

# A Literature Analysis on Medicinal Use and Research of Cannabis in the Meiji Era of Japan

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Cannabis is a historical plant which has been used as a medicine in East Asia. These days, there are active debates about using cannabis in clinical field. Collecting and comparing cannabis research articles which had been published in the Opening of Japan to spot the interactions between the traditional medicine of Japan, Rangaku which was established in Edo Period and the European medicine which is transferred after Perry Expedition is academically meaningful. This study searched publications, which were listed on Open-Access databases by Dec. 11<sup>th</sup>, 2019. We collected research articles which had been published from January 3<sup>rd</sup>, 1867 to July 30<sup>th</sup>, 1912 also known as Meiji era and uploaded on Open-Access databases. Our searching databases were J-stage, CiNii (Scholarly and Academic Information Navigator), Tokyo Metropolitan Library, The National Diet Library, IRDB (Institutional Repositories DataBase) and KAKEN (Grant-in-Aid for Scientific Research Database). Searching keywords were cannabis, hemp and all their Japanese synonyms and available combinations. We selected final 15 studies which met every selection criteria in the 346,393 collected studies. Cannabis was prescribed in Meiji era of Japan to alleviate pain and cure the digestive, respiratory, urinary, and nervous system diseases such as indigestion, asthma, tuberculosis, gonorrhoea and its complications, insomnia, and nervous prostration. Cannabis was medically used in Meiji era of Japan and the reporting and sharing of its clinical effect was published on the medical journals like present days. There were already Cannabis regulations in that era, but its medicinal use was more liberated than nowadays. It may be a chance to reconsider the current legal system, which strictly controls the use of Cannabis.

**Keywords:** cannabis, clinical medicine, historical review, hemp, Meiji era

## INTRODUCTION

Cannabis is medically used for a long time in East Asia. Many documents shows that each parts of Cannabis (leaf, flower, seed, root) was prescribed on different diseases including Sin-nong-bon-cho-gyeong (神農本草經), Bon-cho-kang-mok (本草綱目), and Dong-ui-bo-gam (東醫寶鑑) [1-3].

Many documents are discovered which show the using of Cannabis in various fields in Japan, for example, encyclopedias such as Fudoki (風土記; published in 8th century CE) [4-7],

Kokonyorankou (古今要覽稿; published in 1834 CE) [8, 9], anthology such as Manyoshu (万葉集; published in 7-8th century CE) [10], chronicle such as Kogoshui (古語拾遺; published in 9th century CE) [11, 12], and pharmacology book such as Yoyakusuchi (用藥須知; published in 1726 CE) [13, 14] (Fig. 1).

Medicinal documents of Cannabis were rapidly increased from the opening of Japan. Bakufu of Japan signed a commerce treaty with the United States on March 31<sup>st</sup>, 1854, therefore abolished the Sakoku policy (meaning self-isolation policy, directly translated as “state in chains”) that had been maintained



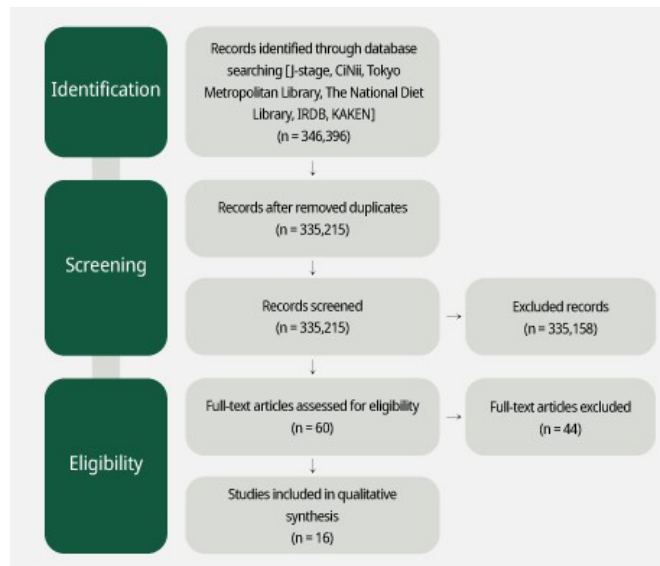
**Figure 1.** The illustration of Cannabis from “Illustration of civil life, volume the earth” (民家検勞図, 地編), published in 1830, possessed by ISHIKAWA Prefectural Library (石川県立図書館) [50].

since the Toyotomi Hideyoshi (豊臣秀吉) regime in the late Sengoku (meaning warring state) period. Japan’s political changes made a profound impact on academics. Starting from the treaty with the United States, the latest European medicine was introduced to Japan in earnest, and Japanese medical practitioners also actively accepted this. However, the European studies were not the first to be introduced in Japan. Since the late 15th century, several regional warlords had been interacting with Portugal, Netherlands, and Spain.

However, it was stopped by Toyotomi Hideyoshi, who did success unifying Japan and finished Sengoku Period to prohibit Catholicism from 1587 CE. As a result, Japan excluded Portugal and Spain which were based on Catholicism except for the Puritan country, the Netherlands. The Netherlands could access only designated ports (Nagasaki, Sakai).

Exchange with the Netherlands, European studies continued to flow into Japan, and in combination with Japanese conventional studies, a kind of new integrated study called Rangaku (directly translated as Holland studies) was born. Rangaku flourished in Edo period of Japan, especially in the category of medicine. The most advanced medical achievement of Rangaku is the anatomy textbook Kaitaishinsho (meaning “new book of dissecting human body”) [15, 16].

We will review how Japan did accept and adjust the European academic achievements on medical Cannabis use in Meiji era.



**Figure 2.** Flowchart of research selection.

## METHOD

This study searched publications, which were listed on Open-Access databases by Dec. 11, 2019. We collected research articles which had been published from January 3<sup>rd</sup>, 1867 to July 30<sup>th</sup>, 1912 also known as Meiji era and uploaded on Open-Access databases. Our searching databases were J-stage, CiNii (Scholarly and Academic Information Navigator), Tokyo Metropolitan Library, The National Diet Library, IRDB (Institutional Repositories DataBase) and KAKEN (Grant-in-Aid for Scientific Research Database). Searching keywords were cannabis, hemp and all of their Japanese synonyms and their available combinations. We selected final 15 studies which met every selection criteria in the 346,393 collected studies (Fig. 2, Table 1).

## RESULTS

### 1. The use of Cannabis in the Meiji era records

We categorized cannabis-related articles in medicine field which were published in Meiji Era of Japan with bibliographic data, applied system, indication, prescription, efficacy, and side effect & adverse effect in detail (Table 2).

**Table 1.** The list of searching results

	Cannabis	カナビス	Hemp	ヘンプ	大麻	アサ	麻仁	麻蕒	大麻子	火麻子	漢麻	牡麻	苴麻	苧麻	苧麻	梟
J-Stage	495	1	939	75	3274	2035	2109	0	20	1	5	2	0	0	0	2
CiNii	301	3	461	31	1868	21752	124	0	2	0	0	0	0	0	0	1
TML	3	2	78	2	30	96	33	100	2	0	1	0	0	100	100	2
NDL	237	12	381	773	3046	291904	344	1	12	0	8	0	0	0	0	12
IRDB	47	0	87	2	120	531	0	0	0	0	0	0	0	0	0	1
KAKEN	62	0	61	8	199	14470	25	0	0	0	0	0	0	0	0	0

\*カナビス [kanabisu] is the Japanese Katakana notation of Cannabis.

\*ヘンプ [henpu] is the Japanese Katakana notation of Hemp.

\*大麻 [taima], 漢麻 [kanma] are the Chinese notations of Cannabis.

\*アサ [asa] is the Japanese native language notation of Cannabis.

\*麻仁 [main], 大麻子 [taimasi], 火麻子 [kamasu] are the Chinese notations of Cannabis.

\*麻蕒 [mabun] is the Chinese word that means the blooming of Cannabis flower, the Cannabis female flower, or the immature fruit of the Cannabis female flower (麻蕒 is a word that's being discussed among researchers because it is not yet clear what it refers to.).

\*牡麻 [boma], 梟 [karamusi] are Cannabis male plant's Chinese notation.

\*苴麻 [chouma], 苧麻 [chouma], 苧麻 [chouma] are Cannabis female plant's Chinese notation.

\*J-STAGE is an electronic journal platform for science and technology information in Japan, developed and managed by the Japan Science and Technology Agency (JST). <https://www.jstage.jst.go.jp/browse/-char/en>

\*CiNii (Scholarly and Academic Information Navigator, pronounced like "sigh-knee") is a database service which can be searched with academic information of articles, Books, Journals & Dissertations and managed by National Institute of Informatics. <https://ci.nii.ac.jp/en>

\*NDL is National Diet Library of Japan. <https://www.ndl.go.jp/en/index.html>

\*IRDB is Institutional Repositories DataBase which is managed and supported by National Institute of Informatics. <https://irdb.nii.ac.jp/>

\*KAKEN (Database of Grants-in-Aid for Scientific Research) is a public database which includes information on adopted projects, assessment, and research achievements from the Grants-in-Aid for Scientific Research (KAKENHI) Program. This system is hosted by the National Institute of Informatics (NII) in cooperation with MEXT and JSPS. <https://kaken.nii.ac.jp/>

## 2. Nervous system diseases

### 1) Grundzüge der Arzneimittellehre 1 3rd edition [17]

Grundzüge der Arzneimittellehre (in Japanese title as 薬性論; Yakusei-ron) was written by Karl Binz (a German army surgeon with a lot of pharmacology research especially in quinine) and, translated by Adachi Kan (足立寛, a Japanese army surgeon and principal of Japanese Army Surgeon school). Cannabis indica, Cannabis indica extract and, Cannabis indica tincture were indexed as the anesthetic in the volume 1 of Grundzüge der Arzneimittellehre.

It states that branches of blooming flowers of female Cannabis indica were used. Also, there are manufacturing techniques of Cannabis indica extract and tincture sections. They have different material mixing ratio comparing to Japanese Pharmacopoeia. Their efficacies were inducing sleep, being helpful on the intestine. Especially, the author explains that Cannabis indica extract and tincture can replace Opium's role in case of very specific indications and deuteropathy. The dosage of Cannabis indica tincture is recommended 6 to 30 drops (Tables 3 and 4).

### 2) Grundzüge der Arzneimittellehre 1, new edition [18]

Cannabis indica and Cannabis indica extract were categorized as sedative in the new edition, and their contents were as same as previous edition. The new edition had 3 prescriptions using Cannabis indica instead of Opium. However, the author introduced opium first in the sedative volume of the new edition and declared that opium is the most effective sedative medicine.

(1) Prescription 1. For Perspiration of long-period cough patient; Mix Cannabis indica extract 1.5 g, Gallic acid 6.0 g, lycodium into 50 pills; Take 1 or 2 pills every night

(2) Prescription 2. For Intense gonorrhoeal pain; Mix Cannabis indica extract 0.03 g, OOO 0.03 g, sugar 0.3 g into 8 powdered medicines; Take 3 times in a day

(3) Prescription 3. Chronic rheumatism pain; Mix Cannabis indica extract 0.2 g, ammonia medicine 25 g

### 3) Addiction experiment of Cannabis [19]

This article was recorded about the clinical case of the Cannabis addiction and its curing. We reconstructed the author's

Table 2. Cannabis-related articles in medicine field which were published in Meiji Era of Japan

Article type	Title and DOI	Author	Published	Publisher	Applied system	Indication	Prescription	Efficacy	Side effect, adverse effect
etc.	薬性論(敏氏) — Grundzüge der Arzneimittellehre vol. 1 Anesthesia 3rd edition (1873) info:ndljp/pid/837690	加爾・敏都 著 written by Karl Binz, 足立寛 訳補 translated by Adachi Kan	1875-6	英蘭堂	Nervous system	Not specified	6-30 drops (Cannabis indica tincture)	Hypnotic, helpful for intestine	Pupillary dilatation, sleep inducing when using 0.1 g rather than 0.03 g. Can be used as an alternative to Opium in case of bad complications.
etc.	薬性論(敏氏) 二 Grundzüge der Arzneimittellehre vol. 2 Analeptic 3rd edition (1873) info:ndljp/pid/837691	加爾・敏都 著 written by Karl Binz, 足立寛 訳補 translated by Adachi Kan	1875-6	英蘭堂	Gastrointestinal tract	Not specified	Hemp seed oil	Helpful for intestine	Possible to induce diarrhea
etc.	日本薬局方 Japanese Pharmacopoeia info:ndljp/pid/2938123	内務省 Home Ministry	1886	内務省 Home Ministry	Not specified	Not specified	Cannabis indica, Cannabis indica extract	Not specified	Not specified
Review article (translated)	印度大麻ノ下利症ニ於ケル効驗 The efficacy of Cannabis Indica to Diarrhea DOI: 10.14789/pjmi.M20.21_28_1	フレデリック ボンド, エドワード 平野 千代吉 Frederik Bond, Edward translated by Hirano Chiyokichi	1887	順天堂医学 Junendo Medical Journal (unknown medical journal of India)	Gastrointestinal tract	Diarrhea, dysentery, Indian cholera	1. Mix Cannabis indica tincture 0.6 g, chloroform 0.6 g, 吉納 4.0 g water 30 g 2. Mix Cannabis indica tincture 0.6 g, Morphine (Morphine 1: Water 100) 0.3-6 g, Ammonium Chloride 1.5 g, chloroform 4.5 g water 30 g. Take per 2 or 3 hours everyday.	Diarrhea inhibition, cramp and pain alleviation, appetite recovery	Strong sedation of morphine. Cannabis indica decrease the adverse effect of morphine (appetite loss)
Case study	麻ノ中毒實驗 Addiction Experiment of Cannabis DOI: 10.14789/pjmi.M23.469	鈴木 肝一郎 Suzuki Kanichiro	1890- May-30	順天堂医学 Junendo Medical Journal	Nervous system	Not specified	Not specified	Not specified	Mental disorder, nausea Mental disorder appears quickly. Sedation of Opium is the best.

**Table 2. Continued 1**

Article type	Title and DOI	Author	Published	Publisher	Applied system	Indication	Prescription	Efficacy	Side effect, adverse effect
Abstract (translated)	印度大麻ノ胃神經症及消化不良ニ於ケル效用 The efficacies of Cannabis Indica to Gastric Neurosis and Dyspepsia DOI: 10.14789/pjmi.1890.31-34	G. See	1891-Feb-28	順天堂医学 Juntendo Medical Journal (Deutsche Medizinische Wochenschrift. 1890, no.31-34)	Gastrointestinal tract	1 Gastric neurosis, dyspepsia 2 Gastrospasm, vomitus nervosus, nasty feeling in the abdomen (caused by 1) 3 Dizziness, migraine, palpitations, dyspnea (caused by 2)	0.05 g extract with fluid. Three times a day	Cannabis works, but it needs a lot of alkaline laxative. Should be properly applied according to the patient's condition.	Not specified
etc.	改正日本薬局方 Japanese Pharmacopoeia 2nd Edition info:ndljp/pid/837841	内務省 Home Ministry	1891-Jun	英蘭堂	Not specified	Not specified	Cannabis indica, Cannabis indica extract	Not specified	Not specified
etc.	薬性論(敏氏)一卷 新訂増補 Grundzüge der Arzneimittellehre vol. 1 Sedative New edition, supplement (1889) DOI: info:ndljp/pid/837698	加爾・敏都 著 written by Karl Binz, 足立寛, 谷口謙 訳補 translated by Adachi Kan, Taniguchi Ken	1894	英蘭堂	Nervous system	1 Perspiration of long-period cough patient 2 Intense gonorrhoeal pain 3 Chronic rheumatism pain	1 Mix Cannabis indica extract 1.5 g, Gallic acid 6.0 g, lycopodium into 50 pills. Take 1 or 2 pills every night. 2 Mix Cannabis indica extract 0.03 g, 〇〇〇 0.03 g, sugar 0.3 g into 8 powdered medicines. Take 3 times in a day. 3 Mix Cannabis indica extract 0.2 g, ammonia medicine 25 g	Effective	Pupillary dilatation, sleep inducing when using 0.1 g rather than 0.03 g. Can be used as an alternative to Opium in case of bad complications.
Case study (translated)	薬物ノ胃消化ニ及ボス作用ニ就テ On the Effect of Gastric Digestion of Medicine DOI: 10.14789/pjmi.1893.134	Penzoldt	1894-Feb-15	順天堂医学 Juntendo Medical Journal (Deutsche Medizinische Wochenschrift. 1893, no.47)	Gastrointestinal tract	Not specified	Hydrochloric acid, orexin, Cannabis work together	Raise/increase digestion	Not specified

Table 2. Continued 2

Article type	Title and DOI	Author	Published	Publisher	Applied system	Indication	Prescription	Efficacy	Side effect, adverse effect
Lecture note	麻酔法／外科的手術上二及ホシタル影響二就テ On the Effect of Anesthesiology to Surgical Operation DOI: 10.14789/pjij. M30.435	佐藤 佐 Satoh Tasuku	1897- May-15	順天堂医学 Juntendo Medical Journal	Nervous system	Surgical operation	Cannabis indica, Datura metel, Opium has been used as anesthesia from ancient India, Arab, Greek, Tibet.	Incomplete anesthesia	Incomplete anesthesia in current criterion (19th century)
Research article	喘息病理二就テノ卑見 The Humble Opinion about Asthma Pathology DOI: 10.14789/pjij. M35.103	秋元 洗二 Akimito Senji	1902- Mar-1	順天堂医学 Juntendo Medical Journal	Respiratory system	Asthma	Cannabis indica and Datura metel mixed cigarette	Soothing cough, decreasing phlegm	No initial effectiveness, but mid to long-term effect
Case study	肺結核藥物療法 Medication for Pulmonary Tuberculosis DOI: 10.14789/pjij. M37.844	佐藤 佐 Satoh Tasuku	1904- Oct-27	順天堂医学 Juntendo Medical Journal	Respiratory system	Tuberculosis 1 Severe cough 2 Perspiration and exhaustion	1 Take or inhale Cannabis indica extract, take warm poultice 2 Take Cannabis indica extract	Decreasing phlegm and cough	Not specified
Research article	淋病／合併症(攝護腺及副睾丸系) Complications of Gonorrhoea (Prostate and Epididymis) DOI: 10.14789/pjij. M38.699	阿久津 三郎 Akutsu Saburo	1905- Sep-27	順天堂医学 Juntendo Medical Journal	Urinary system	Prostatitis -Acute prostatitis	Morphine, Cannabis indica, Heroin	Soothing pain	Morphine hypodermic prescription (if the pain is very severe)
etc.	第三改正日本薬局方 Japanese Pharmacopoeia 3rd Edition info:ndljp/pid/837860	内務省衛生局 Home Ministry Hygiene Bureau	1906- Sep	内務省衛生局 Home Ministry Hygiene Bureau	Not specified	Not specified	Cannabis indica Cannabis indica extract Cannabis indica tincture	Not specified	Not specified

**Table 2. Continued 3**

Article type	Title and DOI	Author	Published	Publisher	Applied system	Indication	Prescription	Efficacy	Side effect, adverse effect
Abstract (translated)	神經衰弱/藥物的及食餌的療法 Medication and Dietary Therapy of Neurasthenia DOI: 10.14789/pjmi.M41.721	Robert Bing	1910	順天堂医学 Juntendo Medical Journal (Therap. Monatshf. 1908. Hft. 7)	Nervous system	Type 1 Pure mental sign Type 2 Subjective sign e.g. headache, back pain, insomnia, appetite loss, dizziness Type 3 Objective sign e.g. deep tendon reflex, palpitations and seizure, pulse and blood pressure change, finger shaking, localized seating, dyspepsia	Type 1 Mental care only Type 2 Physical and dietary intervention Type 3 Mix sulfate of quinine 1.0 g, arsenious acid 0.06-0.1 g, Cannabis indica extract 0.45 g, moderate amount of Valeriana fauriei extract into 30 pills and take it 1 pill every night	Effective in headache, effective in sedation (when intensifying excitement)	No side effect No poisonous effect
etc.	受驗必携生薬学粹改訂増補 8版 The Essence of Pharmacognosy for examinations. Revised and enlarged 8th edition info:ndljp/pid/837467	岸市五郎 編 Kishi Ichigoro	1911- Nov	明文堂	Respiratory system/ Nervous system	Asthma/Insomnia	Cigarette/Hypnotic, Sedative	Soothing cough/sleep inducing, sedation	Not specified

\*DOI: Digital Object Identifier.

\*info: NDL archive identifier.

**Table 3. Contrasting of Cannabis indica extract manufacturing between Japanese Pharmacopoeia and Grundzüge der Arzneimittellehre**

	1st mixture	1st macerating	2nd mixture	2nd macerating	
Japanese Pharmacopoeia	Cannabis indica 0.375 g Alcohol 1.875 g	6 days	Alcohol 1.875 g	3 days	Filtrations and evaporations
Grundzüge der Arzneimittellehre	Cannabis indica 0.375 g Alcohol 2.25 g	3 days	Alcohol 1.5 g	3 days	

**Table 4. Contrasting of Cannabis indica tincture manufacturing between Japanese Pharmacopoeia and Grundzüge der Arzneimittellehre**

	1st mixture		
Japanese Pharmacopoeia	Extract 0.375 g Alcohol 7.5 g	Dissolution	Filtration
Grundzüge der Arzneimittellehre	Extract 0.375 g Alcohol 7.125 g		

text in medical chart format.

Subjective and Objective:

(1) Name: Unknown

(2) Sex: Woman

(3) Age: 43

(4) Date of outbreak: June 15<sup>th</sup>, 1878

(5) Chief complaint: The patient had eaten female cannabis leaves and seeds. After 10 minutes, she felt warmth inside of the body. Headache, dizziness, tinnitus experienced. Especially, she got very intense dizziness feels like boarding a raft on the upside-down waves. Depression on solar plexus and unpleasant feeling in the chest. She felt nausea and severe stomachache. She called a doctor after 90 minutes.

(6) Past medical history: Nil. Natural-born stubborn.

(7) Family history: Nil

(8) Social history: Nil

(9) Physical examination: Pulse-75; temperature 37.2°C; dry mouth; clear heartbeat sound; Pupillary dilatation; abdomen inflation; facial flush; body shaking

(10) History of the present illness

The patient got flushed, thirst, and a lot of pain. Abdomen inflation and pain. Visual impairment. Shaking the limbs and difficult to move. She cannot stop laughing and chattering in the room. Rashes appeared on the body. Particularly, she got mental disorder, kept talking absurd words; "I am very closed to death, call all family member as quick as possible.", "I did come this clan without reasons and now leaving this fast with burdened my Karma." However, the patient began to awaken after 150 minutes of eating Cannabis. She was beginning to

cease laughing, talking, crying, and bring back her memory. Additionally, the author had examined the patient's husband at the same time, because the husband also had eaten the leaves and seeds of Cannabis with the patient, and experienced almost same symptoms. But the patient's husband did throw up Cannabis leaves but the patient did not. Not only he shook his body more intensely, but also he could not stick his tongue out which was diagnosed a sort of muscle shrinkage by the author.

(11) Assessment and plan

The patient had eaten the leaves and seeds of Cannabis female plant. Common therapy of Cannabis addiction is leaving patient alone for 5-6 days. Every indications related Cannabis will be banished without medical interventions.

After sick calls, the author asked his friend Tomoatsu Taro (physiologist, professor of medical school) about poison of Cannabis. Briefly, Cannabis sativa and Cannabis indica were both regarded as nontoxic in Meiji era of Japan, but Cannabis indica could cause anesthesia and addiction. The author concluded that doctors shall be careful with the dosage in case of prescribing Cannabis.

#### 4) Effect of anesthesiology to surgical operation [20]

This paper is a publication of a lecture note for presentation at an academic conference. It is said that Cannabis has been used for a long time with Datura metel in India, Arabia, Europe, and Tibet as an anesthetic in the beginning of the paper. It is noteworthy that it is pointed out as an incomplete method.

#### 5) Medication and dietary therapy of neurasthenia [21]

This is a translation of the abstract which was published in the German Journal Therap. Monatshf (not publishing now). The author is Robert Bing and the translator is unknown. The author categorized types and medications of neurasthenia.

Type 1. Pure mental sign. Mental care only.

Type 2. Subjective signs such as headache, back pain, insomnia, appetite loss, and dizziness.

Type 3. Objective signs such as deep tendon reflex, palpitations and seizure, pulse and blood pressure change, finger shak-



ing, localized seating, and dyspepsia.

It is recommended to prescribe Cannabis indica as a sedative, and it is effective for headaches. In particular, using in succession does not cause any problems. It is inferred that European and Japanese researchers highly credited the stability of Cannabis indica at that time.

6) The essence of pharmacognosy for examinations.

Revised and enlarged 8th edition [22]

This book was for the people who prepared the doctor and pharmacist license examination. It shows Cannabis indica was prescribed for inducing sleep and sedating in Japan during the Meiji era (Fig. 3).

3. Digestive system diseases

1) Grundzüge der Arzneimittellehre 2 3rd edition (薬性論 2) [23]

The seed of Cannabis sativa was classified as analeptic. This pointed out the fruit of Cannabis sativa, not Cannabis indica which were recorded in almost every manuscripts of Japan in Meiji era. It is said that being used for acute gonorrhoea, but no specific medicinal effect has been documented. The smell and

taste of Cannabis indica bad and it may cause diarrhea.

2) The efficacy of Cannabis Indica to diarrhea [24]

This article was written by Frederik Bond, Edward, published in the Medical Indian journal (now stop publishing), and translated by Hirano Chiyokichi (平野 千代吉). It was recorded about the clinical case of using Cannabis indica to cholera and diarrhea.

(1) Stage 1 intervention

Mix Cannabis indica tincture 0.6 g, chloroform 0.6 g, 吉納 tincture 4.0 g, water 30 g. Take from August to September.

It was much more efficient than other famous medicine. After 2-3 day from taking, convulsion and pain were alleviated and recovered appetite. Still fatigue and exhaustion remain, so the author moved to next phase.

(2) Stage 2 intervention

Mix Cannabis indica tincture 0.6 g, Morphine (Morphine 1: Water 100) 0.3-6 g, Ammonium Chloride 1.5 g, chloroform 4.5 g, water 30 g. Take per 2 or 3 hours every day.

It was said that morphine was highly effective sedation, and Cannabis indica can decrease the adverse effect of morphine such as bile secretion degradation, appetite loss. The author was still testing the specific prescription which was for the patient who is battling tuberculosis and diarrhea at the same time, and there were not positive results yet. In addition, there was a clinical case of prescribing Cannabis. We reconstructed the translator's text in medical chart format.

Subjective and Objective:

- (1) Name: Unknown
- (2) Sex: Woman
- (3) Age: 13
- (4) Past medical history: Nil
- (5) Family history: Nil
- (6) Social history: Nil
- (7) Underlying disease: Anemia
- (8) Physical examination: Temperature 38°C
- (9) History of the present illness: Upper abdomen pain is very severe. No appetite. Throwing up after eating. Tongue has a yellow-white coating.
- (10) Assessment and plan
- (11) Progress

The author seemed that she got an acute diarrhea and, prescribed Cannabis indica based medicine.

All symptoms including throw-up, diarrhea, and pain on the abdomen. Appetite highly increased, every indication disap-

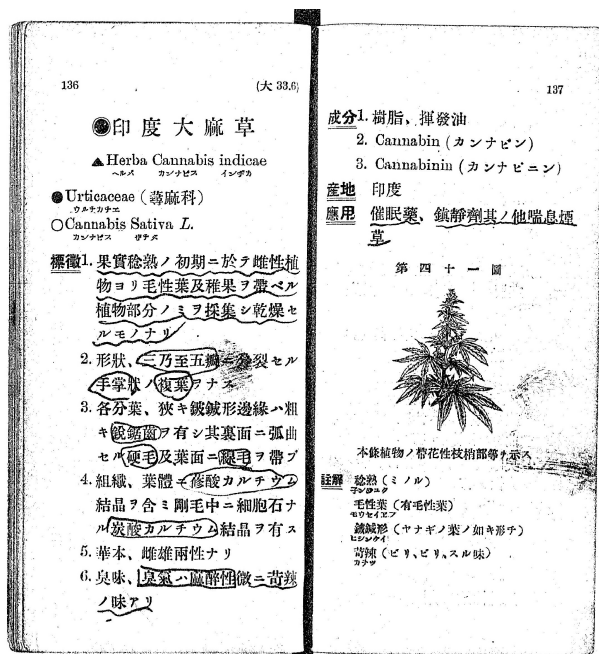


Figure 3. The Essence of Pharmacognosy for examinations. Revised and enlarged 8th edition (受験必携生薬学粹 改訂増補8版), published in November, 1911 [22].

peared after 1 week. Only anemia got remained in weakened status. It was still being tested on a patient suffering from tuberculosis and diarrhea at the same time, and it is reported that there is no satisfactory outcome.

There is interesting point about translator's comment in the tail of the paper. He said that he felt some sense of duty to keep Japanese-originated Cannabis prescription, because it was being rapidly forgotten due to a lot of developing new medicines in Meiji era of Japan. It shows that European's latest research spread into Japan very quickly, and Japanese traditional medicine and Rangaku could not take active rolls in the practical clinics.

### 3) The efficacies of Cannabis Indica to gastric neurosis and dyspepsia [25]

This is a translation of the abstract which was published in German journal "*Deutsche Medizinische Wochenschrift*". The author is G. See but the translator is unknown. It is reported that taking 0.05 g of Cannabis indica extract in solid preparation three times in a day along with the fluid is effective. If patient exceed the dosage, patients can be addicted with adverse effect like aching. It is said that the ingredients of Cannabis indica plays a role in supporting gastric digestion. When combined with other treatments, it should be treated with an appropriate amount of Alkaline laxative. The author analyzed the causes and indications of digestive disorders.

(1) Stage 1. Gastric neurosis, dyspepsia

(2) Stage 2. Gastrospasm, vomitus nervosus, nasty feeling in the abdomen (caused by Stage 1)

(3) Stage 3. Dizziness, migraine, palpitations, dyspnea (caused by Stage 2)

(4) Stage 4. Relieved all symptoms after Cannabis indica consumption

### 4) Effect of gastric digestion of medicine [26]

This is a translated article which was originally published in German journal "*Deutsche Medizinische Wochenschrift*". The author, Mr. Panzolt's information was not clear. The translator is unknown. Eight students participated the experiment. They had 70 g of white bread or 270 g of steak. After a certain period of time, a chemical experiment was performed to analyze the progress and the effects of each drugs. Using stomach tube to collect a small amount of the food in the students' stomach. As a result, Cannabis indica promotes gastric acid secretion, helping digestion.

## 4. Urinary system diseases

### 1) Complications of gonorrhoea - prostate and epididymis [27]

This article introduces the treatment of prostatitis, a complication caused by gonorrhoea, with Cannabis indica. Cannabis indica was used as a pain management drug along with morphine and heroin.

## 5. Respiratory system diseases

### 1) The humble opinion about asthma pathology [28]

This article has very distinct style and detailed contents which shows actual clinics of Japan in Meiji era. It is combined with case report, original research, and primitive cohort study. We reconstructed the author's text in medical chart format.

Subjective and Objective:

(1) Name: M, H. (assumed name)

(2) Sex: Woman

(3) Age: 38

(4) Address: Kita-Horie cho, Nishi-ku, Osaka city, Japan.

(5) Date of break: 18-19 years old

(6) Chief complaint: Asthma and related complications (cough, headache, seizure, insomnia, phlegm)

(7) Underlying diseases: Nil

(8) Family history: Father is 70 years old. Mother died at 50 years old due to apoplexy. Her elder sister died at 42 years old due to stroke, and younger brother also died because of stroke at 35 years old.

(9) Past medical history: She had smallpox and measles. Asthma reoccurred at 22-23 years old. She had a breech delivery when giving birth to a boy, and the symptoms of asthma were very severe especially in childbirth. This patient tried almost every asthma treatment in 8 years, but still suffering. Now she does not care what is going to happen in the clinical test and medical intervention which were controlled by the author.

(10) Social history: She prostituted herself from 13 years old.

(11) Growth and development history: Menstruation began at the age of 13. Married at 22, gave birth to a girl at 24, a boy at 27. Her son died at 1 year old because of meningitis, and she got the depression. Her character is forthright, sensitive, emotional and has a mood swing. She has an irregular lifestyle. She ate irregularly, sometimes binges (2-4 bowls of rice), other times fasts, also lying all day or sitting on the couch. She does not feel good in the morning but feel light and concentrated in

the night. She occasionally did reading and sewing to the dawn.

(12) History of the present illness: Asthma reoccurred in winter of 28 years old. She began to examine in 1885 CE. She coughed and threw a lot of mucus up every morning. She usually began to sleep between 19 to 21 o'clock but woke up between 1 and 3 o'clock due to the itchy feeling in the throat. After awakening, she got a headache. Therefore, she awakens in the dawn. The symptoms tended to get worse during menstruation, which often led to menstruation difficulties.

(13) Physical examination

- Medium grade in physique and nutritional status. No tongue coating. Pulse 70-80 in a minute; Breathing 18 to 20 in a minute; Lung capacity 2,600 cm<sup>3</sup>; Body temperature 37°C.
- Nerve system: Migraine in the left part of the head. Shoulder pain. Dizziness. Over-sensitive.
- Digestive system: No abnormalities in gastrointestinal, liver, pancreas. Excreting 1 time in the morning. Eggs of ascarid and other abnormal components were detected in the excrement.
- Cardiovascular system: No abnormalities in blood circulation and heart beating.
- Respiratory system: There were no bloated organizations

or inflammations in the nasal cavity and laryngopharynx, also there were not any abnormalities in the chest and back via physical diagnosis.

- Urinary system: Urinating 3-4 times in a day. No abnormality in the urethra. Urine is slightly acid, and do not contain any abnormal components.
- Genital system: No abnormalities in the vulva. The uterus is highly retroverted. She has chronic endometritis. Gonococcus was discovered in the microscopic examination. A small myoma in left ovary, and it aroused a pain.

(14) Assessment and plan

- ① Using morphine and Cocaine
  - ② Smoking Cannabis indica and Datura metel mixed cigarette (Fig. 4).
  - ③ Injecting cocaine solution into the nasal cavity and uterine cavity
  - ④ Having strictly regulated daily life for 2-3 months
- (15) Progress: Cough and seizure were decreased by medical treatment and strictly regulated daily lifestyle. Cannabis indica and Datura metel mixed cigarette was helpful to get rid of phlegm, also including anesthetic side effect which was not



**Figure 4.** Cannabis cigarette for asthma therapy and its advertisement in Meiji era of Japan. (A, B) Cannabis cigarette; (C, D) Newspaper advertisement. In C, there is a recommendation of Japanese Army Surgeon translated as “Army Surgeon recommends Cannabis indica”; (E) Magnified image of advertisement. It is translated as “be used as paper-rolled cigarette and aroma therapy in case of asthma and other respiratory diseases. Also Known as Cannabis indica extract in the Japanese Pharmacopoeia” [51].

deliberate. However, its effect appeared in the long-term, not in the early stage of intervention.

In the afternoon of June 28<sup>th</sup>, 1893 CE, the author, his patient, and the brother of the patient were in the local pub. The author had actually witnessed the seizure and asthma-related symptoms of his patient in first time. After the meeting, the author did put the test himself and his friend to test the contagiousness of asthma. For the test, they had inhaled the diluted phlegm of the patient. The author had experienced light dyspnea in the night, and asthma-related symptoms occasionally visited for a while. Now he only got mitigated symptoms at spring and autumn. However, the author's friend experienced a lot of asthma-related symptoms for a while, even in boarding to Korea (Joseon).

In this manuscript, there were some circumstantial evidences that the primitive cohort study and statistical analyses in the public health field were performed in the Meiji era of Japan. Asthma patients analyses between Kita-Horie cho (2,000 persons) of Osaka city and Ibaraki Prefecture (1,000 families, about 4,000 persons) were cited in the article. The author concluded that the cause asthma and its treatment is heavily up to the patient's environment and hygiene, especially income differences.

The author concluded that the cause asthma and its treatment is heavily up to the patient's environment and hygiene, especially income differences.

## 2) Medication for pulmonary tuberculosis (肺結核藥物療法) [29]

This is a conference proceeding which was presented on the 2nd Japan Internal Medicine Institute. The speaker said that

Cannabis indica extract or the warm poultice made by Cannabis indica extract can be used on very severe cough which make patient cannot sleep. It also can be prescribed on the fatigue, perspiration and exhaustion which were caused by the late stage of tuberculosis.

## 3) The essence of pharmacognosy for examinations.

### Revised and enlarged 8th edition [22]

This book was for the people who prepared the doctor and pharmacist license examination. Cannabis indica was prescribed as an asthma medicine with a smoking method.

## JAPANESE PHARMACOPOEIA

The first edition of the Japanese Pharmacopoeia was published in 1886 by the Home Ministry. The first edition was mostly referred to the Pharmacopoeia of Germany and the Netherlands (Fig. 5).

A. J. C. Geerts the Netherlands pharmacist who taught Physics and Chemistry in the Nagasaki medical school (now Nagasaki University), the National Institute of Drug Safety Evaluation in Kyoto and Yokohama from 1869 CE took the control in the editing of the first edition [30-32] (Fig. 6).

Japanese Pharmacopoeia was revised and published to 3rd edition during the Meiji era, and the contents of Cannabis indica and Cannabis indica extract was not changed.

Cannabis indica is said to be anesthetic, and only the fruit and seeds are pointed out. It is recommended that Cannabis indica must be harvested and used in the early stages of the fruit maturation. The resin secretion is observed between the stem and leaves via microscope. It has a unique and bad odor, tastes

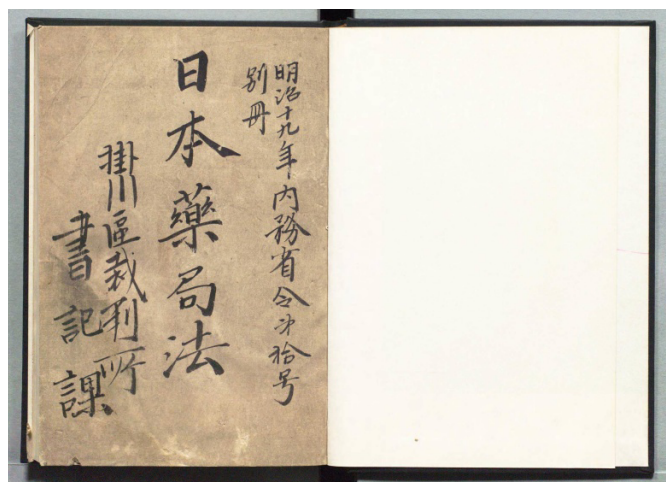


Figure 5. Japanese Pharmacopoeia first edition.



Figure 6. Antonius Johannes Cornelius Geerts, the main editor of Japanese Pharmacopoeia first edition [32].

almost nothing, and is close to green color. Female plant and fruit of female plant have more anesthetic components than male plant. It is advised that keeping *Cannabis indica* should be careful because it is prone to oxidize in the air [33-35].

In the *Cannabis indica* extract section, there is a manufacturing technique. First, mix 0.375 g of *Cannabis indica* in a ratio of 1.875 g of alcohol and cool for 6 days. After that, the alcohol is drained, and the remains are poured again at a ratio of 1.875 g of alcohol and cooled for 3 days. After evaporating the solution obtained by pressing and filtering, it is completed. Cold filtration using alcohol and filtration osmosis were used, and final-filtered liquid was evaporated to use its remaining one as extract. It is said that the extract does not dissolve in the water (Tables 3 and 4) [33, 34].

*Cannabis indica* and *Cannabis indica* extract were designated as deadly medicines, so pharmacists are required to separate and keep them in the separate containers. In addition, an adult-based medication guideline is attached.

## DISCUSSION

### 1. Perspective of medicine field

The history of *Cannabis indica* and its characteristic usages (analgesic and hypnotic) of several ancient civilizations (India, Greek, Tibet, Arabia) were perceived. Also, there were agreements that *Cannabis* has anesthetic and hypnotic ingredients but using *Cannabis* alone for anesthesia was perceived as out-of-date and incomplete method. According to *Grundzüge der Arzneimittellehre*, hemp seed was comprehended a kind of analeptic while *Cannabis* and its extraction was comprehended a kind of anesthesia.

*Cannabis indica* was rather commonly used than *Cannabis sativa* and in the form of extract, tincture, cigarette. Medication policy for adult was legalized (Table 5). Using *Cannabis* was not prohibited. Even Opium was legalized as an essential drug in a pharmacy, *Cannabis* was not. *Cannabis* and Opium was designated as dangerous drugs. They must be recognizably labelled and separately stored in a pharmacy.

There were some medical experiments about prescribing *Cannabis indica* to the patient who have both tuberculosis and diarrhea in 1890s, British Raj.

According to “Addiction Experiment of *Cannabis*”, most recommended remedy of *Cannabis* addiction was keeping patient away from *Cannabis* 5-6 days without any interventions. It

**Table 5. Medication policy of *Cannabis indica* extract**

Cannabis indica extract	
First edition	
1 time	0.1 g
1 day	0.4 g
Second edition	
1 time	0.1 g
1 day	0.4 g
Third edition	
1 time	0.1 g
1 day	0.3 g

\**Cannabis indica* tincture was initially indexed on the third edition, and its medication policy was not appointed yet.

can be inferred that the intensity of *Cannabis*' dependence and adverse effect were relatively low. However, the author Hirano Chiyokichi (平野 千代吉), translated “The efficacy of *Cannabis Indica* to Diarrhea”, was concerned that traditional *Cannabis* medicine were being forgotten rapidly even in his time (Meiji Era). Considering his observation, it can be inferred that European medicine and pharmacy had been very quickly accepted in Japan.

### 2. Perspective of non-medicine field

#### 1) Japanese Empire's activities in civil area to catch up with European countries

Journals of various academic fields were published. It was caused by the civilization (文明開化; Bunmei Kaika; *Civilization and Enlightenment*) which was modeled after advanced Western Europe. In addition, inviting Western Europe scholars (especially Netherland, Germany, and United Kingdom) to publish and translate various medicine, pharmacology publications.

It completely escaped the simple and concise description style of the East Asian traditional medicine. However, due to the limitations of the times, the structural completeness, internal citations, and reference writing methods are insufficient compared with today's academic articles.

*Cannabis*-themed articles were not only published in the medicine journal, but also in the diverse areas like botany, agriculture, and chemistry. It can be inferred that rapid industrialization and political expansionism of Japanese Empire were symmetrically interlinked.

## 2) Japanese Empire's activities in governmental area to catch up with European countries

As a national project for improving medical health care, Home ministry of Japan published Japanese Pharmacopoeia. First edition of Japanese Pharmacopoeia mainly referred to the Netherland and Germany's Pharmacopoeia. Japanese Pharmacopoeia is being revised and published by Ministry of Health, Labour and Welfare of Japan (now 18th edition). Available from: <https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/0000066530.html>.

## 3. Nowadays research

Compared with the papers of the Meiji era, Cannabis used for respiratory diseases such as asthma have almost disappeared. However, the evidence which supports the efficacy of Cannabis as analgesia is being accumulated. Especially, cases of prescribing Cannabis (CBD, THC, CBD + THC) for diseases caused by cancer [36-40] and other refractory diseases [41-45] are increasing. In addition, research and clinical cases indicating the effectiveness of Cannabis (CBD, THC, CBD + THC) for degenerative brain lesions (e.g., dementia, Alzheimer's disease, Parkinson's disease) and neurological diseases are increasing [46-49].

Currently, not only original research articles related to Cannabis, but also review and systematic review articles are written as much as original research papers in foreign countries. Since the legalization of Cannabis is gradually has been beginning in global, so the maximum amount of study is not sufficient yet. Korean researchers in the medicinal field (including Traditional Korean Doctor) should produce various types of studies which has any correlations to Cannabis to build up the evidence-based substructure of the medical Cannabis using even under the strictest governmental regulations in the world.

## CONCLUSION

Cannabis was prescribed in Meiji era of Japan to alleviate pain and cure the digestive, respiratory, urinary, and nervous system diseases such as indigestion, asthma, tuberculosis, gonorrhoea and its complications, insomnia, and nervous prostration.

Japan had embraced the latest European pharmacology without resistance. Rangaku became a great help in quick expanding of European studies in Japan. However, Rangaku was rapidly

removed from the field of the practical studies by European medicine, because Rangaku was based on the European studies. In addition, Japanese traditional medicine also quickly gave way to European studies. Both Rangaku and Japanese traditional medicine could not take academic hegemony because of "civilization" movements in governmental and civilian areas. They were regarded as premodern ways which must be overcome to escaping Asia, entering Europe.

Cannabis was medically used in Meiji era of Japan and the reporting and sharing of its clinical effect was published on the medical journals like present days. There were already Cannabis regulations in that era, but its medicinal use was more liberated than nowadays. Despite the strict regulations, Doctor of Korean Medicine already has been using Majain, the peeled hemp seed. It should be the foundation for ensuring that there shall be no restrictions on the use of cannabis by Doctor of Korean Medicine.

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## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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