

Short Communication

The association between chronic cannabis use and cognitive functions

R. RAY, G. G. PRABHU, D. MOHAN, L. M. NATH and J. S. NEKI

Department of Psychiatry, All India Institute of Medical Sciences, New Delhi 110016 (India)

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Summary

The cognitive functions of chronic cannabis users were compared with those of non-users. The tests did not reveal any significant difference between the two groups in respect of memory, attention, concentration and percepto-motor functions.

Introduction

Cannabis, like other psychoactive substances, affects certain mental processes and cognitive tasks. During the acute phase of intoxication the impairment of cognitive functions has been shown to be dose related [1 - 4].

Studies on the effects of long-term cannabis use are rather few. Campbell *et al.* [5] reported cerebral atrophy following heavy chronic use, which was disputed following the findings of Bull [6], Brewer [7] and Susser [8].

Cognitive disturbances in chronic cannabis users were also noted by S. S. Mehndiratta, N. N. Wig and S. K. Varma*, and suspected by Agarwal *et al.* [9]. Contrary findings, where evidence of organic brain damage or impairment of cognitive functions was not found, are not lacking in the literature [10 - 14].

As part of a larger investigation which also focused on adverse psychosocial sequelae associated with cannabis use and the social perception of cannabis use by the users' close family members, we studied the cognitive functioning of long-term cannabis users and a representative sample of the non-users drawn from the same population to which the users belonged.

The terms, samples and controls were those communicated earlier [15].

The following tests were used:

(a) Attention and concentration

- (i) digits backwards test,
- (ii) serial addition of 3s,

*Personal communication.

- (iii) serial subtraction of 3s,
- (iv) colour cancellation test [16].

(b) *Visuo-motor coordination*

Minnesota Percepto-Diagnostic Test [17].

(c) *Memory functions*

P.G.I. Memory Scale, as developed in the Post-Graduate Institute of Medical Education and Research, Chandigarh (India)*.

Observations

The groups of users and non-users with similar educational background showed no difference on tests of attention, concentration, and visuo-motor coordination (Tables 1 and 2), and no difference on the memory function test as a whole except for significant differences on one sub-test of the Scale (Table 3).

TABLE 1
Attention and concentration

Test	Users (<i>N</i> = 30)		Non-users (<i>N</i> = 50)		<i>t</i>	Difference
	Mean	S.D.	Mean	S.D.		
Digits backwards	3.1	1.4	2.9	1.4	0.48	Not significant
1 + 3s → 100 (seconds)	110.4	68.4	105.8	66.1	0.29	Not significant
Colour cancellation	43.1	14.5	41.0	15.3	0.62	Not significant
100 — 3s* (seconds)	160.5	112.3	133.9	65.7	0.92	Not significant

*In this test, number of users = 18, number of non-users = 34.

TABLE 2
Minnesota Percepto-Diagnostic Test

Test	Users (<i>N</i> = 30)		Non-users (<i>N</i> = 50)		<i>t</i>	Difference
	Mean	S.D.	Mean	S.D.		
Angle of rotation (degrees)	78.1	36.8	74.5	32.3	0.43	Not significant

*D. Pershad and N. N. Wig, personal communication.

TABLE 3
P.G.I. Memory Scale

Sub-test	Users (N = 30)		Non-users		t	Difference
	Mean	S.D.	Mean	S.D.		
1	6.0	0.0	5.9	0.1	—	N.S.
2	4.8	0.3	4.7	0.4	1.2	N.S.
3	2.3	1.5	2.0	1.5	0.7	N.S.
4	7.5	1.8	7.4	2.1	0.3	N.S.
5	7.2	1.7	7.5	1.3	0.8	N.S.
6	6.9	2.3	6.5	2.6	0.6	N.S.
7	4.1	1.1	4.0	1.0	0.07	N.S.
8	10.6	3.8	11.6	3.0	1.2	N.S.
9	7.1	3.5	7.1	3.3	—	N.S.
10	8.0	1.9	7.0	2.6	2.0	$p < 0.05$
Total score	64.7	12.3	64.1	12.3	0.2	N.S.

*N.S. = not significant.

Discussion

The results suggest that there may not be any significant association between long-term heavy cannabis use and cognitive functions. This finding is in line with what has been reported earlier [10 - 14].

It is possible that a low level of education and rural living may have led to hyporesponsivity in the test situation [19, 20], thus masking the difference between the two groups. In an earlier Indian study*, cannabis users were slower to react, poorer in concentration and time estimation, and had greater percepto-motor disturbances; charas smokers, in addition, had poor memory and size estimation. One factor contributing to the different findings could be that in the other studies the controls usually were individually matched. The differences tend to disappear when, as in our study, the performance is compared with the average functioning level of the population to which the users belong. The observed differences may also be explained by the association with a socially unacceptable life style [21].

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