

ALCOHOL DEPENDENCE, HEAD INJURY AND MEMORY IMPAIRMENT

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SUMMARY

In a follow-up of 52 alcoholic head injured patients for a period of 18 months, 14 patients were found to abstain from alcohol totally. The rest resumed alcohol consumption between three and six months. Leaving out three patients with other complications, 11 patients in the abstainer group were compared with equivalent groups of persistent abusers, and non-alcoholic head injured patients, using PGI Memory Scale. The performance of the groups indicated that persistent abusers were the poorest and that abstinence were followed by welcome change in memory. Qualitative analysis of the results and their implications for the rehabilitation of the alcoholic head injured patient are discussed.

Subjective impairment of memory is a symptom common to both chronic alcohol dependence and head injury. Objective evidence for the same has been made out by many workers. Cutting (1978) observed that non-verbal memory was deficient in abstinent alcoholics and that the problems were more when meaningless patterns were used. Ryan et al. (1979) noted similar deficits in tests of verbal memory and suggested that impaired retrieval and difficulties in generating mnemonic strategies were responsible for the problem. Abstinence aided the recovery of certain aspects of memory. Similar studies of memory deficits of head injured patients have shown that they were related to both diffuse injury and focal damage to the cortex. Head injured patients performed worse than normal controls on a variety of tests involving recall, recognition and learning of both verbal and non-verbal material (Luria, 1971; Brooks, 1976; Levin et al., 1979; Mukundan et al., 1987).

Epidemiological studies emphasize

the pathologically significant association between head injury and alcohol dependence. Field (1976) observed that in England and Wales, one fourth to one half of the severe accidents involved chronic alcoholics. Chandrasekaran (1985) estimated that 15 percent of the road accidents were due to drunken driving. Natarajan et al. (1987) observed that about one fifth of their selected sample of head injured patients were abusers. Among different causes of head injury (traffic accidents, assaults and falls from height), similar proportion of patients were alcohol dependents prior to the injury. Though the degree of association between the two might vary from place to place, the significance of the association was nevertheless evident. The present study aims to understand if alcohol dependence adversely affects the memory recovery of the head injured patient, the qualitative nature of the impairment if any, and if abstinence during the follow-up has any salutary effects on the recovery.

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Materials and Methods

The study was a part of the prospective follow-up of head injured patients, conducted in the Department of Neurosurgery, Govt. Rajaji Hospital, Madurai. Among the 184 patients included in the study between September 1984 and June 1985, 141 could be followed up for a period of 18 months. Defined by DSM III criteria (A.P.A., 1980), 52 patients had been alcohol dependents prior to the injury. Fourteen patients had stopped taking alcohol and continued to be so throughout the follow-up. The rest resumed alcohol consumption three to six months after the injury and eight of them complained of lowered tolerance to alcohol.

Study of memory performance was done using three groups of comparable patients; non-alcoholics (Group 1), alcoholics who had stopped taking alcohol after head injury (Group 2), and those who persisted with alcohol consumption during the follow-up (Group 3). In Group 2, two patients with dementing changes and one patient with post traumatic amnesic syndrome were excluded. For each patient in this group ($n=11$), one patient was chosen from among the non-alcoholics and one from the persistent abusers, so that patients in each triplet belonged to the same sex and age group, had similar education attainments, had sustained head injury due to same cause, and had the same severity of injury as measured by the duration of coma.

The groups were thus made of comparable individuals. In each group, there were six patients below 30 years, two between 30 and 45 years, and three above 45 years. Four of them were illiterates, three had less than five years of education, two with five to ten years of education and two with more than 10 years of education. Three had sustained

head injury in assaults and the rest in acceleration injuries. As measured by Glasgow Coma Scale (Teasdale and Jennett, 1974), five had suffered from mild injury, three moderate injury and the rest severe injuries, with a coma duration of less than one hour, one to six hours, and more than six hours respectively. All the patients were males and none of them suffered from any neurophysical deficit. All were tested 18 months after the injury.

Memory was assessed with the help of PGI Memory scale (Pershad, 1977; Pershad and Wig, 1979). The scale was not unduly dependent upon intelligence and the administration was simple enough for use among the illiterates. Availability of tests for various aspects of memory made it an useful tool to evaluate memory thoroughly. While testing the alcoholics, care was taken to avoid testing them if they were either intoxicated or in withdrawal state.

As the study involved comparable groups of patients, raw scores were used in the analysis of the results. Comparison of the sub-tests was done using ANOVA and wherever the F values were significant ($p<.05$), individual groups were compared with 't' tests.

Results

The total scores indicated that non-alcoholics performed better than the alcoholic groups, and that those who stopped using alcohol performed better than those who persisted with abuse. The results of comparison of the sub-tests are given in Table 1. The following patterns of differences were observed between the groups:

- i. In certain sub-tests, there were no differences between the groups. These include attention, immediate recall, verbal retention for

TABLE 1—Comparison of performance of alcoholics in PGI Memory Scale

	1 Mean (S.D.)	2 Mean (S. D.)	3 Mean (S. D.)	F	t ¹⁻²	t ¹⁻³	t ²⁻³
I	5.00 (0.63)	5.00 (1.00)	3.91 (1.30)	4.24*	—	2.52*	2.21*
II	4.55 (0.52)	4.00 (0.89)	3.64 (0.92)	3.58*	1.75	2.84**	0.94
III	6.55 (1.44)	6.00 (2.72)	3.09 (3.21)	5.76***	0.59	3.26***	2.29*
IV	7.27 (2.90)	6.00 (1.67)	4.82 (2.52)	2.83			
V	5.46 (1.86)	4.36 (2.16)	3.00 (1.73)	4.49*	1.27	3.20***	1.64
VI	7.64 (2.58)	7.55 (1.75)	5.46 (2.54)	3.10			
VII	4.09 (1.04)	3.55 (1.02)	3.09 (1.51)	1.86			
VIII	11.09 (1.58)	6.82 (3.43)	3.82 (3.37)	17.21***	3.75***	6.48*****	2.07
IX	7.18 (4.54)	5.64 (4.13)	3.91 (3.70)	1.72			
X	9.00 (1.18)	7.91 (2.17)	5.55 (3.91)	4.82*	1.47	2.81*	1.75
Total	68.82 (7.28)	56.82 (11.81)	39.36 (15.82)	16.36***	2.87***	5.61*****	2.93***

* $p < .05$; ** $p < .02$; *** $p < .01$; **** $p < .001$.

Group are referred to as follow: 1—non-alcoholics; 2—alcoholics who abstain and 3—alcoholics who persist with abuse. $n = 11$ in each group.

Sub-tests in PGI memory scale are: I—Remote memory, II—Recent memory, III—Mental balance, IV—Attention, V—Delayed recall, VI—Immediate recall, VII—Verbal retention of similar pairs, VIII—Verbal retention of dissimilar pairs, IX—Visual retention, and X—Visual recognition.

similar pairs and visual retention.

- ii. Verbal retention for dissimilar pairs was poorly performed by both groups of alcoholics. There was no difference between the abstainers and persistent abusers, indicating that the effects of abstinence were not evident.
- iii. In recent memory, delayed recall, and visual recognition non-alcoholics

performed better than persistent abusers significantly. Scores of abstinent group were better than those of persistent abusers, but, less than those of non-alcoholics. The differences were not statistically significant. Abstinence had only partly helped recovery in these areas.

- iv. In remote memory and mental balance, abstainers performed to the

level of non-alcoholics and both were significantly better than persistent abusers.

Discussion

The results indicated that memory was not an unitary function and that various aspects of memory behaved differently during recovery. The consequences of alcohol dependence and the positive effects of abstinence varied vastly in different sub-tests. The interpretation of the results could be done better in the context of normal recovery of memory after head injury. Sabhesan et al. (1989) compared non-alcoholic head injured patients with varying degrees of severity of injury with equivalent normal controls. At 18 months after the injury, the differences were confined to four sub-tests; remote memory, delayed recall, visual retention, and visual recognition.

Comparing the results of both studies, it was obvious that attention, immediate recall and verbal retention of similar pairs showed improvements almost to the levels of normals. In visual retention, head injured patients lagged behind normal controls, and the present study indicated that neither alcohol dependence nor abstinence held any significant impact on the performance. In verbal retention of dissimilar pairs, both groups of alcoholics proved to be inferior and abstinence had not contributed to any positive change. The scores reiterated the earlier observations that alcoholics had difficulties with harder items of memory (Albert et al., 1980). Abstinence had helped recovery of certain areas of memory partially and remote memory and mental balance were helped more significantly. Persistence of certain types of memory deficits even after abstinence has been attributed to permanency of damage or to a very protracted recovery process (Ron, 1983).

Psychometric performances of alco-

holics have been correlated with certain neuroanatomical changes in the brain. The present study showed a discrepancy in the performance of immediate recall and delayed recall sub-tests. Ron (1983) observed that the size of the ventricular system was positively and significantly correlated with the discrepancy between immediate and delayed recall of verbal material. Similarly, Golden et al. (1980) reported decreased absorption density in left hemisphere when compared to the right in over half of the chronic alcoholic group, whereas the opposite was true for most of the normal controls. In the present study, tests of attention (Right hemisphere function) were performed equally well by all groups, and tests involving verbal material such as delayed recall, dissimilar pair verbal retention and visual recognition (left hemisphere functions) were poorly performed by the alcohol dependents. Though greater and continuous utilization of the functions of left hemisphere helped their faster restoration after brain damage (Mukundan et al., 1987), the results indicated that impairment of left hemisphere functions was more than those of right hemisphere. Thus, at least a part of the impairment of left hemisphere-related memory functions was attributable to alcohol-related neuropathological changes. Even in the absence of clinical signs, alcoholics have been shown to evince neurological pathology (Ron, 1983).

Becker et al. (1982) contended that any pre-existing brain damage such as due to hydrocephalus or mild stroke could give rise to cumulative damage following head injury. Even a mild injury could be followed by devastating disability. The results of the present study indicated that sub-clinical neuropathological changes in the alcoholics had potentiated the consequences of head injury. Though abstinence was not able to reverse the

