International Journal of Scientific Engineering and Research (IJSER)
www.ijser.in
ISSN (Online): 2347-3878
Volume 2 Issue 9, September 2014

Antifertility Effect of Alcoholic Extract of Mentha arvensis L. Leaves in Swiss Albino Mice

Preeti Gupta

Department of Zoology,
LBS Govt College, Kotputli, Jaipur, Rajasthan, India
Email: preetiharsh0[at]gmail.com

Abstract: ***The effect of the Alcoholic extract of the leaves of Mentha arvensis was investigated. A dose of 10 mg alcoholic extract was dissolved in 50% alcohol and administered to Swiss albino female mice from day 7-9 post-coitum. The 10 mg alcoholic dose proved to be 100% effective in causing pregnancy interruption. Postcoital administration of the pregnancy interceptive doses of the alcoholic extract of the leaves of Mentha arvensis from day 7 to 9 pc. caused a significant decline in the uterine sialic acid content on day 12 pc. in relation to the mean control value.***

Keywords: Mentha arvensis, leaves, Alcohol extract, pregnancy interruption, antifertility, sialic acid, uterus

1.Introduction

The global population surge has intensified the demand for effective, safe, and reversible contraceptive methods. While synthetic contraceptives are prevalent, their associated side effects and long-term health implications have prompted a shift towards exploring plant-based alternatives. Marvellous powers have been attributed to plants for the alleviation of different maladies in the indigenous medicine system of India. Millions of people in the third world use herbal medicines because they believe in them and regard them as their system of medicine. (Chaudhary, R.R., 1992).

Mentha arvensis or 'mint', commonly known as wild mint, is a member of the family Labiatae, is an erect, hairy herb, 10-60 cm high with 2.5-5 cm long leaves, which are shortly petiolate. Field mint is locally used as a stimulant and carminative and is extensively utilized in traditional medicine for its diverse therapeutic properties, including antimicrobial, anti-inflammatory, and antioxidant activities. The herb yields a volatile oil known as Japanese mint oil, which is used as a substitute for peppermint oil. (Chopra *et al.,* 1956). Further, an infusion of leaves of Mentha affords a remedy for rheumatism and indigestion. (Acharya and Srivastava, 2008). The leaves of Mentha arvensis are known for their abortifacient properties in folkloric medicine. Recent studies have highlighted its potential antifertility effects. For instance, Sharma and Jacob (2002) demonstrated that the methanolic extract of *M. arvensis* leaves, when administered orally to male albino mice, led to a significant reduction in fertility parameters such as sperm count, motility, and viability, without affecting overall health indicators. Based on these findings, the present study aims to evaluate the antifertility efficacy of the alcoholic extract of *Mentha arvensis* as a natural, reversible female contraceptive agent.

2.Material and Methods

Plant extract and animals used: Leaves of the experimental plant," Mint" (Mentha arvensis),_were collected from agricultural farms near Jaipur, Rajasthan. They were then authenticated in the Herbarium, Department of Botany, University of Rajasthan, Jaipur, under specimen voucher No. RUBL-20841.The leaves were shade dried, powdered, and extracted with alcohol (90%) in a Soxhlet apparatus, to obtain a semi-solid, viscous, dark green mass, i.e., the extract.

Colony-bred adult healthy male of proven fertility (8-12 weeks old) and parous female Swiss albino mice (5-10 weeks old) weighing 25 ± grams were used in the present investigation. The mice were housed in standard cages and maintained under standard conditions (12h light/dark cycle, room temperature) and provided standard laboratory chow (Ashirwad Food Industries, Chandigarh, India) and water were provided ad libitum. The extract was dissolved in 50% alcohol and administered intramuscularly. The study was approved by the Institutional Ethical Committee of the Department of Zoology, University of Rajasthan, Jaipur. The Indian National Science Academy (2000), New Delhi, guidelines were followed for the maintenance of experimental animals.

Experimental design;

Female antifertility test:

Control: Parous female mice were administered 0.1 ml of 50% alcohol as a vehicle only and were treated as controls. A minimum of five animals were used in each experiment.

Experimental: 10 mg alcoholic extract dissolved in 0.1 ml of 50% alcohol was administered during post coital stages to adult, healthy parous female rats for 3 consecutive days from day 7-9 post-coitum (pc). These females were then cohabited with males of proven fertility. Mating was confirmed by the presence of a vaginal plug or spermatozoa in the vaginal smear. The day of mating was taken as day 0.

Autopsy schedule: The animals were weighed, and an autopsy was performed on day 12 post-coitum (pc). The reproductive tract was quickly exposed and cleared of adherent tissue.

Body and Organ Weight: The initial and final body weights of the animals were recorded. The uterine horns were dissected, cleared of adherent tissues and blood, and weighed to the nearest milligram.

Fertility Test: Number of Corpora lutea (CL) and implantation sites (IS), Resorbed implantation sites (RIS), living foetus (LF)and dead foetus (DF), if any, were counted and recorded.

Tissue Biochemistry: Uterine horns were frozen at -20 °c for biochemical estimations. Sialic acid content was estimated by the method of Svennerholm (1950) as given by Glick (1960). Colorimetric readings taken at 580 millimicrons.

Statistical Analysis: Data are expressed as mean ± SEM. Student's t-test was used for statistical comparisons.

3.Results

Body and organ weights: The 10 mg dose of the alcoholic extract of Mint (*Mentha arvensis)* leaves did not significantly change the mean body weights but caused a statistically significant decline in the wet uterine weights of the experimental rats compared to the control mice (Table 1).

Fertility Test: A total pregnancy intercepotory effect of alcoholic extract of Mint (*Mentha arvensis)* was observed at a dose of 10 mg/day/mice as compared to the control animals. (Table 2).

Tissue Biochemistry: Postcoital administration of the pregnancy interceptive doses of the alcoholic extract of the leaves of *Mentha arvensis* from day 7 to 9 *pc.* caused a significant decline in the uterine sialic acid content on day 12 *pc.* in relation to the mean control value. (Table 3).

Table 1: Effect of administration of alcoholic extract of the leaves of Mint (Mentha arvensis) on the body weight and uterine weight of female mice. (Number of mice in each group: 5)

Group		Dose Mg/day/mice	Initial body weight Mean±SEM	Final body weight Mean±SEM	Uterine weight Mean±SEM
Post-coital	Control	--	33.5±0.8	35.7±1.03	372.2± 31.94
	Experimental	10	32.7 ± 2.6	35.7 ± 2.6*	156 ± 22.6***

Significant difference at: *P<0.05 (Almost Significant) **P<0.01 (Significant) ***P<0.001 (Highly Significant)

Table 2: Effect of administration of alcoholic extract of the leaves of Mint (Mentha arvensis) on the on fertility of female mice (Number of mice in each group= 5)

Group		Dose Mg/day/ mice	Corpora lutea	Implantation sites	Percentage Implantation
Post-coital	control	-	61	52	85.24
	Experimental	10	56	0	0

Table 3: Effect of administration of alcoholic extract of the leaves of Mint (Mentha arvensis) on the on the Biochemical Parameters of the uterus of female mice (Number of mice in each group= 5)

Group		Dose Mg/day/rat	Sialic ACID Mean±SEM
Post-coital	Control	-	0.61±0.03
	Experimental	10	0.32 ± 0.7••

Significant difference at: *P<0.05 (Almost Significant) **P<0.01 (Significant) ***P<0.001 (Highly Significant)

4.Discussion

Several plant extracts have been reported to act as effective antifertility agents (Badami *et al.,* 2003; Vasudev and Sharma, 2006). For a long time, leaves of Mentha arvensis have been a folklore remedy, used to terminate pregnancy. In the present investigation, it was observed that the alcoholic extract of leaves of Mentha arvensis caused a decline in the percentage of implantation to corpora lutea reported to possess antifertility activity in various laboratory animals. However, the leaves of Mentha arvensis have not been subjected to extensive study for their antifertility effect, excepting for the initial reports by Kapoor *et al.,* (1974), Bodhankar *et al.,* (1974) and Garg *et al.,* (1978), Alcoholic extract of *Mentha arvensis* leaves is 60% effective in inhibiting ovulation among rabbits, when given orally at a dose of 100 mg/kg body weight once daily for three days (Kapoor, Garg and Mathur, 1974). Bodhankar *et al.,* (1974) reported that the alcoholic extract of *Mentha arvensis* showed 80 per cent and 100 per cent postcoital antifertility activity in rats at a dose of 100 mg and 500 mg/kg body weight. Similar, results were observed by Kanjanopathi et al., (1981), who reported that the uterotonic fraction of *Mentha arvensis* inhibits pregnancy in rats at a dose of 5 and 10 mg/kg body weight. My results are similar to those reported by many other researchers (Kanjanopathi *el al,* 1981, Gupta and Mathur 2009).

Body weight: In the present investigation administration of the alcoholic and extract leaves of *Mentha arvensis* does not significantly alter the body weights when administered post-coitally to female mice. In gross terms, this possibly indicates that the extracts do not have any apparent toxic or adverse effect on the general physiology of the test animal.

Organ Weight: In the present investigation, administration of the alcoholic and extract leaves of

Mentha arvensis shows a dose-dependent decline in the weight of the uterus on day 12 *postcoitum.* The control uterus is heavy on day 12 *pc* when the foetal sites are well marked and well-developed foetuses are present in the uterus. As a result of abortions occurring in treated females, the uterine weight decreases considerably, and its appearance is like that of a normal uterus. Gopalakrishnan *et al.* (1970) reported a decrease in uterine weight of rats treated with *Carica papaya* fruit during the post implantation stages of pregnancy. Similarly, Sharma (1989) reported a dose related decrease in the uterine weight of rats treated with the alcoholic extract of *Nigella sativa* and *Carica papaya* seeds from day 1 to 3 *postcoitum.* In contrast, Sizzirmani (1962) reported that estrogens in general exert a stimulatory effect on the female genital tract.

Acknowledgements

The author is thankful to the Head Department of Zoology for allowing her to pursue the research work and providing all the necessary facilities.

References

[1] Acharya, Deepak and Srivastava, Anshu (2008): Indigenous Herbal Medicines – Tribal Formulations and Traditional Herbal Practices (Book).
[2] Badami, S., Aneesh, R., Sarkar, S., Satish Kumar, M.N., Suresh, B., Rajan, S. (2003) Antifertility activity of Derris brevipes variety Coriacea. J. Ethnopharmacology: 84. 99 -104. (Paper published in Journal)
[3] Bodhankar, S.L., Garg, S.K. and Mathur, V.S., (1974): Anti [fertility screening of
[4] Casey, R.C.D. (1960): Alleged Antifertility plants of India. Ind. J. Med. Sci, 14: 390-600. (Paper published in Journal)
[5] Chandhoke, N., Daftan, P., Gupta, S.C. and Atal, C.K. (1979): Contraceptive activity of Puereria tuberosa, enhancement of its biological activity by trikatu group of drugs (Piplamadi). In 3rd Ann. Conj.Soc., Endocrin. India and Mid Term Conj. Endocrin. Soc. India (Varanasi), p.37.
[6] Chopra, R.N., Nayar, S.L. and Chopra, 1.C. (1956): Glossary of Indian Medicinal plants CSIR. New Delhi (For book).
[7] Choudhary. R.R. (1992): Why Herbal medicines? In: Herbal medicine for human health. Regional Publications: SEARO. No. 20. WIIO: pp 1-3. (Paper published in a Book)
[8] Christie, G.A. (1966): Implantation of the rat embryo: glycogen and alkaline phosphates.J. Reprod. Fertil, 12:279-294. (Paper published in Journal).
[9] Cushner. I.M. (1973): The Current status of the use of prostaglandins in induced abortion Aner.J. Public Health. 63 (3): 189-190. (Paper published in Journal)
[10] Cushner. I.M. (1973): The Current status of the use of prostaglandins in induced abortion Aner.J. Public Health. 63 (3): 189-190. (Paper published in Journal)
[11] **Dixit, U.P. and Bhatt, G.K. (1975):** *Folklore studies on unknown indigenous antifer- tility drugs. I.Res.Indian Med., 10: 77-81.*
[12] **Dixit, U.P., Arya, M. and Lohiya, N.K. (1976):** *Mechanism of action of chronically administered Canabis extract on the female genital tract of gerbils - Meriones hurrianae. Indian. J.Physio!. Pharmacol., 20: 38-41.*
[13] Elligner, J.V.and Kirton, K.J. (1974): Ovum transport in rabbits injected with prostaglandin, EL and F2. Biol. Reprod. 11:93-96(Paper Published in Journal)
[14] Emmens. C.W. (1970): Postcoital Contraception: British. Med. Bull., 26 (1): 45-51. (Paper published in the journal).
[15] female albino rats. Indian. J. Med. Res., 62: 831-837.
[16] Gopal Krishnan, M., and Rajashekharushetty, M.R. (1978): Effect of Papaya (Carica Papaya) on pregnancy and estrus cycle in albino rats of Wistar strain. Indian J. Physiol. Pharmacol., 22;66. (Paper published in Journal)
[17] Gupta Preeti, Mathur Sadhana, and Joshi, Suresh. Precoital antifertility Activity of *Mentha arvensis* 2010, Int.J.Pharmacol.biol.Sci.4 (4). 39-44.
[18] Gupta, P. and Mathur, S (2009); Changes in the uterine phosphatases' levels in female swiss albino mice treated with chromatographic fractions of petroleum ether extracts of Vinca rosea leaves, JL. of Herbal Medicine and Toxicology 3 (2)., 143-145. (Paper published in Journal)
[19] Gupta, Preeti (1994): interruption of Pregnancy after Post-Coital Administration of Certain Substances of Plant origin in Mouse. Ph.D. Thesis, University of Rajasthan, Jaipur (Thesis).
[20] Jacob, D. Sharma, S. and Vyas, D.K. (1986): Estrogen and postcoital antifertility effect of Carica papaya seed in the rat. The Indian Zoologist. 10: 127-129. (Paper Published in Journal).
[21] Kanjanopathi, Duangta., Smistri, Yuthana., Panthong Ampai., Taesotikul, Twat., Rattan Panona, Vibron (1981): Post-Coital Antifertility effect of Mentha arvensis Contraception, 24., 554-567. (Paper published in Journal).
[22] Kapoor, M., Garg, S.K. and Mathur, V.S. (1974): Anti-ovulatory activity of five indigenous plants in rabbits. Indian. J. Med. Res., *62:* 1223-1227.
[23] King, E.J. and Wolten, I.D.P. (1959): Microanalysis in Medical Biochemistry, Churchill, London 42 pp. (For Book).
[24] Lal, G. (1976): Evaluation of Post-Coital antifertility substances and their effects on histochemistry. Ph.D. Thesis University of Rajasthan, Jaipur (Thesis)
[25] Lal, G. Evaluation of Post-Coital antifertility substances and their effects on Histochemistry.PhD. THESIS. 1976.University of Rajasthan, Jaipur.
[26] Montgomery, R. (1957): Determination of Glycogen. Arch. Biochem., Biophys., 67:378-386 (Paper published in Journal).
[27] Mutreja. A, Agarwal, Meera., Kushwaha, Sonalika., Chauhan, Alka (2008): Effect of Nelumbo mucifera seeds on the reproductive organs of female rats. Iranian. JI of Reprod. Medicine Vol ó, No. I. pp-7-11 (Paper published in Journal)
[28] Phariss, B.B. (1971): Prostaglandins in fertility. Proc. Roy. Sol. Med., 64: 101 (Paper published in Journal).
[29] plants - Part IX-: *Effect of* five indigenous plants on early pregnancy in

[30] Rajlakshmi, M., Sankran, M.S. and Prasad, M.R.N. (1972): Changes *in uterine sialic acid and glycogen during pregnancy is rat. Biol., Reprod., 6: 204-209.*
[31] Sharma, Shubra (1989): An Investigation on the fertility of female rats after post-coital administration of seeds of Nigella sativa and Carica papaya. Ph.D. Thesis. University of Rajasthan, Jaipur (Thesis).
[32] Vasudev, N.and Sharma, S.K.Postcoital antifertility effect of Achyranthes aspera Linn. Roots J. Ethnopharmacol 2006. 107, 179-81.
[33] Vasudeva Neeru and Sharma, S.K. (2007): Post-coital Antifertility activity of Hibiscus rosa sinensis Linn. Roots. Evidence. Based. Compl. And Alt. Med., Vol. S No l, pp. 91-94 (Paper Published in Journal).
[34] Vasudeva, N. and Sharma, S.K. (2006). Post coital Antifertility effect of Achyranthes aspera Linn. roots. J. Ethnopharmacology., 107: 179-81. (Paper published in Journal).
[35] Walaas, O. (1952): Effect of Estrogen on the glycogen content of the rat uterus. Acta. Endoerm., 10: 175-192. (Paper Published in Journal)
[36] Yadav, R. and Jain, G.C. (1992): Antifertility effect of the aqueous extract of the seeds of Cassia fistula in female rats. Adv. in Contraception, 15:293-301. (Paper Published in Journal)