



Survey of medicinal cannabis use among childbearing women: Patterns of its use in pregnancy and retroactive self-assessment of its efficacy against 'morning sickness'

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Summary A majority of women experience some nausea and/or vomiting during pregnancy. This condition can range from mild nausea to extreme nausea and vomiting, with 1–2% of women suffering from the life-threatening condition *hyperemesis gravidarum*. Cannabis (*Cannabis sativa*) may be used therapeutically to mitigate pregnancy-induced nausea and vomiting. This paper presents the results of a survey of 84 female users of medicinal cannabis, recruited through two compassion societies in British Columbia, Canada. Of the seventy-nine respondents who had experienced pregnancy, 51 (65%) reported using cannabis during their pregnancies. While 59 (77%) of the respondents who had been pregnant had experienced nausea and/or vomiting of pregnancy, 40 (68%) had used cannabis to treat the condition, and of these respondents, 37 (over 92%) rated cannabis as 'extremely effective' or 'effective.' Our findings support the need for further investigations into cannabis therapy for severe nausea and vomiting during pregnancy.

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Introduction

The condition known as 'morning sickness' is characterised by heightened sensitivity to smells and flavours, nausea, and/or vomiting during pregnancy. In spite of its colloquial name, it can

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affect women at any time of the day or night. This ailment afflicts an estimated 50–90% of pregnant women.^{1,2} Morning sickness usually occurs in early pregnancy and frequently abates in the late first trimester, without significant adverse effects on weight or nutritional status.³ More serious, however, is pernicious vomiting of pregnancy, or *hyperemesis gravidarum*, an intractable form of morning sickness that often requires hospitalisation and even total parenteral nutrition to avoid dehydration, electrolyte imbalances, and hypovolemic shock. Its incidence remains stable at 1–10/1000 pregnancies in Western societies,³ despite modern attempts at treatment, whether pharmacological, or with alternative methods such as acupressure bracelets and hypnosis.

As with milder forms of morning sickness, the aetiology of hyperemesis gravidarum remains cryptic, as it has not been ascribed to any known pathophysiological mechanism such as endocrine imbalance or other biochemical derangement.

Use of cannabis as an anti-emetic

Cannabis has a lengthy history of use as a medicinal plant, including a number of uses relating to obstetrics and gynaecology. While cannabis in various forms has been utilised as a treatment for morning sickness in many indigenous cultures throughout history,⁴ its first formal citation in Western medicine probably dates to the 19th century when a physician in Ohio employed an extract of *Cannabis indica* to successfully remedy a near fatal case of hyperemesis gravidarum.⁵ Such use persists today amongst Rastafarian women in Jamaica.⁶

Despite the stigma cannabis carries due to its illegal status and its popularity as a recreational psychoactive drug, it has attracted considerable attention for its potency as an anti-emetic, used primarily by chemotherapy and anti-HIV-exposed drug patients.⁷ Accordingly, allowances have been made in Canada for medicinal cannabis use through a federally administered licensing programme.

Clinical trials have evaluated THC and other natural and synthetic cannabinoids for use against nausea and vomiting among chemotherapy patients. Tramer and colleagues⁸ conducted a systematic review of 30 such trials, including 1366 chemotherapy patients altogether. The authors of this review concluded that cannabinoids (extracts or synthetic versions, none of which were administered in smoked form) are slightly more effective than conventional anti-emetic drugs. While many patients said they preferred cannabinoids to other

anti-emetic drugs, they reported more side effects. These side effects included a feeling of 'high' (30%), sedation (20%), euphoria (15%), dizziness, dysphoria or depression (13%), hallucinations (6%), paranoia (5%), and arterial hypotension.

Musty and Rossi⁹ reviewed six previously unpublished US state trials of cannabis therapy for nausea and vomiting in cancer chemotherapy patients. According to these authors, smoked cannabis gave patients 70–100% relief from symptoms of nausea and vomiting, whereas THC capsules gave 76–88% relief from symptoms.

Despite its positive evaluation as an anti-emetic in the context of chemotherapy, cannabis has not been formally evaluated as a therapy for the common ailment described above as 'morning sickness.' A case study by Curry¹⁰ indicated that nausea and vomiting in pregnancy may be relieved by smoking cannabis in very small quantities—as little as one or two puffs, once or twice a day.

Health concerns regarding cannabis use in pregnancy

As a result of the social stigma and legal consequences associated with the use of cannabis, the health implications of prenatal exposure resulting from therapeutic use have not been studied at all. As such, we must turn to the literature on risk management and illicit drug use, with the caveat that recreational cannabis use in pregnancy may not be equivalent to its therapeutic use, in terms of adverse health effects.

Cannabis is reported to be the most widely used recreational drug in pregnancy,^{11,12} and, accordingly, the health effects are relatively well studied in this context. Nonetheless, conclusive evidence is lacking with regards to immediate health effects of prenatal cannabis exposure, such as infant birthweight and rates of perinatal mortality and morbidity. In some studies, maternal cannabis use appears, at face value, to be associated with lower birth weight and higher rates of premature delivery; in others, birth outcomes are comparable to those of non-exposed infants.

Studies examining the use of cannabis during pregnancy have been limited by their failure to distinguish between the effects on the newborn of alcohol vs. cannabis exposure.^{13,14} A survey of 12060 British women did not demonstrate significant differences in growth among babies exposed to cannabis in utero vs. no cannabis exposure controlling for mother's age, parity, ethnicity, education, height, and prepregnant weight, and use of tobacco, alcohol, caffeine, and other illicit

drugs.¹⁵ This study is limited in that the findings were self-reported. Similar findings were reported from a survey of 12885 pregnant women in Copenhagen, controlling for use of alcohol use and tobacco smoking.¹⁶ A multi-site study of 7470 women in the US at low risk for adverse perinatal outcomes in whom the use of cannabis was assessed by interview and serum assay, reported no association between cannabis use and premature delivery, low birth weight, or abruptio placentae after adjustment for tobacco use.¹⁷ A study of perinatal deaths in Jamaica, involving 9919 singleton births, found no correlation between maternal cannabis use and rates of perinatal mortality or morbidity.¹⁸ A prospective study with cohorts matched on age, parity, and socio-economic status did not differentiate between infant scores on the Brazelton Neonatal Assessment scale on days 1, 3, and 1 month of life by use of cannabis in pregnancy among Jamaican mothers.⁶

Some researchers have suspected that cannabis exposure *in utero* might affect early childhood development, including behaviour and cognitive performance. Two longitudinal cohort studies have examined the effects of prenatal cannabis exposure upon growth and development past the neonatal stage and into early and middle childhood.

The Maternal Health Practices and Health Study (MHPCD), initiated in 1982, looked for long-term effects of prenatal cannabis exposure in 87 children. The researchers found an association between third trimester exposure to one or more cannabis joints per day, and a lowered score on the mental development index of the Bayley scale¹⁹ at 9 months of age, but not at 18 months.²⁰ At age 3, on average the children were impaired on the short-term memory of verbal, and abstract visual reasoning on subscales of the Stanford-Binet Intelligence test.²¹ However, there were no overall effects on the composite intelligence scores.²²

In a larger longitudinal cohort study involving 606 families of lower socio-economic backgrounds, first trimester exposure to one or more joints per day predicted lower reading and spelling scores and poorer teacher's evaluation at age 10.¹⁴ This did not appear to be a direct effect.

In a multivariate analysis, the effects of maternal cannabis use were found to be mediated through the child's depression and anxiety. There were elevated self-reported rates of depression and anxiety in children who had been exposed to cannabis prenatally, particularly if the exposure occurred in the first trimester of pregnancy. Heavy exposure to cannabis in the second trimester was also negatively associated with reading comprehen-

sion and teachers' evaluation of performance at age 10.

The Ottawa Prenatal Prospective Study (OPPS) is a longitudinal study of offspring of 700 middle-class, healthy women residing in Ottawa, Ontario in Canada.²³ A small percentage of these women were documented as recreational cannabis users during pregnancy. No adverse effects of prenatal cannabis exposure were noted on the Bayley Scales, which measure mental and psychomotor development as well as attitudes, interests, and temperament. At 2 and 3 years of age, prenatal cannabis exposure was not correlated with the Bayley scores, the Reynell test of language expression and comprehension,²⁴ or the McCarthy Scales of Children's Abilities.²⁵

The first reported relationship of altered functioning associated with maternal use of cannabis was at age 4 on tests of verbal ability and memory, after controlling for home environment and other potential confounding variables. Paradoxically, these effects were not evident at age 5 and 6 years. Between ages 6 and 9, children of cannabis users scored more poorly on parental behaviour ratings, visual perceptual and visual memory tasks, language comprehension, and distractibility, but these differences were accounted for by the influence of mother's age at delivery, self-rated personality, and the home environment.²⁶ The authors of a review of these cohorts caution that the effects of cannabis are potentiated in a higher risk environment, and that findings from the OPPS may not be extrapolated to other populations.²⁷ They conclude that the long-term consequences of prenatal exposure to cannabis, if they exist, are very subtle.

There is speculation in the literature that cannabis may exert an effect on some aspects of executive function, or the integration of cognitive processes.²⁷ These processes include the ability to maintain attention, and the ability to act on accumulated knowledge. Many aspects of executive functioning are not apparent until school-age and are disassociated from measures of global intelligence and thus are not measured on standard IQ tests. Executive function is thought to serve as a marker of prefrontal lobe function.²⁷ This theory is supported by recent discoveries of receptors for cannabinoid substances in the mammalian brain²⁸ as well as alterations in alpha activity in the frontal region of the adult brain after chronic daily use of cannabis.²⁹ It remains to be seen whether ongoing research continues to support this line of reasoning. The existence of adverse effects, if established, will then have to be examined at a dosage level that is therapeutic for nausea in pregnancy.

Method and sample

In the current study, we surveyed women who were currently using cannabis medicinally for any reason, with the recommendation of a health practitioner, and obtained through a compassion society. The study was approved by the University of British Columbia's Behavioural Research Ethics Board. Between November 2003 and May 2004, a 21-item survey was distributed to women who were active members of the Vancouver Island Compassion Society (VICS—Victoria, BC) or the British Columbia Compassion Club Society (BCCCS—Vancouver, BC). The BCCCS has approximately 2200 active members, who range in age from 18 to 95; the female to male ratio of their membership is 1:2, with approximately 700 active female members. The VICS has a similar membership profile, and has approximately 150 active female members. Of those members, an estimated 142 picked up a survey from the VICS or BCCCS society office. Eighty-four of the surveys were completed by the respondents at their convenience, and later returned to the society office (a 59% response rate).

There are currently about ten compassion societies in Canada, serving a clientele of over 8000 users. The VICS and the BCCCS are two of Canada's oldest and best-established compassion societies. Although registration requirements differ widely between Canada's compassion societies, both the VICS and BCCCS require that their members provide a confirmation of diagnosis and/or recommendation for cannabis from a health care practitioner.

By targeting compassion society members, we were able to reach a concentrated sub-population of medicinal cannabis users far more readily than we could have done if we had approached the public-at-large. This gave us a purposeful sample³⁰ of medicinal cannabis users, many of who might potentially have used cannabis therapeutically during pregnancy.

There were three main components to the survey. First, we asked the participants to let us know whether they used cannabis by oral ingestion of edible cannabis products, by smoking, or by some other means. They were also asked how often they used cannabis, in what quantity, as a result of what medical condition, and for treatment of which symptoms. Second, we asked the participants who used cannabis for nausea, vomiting and appetite loss to rate its effectiveness as a therapy for these conditions. Third, we asked the participants to report how many children they have ever given birth to, and whether they used cannabis recreationally or therapeutically during pregnancy. They were asked if they experienced morning

sickness during pregnancy, whether they used cannabis to treat the condition, and how they would rate its effectiveness.

Results

The survey respondents

The 84 survey respondents ranged between 19 and 64 years of age; their median age was 42 (Table 1). Sixty-four respondents (76%) had given birth to at least one child, whereas 79 respondents (94%) had experienced pregnancy but some may not have carried their babies to term.

The respondents' experiences with cannabis therapy

Our survey respondents were all current users of medicinal cannabis. They used cannabis to treat a variety of symptoms, including nausea, vomiting, lack of appetite, pain, insomnia, anxiety, depression, and fatigue, not necessarily related to pregnancy (Table 2).

Table 1 Sociodemographic characteristics of respondents.

Characteristic	n = 84	
	n	(%)
Age		
19–24	3	(3.6)
25–34	18	(21.4)
35–44	26	(31.0)
45–54	25	(30.0)
55–64	11	(13.1)
Unknown	1	(1.1)
Parity		
0	18	(21.4)
1	24	(28.6)
2	24	(28.6)
3	10	(11.9)
4	3	(3.6)
5 or more	2	(2.4)
Unknown	2	(2.4)
Ethnicity		
Aboriginal/Metis	11	(13.1)
Euro-Canadian (Caucasian)	61	(72.6)
Indo-Canadian	2	(2.4)
Japanese	1	(1.2)
Unknown	9	(10.7)

We asked the study participants to tell us the methods by which they self-administered cannabis. All but four of the respondents (95%) used cannabis in a smoked form. Twenty-six respondents (31%) reported using an edible preparation. Seven respondents (8%) used a tincture, spray, oil, or encapsulated form, and all of these respondents also reported using a smoked or edible form.

Seventy-three respondents (87%) used cannabis therapeutically at least once daily. Of these, 57 respondents (68%) reported using cannabis more than once a day, and 16 (18%) reported using cannabis once a day; the remaining respondents used it several times a week, weekly, or monthly. Thirty-four (41%) of the respondents said they used less than 1 g of cannabis daily, whereas 48 (58%) used 1–5 g daily. One respondent reported using more than 5 g daily.

Cannabis therapy for nausea, vomiting, and appetite loss

We asked the study participants to rate the effectiveness of cannabis as a therapy for nausea, if they had used it in that context. Altogether, a total of 66 respondents who gave their opinion rated cannabis as either 'extremely effective' or 'effective' as a therapy for nausea. Sixty-seven respondents rated cannabis as a remedy for

vomiting, and a total of 43 (75%) of these respondents rated cannabis as 'extremely effective' or 'effective' as a therapy for vomiting. Of the 74 respondents who rated cannabis as an appetite stimulant, a total of 70 (95%) rated cannabis as 'extremely effective' or 'effective' as an appetite stimulant (Table 3).

Use of cannabis in pregnancy

We asked the study participants whether they had used cannabis recreationally or therapeutically while pregnant. We did not enquire where the respondents had accessed their cannabis, and since these were retrospective data the cannabis may or may not have come from a Compassion Society. The Compassion Societies do not distribute Cannabis for recreational use. Nonetheless, medicinal cannabis users may also be recreational users, and they may have obtained cannabis from a variety of sources.

Seventy-nine respondents (94%) answered these questions. Thirty-three respondents (42% of those who had been pregnant) reported having used cannabis recreationally during pregnancy (17 'frequently,' and 16 'occasionally.'). Similarly, 36 respondents (46%) reported having used cannabis therapeutically while pregnant: 23 'frequently,' and 13 'occasionally.' Overall, 51 of the respondents who had been pregnant (65%) reported using cannabis during pregnancy. Seven respondents had used cannabis only therapeutically while pregnant, whereas 14 had used it only recreationally; the remaining respondents had used it both recreationally and therapeutically during pregnancy.

Fifty-nine of 77 respondents (77%) said they had experienced nausea and vomiting of pregnancy; the remainder abstained from answering these questions. Most described their symptoms as quite severe: 24 (39% of those who had experienced some degree of morning sickness) had nausea with occasional vomiting (up to once daily), and 27 (42%) had nausea with frequent vomiting (once or more

Table 2 Indication for use of cannabis.

Characteristic	<i>n</i>	(%)
Nausea	65	(77)
Vomiting	31	(37)
Lack of appetite	59	(70)
Pain	70	(83)
Insomnia	62	(74)
Anxiety	63	(75)
Depression	57	(68)
Fatigue	49	(58)

Table 3 Perceived effectiveness of cannabis therapy.

	Extremely effective		Effective		Somewhat effective		Not very effective		Ineffective	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Nausea (<i>n</i> = 71)	39	(54.9)	27	(38.0)	5	(7.0)	0	(0)	0	(0)
Vomiting (<i>n</i> = 57)	18	(31.6)	25	(43.9)	12	(21.1)	2	(3.5)	0	(0)
Appetite stimulant (<i>n</i> = 74)	50	(67.6)	20	(27.0)	3	(4.1)	1	(1.4)	0	(0)
Morning sickness (<i>n</i> = 40)	17	(42.5)	20	(50.0)	2	(5.0)	0	(0)	1	(2.5)

every day). Two respondents (3%) said they had loss of appetite, without nausea and vomiting, while 10 (16%) reported having mild nausea without vomiting.

Of those who had experienced morning sickness, 40 respondents (68%, or 48% of all the study participants) said they had used cannabis to treat the condition. Overall, 92% of the respondents who had used cannabis therapy for morning sickness considered it 'extremely effective' or 'effective' (Table 3).

Discussion and conclusions

This study was designed to determine how therapeutic users of cannabis rate its effectiveness as an anti-emetic, and particularly as a treatment for nausea and vomiting of pregnancy. In general (not specific to pregnancy), the vast majority of our respondents considered cannabis to be extremely effective or effective as a therapy for nausea (93%) and vomiting (75%), and as an appetite stimulant (95%). In the context of pregnancy, cannabis was rated as extremely effective or effective by 92% of the respondents who had used it as a therapy for nausea and vomiting (morning sickness).

Our study design had a number of strengths. By using an anonymous survey, we eliminated a potential non-response bias among persons not wishing to disclose their use of cannabis. Further, by sampling from the compassion club members, we were able to gather information from a relatively large number of medicinal cannabis users. Through the compassion societies, we were able to capture data from a population with high cannabis use rates in pregnancy (65% of our respondents). This rate illustrates the uniqueness of the study sites and the effectiveness of our purposeful sampling technique, as other studies suggest that we would have encountered much lower usage rates in the population-at-large, with reported rates from other high-income countries ranging between 0.8% and 11%.^{13,15,16} There were also some limitations to the study design. Our study was not randomised, and therefore we cannot assume that self-selection to cannabis use did not alter our findings in favour of efficacy. By sampling exclusively through compassion society offices, we reached a population that was already biased in favour of therapeutic cannabis use. Though this study is limited by the retrospective, self-reported nature of the data and the specific characteristics of the sample population, it is to our knowledge the first report on cannabis use in pregnancy with the

exception of a case report.¹⁰ Our study suggests that cannabis therapy for severe nausea and vomiting of pregnancy merits further investigation.

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