Journal of Pharmacology and Toxicology

ISSN 1816-496X

Academic Journals Inc.

www.academicjournals.com

OPEN ACCESS Journal of Pharmacology and Toxicology

ISSN 1816-496X
DOI: 10.3923/jpt.2017.57.75

Review Article
Plants for Female Fertility Regulation: A Review

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Abstract

The review provides updated scientific information of medicinal plants with proven female anti-fertility activity. The objective is to highlight the fertility regulating agents from plant origin for females. This review is a result of conduction of a literature search from different sources viz., the library of our institution, pubmed, google search and other personal sources. A total of 317 references were found using 204 plants for fertility regulation in females for the period of 68 years (1947-2015). The biological name, plant part, type of extract, dose, mode of administration, animal model and pharmacological action of these plants have been reviewed in this study to explore some of the ways in which phytotherapy may contribute and focus on research into potential herbal tools for population control.

Key words: Population, anti-fertility, anti-implantation, abortifacient, antioestrogenic, antiovulatory, intravaginal, teratology, contraception

Received: November 21, 2016 Accepted: February 06, 2017 Published: March 15, 2017

Citation: A.S. Ansari, K. Sevliya, I. Mohammad, A. Badar and N.K. Lohiya, 2017. Plants for female fertility regulation: A review. J. Pharmacol. Toxicol., 12: 57-75.

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Global population has severely disturbed the ecological balance and has forced mankind to develop new fertility regulating techniques. Although, considerable progress has been made in the field of chemically formulated contraceptive methods but many of them have adverse effects. Therefore, it is necessary to screen biologically active fertility regulating agents which are safe. Plants have been used worldwide for screening of various human ailments since ancient times. About 325 extracts from 75 plants with anti-fertility actions were screened by Garg *et al.*[1]. Kulshreshtha and Srivastava[2] recognized anti-fertility action in 43 folkloric traditional plants. The Task Force on Plants for Fertility Regulation set up by the World Health Organization (WHO) identified approximately 30 plants with anti-implantational activities but none of these have reached the stage of clinical examination[3]. Hence, the detailed information including plants scientific name, part, extract, dose, administration mode, animal model and pharmacological action have been reviewed in this study (Table 1).

The status of the plant products which have undergone clinical trials and have shown promising results is briefly reviewed.

Pippaliyadi vati: It has been used in combination of powdered fruit berries of *Embelia ribes*, *Piper longum* and borax, as an ayurvedic contraceptive, since ancient times. Phase I clinical trials have been completed at the Postgraduate Institute of Medical Education and Research, Chandigarh, the JIPMER, Pondicherry and at the KEM Hospital, Mumbai. The trial was preceded in Central Council for Research in Ayurveda and Sidha, Kolkata and Hyderabad and acute, subacute toxicology and teratological examination carried out at the National Institute of Immunology, New Delhi[3]. The researchers concluded that *in utero* exposure to pippaliyadi did not exhibit any adverse effects on postnatal development and reproductive performance of the F_1 progeny[4].

Consap: Saponins (obtained from *Sapindus mukorossi)* have spermicidal activity. Saponins caused alterations in the glycoproteins associated with the lipid bilayer of plasma membrane of spermatozoa, observed under scanning electron microscope[5]. Plant extracts altered biochemical and biophysical changes in the sperm membrane during sperm maturation without changing the testicular and epididymal morphology[6]. A contraceptive cream known as consap was developed under CDRI's contraceptive development programme. It has passed through phase I, II and III clinical trials and proved to be an effective fertility regulating agent. Hindustan Latex Limited, Mumbai licensed the cream to market as non-hormonal herbal spermicidal contraceptive[7].

Praneem: Praneem, combination of seed extract of *Azadirachta indica*, fruit extract of *Sapindus mukorossi* and *Mentha citrata* oil has emerged as an intravaginal polyherbal (PPH) cream and pessary at the National Institute of Immunology, Delhi, India. The formulation was safe under sub-acute toxicity studies in monkeys and has effective contraceptive efficacy in rabbits and monkeys after intravaginal application[8]. This has undergone phase II clinical trials[9] and was accepted by the study participants in a phase II safety and acceptability study done in Pune, India[10,11]. Clinical trials were carried out in 3 centres in India, viz., Postgraduate Institute of Medical Education and Research, Chandigarh; Safdarjang Hospital, New Delhi and Kamla Nehru Memorial Hospital, Allahabad. No toxic effects were observed on intravaginal use during clinical investigations[12]. A microbicide praneem polyherbal tablet has successfully passed through phase III clinical trials and licensed to M/s Panacea Biotec.

***Carica papaya*:** As a male contraceptive, a series of experiments have been conducted by Lohiya and associates with various extracts, fractions and sub-fractions with varying dose and duration in male rats, rabbits and langur monkeys. The chloroform extract exerted maximum antifertility activity in rats and rabbits, mainly due to its mild estrogenic property. The benzene chromatographic fraction of chloroform extract produced inhibition of cauda epididymal sperm motility in rats with reduced sperm density and morphological changes of the spermatozoa and azoospermia in rabbits. The methanol and ethyl acetate sub-fractions obtained from the benzene chromatographic fraction also showed motility inhibition properties in rats following 30-60 days of treatment and azoospermia in rabbits within 15 days of treatment[13,14].

Apart from effective male contraceptive, it has been equally screened as a fertility regulating agent in females. *Carica papaya* seeds and fruits exerted abortion in women[15]. In countries like Indonesia, Malaysia and Myanmar papaya have been used indigenously as abortifacients[16-18]. About 82% of females avoided papaya consumption during pregnancy in Tamil Nadu, India[19].

Extensive toxicological investigations have also been carried out with Methanol Sub Fraction (MSF) of the benzene chromatographic fraction of the chloroform extract of papaya seeds following a single high dose administration or daily

Table 1: Summary of plants with reported anti-fertility activity in female

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
Abroma augusta	Rt	p_4, b_1, c_1			A_1	Pakrashi *et al.*[23]
	Rt	e_3	Rat	50 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Abrus precatorius	Sd	b_2	Rat, hamster	75 and 150 mg kg^{-1} b.wt.	A_3	Wadhwa[25]
	Sd	a_4			A_4, L_1	Zia-Ul-Haque *et al.*[26]
	Pl	e_3	Mice		A_4	Abu *et al.*[27]
Abutilon indicum		m_1	Rat	500 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Acacia leucophloea	Rt	a_1	Rat	200 mg kg^{-1} b.wt.	A_3, A_4	Ahirwar[28]
Acalypha indica	Pl	p_4, e_3	Rat	Pc; 600 mg kg^{-1} b.wt.	A_1, E_1, R_1	Hiremath *et al.*[29]
Acanthus montanus	Lf	m_4	Rat	250, 500, 1000 mg kg^{-1} day^{-1}, Or; 6-15 day of gestation	E_5	Nana *et al.*[30]
	Lf	a_3	Rat	62.5, 125, 250, 500, 1000 mg kg^{-1} day^{-1}	F_3	Asongalem *et al.*[31]
Achillea millifoleum	Lf	a_3	Rat		A_3	Dalsenter *et al.*[32]
Achrostichum aureum	Pl	e_3	Rat	50-200 mg kg^{-1} Or; 5 days	A_2	Dhawan *et al.*[33]
	Pl	w_1	Rat	Pc; 17 days	P_1, A_9	Dhar *et al.*[34]
Achyranthes aspera	St Bk	b_1	Rat, rabbit, Mice	50 mg kg^{-1} b.wt; 6 or 7 days pc; 10, 25 and 50 mg kg^{-1} b.wt. 8 Pc	A_1, A_2	Pakrashi and Bhattacharya[35]
			Mice			Pakrashi *et al.*[23]
	St Bk	b_2	Rat		A_1, E_1	Wadhwa *et al.*[36]
	St Bk		Rat		E_1	Kamboj[37]
	Rt	e_3	Rat	200 mg kg^{-1} b.wt.; 1-7 days Pc	A_1, A_2, A_4, E_1	Vasudeva and Sharma[38]
	Lf	m_1	Rat	5.5 g kg^{-1} b.wt.	A_1, A_2	Shibeshi *et al.*[39]
Adhatoda vasica	Lf	a_9	Mice, rat, guinea pig, human		N_1, A_2, U_1	Gupta *et al.*[40]
	Lf	a_9			A_2	Lal and Sharma[41]
	Lf	l_1	Rat	175 mg kg^{-1} b.wt.	A_2	Nath *et al.*[42]
Aerva lanata	Ae Pl	e_3	Rat	400 mg kg^{-1} b.wt.	A_1	Savadi and Alagawadi[43]
Ailanthus excelsa	Lf, St Bk	e_3, p_4	Rat	250 mg kg^{-1} b.wt. Or; 6 days	A_1, A_2	Dhanasekaran *et al.*[44]
	St BK	h_2	Rat	200 and 400 mg kg^{-1}, Or;	A_1, A_2	Ravichandran *et al.*[45]
Alangium salvifolium	St Bk	a_3, c_1 e_4, m_1, p_4	Rat	100, 250, 500 and 1000 mg kg^{-1} b.wt., 8 days	A_2, I_1	Murugan *et al.*[46]
Albizzia lebbeck	Sd	a_3	Rabbit		A_5	Gupta *et al.*[47]
Allium cepa	Sd				A_5	Vohra *et al.*[48]
	Tu	e_3	Rat	300 mg kg^{-1} b.wt.	A_4	Thakare *et al.*[49]
Aloe barbadensis	Lf	l_1			A_1	Bhaduri *et al.*[50]
	Lf	e_3	Rat	100 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Amaranthus spinosus	Pl	e_3	Rat	200 and 400mg kg^{-1} b.wt.	A_1, A_4	Gurumani and Balamurugan[51]
Ammania baccifera	Pl	e_3	Mice	100, 200 and 400 mg kg^{-1} b.wt.; 18 days	R_2	Dhanapal *et al.*[52]
Ananas comosus	Lf	p_4, b_1	Rat		A_2	Pakrashi and Basak[53]
Andrographis paniculata	Lf		Mice	2 g kg^{-1} b.wt.; Or; 20 days	P_1, A_4	Zoha *et al.*[54]
Anethum graveolens	Pl, Sd	a_1, a_3, e_3	Rat	0.045, 0.45 and 0.5 g kg^{-1}, Or; 10 days	A_3, C_5, P_3, I_{10}	Monsefi *et al.*[55]
Annona squamosa	Lf	a_1			A_2	Saluja and Santani[56]
	Sd	a_3	Rat	300, 600 mg kg^{-1}, Or; 5 days of pregnancy	A_1	Damasceno *et al.*[57]
Areca catechu	Nut	p_1, a_1, a_3	Rat		A_1	Garg and Garg[58]
	Nut	n_1	Rat		A_4	Garg[59]
Aristolochia bracteolata	Rt	e_3	Rat	20 and 40 mg kg^{-1} b.wt.	A_2	Nataraj *et al.*[60]
Aristolochia indica	Rt		Mice	100 mg kg^{-1} b.wt., Or	A_1	Pakrashi and Shaha[61]
	Rt	a_5	Mice, rabbit			Pakrashi and Chakrabarty[62]
	Rt, Rt	a_1, p_5	Mice	50 and 100 mg kg^{-1} b.wt., 6 days, 50 mg kg^{-1}	A_2, A_4	Pakrashi and Pakrasi[63]
	Rt	a_5	Mice		A_3	Pal *et al.*[64]
		a_5	Mice		A_4	Ganguly *et al.*[65]
Artabotrys odoratissimus	Lf	b_1, e_3	Rat		A_3, A_6	Prakash and Mathur[66]
Artemisia vulgaris	Lf	p_1	Rat	300 and 600 mg kg^{-1} b.wt.	A_4	Shaik *et al.*[67]
Asparagus africanus	Lf, Rt	a_3, e_3	Rat	300 mg kg^{-1} b.wt., Or	A_1, I_2	Tafesse *et al.*[68]
Asparagus pubescens	Rt Bk	m_1	Mice, rat, rabbit	0.5 and 1.5 g kg^{-1} b.wt., 4-14 days of gestation	A_1	Nwafor *et al.*[69]
Aspilia africana	Lf	a_3, l_1	Rat	500 and 1000 mg kg^{-1} b.wt.	C_5, A_3	Oyesola *et al.*[70]
Azadirachta indica		n_2	Rat		A_1	Chandhoke[71]
		n_2	Rat	Ivg	A_1	Lal *et al.*[72]
	Sd	s_7	Rat	25 mcl; Ivg; 2-4, 4-6, 7-9 days for 3 min	A_1, R_3	Riar *et al.*[73]
		n_2	Rat	Iu; 100 µL, single dose	B_1	Upadhyay *et al.*[74]
	Sd and Lf	h_1	Rodents, primates		A_6	Mukherjee *et al.*[75]
	Sd,	m_5, h_3	Rat	3 and 6 mg kg^{-1} b.wt. day^{-1}, Or; 18 days	F_1	Roop *et al.*[76]
	Fl	a_1	Rat	1 g kg^{-1}, Or; 3 weeks	A_3, F_1	Gbotolorun *et al.*[77]
Balanites roxburghii	Fr	c_1, d_1, e_3, p_4	Rat	300 and 600 mg kg^{-1} b.wt.	A_1, A_2	Padmashali *et al.*[78]
Bassia latifolia	Bud	m_1	Mice		A_3	Bandyopadhyay[79]
Bougainvillea spectabilis	Lf	a_3	Rat		A_3	Mishra *et al.*[80]
Bromelia pinguin	Fr	n_3	Rat	Ip	U_2	Matadial *et al.*[81]
Butea frondosa	Pe	a_1	Rat, mice	Pc; 50 mg and 100 mg kg^{-1} b.wt., 15 days	A_1	Kapila *et al.*[82]
	Sd	a_1	Rat	Sc; 500 mg kg^{-1} b.wt.	A_1	Razdan *et al.*[83]
Butea monosperma	Fl	f_2	Rat		A_1	Khanna *et al.*[84]
	Rt, Fl	p_4, c_1, m_1, a_3	Mice	200 mg kg^{-1} b.wt.	A_1	Sharma *et al.*[85]
	Sd		Rat		A_1	Kholkute *et al.*[86]

Table 1: Continue

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
	Sd		Rat	5, 10 and 20 mg rat^{-1}, 1-5 days, Or	E_1	Bhargava[87]
Caesalpinia pulcherrima	Lf	e_3	Mice	400 mg kg^{-1} b.wt.	A_1	Kumar *et al.*[88]
Cajanus cajan	Sd	m_1	Mice		A_3	Bandyopadhyay[79]
Calotropis gigantea	Rt		Rat		A_1	Khanna *et al.*[89]
	Fl		Rat		A_2	Vohora *et al.*[90]
	Lf		Rat		A_2	Saksena *et al.*[91]
	Rt	e_3	Rat		A_4	Srivastava *et al.*[92]
Calotropis procera	Rt	e_3	Rat	250 mg kg^{-1}	A_1, A_4	Kamath and Rana[93]
Cannabis sativa	Lf	a_1	Rat	400 mg kg^{-1} b.wt.	A_2	Zade *et al.*[94]
Careya arborea	Rt	m_1			A_4	Kalita *et al.*[95]
	Rt	m_1	Mice			Haloi *et al.*[96]
Carica papaya	Un Fr Lx	s_6	Rat		P_1	Garg and Garg[58], Garg[59], Devi and Singh[97]
	Un Fr Pu	a_1	Rat		A_1	Garg and Garg[58]
	Un Fr Pu	f_1	Rat		E_2	Garg[59]
	Un Fr				A_2	Garg *et al.*[1]
	Un Fr Pu		Rat	Pc; 30 g rat^{-1} 18 days	A_2, A_3	Gopalakrishnan and Rajasekharasetty[98]
	Sd		Rat	10, 20, 30 mg kg^{-1} rat^{-1} 17 days	A_1, P_1	Singh and Singh[99]
	Sd	a_3	Rat	1 mg mL^{-1} $days^{-1}$ rat^{-1}	C_2	Chinoy *et al.*[100]
	Un Fr Lx	l_2	Rat	200, 400, 800 mg kg^{-1}, Or/Ip, 0-6 days gestation, 6-15 days gestation	N_1	Schmidt[101]
	Sd	a_1	Rat		A_4	Chinoy *et al.*[102]
	Sd	c_1	Rat	5 mg kg^{-1} b.wt., 3 days	E_1, S_1, V_1	Mishra *et al.*[103]
	Fr	ct	Rat	*in vitro*, 18-19 days pregnant uterine muscles, 0.2 mg mL^{-1}	Ts	Adebiyi *et al.*[104]
	Sd	a_3	Rat	800 mg kg^{-1} b.wt., Or; 1-10 days Pc	A_2	Oderinde *et al.*[105]
	Sd	c_1	Rat	25, 50 and 100 mg kg^{-1} b.wt. 2 weeks Pc, gestation period 2 weeks Pc and gestation period	D_3, I_2, R_3	Raji *et al.*[106]
	Ri Fr Ep; Gr Fr Ep	a_3	Mice	1 mg g^{-1} b.wt., day^{-1}, Or; days 10 of Pc	R_3, L_2	Anuar *et al.*[107]
Carum carvi		a_3, e_3	Rat	30 days Or	A_3, I_3	Thakur *et al.*[108]
Cassia fistula	Fr	a_1	Rat		A_1	Bhardwaj *et al.*[109]
	Sd	a_3	Rat	100 and 200 mg kg^{-1} b.wt., 1-5 days of pregnancy	A_3, A_4, U_1, P_1	Yadav and Jain[110]
	Sd	p_4	Rat	100 mg kg^{-1} b.wt., 1-5 days pregnancy; Or	A_1, E_1, R_5	Chauhan and Agarwal[111]
Cassia nigricus	Lf	m_1	Mice	0.25-0.75 g kg^{-1} b.wt., Ip; 4 days	A_1, A_8	Nwafor and Okwuasaba[112]
Cicer arietinum	Sd	e_3	Rat	1900 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Cichorium intybus		e_3	Rat		R_3	Prakash and Mathur[113]
	Sd	e_3	Rat	Or; days 1-10 Pc	P_1	Keshri *et al.*[114]
	Fr	e_3	Rat	50 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Cimicifuga racemosa	UnFrLx	l_3	Rat	5 L -30 µL, *in vitro*	E_4, U_1	Cherian[115]
	Rh	a_1, ip	MCF-7 cells	100-1,000 µg mL^{-1}	A_3	Zierau *et al.*[116]
Cissampelos pareira	Lf	m_1	Mice	250 and 450 mg kg^{-1} b.wt., day^{-1}, Or; 21 days	D_3, G_1, I_4, P_3	Ganguly *et al.*[117]
	Lf	m_1	Rat		A_3, I_4, C_5	Ganguly *et al.*[117]
	Pl	e_3			A_4	Samanta and Bhattacharya[118]
Citrus hystrix	Fr Pl	a_2, c_2	Rat	Or; 2-5, 8-12 and 15-labour d Pc	A_4, U_1	Piyachaturawat *et al.*[119]
Citrus limonum	Sd	p_4, a_1, a_3	Mice	200 and 500 mg kg^{-1} $days^{-1}$, 7 days Pc; Or	A_4, A_{10}	Kulkarni *et al.*[120]
Citrus medica	Fr Pl	e_3, c_1			A_4	Kachroo and Agrawal[121]
	Sd	p_4	Rat		A_4, A_5	Patil and Patil[122], Patil *et al.*[123]
Clerodendrum phlomidis	Rt	Root extract	Rat	100, 200, 400 and 600mg kg^{-1} b.wt.	A_4	Kumar *et al.*[124]
Cnidoscolus aconitifolius	Lf , Sd	p_1, s_6	Rat	250, 500 and 1000 mg kg^{-1} b.wt.	A_5, A_7	Yakubu *et al.*[125]
Coix lachrymal	Sd	a_3	Rat	1 g kg^{-1} b.wt.	A_2	Tzeng *et al.*[126]
Combretodendron africanum	Bk	a_3	Rat	50 mg kg^{-1}; Ip	A_3	Benie *et al.*[127]
Commiphora mukul		o_1	Rat	2 and 20 mg/100 g b.wt.; 7 days	R_2	Amma *et al.*[128]
Corchorus olitorius	Sd	m_1	Mice	17 days	I_4, R_2, I_8	Gupta *et al.*[129]
Coriandrum sativum	Sd	a_3	Rat	250 and 500 mg kg^{-1} b.wt., Or; 5, 12 and 20th day of pregnancy	A_1	Al-Said *et al.*[130]
Costus speciosus	Rh				A_1	Singh *et al.*[131]
	Rh		Rat	5-500 µg/100 g b.wt., 15 days	A_2	Tewari *et al.*[132]
Crotalaria juncea	Sd	a_1	Rat	Pc; 300 mg kg^{-1} b.wt.	A_1	Rao *et al.*[133]
	Pl				A_1	Rao and Krishnaiah[134]
	Sd	a_1, b_1, p_4	Mice	25mg/100 g b.wt.	I_4	Vijaykumar *et al.*[135]
	Sd	e_3	Rat	200 mg kg^{-1} b.wt. for 30 days	A_5	Malashetty and Patil[136]
Crataeva nurvala	St Bk	a_3, e_3	Rat	300 and 600 mg kg^{-1} b.wt.	A_4, I_3, R_3	Bhaskar *et al.*[137]
Croton roxburghii	Bk	c_2	Mice	18 days	A_3, A_4	Gupta *et al.*[138]
Cuminum cyminum	Sd	a_1, a_3	Rat	Pc; 100, 150 and 200 mg kg^{-1} b.wt.	A_4	Garg[139]
	Sd	e_3	Rat	Ov; 50, 150 and 500 mg kg^{-1} b.wt./alt.d; 42 days	E_1	Kant *et al.*[140]
	Sd	s_6	Rat		I_3, C_2	Atkinson and Elftman[141]
Curcuma aromatica	Rh	e_3	Rat	200 and 400 mg kg^{-1} b.wt.	A_1	Trishna *et al.*[142]

Table 1: Continue

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
Curcuma longa	Rh	p_4	Rat		R_3	Garg and Garg[58]
	Rh	p_4	Rat, rabbit		A_4, N_1	Garg[59]
	Rh	p_4, a_3, a_1	Rat	200 mg kg^{-1} b.wt.	A_1	Garg *et al.*[1]
	Rt	a_3, e_3	Rat	200mg kg^{-1} b.wt.	A_5, A_3, A_1	Ghosh *et al.*[143], Maurya *et al.*[24]
	Rh	a_3, e_3	Rat	Or	A_4	Mishra and Singh[144]
Cuscuta reflexa	St	m_1	Mice	17 days	I_4, R_2	Gupta *et al.*[129]
		e_3	Rat	800 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Cynodon dactylon	Lf	a_3	Rat	400 mg kg^{-1} b.wt.	A_3	Nayanatara *et al.*[145]
Dalbergia saxatilis	Rt	t_1	Rat	200 mg kg^{-1} b.wt.	A_4	Uchendu *et al.*[146]
Datura metel	Sd	s_6	Mouse	25 g b.wt.	A_4	Pandiarajan *et al.*[147]
Datura quercifolia	Pl	s_3	Rat	50 and 100 mg kg^{-1} b.wt.	I_3	Chandhoke and Gupta[148]
	Pl	s_4	Rat	Pc; 20 mg kg^{-1} b.wt., 17 days	P_2	Chandhoke *et al.*[149]
Daucus carota	Sd	a_1, a_3, p_4	Rat	Pc; 100 and 500 mg kg^{-1} b.wt., 17 days	A_1, A_4, N_1	Garg and Garg[58]
	Sd		Rat			Garg and Mathur[150]
	Sd	a_1	Rat, mouse	60, 80 and 120 mg $mouse^{-1}$, 46 days	A_1, U_2	Sharma *et al.*[151]
	Sd		Rat		A_2	Kaliwal *et al.*[152]
	Sd	a_1	Rat	Or; 50, 150 and mg kg^{-1} b.wt./alt.d, 42 days	A_7, M_1	Kant *et al.*[153]
	Sd	e_3	Rat	50, 150 and 500 mg kg^{-1} b.wt.	A_1	Kant *et al.*[154]
	Sd	f_5, p_4	Mouse	15 days	I_4, R_2, I_8	Majumder *et al.*[155]
Dendrophthoe falcata	Ae Pl	h_2	Rat	4.55 g kg^{-1} b.wt.	A_4	Pattanayak and Mazumder[156]
Derris brevipes	Rt	e_3	Rat	200, 600 mg kg^{-1} b.wt., Or; day (17) of pregnancy	A_1, A_2, A_4	Badami *et al.*[157]
	Rt	e_3	Rat	600 mg kg^{-1} b.wt.	A_2	Govindaraj *et al.*[158]
Dieffenbachia amoena	Lf	a_1	Rat	4 days	I_4	De Pasquale *et al.*[159]
Dipsacus mitis		e_4	Hamster, rat	Or; 150 mg kg^{-1}, days 17 and 110 Pc	C_7	Kitchlu *et al.*[160]
Dodonaea viscosa	Lf	m_1	Rat	250 mg kg^{-1} b.wt.	A_2	Ramya *et al.*[161]
Drosera burmannii vahl	Pl				A_4	Madhavan *et al.*[162]
Drynaria quercifolia	Rh	m_1, a_3	Rat		A_4	Das *et al.*[163]
Embelia ribes	Be		Rat, women		A_1, A_3	Arora *et al.*[164]
		e_1	Rat	Pc; 60 and 120 mg kg^{-1} b.wt., 17 days	A_1	Radhakrishnan and Alam[165]
		e_1	Rat, rabbit		A_1, A_5	Rathinam *et al.*[166]
	Be	p_4, m_1, b_1, c_1	Rat	1, 2 and 4 g rat^{-1}	P_3, A_4, C_1, P_1	Kholkute *et al.*[167]
	Rt	a_3	Rat	Pc; 100 mg kg^{-1} b.wt., 17 days	A_4	Garg *et al.*[1]
	Sd		Rat		A_3	Prakash and Mathur[168]
		e_1			A_1	Krishnaswamy and Purushothaman[169,170]
	Be	e_1	Rat		E_1	Prakash[171]
	e_1				A_1	Bhargava *et al.*[172]
	Be	e_1	Rat	10 and 20 mg kg^{-1} b.wt.	A_1	Wango[173]
Ensete superburn			Rat, mice, Guniea pig, hamster		A_1, A_3	Dutta *et al.*[174]
Ferula assafoetida	Rs	m_1, h_1 fr, c_1 fr, m_1 fr	Rat	200, 300 and 400 mg kg^{-1} b.wt., Or; 1-10 Pc	A_3, U_1	Keshri *et al.*[175]
		e_3	Rat	1-7 days	I_7, I_8	Keshri *et al.*[176]
Ferula hormonis		a_1	Mice	3 mg kg^{-1} b.wt., day^{-1}, 6 weeks, intragastric	A_1, I_2, H_1	Homady *et al.*[177]
Ferula jaeschkeana	Ae Pl	h_1	Rat	25 mg kg^{-1}, Or	A_1	Prakash *et al.*[178]
	Ae Pl, Rt		Rat, mice	50 mg kg^{-1} b.wt. for 30 and 45 days	A_1	Prakash and Jonathan[179], Prakash and Pathak[180], Prakash and Sharma[181]
Ficus religiosa	Fr	f_2	Goat	*In vitro*	A_1	Sharma *et al.*[182]
Garcinia kola	Sd	s_6	Rat	200 mg kg^{-1} b.wt.	A_3, A_5, F_3	Akpantah *et al.*[183]
Gelidiella acerosa		m_4	Rat	500/1000 mg kg^{-1} b.wt., day^{-1}; 1-7 of pregnancy	A_1, I_2, R_3	Ratnasooriya *et al.*[184]
	Pl	m_1	Rat	1000 mg kg^{-1} b.wt., day^{-1}, 7-8 days of pregnancy	R_3	Premakumara *et al.*[185]
Geum elatum	Ae Pl				A_2	Garg[139]
Globularia alypum	Lf	e_3	Rat	800 mg kg^{-1} b.wt., day^{-1}, 1-6 gd Intragastric ingestion for 30 days	R_3	Elbetieha *et al.*[186]
Globularia arabica	Lf	e_3	Rat	800 mg kg^{-1} b.wt., day^{-1}, 1-6 gd	R_3	Elbetieha *et al.*[186]
Gloriosa superba	Tu	h_2	Rat		A_1	Latha *et al.*[187]
Glycyrrhiza glabra	Rt	e_3	Rat	250 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Gossypium herbaceum	Sd	g_1	Rat		A_1	Lin *et al.*[188]
Gracilaria corticata		m_3	Rat	500/1000 mg kg^{-1} b.wt. day^{-1}; 1-7 of pregnancy	A_1, I_2, R_3	Ratnasooriya *et al.*[184]
Guaiacum officinale	Fl, Sd	a_3	Rat	480.75 mg kg^{-1}	A_2	Offiah and Ezenwaka[189]
Guettarda andamni	Ae Pl	e_3	Rat	Or; days 1-10 Pc	P_1	Keshri *et al.*[114]
Hagenia abyssinica	Rt	e_3	Rat	120 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Hibiscus rosa-sinensis	Fl	b_1	Rat		A_4	Prakash *et al.*[190]
	Fl	b_1	Mice	250-1000 mg kg^{-1} b.wt.	A_1	Kabir *et al.*[191]
	Fl	b_1		1-4 gd	A_1	Pal *et al.*[192]
	Lf	a_3	Mice	100 mg kg^{-1} b.wt., 1-6 days of pregnancy	A_1	Nivsarkar *et al.*[193]
	Rt	e_3	Rat	400 mg kg^{-1} b.wt., Or	A_1, U_3	Vasudeva and Sharma[194]
Hyptis suaveolens	Lf	a_1	Rat	Pc; 125 and 200 mg kg^{-1} b.wt., 17 days	A_1	Garg[139]

Table 1: Continue

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
	Lf				E_1	Saluja and Santani[195]
Hymenocardia acida	St Bk		Rat		A_1	Hyacinth and Nwocha[196]
Inula viscosa	Lf	a_3, p_4, d_2	Rat	Ip; 1-6 gd; 13-15 gd	A_1, A_2	Al-Dissi *et al.*[197]
Indigofera trifoliata	Lf	a_1, a_3, e_4, c_1	Rat	100, 200 and 400 mg kg^{-1} b.wt.	A_2	Dabhadkar and Zade[198]
Ipomoea fistulosa	Ae Pl	a_1	Rat	Pc; 100 mg kg^{-1} b.wt., 15 days	A_1, A_5	Mishra *et al.*[199]
Ischinochiton camptus		a_3, e_3	Rat		A_1, A_3	Dhar *et al.*[200]
Ixora finlaysoniana	Sp	e_3	Rat	250 mg kg^{-1} Or; 17 Pc	A_1	Singh *et al.*[201]
Jatropha curcas	Fr	d_2, m_1, p_4	Rat	Different doses; Or; Varying period	A_2, R_3	Goonasekera *et al.*[202]
Jatropha gossypifolia	Lf	e_3	Rat	250 and 450 mg kg^{-1} b.wt.	P_3	Jain *et al.*[203]
Juniperus communis	Fr	e_3	Rat	500 mg kg^{-1} b.wt.	A_1	Agrawal *et al.*[204]
	Pl	a_3			A_4	Aswal *et al.*[205]
	Sd	e_3	Rat	200 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Lagenaria breviflora	Fr, Sd	e_4, m_1	Rat	20 g kg^{-1} b.wt., Or	A_1, A_2	Elujoba *et al.*[206]
Lawsonia inermis	Lf	e_3	Rat	134 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
	Rt	Root extract	Rat		A_1	Agunu *et al.*[207]
	Lf		Rat	3, 30-300 mg kg^{-1} b.wt.	A_4	Munshi *et al.*[208]
Leonotis ocymifolium	Lf, Rt	e_3	Rat	300 mg kg^{-1}, Or; 20 days	A_1	Tafesse *et al.*[209]
Lepidium capitatum	Pl	e_3, h_1	Mice, rats, golden hamsters	250 mg kg^{-1} b.wt., Or; 1-5 Pc	A_1, A_4, E_1	Singh *et al.*[210]
Lepidium sativum	Pl	e_3			A_2	Aswal *et al.*[205]
Lobelia nicotianifolia	Pl	a_3			A_2	Aswal *et al.*[205]
Lygodium flexosum	Pl	a_1			A_5	Gaitonde and Mahajan[211]
Mallotus philippinensis	Sd	e_2	Rat	50, 75, 100 mg kg^{-1} b.wt., Or; 30 days	R_2	Thakur *et al.*[212]
Malvaviscus conzatti	Fl	a_1	Rat	25 days	A_5, F_1	Dixit[213]
	Fl	m_1	Rat	Ov; 1 g kg^{-1} b.wt. $days^{-1}$, 12c	C_5	Banerjee *et al.*[214]
Marsdenia tinctoria		h_2	Rat, mice	300, 200 or 100 mg kg^{-1} b.wt.	A_2	Chowdhury *et al.*[215]
Maytenus ilicifolia	Lf	e_2	Mice	1000 mg kg^{-1} Or	U_1	Montanari and Bevilacqua[216]
Melia azedarach	Rt	e_3	Rat	Or; 250 and 500 mg kg^{-1} day^{-1}, days 1-10 Pc	I_2	Keshri *et al.*[217]
		e_3	Rat	1-7 days	I_7, I_8	Keshri *et al.*[176]
	Sd	h_3, m_5	Rat	24 mg kg^{-1} b.wt., day^{-1}, Or; 18 days	F_1	Roop *et al.*[176]
	Sd	s_6	Rat	Or; 5-20 mg kg^{-1} b.wt., days 1-7 and 7-18 Pc	F_2, R_5	Mandal and Dhaliwal[218]
Memecylon lushingtonii	Ae Pl	e_3	Rat	Or; days 1-10 Pc	P_1	Keshri *et al.*[214]
Mentha arvensis	Lf	a_1	Rat		A_4	Bodhankar *et al.*[219]
	Lf	a_1	Rabbit		A_5	Kapoor *et al.*[220]
	Lf	p_4, a_1	Rat	Pc; 100, 500 mg kg^{-1} b.wt., 17 days	A_1	Garg *et al.*[1]
		u_1	Rat	Sc; 1-10 day	A_4, U_1	Kanjanapothi *et al.*[221]
	Lf	e_3	Rat	100 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Michelia champaca	Lf	h_2	Rat	100 and 200 mg kg^{-1} b.wt.	A_1	Taprial *et al.*[222]
Mimosa pudica	Rt	m_1	Mice, rat	300 mg kg^{-1} b.wt., day^{-1}, 21 days	F_2, G_1, P_3	Ganguly *et al.*[223]
Momordica angustisepalia	Rt	a_3	Mice, Guinea pig	Ip; 3.5 and 4 mL kg^{-1} b.wt.	A_2	Aguwa and Mittal[224]
Momordica charantia	Sd	b_1, c_1, e_3, p_4	Rat	25 mg/100 g b.wt., Or 30 days	A_5	Sharanabasappa *et al.*[225]
	Sd	m_1	Rat	25 mg/100 g b.wt.	A_3, I_4	Ifeanyi *et al.*[226]
Momordica cymbalaria	Rt	e_3	Rat	250 and 500 mg kg^{-1} b.wt., Or; 15 days	A_2, A_5	Koneri *et al.*[227]
	Rat			250 and 500 mg kg^{-1} b.wt	P_3	Koneri *et al.*[228]
Montanoa fruitescens	Lf	a_3	Rat	Iu; 5, 50 mg; 4 gd	A_1	Pedron *et al.*[229]
	Lf	a_3	Rat uterus	*In vitro*	E_4	Perusquia *et al.*[230]
Montanoa tomentosa	Lf	a_3	Women	Or; t.o. and 1.4 gm kg^{-1} b.wt., 7 weeks gestation	U_1	Landgren *et al.*[231]
	Lf	z_1	Rat, mice, hamster, guinea pig	Or; Ip; 1-6 gd and 4-6 gd	A_1	Hahn *et al.*[232]
	Lf	a_3	Rat	Iu; 11 gd; 50 mg and 100 mg; 11 gd	R_3	Pedron *et al.*[229]
	Lf	a_3	Rat uterus	*In vitro*	I_{11}	Perusquia *et al.*[230]
			Guinea pig		A_4, U_1, U_2	Waller *et al.*[233]
Moringa coneanensis	Rt	a_3	Rat		A_2	Shukla *et al.*[234]
Moringa oleifera	Rt	e_3, a_3	Rat	Iu	A_1	Dhawan *et al.*[235]
	Rt	a_3	Rat	600 mg kg^{-1} b.wt., Or	A_2, A_4	Shukla *et al.*[234]
	St Bk	e_2, b_1, d_1	Rat	1-7 days	A_2	Zade *et al.*[236]
Mucuna monosperma	Pl	a_3			A_1, A_2	Dhawan *et al.*[235]
Murraya paniculata	Pl	a_8			A_1	Kong *et al.*[237]
Musa paradisiaca	St	a_3, a_{10}, c_1, e_3, p_4	Rat	250 and 500 mg kg^{-1} b.wt., 5 days	A_3, A_4, A_5	Soni *et al.*[238]
Nelumbo nucifera	Sd	p_4	Mice	3 mg kg^{-1} b.wt., Ip; 15 days	A_3	Mazumder *et al.*[239]
	Sd	e_3	Rat	0.5, 1.0 and 2.0 g kg^{-1} in 1 mL of vehicle	A_3	Mutreja *et al.*[240]
Neriurn indicum	Rt, Lf	e_3	Rat	250 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Nigella sativa	Pl	a_1			A_5	Vohra *et al.*[48]
	Sd	h_1	Rat	2 g kg^{-1} b.wt. day^{-1}, Or; 1-10 Pc	A_4	Keshri *et al.*[241]
Ocimum sanctum	Lf, St	p_6	Rat	20, 200, 400 mg/100 g b.wt., 3 months	R_2	Khanna *et al.*[242]
	Lf	a_3	Rat		A_1, A_2, A_4, A_{10}	Vohora *et al.*[90]
	Lf	b_1, p_4	Rat	1-5 days pregnancy	A_4	Batta and Santhakumari [243]
Ocimum gratissimum	St	a_{10}	Rat	100 mg kg^{-1} b.wt.	A_3	Sripriya *et al.*[244]
Oxalis corniculata	Pl	e_3	Rat	10 and 20 mg/100 b.wt.	A_1	Patil and Patil [245]
Peganum harmala		m_1	Rat	2.0, 2.5, 3.5 g kg^{-1} b.wt., day^{-1}, 30 days	I_4, D_3	Shapira *et al.*[246]

Table 1: Continue

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
Pergularia daemia	St, Lf	a_6, e_3, s_5	Mice	100, 200, 400 and 600 mg kg^{-1} b.wt. day^{-1} 1-9 gd and 12-16 gd	A_2, A_2	Sadik *et al.*[247,248]
Perilla frutescens	Pl	e_3	Rat	50-200 mg kg^{-1}, Or; 5 days	A_2	Dhawan *et al.*[33]
Phyllanthus amarus	Pl	a_2	Mice	100 mg kg^{-1} or, 45 days	A_4	Rao and Alice[249]
Physalis alkekengi	Pl	a_1, p_1	Rat	150 mg kg^{-1} b.wt., on day 1-5 of pregnancy	A_1, A_4	Montaserti *et al.*[250]
Physalis minima	Lf	p_4	Rat	1 g kg^{-1} b.wt., Or; 8 days	I_4	Sudhakaran *et al.*[251]
Phytolacca dodecandra	Be	a_1			B_3	Stolzenberg *et al.*[252]
Piper betle	Petiole	e_3	Rat	100 mg kg^{-1} b.wt.	A_3	Sharma *et al.*[253]
Pinus ponderosa	Needle		Cattles		A_2	Short *et al.*[254,255] and Patil and Patil[245]
Piper longum	Fr	e_3, h_3, c_5, b_3	Rat	100, 200 mg kg^{-1} b.wt., 1-7 Pc	A_4	Lakshmi *et al.*[256]
Piper officinarum	Fr	p_4	Rat	Pc; 200 mg kg^{-1} b.wt., 17 days	A_5	Chandhoke *et al.*[149]
Pluchea lanceolata	Ae Pl	e_3			A_1	Aswal *et al.*[205]
Plumbago rosea	Rt		Rat	400 and 800mg kg^{-1} b.wt.	I_7	Lal *et al.*[257]
	St Bk	a_{10}	Rat	200 and 400 mg kg^{-1} b.wt.	A_5, A_1, A_4	Sheeja *et al.*[258] and Maurya *et al.*[24]
	Rt	m_1	Mice	400 and 800 mg kg^{-1}	A_2	Sattar *et al.*[259]
	Lf		Rat		A_3, A_5	Sheeja *et al.*[260]
Plumbago indica	Rt	e_3	Rat	200 and 400 mg kg^{-1} b.wt.	A_1	Savadi and Alagawadi[43]
Plumbago zeylanica	Lf	a_{10}, e_3	Rat	200 and 400 mg kg^{-1} b.wt.	A_5, C_5	Edwin *et al.*[261]
	Rt	a_1	Rat	300 and 500 mg kg^{-1} b.wt.	A_3	Sandeep *et al.*[262]
Plumeria rubra	pods	a_1	Rat	50, 100 and 200 mg kg^{-1} b.wt.	A_2	Dabhadkar and Zade[263]
Podocarpus brevifolius	Lf	c_1			A_1	Kholkute *et al.*[264]
Polygonium hydropiper	Rt	p_4, a_3			A_1, U_2	Garg *et al.*[1]
	Rt	A_1	Rat		A_1, A_2, A_4, A_{10}	Vohora *et al.*[90]
	Rt	m_1	Rat	1 g kg^{-1} b.wt., day^{-1} Or; 12 days	E_1, I_4	Hazarika and Sarma[265]
	Rt	e_3	Rat	150 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Portulaca oleracea	Ae Pl	c_1, e_3, p_4	Rat	250 and 500 mg kg^{-1} b.wt., 7 days	A_1, A_2	Londonkar and Nayaka[266]
	Lf	e_3	Rat	250 and 500 mg kg^{-1} b.wt.	A_2	Nayak *et al.*[267]
Pueraria mirifica	Pl		Monkey	10, 100 and 1000 mg day^{-1}; for 3 mc; Or	A_5, E_1	Trisomboon *et al.*[268]
Pueraria tuberosa	Tu	a_1	Rat	Pc; 125 mg kg^{-1} b.wt., 17 days	A_1	Sharma and Shanmugasundaram[269]
	Tu	a_1	Rat	Pc; 250 mg kg^{-1} b.wt., 12 days	A_1	Chandhoke *et al.*[270]
	Tu	a_3, b_1 c_1, h_1, m_1, p_4	Rat, mice, hamsters	150 mg kg^{-1} b.wt.	A_1, A_4, E_1	Prakash *et al.*[271]
Punica granatum	Fr	e_3	Rat	1.82 g kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Randia dumetonum	Sd	o_2	Rat	Pc; 100 mg kg^{-1} b.wt., 15 days	A_3	Pillai *et al.*[272]
Rhaptopetalum coriaceum	St Bk	m_1	Rat	350, 700 and 1400 mg kg^{-1} b.wt.	A_2	Onu[273]
Rhazya stricta	Lf	a_3	Rat	0.5, 2, 5 and 8 g kg^{-1} b.wt., Or; 1-15 gd	F_2, F_3, R_3	Rasheed *et al.*[274]
Ricinus communis	Sd	s_6	Guinea pig		A_1, A_2, P_3, R_1, R_2	Makonnen *et al.* [275]
	Sd	m_1	Mice	200 mg kg^{-1} b.wt.	A_1	Sani and Sule[276]
Rivea hypocrateriformis	Pl	p_4, c_1, d_1, e_3	Rat		A_1, P_1, R_4	Shivalingappa *et al.*[277]
	Pl	e_3	Rat	200 and 400 mg kg^{-1} b.wt.	A_3, D_2	Shivalingappa *et al.*[278]
Rubia cordifolia	Rt	e_3	Rat	250 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Rumex steudeli	Rt	m_1	Rat	2.2-3 g kg^{-1} b.wt., intragastric, 21 days	D_3, P_3, R_1, R_2	Gebrie *et al.*[279]
	Rt	m_1	Guinea pig		A_4, A_1, A_3	Gebrie *et al.*[280]
		m_1	Rat	300 g kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Ruta graveolens	St, Rt and Lf	c_2	Rat	Pc	A_1, A_4	Kong *et al.*[281]
	Rt, Ae Pl	a_3, p_4, m_1	Rat, hamster	Or; 1-10 Pc	A_8	Gandhi *et al.*[282]
Salvia fruiticosa	Lf	e_3	Rat	400 mg kg^{-1} b.wt., Or; 1-6 Pc	A_1, A_4	Elbetieha *et al.*[283]
		e_3	Rat	200, 400 and 800 mg kg^{-1} b.wt.	A_2	Elbetieha *et al.*[283]
Sapindus trifoliatus	Sd	a_1	Rat		A_4	Bodhankar *et al.*[219]
	Sd	a_1	Rat	Pc; 100500 mg kg^{-1} b.wt., 17 days	A_1	Garg *et al.*[1]
Senecio vulgaris	Pt	m_1	Rat	1-10 Pc	D_1	Tu *et al.*[284]
Sesbania aegyptica	Fl	b_1	Rat	Pc; 50 mg kg^{-1} b.wt., 16 days	A_5	Pakrashi *et al.*[23]
Sesbania sesban	Fl		Rat		A_1	Dhawan *et al.*[235]
	Sd	d_1	Rat	100, 250 and 400 mg kg^{-1} days^{-1}, 30 days	H_1, A_1, A_2	Singh[285]
Sida carpinifolia	Pl	p_4			A_1	Kholkute *et al.*[264]
Sida veronicaefolia	Pl	a_1	Rat	3 mL kg^{-1} Iv, 32 mL kg^{-1} Or; 15-17 gd	A_1	Lutterodt[286]
Solanum crassypetalum	Ae Pl	e_3	Rat	Or; day 1-10 Pc	P_1	Keshri *et al.*[114]
Spondias mombin	Lf	a_1, a_3	Rat	800 mg kg^{-1}, Ip, 1-4 gd	A_8	Uchendu and Isek[287]
Stachys lavandulifolia	Sd		Mice	0, 50, 100, 150 and 200 mg kg^{-1}	A_2	Jafarzadeh *et al.*[288]
Striga lutea	Pl	p_4	Mice	50, 100 mg kg^{-1}	A_4	Hiremath *et al.*[289]
	Pl	f_4	Rat	5-25 mg kg^{-1} b.wt. day^{-1}; Or; 1-4 pregnancy	A_1, A_4	Hiremath and Rao[290]
Striga orobanchioides	Sd, Pl	e_3	Rat	200 mg kg^{-1} b.wt.	A_1, E_1	Hiremath *et al.*[291]
		f_3	Rat	5-25 mg kg^{-1} b.wt., Or 1-4 days	A_1, I_3	Hiremath *et al.*[292]
Striga senegalensis	Fl	e_3	Rat	120 mg kg^{-1} b.wt., Or	A_4	Choudhury *et al.*[293]
Strumpfia maritima	Fl	a_3			A_4	Hsu *et al.*[294]
Tabernaemontana divaricata	Fl	m_1, p_4			A_4	Mukhram *et al.*[295]
	Lf	e_3	Rat	250 and 450 mg kg^{-1} b.wt.	P_3	Jain *et al.*[296]
Tabernaemontana heyneana	Rt	c_4	Rat	30 mg kg^{-1}, Or; 1-4 gd	A_1, E_1	Mehrotra and Kamboj[297]
	Fr	E_3	Rat		U_3	Srivastava *et al.*[298]
Tambul patrabrint	Lf St	a_1	Rat	50 mg kg^{-1} b.wt. for 3 and 10 days	A_4, D_1	Tewari *et al.*[299]
Terminalia arjuna	St Bk	a_2	Rat		A_4	Yadav *et al.*[300]
Terminalia bellirica		e_3	Rat	250 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]

Table 1: Continue

Name of plant	Plant part	Extract	Animal model	Dosage duration	Observation	References
	Bk	e_3	Rat	25 mg/100 g b.wt.	A_1	Vishwanatha *et al.*[301]
Thespesia populnea	Pl	p_1	Mouse	15 days	R_2, C_6, I_8	Kavimani *et al.*[302]
	Sd	a_1, e_4, p_4	Rat	50, 75, 90 and 110 mg kg^{-1} b.wt., 7 days	A_1	Ghosh and Bhattacharya[303]
Tragia involucrata	Ae Pl	h_1			A_4	Joshi and Gopal[304]
Trianthema portulacastrum	St, Lf, Rt	a_1	Rat	100, 200 and 400 mg kg^{-1} b.wt.	A_2	Pare *et al.*[305]
Trichosanthes cucumerina		e_3	Rat	200 and 400 mg kg^{-1} b.wt.	F_1, I_4	Kage *et al.*[306]
Trichosanthes kirilowii	Tu		Mice		D_2, F_1	Ng *et al.*[307]
Trigonella foenum graecum	Sd	s_2	Rat	100 mg day^{-1}, 12 days	A_2	Yadav[308]
	Sd	s_6	Rat		A_3, A_4	Sharma and Bhinda[309]
	Sd	p_6	Rabbit	Pc; Or; 20 days	F_2, I_{10}	Kassem *et al.*[310]
	Sd	m_1	Rat	200 mg kg^{-1} b.wt.	A_4	Dande and Patil [311]
Uraria lagopodioides	Pl	a_1	Rat	Or	A_1	Khanna *et al.*[89]
Urtica diocia		e_3	Rat	250 mg kg^{-1} b.wt.	A_1	Maurya *et al.*[24]
Valeriana officinalis	Pl	e_3	Rat	2.79 g kg^{-1} day^{-1}, Or; 1-8 and 8-15 gd	N_1	Yao *et al.*[312]
Vicoa indica	Pl	a_3	Women	15 g day^{-1}, 3 days, 3 cycles	A_4	Dhall and Dhogra[313]
	Pl	p_1	Bonnet monkey	days 1-14 and 9-14 of mc	P_1	Rao *et al.*[314]
Woodfordia fruticosa	Fl	a_3	Rat	Pc; 50 mg kg^{-1} b.wt., 16 days	A_1, A_9	Pakrashi *et al.*[315]
	Fl	a_1	Rat	100 mg kg^{-1} b.wt.	A_2	Khushalani *et al.*[316]
Wrightia tinctoria	St Bk	e_3	Rat	250 mg kg^{-1} dose on days 1-7 Or; 1-5 Pc	A_4	Keshri *et al.*[317]
Xeromphis spinosa	Fr Pu	a_1	Rat		A_1, P_1	Saluja and Santani[56]
Zizyphus jujuba	Bk	e_4	Mice		A_4	Gupta *et al.*[138]

a_1: Alcoholic extract, a_2: Alcoholic extract (arjunalone), a_3: Aqueous extract, a_4: Abridin, a_5: Aristolic acid, a_6: Alkaloid, a_7: Alkaloid (aroborinine), a_8: Alkaloid (binsindole), a_9: Alkaloid (vasicine), a_{10}: Acetone, b_1: Benzene extract, b_2: n-butanol extract, b_3: Butanol fraction, c_1: Chloroform extract, c_2: Chloroform extract (chalepensin), c_3: Coumarin, c_4: Coronaridine hydrochloride, c_5: Crude fraction, d_1: Distilled water extract, d_2: Dichloromethane, e_1: Embelin, e_2: Ether extract, e_3: Ethanolic extract, e_4: Ethyl acetatem, f_1: Fruit oil, f_2: Flower extract, f_3: Flavones (apigenin and luteolin), f_4: Flavones (acacetin and luteolin), f_5: Fatty acids, g_1: Gossypol, g_2: Glycosides, h_1: Hexane extract, h_2: Hydroalcoholic extract, h_3: Hexane fraction, ip: Iso-propanolic extract, I_1: Leaf juice, I_2: Latex extract (aqueous), m_1: Methanolic extract, m_2: Methanolic extract (andrographolide), m_3: Montanol, m_4: Methanol:methylene chloride 1:1, m_5: Methanol fraction, n_1: Nut oil, n_2: Neem oil, n_3: Non-proteinaceous extract, o_1: Oleoresin (acidic fraction), o_2: Oleonolic acid,$_3$-β Glucoside, p_1: Plant extract, p_2: Phenol and flavonoids, p_3: Physalinx, p_4: Petroleum ether extract, p_5: P-coumaric, p_6: Powder, r_1: Resin, s_1: Saponin fraction, s_2: Steroidal extract, s_3: Steroidal lactone (dq_1), s_4: Steroidal lactone, s_5: Steroidal fraction, s_6: Seed extract, s_7: Seed oil, t_1: Triterpenoid glycoside, u_1: Uterotonic fraction, w_1: Water soluble fraction of ethanolic extract, x_1: Xylohydroquinone, z_1: Zoapatanol, A_1: Anti-implantation, A_2: Abortifacient, A_3: Anti-oestrogenic or interrupt oestrous cycle, A_4: Antifertility or 100% sterility or inhibited fertility, A_5: Anti-ovulatory, A_6: Abrogate pregnancy (10%), A_7: Alteration in reproductive organ weight, A_8: Anti-conceptive, A_9: 100% Activity, A_{10}: Anti-zygotic, B_1: Blocked pregnancy (pre-implantation block), B_2: Blocked the uterotropic responses of exogenous estrogen, B_3: Blastocidal, C_1: Cyclicity disrupted in virgin, C_1: Changes in biochemical profile of ovary and uterus, C_3: Completely annulled the biological potency of hCG, C_4: Complete inhibition of chorionic gonadotropin, C_5: Cycle length prolonged, C_6: Cholesterol, ascorbic acid of ovary is elevated, C_7: Contraceptive efficacy, D_1: Decrease in fertile mating and number of offspring, D_2: Decrease no. of graafian follicle and corpora lutea, D_3: Decrease in litter size, E_1: Estrogenic activity or oestrogenic or estrogenicity, E_2: Encouraging antifertility activity, E_3: Estrogen induced alkaline phosphatase activity in the endometrium of immature rabbits, E_4: Enhanced uterine contractibility, E_5: Embryotoxic perinatally, F_1: Follicular degeneration, F_2: Reduction in No. of viable fetuses, F_3: Fetal toxicity, G_1: Altered gonadotropin release and estradiol secretion, H_1: Histopathological changes in the ovary and uterus, I_1: Inhibition of progesterone production (abortifacient), I_2: Implantation sites decreased, I_3: Increase in uterine, cervical and vaginal weights, I_4: Irregular oestrous cycle, I_5: Influences the sexual maturity of immature female rats, I_6: Inhibited the action of hormone in hCG, I_7: Inhibition of uterine activity, I_8: Inhibition of delta 5, 3- β hydroxy steroid dehydrogenase and glucose-6-phosphodehydrogenase, I_9: Inhibition of heat, I_{10}: Increased progesterone concentration, I_{11}: Inhibited uterine contractility, L_1: Lower plasma level of oestradiol, L_2: Lower body weight of pups, M_1: Mild oestrogenic activity, N_1: No effect, N_2: No effect on progesterone response of uterus, P_1: Prevent or protected or inhibit or interrupt pregnancy, P_2: Partial to complete vaginal cornification, P_3: Prolonged diestrous phase (prolonged oestrus cycle), P_4: Pregnant mare's serum gonadotropin, P_5: Post-coital contraceptive efficacy, R_1: Resin-Rs: Reversible on withdrawal of treatment, R_2: Reduction in weight of ovaries, uterus and cervix, R_3: Resorption of implants, R_4: Reversible on exogenous administration of hydroxy progesterone, R_5: Reduction in fertility index, S_1: Significant increase in body weight, Ts: Tetanic spasm, U_1: Uterotonic, U_2: Uterine stimulant, U_3: Uterotropic activity, V_1: Vagina open, showed cornified and epithelial cells, Pl: Whole plant, Ae Pl: Aerial plant part, Rt: Root, St: Stem, Lf: Leaves or leaf, Bk: Bark, Rt-Bk: Root bark, Bk: Stem bark, Rt Xy: Root xylem, Ep: Epigeal part, Fl: Flowers, Fr Pl: Fruit peel. Pe: Petals, Be: Berries, Fr: Fruit, Ri Fr: Ripe fruit, Ri Fr Ep: Ripe fruit epicarp, Gr Fr Ep: Green fruit epicarp, Un Fr Pu: Unripe fruit pulp, Un Fr Lx: Unripe fruit latex, Sl Fr: Stale fruit, Sd: Seed, sp: Serial part, Rh: Rhizome, Rg: Bulb, Bu: Resinous gum, Tu: Tuber, Ct: Crude papaya latex, Pc: Post-coitally, Ivg: Intravaginal, Iu: Intrauterine, Sc: Subcutaneous, Or: Oral, Ov: Overiectomised, b.wt.: Body weight, Ip: Intraperitoneum, d: Days, c: Cycle, gd: Gestation day, mc: Menstrual cycle

administration upto 10 times of contraceptive dose for a period of 28 and 90 days and long-term daily administration upto 10 times for a period of 52 weeks and 2 years in rats indicated no associated health hazards. The study suggested that MSF was administered at doses of 50, 100, 250 and 500 mg kg^{-1} b.wt., day^{-1} for 4 weeks had no developmental toxicity and teratogenicity during implantation and gestation[20]. The MSF treatment at various dose regimens did not show significant changes in body and organs weight, feeding habit and pre-terminal deaths. Chromosomal aberrations were investigated in spermatogonial cells of albino rats and rabbits, following oral administration of Methanol Sub Fraction (MSF) of papaya seeds. The chromosomal fragments, rings, dicentrics, exchanges, damaged chromosomes and total chromosomal aberrations in MSF treated rats and rabbits did not showed any alterations[21]. Moreover, oral administration of Methanol Sub-Fraction (MSF) of benzene chromatographic fraction of the chloroform extract of papaya seeds had no lethal effect when administered at 20x CD (Contraceptive dose) for 5 consecutive days in albino rats and rabbits[22].

CONCLUSION

The review showed that study for female fertility regulation is being carried out on a large number of plants and derived products. Consap as a spermicide has been licensed to the Hindustan Latex Limited, Mumbai to market the product. Clinical trials are on going with pippaliyadi vati. A microbicide praneem polyherbal tablet (PPHT), as a contraceptive and for management of abnormal vaginal discharge syndrome has been licensed to M/s Panacea Biotec.

Carica papaya products may take a great lead as a dual contraceptive which has been found effective for both sexes. At last, for developing a contraceptive from a natural source, a well defined time-bound approach should be adapted.

SIGNIFICANT STATEMENT

- The ancient literature described how plant and their derived products contributed in regulating fertility in females
- In this review, status of research on plant derived agents is highlighted
- The plant kingdom stills an essentially unused source of new fertility regulating agents

ACKNOWLEDGMENT

The authors are thankful to the Head, Department of Zoology, University of Rajasthan, Jaipur, India for providing facilities.

REFERENCES

1. Garg, S.K., V.S. Mathur and R.R. Chaudhury, 1978. Screening of Indian plants for antifertility activity. Indian J. Exp. Biol., 16: 1077-1079.
2. Kulshreshtha, D.K. and S. Srivastava, 2001. New Leads for Female Fertility Regulation from Plants. In: Current Status in Fertility Regulation: Indeginous and Modern Approaches, Chaudhary, S.R., C.M. Gupta and V.P. Kamboj (Eds.). Central Drug Research Institute, Lucknow, pp: 133-158.
3. Chaudhury, R.R., 2001. Traditional Methods of Fertility Regulation. In: Current Status in Fertility Regulation: Indeginous and Modern Approaches, Chaudhary, S.R., C.M. Gupta and V.P. Kamboj (Eds.). Central Drug Research Institute, Lucknow, pp: 11-21.
4. Balasinor, N., A. Bhan, N.S. Paradkar, A. Shaikh, T.D. Nandedkar, K.K. Bhutani and M. Roy-Chaudhury, 2007. Postnatal development and reproductive performance of F_1 progeny exposed *in utero* to an ayurvedic contraceptive: *Pippaliyadi yoga*. J. Ethnopharmacol., 109: 406-411.
5. Dhar, J.D., V.K. Bajpai, B.S. Setty and V.P. Kamboj, 1989. Morphological changes in human spermatozoa as examined under scanning electron microscope after *in vitro* exposure to saponins isolated from *Sapindus mukorossi*. Contraception, 39: 563-568.
6. Nivsarkar, M., N. Shrivastava, M. Patel, H. Padh and C. Bapu, 2002. Sperm membrane modulation by *Sapindus mukorossi* during sperm maturation. Asian J. Androl., 4: 233-235.
7. Bhosale, V.V., O.P. Asthana and S.P.S. Gaur, 2013. Efficacy and safety of herbal spermicidal contraceptive Consap. Curr. Sci., 104: 1701-1703.
8. Garg, S., V. Taluja, S.N. Upadhyay and G.P. Talwar, 1993. Studies on the contraceptive efficacy of *Praneem polyherbal* cream. Contraception, 48: 591-596.
9. Joglekar, N.S., S.N. Joshi, S.S. Deshpande, A.N. Parkhe, U.R. Katti and S.M. Mehendale, 2010. Acceptability and adherence: Findings from a Phase II study of a candidate vaginal microbicide, Praneem polyherbal tablet, in Pune, India. Trans. R. Soc. Trop. Med. Hygiene, 104: 412-415.
10. Talwar, G.P., P. Raghuvanshi and S. Gopalan, 2001. Praneem Polyherbal Formulation for Dual Purpose of Contraception and Prevention of Sexually Transmitted Diseases and Reproductive Tract Infections. In: Current Status in Fertility Regulation: Indigenous and Modern Approaches, Chowdhury, S.R., C.M. Gupta and V.P. Kamboj (Eds.). Central Drug Research Institute, Lucknow, pp: 91-98.
11. Joglekar, N.S., S.N. Joshi, S.N. Navlakha, U.R. Katti and S.M. Mehendale, 2006. Acceptability of *Praneem polyherbal* vaginal tablet among HIV uninfected women and their male partners in Pune India-Phase I study. Indian J. Med. Res., 123: 547-552.
12. Bagga, R., P. Raghuvanshi, S. Gopalan, S.K. Das and R. Baweja *et al*., 2006. A polyherbal vaginal pessary with spermicidal and antimicrobial action: Evaluation of its safety. Trans. R. Soc. Trop. Med. Hygiene, 100: 1164-1167.
13. Lohiya, N.K., B. Manivannan, P.K. Mishra and N. Pathak, 2001. Prospects of Developing a Plant Based Male Contraceptive Pill. In: Current Status in Fertility Regulation: Indigeneous and Modern Approaches, Chowdhury, S.R., C.M. Gupta and V.P. Kamboj (Eds.). Central Drug Research Institute, Lucknow, India, ISBN: 81-85042-17-9, pp: 99-119.
14. Kamal, R., R.S. Gupta and N.K. Lohiya, 2003. Plants for male fertility regulation. Phytother. Res., 17: 579-590.
15. Chopra, R.N., I.C. Chopra, K.L. Handa and L.D. Kapur, 1958. Chopra's Indigenous Drugs of India. Dhur and Sons Private Ltd., Calcutta, India.
16. Keharo, J. and A. Bouquet, 1950. Medicinal and Poisonous Plants in the Ivory Coast Upper Volta. Vigot Freres, Paris.
17. Quisumbing, E.A., 1951. Medicinal plants of the Philippines. Department of Agricultural and Natural Resources, Technical Bulletin No. 16, Philippines.
18. Tang, C.S., 1979. Macrocyclic piperidine and piperiding alkaloid in *Carica papaya*. Food Chem. Nutr., 1: 55-68.
19. Ferro-Luzzi, E.G., 1980. Food Avoidance of Pregnant Women in Tamil nadu. In: Food, Ecology and Culture: Reddings in the Anthropology of Dietay Practices, Robson, J.R.K. (Ed.). Gordon and Breach Science Publishers, New York, pp: 101-108.
20. Shrivastava, S., A.S. Ansari and N.K. Lohiya, 2011. Fertility, developmental toxicity and teratogenicity in albino rats treated with methanol sub-fraction of *Carica papaya* seeds. Indian J. Pharmacol., 43: 419-423.

21. Ansari, A.S., S. Shrivastava, S. Goyal and N.K. Lohiya, 2011. Observations on chromosomal aberrations following the administration of methanol Sub-Fraction of *Carica papaya* seeds for contraception in albino rats and rabbits. Int. J. Pharmacol., 7: 721-725.
22. Ansari, A.S., S. Shrivastava and N.K. Lohiya, 2011. Dominant lethal assay following administration of methanol sub-fraction of the seeds of *Carica papaya*. Pharmacologia, 2: 229-236.
23. Pakrashi, A., N. Mookerji and B. Basak, 1975. Effect of chromatographic fractions of the plant *Achyranthes aspera* Linn. on fertility in female albino mice. J. Reprod. Fertil., 43: 127-128.
24. Maurya, R., S. Srivastava, D.K. Kulshreshta and C.M. Gupta, 2004. Traditional remedies for fertility regulation. Curr. Med. Chem., 11: 1431-1450.
25. Wadhwa, M., 1982. Contraceptive effect of phytosteroids in female albino rats. Ph.D. Thesis, University of Rajasthan, Jaipur.
26. Zia-Ul-Haque, A., M.H. Qazi and M.E. Hamdard, 1983. Studies on the antifertility properties of active components isolated from the seeds of *Abrus precatorius* Linn II. Pak. J. Zool., 15: 141-146.
27. Abu, S.M., H.A. Manirul, M.A. Majid and I.M. Anwarul, 2012. Antifertility studies on ethanolic extract of *Abrus precatorius* L on swiss male albino mice. Int. J. Pharmaceut. Sci. Res., 3: 288-292.
28. Ahirwar, D., 2011. Anti fertility activity of *Acacia leucophploea*. Scholars Res. Library, 3: 411-413.
29. Hiremath, S.P., K. Rudresh, S. Badami, S.B. Patil and S.R. Patil, 1999. Post-coital antifertility activity of *Acalypha indica* L. J. Ethnopharmacol., 67: 253-257.
30. Nana, P., E.A. Asongalem, H.S. Foyet, G.N. Folefoc, T. Dimo and P. Kamtchouing, 2008. Maternal and developmental toxicity evaluation of *Acanthus montanus* leaves extract administered orally to Wistar pregnant rats during organogenesis. J. Ethnopharmacol., 116: 228-233.
31. Asongalem, E.A., P. Nana, H.S. Foyet, T. Dimo and P. Kamtchouing, 2008. Antifertility and fetotoxic activities of *Acanthus montanus* aqueous extract in wistar rats. Methods Find. Exp. Clin. Pharmacol., 30: 521-528.
32. Dalsenter, P.R., A.M. Cavalcanti, A.J. Andrade, S.L. Araujo and M.C. Marques, 2004. Reproductive evaluation of aqueous crude extract of *Achillea millefolium* L. (Asteraceae) in Wistar rats. Reproduct. Toxicol., 18: 819-823.
33. Dhawan, B.N., G.K. Patnaik, R.P. Rastogi, K.K. Singh and J.S. Tandon, 1977. Screening of Indian plants for biological activity: Part VI. Indian J. Exp. Biol., 15: 208-219.
34. Dhar, J.D., B.S. Setty, V. Lakshmi and D.S. Bhakuni, 1992. Post-coital antifertility activity of the marine plant, *Achrostichum aureum* L. in rat. Indian J. Med. Res., 96: 150-152.
35. Pakrashi, A. and N. Bhattacharya, 1977. Abortifacient principle of *Achyranthes aspera* Linn. Indian J. Exp. Biol., 15: 856-861.
36. Wadhwa, V., M.M. Singh, D.N. Gupta, C. Singh and V.P. Kamboj, 1986. Contraceptive and hormonal properties of *Achyranthes aspera* in rats and hamsters. Planta Medica, 52: 231-233.
37. Kamboj, V.P., 1988. A review of Indian medicinal plants with interceptive activity. Ind. J. Med. Res., 87: 336-355.
38. Vasudeva, N. and S.K. Sharma, 2006. Post-coital antifertility activity of *Achyranthes aspera* Linn. root. J. Ethnopharmacol., 107: 179-181.
39. Shibeshi, W., E. Makonnen, A. Debella and L. Zerihun, 2006. Phytochemical, contraceptive efficacy and safety evaluations of the methanolic leaves extract of *Achyranthes aspera* L. in rats. Pharmacologyonline, 3: 217-224.
40. Gupta, O.P., K.K. Anand, B.J. Ghatak and C.K. Atal, 1978. Vasicine, alkaloid of *Adhatoda vasica*, a promising uterotonic abortifacient. Indian J. Exp. Biol., 16: 1075-1077.
41. Lal, R. and P.L. Sharma, 1981. Potential of prostaglandins evoked contractions of isolated rat uterus by *Vasicine hydrochloride*. Indian J. Med. Res., 73: 641-648.
42. Nath, D., N. Sethi, R.K. Singh and A.K. Jain, 1992. Commonly used Indian abortifacient plants with special reference to their teratologic effects in rats. J. Ethnopharmacol., 36: 147-154.
43. Savadi, R. and K. Alagawadi, 2009. Antifertility activity of ethanolic extracts of *Plumbago indica* and *Aerva lanata* on albino rats. Int. J. Green Pharm., 3: 230-233.
44. Dhanasekaran, S., B. Suresh, M. Sethuraman, S. Rajan and R. Dubey, 1993. Antifertility activity of *Ailanthus excelsa* Linn. in female albino rats. Indian J. Exp. Biol., 31: 384-385.
45. Ravichandran, V., B. Suresh, M.N. Sathishkumar, K. Elango and R. Srinivasan, 2007. Antifertility activity of hydroalcoholic extract of *Ailanthus excelsa* (Roxb): An ethnomedicines used by tribals of Nilgiris region in Tamilnadu. J. Ethnopharmacol., 112: 189-191.
46. Murugan, V., H. Shareef, G.V.S. Ramasharma, M. Ramanathan and B. Suresh, 2000. Anti-fertility activity of the stem bark of *Alangium salvifolium* (Linn.F) wang in wistar female rats. Indian J. Pharmacol., 32: 388-389.
47. Gupta, M.L., T.K. Gupta and K.P. Bhargava, 1971. A study of antifertility effects of some indigeneous drugs. J. Res. Ind. Med., 6: 112-117.
48. Vohra, S.B., M.S.Y. Khan and S.H. Afia, 1973. Antifertility studies on Unani herbs Part III antiovulatory effects of Honzal, Halun, Kalongi, Sambhalu (*Vitex negundo*). Indian J. Pharm., 35: 100-102.
49. Thakare, V.N., P.S. Kothavade, V.V. Dhote and A.D. Deshpande, 2009. Antifertility activity of ethanolic extract of *Allium cepa* Linn in rats. Int. J. PharmTech Res., 1: 73-78.

50. Bhaduri, B., C.R. Ghosh, A.N. Bose, B.K. Moza and B.P. Basu, 1968. Antifertility activity of some medicinal plants. Indian J. Exp. Biol., 6: 252-253.
51. Gurumani, M. and K. Balamurugan, 2013. Evaluation of antifertility potential of ethanolic extract of whole plant of *Amaranthus spinosus* in female albino rats. World J. Pharm. Pharmaceut. Sci., 3: 2162-2167.
52. Dhanapal, R., S. Kavimani, V. Swamy, B. Matha and M. Gupta *et al*., 2005. Antisteroidogenic activity of ethanol extract of *Ammania baccifera* (L.) whole plant in female albino mice ovaries. Iran. J. Pharmacol. Therapeut., 4: 43-45.
53. Pakrashi, A. and B. Basak, 1976. Abortifacient effect of steroids from *Ananas comosus* and their analogues on mice. J. Reprod. Fertil., 46: 461-462.
54. Zoha, M.S., A.H. Hussain and S.A. Choudhury, 1989. Antifertility effect of *Andrographis paniculata* in mice. Bangladesh Med. Res. Counc. Bull., 15: 34-37.
55. Monsefi, M., M. Ghasemi and A. Bahaoddini, 2006. The effects of *Anethum graveolens* L. on female reproductive system. Phytother. Res., 20: 865-868.
56. Saluja, A.K. and D.D. Santani, 1984. Antifertility activity of *Xeromphis spinosa* and *Annona squamosa*. Indian J. Pharmaceut. Sci., 46: 21-23.
57. Damasceno, D.C., G.T. Volpato, T.C.F. Sartori, P.F. Rodrigues, E.A. Perin, I.M.P. Calderon and M.V.C. Rudge, 2002. Effects of *Annona squamosa* extract on early pregnancy in rats. Phytomedicine, 9: 667-672.
58. Garg, S.K. and G.P. Garg, 1971. Antifertility screening of plants: Part 7. Effect of 5 indigenous plants on early pregnancy in albino rats. Indian J. Med. Res., 59: 302-306.
59. Garg, S.K., 1974. Antifertility effect of oil from few indigenous plants on female albino rats. Planta Medica, 26: 391-393.
60. Nataraj, S.K.M., P.K. Puvvada, S. Badami, S.B. Patil and E. Kannan *et al*., 2007. Pre-coital and post-coital anti-implantation and abortifacient activities of *Aristolochia bracteolata* Lam. aerial parts. J. Nat. Med., 61: 302-306.
61. Pakrashi, A. and C. Shaha, 1977. Effect of a sesquiterpene from *Aristolochia indica* Linn. on fertility in female mice. Experientia, 33: 1498-1499.
62. Pakrashi, A. and B. Chakrabarty, 1978. Anti-oestrogenic and anti-implantation effect of aristolic acid from *Aristolochia indica* (Linn.). Indian J. Exp. Biol., 16: 1283-1285.
63. Pakrashi, A. and P. Pakrasi, 1979. Antifertility efficacy of the plant *Aristolochia indica* Linn. on mouse. Contraception, 20: 49-54.
64. Pal, A.K., S.N. Kabir and A. Pakrashi, 1982. A probe into the possible mechanism underlying the interceptive action of aristolic acid. Contraception, 25: 639-648.
65. Ganguly, T., A. Pakrashi and A.K. Pal, 1986. Disruption of pregnancy in mouse by aristolic acid: I. Plausible explanation in relation to early pregnancy events. Contraception, 34: 625-637.
66. Prakash, A.O. and R. Mathur, 1977. Effect of *Artobotrys odoratissimus* Linn. extracts on oestrus cycle, body weight and uterine weight in albino rats. Indian J. Exp. Biol., 15: 1038-1040.
67. Shaik, A., R.S. Kanhere, R. Cuddapah, K.S. Nelson, P.R. Vara and S. Sibyala, 2014. Antifertility activity of *Artemisia vulgaris* leaves on female Wistar rats. Chin. J. Nat. Med., 12: 180-185.
68. Tafesse, G., Y. Mekonnen and E. Makonnen, 2006. Antifertility effect of aqueous and ethanol extracts of the leaves and roots of *Asparagus africanus* in rats. Afr. Health Sci., 6: 81-85.
69. Nwafor, P.A., F.K. Okwuasaba and O.O. Onoruwe, 1998. Contraceptive and non-estrogenic effects of methanolic extract of *Asparagus pubescens* root in experimental animals. J. Ethnopharmacol., 62: 117-122.
70. Oyesola, T.O., O.A. Oyesola and C.S. Okoye, 2010. Effects of aqueous extract of *Aspilia africana* on reproductive functions of female wistar rats. Pak. J. Biol. Sci., 13: 126-131.
71. Chandhoke, N., 1979. Scoparone: Effect on reproductive processes in rats. Indian J. Exp. Biol., 17: 740-742.
72. Lal, R., A. Sankaranarayanan, V.S. Mathur and P.L. Sharma, 1986. Antifertility effect of neem oil in female albino rats by the intravaginal and oral routes. Indian J. Med. Res., 83: 89-92.
73. Riar, S.S., J. Bardhan, P. Thomas, A.K. Kain and R. Parshad, 1988. Mechanism of antifertility action of neem oil. Indian J. Med. Res., 88: 339-342.
74. Upadhyay, S.N., C. Kaushic and G.P. Talwar, 1990. Antifertility effects of neem (*Azadirachta indica*) oil by single intrauterine administration: A novel method for contraception. Proc. R. Soc. London B: Biol. Sci., 242: 175-179.
75. Mukherjee, S., S. Garg and G.P. Talwar, 1999. Early post implantation contraceptive effects of a purified fraction of neem (*Azadirachta indica*) seeds, given orally in rats: Possible mechanisms involved. J. Ethnopharmacol., 67: 287-296.
76. Roop, J.K., P.K. Dhaliwal and S.S. Guraya, 2005. Extracts of *Azadirachta indica* and *Melia azedarach* seeds inhibit folliculogenesis in albino rats. Braz. J. Med. Biol. Res., 38: 943-947.
77. Gbotolorun, S.C., A.A. Osinubi, C.C. Noronha and A.O. Okanlawon, 2008. Antifertility potential of *Neem* flower extract on adult female Sprague-Dawley rats. Afr. Health Sci., 8: 168-173.
78. Padmashali, B., V.P. Vaidya, H.M. Vagdevi and N.D. Satyanarayana, 2006. Antifertility efficacy of the plant *Balanites roxburghii* (Balanitaceae) in female rats. Indian J. Pharmaceut. Sci., 68: 347-351.
79. Bandyopadhyay, S., 2010. Anti-fertility activity of methanol extract of *Bassia latifolia* and *Cajanus cajan* in female albino mice ovaries. Iran. J. Pharmacol. Therapeut., 9: 83-87.
80. Mishra, N., S. Joshi, V.L. Tandon and A. Munjal, 2009. Evaluation of anti-fertility potential of aqueous extract of *Bougainvillea spectabilis* leaves in Swiss albino mice. Int. J. Pharmaceut. Sci. Drug Res., 1: 19-23.

81. Matadial, L., M.E. West, M. Gossell-Williams and T.L. The, 1999. The effect of *Bromelia pinguin* extract on the pregnant rat uterus. West Indian Med. J., 48: 198-199.
82. Kapila, K., N.K. Bhide and M.K. Razdan, 1970. The antifertility effect of *Butea frondosa* petals (alcoholic extract and its crystalline fraction). J. Indian Med. Assoc., 55: 60-61.
83. Razdan, M.K., K. Kapila and N.K. Bhide, 1969. Antifertility effect and some pharmacological actions of *Butea frondosa* seed extracts. Indian J. Physiol. Pharmacol., 13: 239-249.
84. Khanna, U., S. Handa and R.R. Chaudhary, 1966. The effect of *Butea monosperma* (Lam) kuntze on the fertility of female rats. Indian J. Pharmacy, 28: 343-348.
85. Sharma, S.K., G. Rai and N. Vasudeva, 2012. Anti-fertility investigation of *Butea monosperma* (Lam.) kuntze root in female albino mice. Res. J. Med. Plant, 6: 260-266.
86. Kholkute, S.D., V. Mudgal and P.J. Deshpande, 1976. Screening of indigenous medicinal plants for antifertility potentiality. Planta Medica, 29: 151-155.
87. Bhargava, S.K., 1986. Estrogenic and postcoital anticonceptive activity in rats of butin isolated from *Butea monosperma* seed. J. Ethnopharmacol., 18: 95-101.
88. Kumar, S., J. Singh, A. Baghotia, V. Mehta and V. Thakur *et al*., 2013. Antifertility potential of the ethanolic extract of *Caesalpinia pulcherrima* Linn. leaves. Asian Pac. J. Reprod., 2: 90-92.
89. Khanna, U., S.L. Garg, S.B. Vohra, H.B. Walia and R.R. Chaudhury, 1969. Antifertility screening of plants: Part 2. Effect of 6 indigenous plants on early pregnancy in albino rats. Indian J. Med. Res., 57: 237-244.
90. Vohora, S.B., S.K. Garg and R.R. Chaudhury, 1969. Antifertility screening of plants. 3. Effect of six indigenous plants on early pregnancy in albino rats. Indian J. Med. Res., 57: 893-897.
91. Saksena, S.K., S.K. Garg and R.R. Chaudhury, 1970. Antifertility screening of plants. Part V: Effect of six indigenous plants on early pregnancy in albino rats. Indian J. Med. Res., 58: 253-257.
92. Srivastava, S.R., G. Keshri, B. Bhargavan, C. Singh and M.M. Singh, 2007. Pregnancy interceptive activity of the roots of *Calotropis gigantea* Linn. in rats. Contraception, 75: 318-322.
93. Kamath, J.V. and A.C. Rana, 2002. Preliminary study on antifertility activity of *Calotropis procera* roots in female rats. Fitoterapia, 73: 111-115.
94. Zade, V., M. Dhore, D. Dabhadkar, S. Pare, M. Wikhe, V. Deshmukh and S. Chede, 2013. Indigenous herbal remedies used by Tribals of Melghat region of Amravati district for regulation of antifertility and aphrodisiac activity. Int. J. Res. Pharmaceut. Biomed. Sci., 4: 1104-1109.
95. Kalita, J.C., A. Haque, E. Kalita, R. Sharma and M.M. Rahman, 2011. Anti-fertility effects of the methanolic root extract of *Careya arborea* Roxb in albino mice. BioScan, 6: 701-706.
96. Haloi, A.K., E. Kalita and J.C. Kalita, 2010. Effects of methanolic root extract of *Careya arborea* Roxb. on ovarian histology of albino mice. NeBIO: Int. J. Environ. Biodivers., 1: 14-17.
97. Devi, S. and S. Singh, 1978. Changes in placenta of rat fetuses induced by maternal administration of papain. Indian J. Exp. Biol., 16: 1256-1260.
98. Gopalakrishnan, M. and M.R. Rajasekharasetty, 1978. Effect of papaya (*Carica papaya* Linn) on pregnancy and estrous cycle in albino rats of Wistar strain. Indian J. Physiol. Pharmacol., 22: 66-70.
99. Singh, S. and K. Singh, 1992. Anti-implantation effect of *Carica papaya* seed powder in female albino rats. Indian J. Phys. Nat. Sci., 11-12: 73-78.
100. Chinoy, N.J., T. Dilip and J. Harsha, 1995. Effect of *Carica papaya* seed extract on female rat ovaries and uteri. Phytother. Res., 9: 169-175.
101. Schmidt, H., 1995. Effect of papain on different phases of prenatal ontogenesis in rats. Reprod. Toxicol., 9: 49-55.
102. Chinoy, N.J., J. Harsha and G. Shilpa, 1997. Antifertility investigations of alcoholic papaya seed extract in female rats. J. Med. Aromatic Plant Sci., 19: 422-427.
103. Mishra, P.K., N. Pathak, B. Manivannan and N.K. Lohiya, 2000. Screening for the hormonal properties of the chloroform extract of *Carica papaya* Linn. seeds for antifertility investigation. Nat. Prod. Sci., 6: 5-10.
104. Adebiyi, A., P.G. Adaikan and R.N.V. Prasad, 2002. Papaya (*Carica papaya*) consumption is unsafe in pregnancy: Fact or fable? Scientific evaluation of a common belief in some parts of Asia using a rat model. Br. J. Nutr., 88: 199-203.
105. Oderinde, O., C. Noronha, A. Oremosu, T. Kusemiju and O.A. Okanlawon, 2002. Abortifacient properties of aqueous extract of *Carica papaya* (Linn) seeds on female Sprague-Dawley rats. Niger. Postgraduate Med. J., 9: 95-98.
106. Raji, Y., A.O. Morakinyo, O.S. Akinsomisoye, A.K. Oloyo, P.R.C. Esegbue-Peters and O.T. Kunle-Alabi, 2006. Evaluation of the abortifacient properties of chloroform extract of *Carica papaya* L. seed in female albino rats. Int. J. Pharmacol., 2: 20-23.
107. Anuar, N.S., S.S. Zahari., I.A. Taib and M.T. Rahman, 2008. Effect of green and ripe *Carica papaya* epicarp extracts on wound healing and during pregnancy. Food Chem. Toxicol., 46: 2384-2389.
108. Thakur, S., B. Bawara, A. Dubey, D. Nandini, N.S. Chauhan and D.K. Saraf, 2009. Effect of *Carum carvi* and *Curcuma longa* on hormonal and reproductive parameter of female rats. Int. J. Phytomed., 1: 31-38.
109. Bhardwaj, S., R. Mathur and O.P. Agrawal, 1980. Estrogenicity of fruits of *Cassia fistula* Linn and its effects on implantation in female albino rats. Bull. Med. Ethnobot. Res., 1: 281-284.
110. Yadav, R. and G.C. Jain, 1999. Antifertility effect of aqueous extract of seeds of *Cassia fistula* in female rats. Adv. Contraception, 15: 293-301.

111. Chauhan, A. and M. Agarwal, 2010. Evaluating the antifertility potential of an aqueous extract from *Cassia fistula* seeds in male rats. Fertil. Steril., 93: 1706-1710.
112. Nwafor, P.A. and F.K. Okwuasaba, 2001. Contraceptive and estrogenic effect of a methanol extract of *Cassia nigricans* leaves in experimental animals. Pharmaceut. Biol., 39: 424-428.
113. Prakash, A.O. and R. Mathur, 1976. Screening of Indian plants for antifertility activity. Indian J. Exp. Biol., 14: 623-626.
114. Keshri, G., V. Lakshmi and M.M. Singh, 1998. Postcoital contraceptive activity of some indigenous plants in rats. Contraception, 57: 357-360.
115. Cherian, T., 2000. Effect of papaya latex extract on gravid and non-gravid rat uterine preparations *in vitro*. J. Ethnopharmacol., 70: 205-212.
116. Zierau, O., C. Bodinet, S. Kolba, M. Wulf and G. Vollmer, 2002. Antiestrogenic activities of *Cimicifuga racemosa* extracts. J. Steroid Biochem. Mol. Biol., 80: 125-130.
117. Ganguly, M., M.K. Borthakur, N. Devi and R. Mahanta, 2007. Antifertility activity of the methanolic leaf extract of *Cissampelos pareira* in female albino mice. J. Ethnopharmacol., 111: 688-691.
118. Samanta, J. and S. Bhattacharya, 2011. *Cissampelos pareira*: A promising antifertility agent. Int. J. Res. Ayurveda Pharm., 2: 439-442.
119. Piyachaturawat, P., T. Glinsukon and A. Chanjarunee, 1985. Antifertility effect of *Citrus hystrix* DC. J. Ethnopharmacol., 13: 105-110.
120. Kulkarni, T.R., M.A. Kothekar and M. Mateenuddin, 2005. Study of anti-fertility effect of lemon seeds (*Citrus limonum*) in female albino mice. Indian J. Physiol. Pharmacol., 49: 305-312.
121. Kachroo, M. and S.S. Agrawal, 2011. Anti-implantation activity of different extract of the peels of *Citrus medica*, Linn. Int. J. PharmTech Res., 3: 535-539.
122. Patil, S.J and S.B. Patil, 2013. Antiovulatory activity of petroleum ether extract of chromatographic fractions of *Citrus medica* seeds in albino rats. J. Med. Sci., 13: 410-417.
123. Patil, S.J., S.R. Banagar, R.R. Banagar, S. Venkatesh, T. Vishwanatha and S.B. Patil, 2013. Withdrawal antifertility effect of petroleum ether extract of *Citrus medica* seeds in female albino rats. Med. Plants: Int. J. Phytomed. Relat. Ind., 5: 75-81.
124. Kumar, D., A. Kumar and O. Prakash, 2010. Post-coital antifertility activity of *Clerodendrum phlomidis* Linn. dichloromethane root extract. Pharmacologyonline, 3: 479-485.
125. Yakubu, M.T., M.A. Akanji, A.T. Oladiji, A.O. Olatinwo and A.A. Adesokan *et al*., 2008. Effect of *Cnidoscolous aconitifolius* (Miller) I.M. Johnston leaf extract on reproductive hormones of female rats. Iran. J. Reprod. Med., 6: 149-155.
126. Tzeng, H.P., W. Chiang, T.H. Ueng and S.H. Liu, 2005. The abortifacient effects from the seeds of *Coix lachryma-jobi* L. var. *ma-yuen* Stapf. J. Toxicol. Environ. Health Part A, 68: 1557-1565.
127. Benie, T., A. El Izzi, C. Tahiri, J. Duval and M.L. Thieulant, 1990. *Combretodendron africanum* bark extract as an antifertility agent. I: Estrogenic effects *in vivo* and LH release by cultured gonadotrope cells. J. Ethnopharmacol., 29: 13-23.
128. Amma, M.K., N. Malhotra, R.K. Suri, O.P. Aryc, H.M. Dani and K. Sareen, 1978. Effect of oleo resin of gum guggul (*Commiphora mukul*) on the reproductive organs of female rat. Indian J. Exp. Biol., 16: 1021-1023.
129. Gupta, M., U.K. Mazumder, D.K. Pal and S. Bhattacharya, 2003. Anti-steroidogenic activity of methanolic extract of *Cuscuta reflexa* roxb. stem and *Corchorus olitorius* Linn. seed in mouse ovary. Indian J. Exp. Biol., 41: 641-644.
130. Al-Said, M.S., K.I. Al-Khamis, M.W. Islam, N.S. Parmar, M. Tariq and A.M. Ageel, 1987. Post-coital antifertility activity of the seeds of *Coriandrum sativum* in rats. J. Ethnopharmacol., 21: 165-173.
131. Singh, S., A.K. Sanyal, S.K. Bhattacharya and V.B. Pandey, 1972. Oestrogenic activity of saponins from *Costus speciosus* (Koen) Sm. Indian J. Med. Res., 60: 287-290.
132. Tewari, P.V., C. Chaturvedi and V.B. Pandey, 1973. Anti-fertility activity of *Costus speciosus*. Indian J. Pharmacol., 35: 114-117.
133. Rao, V.S., P. Dasaradhan and K.S. Krishnaiah, 1979. Antifertility effect of some indigenous plants. Indian J. Med. Res., 70: 517-520.
134. Rao, V.S.N. and K.S. Krishnaiah, 1979. Antifertility screening of plant effect of some reputed abortifacient indigenous plants on early pregnancy in rats. Indian J. Pharmacol., 11: 59-62.
135. Vijaykumar, B.M., I. Sangamma, A. Sharanabasappa and S.B. Patil, 2004. Effect of *Crotalaria juncea* seed extracts on the estrous cycle and ovarian activity in albino mice. Orient. Pharm. Exp. Med., 4: 77-81.
136. Malashetty, V.B. and S.B. Patil, 2007. Effect of chromatographic fractions of ethanolic extract of *Crotalaria juncea* (L.) seeds on ovarian follicular kinetics and estrous cycle in albino rats. Iran. J. Pharmacol. Therapeut., 6: 159-163.
137. Bhaskar, V.H., K.M. Profulla, B.R. Balakrishnan, N. Balakrishnan and B. Sangameswaran, 2009. Evaluation of the anti-fertility activity of stem bark of *Crataeva nurvala* buch-ham. Afr. J. Biotechnol., 8: 6453-6456.
138. Gupta, M., U.K. Mazumder, M.L.M. Vamsi, T. Sivakumar and C.C. Kandar, 2004. Anti-steroidogenic activity of the two Indian medicinal plants in mice. J. Ethanopharmacol., 90: 21-25.
139. Garg, S.K., 1976. Antifertility screening of plants-effect of four indigenous plants on early pregnancy in female albino rats. Indian J. Med. Res., 64: 1133-1135.

140. Kant, A., N.K. Lohiya and D. Jacob, 1988. The oestrogenicity of cumin (*Cuminum cyminum*) seeds in the ovariectomized rat. Indian Zool., 12: 209-213.
141. Atkinson, W.M.B. and H. Elftman, 1947. Mobilization of alkaline phosphatase in the uterus of the mouse by estrogen. Endocrinology, 40: 30-36.
142. Trishna, D., M.S. Bhushan, B. Mrinmoy, J.P. Mohanty and S. Dibyendu, 2010. Evaluation of phytochemical screening and anti-fertility activity of *Curcuma aromatica Salisb*. Int. J. Pharmaceut. Sci. Res, 3: 18-22.
143. Ghosh, A.K., A.K. Das and K.K. Patra, 2011. Studies on antifertility effect of rhizome of *Curcuma longa* Linn. Asian J. Pharm. Life Sci., 1: 349-353.
144. Mishra, R.K. and S.K. Singh, 2009. Reversible antifertility effect of aqueous rhizome extract of *Curcuma longa L.* in male laboratory mice. Contraception, 79: 479-487.
145. Nayanatara, A.K., A. Alva, S. Kottari, A.A. Soofi and E.P. Rejeesh *et al*., 2012. Effect of cynodon dactylon extract on estrous cycle and reproductive organs in female Wistar rats. Int. J. Anal. Biomed. Pharm. Sci., 1: 10-15.
146. Uchendu, C.N., T.N. Kamalu and I.U. Asuzu, 2000. A preliminary evaluation of antifertility activity of a triterpenoid glycoside (DSS) from *Dalbergia saxatilis* in female wistar rats. Pharmacol. Res., 41: 521-525.
147. Pandiarajan, G., R. Govindaraj, K.B. Makesh and K. Sankarasivaraman, 2012. Antifertility activity in the acetone extracts of *Datura metel* L. seeds on female mouse. J. Pharmacogenom. Pharmacoproteom., Vol. 3.
148. Chandhoke, N. and S. Gupta, 1978. Estrogenic activity of DQ1-a steroidal lactone-isolated from *Datura quercifolia*. Indian J. Exp. Biol., 16: 648-652.
149. Chandhoke, N., A. Gupta and S. Dhar, 1978. Interceptive activity of various species of piper, their natural amides and semi-synthetic analogs. Indian J. Pharm. Sci., 48: 113-118.
150. Garg, S.K. and V.S. Mathur, 1972. Effect of chromatographic fractions of *Daucus carota* Linn. (seeds) on fertility in female albino rats. J. Reprod. Fertil., 31: 143-145.
151. Sharma, M.M., G. Lal and D.S. Jacob, 1976. Estrogenic and pregnancy interceptory effects of carrot *Daucus carota* seeds. Indian J. Exp. Biol., 14: 506-508.
152. Kaliwal, B.B., R.N. Ahamed and M.A. Rao, 1984. Dose and temporal effect of carrot seed (*Daucus carota*) extract on pregnancy in albino rats. Compar. Physiol. Ecol., 9: 173-177.
153. Kant, A., D. Jacob and N.K. Lohiya, 1986. The estrogenic efficacy of carrot (*Daucus carota*) seeds. J. Adv. Zool., 7: 36-41.
154. Kant, A.K., N.K. Lohiya and J. Dennis, 1989. A revolution of the pregnancy interceptory efficacy of carrot (*Daucus carota*) seeds in the rat. J. Adv. Zool., 10: 110-113.
155. Majumder, P.K., S. Dasgupta, R.K. Mukhopadhaya, U.K. Mazumdar and M. Gupta, 1997. Anti-steroidogenic activity of the petroleum ether extract and fraction 5 (fatty acids) of carrot (*Daucus carota* L.) seeds in mouse ovary. J. Ethnopharmacol., 57: 209-212.
156. Pattanayak, S.P. and P.M. Mazumder, 2009. Effect of *Dendrophthoe falcata* (L.f.) Ettingsh on female reproductive system in Wistar rats: A focus on antifertility efficacy. Contraception, 80: 314-320.
157. Badami, S., R. Aneesh, S. Sankar, M.N. Sathishkumar, B. Suresh and S. Rajan, 2003. Antifertility activity of *Derris brevipes* variety coriacea. J. Ethnopharmacol., 84: 99-104.
158. Govindaraj, Y., V. Melanaphuru, S. Gupta, V. Agrahari and R.K. Nema, 2009. Antifertility activity of the ethanolic extract of *Cassia occidentalis*, *Derris brevipes* variety *Brevipes* and *Justicia simplex*. World J. Chem., 4: 118-122.
159. De Pasquale, R.C., S. Ragusa, C. Circosta and A.M. Forestieri, 1984. Investigations on *Dieffenbachia amoena* Gentil. I: Endocrine effects and contraceptive activity. J. Ethnopharmacol., 12: 293-303.
160. Kitchlu, S., P.K. Mehrotra and S. Singh, 1999. Progesterone potentiating effect of *Dipsacus mitis* D. Don for its contraceptive action in hamster. Indian J. Exp. Biol., 37: 402-405.
161. Ramya, R., J. Anudeepa, C. Senthilkumar, S.S. Rajendran, R. Sivasakthi, C. Moorthy and D.R. Venkatnarayanan, 2011. Wound healing activity of *Dodonea viscosa* Linn ointment in rats. Int. J. Res. Pharm. Chem., 1: 481-483.
162. Madhavan, V., H. Basnett, M.R. Gurudeva and S.N. Yoganarasimhan, 2009. Pharmacognostical evaluation of *Drosera burmannii* Vahl (Droseraceae). Indian J. Tradit. Knowledge, 8: 326-333.
163. Das, B., A. Dey, A.D. Talukdar, K. Nongalleima, M.D. Choudhury and L. Deb, 2014. Antifertility efficacy of *Drynaria quercifolia* (L.) J. Smith on female Wister albino rats. J. Ethnopharmacol., 153: 424-429.
164. Arora, R.B., N. Ghatak and P.S. Gupta, 1971. Anti-fertility activity of *Embelia ribes*. J. Res. Indian Med., 6: 107-110.
165. Radhakrishnan, N. and M. Alam, 1975. Antifertility activity of embelin in albino rats. Indian J. Exp. Biol., 13: 70-71.
166. Rathinam, K., G. Santhakumari and N. Ramiah, 1976. Studies on the antifertility activity of embelin. J. Res. Ind. Med. Yoga Homeop., 11: 84-90.
167. Kholkute, S.D., M.B. Kekare, V.S. Jathar and S.R. Munshi, 1978. Antifertility effects of *Embelia ribes* Burm. Indian J. Exp. Biol., 16: 1035-1037.
168. Prakash, A.O. and R. Mathur, 1979. Studies on oestrous cycle of albino rats: Response to *Embelia ribes* extracts. Planta Med., 36: 134-141.
169. Krishnaswamy, M. and K.K. Purushothaman, 1980. Antifertility properties of *Embelia ribes*. Indian J. Exp. Biol., 18: 638-639.
170. Krishnaswamy, M. and K.K. Purushothaman, 1980. Antifertility properties of *Embelia ribes*: (embelin). Indian J. Exp. Biol., 18: 1359-1360.
171. Prakash, A.O., 1981. Antifertility investigations on Embelin-an oral contraceptive of plant origin. Part I-Biological properties. Planta Medica, 41: 259-266.

172. Bhargava, S.K., V.P. Dixit and P. Khanna, 1984. Antifertility effect of embelin in female rats. Fitoterapia, 55: 302-304.
173. Wango, E.O., 2005. Anti-fertility effects of embelin in female Sprague-Dawley rats may be due to suppression of ovarian function. Acta Biologica Hungarica, 56: 1-9.
174. Dutta, N.K., M.Y. Mhasalkar and G.R. Fernando, 1970. A study on the antifertility action of VIDR-2GD: A constituent isolated from the seeds of *Ensete superbum*, Cheesm, Musaceae (Banakadali). Fertil. Steril., 21: 247-252.
175. Keshri, G., V. Lakshmi, M.M. Singh and V.P. Kamboj, 1999. Post-coital antifertility activity of *Ferula assafoetida* extract in female rats. Pharmaceut. Biol., 37: 273-276.
176. Keshri, G., M. Bajpai, V. Lakshmi, B.S. Setty and G. Gupta, 2004. Role of energy metabolism in the pregnancy interceptive action of *Ferula assafoetida* and *Melia azedarach* extracts in rat. Contraception, 70: 429-432.
177. Homady, M.H., K.M. Khleifat, K.A. Tarawneh and I.A. Al-Raheil, 2002. Reproductive toxicity and infertility effect of *Ferula hormonis* extracts in mice. Theriogenology, 57: 2247-2256.
178. Prakash, A.O., S. Pathak and R. Mathur, 1991. Postcoital contraceptive action in rats of a hexane extract of the aerial parts of *Ferula jaeschkeana*. J. Ethnopharmacol., 34: 221-234.
179. Prakash, A.O. and S. Jonathan, 1996. Effect of hexane extract of *Ferula jaeschkeana* on the reproductive organs in cyclic female rats. Philippine J. Sci., 125: 129-146.
180. Prakash, A.O. and S. Pathak, 1994. Inhibition of β-glucuronidase activity in rat uterus during implantation by feeding *Ferula jaeschkeana* extract. Int. J. Pharm., 32: 362-365.
181. Prakash, A.O. and M. Sharma, 1997. Morphological and functional consequences in the reproductive organs of immature rats exposed to multiple admnistration of *Ferula jaeschkeana* extract. Phytother. Res., 11: 1-5.
182. Sharma, R.K., A.K. Goyal and R.A. Bhat, 2013. Antifertility activity of plants extracts on female reproduction: A review. Int. J. Pharm. Biol. Sci., 3: 493-514.
183. Akpantah, A.O., A.A. Oremosu, C.C. Noronha, T.B. Ekanem and O.A. Okanlawon, 2005. Effects of *Garcinia kola* seed extract on ovulation, oestrous cycle and foetal development in cyclic female sprague-dawley rats. Niger. J. Physiol. Sci., 20: 58-62.
184. Ratnasooriya, W.D., G.A.S. Premakumara and L.M.V. Tillekeratne, 1994. Post-coital contraceptive activity of crude extracts of Sri Lankan marine red algae. Contraception, 50: 291-299.
185. Premakumara, G.A.S., W.D. Ratnasooriya and L.M.V. Tillekeratne, 1995. Studies on the post-coital contraceptive mechanisms of crude extract of Sri Lankan marine red algae, *Gelidiella acerosa*. Contraception, 52: 203-207.
186. Elbetieha, A., S.A. Oran, A. Alkofahi, H. Darmani and A.M. Raies, 2000. Fetotoxic potentials of *Globularia arabica* and *Globularia alypum* (Globulariaceae) in rats. J. Ethnopharmacol., 72: 215-219.
187. Latha, K.P., H. Kirana and H.N. Girish, 2013. Anti-implantation activity of the hydroalcoholic tuber extract of *Gloriosa superba* Linn in female albino rats. Int. J. Adv. Pharm. Biol. Chem., 2: 443-448.
188. Lin, Y.C., T. Fukaya, Y. Rikihisa and A. Walton, 1985. Gossypol in female fertility control: Ovum implantation and early pregnancy inhibited in rats. Life Sci., 37: 39-47.
189. Offiah, V.N. and C.E. Ezenwaka, 2003. Antifertility properties of the hot aqueous extract of *Guaiacum officinale*. Pharmaceut. Biol., 41: 454-457.
190. Prakash, A.O., R.B. Gupta and R. Mathur, 1978. Effect of oral administration of forty two indigenous plant extracts on early and late pregnancy in albino rats. Probe, 27: 315-323.
191. Kabir, S.N., K. Bhattacharya, A.K. Pal and A. Pakrashi, 1984. Flowers of *Hibiscus rosa-sinensis*, a potential source of contragestative agent: I. Effect of benzene extract on implantation of mouse. Contraception, 29: 385-397.
192. Pal, A.K., K. Bhattacharya, S.N. Kabir and A. Pakrashi, 1985. Flowers of *Hibiscus rosa-sinensis*, a potential source of contragestative agent: II. Possible mode of action with reference to anti-implantation effect of the benzene extract. Contraception, 32: 517-529.
193. Nivsarkar, M., M. Patel, H. Padh, C. Bapu and N. Shrivastava, 2005. Blastocyst implantation failure in mice due to nonreceptive endometrium: Endometrial alterations by *Hibiscus rosa-sinensis* leaf extract. Contraception, 71: 227-230.
194. Vasudeva, N. and S.K. Sharma, 2008. Post-coital antifertility activity of *Hibiscus rosa-sinensis* Linn. roots. Evidence-Based Complement. Altern. Med., 5: 91-94.
195. Saluja, A.K. and D.D. Santani, 1983. Hormonal properties of *Hyptis suaveolens roit*. Indian J. Pharmacol., 45: 97-99.
196. Hyacinth, A.A. and U.C. Nwocha, 2011. Antifertility activity of aqueous ethanolic extract of *Hymenocardia acida* stem bark in female rats. Iran. J. Reprod. Med., 9: 217-222.
197. Al-Dissi, N.M., A.S. Salhab and H.A. Al-Hajj, 2001. Effects of *Inula viscosa* leaf extracts on abortion and implantation in rats. J. Ethnopharmacol., 77: 117-121.
198. Dabhadkar, D. and V. Zade, 2013. Abortifacient efficacy of *Indigofera trifoliata* leaves extract on female albino rats. Asian J. Pharm. Clin. Res., 6: 75-79.
199. Mishra, A., J.V.V. Dogra, J.N. Singh and O.P. Jha, 1979. Post-coital antifertility activity of *Annona squamosa* and *Ipomoea fistulosa*. Planta Medica, 35: 283-285.
200. Dhar, J.D., B.S. Shetty, K. Singh, S. Jain and D.S. Bhakuni, 1993. Contraceptive potential of *Ischinochiton camptus*. Biol. Memories, 19: 95-99.
201. Singh, M.M., S.R. Chowdhury, D.K. Kulshreshtha and V.P. Kamboj, 1993. Antigestagenic activity of *Ixora finlaysoniana* in rat. Contraception, 48: 178-191.

202. Goonasekera, M.M., V.K. Gunawardana, K. Jayasena, S.G. Mohammed and S. Balasubramaniam, 1995. Pregnancy terminating effect of *Jatropha curcas* in rats. J. Ethnopharmacol., 47: 117-123.
203. Jain, S., G.P. Choudhary and D.K. Jain, 2013. Pharmacological evaluation and antifertility activity of *Jatropha gossypifolia* in rats. BioMed Res. Int. 10.1155/2013/125980.
204. Agrawal, O.P., S. Bharadwaj and R. Mathur, 1980. Antifertility effects of fruits of *Juniperus communis*. Planta Medica, 40: 98-101.
205. Aswal, B.S., D.S. Bhakuni, A.K. Goel, K. Kar, B.N. Mehrotra and K.C. Mukherjee, 1984. Screening of Indian plants for biological activity: Part X. Indian J. Exp. Biol., 22: 312-332.
206. Elujoba, A.A., S.O. Olagbende and S.K. Adesina, 1985. Anti-implantation activity of the fruit of *Lagenaria breviflora* Robert. J. Ethnopharmacol., 13: 281-288.
207. Agunu, A., C. Samagoro and H. Nuhu, 2011. Evaluation of the anti-fertility of *Lawsonia inermis* L. roots found in Kaduna State, Nigeria. Proceedings of the 59th International Congress and Annual Meeting of the Society for Medicinal Plant and Natural Product Research, September 4-9, 2011, Antalya, Turkey.
208. Munshi, S.R., T.A. Shetye and R.K. Nair, 1977. Antifertility activity of three indigenous plant preparations. Planta Medica, 31: 73-75.
209. Tafesse, G., Y. Mekonnen and E. Makonnen, 2005. *In vivo* and *in vitro* anti-fertility and anti-implantation properties of *Leonotis ocymifolia* in rats. Afr. J. Tradit. Complement. Altern. Med., 2: 103-112.
210. Singh, M.M., V. Wadhwa, D.N. Gupta, R. Pal, N.M. Khanna and V.P. Kamboj, 1984. Postcoital contraceptive efficacy and hormonal profile of *Lepidium capitatum*. Planta Medica, 50: 154-157.
211. Gaitonde, B.B. and R.T. Mahajan, 1980. Antifertility activity of *Lygodium flexuosum*. Indian J. Med. Res., 72: 597-604.
212. Thakur, S.C., S.S. Thakur, S.K. Chaube and S.P. Singh, 2005. An etheral extract of Kamala (*Mallotus philippinensis* (Moll. Arg) Lam.) seed induce adverse effects on reproductive parameters of female rats. Reprod. Toxicol., 20: 149-156.
213. Dixit, V.P., 1977. Effect of chronically administered *Malvaviscus conzattii* flower extract on the female genital tract of gerbil, *Merionis hurrianae*, Jerdon. Indian J. Exp. Biol., 15: 1650-1652.
214. Banerjee, R., A.K. Pal, S.N. Kabir and A. Pakrashi, 1999. Antiovulatory faculty of the flower of *Malvaviscus conzattii*. Phytother. Res., 13: 169-171.
215. Chowdhury, A.K.A., M.F. Hashim, B.C. Sen, O.F. Khan and M. Ahmed, 1994. Antifertility principles from *Marsdenia tinctoria*: Pharmacological and phytochemical studies. Pure Applied Chem., 66: 2343-2346.
216. Montanari, T. and E. Bevilacqua, 2002. Effect of *Maytenus ilicifolia* Mart. on pregnant mice. Contraception, 65: 171-175.
217. Keshri, G., V. Lakshmi and M.M. Singh, 2003. Pregnancy interceptive activity of *Melia azedarach* Linn. in adult female Sprague-Dawley rats. Contaception, 68: 303-306.
218. Mandal, R. and P.K. Dhaliwal, 2007. Antifertility effect of *Melia azedarach* Linn. (dharek) seed extract in female albino rats. Indian J. Exp. Biol., 45: 853-860.
219. Bodhankar, S.L., S.K. Garg and V.S. Mathur, 1974. Antifertility screening of plants. Part IX. Effect of five indigenous plants on early pregnancy in female albino rats. Indian J. Med. Res., 62: 831-837.
220. Kapoor, M., S.K. Garg and V.S. Mathur, 1974. Anthiovulatory activity of five indigenous plants in rabbits. Indian J. Med. Res., 62: 1225-1227.
221. Kanjanapothi, D., Y. Smitasiri, A. Panthong, T. Taesotikul and V. Rattanapanone, 1981. Postcoital antifertility effect of *Mentha arvensis*. Contraception, 24: 559-567.
222. Taprial, S., D. Kashyap, V. Mehta, S. Kumar and D. Kumar, 2013. Antifertility effect of hydroalcoholic leaves extract of *Michelia champaca* L.: An ethnomedicine used by Bhatra women in Chhattisgarh state of India. J. Ethnopharmacol., 147: 671-675.
223. Ganguly, M., N. Devi, R. Mahanta and M.K. Borthakur, 2007. Effect of *Mimosa pudica* root extract on vaginal estrous and serum hormones for screening of antifertility activity in albino mice. Contraception, 76: 482-485.
224. Aguwa, C.N. and G.C. Mittal, 1983. Abortifacient effects of the roots of *Momordica angustisepala*. J. Ethnopharmacol., 7: 169-173.
225. Sharanabasappa, A., B. Vijayakumar and S.B. Patil, 2002. Effect of *Momordica charantia* seed extracts on ovarian and uterine activities in albino rats. Pharm. Biol., 40: 501-507.
226. Ifeanyi, A.C., Y.O. Eboetse, D.F. Ikechukwu, O.A. Adewale, N.C. Carmel and O.A. Olugbenga, 2011. Effect of *Momordica charantia* on estrous cycle of Sprague-Dawley rats. Pac. J. Med. Sci., 8: 37-48.
227. Koneri, R., R. Balaraman and C.D. Saraswati, 2006. Antiovulatory and abortifacient potential of the ethanolic extract of roots of *Momordica cymbalaria* Fenzl in rats. Indian J. Pharmacol., 38: 111-114.
228. Koneri, R., C.D. Saraswati, R. Balaraman and E.A. Ajeesha, 2007. Antiimplantation activity of the ethanolic root extract of *Momordica cymbalaria* Fenzl in rats. Indian J. Pharamacol., 39: 90-96.
229. Pedron, N., A.V. Estrada, H. Ponce-Monter, A. Valencia, A. Guzman and A.J. Gallegos, 1985. The Zoapatle VII. Antiimplantation effect in the rat of Zoapatle Aqueous Crude Extract (ZACE) from *Montanoa tomentosa* and *Montanoa frutescenes*. Contraception, 31: 499-507.
230. Perusquia, M., E. Sanchez, H. Ponce-Monter, A.V. Estrada and N. Pedron *et al*., 1985. The Zoapatle XI. Effects elicited by *Mmontanoa tomentosa* and *Montanoa frutescens* on rat uterine strips. Contraception, 31: 543-551.

231. Landgren, B.M., A.R. Aedo, K. Hagenfeldt and E. Diczfalusy, 1979. Clinical effects of orally administered extracts of *Montanoa tomentosa* in early human pregnancy. Am. J. Obstetr. Gynecol., 135: 480-484.
232. Hahn, D.W., E.W. Ericson, M.T. Lai and A. Probst, 1981. Antifertility activity of *Montanoa tomentosa* (Zoapatle). Contraception, 23: 133-140.
233. Waller, D.P., A. Martin, Y. Oshima and H.H.S. Fong, 1987. Studies on Zoapatle V. correlation between *in vitro* uterine and *in vivo* pregnancy interruption effects in guinea pigs. Contraception, 35: 147-153.
234. Shukla, S., R. Mathur and A.O. Prakash, 1988. Antifertility profile of the aqueous extract of *Moringa oleifera* roots. J. Ethnopharmacol., 22: 51-62.
235. Dhawan, B.N., M.P. Dubey, B.N. Mehrotra, R.P. Rastogi and J.S. Tandon, 1980. Screening of Indian plants for biological activity: Part IX. Indian J. Exp. Biol., 18: 594-606.
236. Zade, V., S. Pare, D. Dabhadkar and R. Chondekar, 2010. Abortifacient efficacy of *Moringa oleifera* in albino rats. Int. J. Pharmacol. Biol. Sci., 4: 133-138.
237. Kong, Y.C., K.H. Ng, K.H. Wat, A. Wong and I.F. Saxena *et al*., 1985. Yuehchukene, a novel anti-implantation indole alkaloid from *Murraya paniculata*. Planta Medica, 51: 304-307.
238. Soni, P., A.A. Siddiqui, J. Dwivedi and V. Soni, 2013. Antiovulatory and estrogenic activity of stem of *Musa paradisiaca* in female albino rats. J. Applied Pharmaceut. Sci., 3: 102-106.
239. Mazumder, U.K., M. Gupta, G. Pramanik, R.K. Mukhopadhyay and S. Sarkar, 1992. Antifertility activity of seed of *Nelumbo nucifera* in mice. Indian J. Exp. Biol., 30: 533-534.
240. Mutreja, A., M. Agarwa, S. Kushwaha and A. Chauhan, 2008. Effect of *Nelumbo nucifera* seeds on the reproductive organs of female rats. Int. J. Reprod. BioMed., 6: 7-11.
241. Keshri, G., M.M. Singh, V. Lakshmi and V.P. Kamboj, 1995. Post-coital contraceptive efficacy of the seeds of *Nigella sativa* in rats. Indian J. Physiol. Pharmacol., 39: 59-62.
242. Khanna, S., S.R. Gupta and J.K. Grover, 1986. Effect of long term feeding of tulsi (*Ocimum sanctum* Linn) on reproductive performance of adult albino rats. Indian J. Exp. Biol., 24: 302-304.
243. Batta, S.K. and G. Santhakumari, 1970. The antifertility effect of *Ocimum sanctum* and *Hibiscus cosa sinensis*. Indian J. Med. Res., 59: 777-781.
244. Sripriya, S., G. Yuvaraj, R.K. Nema, V. Madhan Kumar and M. Deecaraman, 2011. Evaluation of antifertility activity from stem part of *Ocimum gratissimum* in acetone extracts. Int. J. Pharmaceut. Clin. Res., 3: 41-44.
245. Patil, S.J. and S.B. Patil, 2012. Effect of *Oxalis corniculata* whole plant extracts on fertility regulation in female Albino rats. J. Adv. Scient. Res., 3: 58-61.
246. Shapira, Z., J. Terkel, Y. Egozi, A. Nyska and J. Friedman, 1989. Abortifacient potential for the epigeal parts of *Peganum harmala*. J. Ethnopharmacol., 27: 319-325.
247. Sadik, G., M.A. Gafur, M.S.A. Bhuiyan, A.H.M.K. Alam and M.H.U. Biswas *et al*., 2001. Antifertility activity of *Pergularia daemia*. J. Med. Sci., 1: 22-24.
248. Sadik, M.G., M.A. Gafur, M.S.A. Bhuiyan, M.M. Rahman and H.U. Biswas, 2001. Antifertility activity of the alkaloidal fraction of *Pergularia daemia*. J. Med. Sci., 1: 217-219.
249. Rao, M.V. and K.M. Alice, 2001. Contraceptive effects of *Phyllanthus amarus* in female mice. Phytother. Res., 15: 265-267.
250. Montaserti, A., M. Pourheydar, M. Khazaei and R. Ghorbani, 2007. Anti-fertility effects of *Physalis alkekengi* alcoholic extract in female rat. Iranian J. Reprod. Med., 5: 13-16.
251. Sudhakaran, S., B. Ramanathan and A. Ganapathi, 1999. Antifertility effects of the petroleum ether extract of *Physalis minima* on female albino rats. Pharmaceut. Biol., 37: 269-272.
252. Stolzenberg, S.J., R.M. Parkhurst and E.J. Reist, 1976. Blastocidal and contraceptive actions by an extract and compounds from Endod (*Phytolacca dodecandra*). Contraception, 14: 39-51.
253. Sharma, J.D., L. Sharma and P. Yadav, 2007. Antifertility efficacy of *Piper betle* Linn. (Petiole) on female albino rats. Asian J. Exp. Sci., 21: 145-150.
254. Short, R.E., L.F. James, K.E. Pantert, R.B. Staigmiller, R.A. Bellows, J. Malcolm and S.P. Ford, 1992. Effects of feeding ponderosa pine needles during pregnancy: Comparative studies with bison, cattle, goats and sheep. J. Anim. Sci., 70: 3498-3504.
255. Short, R.E., S.P. Ford, E.E. Grings and S.L. Kronberg, 1995. Abortifacient response and plasma vasoconstrictive activity after feeding needles from ponderosa pine trees to cattle and sheep. J. Anim. Sci., 73: 2102-2104.
256. Lakshmi, V., R. Kumar, S.K. Agarwal and J.D. Dhar, 2006. Antifertility activity of *Piper longum* Linn. in female rats. Nat. Prod. Res., 20: 235-239.
257. Lal, R., A. Sankaranarayanan and V.S. Mathur, 1983. Antifertility and uterine activity of *Plumbago rosea* in rats. Indian J. Med. Res., 78: 287-290.
258. Sheeja, E., S.B. Joshi and D.C. Jain, 2008. Antifertility activity of stems of *Plumbago rosea* in female albino rats. Pharmaceut. Biol., 46: 920-927.
259. Sattar, M.A., N.A. Abdullah, A.H. Khan, A. Dewa and D. Samshia, 2007. Uterotrophic, fetotoxic and abortifacient effect of a Malaysian variety of *Plumbago rosea* L. on isolated rat uterus and pregnant mice. Pak. J. Biol. Sci., 10: 763-767.
260. Sheeja, E., S.B. Joshi and D.C. Jain, 2009. Antiovulatory and estrogenic activity of *Plumbago rosea* leaves in female albino rats. Indian J. Pharmacol., 41: 273-277.
261. Edwin, S., S.B. Joshi and D.C. Jain, 2009. Antifertility activity of leaves of *Plumbago zeylanica* Linn. in female albino rats. Eur. J. Contracept. Reprod. Health Care, 14: 233-239.
262. Sandeep, G., A. Dheeraj, N.K. Sharma, D. Jhade and A. Bharti, 2011. Effect of plumbagin free alcohol extract of *Plumbago zeylanica* Linn. root on reproductive system of female Wistar rats. Asian Pac. J. Trop. Med., 4: 978-984.

263. Dabhadkar, D. and V. Zade, 2012. Abortifacient activity of *Plumeria rubra* (Linn) pod extract in female albino rats. Indian J. Exp. Biol., 50: 702-707.
264. Kholkute, S.D., S.R. Munshi, S.D. Naik and V.S. Jathar, 1978. Antifertility activity of indigenous plants *Sida carpinifolia* Linn. and *Podocarpus brevifolius* Stapf in female rats. Indian J. Exp. Biol., 16: 696-698.
265. Hazarika, A. and H.N. Sarma, 2007. Effects of crude root extract of *Polygonum hydropiper* on estrous cycle and induction of reversible sterility in female albino rat. J. Endocrinol. Reprod., 11: 36-40.
266. Londonkar, R.L. and H.B. Nayaka, 2011. Evaluation of anti implantation and abortificient properties of *Portulaca oleracea* L. in albino rats. Int. J. Pharma Bio Sci., 2: 501-508.
267. Nayak, H.B., R.L. Londonkar and M.K. Umesh, 2014. Evaluation of potential antifertility activity of total flavonoids, isolated from *Portulaca oleracea* L. on female albino rats. Int. J. PharmTech Res., 6: 783-793.
268. Trisomboon, H., S. Malaivijitnond, G. Watanabe and K. Taya, 2005. Ovulation block by *Pueraria mirifica*: A study of its endocrinological effect in female monkeys. Endocrine, 26: 33-39.
269. Sharma, K.C. and S.S.K. Shanmugasundaram, 1979. An antifertility drug from ethnobotanical folklore. Regional Res. Lab. Jammu Newslet., 6: 5-12.
270. Chandhoke, N., O.P. Gupta, C.K. Atal and J.G. Langer, 1981. Clinical evaluation of *Pueraria tuberose* for its contraceptive emmonaggue activity. Indian J. Pharmacol., 13: 60-65.
271. Prakash, A.O., V. Saxena, S. Shukla and R. Mathur, 1985. Contraceptive potency of *Pueraria tuberosa* D.C. and its hormonal status. Acta Europaea Fertilitatis, 16: 59-65.
272. Pillai, N.R., M. Alam and K.K. Purushothaman, 1977. Studies on the antifertility activity of oleanolic acid 3-β-glucoside (RDG-1). J. Res. Indian Med. Yoga Homeopath., 12: 26-29.
273. Onu, U.O., 1995. Evaluation of the folklore use of *Rhaptopetalum coriaceum* olio as an abortifacient. Phytother. Res., 9: 64-65.
274. Rasheed, R.A., A.K. Bashir, B.H. Ali and R. Padmanabhan, 1997. Effect of *Rhazya stricta* on the developing rat fetus. Reprod. Toxicol., 11: 191-199.
275. Makonnen, E., L. Zerihun, G. Assefa and A.A. Rostom, 1999. Antifertility activity of *Ricinus communis* seed in female guinea pigs. East Afr. Med. J., 76: 335-337.
276. Sani, U.M. and M.I. Sule, 2007. Anti-fertility activity of methanol extracts of three different seed varieties of *Ricinus communis* Linn (Euphorbiaceae). Niger. J. Pharmaceut. Sci., 6: 78-83.
277. Shivalingappa, H., N.D. Satyanarayan and M.G. Purohit, 2001. Antiimplantation and pregnancy interruption efficacy of *Rivea hypocrateriformis* in the rat. J. Ethnopharmacol., 74: 245-249.
278. Shivalingappa, H., N.D. Satyanarayan, M.G. Purohit, A. Sharanabasappa and S.B. Patil, 2002. Effect of ethanol extract of *Rivea hypocrateriformis* on the estrous cycle of the rat. J. Ethnopharmacol., 82: 11-17.
279. Gebrie, E., E. Makonnen, A. Debella and L. Zerihun, 2005. Phytochemical screening and pharmacological evaluations for the antifertility effect of the methanolic root extract of *Rumex steudelii*. J. Ethnopharmacol., 96: 139-143.
280. Gebrie, E., E. Makonnen, L. Zerihun and A. Debella, 2005. The possible mechanisms for the antifertility action of methanolic root extract of *Rumex steudelii*. Afr. Health Sci., 5: 119-125.
281. Kong, Y.C., C.P. Lau, K.H. Wat, K.H. Ng, P.P. But, K.F. Cheng and P.G. Waterman, 1989. Antifertility principle of *Ruta graveolens*. Planta Medica, 55: 176-178.
282. Gandhi, M., R. Lal, A. Sankaranarayanan and P.L. Sharma, 1991. Post-coital antifertility activity of *Ruta graveolens* in female rats and hamsters. J. Ethnopharmacol., 34: 49-59.
283. Elbetieha, A., M.H. Al-Hamood, A. Alkofahi and H. Bataineh, 1998. Reproductive toxicity potentials of *Salvia fruticosa* (Labiatae) in rats. J. Ethnopharmacol., 61: 67-74.
284. Tu, Z.B., C. Konno, D.D. Soejarto, D.P. Waller and A.S. Bingel *et al*., 1988. Identification of senecionine and senecionine *N*-oxide as antifertility constituents in *Senecio vulgaris*. J. Pharmaceut. Sci., 77: 461-463.
285. Singh, S.P., 1990. Fertility control of female through *Sesbania sesban* seeds. J. Res. Educ. Indian Med., 9: 27-32.
286. Lutterodt, G.D., 1988. Abortifacient properties of an extract from *Sida veronicaefolia*. J. Ethnopharmacol., 23: 27-37.
287. Uchendu, C.N. and T. Isek, 2008. Antifertility activity of aqueous ethanolic leaf extract of *Spondias mombin* (Anacardiaceae) in rats. Afr. Health Sci., 8: 163-167.
288. Jafarzadeh, L., M. Rafieian-Kopaei, R. Ansari Samani and A. Asgari, 2012. The effect of hydroalcoholic extract of *Stachys lavandulifolia* Vahl on pregnant mice. EXCLI J., 11: 357-362.
289. Hiremath, S.P., S.H. Rao, P.K. Jain, Y. Jaya and K. Sembulingam, 1990. Antifertility activity of *Striga lutea*-Part I. Indian J. Physiol. Pharmacol., 34: 23-25.
290. Hiremath, S.P. and S.H. Rao, 1990. Antifertility efficacy of the plant *Striga lutea* (scropholariacae) on rats. Contraception, 42: 467-477.
291. Hiremath, S.P., S. Badami, H.K.S. Swamy, S.B. Patil and R.L. Londonkar, 1994. Antifertility activity of *Striga orobanchioides*. Biol. Pharmaceut. Bull., 17: 1029-1031.
292. Hiremath, S.P., S. Badami, S.K. Hunasagatta and S.B. Patil, 2000. Antifertility and hormonal properties of flavones of *Striga orobanchioides*. Eur. J. Pharmacol., 391: 193-197.
293. Choudhury, M.K., U.M. Sani and A. Mustapha, 1998. Antifertility activity of the flowers of *Striga senegalensis* (Scrophulariaceae). Phytother. Res., 12: 207-208.
294. Hsu, C.C., R.H. Dobberstein, A.S. Bingel, H.H.S. Fong, N.R. Farnsworth and J.F. Morton, 1981. Biological and phytochemical investigation of plants XVI: *Strumpfia maritima* (Rubiaceae). J. Pharmaceut. Sci., 70: 682-683.

295. Mukhram, M.A., H. Shivakumar, G.L. Viswanatha and S. Rajesh, 2012. Anti-fertility effect of flower extracts of *Tabernaemontana divaricata* in rats. Chin. J. Nat. Med., 10: 58-62.
296. Jain, S., A. Jain, L. Deb, K.R. Dutt and D.K. Jain, 2010. Evaluation of anti-fertility activity of *Tabernaemontana divaricata* (Linn) R.Br. leaves in rats. Nat. Prod. Res., 24: 855-860.
297. Mehrotra, P.K. and V.P. Kamboj, 1978. Hormonal profile of coronaridine hydrochloride-an antifertility agent of plant origin. Planta Medica, 33: 345-349.
298. Srivastava, S., M.M. Singh and D.K. Kulshreshtha, 2001. A new alkaloid and other anti-implantation principles from *Tabernaemontana heyneana*. Planta Medica, 67: 577-579.
299. Tewari, P.V., C. Chaturvedi and S.N. Dixit, 1970. Antifertility effect of betal leaf stalk (*Tambul patrabrint*): A preliminary experimental study. J. Res. Indian Med., 4: 143-151.
300. Yadav, B.L., R. Mathur and R.B. Gupta, 1980. Antifertility activity of *Terminalia arjuna* (W&A) in female albino rats. Probe, 19: 196-198.
301. Vishwanatha, T., S. Satishagouda, S.J. Patil and B.S. Patil, 2009. Anti-implantation activity of *Terminalia bellirica* bark extracts in female albino rats. Biotechnol. Indian J., 3: 257-260.
302. Kavimani, S., R. Ilango, R. Karpagam, K. Suryaprabha and B. Jaykar, 1999. Anti-oestrogenic activity of floral extract of *Thespesia populnea* Corr. in mouse ovary. Indian J. Exp. Biol., 37: 1241-1242.
303. Ghosh, K. and T.K. Bhattacharya, 2004. Preliminary study on the antiimplantation activity of compounds from the extracts of seeds of *Thespesia populnea*. Ind. J. Pharmacol., 36: 288-291.
304. Joshi, G.C. and M. Gopal, 2011. Antifertility activity of hexane and ethyl acetate extracts of aerial parts of *Tragia involucrate* Linn. J. Pharmacol. Toxicol., 6: 548-553.
305. Pare, S., V. Zade and D. Dabhadkar, 2013. Evaluation of potential antifertility activity of plant *Trianthema portulacastrum* in female albino rat. Int. J. Applied Pharm. Sci. Biomed. Sci., 2: 7-11.
306. Kage, D.N., V.B. Malashetty, Y.N. Seetharam, P. Suresh and S.B. Patil, 2009. Effect of ethanol extract of whole plant of *Trichosanthes cucumerina* var. *Cucumerina* L. on gonadotropins, ovarian follicular kinetics and estrous cycle for screening of antifertility activity in albino rats. Int. J. Morphol., 27: 173-182.
307. Ng, T.B., W.Y. Chan, L.Y. Sze and H.W. Yeung, 1991. Trichosanthin induces atresia of ovarian follicles and inhibits steroidogenesis in gonadotropin-primed immature mice. Gen. Pharmacol., 22: 847-849.
308. Yadav, R., 1988. Studies on natural products of certain medicinal plants. Ph.D. Thesis, University of Rajasthan, Jaipur.
309. Sharma, J.D. and A. Bhinda, 2005. Anti-fertility activity of steroidal extract of *Trigonella foenum-graceum* (seeds) in female rats. Asian J. Exp. Sci., 19: 115-120.
310. Kassem, A., A. Al-Aghbari, M. Al-Habori and M. Al-Mamary, 2006. Evaluation of the potential antifertility effect of fenugreek seeds in male and female rabbits. Contraception, 73: 301-306.
311. Dande, P. and S. Patil, 2012. Evaluation of saponins from *Trigonella foenum graecum* seeds for its antifertility activity. Asian J. Pharmaceut. Clin. Res., 5: 154-157.
312. Yao, M., H.E. Ritchie and P.D. Brown-Woodman, 2007. A developmental toxicity-screening test of valerian. J. Ethnopharmacol., 113: 204-209.
313. Dhall, K. and M. Dhogra, 1988. Phase I and II clinical trials with *Vicoa indica* (Banjauri), a herbal medicine, as an antifertility agent. Contraception, 37: 75-84.
314. Rao, A.J., N. Ravindranath and N.R. Moudgal, 1996. The plant Banjauri (*Vicoa indica*) exhibits antifertility activity in adult female bonnet monkeys (*Macaca radiata*). Curr. Sci., 71: 918-921.
315. Pakrashi, A., B. Basak and N. Mookerji, 1975. Search for antifertility agents from indigenous medicinal plants. Indian J. Med. Res., 63: 378-381.
316. Khushalani, H.N., P.A. Tatke and K.K. Singh, 2008. Antimicrobial activity of dried flowers of *Woodfordia fruticosa* Kurz. Asian J. Microbiol. Biotechnol. Environ. Sci., 10: 155-156.
317. Keshri, G., S. Kumar, D.K. Kulshreshtha, S.M. Rajendran and M.M. Singh, 2008. Postcoital interceptive activity of *Wrightia tinctoria* in Sprague-Dawley rats: A preliminary study. Contraception, 78: 266-270.