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DRUG ABUSE IN INDIA : AN OVERVIEW WITH SPECIAL REFERENCE TO CANNABIS

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SUMMARY

The Indian literature related to drug abuse in general and Cannabis in particular has been reviewed and possible implications discussed. In this regard to solve the existing controversy, 50 pure chronic cannabis users were evaluated for their physical, mental, cognitive and socio economic functions and the results were compared with a matched control group. Results of this study did not reveal any impairment in these areas. It is concluded that cannabis, in India, may not be as much injurious to health as has often been mentioned in Western Countries. Future areas of research have been suggested.

Drug abuse has been showing a rising trend all over the world including India, perhaps as a result of newer and greater stresses related to rapid changes in life styles. Man is increasingly feeling lonely and is getting isolated from kith and kin. Contemporary life is highly competetive which creates a far severe challenge towards survival than at any time in the past. The form and manner of communicating at a socio-familial level is much too ungratifying and there is just no desire to await gratification-one must have what one wants and that too quickly. There may well be other contributory phenomena but it all leads one to believe that the traditional methods of meeting the stress are far too inadequate. As a consequence prevalence of drug abuse is on the increase. Elnager *et al.* (1971) reported a prevalence rate of 13 per 1000 in the State of West Benagal, while Nandi *et al.* (1975) gave a figure of 0.94 per 1000 of the total population for the same state. Similarly in Uttar Pradesh, Dube and Handa (1971) from Agra reported 22.8 per 1000 as suffering from the problem of drug abuse while Thacore (1972) from Lucknow gave a figure of 18.55 per 1000. In all these studies alcohol was by far the commonest drug abused, accounting for 60-98% of the subjects investigated. It was followed by cannabis in 4-20% and opium in only 0-15%.

An attempt was made to study the frequency of drug abuse in different strata of our society such as (1) students (2) general population (rural) and (3) psychiatric patients. For these studies Sethi and Manchanda (1977, 1978a and 1978b) defined drug abuse as "indulgence in a drug with a frequency of at least once a month without medical prescription excluding intake during festivals or on ceremonial occasions". This was necessary since no definition or criteria existed that would permit a meaningful comparison by different investigators. To find out the pattern of drug abuse among students-medical, non-medical and postgraduate medical students were surveyed. It was observed that 25.1% undergra-

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duate medical students, 11.5% college students and 30.4% post-graduate medicos were drug abusers. Alcohol was found to be maximally abused (51.1%) followed by Cannabis (40.8%); similar to observations of Mohan and Arora (1976) from Delhi and Dube *et al.* (1977) from Agra. College students maximally abused minor tranquillizers but the occurrence was much less as compared to medical undergraduates and post-graduates. Muttangi (1981) from Bombay and Parameshwaran and Mashiuddin (1981) from Hyderabad noted that the prevalence rate of drug abuse was 42% and 27.5% among college and university students respectively. Singh (1979) reported 82.4% boys and 29.6% girls to be abusing various drugs in colleges of Punjab.

In a study of rural population incorporating 8 villages Sethi & Trivedi (1979) found alcohol to be the commmonest (82.5%) drug abused followed by cannabis (16.1%). None of the subjects reported abuse of psychotropic drugs whereas they were found to be occupying third place after alcohol and cannabis as far as their abuse is concerned among urban student population. Dube & Handa (1969) reported that 1.24% of the population in and around Agra abused alcohol and cannabis. Deb & Jindal (1974) in a survey of 4 villages in Punjab found that 78.28% of the population used alcohol whereas Lal and Singh's (1979) figures were 9.13%.

The third population studied was the pattern of drug abuse in psychiatric patients that has generated interest in recent years. In a study (Trivedi and Sethi, 1978) on 1000 male psychiatric outpatients, 16.4% were found to be drug abusers. The extent in affective disorders was 22.8% and in schizophrenics and neurotics 19.6% and 15.4% respectively. Alcohol was found to be maximally abused followed by cannabis and minor tranquillizers in a descending order.

The problem of drug abuse whether it exists in India or not has been a subject of great concern. In order to seek an answer a National Committee on drug abuse was appointed by the Government of India in 1976 and the Committee in its report (NCDAI, 1977) concluded that "there is a hard core of drug addicts in general population and the drugs most frequently abused are alcohol, tobacco, cannabis and opium. Further, the problem among the students is more complex and difficult and drugs most commonly used are alcohol and tobacco. The students used psychotropics to a greater extent than general population but the use of opium and cannabis is markedly limited. On the whole, the prevalence was more among boys and men than amongst girls and women. There are, however, disturbing signs that the drug abuse may be on the increase. There is no reason for panic but no room for complacency either".

CANNABIS

Until the year 1980 (Turner *et al*, 1980) 421 compounds were identified from the cannabis plant of which approximately 61 are with cannabinoid structure. Of these cannabinoids,—Δ^9—Tetrahydro-Cannabinol (THC) is of greatest interest because of its characteristic mental effects that constitutes the main reason for use of cannabis by humans. Several other cannabinoids including cannabidiol (CBD) and Cannabinol (CBN), as well as various non-cannabinoid constituents of supyrolized cannabis may also have biological activities of other types. Dependent on the geographical origin of the plant, relative and absolute contents of individual cannabinoids vary widely (Turner *et al.*, 1980).

Various preparations derived from cannabis plant have a wide range of potencies. Marihuana or Bhang consists mainly of dried leaves and stems and can

range in content from less than 1% to greater than 8% THC. Other preparations (Hashish, Ganja, Charas) made from the resin and flowering tops of the plant can contain upto 15% of THC. Recently, in western world solvent extracts of lead material, flowers or resin have appeared on the illicit market. The potency of this so called "Hashish oil", "honey oil" or "weed oil" is extremely variable; the THC content can-range upto 60%. The toxicity of these preparations appears to be related to their THC content, although other cannabinoids or non-cannabinoids may contribute significantly.

The pyrolysis of cannabis products produce hundreds of compounds that make up the vapour and particulate phases of the smoke which consist of toxic chemicals and carcinogens. The tetrahydrocannabinolic acid is activated by conversion to THC at usual burning temperatures during smoking and about 50% of the total available is delivered in the mainstream smoke from a marihuana cigarette (Rosenkrantz, 1982).

EPIDEMIOLOGY AND ETIOLOGICAL FACTORS

The abuse of cannabis ranks number two after alcohol in its rate of prevalence in urban and rural population in India. Among all the psycho-active drugs of abuse cannabis abuse has exhibited a steep rise particularly in western countries where it is becoming more popular. This growing trend of cannabis abuse has drawn considerable attention and has resulted in its recognition by the social scientists, health workers and planners. A flood of investigations have appeared in the literature in recent years as regards various aspects of cannabis abuse but the controversy remains. The factors responsible for its initiation, perpetuation and consequences continue to haunt us. No unitary theory explains the true aetiological factors responsible for cannabis abuse. Personal, inter-personal, familial, developmental, psychodynamic environmental and biological factors might contribute individually or collectively. Socio-demographic studies (Sethi *et al.*, 1981; Dube, 1972; Verma, 1972) reveal that indulgence in cannabis was initiated around adolescence and early adulthood and curiosity, companionship and need for pleasure in descending order were factors for such behaviour. Further, cultural sanction and easy availability of the drug appear to be important determinants.

Several studies have suggested that drug dependent groups are characterised by high levels of neuroticism and psychoticism and by low level of extroversion (Gossop, 1978; Teasdale and Hinkson, 1971). However, investigations of non-psychiatric, chronic cannabis abusers (Sethi *et al*, 1981, 1983) did not reveal any particular identifiable trait in their personality. Psychiatric and psychometric evaluations of cannabis abusers did not reveal any significant impairment. These observations suggest that social, cultural and occupational or environmental facets are more important than the personality constellation.

ADVERSE REACTIONS OF CANNABIS

The ill-effects of cannabis are much highlighted in the literature but the issue remains unresolved. The lethality of cannabis in humans remains questionable. However, it has been reported to be toxic for the respiratory bronchitis, obstructive pulmonary disease, cancer), cardio-vascular (tachycardia, hypotension angina in vulnerable subjects) and gastro-intestinal (decrease in gastric secretion, hepatotoxicity, enhancement of alcohol induced hepatotoxicity) systems. Other toxic effects (aspergillosis, anaphylactic shock in sensitive subjects, aggravation of some der-

matological conditions, malnourishment etc.) are also reported. Besides, cannabis is reported to be causing chromosomal aberrations and mutagenicity carcinogenecity, impairment of immune system and endocrinal disturbances affecting both male and female reproductive hormones. It is also reported to be causing sterility, teratogenesis, decrease in sexual activity and impairment of postnatal development of offspring of cannabis abusers. As regards acute effects of cannabis on behaviour, it has been reported to impair intellectual functions and driving skills. Chronic abuse of cannabis may lead to various psychiatric syndromes viz. flash back, psychosis, amotivational syndrome, cerebral atrophy and impairment in sexual and social adjustment etc.

The reports of these toxic effects of cannabis chiefly hail from Western literature and remain a controversial issue since contradictory reports too are available in the literature.

Alarmed by rising trend of cannabis abuse. WHO in 1981 invited leading scientists of collaborative centres to resolve some of these issues. Realizing the importance of the entire reports a study has been conducted to explore the possible consequences of cannabis intake in human subjects. The study entitled " ong Term Effects of Cannabis Use" was also conducted in this department.

METHODOLOGY

In this project 50 male pure chornic cannabis abusers (abuse for a minimum period of 5 years) were identified and these subjects were evaluated for their physical, mental, cognitive and socio-economic status. The subjects were investigated using a semistructured proforma which included variables for socio-demographic characterties and several factors for initiation, maintenance and also the pattern of cannabis abuse. After a thorough physical and psychiatric assessment, studies such as, haemogram, liver functions, total serum protein, renal functions including urine analysis, serum creatinine and blood urea; electrocardiography, electro-encephalography, nerve conduction test and tonometry have been done. Detailed psychiatric and cognitive assessment was done using Weschsler Memory Scale, Bhatia Battery of Intelligence Test, Bender Gestalt Test, Cornell Medical Index, Taylor's Manifest Anxiety Scale and Hamilton Rating Scale for Depression.

Further, to investigate any possible association between levels of Δ^9-T. H. C. and physical and mental status of cannabis abusers, cannabis samples from 20 randomly selected patients were obtained. These crude cannabis samples were analysed for their Δ^9-T. H. C. content by the method of Singh *et al.* (1981) using thin layer gas chromatographic techniques.

The results were compared with an equal number of control subjects matched for age, sex and economic status.

OBSERVATIONS AND RESULTS :

Socio-Demographic Characteristics:

Most of the chronic cannabis abusers were found to be between 23 to 40 years of age, married (76%), Hindus (70%) either illiterate (36%) or educated upto high school (32%), hailed nearly equally from unitary (48%) and joint (52%) families, belonged to lower middle 48%) or middle (36%) segment of socio-economic class (Table-1 and Table-2).

Pattern of abuse:

In majority of the subjects cannabis intake was initiated between 19-25 years (52%), or between 12 and 18 years (36%), for seeking of company (56%), pleasure (24%) and curiosity (8%). These subjects maintained intake of cannabis for reasons such as pleasure (42%), impro-

TABLE 1. *Socio-Demographic Characteristics of Cannabis Users and Control* (N=50).

	Experimental N	%	Control N	%
Age (in years) :				
17—22	3	6	5	10
23—28	13	26	17	34
29—34	15	30	9	18
35—40	11	22	10	20
41—46	8	16	9	18
	X^2=2.55; N. S.			
Marital Status :				
Unmarried	10	20	14	28
Married	38	76	35	70
Widower	—	—	1	2
Separated	2	4	—	—
Divorce	—	—	—	—
	X^2=0.45; N. S.			
Religion :				
Hindu	35	70	40	80
Muslim	11	22	7	14
Christian	1	2	2	4
Sikh	2	4	1	2
	X^2=0.95, N. S.			
Education :				
Illiterate	18	36	10	20
Just literate	2	4	11	22
Primary	9	18	12	24
Upto High School	16	32	11	22
Intermediate	3	6	5	10
Graduate	1	2	1	2
Post-Graduate	1	2	—	—
	X^2=9.90, N.S.			
Type of Family :				
Unitary	24	48	22	44
Joint	26	52	28	56
	X^2=0.16, N. S.			
Social Status (income in Rs. per month) :				
Upper middle (1001-1500)	—	—	—	—
Middle (501-1000)	18	36	22	44
Lower middle (201-500)	24	48	22	44
Very low (upto 200)	8	16	6	12
	X^2=0.77, N. S.			

Table 1 (Contd.)

Occupation :				
Unemployed	6	12	4	8
Student	—	—	2	4
Farmer	7	14	8	16
Service	1	2	4	8
Businessman	8	16	8	16
Skilled worker	10	20	14	28
Unskilled worker	18	36	10	20
	X^2=3.40, N. S.			

ving concentration (22%), company (18%) to allay anxiety (16%) and for relaxation (14%) (Table-2).

TABLE 2. *Pattern of Cannabis Use*

		N	%
(a)	*Age of initiation* (in yrs) :		
	12—18	18	36
	19—25	26	52
	26—32	5	10
	33—39	1	2
	40—46	—	—
	Mean = 19.2±2.4		
(b)	*Reasons for initiation :*		
	Company	28	56
	Curiosity	4	8
	Pleasure	12	24
	Psychosocial stress	2	4
	To increase work capacity	0	0
	To increase appetite	2	4
	Tradition	2	4
(c)	*Reasons for Maintaining :*		
	Curiosity	2	4
	Company	9	18
	Pleasure	21	42
	Relaxation	7	14
	Better performance	4	8
	To allay anxiety	8	16
	For digestion purpose	1	2
	To avoid loneliness	1	2
	To allay the depression and frustration	3	6
	For improving concentration	11	22
	Religion cult	2	4
	To avoid withdrawal symptoms	—	—

The total duration of cannabis abuse ranged from 5-10 years (62%), 11-12 years (24%) and 23-34 years (14%) (Table 3). Most of the subjects consumed cannabis in the form of Bhang and Ganja together (58%) followed by only Bhang (34%). The dose ranged between 1-5 gm/day in majority (36%) and Δ^9-THC content was found to be 5.6% and 10.4% in Bhang and Ganja, respectively. (Table 4).

TABLE 3. *Duration of Use*

Pattern of cannabis consumption	Durations of Cannabis use (years)				
	5–10	11–16	17–22	23–28	29–34
—Irregular	16%	4%	6%	6%	4%
—Gradual increase	20%	6%	2%	—	—
—Stationary	26%	4%	2%	2%	2%

TABLE 4. Δ^{-9} *THC Content in Crude Cannabis*

Bhang (gm/day)	Ganja (gm/day) Number of subjects				
	0	1–5	6—10	11–15	16 & above
0		1	1	—	3
1—5	4	18	--	--	2
6—10	7	--	4	--	5
11—15	4	—	--	—	
16 & above	2	--	--	--	

Δ—9 THC%—Bhang—5.6±1.2
Ganja—10.4±2.6
(M±S. E.)

As depicted in Table-5 52% of the abusers reported not having experienced any stressful event prior to initiation of cannabis intake while 48% reported one or the other psycho-social stresses. Majority of the abusers (64%) were not found to possess any abnormal personality traits.

TABLE 5. *History of stresses within a year prior to onset of cannabis use*

	N	%
No stress	26	52
Stress within one year (N=24)	24	48
I. Loss of (a) love object	14	31.1
(b) prestige	5	11.1
(c) Economic	6	13.3
II. Frustration	3	6.6
—Scholastic failure	5	11.1
—Lack of heterosexual attachment	—	—
—Lack of promotion or job	9	20
III. Others	3	6.6

Premorbid personality of subjects :

Personality Traits	Experimental		Control	
	N	%	N	%
—Average personality (No abnormal psychiatric traits)	32	64	36	72
—Schizoid traits	5	10	4	8
—Paranoid traits	1	2	×	—
—Obsessive traits	2	4	3	6
—Hysterical traits	4	8	2	4
—Antisocial traits	3	6	1	2
—Asthenic/dependent traits	1	2	1	2
—Cyclothymic traits	2	4	3	6

36% of the abusers never discontinued the cannabis abuse while 64% occasionally discontinued. Out of those who discontinued the cannabis at times, 32%

did not experience any withdrawal symptoms. In rest of the subjects, mild-craving, psychological upset, tiredness and fatigue, anxiety, bodyache, listlessness, irritability, decreased performance, poor concentration and sleep disturbance were the reported withdrawal symptoms in descending order. However, these symptoms neither required active medical intervention nor were the subjects compelled to resume cannabis intake immediately (Table 6).

TABLE 6. *Withdrawal Symptoms*

Subject (N=50)	N	%
1. Never stopped	18	36
2. Stopped occasionally	32	64
(b) *Symptoms* (N=32)		
A. No symptoms	10	31
B. Mild craving	19	38
2. Psychological upset	6	12
3. Tiredness & Fatigue	8	16
3. Anxiety	5	10
5. Headache, bodyache	6	12
6. Listlessness	8	16
7. Decreased performance	5	10
8. Poor concentration	6	12
9. Sleep disturbances	2	4
10. Irritability	7	14
11. Palpitation	1	2

PHYSICAL AND PSYCHIATRIC EVALUATION

On clinical psychiatric evaluation most of the subjects (64%) were found to have no psychiatric problem. The remaining were, however, found to manifest mild features of depression (16%) and anxiety (10%) (Table 7). There was no abnormality on physical examination except chronic bronchitis in a few.

TABLE 7. *Clinical Evaluation.*

	N	%
No Psychiatric Problemc	32	64
Psychiatric problem	18	36
—Depressive feature	8	16
—Anxious Preoccupation into:		
(a) Family problems	1	2
(b) Economic problems	—	—
(c) Future	2	4
—Suspiciousness	2	4
—Anxiety	5	10

Similarly, laboratory examination for haemogram, liver and renal function tests, cardiogram and nerve conduction test did not reveal any abnormality. However, in two subjects electroencephalogram was found to be abnormal. In one, it was non-specific borderline defect and in the other slow activity with superimposed beta activity was detected. Tonometry was found to reveal normal ocular tension in 84% cases and lower tension in 16% cases (Table-8).

Psychometric evaluation did not reveal any significant abnormality in comparison to control subjects on Bhatia Battery of Intelligence Test, C. M. I. and HRS-D. 28% subjects were found to have low memory score on W. M. S. indicating mild memory impairment and 6% had low scores on B. G. T. indicating organicity. One surprising observation was made on Taylor's Manifest Anxiety Scale, where experimental patients were found to have statistically significant low anxiety scores as compared to control subjects. (Table-9).

TABLE 8. *Laboratory investigations*

(a) *Biochemical*

Investigation	Mean ± SE	Remark
—Hb %	12±0.2 gm%	N. A. D.
L. F. T. (Liver Function Test		
Serum bilrubin	0.22 mg%	N. A. D.
Van den-berg	—ve	N. A. D.
Alkaline Phosphatase	8.2±0.02 K.A. Unit	N. A. D.
Total serum protein	5.6±0.26 gm%	N. A. D.
—R. F. T. (Renal Function Test)		
Blood urea	24±2.2 mg%	N. A. D.
Serum Creatinine	0.8±0.002 mg%	N. A. D.
-Blood sugar (F)	98±4.6 mg%	N. A. D.
—Urine analysis		
Albumin	—ve	N. A. D.
Sugar	—ve	N. A. D.
Microscopic	Normal	N. A. D.

(b) *Other Investigations* :

Tests	Normal	Abnormal
E. C. G. (N=50)	50	--
E. E. G. (N=48	46	2

1—Nonspecific borderline

1—Slow activity superimposed with fast Beta activity

Nerve conduction Metre/Sec.	Rt. Ulnar	Lat. Popliteal (Rt.)	Lt. Ulnar	Lat. Popliteal (Lt.)
Mean±S. E.	42±3.6 (Normal)	34±4.2 (Normal)	40±4.6 (Normal)	32±3.8 (Normal)

Tonometry

Tension of both eyes (m. m. Hg)	N	%
7—12	8	16
13—18	42	84

TABLE 9. *Psychometric Evaluation*

Scores	Experimental N	Experimental %	Control N	Control %
(a) *Taylor's Manifest Anxiety Scale* :				
Below 17	46	92	50	100
17—22	4	8	—	—
23—28	—	—	—	—
	M±S.E.=6.9±2.2 ($p<0.05$)		M±S.E.=13.8±2.6	
(b) *Cornell Medical Index* (A-R score)				
Below 30	46	92	48	96
31—40	3	6	2	4
41—51	1	2	—	—
52—62	—	—	—	—
	M±S. E.=14±2.4 X^2=1.2; N. S.		M±S. E.=11+1.2	
(c) *Hamilton Rating Scale*				
Below 17	46	92	48	96
17—23	4	8	2	4
24—29	—	—	—	—
	M ±S. E.=8+08+ X^2=0.7; N. S.		M±S. E.=6.2±1.8	
(d) *Bender-Gestalt Test* (Z-score)				
0—5	34	68	38	76
6—12	13	26	10	20
13—24	3	6	2	4
	M±S. E.=5±1.2 X^2=0.81, N. S.		M±S. E=4±1.6	
(e) *Weschsler Memory Scale CMP*				
81—90	28	56	22	44
91—100	16	32	20	40
101—110	3	6	6	12
111—120	3	6	2	4
	M±S. E.=94.6±8.6		X^2=1.4, N. S. X^2=2.3, N. S.	
(f) *Bhatia Battery of Intelligence*				
71—80	2	4	2	4
81—90	11	22	10	20
91—100	23	46	17	34
101—110	11	22	175	30
111—120	3	6	6	12
	M±S. E.=96.3±7.2		X^2=1.4 N. S. X^2=2.3, N. S.	

DISCUSSION

Cannabis having been used since time immemorial in several cultures and for variety of effects, has been an issue of heated debate with regard to its possible ill effects on physical, psychological and social aspects of an individual. Man on the street has read a number of documented reports by one or more investigators that seem to contradict and refute each other resulting in confusion.

A consistent problem with reported studies has been the definition of a true cannabis abuser for its use differs from culture to culture. The operational definition of chronic use, therefore, in terms of duration, regularity, frequency, dose etc. varies from investigator to investigator, making it difficult to compare various studies. In the present work, the term 'chronic use' has been operationally defined as to regular usage of cannabis for 5 or more years and all its effects have been studied in the light of this definition.

Our experience with the present work, involving 50 chronic cannabis users and 50 matched controls for age, sex and economic status, has been that chronic use of cannabis does not cause impairment of physical, psychological and socio-economic aspects of users.

It was noticed that indulgence in cannabis use is initiated around adolescence and early adulthood in the majority of our subjects. These observations are similar to earlier ones in India (Dube, 1972; Varma, 1972; Sethi *et al.* 1981) and West (Beedle, 1971; Mabilean, 1972; Baselqu, 1972). We could not delineate a particular factor among our subjects responsible for early initiation of cannabis use. Stress was not an important factor for such an initiation, however, curiosity, company, need for pleasure appear to be important factors for such a behaviour. Further, cannabis is often used in the Indian cultural setting for a

variety of reasons, thus cultural sanction may be an important phenomenon. A similar observation was made in an earlier study (Sethi *et al.*, 1981).

In terms of psychiatric status of these subjects, no definite trait could be identified from a study of their premorbid personality. Further, psychiatric and psychometric evaluation of these subjects did not reveal any significant impairment. However, the abnormality observed on Bender Gestalt Test and Weschler Memomory Scale for Z scores and low M. Q. respectively could be due to poor educational background in these subjects. The observations made on Hamilton Rating Scale for Depression, Cornell Medical Index and Bhatia Battery of Intelligence Test did not, however, differ from that made in control subjects. One significant observation on Taylor's manifest Anxiety Scale in which cannabis users were found to have low anxiety scores, appears to be due to soothing effect produced by cannabis or some other yet to be identified phenomenon.

In our study we did not observe any impairment of functioning, observations somewhat similar to that of Comitas (1976) but certainly contrary to the works of Kolansky and Moore (1971) and West (1970). It appears that use of cannabis in our society has a traditional and cultural sanction as a result of which majority of the subjects do not take an excessive quantity which may otherwise be detrimental to psychosocial aspects of life. It was noticed in our work that majority of the subjects used cannabis ranging from 1-5 gm/day which is a low quantity. Further, Halikas *et al.* (1971) emphasized that antisocial behaviour more often preceeded cannabis use than followed it.

Similarly, physical status was found unaltered, as assessed by physical examination and laboratory investigations which are further supported by earlier observation (Hartley *et al.*, 1978; Tennant, 1982). Normal immune status and lack of increase in the susceptibility to infection were also reported by Silverstein and Lessin (1976). Normal nerve conduction and E. E. G. reported in our study, as did earlier studies (Dibenedetto *et al.*, 1977; Stefanis *et al.* 1976) further confirm that cannabis does not produce any impairment of central or peripheral nervous system. We did not observe any evidence of epileptogenesis in E.E.G. even after photostimulation and cerebral atrophy as reported by Nahas (1979) and Compbell *et al.* (1971). However, Nahas (1979) used pure Δ^9T. H. C. in his study instead of crude cannabis. Recently Rotenbergh (1982) described 'Cannabidiole' as a potent antiepileptic agent. It is possible that 'cannabis' used by our subjects may be rich in cannabidiole' and thus exhibited no epileptic discharges during E.E.G. Cannabis is known to reduce intraoccular tension both in normal as well as in patients suffering from glaucoma (Cohen, 1976; Crawford and Meritt, 1978; Meritt et al, 1981). It is probable that lack of such observation in the majority of the subjects might be due to development of tolerance following chronic cannabis use.

The Indian Hemp Drug Commission reported that large number of practioners of long experience have seen no evidence of any connection between the moderate use of hemp drug and disease (Grinspoon, 1971) and this conclusion has never been seriously challenged and is similar to observation of La Gurdia Committee. Studies in Jamaica (Rubin and Comitas, 1975) and Costa Rica (Coggins et al, 1977) confirm these observations and those of our study.

The question as to whether cannabis produces dependence remains controversial (Goth, 1970; Keilholz and Ladwing, 1970; Stefanis et al, 1976). In this study it was found that cannabis does produce mild withdrawal symptoms in some

subjects but appear to be of no significance, because neither these subjects were compelled to consume cannabis nor did it require therapeutic intervention. It is possible that cannabis does not produce 'Dependence' because of its very long half life.

It may thus be categorically stated that cannabis is not associated with physical, psychological and socioeconomic impairment of an individual. However, National and International discussion on health and social consequences of cannabis use and the relevance of these issues to development of public policy continues unabated. Therefore, well designed large scale, long term, prospective studies assisted with biochemical investigations are required to delineate the various effects of cannabis so as to resolve the controversies.

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