



## A Review on *Cannabis sativa*: Its Compounds and Their Effects

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Received: 01-11-2018; Revised: 25-11-2018; Accepted: 10-12-2018.

### ABSTRACT

Our society often considered the use of cannabis is an under-reported activity. Cannabis is used to relieve neuropathic and chronic pain. Cannabis, produced from the *Cannabis sativa* plant, have been used in three forms: herbal cannabis, the dried leaves and flowering tops. The resin of the cannabis is the pressed secretions of the plant, known as 'hashish' or 'charash'. *Cannabis sativa* is an herbaceous species originated from Central Asia. It has been used in medicine and as a source of textile fiber since ancient times. The *Cannabis sativa* is a fast growing plant attracted the people's interest because of its multi-purpose applications. It is a rich source of photochemical, cellulose and woody fibers. The more interest is also due to its metabolites which show potent bioactivities on human health. In this review, the phytochemicals is discussed by putting a special emphasis on molecules including cannabinoids, terpenes and phenolic compounds. Cannabinoids are represented as the most studied group of compounds, because of their wide range of pharmaceutical effects in humans, including psychotropic activities. This article aims to update the current knowledge and evidence of using cannabis and its derivatives with a view to the sociolegal context and perspectives for future research.

**Keywords:** Cannabis, cannabidiol, tetrahydrocannabivarin, sensitivity to cannabis.

### INTRODUCTION

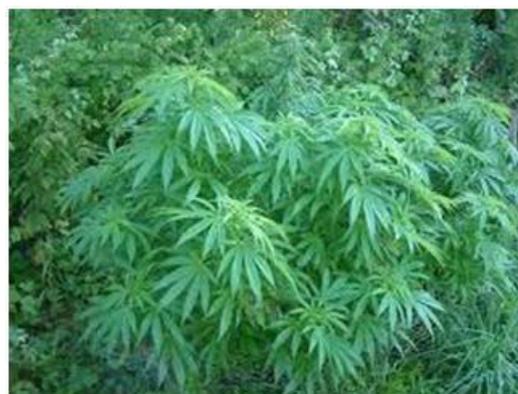
The cannabis preparations (marijuana and hashish) are the most common illegitimate drugs all over the world. The cannabis preparations are derived from the female plant of *Cannabis sativa*. Marijuana consists of the dried flowering tops and leaves; hashish consists of dried cannabis resin and compressed flowers. Marijuana and hashish are commonly smoked but it can be also eaten or used in a tea form<sup>1</sup>.

The herbs continue to have a religious association in India, and during religious ceremonies Hindu devotees offered Cannabis to Shivji (God). The Cannabis has very long history of medicinal uses. However, the sociopolitical strain resulted in decreased the medicinal use of hashish<sup>2</sup>. The genera Cannabis and Humulus are the (hops) belongs to the same family Cannabaceae. Commonly, cannabis is pondered to be monospecific (*Cannabis sativa* L.) which is separated into many subspecies i.e. *C. sativa* subsp. *sativa*, *C. sativa* subsp. *indica*, *C. sativa* subsp. *p. ruderalis*, *C. sativa* subsp. *spontanea*, *C. sativa* subsp. *afiristanca*. However, cannabis has been split into the chemical and morphological distinctions, these subspecies are often not readily discernible, appear to be environmentally modifiable<sup>3</sup>. Cannabis is a dioecious, annual, flowering herb. Male (Staminate) plants are usually taller but less strong than female (pistillate) plants. Stems are erect and height is 0.2-2.0 meter long. However, but mostly plants reach heights of 1-3 m<sup>4</sup>. The consequences of hashish *sativa* are related to the cannabinoids in the body. The cannabinoid components could also be described as terpene phenols and not been isolated from some other plant or animal genus<sup>5</sup>. According to the World Health Organization (WHO, 2000), the psychoactive substances

increased on demand significantly over the last decades. Thus, it is essential to obtain a greater collection of information on the effects of, taking into account the theme great coverage and significances, upgrading the knowledge with information from recent studies<sup>6</sup>.

### Classification of Cannabis<sup>7</sup>

Kingdom	: Plantae
Phylum	: Magnoliophyta
Class	: Magnoliopsida
Order	: Rosales
Family	: Cannabaceae
Genus	: <i>Cannabis</i>
Species	: <i>Cannabis sativa</i>



*Cannabis sativa* L.



## Products of cannabis

- Ghanja or marijuana- Marijuana is prepared from leaves and flowering tops, has higher resin content and is highly potent. Potency is changeable, with a THC content of 1-10 per cent.
- Bhang- Bhang is obtained from the cut tops of uncultivated plants, has low resin content is the least potent.
- Hashish- Cannabis resin (hashish) is the resin, which is in the form of a sticky brown cake, which can be smoked or eaten.
- Hashish oil- Liquid cannabis is known as hashish oil. It is extracted from cannabis resin, and it is more potent. Tobacco is dipped in this hashish oil before smoking. It may contain up to 60 % THC, and Class A drug.

The Cannabis plants and products contain of an enormous variety of chemicals. Some 483 Cannabis compounds identified are unique, for example, the more than 60 cannabinoids, whereas the terpenes, with about 140 members forming the most abundant class, are widespread in the plant kingdom. Cannabis contains more than 300 compounds. There are five important cannabinoids are found in the cannabis plant.

1. Tetrahydrocannabinol (THC): Tetrahydrocannabinol (THC) is the most important compound accountable for the psychoactive results of cannabis. The compound is a moderate analgesic, and mobile research has proven the compound has antioxidative properties. THC is believed to interact with ingredients of the brain most often controlled through the endogenous cannabinoid neurotransmitter, anandamide. Anandamide is believed to play a role in suffering sensation, memory and sleep.

2. Cannabidiol (CBD) Cannabidiol (CBD) is a main constituent of scientific cannabis. CBD represents up to forty percent of extracts of the medical cannabis plant. Cannabidiol has been shown to alleviate convulsion, irritation, tension, cough and congestion, nausea, and inhibits most cancers cell to increase. Current studies have shown cannabidiol to be as effective as strange antipsychotics in treating schizophrenia. Because cannabidiol relieves the aforementioned signs and symptoms, cannabis traces with a high quantity of CBD may advantage human beings with more than one sclerosis, common tension assaults and Tourette syndrome.

3. Cannabinol (CBN) Cannabinol (CBN) is a therapeutic cannabinoid observed in *Cannabis sativa* and *Cannabis indica*. it is also produced as a metabolite, or a breakdown product, of tetrahydrocannabinol (THC). CBN acts as a weak agonist of the CB<sub>1</sub> and CB<sub>2</sub> receptors, with cut down affinity in evaluation to tetrahydrocannabinol (THC).

4.  $\beta$ -caryophyllene is a part of the mechanism with the aid of which scientific cannabis has been shown to reduce tissue irritation. A cannabinoid receptor referred to as CB<sub>2</sub>

plays a critical element in decreasing infection in human beings and other animals.  $\beta$ -caryophyllene has been shown to be a selective activator of the CB<sub>2</sub> receptor.  $\beta$ -caryophyllene is specially focused in cannabis critical oil, which contains approximately 12–35%  $\beta$ -caryophyllene.

5. Cannabigerol: Like cannabidiol, cannabigerol is not psychoactive. Cannabigerol has been proven to relieve intraocular strain, which could also benefit within the healing of glaucoma<sup>8</sup>.

## HISTORY OF MARIJUANA

One of the world's oldest cultivated plants is *Cannabis sativa*<sup>9</sup>. Many 19<sup>th</sup> century practitioners explain medicinal competencies to cannabis after the drug found its way to Europe during a period of colonial elaboration into Africa and Asia<sup>10</sup>. In the early 19<sup>th</sup> century, Europe used to be amongst the final civilization to come upon the plants, with diverging motives for the usage of cannabis. In France, the psychoactive effects of hashish were pursued, whereas in England the use of hashish focused on clinical functions<sup>11</sup>. Although it is used for several centuries in other parts of the world for its mind-altering properties, it was once now not till the first 1/3 of this century that its psychoactive properties had been recognized in the United States<sup>12</sup>. Cannabis has played a chief role on the stage of human history. The evolution of agriculture, which began approximately 10,000 years ago, has had monumental outcomes for humans and our planet, allowing us to apply more control over our food supply and vastly increase our populations and success as a species. The so-known as agricultural revolution in fact took millennia to unfold and remains to be progressing with new scientific breakthroughs in genetic engineering and environmental manipulation. These latest innovations also impact the position and our lives. By way of artificial decision of desirable qualities and for a sort of functions, people were manipulating cannabis plants for a lot of countless numbers of years. The saga of human-hashish relationships has been an extended, drawn-out affair, an epic organization of people and a plant that has influenced historical past on many fronts in more than a few regions of the arena. For example, hemp was once a colossal and in all probability important supply of rope used to lure, harness, and command the vigor and versatility of horses, starting enormous quantities of years ago within the Eurasian steppes. On this huge vicinity horses have long been utilized in transportation, hunting, farm work, endeavor, and warfare. Hemp also furnished rigging and sails that allowed sailing vessels of the first-class fleets of Europe and Asia to navigate the oceans for exploration, exploitation, fight, commerce, and journey. Hashish's operate as a primary, nutritious food and source of vegetable oil used to be gigantic up to now. Its use for drug purposes, medicinal and mind altering, licit and illicit, has been preferred longer handiest in our time but also throughout history<sup>13</sup>.



## BENEFICIAL USES OF MARIJUANA

*Cannabis sativa* has long history as a medicinal plant over two millennia<sup>9</sup>.

**Diabetes:** In 2012, Rajavashisth and coworkers analyzed data collected by the National Health and Nutrition Examination Survey and determined that present, light marijuana users have scale back diabetes occurrence than current heavy users and past marijuana users. Also, all marijuana customers (prior or current) are less likely to be identified as diabetes in comparison with non-marijuana users after adjustment with confronting factors reminiscent of age, race and alcohol use<sup>14</sup>.  $\Delta^9$ -THC (Delta-9-tetrahydrocannabinol is a compound extracted from Marijuana plants) has been reported to have treatment or preventative effects, for diabetic patients<sup>15</sup>. Levendal and Frost (2006) were observed reduced blood glucose levels (normal group, but not significant) in Cannabis-treated rats<sup>16</sup>.

**Cancer:** Cannabinoids have been shown to inhibit the growth of latest blood vessels which can be essential to furnish adequate oxygen and meals to aid the fast growth of cancer cells<sup>17</sup>. *Cannabis sativa* is being used and prescribed in various medical conditions. Cannabis is used for the management of chemotherapy-induced vomiting and nausea in cancer patients<sup>18</sup> (Machado Rocha et al., 2008). Studies were focused on the role of cannabinoid receptor agonists (both CB(1) and CB(2) in the cure of estrogen receptor-negative breast cancer. The cannabinoids additionally lower the potential of cancer cells to invade surrounding normal tissues and to metastasize (i.e., decrease the colonies of cancer cells in lots of one-of-a-kind tissues at a distance from the customary melanoma site). It has additionally been suggested that some moves of endocannabinoids might diminish the danger of mutations that provide decrease the cancer cells<sup>19-20</sup>.

**Parkinson's disease:** Cannabinoids would alleviate some parkinsonian symptoms with the aid of their extraordinary receptor-mediated modulatory action within the basal ganglia output nuclei. Moreover, it became lately discovered that a few cannabinoids are mighty antioxidants which can protect neurons from death even without cannabinoid receptor activation. Apparently cannabinoids could prolong or even discontinue modern degeneration of mind dopaminergic techniques, a method for which there's at the moment no prevention. In blend with currently used drugs, cannabinoids would symbolize, qualitatively, a new strategy to the medication of Parkinson's disease, making it more amazing<sup>21</sup>.

**HIV:** In Human Immunodeficiency Virus positive patients, Cannabis has been used as a treatment to manage pain for chemotherapy patients and induce hunger<sup>22</sup> (Hernandez and Chandra (2016). Clinical trials have prompt that marijuana have some valuable results in a few disorders like reduction of intraocular pressure,

nausea, vomiting, stimulation of bronchodilation and attenuation of the AIDS wasting syndrome and so the congeners of cannabinoids are been developed with capabilities therapeutic makes use of<sup>23</sup>.

**Glaucoma:** One of the leading causes of blindness in this world is Glaucoma. IOP (Intraocular pressure) effectively decrease by the Cannabinoids and have neuroprotective actions. Thus, cannabinoid could potentially be helpful in the treatment of glaucoma<sup>24</sup>.

**Chronic pain and arthritis:** Medical cannabis is also used for reduction of chronic pain and arthritis<sup>25</sup> and neuropathic pain which is caused by diabetes<sup>26</sup> and to improve the wellbeing in patients who suffer with depression<sup>27</sup>. There is laboratory proof that CB2 receptors are involved within the regulation of joints pain, as in arthritis<sup>28</sup>.

**Nausea and vomiting** Cannabis-based totally medications may be beneficial for treating chemotherapy-precipitated nausea and vomiting that responds poorly to conventional antiemetics. But, the pains produced low to mild fine proof and meditated chemotherapy sellers and antiemetics that had been available inside the Eighties and Nineties<sup>29</sup>, Cannabis and THC synthetics had been used to counter the nausea, and vomiting often related to chemotherapies, and some radiation remedies for cancers. These aspects effects, which may last for several hours or even numerous days<sup>30</sup> Inside the cure of delayed-onset nausea, dronabinol was just as potent as the antiemetic ondansetron<sup>31</sup>.

**Other beneficial uses** Cannabis sativa is used in indigenous medicine as a cure for diverse sickness, including diabetes, and used as an early treatment for snake-biting<sup>32</sup>. Skills therapeutic uses of cannabinoid receptor agonists comprise the management of spasticity and tremor in more than one sclerosis/spinal wire injury, anguish, inflammatory disorders, glaucoma, bronchial bronchial asthma, cancer, and vasodilation that accompanies developed cirrhosis<sup>33</sup>. Cannabis sativa is important to humanity, and so, it was once encouraged that the ban placed on the drug be lifted forthwith, for it to be legally produced, distributed, sold and used for sustainable development; and that extra researches be performed on *Cannabis sativa* to additional increase the agricultural, medical, leisure, and industrial opportunities in the plant for human progress<sup>34</sup>.

## HARMFUL USES OF MARIJUANA

### Effects on lungs and airways

The extreme bronchial results of smoking tobacco and smoking cannabis fluctuate; tobacco smoking produces acute bronchial constriction, while cannabis smoking causes acute bronchial dilation in percentage to the dose of THC<sup>35</sup>. This result has been reported in cannabis users in the USA the where cannabis used to be smoked by alone. Customers in most of the world most often smoke hashish and tobacco together (especially when cannabis



resin is used), and this blend is prone to produce specific acute bronchial results.

### Injuries related to Cannabis

The prevailing features to a small causal have an effect of cannabis on traffic injury. There are believable organic pathways, and the pooling of reviews determined significant results for hashish. Overall, although the outcomes is small compared to the effects of alcohol, traffic injury could also be the major antagonistic public well being outcome for cannabis in terms of mortality in high-income nations<sup>36</sup>. A random-results model of analysis produced estimates of the risk of injury related to the use of cannabis (ninety five% self assurance intervals in parentheses) and after adjustment for publication bias<sup>36</sup>.

Cannabis use disease co morbid with the most fashioned intellectual problems were: anxiousness ailment (3.4%), bipolar affective ailment (5.7%), essential depressive disease (10.9%), persona ailment (9.2%), schizophrenia (15.0%), and severe stress sickness (8.7%). cannabis use ailment has robust associations with these mental health issues (odds ratio 4.8-34.8). The ordinary size of stay (ALOS) for hashish use disorders used to be 9.0 days and the ALOS for the most customary intellectual well being issues was 11.0 days<sup>37</sup>. Longitudinal studies showed that, in long-time period, the larger use of hashish is related to an extended risk of constructing bipolar ailment, and mainly, predominant melancholy in topics firstly without affective disorder, however was now not located expanded danger of hashish use amongst these at the beginning handiest with mania or despair<sup>38</sup>.

### Suicidal behavior related to cannabis

While the evidence tends to recommend that cannabis use is related to suicide ideation and suicidal behaviour, the shortage of homogeneity within the dimension of cannabis exposure across reports and, in some situations, the lack of systematic manage for identified threat explanations are clear obstacles in current knowledge<sup>39</sup>.

**Fertility:** In vivo and in vitro studies have shown that cannabis may be vitiating the hypothalamus pituitary-gonadal axis, spermatogenesis, and sperm functions. Disturbing the fragile balance of the ECS due to marijuana use can negatively impact on reproductive potential<sup>40</sup>. Persistent use of cannabis has also been imagined to decrease sperm counts and sperm motility in men, and suppression of ovulation in women. The results of cannabis on fertility, however, are doubtful<sup>41</sup>.

Acute risks on health of cannabis: After immediate use of cannabis, the acute health risks are those due to the direct effects of cannabis. They include activities on the heart, the brain, and lungs, as well as other organs. Cannabis produces dilation of some blood vessels and leads to constringency of others. The characteristics redness of the eye is due to dilation of the conjunctival blood vessels, shortly after exposure. It constricts other

blood vessels leading to an increase in blood pressure. Cannabis can also disturb the control of blood pressure leading to lower standing blood pressure and a high risk of fainting. Cannabis also caused an increase in heart rate<sup>41</sup>.

### Pregnancy complications related to cannabis

Tobacco smoking and alcohol use are extensive reasons of harm to the unborn babies. A small proportion of women use cannabis at some stage in pregnancy and the start weights of their babies are lower than expected. This might be due to the outcomes of carbon monoxide in the smoke of cannabis cigarettes as comparable findings are properly installed for tobacco smoking in being pregnant. Cannabis may also highly risk of minor birth defects and abortion but the effect is small. Like tobacco smoking, cannabis smoking appears to increase the hazard of surprising infant death syndrome<sup>41</sup>.

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**Source of Support: Nil, Conflict of Interest: None.**

