed by Gurmeet Singh, Dalbir Kaur and Harsharan Kaur, Ways of Coping scale (revised) developed by Folkman and Lazarus in 1988 and Multi dimensional Scale of perceived social support developed by Zimet, Dablem, Zimet & Farley in 1998.

Procedure

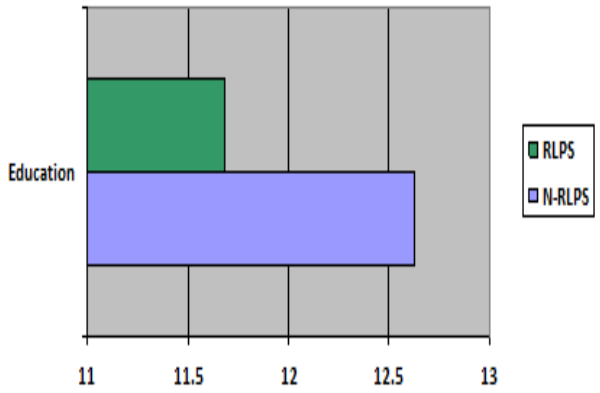
Patients for the both groups (Abstinent and Relapse) were collected from Sweekaar Rehabilitation Institute for Handicapped, Samatha Foundation, Aashra foundation, Secunderabad. The sampling method used was purposive sampling and informed consent was obtained from those who are willing to participate in the study. The questionnaires were administered to both the groups individually in a single session.

Statistical Analysis

To determine the difference between two groups Mann-Whitney U test, x^2 test and ANOVA were employed. Pearson correlation co-efficient was employed to understand the relationship among the variables. SPSS software version 16 was used in the analysis.

Result and Discussion

Figure1. Gives the mean age of participants (N-RLPS) and RLPS



Firure 2. Gives the mean educational background of the participants

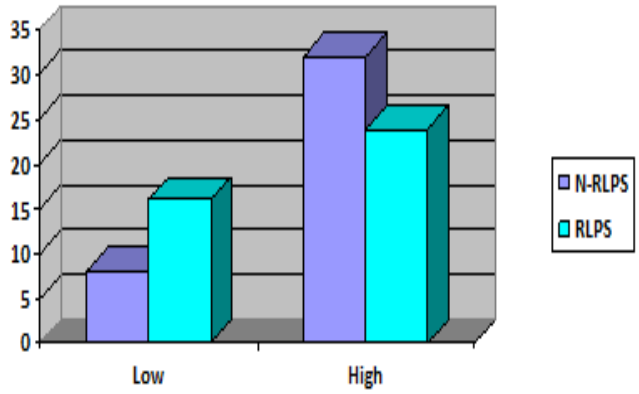


Figure 3. Gives socio economical status of the participants

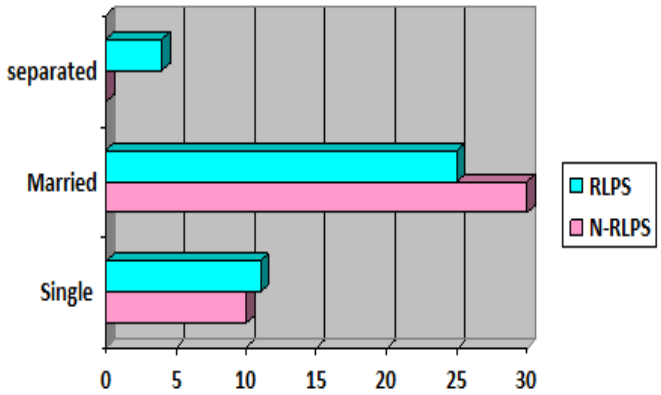


Figure 4. Gives marital status of the participants

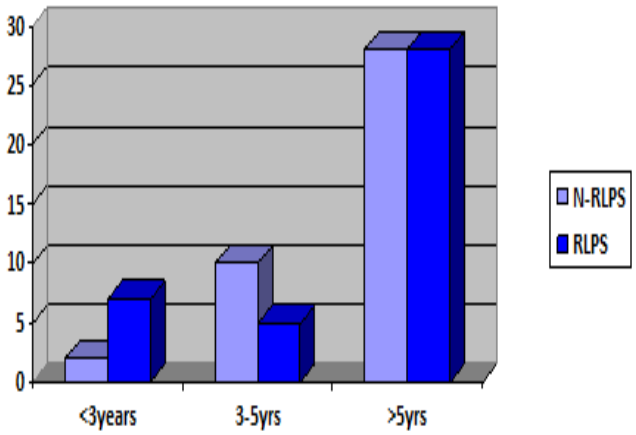


Figure 5. Gives duration of dependence of the participants

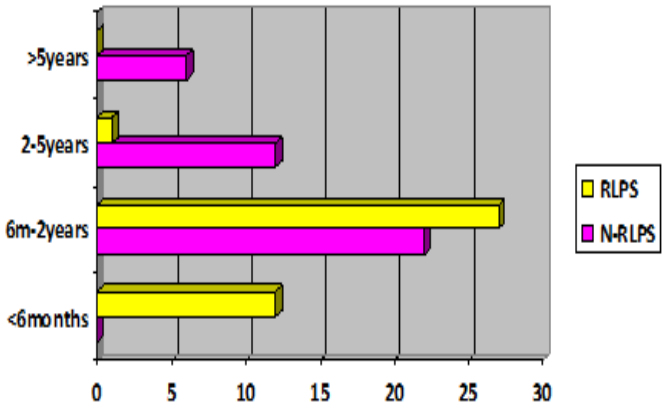


Figure 6. Gives duration of abstinence of participants

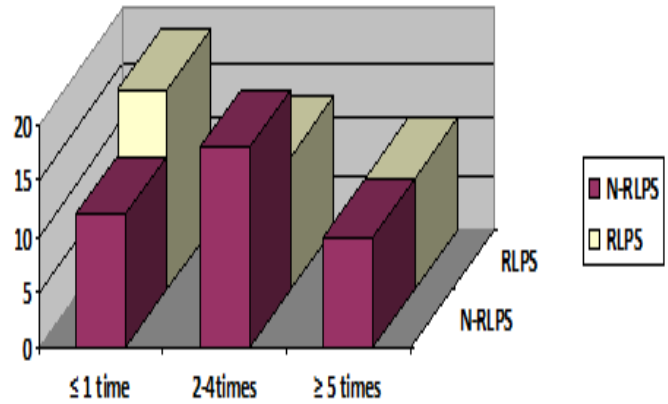


Figure 7. Gives number of relapses of participants.

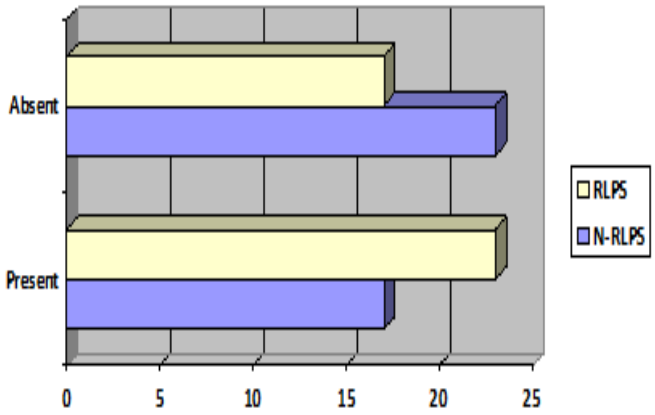


Figure 8. Gives family history of alcohol dependence

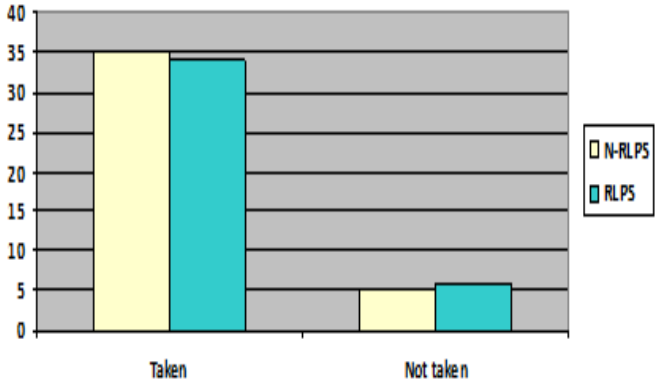


Figure 9. Gives intervention taken by participants

The investigation consists of 80 alcohol dependents divided into 2 groups; 40 abstinent individuals and 40 relapsed individuals. Both groups consisted mostly of married, educated and high Socio Economic Status men in their 30s. There were no significant differences between the two groups on any of the demographic parameters as well as clinical characteristics except duration of abstinence. The socio-demographic variables and clinical profile of the study sample are given in figure1 to figure 9.

Table-I indicates the Mean, Standard Deviation and Mann-Whitney U Test scores on the General Self-Efficacy Questionnaire, Presumptive Stressful Life Events Scale, Ways of Coping and the Multidimensional Scale of Perceived Social Support of the two groups. On the GSE patients who are remained abstinent have significantly higher mean scores 32. 30 (± 5.44) compared to patients who are relapsed 26.03 (± 6.99) indicating abstinent individuals have more self efficacy than relapsed individuals.

The PSLES results revealed that patients who relapsed had experienced a significantly higher stressful life events 399.32 (± 202.39) as well as undesirable life events 115.30 (± 91.65) in the past year but when it comes to desirable events 46. 68 (± 40.57) the abstinent group had experienced significantly higher in the past year compared to the relapsed group 26. 13 (± 27.74). Comparison of the ways of coping scores revealed that the relapsed group had significantly higher mean scores on maladaptive strategies such as cognitive escape avoidance 4.27 (± 1.99) and behavioural escape avoidance 4.83 (± 1.69) where, significantly lower mean scores on adaptive strategies such as painful problem

Table I. Gives Mean (± SD) scores on General Self-Efficacy Questionnaire (GSE), Presumptive Stressful Life Events Scale (PSLES), Ways of Coping and the Multidimensional Scale of Perceived Social Support (MSPSS) in two groups

Variables	N-RLPS(n=40)	RLPS(n=40)	U	p
GSE	**32. 30 (± 5.44)**	**26.03 (± 6.99)**	**393.00**	**0.001****
PSLES				
Desirable events	46. 68 (± 40.57)	26.13 (± 27.74)	566.50	0.022*
Undesirable events	38. 80 (± 51.62)	115.30 (± 91.65)	379.50	0.001**
Total life events	228.35 (± 153.68)	399.32 (± 202.39)	384.00	0.001**
WAYS OF COPING				
Self controlling	5.20 (± 2.39)	5.85 (± 1.79)	665.50	0.191
Cognitive escape	3.53 (± 1.57)	4.27 (± 1.99)	554.50	0.016*
Behavioural escape	65 (± .95)	4.83 (± 1.69)	27.00	0.001**
Distancing	5.73 (± 1.93)	5.20 (± 2.27)	708.50	0.374
Painful problem solving	6.90 (± 1.8)	4.78 (± 2.30)	366.50	0.001**
Seeking social support	7.13 (± 1.52)	4.78 (± 2.30)	322.00	0.001**
Positive reappraisal	4.65 (± 1.25)	3.18 (± 1.41)	351.50	0.001**
MSPSS				
Family support	21.63 (± 4.04)	20.00 (± 5.81)	702.5	0.346
Friends support	20.20 (± 4.23)	14.95 (± 5.99)	388.00	0.001**
Significant support	20.05 (± 4.64)	17.78 (± 6.99)	622.00	0.183
Social support total	61.83 (± 8.75)	52.90 (± 12.98)	471.00	0.002**

Table II. Mean (± SD) scores on the General Self-Efficacy Questionnaire (GSE), Presumptive Stressful Life Events Scale (PSLES), Ways of Coping and the Multidimensional Scale of Perceived Social Support (MSPSS) in RLPS group with respect to number of relapses.

Variables	1 TIME (n=18)	2 -4 TIMES (n=12)	≥ 5 TIMES (n=10)	F (df = 2, 37)	p
GSE	24.83(± 5.13)	27.92(± 7.94)	25.90(± 8.81)	.69	.507
PSLES					
Desirable events	28.56(± 33.85)	20.58(± 21.19)	28.40(± 23.75)	0.33	.721
Undesirable events	131.83(±111)	91.61(± 74.69)	113.90(± 69.72)	0.68	.512
Total life events	467.11(±208)	341.58(±181.02)	346.60(±195.69)	1.92	.160
WAYS OF COPING					
Self controlling	5.78(± 1.56)	6.33(± 1.72)	5.40(± 2.27)	0.76	0.476
Cognitive escape	4.06(± 2.10)	4.75(± 1.86)	4.10(± 2.02)	0.48	0.624
Behavioral escape	4.89(± 1.57)	4.75(± 1.96)	4.80(± 1.75)	0.02	0.976
Distancing	5.28(± 2.54)	5.92(± 2.15)	4.20(± 1.62)	1.64	0.209
Painful problem sol	4.28(±1.45)	6.00(± 3.02)	4.20(± 1.99)	2.78	0.075
Seeking social support	5.00(± 1.97)	5.08(± 2.84)	4.00(± 2.21)	0.75	0.480
Positive reappraisal	2.83(± 1.20)	3.67(± 1.72)	3.20(± 1.32)	1.27	0.292
MSPSS					
Family support	19.39(± 6.27)	20.58(± 5.42)	20.40(± 5.91)	0.18	0.839
Friends support	17.06(± 5.06)	14.58(± 6.93)	11.60(± 5.19)	2.97	0.064
Sign others support	17.89(± 7.05)	16.17(± 7.53)	19.50(± 6.45)	0.61	0.547
Socia support total	55.06(± 12.91)	50.83(± 15.76)	51.50(± 9.70)	0.45	0.644

Table -II demonstrating the scores of relapsed group (Mean, Standard Deviation and ANOVA) on self-efficacy, stressful life events, ways of coping and social support based on number of relapses (1 time, 2- 4 times, ≥ 5 times). There is no significant differences were found between number of relapse and psychological measures in relapsed group.

Table III. Relationship between social support and self-efficacy and stressful life events in the study sample (N = 80)

Variable	Self-efficacy		Stressful life events	
	r	p	r	p
SOCIAL SUPPORT	0.514**	0.001	-0.451**	0.001

Table-III indicates correlation of social support on self efficacy and stressful life events. There is a significant positive correlation (r =.514, P<0.01) between social support and self efficacy. This result indicates that increased level of social support help to increase self efficacy in an individuals. A significant negative correlation (r = -.451, P<0.01) found between social support and stressful life events. The result indicates that if social support is high, the impact of stressful life events is less on the person.

solving 4.78 (± 2.30), seeking social support 4.78 (± 2.30) and positive reappraisal 3.18 (± 1.41) than the abstinent group. There is no significant difference between the two groups on self controlling and distancing coping strategies. Scores on the MSPSS showed that patients who suffered relapse had significantly lower mean total score 52.90 (± 12.98) as well significantly lower score on the social support from friends 14.95 (± 5.99) than patients who were abstinent. There were no significant differences between the two groups on social support with respect to family and significant others.

Discussion

The investigation consists of 80 alcohol dependents divided into 2 groups; 40 abstinent individuals and 40 relapsed individuals. Both groups consisted mostly of married, educated and clinical characteristics such as duration of dependence, duration of abstinence, number of relapses, family history of alcohol dependence, intervention taken are comparable on both the groups. There were no significant differences between the two groups on any of the demographic parameters as well as clinical characteristics except duration of abstinence.

The problem of relapse remains an important challenge in the addictive disorders and alcoholism has been seen as a chronic and relapsing condition. Numerous studies found that psychosocial factors influence relapse in abstinent alcoholics (Brown et al., 1995; Kallmen et al., 2003; Mattoo et al., 2009; Reyes et al., 2009). In the background of this, results of the present study also showed that psychosocial variables were reliably and consistently associated with relapse among patients with alcohol dependence. The present study demonstrated that psychosocial factors such as self-efficacy, stressful life events, coping skills and social support appeared to be of greater importance in determining relapse. Abstinent group significantly differs from relapsed group in all these variables.

Self Efficacy

Self efficacy has significant role in alcoholism recovery and relapse (Marlatt & Gordon, 1985; Annis & Davis, 1988). When an individual fails to cope with high risk situation, he or she is thought to experience a decrease in self efficacy (DiClemente, 1986; Wilson, 1987). This cognitive change is thought to be one of the determinants of alcohol relapse. The results showed that abstinent patients scored significantly higher than relapsed patients on self-efficacy, which is confirming previous research (Maisto et al., 2000; Vielva & Iraugi, 2001; Blomqvist et a.,l 2003; Demmel & Beck 2004; Oei, 2005) on the importance of self-efficacy as a determinant of relapse. If a person has little belief in their ability to refuse a drink, they are more likely to engage in drinking behaviour (Ellickson & Hays, 1991; Oei & Baldwin, 1994). Conversely if a person is confident in their ability to refrain from drinking, they are less likely to consume alcohol (Young & Crook, 1991, Oei & Hasking; 2005). Thus outcome and self-efficacy expectancies are viewed as causal determinants of drinking behaviour.

Stressful Life Events

Alcoholics experiencing highly threatening or chronic psychological stress following treatment are more likely to relapse than abstaining individuals not experiencing such stress (Marlatt, 1996). Numerous clinical studies have demonstrated a relationship between psychosocial stress and alcohol relapse (Billing & Moos, 1983; Cooper & Skinner, 1992; Rosenberg, 1983). The results show that patients who had relapsed in this study had experienced significantly higher amount of stressful life events compared with the abstinent group. Earlier studies supporting these findings (Brown et. al., 1990; Tate et al., 1990). Individuals who relapsed experienced twice as much severe and prolonged stress before their return to drinking as those who remained abstinent (Brown et. al., 1995). Trauma and other adverse life events are strongly associated with alcohol use disorders (Clark et al., 1997). In this study the relapsed individual experienced more negative or undesirable life events on the other hand abstainers experienced more desirable life events, which is in line with some of the earlier studies; which have documented such an association that abstainers were reportedly less likely to drink and more noncompliant in problem situations, and experienced fewer negative life events and more positive life events, than relapsers (Rosenberg, 1983; Mattoo et al., 2003).

Coping Skills

Coping deficits contribute to reliance on alcohol use as a coping response and to the development and maintenance of alcohol abuse (Abrams & Niaura, 1987). Alcohol relapse is likely when the client have limited coping skills to cope with stressful or high risk situations, when it is expected that drinking will be pleasurable and the individual's belief that he/she is unable to cope without drinking (Monti & Rohsenow, 1999). It can be observed from table II that patients with alcohol dependence who remained abstinent tended to used significantly more number of coping strategies including adaptive strategies such as painful problem solving, seeking social support and positive reappraisal, while those who had relapsed more often used maladaptive strategies such as cognitive escape avoidance and behavioural escape avoidance. Maladaptive or avoidant coping strategies have been related to increased alcohol consumption (Windle, 1996; Wagner et al., 1999; Johnson & Pandina, 2000; Chung et al., 2001), whereas task- or problem-focused coping has been related to a decrease alcohol use (Levin et al. 2007). It has been reported previously that the effectiveness of coping strategies among patients are important in determining relapse (Litman et al., 1983; Singhal et al., 1992). Relapsed alcoholics reported using more avoidance and emotion-focused coping responses than abstinent alcoholics (Andrew & Rudolf, 1980). Thus the result of current study is in line with the earlier findings.

Social Support

Social support often act as a protective factor from relapse when an abstinent alcoholic facing stressful situations (Barber, 1995). The participants in this study, who were abstinent, were experienced significantly more social support than relapsed ones. This result is in consistent with previous studies suggesting that social support is a mechanism in the effectiveness of promoting a sober lifestyle (Groh et al., 2007). It also highlights the importance of social integration and abstinence-specific functional support in predicting the risk of relapse (Havassy et al., 1991). It is postulated that the treatment outcome is significantly influenced by social support and family network (Kodandaram & Abraham 1999). These results suggest that specific sources and forms of social support are important to the recovering alcoholic and that the effect of social support on treatment outcome is independent of the alcoholic's history of prior treatment failure (Booth et al 1992). Table I is also indicating a significant difference between the two groups on social support received from friends. Compared to abstinent group the relapsed group is getting significantly less amount of social support from friends. Instead of support these individual may getting pressure, including direct pressure to use the drug, and being in the presence of others using drugs, was the most frequently

reported determinant of relapse to substance (Marlatt & Gordon, 1980). Drug users may receive satisfactory general social support, but it may not include specific support for quitting drug use or maintaining abstinence. If network members also have problems with the drug, the support offered may reinforce continued use. Or, if network members are unaware of the user's problem, the support they provide may not be a resource to help them cope with abstinence related difficulties (Coleman, 1986; Stanton et al., 1982; Todd, 1984).

Social Support, Self Efficacy and Stressful Life Events and correlation

The correlation analysis (table III) indicates the relationship of social support on self efficacy and stressful life events. Social support may facilitate an individual's self efficacy by enabling one's adaptive capabilities to face challenges and to overcome adversity (Benight & Bandura, 2004). The table shows that there is a significant positive correlation between social support and self efficacy, which means that both are moving on the same direction. In alcoholics social support may reduce stress-related arousal and thus provide a source of increased self-efficacy. In that, social support may provide an opportunity to engage in vicarious experiences in dealing with a stressor at hand. This should be especially true when support is granted by persons who have to deal with the same stressor and demonstrate competency in doing so. On the other hand, social support may represent a symbolic experience in which members of the network provide verbal assurances of the support recipient's competency to deal with his or her alcohol problem (Luszczynska et al., 2005).

It has been postulated that social support might reveal its beneficial effect on health and emotions in times of distress, as it buffers the negative impact of stressful events (Cassel, 1976). In this study there is a significant negative correlation found between social support and stressful life events which is in agreement with the buffering effects of social support. These findings indicate the importance of taking into account specific components of social support when examining the relationship between specific sources of life stress and alcohol involvement (Peirce et al., 1996).

Conclusion

In this study patients who had relapsed were significantly more likely to have experienced stressful life events especially undesirable life events and using maladaptive coping strategies to cope with these stress. While those who had remained abstinent scored significantly higher on measures of self-efficacy, experienced more desirable life events, tended to use significantly more number of adaptive coping strategies to deal with stress and also getting significantly more social support. Statistically significant positive correlation found between social support on self efficacy and significant negative correlation found between social support and stressful life events.

The results of this study replicate the earlier findings in this area and underscore the close relationship between psychosocial factors and relapse. This study provided further evidence in support of the importance of certain clinical and psychosocial factors in relapse in substance dependence. If extended to substances other than alcohol and the results of the present study provides the basis for investigating correlates of relapse in a wide range of behavioural and substance use problems.

Implications of the Study

1. The models of relapse referred to earlier have been developed in the West and much of the research evidence also originated from the western countries. Thus, the present findings are useful in illustrating the universal nature of relapse in substance dependence and its proposed mechanisms.

2. If the variables identified in the current and earlier studies are indeed important correlates of relapse in alcohol dependence, these could be of considerable help not only in predicting relapse, but also in identifying key areas to be targeted in order to prevent this common and distressing occurrence. In another way this study would be helpful in the treatment and management of alcoholism.

3. If similar mechanisms of relapse operate across several categories, the findings could also be applicable to a wide-range of substance abuse disorders (Shaffer et al., 2004)., as well as problem behaviours such as impulse control disorders (*e.g.* pathological gambling, pyromania, kleptomania, *etc.*), eating disorders, obesity, *etc.*, currently conceptualized as behavioural addictions (Hollander, 2006). Since relapses also constitute a significant aspect of such behaviours, extending the findings from the field of substance dependence could help in understanding and preventing relapses in these conditions as well.

Limitations

1. This study has several methodological limitations and this evidence can only be regarded as preliminary. The sample size of the current study was small and the sample was restricted to men with substance dependence. Most of sample in the abstinent group is taken from alcoholic anonymous groups and the relapsed group is taken from various de-addiction centers who were undergoing treatment. The findings thus cannot be generalized to other patient populations with substance dependence.
2. The study was exclusively limited to exploration of psychosocial correlates of relapse, and biological factors were not considered. Moreover, the significant associations between psychosocial parameters and relapse demonstrated do not prove that these were causal connections.

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