

A Review of Historical Context and Current Research on Cannabis Use in India

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ABSTRACT

Background: The cultivation and use of cannabis is historically rooted in the Indian subcontinent and this rich heritage of cannabis use dates back to at least two thousand years. Cannabis remains an illicit substance in India despite its changing status globally with many countries legalizing cannabis use in recent years. Scientific research on cannabis use in India has also been sparse.

Method: Extensive search of online databases resulted in the identification of 29 original research studies pertaining to one of three areas of cannabis research; a) prevalence of cannabis use b) psychological correlates of cannabis use, c) cannabis use in substance use treatment settings.

Findings: We found that most Indian studies used very basic quantitative research designs and had poor scientific rigor. Samples were small, region specific and included only males. Data analyses were limited to descriptive methods. The criteria for cannabis use in most of the reviewed studies were not rigorous and prone to biases.

Conclusion & Implications: With changing attitudes and loosening of restrictions on cannabis use, the prevalence of new

users is rising dramatically particularly in the college going population. This presents a strong need for research on motivations and attitudes to cannabis use and how those can influence patterns of use, and also the short- and long-term effects of use. More studies with stronger research designs (both cross sectional and longitudinal) are required for the study of cannabis use and this knowledge will be critical for managing the growing substance epidemic, generating public health solutions as well as formulating effective policy frameworks.

Keywords: Cannabis use, Cannabis use research, India, marijuana

Cannabis is one of the most widely used psychoactive substances. It has a rich history spanning thousands of years and varying representations throughout human civilization. Cannabis is mainly associated with three species of flowering plants belonging to the *canabaceae* family, namely *sativa*, *indica*, and *ruberalis*. The plants are indigenous to Central Asia and the Indian subcontinent, where their earliest use dates back to at least the third century BC.^{1,2} The more prevalent term ‘marijuana’

typically refers to the dried leaves, stems, and flowering buds of the two more commonly consumed strains of *sativa* and *indica*.³ A few active components of cannabis, namely delta-9-tetrahydrocannabinol (THC), cannabidiol (CBD), and cannabidiol (CBD), have been found to produce its intoxicating effects, which include feelings of euphoria, altered perception, relaxation, and wellbeing.^{4-6,7} In India, cannabis is commonly known to have three distinct derivatives; a) *ganja* (marijuana), the dried flower buds or fruits of the female cannabis plant, b) *charas* (hashish), the resinous exudation secreted by the plant, and c) *bhang*, a grinded paste of only the matured leaves.^{6,8}

The use of cannabis has steadily grown in recent years, and more than 200 million people worldwide used cannabis in 2019 alone.⁹ It remains the most widely cultivated and trafficked illicit substance worldwide.¹⁰ In India, according to a nationwide survey, 31 million people (2.8% of the total population) reported using cannabis in 2018, and 0.25% (2.5 million) also showed signs of cannabis dependence.¹¹ It is a significant increase compared to the estimates from

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a previous nationwide drug use survey in 2004, which reported cannabis use in 8.7 million Indians (3% of the total population).¹² Like global patterns, cannabis remains the third most common substance of use in India alongside alcohol and tobacco, making it the most widely used illicit substance.^{13,14} There is also significant gender disparity in cannabis use in India, with 5% of males and only 0.6% of females reporting its use in the previous year.¹¹

Historical and Sociocultural Underpinnings of Cannabis use in India

The history of cannabis use is rooted in the Asian subcontinent. The indigenous strain of *Cannabis indica* has been growing freely along the Himalayan foothills and adjacent plains of India for centuries.^{8,15} The use of cannabis is a significant part of the religious lives of Hindus from mostly India and Nepal, and it has been represented in various Hindu scriptures.¹⁶ The earliest mention of *Bhanga* (cannabis preparation) is from the *Atharva Veda* (2000 BC to 1400 BC), where it is described as a sacred grass alongside alternate connotations of it as *Indracana* (Food of Gods), *Vijaya* (Victory), and *Amrita* (gift).^{8,17-19} In the *Sushruta Samhita* (600 AD), derivatives of cannabis were advocated as valuable medicines useful in treating certain phlegmatic ailments. Even to this day, the consumption of cannabis is regarded as auspicious during the annual Hindu festivals of *Shivaratri*, *Krishna Ashtami*, *Kali puja*, and *Holi* and is an essential part of certain religious observances.^{20,21} These historical and mythological accounts underscore the notions of cannabis as a valuable medicinal herb, a source of life force and euphoria, and a means for spiritual accord with the Gods.^{22,23} Interestingly, the current debates in the West regarding the medicinal value of cannabis had already preexisted in the Indian subcontinent.

The use of cannabis has been reported in India for at least a few thousand years; however, it was only in the 1800s that cannabis cultivation and use expanded rapidly in India and worldwide as nonpsychoactive hemp emerged as a valuable cash crop.^{8,15} The British rulers

of India commissioned the mass cultivation of cannabis for hemp, which subsequently increased the rates of cannabis use as well.^{15,24,25} Although the commercial use of hemp fiber grew obsolete as societies eventually shifted to steel, the recreational use of cannabis had spread to most parts of the world by then due to colonial conquests and trade.^{23,26} [See Warf (2014)²⁴ for detailed historical geography of cannabis] The rise in cannabis use led to the formulation of the Indian Hemp Drugs Commission Report in 1894, and it is regarded as one of the first systematic studies on cannabis use. It concluded that only very heavy use of cannabis led to drastic physical, mental, and moral effects, not intermittent use.^{27,28} The following decades saw an unrestricted increase in cannabis cultivation and use, which peaked during the 1960s in India and Nepal.²⁹ However, India passed the Narcotic Drugs and Psychotropic Substances Act in 1985, effectively banning the cultivation, production, and consumption of cannabis along with 70 other narcotic and psychotropic drugs.^{6,30-32} This was after cannabis use became increasingly regulated and prohibited in the US and European countries, and India followed suit as a signatory to the UN Single Convention on Narcotic Drugs (1961).

Despite the legal prohibitions, cannabis remains the highest consumed and trafficked and frequently seized illicit substance in India.^{33,34} India is also known to have one of the lowest retail prices of cannabis globally.^{35,36} The Indian cities of Mumbai and Delhi are ranked amongst the top ten cities of the world in cannabis consumption.^{37,38} The consumption of cannabis derivatives, particularly *bhanga*, has valuable religious and cultural connotations among Indians and thus remains widely accepted in Indian communities. In line with the global trend toward decriminalizing cannabis use, the support for legalizing cannabis in India for medical and recreational purposes has been gradually growing. Legislation for its medicinal and commercial use was also proposed in the Indian Parliament in 2016. Two Indian states of Uttarakhand and Madhya Pradesh permitted the cultivation of cannabis for medicinal and industrial purposes in 2019.³⁹ There have been efforts toward medicalizing canna-

bis, and the Central Government recently commissioned a council under the Ministry of Ayurveda, Yoga, Naturopathy, Unani, Sidha, and Homeopathy (AYUSH) to conduct scientific research on the efficacy of cannabis for various medical conditions.^{6,40-42} With increasing cannabis legalization and decriminalization worldwide, India has joined the movement but the research on multiple facets of cannabis use in India appears inadequate and with gaps in terms of providing key information for molding policies on cannabis use. A substantial body of research has emerged in the West on the nature of cannabis, its patterns of use, psychological and physiological correlates of cannabis use disorders, and various treatment methods and their outcomes.⁴³⁻⁴⁴ However, these areas have been largely unexplored among the Indian population. Cannabis use has multiple representations at historical, socio cultural and political levels in India, but high quality and credible scientific research on cannabis use has been lacking.

Need for a Review of Research on Cannabis use in India

Apart from the rare government-commissioned epidemiological and household surveys, the level of scientific research on cannabis use in India has been very rudimentary at best, as evidenced by the scientific literature on cannabis use emerging from India. For a country that produced one of the first recorded accounts of the medicinal uses of cannabis^{8,15-16} as well as the first systematic studies on psychosis related to cannabis use^{45,46}, the contribution from the Indian scientific community to recent cannabis literature is dismal. In India, cannabis use is firmly intertwined with people's sociocultural lives. Future resolutions toward legalization or decriminalization of cannabis use need to be rooted in scientific evidence based on ground realities. At this critical juncture in India's history of cannabis use, it remains imperative to evaluate the research efforts made so far to guide cannabis use policies and provide insights for future research.

In the following sections, original research studies on cannabis use from India have been reviewed. Electronic

databases of PubMed, EBSCO host, ProQuest, and Google Scholar were searched for relevant articles using Boolean functions combining three key terms of 'cannabis,' 'marijuana,' and 'India.' Related keywords of 'substance use,' 'drug use,' 'bhang,' 'ganja,' and specific geographical locations from India were also used during the search. Specific inclusion criteria were set for selecting studies which were, a) original research studies using Indian participants, b) cannabis use and/or its dynamics as study variables, and c) date of publication between 1986 and 2020. 1985 was taken as the cut-off because the NDPS Act was passed in 1985, indicating a significant shift in socio-political contexts surrounding cannabis use, which this review has attempted to capture. Approximately 1500 research titles were scanned, out of which full texts of 100 articles were accessed and studied. The review was limited to quantitative original research studies and excluded published case studies and clinical case descriptions of cannabis-related conditions. The review also excluded many useful commentaries and review studies from India on cannabis-related psychosis and psychopathology, which had produced some key insights on cannabis use in India.⁴⁷⁻⁵⁰ Based on the nature of the articles and the selection criteria, a total of 29 research studies were finalized for review. The selected research articles were reviewed and discussed under the following three themes; a) Prevalence of cannabis use, b) Psychological and psychiatric correlates of cannabis use, and c) Cannabis use in treatment settings.

Prevalence of Cannabis use in India

Most of the Indian research studies found on cannabis use were prevalence studies, where the prevalence of cannabis use had been assessed alongside a range of different substances or health behaviors. In most Indian studies identified, the research designs were rudimentary; samples were small and as per convenience, and statistical analyses were limited to only descriptive ones. In **Table 1**, the studies that reported only the prevalence of cannabis use among community samples have been described and evaluated.

The primary objective of most studies reviewed in **Table 1** had been to estimate rates of substance use, of which cannabis was only a minor part. In most instances, the assessment of cannabis use was limited to basic measures of lifetime use, previous year use, or previous month use; however, a few studies did not clarify even that.^{56,57,59} Most studies did not include descriptions of the nature of administration, frequency and intensity of use, or period of use. Only two studies distinguished between cannabis types (bhang, ganja) in their measures.^{56,57} Two studies had even combined cannabis use along with opioid use in a single category.^{56,58} Apart from two studies, none used standard screening instruments and mostly relied on self-report interviews.^{55,60} Six out of the ten prevalence studies had total sample sizes below 500, and males made up all or significant proportions of the samples in all ten studies. Four studies reported on prevalence among adolescents, and the rates of cannabis use were similar to adults.^{51,54,55,60} The pooled prevalence of cannabis use ranged 0.3-28.9% for the previous month and 2.5-34.2% for the previous year. Dube and Dhingra (2020) estimated the prevalence rate of cannabis use to be 6.7%, based on a pooled estimate from five Indian studies.⁶¹ Given these disparities in estimates of cannabis use across research studies, it becomes difficult to ascertain the true prevalence. Thus, the state-commissioned national surveys have proved to be more reliable and representative.^{11,12}

Psychological and Psychiatric Correlates of Cannabis use

Throughout the modern history of cannabis, the role of cannabis use as a predictor or consequence of psychosis has been extensively studied. In fact, the first reports of the 'cannabis psychosis' phenomenon emerged from India and even preceded the Indian Hemp Drugs Commission Report of 1894. At first, the observations were specific to India, and the condition was communicated as the 'Indian hemp insanity' by Ewens in 1904.⁶² The study by Chopra et al. (1942) on the association between cannabis and mental diseases was one of the first sci-

entific inquiries on cannabis psychosis.⁴⁵ There were many research studies on psychiatric and psychological correlates of cannabis use prior to the NDPS Act (1985).⁶³⁻⁶⁵ However, no convincing evidence for the links between cannabis use and psychosis was reported, and only heavy or chronic use was associated with psychotic symptoms.⁶⁶ In the last three decades, research on cannabis use from the disciplines of psychology and psychiatry has produced consistent evidence for various psychological correlates of cannabis use and dependence, as well as the effects of cannabis on mental and physical health. In **Table 2**, eight original research studies that explored the psychological correlates of cannabis use among Indian samples have been listed.

In **Table 2**, six studies assessed cannabis use along with psychosis and other psychological conditions, and some degree of association was found.⁶⁸⁻⁷³ Significant comorbidity was reported between cannabis use and psychiatric disorders, particularly psychosis-related conditions.^{68,70,72,73} Sarkar et al. (2003) comprehensively explored psychiatric comorbidity of cannabis use and found evidence for psychiatric conditions being significant precedents and consequences of cannabis use.⁶⁸ Mixed results have been reported by studies from other countries as well. Singh and Balhara (2017), in their review of cannabis use and psychosis, found that Indian studies mostly described only acute episodes of psychosis characterized by positive and affective symptoms resulting from cannabis use.⁷⁵ Two studies in this review also found evidence for cannabis use related to affective symptom conditions, particularly manic psychosis.^{68,70} Two studies examined cognitive functions and found significant differences in perceptual-motor functioning, but not intelligence, between users and healthy controls.^{67,74} In terms of methodological weaknesses, two studies utilized existing case notes and were prone to limitations of secondary data and recall biases.^{68,70} Use of basic cannabis-use screening measures was found in four studies.^{69, 71-72,74} Apart from two studies, the remaining six had very small sample sizes as well.

TABLE 1.

Review of Indian Research Studies on the Prevalence of Cannabis Use.

Authors	Sample	Results	Comments
Kishore et al. ⁵¹	351 adolescents from urban South Delhi and rural village of Uttar Pradesh (10 to 19 years).	48 out of 351 (23.07%) used cannabis during the previous year.	No structured screening of cannabis use, and only based on one self-report question on past-year use.
Mohan et al. ⁵²	Two samples of 26,792 and 19,436 individuals from 72 colonies in New Delhi (above 10 years of age).	Among 22,349 males, only 45 (0.3%) used cannabis during the previous 30 days.	No structured screening of cannabis use. Only one question on past month use, which was self-reported.
Goel and Chakrabarti ⁵³	103 individuals from 118 households in Sikkim (86.4% males; 15 to 44 years).	14 out of 103 participants (13.6%) reported cannabis use.	No distinction in nature of the level of cannabis use. All substances taken together in demographic analysis.
Tsering et al. ⁵⁴	416 grade 8,9 and 10 students from West Bengal (mean age = 15 years).	13 out of 416 (0.03%) students reported cannabis use during the previous year.	Three measures of cannabis use mentioned in Methods, but only past year use reported in Results.
Tikko et al. ⁵⁵	4024 children from a nationwide survey (95.8% males; mean age = 15.6 years).	1423 (35.4%) reported ever use, 1375 (34.2%) last year use, and 1163 (28.9%) last month use of cannabis.	Comprehensive nationwide survey with adequate measures for cannabis use, which was self-report.
Kumar et al. ⁵⁶	3437 participants between 25 and 70 years of age from Lucknow (82.9% males; 25 to 70 years).	42 out of 3437 (1.2%) reported current use of cannabis (ganja, bhang).	No details or definition of "current use" of cannabis. Cannabis clubbed together with <i>afeem</i> (opioid).
Arora et al. ⁵⁷	230 medical students from Meerut.	18 out of 230 (7.82%) reported current use of cannabis or <i>bhang</i> .	Patten of use (duration, frequency) mentioned in Methods but only current use reported in Results.
Ashtankar and Talapalliwar ⁵⁸	280 individuals from an urban slum in Nagpur (92.5% males).	20 (7.2%) individuals were found to be "addicted" to cannabis and brown sugar.	No distinction between cannabis and opioids. No information on screening for cannabis dependence.
Panwar and Prakash ⁵⁹	1200 participants from community and treatment centers in Indore city between 2009 and 2013.	Cannabis use was reported in 30 (2.5%) participants from the community sample and 22 (11%) from the treatment center population.	No clear information about screening tools or definition of cannabis use. No clear distinction between general and treatment populations.
Uppal et al. ⁶⁰	175 participants from rural Bangalore (86.9% males; 13 to 30 years).	5 out of 175 (2.9%) reported current use of cannabis.	Structured screening used (WHO-ASSIST), but only "current use" mentioned in Results without full details.

WHO, World Health Organization; ASSIST, alcohol, smoking and substance involvement screening test

Treatment of cannabis use

Cannabis use disorder has been recognized by the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a legitimate mental health condition characterized by physiological adaptation, impaired behavioral control, and social and occupational impairment.^{76,77} Despite the growing notion of cannabis being safer than alcohol and tobacco, a sizable proportion of cannabis users become dependent on it and exhibit negative physical and psychological effects that require treatment.^{78,79} Numerous studies in recent years have reported on various treatment methodologies for cannabis use disorders, and cannabis derivatives have also been found to be useful in the treatment of other substance use disorders and in alleviating certain medical conditions.^{80,81} However, the scientific literature on cannabis use

is still limited, particularly studies on interventions and treatment of cannabis-related conditions. The literature from India on cannabis use treatment is even sparse. There is a pressing need to determine effective strategies to prevent, delay, reduce, and treat cannabis abuse and dependence.^{43,82} In India, cannabis users also make up a significant proportion of individuals seeking treatment from deaddiction and rehabilitation centers every year.^{12,83} In **Table 3**, research studies exploring cannabis-use-related variables within substance use treatment programs in India have been reviewed.

From the studies reviewed in **Table 3**, it is apparent that cannabis abuse and dependence were not the primary reasons for approaching substance use treatment centers. It was mostly problems associated with alcohol or opioid use, and patients were found to have used

cannabis or diagnosed with cannabis use disorder only during treatment.^{84,89-93} Up to 13% of patients across the studies indicated cannabis as the primary substance for seeking treatment.^{86,88,90} The studies revealed a high degree of poly-substance use, with high concurrent use and dependence on tobacco, alcohol, or opioids.^{85,87-89,91-94} None of the studies addressed cannabis use or dependence in terms of treatment variables, and most of them only provided sociodemographic profiles of substance use patients in treatment. No research study from India was found that reported on the outcomes of psychosocial or psychiatric treatments for cannabis-use-related conditions.

Discussion

The present review highlights several salient aspects of the status of cannabis

TABLE 2.

Review of Indian Research Studies Reporting on Psychological and Psychiatric Correlates of Cannabis Use.

Authors	Sample and Variables	Results	Comments
Mendhiratta et al. ⁶⁷	26 cannabis users and 26 controls (males; mean age = 24.5 years). Intelligence, memory, perceptual-motor functions, personality, disability.	Significant differences between users and nonusers on perceptual-motor tasks, but not intelligence and memory. Users had higher scores on psychoticism, neuroticism, and extraversion, and also disability.	Very comprehensive battery of cognitive tests. Criteria for cannabis use well defined but based on self-report.
Sarkar et al. ⁶⁸	244 patients with cannabis-related diagnosis (<i>ICD-10</i>) at a tertiary referral center (males; mean age = 30 years). Psychiatric and treatment histories corroborated from case notes from 1984 to 1994.	High psychiatric comorbidity in patients with cannabis abuse. Cannabis abuse associated with the development of cannabis-induced psychosis and other psychotic disorders, most significantly manic disorders. For two-thirds of the sample, cannabis was the first drug they used and the only drug of abuse for another two-third.	Missing data for at least 41%. Chances of retrospective and recall bias and underreporting and lack of structured assessment.
Pandya ⁶⁹	30 cannabis users and 30 controls (males; 25 to 30 years). Anxiety, adjustment, loneliness.	Cannabis users had significantly higher levels of adjustment problems and anxiety, but no difference in loneliness.	No structured screening method for cannabis users (self-report only). No information on the source of the sample or matching controls.
Shah et al. ⁷⁰	35 individuals diagnosed with cannabis-induced psychosis (<i>CIP-ICD-10</i>) followed up after 5.7 years (all males; 16 to 70 years).	Abstinence from cannabis after CIP episode associated with a good prognosis, whereas relapse associated with progression to psychiatric disorders. 11 with nonaffective psychosis and one with affective psychosis progressed to a psychiatric disorder. Age of onset, age of the first episode, and family history predicted poorer progression.	Retrospective bias as old case histories were used. Structured screening both at baseline and follow-up.
Wani and Singh ⁷¹	50 cannabis users and 50 controls (males; 21 to 30 years). Mental health measures of anxiety, depression, behavior/emotional control, and life satisfaction.	Cannabis users had higher levels of depression, anxiety, behavioral disinhibition, and psychological distress and lower life satisfaction, behavior/emotional control, and overall mental health.	No structured screening method for cannabis users or matching controls. All study variables based on one 38-item questionnaire.
Srivastava et al. ⁷²	80 individuals with mental disorders from OPD setting and 80 controls (mostly males; mean age = 32 years).	Cannabis use was found among 7.5% of patients and only 5% of controls, using <i>DSM-IV</i> criteria. Cannabis use was most prevalent among patients with psychotic disorders, unipolar depression, and bipolar affective disorder.	Cannabis use screening was self-report only and not clearly explained. Controls used were individuals related to patients, thus increasing bias.
Park et al. ⁷³	475 Indian patients with schizophrenia (<i>DSM-5</i>) in a sample of 1888 Asians from 15 countries. Lifetime cannabis use, psychiatric symptoms, extrapyramidal symptoms, type of psychotropic drugs.	53 out of 475 (11.2%) schizophrenia patients reported lifetime cannabis use. Patients with cannabis use had more prevalent delusions and aggressive behavior/speech and took long-acting antipsychotic treatments.	Analysis was combined for all 1888 participants and not specific to Indian patients alone. Very basic measure of cannabis use (lifetime use: presence vs. absence).
Ghosh et al. ⁷⁴	20 individuals with opioid dependence, 21 with opioid and cannabis dependence, and 20 healthy controls (males; mean age = 27.7 years). Cognitive functions of decision-making, attention, working memory, cognitive flexibility, and impulsivity; intelligence.	Compared with controls, both opioids and opioids-cannabis groups had significant cognitive impairments in decision making, psychomotor speed, set-shifting, attention, and working memory. The patient and control groups had no significant difference in IQ scores. No significant differences found between opioid-dependent and opioid-cannabis dependent groups.	No structured screening of cannabis use to determine dependence. The effects of cannabis could not be singled out as cannabis use was combined with opioid use.

ICD, International Classification of Diseases; OPD, outpatient department; DSM, Diagnostic and Statistical Manual of Mental Disorders

TABLE 3.

Review of Indian Research Studies Reporting on Cannabis Use in Treatment Settings.

Authors	Sample and Variables	Results	Comments
Chaudhury et al. ⁸⁴	471 consecutive patients admitted to a psychiatric facility for tertiary care. Cannabis use alongside other diagnosed mental disorders.	67 out of 471 (14.2%) reported lifetime cannabis use (42 had occasional use, 18 had frequent use, and seven had cannabis dependence). Diagnosis of schizophrenia (7), neurosis (16), psychosis (6), and alcohol dependence (11) most common among cannabis users.	Cannabis screening was basic and completely self-reported only. Sample of only military personnel, thus higher chances of under-reporting.
Venkatesan and Suresh ⁸⁵	839 patients with substance dependence attending OPD for treatment in 1985/86, 1995/96, and 2005/06 (98.6% males).	Among polysubstance users, cannabis was the primary substance in 28% of cases. Cannabis and alcohol was the most common combination among poly users (61 out of 121).	Very little information about cannabis use alone. Based on case notes of three decades, with retrospective bias and lack of control or consistency.
Basu et al. ⁸⁶	6608 patients registered for treatment at a drug deaddiction center between 1978 and 2008. (Use of case notes, 99.5% males).	13.5%, 7.2%, and 9.6% of patients presented with cannabis dependence in the three respective decades. Age of patients with cannabis dependence the youngest in the last decade.	Use of case notes, with likely retrospective bias and no control. Issues of consistency of reporting cases during 30 years.
Sethi and Jhanjee ⁸⁷	110 male outpatients at a drug dependence treatment center seeking treatment for heroin, opium, or cannabis.	Concomitant alcohol use was found among 45.5% of cannabis users.	No information about the proportion of cannabis users among the 110. No description of the nature of cannabis use in the group.
Chatterjee et al. ⁸⁸	51 individuals with cannabis dependence identified through retrospective case review at a tertiary care center (males; mean age = 28 years).	Comorbid dependence on opioid among 33 (64.7%), nicotine 51 (100%), and alcohol 15 (29.6%). 43 (84.3%) used other substances before cannabis. None of them were being treated for cannabis dependence.	No information on screening for cannabis dependence. Retrospective study, hence chances of bias and lack of control.
Balhara et al. ⁸⁹	107,469 individuals treated from Government deaddiction centers between 2007 and 2013 (99.4% males). Retrospective review of case files.	14,561 (13.54%) reported current cannabis use. 84.7% also co-used other psychoactive substances besides tobacco. Increase in proportion of cannabis users through 2007 to 2013.	Retrospective use of case notes, thus no complete information. "Current use" not properly defined, nor patterns of use. No description of treatment procedure or outcome.
Dhawan et al. ⁹⁰	Case reports from 3110 new patients seeking treatment at private, Government, and nongovernment deaddiction centers in 2011.	Only 24 (<1%) reported cannabis as the primary drug for which treatment was sought. Highest for alcohol (53%) and heroin (25.5%).	No information on cannabis use other than it being the primary substance for treatment. No report of nature/outcome of treatment.
Parmar et al. ⁹¹	100 individuals with opiate dependence from an OPD at a tertiary addiction treatment center (all males; mean age = 44.6 years).	Out of 100, ten reported lifetime cannabis use, three past month use, and none had cannabis dependence.	Cannabis use limited to co-occurrence with opioids only, and no further elaboration on it.
Bagra et al. ⁹²	100 patients on opioid agonist treatment from community drug treatment clinics (males; mean age = 43.9 years).	35 out of 100 had used cannabis in the last 90 days, and 77 had lifetime use. Cannabis users were on lower doses of buprenorphine, but no other significant differences.	Cannabis implied as a factor determining opioid treatment rather than cannabis use as a cause for treatment.
Sarkar et al. ⁹³	100 patients at an addiction treatment facility with a history of cannabis use (males; mean age = 28.4 years). Patterns of cannabis use and attitudes assessed.	Among 100 patients, the criteria for dependence met for tobacco, opioids, and alcohol by 99 patients, 88 patients, and 75 patients, respectively. 58 fulfilled ICD-10 criteria for cannabis dependence and 74 for DSM-5 criteria for cannabis use disorder. Profile and patterns of cannabis use presented.	For all 100 participants, the primary substance for which they sought treatment was not cannabis. Useful descriptions of treatment-related attitudes and outcomes for cannabis.
Parmar et al. ⁹⁴	30 patients with cannabis use disorder from a substance use outpatient clinic of a tertiary hospital in North India (males; mean age = 24.57 years).	Cannabis use disorder was diagnosed as per DSM-5 criteria. Average duration of cannabis use was five years and dependence was 3.98 years. Family pressure (70%) was the most common reason for seeking treatment, and there was some internalized stigma.	Patients with other substance use disorders (besides tobacco) were excluded. Useful insight into pathways to care and treatment-seeking behavior.

ICD, International Classification of Diseases; OPD, outpatient department; DSM, Diagnostic and Statistical Manual of Mental Disorders

use research in India for the period between 1985 and 2021. Apart from studies on the association between cannabis use and psychosis, the overall research output on all aspects of cannabis use has been sparse and brief. Cannabis use often appears only as a subpart of substance use prevalence studies in India, along with sociodemographic associations of substance use. However, many of these studies lack scientific rigor due to the use of elementary designs and measures, small samples, and predominantly descriptive statistical analyses. The most comprehensive and representative prevalence estimates still come from government-commissioned national surveys conducted a couple of times every decade. There were a few Indian studies on psychiatric correlates of cannabis use but hardly any published literature on treatment methods and outcomes for cannabis dependence and related disorders. There remains huge scope for examining questions about cannabis use in India, and research conducted so far provides the best indication of limitations that need to be improved on.

The reviewed prevalence studies and the reports from national surveys reveal the extent of use of cannabis in India, with millions of active users at any given time.¹¹ Among the illicit substances in India, the use of cannabis is significantly higher than opioids, inhalants, and prescription drugs. Given its unique sociocultural and political position in Indian society, the future course for cannabis use liberalization should be carefully outlined. Any stride towards legalization must consider the consequences of cannabis use rates exploding in the future, particularly among Indian youths. The proponents of cannabis usually point out that cannabis is less risky than alcohol and tobacco, which, although legal, still causes a great deal of personal and social harm.^{80,81} However, the health costs associated with tobacco and alcohol are largely attributed to their magnitude of use. Even with cannabis, there are a proportion of users who face negative physical and psychological consequences, which will only become more apparent with widespread use.^{79,80} The US, which has largely shaped the modern history of cannabis, is also one of the forerunners in cannabis medicalization

and legalization for recreational use. The rate of its use there has already surpassed that of tobacco.⁹⁵ Going forward, India must set its own cannabis narrative, incorporating its rich cultural and religious heritage surrounding cannabis use.⁹⁶

In recent years, Western countries have seen a proliferation of the use of cannabis derivative products and synthetic cannabis. Modern technologies have enabled scientists and cannabis cultivators to isolate and process different components of cannabis, particularly delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD), which have specific psychoactive properties and physical effects as well as different medicinal and recreational values.⁹⁷ In places where cannabis is legalized for medicinal or recreational purposes, the use of CBD-based products such as oils and supplements has drastically increased in recent years. Decriminalization of cannabis use for medical and recreational purposes has led to better regulation of relative concentrations of the active components of various cannabis strains and derivative products, with scope for use across realms of wellness, recreation, pain or stress relief, and health.⁹⁸ In India, the indigenous distinction between marijuana, bhang, and hashish has existed for centuries, and the three derivatives have considerable differences in concentrations of THC, CBD, and other components. However, none of the 29 reviewed studies made any significant distinction between the different modes of cannabis administration, the concentration of active components, or their relative effects. The medicalization of cannabis use in India began very recently, and almost all research studies reviewed in this article examined cannabis use as a negative health behavior or condition. With more Indian states permitting the cultivation of cannabis and hemp for medicinal purposes, several Indian startups have also begun selling cannabis-based products aimed at wellness and relief.^{40-42,99} Many have attempted to consolidate Western scientific evidence on concentrations of CBD and THC with practices and customs from the Hindu tradition, such as Ayurveda, to create uniquely Indian cannabis products.¹⁰⁰

One interesting fact that emerged from the review of the Indian research studies was the profound gender differences in cannabis use and the other substances. Large nationwide surveys have validated this. The rates of use of alcohol, tobacco, cannabis, and other illicit drugs are many times higher among Indian males than females.^{11,12} Among the 29 reviewed studies, all or most of the participants were male. A few reasons can be attributed for this phenomenon, the main one being the nature of social arrangements and gender roles in Indian communities, which are still rife with patriarchy. Women are still disadvantaged and underrepresented in education, occupation, policy-making, etc. The same has extended to substance use, with less access and negative perceptions and disapproval of women using substances. Males predominantly make up the substance use treatment population as well, and there are disproportionately fewer female-centered treatment and rehabilitation programs for cannabis use. This inevitably affects treatment-seeking and outcomes as well for women. However, the rate of substance use among Indian women has been increasing recently, particularly among younger women in the urban centers of the country.¹⁰¹ The difference in substance access, perceptions, and attitudes between the genders itself remains a worthwhile area for further research to elucidate the extent and reasons for the huge gender disparity.

Another important detail that emerged from the review was the lack of scientific and standardized assessment for cannabis use in research studies. In most of the articles reviewed, the inquiry for cannabis use status was limited to ordinal-level questions of lifetime use or a previous year or month of use. The nature of the use of cannabis remains a multifaceted variable with details of administration routes and dosage, intensity and frequency, subjective experiences, and progression to dependence characterizing further specifics. Many of those details are parts of standardized assessment tools such as the Alcohol, Smoking, and Substance Involvement Screening (ASSIST) by WHO and structured interview schedules based on the DSM 5 or ICD 10.^{76,102,103} While it makes sense to include brief measures of

cannabis use while estimating the prevalence of a range of different substances and allowing for large community-level assessments, there is also a dire need for systematic research studies to characterize cannabis use alone among large samples of Indians. Until now, research on cannabis has always been overshadowed by tobacco and alcohol. This warrants particular attention to cannabis use in future research to characterize its various dimensions and correlates properly.

There has been a surge in scientific research on various aspects of cannabis use in recent decades, pioneered by researchers in the US and Europe. Mainstream research has moved beyond simply estimating prevalence of cannabis use. Researchers are increasingly studying various aspects of cannabis use, such as the characterization of cannabis use profiles and cannabis use disorders,¹⁰⁴⁻¹⁰⁷ association with other substances and polysubstance use,^{108,109} and risk factors and predictors of use at various individual, family, and social levels.^[110-114] Younger age groups have been the focus of cannabis use research^{115,116} and longitudinal studies have explored trajectories of cannabis use right from young age to adulthood^{117,118} when the consequences of long-term use become most apparent.^{78,119} The field of cannabis use research is burgeoning globally and the contribution from the Indian scenario is imperative. The social, cultural and political factors surrounding cannabis use in India are one of the most unique in the world. High-quality systematic research on these facets can help shed light on the intricacies of cannabis use that are still unexplored.

In terms of limitations of the review study, one major concern was the nature of the reviewed articles. Although three primary databases had been utilized (PubMed, EBSCO host, and ProQuest), which represent legitimate indexing bodies, there was a dearth of relevant studies, which led to the deployment of Google Scholar too. Since Google Scholar is not a standardized indexing body and is based primarily on crowd-sourced and web crawler data, research articles found through the same are of questionable quality. Nonetheless, an objective judgment was used to screen for low-quality publications. There is also the possibility that existing and rele-

vant research studies were missed or not found through the conventional search strategies. Thus, the review is in no way exhaustive of all existing research studies fitting the inclusion criteria.

Recommendations and Future Directions

Based on the present review and considering the global context and current issues on cannabis use, the following recommendations for future research emerged. First, the extent of cannabis use in India needs to be monitored more rigorously through timely nationwide surveys involving large representative samples of various age, gender, region, and ethnic groups. The two most prominent recent national surveys assessed cannabis use alongside a range of psychoactive substances with the primary aim of determining only the prevalence of cannabis use across the country.^{11,12} There is a need for further nationwide surveys focusing on cannabis use, with consideration for administration routes, patterns of use, association with other substances, biopsychosocial correlates, and cultural/religious influences specific to India. The assessment and screening of cannabis use and related disorders also need to be standardized across treatment settings in India to ensure better monitoring. Health institutions remain the primary point of contact with cannabis users. There is huge scope to develop frameworks to record relevant details related to cannabis use and foster further research. This can aid in formulating effective treatment regimens and extending intervention efforts at the community level.

In terms of research on cannabis use in India, there is a need to determine the influence of indigenous practices on rates of cannabis use and also the various ways in which cannabis is represented in beliefs, rituals, and lifestyle among Indians. Cannabis has deep religious and sociocultural significance in India, and this ultimately influences people's perceptions and use of cannabis despite it being illegal in India. More innovative research on different facets of cannabis use is needed, and central and state agencies must ensure the provision of necessary mechanisms to support and foster research on cannabis use. This

includes easing administrative/legal hurdles, protection of participants, and direct funding for cannabis-use research. The policies on cannabis cultivation, distribution, and use must be aligned at the state and central levels to ensure standard implementation and jurisdiction.

Cannabis decriminalization in most modern societies started with medicalization, before recreational use was later permitted. This distinction needs to be carefully considered, along with the psychosocial effects of both, before any step towards full legalization of cannabis is made in India. With the emergence of cannabis-based products for a range of medical and health conditions in India, more scientific research is needed to test the effectiveness of cannabis and its related products as medicinal drugs and also gauge the extent of its negative effects. The rise in the use of CBD-based products and synthetic cannabis needs to be regulated until their short- and long-term effects on health can be determined through more scientific evidence grounded in high-quality indigenous research. Younger age groups and individuals with vulnerabilities to mental health disorders have the highest risks to negative consequences of cannabis use.^{4,44,46} After decriminalizing cannabis in Western countries, there has been a dramatic rise in cannabis use among younger age groups. For any step towards propagating the medicinal or positive health effects of cannabis use in India, the increased health and social costs emerging from a higher prevalence of use should be carefully monitored. With rising cannabis use in India, more effective policies and regulations are also needed to prevent youths from initiating cannabis use. Subsequently, more scientific research is needed to determine the effects of cannabis use during adolescence and emerging adulthood.

Conclusion

Cannabis has a chequered history in India, one that has spanned thousands of years, and is associated with multiple connotations as medicine, divine herb, cash crop, and a drug of recreation or abuse. Only in the most recent parts of its Indian history was cannabis banned, its use and prevalence grew exponentially, and now it is on the verge of being

legalized again. For a substance known to have an addiction propensity and distinct negative effects, there is still a lot we do not know about cannabis, and scientific research on it has picked up only in the recent decades. For a country with such unique history surrounding cannabis, the state of scientific research on cannabis in India is quite basic, as evident by the above review. There is a dire need for systematic and high-quality research on cannabis use, particularly to explore the influences of the sociocultural representations of cannabis on the rapidly growing rates of cannabis use initiation among Indians. Alcohol and tobacco are already huge social menaces in India, costing millions of lives and billions in the economy every year. It remains a collective responsibility of researchers, policy makers, economists, and citizens alike to prevent the same happening with cannabis.

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