



PHARMACOLOGICAL APPRAISAL OF *CUMINUM CYMINUM* L. IN DYSMENORRHOEA: AN AYURVEDIC APPROACH IN CONSIDERATION OF CURRENT EVIDENCES

Dilip Jani¹, Jasmine Gujarathi^{2*}

¹Associate Professor, Dept. of Dravyaguna, G. J. Patel Institute of Ayurvedic Studies And Research Centre, New Vallabh Vidyanagar, Anand, Gujarat, India.

^{2*}Associate Professor, Dept. of Striroga and Prasuti, G. J. Patel Institute of Ayurvedic Studies And Research Centre, New Vallabh Vidyanagar, Anand, Gujarat, India.

ABSTRACT

The demand of personalized medication has grown to leaps and bounds since last few years. Ayurveda, the oldest system of medicine, emphasized on such personalized medication by analyzing the personal health status of individual through different assessment criteria. *Cuminum cyminum* L. called as *Jeeraka* in Sanskrit and *Jeera* in Hindi, is one of the herb which was used since many centuries for various ailments. Traditionally the herb is well-known for its action in various alimentary diseases like, indigestion, diarrhea, gynecological diseases, etc. This herb is also screened for various pharmacological activities like antibacterial, anticancer, antiulcer and others. The condition of painful menstruation is affecting more than half of young adolescent girl population. The current article is an effort to establish the mode of action of *Cuminum cyminum* L in terms of Ayurveda pathogenesis as well as contemporary science. Various pathogenic pathways of Dysmenorrhoea according to Ayurveda are discussed with conclusion of using *Jeeraka* in dysmenorrhoea under which particular pathogenesis. Such comparison will help to establish personalized medicine for other diseases and this may be a novel approach towards same.

KEYWORDS: *Cuminum cyminum* L., *Jeeraka*, Individualized/Personalized medicine, Dysmenorrhoea, Menstrual Pain.

INTRODUCTION

The present status of chronic diseases in relation with availability of their treatment-approaches is observed to be very limited [1]. Despite of having many technological developments in current science, the exact cure of these diseases is not achieved. Moreover various patterns of symptomatic relief of diseases persist in the existing scenario. As a reflection, gradually, the world is taking interest in the culture of Individualized / Personalized Medicine and trying to get relief from many diseases [2,3]. The Ayurveda claimed Individualized / Personalized Medicine is a science, based on the concepts for analyzing the various parameters mentioned in literature. Eventually, the classical Ayurveda lies in implementing these selective methods and providing proper remedy in proper form to the needy. It will be always encouraged and appreciated that the selection of herb must have some evidence based background to convince the new generation. However, it doesn't always mean that the selected herb must have or must not have the proved back-up for claimed actions. So far the contemporary way of Herbal Research is concerned, it is found to be still in infancy to validate Ayurvedic claims with respect to the concepts of Ayurveda. In Ayurveda, the knowledge regarding personified-study is mentioned under the concept '*Amshamsha Vikalpana* which covers a broad range of human as well as drug study. The human differential factors are achieved through *Vyadhi Ghataka* (factors responsible for pathogenesis), where as drug selection is achieved by *Rasapanchaka* (Ayurvedic

conceptual composition of herb). Ayurveda the science of life have greatness in studying pathogenesis and selection of remedy accordingly. At primary level, with an example of Dysmenorrhoea, this theme is attempted by evaluating various pathological conditions of Ayurveda and contemporary sciences supported by the pharmacological claims of *Cuminum cyminum* L.

Glimpse of Dysmenorrhoea

Prevalence: Dysmenorrhoea is one of pathological condition which is generally ignored by patients and practically unresolved completely by physicians (except some pathology). It is observed through various published paper that the dysmenorrhoeal condition is present throughout the world [4]. According to a survey, an average of 68% girls has dysmenorrhoea and alarming one in eight girls reported absenteeism at college/school because of menstrual symptoms [5]

Ayurvedic View

The condition of dysmenorrhoea is explained in Ayurvedic literature in terms of '*Kastartava / Kukshi Shoola, Vatala Yoni, Udavartini Yonivyapad* (Ayurvedic names of disease under *Striroga-Gynecology*) [6]. The causative factors, pathogenesis, symptoms and treatment are also described in Ayurveda and based on that, the increased '*Vata*' type of humors in the body is responsible for disease creation [7]. The various Ayurvedic causative factors which manifest into dysmenorrhoea are inappropriate food habits, inappropriate lifestyle,

infectious menstruation, vitiated reproductive physiology, abnormal ovarian function, inappropriate sitting-sleeping habits, excessive use of liquid foods and many non-etiological factors [8]. All these factors creates imbalance in humors (*Vata-Pitta-Kapha*) of a normal individual through specific mode of vitiations [9]. This vitiation may occur by individual-increase of body-humors (*Vata-Pitta-Kapha*) or their combinations [10]. The modes of vitiations are called as *Samprapti* or *Dosh-Dushya Sammurchhana* (pathogenesis) [11]. This pathogenesis of *Kashtartava* can be summarized under six major patterns. The aim of management should be by equilibrating vitiated *Doshas*, especially *Vata* (as it is main causative factor of all *Yonivyapadas*) [12] or managing *Avrita Apana Vayu* (pathology of one of the type of *Vata* humor) through *Agnideepaka* (Improving appetite), *Grahi* (controlling of excessive outflow), *Vata Anulomana* (normalizing any type of abnormal flow) and *Pakvashaya Shuddhikara* (purification of large intestine) [13] methods.

Contemporary Medicine

The various causes of Dysmenorrhoea described under contemporary system of medicine are like environmental factors causing nervous tension, general ill health, faulty outlook, hormonal imbalance, psychogenic cause, imbalance of autonomic nervous system, intrauterine contraceptive device, stenosis at internal Os, unequal development of mullerian ducts, inappropriate low of polarity, retroverted uterus, uterine hypoplasia, vasopressin and prostaglandins [14].

Ayurvedic Individualized / Personalized Medicine Documentation

Ayurveda advocates that selection of any medicine should be purely based on the Individualized / Personalized features of sufferings. According to *Charaka Samhita* a best physician should know the science of administration of drugs with due reference to climate and season, and who applies it only after examining each and every patient individually [15]. Moreover while commenting on the role of diet, *Charaka* recommends planning of opposite properties of vitiated *Doshas* in the form of diet to maintain the health. Habitual intake of balanced diet with all *Rasas* (tastes) in proportionate quantity is recommended for equilibrium of doshas [16]. The Ayurveda system does not stress on the naming of the disease but a proper diagnosis related with the vitiation is more important than the labeling of the disease. It explains that the diseases are innumerable being divided on the basis of trouble, color, etiology, site, symptoms and name. However in other cases general principle may be followed [17].

Ultimately, applying knowledge and common sense one should plan the management [18]. Moreover, the treatment should be continued till the patient regains health. While describing the state of normalcy Ayurveda screened many points to identify healthy individual. Some of these parameters like person having good built, has balanced proportion of muscles, compactness of the body, possess very strong sensory and motor systems, etc. Also healthy individual can withstand hunger, thirst, the heat of the sun, cold and physical exercise. They can digest and assimilate the food properly [19]. In total all these factors make the concept of Individualized / Personalized features of an individual and help in assessment of personalized treatment plan. In the present paper we adopted some methods to achieve the target through literature review.

Methodology

Based on the above information the conceptual analysis of Dysmenorrhoea (disease) and *Jeeraka* (drug as a remedy) was studied with detailed micro-classification. The pathogenesis of *Kashtartava* (Dysmenorrhoea) condition was classified based on the basic concepts of Ayurveda so that exact pathology can be understood (Table No. 1). The disease pathology was broadly classified into six major categories (Images). The *Samprapti Ghataka* (factors responsible for disease formation) was further co-related with pinpointed (broad category of Individualized / Personalized) pathological conditions of *Kashtartava* with special reference to type of pathology (Table No 2).

On the other hand, the literature analysis on herb *Cuminum cyminum* L (*Jeeraka*) was conducted. The properties and pharmacological indications were noted down (Table No 3). A comparative estimation was calculated among the desired properties of the drug needed in various pathological conditions of *Kashtartava* (Dysmenorrhoea) and the properties present in *Jeeraka*. An interpretations was also made for logical application of the drug in specific conditions (Table No.-4).

To support the Ayurvedic theme of *Jeeraka* selection in *Kashtartava* (Dysmenorrhoea), a review regarding its pharmacological screening was conducted. No direct references were found regarding its activity on signs / symptoms of Dysmenorrhoea. But a conceptual indirect pharmacological activity references were collected which may claim the action in the diseased condition (Table No 5). Some review of essential / non essential activities were also studied to know the efficacy of *Jeeraka* in terms of modern experimental study [59,60,61]. Some of the activity was absolutely not found, neither their relations can be made with the Dysmenorrhoeal condition.

Table 1: Samprapti Ghataka (factors responsible for Kashtartava (Dysmenorrhoea) pathogenesis)²⁰

No	Conceptual head of Factors	Type of vitiation under the head
1.	<i>Dosha</i> (Body humors)	<i>Vata Pradhana Tridosha</i>
2.	<i>Dushya</i> (tissues / cells involved)	<i>Rasa, Rakta, Artava</i>
3.	<i>Agni</i> (digestive capacity)	<i>Jatharagni, Dhatvagni Mandya</i>
4.	<i>Srotasa</i> (systems involved)	<i>Rasa, Rakta and ArtavavahaSrotasa</i>
5.	<i>Srotodushti</i> (mode of system involvement)	<i>Sanga and Vimargagamana</i>
6.	<i>Udbhavasthana</i> (root cause of origin of pathology)	<i>Amapakvashaya</i>
7.	<i>SthanaSamshraya</i> (place where the disease expressed)	<i>Garbhashaya</i>
8.	<i>VyaktiSthana</i> (labeling of the disease)	<i>Triyavarta Yoni</i>

Table 2: Micro-classification of Kashtartava Pathology in Ayurveda²⁰

Type of pathogenesis	Desired actions / site of actions of a herb in different pathogenesis conditions								
	Dosha	Dushya	Agni	Sroto-Gamitva	Eradication of Srotodushti	Acting place of Udbhavasthana	Sthana Samshraya (Broad area)	Vyaktasthana (Specific area)	Lakshana (Symptom)
Ayurveda Pathogenesis 1	Vata Shamaka	Rasa-Rakta Balance	Agni Vardhaka	Anna, Rasa, Rakta Artava	Vimarga Gamana	Mahasrotasa, Rasa-Rakta Dhatu	Sampurna Shareera	Garbhashaya	Vedana, Shoola,
Ayurveda Pathogenesis 2	Vata Shamaka	Rasa-Rakta Balance	Agni Samikara	Rasavaha, Raktavaha Artavavaha	Sanga or Vimarga Gamana	Rasa-Rakta	Prajanana Avayava	Garbhashaya	Vedana, Shoola,
Ayurveda Pathogenesis 3	Pitta-Vata Shamaka	Rakta Balance	Dhatvagni Vardhaka	Raktavaha Artavavaha	Vimarga Gamana or Atipravrutti	Mahasrotasa	Sampurna Shareera	Garbhashaya	Vedana, Daha, Shoola
Ayurveda Pathogenesis 4	Kapha-Vata Shamaka	Rasa Balance	Agni Vardhaka	Annavaaha, Rasavaha, Artavavaha	Sanga	Mahasrotasa	Sampurna Shareera	Garbhashaya	Vedana, Shoola
Ayurveda Pathogenesis 5	Sansarga or Sannipata	Rasa-Rakta Balance	Agni Vardhaka	Rasavaha, Raktavaha Artavavaha Shukravaha	Avarana	Mahasrotasa	Prajanana Avayava	Garbhashaya	Vedana, Shoola,
Ayurveda Pathogenesis 6	Vata Shamaka	Rasa Balance	Agni Vardhaka	Manovaha, Rasavaha, Artavavaha	Vimarga Gamana	Mana	Sampurna Shareera	Garbhashaya	Vedana, Shoola

Table 3: Jeeraka: The Ayurvedic records

No	Properties & Actions	Criteria	Quotes
1	Pharmacological Properties	Rasa	<i>Katu</i> ^{21,22,23,24,25} <i>Tikta</i> ²¹
		Guna	<i>Ruksha</i> ^{21,22,23,24} <i>Laghu</i> ^{21,23,24}
		Veerya	<i>Ushna</i> ^{21,22,23,24,25}
		Vipaka	<i>Ushna Paka</i> ²¹
2	Pharmacological Actions	On Humors (Doshagnata)	<i>Pittala</i> ^{21,23,24} <i>Vata-Kaphahara</i> ²¹ <i>Vatahara</i> ^{22,23,24,25} <i>Kaphahara</i> ^{22,23,24}
		The mechanism (Karma)	<i>Ruchya</i> ^{21,22,23} <i>Sangrahi</i> ^{21,23,24} <i>Chakshushya</i> ^{21,22,23,24} <i>Garbhashaya</i> <i>Vishodhana</i> ^{21,23,24} <i>Deepana</i> ^{21,22,23,24,25} <i>Medhya</i> ^{21,23,24} <i>Hrudya</i> ²¹ <i>Pachana</i> ^{21,23} <i>Jarana</i> ²² <i>Vrushya</i> ²³ <i>Balya</i> ²³
		Direct on diseases (Rogagnata)	<i>Chhardi</i> ^{21,23,24} <i>Gulma</i> ^{21,22,23,24,25} <i>Adhmana</i> ^{21,22,23,24,25} <i>Atisarahara</i> ^{21,22,25} <i>Grahani</i> ^{22,25} <i>Krumihara</i> ^{22,25} <i>Shopha</i> ²² <i>Jwaraghna</i> ^{22,23} <i>Ajeerna</i> ²²

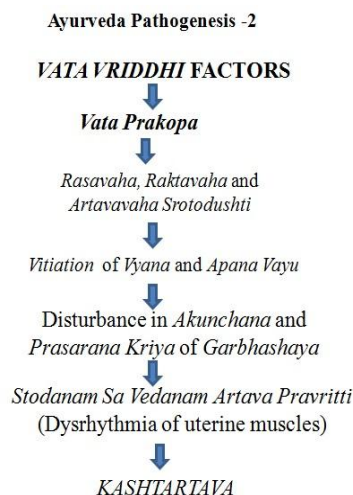
Table 4: The Samprapti Ghataka (factors responsible for Dysmenorrhoea pathogenesis)

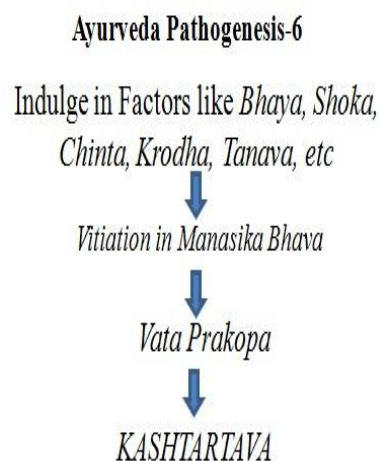
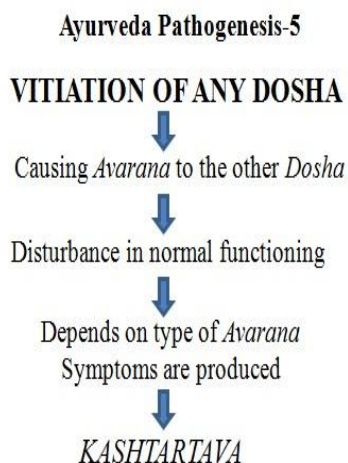
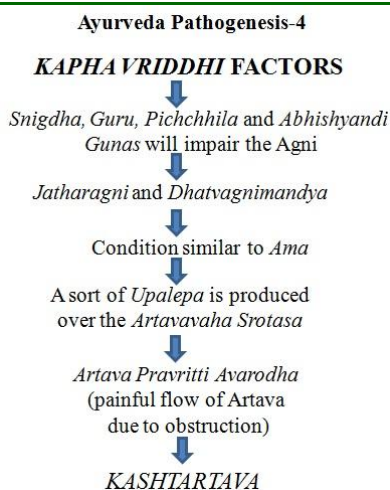
No	Desired action on Dysmenorrhoea	Actions of Jeeraka	Classical interpretation of Jeeraka actions
1.	Vata Pradhana Tridosha	Vata-Kaphahara	The Drug will specifically applicable only in Vata-Kapha dominant Kashtartava (Dysmenorrhoea) condition.
2.	Rasa, Rakta, Artava	Pachana	The drug will not nourish the Rasa-Rakta Dhatu but will improve its functional capacity. It will be utilized for limited period till the condition gets normalize.
3.	Jatharagni, Dhatvagni Mandya	<i>Deepana</i> ^{21,22,23,24,25} , <i>Pachana</i> ^{21,23} <i>Jarana</i> ²² , <i>Chhardi</i> ^{21,23,24} <i>Adhmana</i> ^{21,22,23,24,25} <i>Atisarahara</i> ^{21,22,25} <i>Grahani</i> ^{22,25} , <i>Ajeerna</i> ²²	Through the Main Agni (Jatharagni), Jeeraka will start showing its action. Eradication of root cause in the form of malfunction of Mahasrotasa it shows its results. Normalizing metabolism may be the main effect.
4.	Rasa, Rakta and Artavavaha Srotasa	Garbhashaya <i>Vishodhana</i> ^{21,23,24}	The drug shows action specifically on Uterus by removing the metabolic toxicity. It helps in improving regular menstrual blood flow, improvement in menstruation complications. Improving the Dhatvagni of Rasa-Rakta Dhatu is the main area of the drug.
5.	Sanga and Vimargagamana	<i>Katu</i> ^{21,22,23,24,25} <i>Tikta</i> ²¹ , <i>Ushna</i> ^{21,22,23,24,25} <i>Pachana</i> ^{21,23}	<i>Ushna Veerya</i> , <i>Katu Rasa</i> and <i>Pachana Karma</i> responsible to break and obstructive pathology for disease formation. Hence drug may be useful in Santarpana Janya Karstartava. Pathcan

			can be referred as <i>Aampachan</i> in the disease.
6.	<i>Amapakvashaya</i>	<i>Katu</i> ^{21,22,23,24,25} <i>Tikta</i> ²¹ <i>Ushna</i> ^{21,22,23,24,25} <i>Pachana</i> ^{21,23}	These references shows the main action is on <i>Mahasrotasa (Annavaaha)</i> . Which facilitate in eradication of <i>Ama</i> (endotoxins) and formation of new, sustainable, purified <i>Dhatu</i> s which later helps in improving the disease condition.
7.	<i>Garbhashaya</i>	<i>Garbhashaya Vishodhana</i> ^{21,23,24}	By purifying and cleansing the uterus (<i>Garbhashaya Vishodhana</i>) it helps in creation of ideal platform for normal menstruation, development of good progeny, etc.

Table 5: Pharmacological screening of Jeeraka

No.	Pathogenesis factor	Direct or indirect references of Pharmacological actions useful in pathogenesis
1.	Hormonal Imbalance	Galactogogues ²⁶
		Sperm Function ²⁷
		Antitesticular ²⁸
		Antiestrogenic ²⁹
2.	Ischaemic Theory	Anti-osteoporotic ³⁰
		Erythrocyte Hemolysis ³¹
		Blood Platelet Aggregation ³²
		Hypolipidemic ^{33,34}
3.	Psychogenic Causes	Antistress ³⁵
		Alzheimer ³⁶
		Central Nervous system ^{37,38,39}
4.	Prostaglandins (PGs)	Analgesic ^{40,41}
		Antiinflammatory ⁴²
5.	Systemic Disease and General Ill Health	Antibacterial Activity ^{43,44}
		Antimicrobial ⁴⁵
		Antifungal activity ⁴⁶
		Antioxidant properties ⁴⁷
		Immunomodulatory ⁴⁸
6.	Other indirect activities	Hepatoprotective ^{49,50,51}
		Antidiabetic ⁵²
		Antiepileptic ⁵³
		Gastrointestinal Disorders ^{54,55}
		Antiulcer ⁵⁶
		Antidermatophytic ⁵⁷
Other activities ^{59,60,61}		
7.	Myometrial Activity Theory	No direct reference found
8.	Vasopressin	No direct reference found
9.	Poor Posture	Not Applicable
10.	Abnormal Anatomical And Functional Aspects of Uterus	Not Applicable
11.	Muscular In-coordination	Not Available





DISCUSSION & CONCLUSION

There are many herbs that are directly or indirectly indicated in the menstrual condition, especially *Kashtartava* (Dysmenorrhoea). *Jeeraka* i.e. *Cuminum cyminum* L. is one of the popular herbs used since many centuries for various ailments as mentioned in Ayurveda literature. Based on the properties of the herbs, it shows its action through the pacifying many abnormal conditions of Gastro-intestinal tract. This GIT is considered as *Mahasrotasa* (Major channel) in Ayurveda and its dysfunction leads to many diseases. The various indications of *Jeeraka* like *Ajeerna*, *Deepana*, *Pachana*, *Gulma*, *Garhani*, *Atisaara*, *Adhmana*, *Atopa*, etc directly establish it as a drug of choice in GIT associated menstrual disease. By this way it not only pacifies the symptoms of disease but also rectify the root cause of disease. Apart from this it has direct action as *Garbhashaya Vishodhana* which leads to clean the female reproductive system. Having targeted action on affected part as well as capacity to eradicate the disease from its root makes *Jeeraka* as one of the best choice of drug. While planning *Jeeraka*, one should observe its utility for a specific period. Being *Ushna*, *Ruksha*, *Laghu*, *Katu*, *Tikta*, it may harm and create *Dhatukshaya* by various manner. Hence though it is good herb for *Kashtartava*, it should be administered only till the relief and should not be used excessively. The pharmacological screening for Sperm Function and anti-testicular activity is an additional proof for its side-effects in long term use. By studying the Ayurvedic pathology *Jeeraka* can be the best drug of choice in Pathology 2, better in pathology 4, good drug of choice in pathology 5 & 3. It should not be recommended in pathology 1 where *Dhatukshaya* is a responsible cause for disease. It also may not show its effects in pathology 6 where psychosomatic involvements are observed. The modern pharmacological screening can be correlated but can't be claimed to validate the Ayurvedic activities. Ayurvedic action of *Jeeraka* on menstrual disorder through GIT is a best example to discard the theory of correlation among two systems. The entire pathology of Dysmenorrhoea is least concerned with GIT activity (exact opposite to Ayurveda). The screening strongly correlate the analgesic, anti-inflammatory, anti-microbial and Galactogogues activity. Overall both the sciences are helpful to know the nature of

the disease and drug which help the researchers to think and plan a treatment for the betterment of society.

ACKNOWLEDGEMENT

The authors are highly thankful to GUJCOST for awarding the minor research project. The authors also acknowledge their thanks to management of CVM, Principal GJP-IASR, ADIT, IICP and Director, ARIBAS for their constant support and help.

REFERENCES

1. Jane Turner, Brian Kelly, Emotional dimensions of chronic disease, West J Med. 2000 Feb; 172(2): 124-128.
2. Bhushan Patwardhan, Bridging Ayurveda with evidence-based scientific approaches in medicine, The EPMA Journal 2014, 5:19.
3. Archakov AI, Lisitsa AV, Petushkova NA, Karuzina II, [Cytochromes P-450, drug disease, and personified medicine. Part I], Klin Med (Mosk). 2008; 86 (2):4-8.
4. Trivedi Upama N. et.al. Women & their menstrual cycles awareness survey study; IJPI's Journal of Hospital and Clinical Pharmacy; Vol 1:2 (2011).
5. Symphorosa SC Chan, et.al; Menstrual problems and Health-seeking behavior in Hong Kong Chinese girls; Hong Kong Med J 2009;15:18-23.
6. Premavati Tiwari, Ayurvediya Prasutitantra Evam Striroga, 2nd Volume-Striroga, Chapter 2nd Artavavyapada, Chaukhambha Orientalia, Varanasi, 2nd edition 2000 p-139.
7. Vd. J. T. Acharya, Charaka Samhita with Ayurveda Deepika commentary, Chaukhambha Surabharati Prakashan, Reprint edition - 2000, Varanasi, Chikitsasthana 30 (Yonivyapad Chikitsitam)/115.
8. Vd. J. T. Acharya, Charaka Samhita with Ayurveda Deepika commentary, Chaukhambha Surabharati Prakashan, Reprint edition - 2000, Varanasi, Chikitsasthana 30 (Yonivyapad Chikitsitam)/8-10.
9. Vd. J. T. Acharya, Charaka Samhita with Ayurveda Deepika commentary, Chaukhambha Surabharati Prakashan, Reprint edition - 2000, Varanasi, Vimanasthana 5 (Srotovimana)/32.
10. P. V. Sharma, Sushruta Samhia (English translation and Dalhan's commentary along with critical notes),

- Vol. I-III, edition-1999, Chaukhambha Visvabharati, Varanasi, 1, Sutrsthana 15 (Ashtavidhashastra karmeeya Adhyayopakrama)/11-19.
11. Dr. A. M. Kunte, K. R. Sastri Navne (Annotated), Pt. H. S. Sastri Pradakara (edited), Ashtanga Hridaya of Vagbhata with the Sarvangasundara of Arundatta, Ayurveda Rasayana of Hemadri commentaries, Reprint edition, 1997, Chaukhambha Surabharati Prakashan, Varanasi, India, Nidanasthana 1 (Jwaraneedanam)/8.
 12. Vd. J. T. Acharya, Charaka Samhita with Ayurveda Deepika commentary, Chaukhambha Surabharati Prakashan, Reprint edition - 2000, Varanas, Chikitsasthana 30 (Yonivyapad Chikitsitam)/115.
 13. Vd. J. T. Acharya, Charaka Samhita with Ayurveda Deepika commentary, Chaukhambha Surabharati Prakashan, Reprint edition - 2000, Varanasi, Chikitsasthana 28 (Vatavyadhi Chikitsa)/243.
 14. Padubidri VG, Shirish N. Daftarey, editors. Howkins and Bourne Shaw's Textbook of Gynaecology, 12th edition, New Delhi, B. I. Churchill Livingstone Pvt. Ltd.; 1999. p. 227.
 15. Vidyadhar Shukla, Ravidatta Tripathi, Charaka Samhita with 'Vaidyamanorama' Hindi Commentary, Sutrasthana 1/123, 1st Volume, P-48, Chaukhambha Sanskrit Pratishthan, Delhi, Reprint -2004.
 16. Vidyadhar Shukla, Ravidatta Tripathi, Charaka Samhita with 'Vaidyamanorama' Hindi Commentary, Sutrasthana 7/41, 1st Volume, P-129, Chaukhambha Sanskrit Pratishthan, Delhi, Reprint -2004.
 17. Vidyadhar Shukla, Ravidatta Tripathi, Charaka Samhita with 'Vaidyamanorama' Hindi Commentary, Sutrasthana 15/5, 1st Volume, P-233, Chaukhambha Sanskrit Pratishthan, Delhi, Reprint -2004.
 18. Prashar Radha Krishan, Sharangdhara Samhita of Sharangdhar, Pu.Kh. 7/204, Shri Vaidyanath Ayurved Bhavan Ltd., 4th Edition 1994, Nagpur.
 19. Vidyadhar Shukla, Ravidatta Tripathi, Charaka Samhita with 'Vaidyamanorama' Hindi Commentary, Sutrasthana 21/18-19, 1st Volume, P-303, Chaukhambha Sanskrit Pratishthan, Delhi, Reprint - 2004.
 20. Dilip Jani, Jasmine Gujarathi, Role of Zingiber Officinale R. in Dysmenorrhoea: A Selective Ayurvedic and Contemporary Medicine Documentation, J. of Pharmaceutical and Scientific Innovation 2016;5(5):160-167.
 21. Sharma P. V., Sharma Guru Prasad, Kaiyadeva Nighantu, Oshadhi Varga/1184-1188, P-219, Reprint-2009, Chaukhamba Orientalia, Varanasi.
 22. D.K. Kamat, Studies on Medicinal Plants & Drugs in Dhanvantari Nighantu, Vol-1, Shatapushpadi Varga/ 68-71, p-156, Reprint-2011, Chaukhambha Sanskrit Pratishthan, Delhi.
 23. Bramhashankar Mishra, Ruplal Vaishya, Bhavaprakasha including Nighantu, 1st Part, Hareetakyadi Varga-82-85, P-30, Edition-2012, Chaukhambha Sanskrit Bhavana, Varanasi.
 24. Vaidya Ram Prasad, Madanpal Nighantu, Shunthyadi Varga, Bhasha Tatwa Praksahini commentary, 1998, Khem, Raj Sri Krishnadas, Bombay.
 25. Apte Vinayak Ganesha, Raj Nighantu Sahita Dhanvantari Nighantu, Pippalyadi Varga, Vaidya Narayan Sharma Sanshodhita, Ananadashram Sanskrit Granthavali, Granthank- 33, 1925.
 26. Sudhanshu K Bharti, et.al, Pharmacological actions and potential uses of diverse Galactogogues in Cattle, International Journal of Pharmacology and Therapeutics, Volume 2 Issue 1 2012.
 27. Beena Khillare and Ashish Ranjan Singh, Spermicidal activity of Elettaria cardamomum and Cuminum cyminum seed extracts and assessment of sperm function in albino rats, International Journal of Pharmacognosy, (2014), Vol. 1, Issue 4.
 28. Bhabani Prasad Pakhira, et.al. Antitesticular activity of hydro-methanol extract of Cuminum cyminum in adult rat: A dose dependent study, International Journal of Pharmacy and Pharmaceutical Sciences, Vol 7, Issue 3, 2015
 29. Raj A, Singh A, Sharma A, Singh N, Kumar P, Bhatia V. Antifertility Activity of Medicinal Plants on Reproductive system of Female Rat. 2011; 2: 1-7.
 30. Shirke SS, Jadhav SR, Jagtap AG. Methanolic extract of Cuminum cyminum inhibits ovariectomy-induced bone loss in rats. Exp Biol Med. 2008;233:1403-10
 31. Omar M. Atrooz, The Effects of Cuminum cyminum L. and Carum carvi L. Seed Extracts on Human Erythrocyte Hemolysis, International Journal of Biology; Vol. 5, No. 2; 2013.
 32. Rathore SS, Saxena SN, Singh B. Potential Health Benefits of Major Seed Spices. International J. Seed Spices, 2013; 3: 1-12.
 33. Shirke SS and Jagtap AJ. Effects of methanolic extract of Cuminum cyminum on total serum cholesterol in ovariectomized rats. Indian J Pharmacol 2009; 41(2): 91-93.
 34. Zare R, Heshmati F, Fallahzadeh H and Nadjarzadeh A. Effect of cumin powder on body composition and lipid profile in overweight and obese women. Complement Ther Clin Pract 2014; 20(4): 297-301.
 35. Koppula, Choi. Cuminumcyminum Extract Attenuates Scopolamine - Induced Memory Loss and Stress Induced Urinary Biochemical Changes in Rats: A Noninvasive Biochemical Approach. Pharmaceutical biology, Original articles, 2011; 49: 702-708.
 36. VenKatalakshmi, Kambakam. Phytochemical Investigation of Antiulcer and Antistress Activity in the Seeds of Cuminumcyminum (linn). RGUHS, 2010; 1-2.
 37. Haghparast A, Shams J, Khatibi A, Alizaseh AM, Kamalinejad M. Effects of the fruit essential oil of Cuminum cyminum Linn. (Apiaceae) on acquisition and expression of morphine tolerance and dependence in mice. Neurosci Lett. 2008;440:134-9.
 38. Janahmadi M, Niazi F, Danyali S, Kamalinejad M. Effects of the fruit essential oil of Cuminum cyminum Linn. (Apiaceae) on pentylenetetrazol-induced

- epileptiform activity in F1 neurones of *Helix aspersa*. *J Ethnopharmacol.* 2006;104:278-82.
39. Sayyah M, Mahboubi A, Kamalinejad M. Anti-convulsant effect of the fruit essential oil of *Cuminum cyminum* in mice. *Pharmaceut Biol.* 2002a;40:478-80.
40. Sangeeta P. Bhat, Waseem Rizvi, Anil Kumar Effect of *Cuminum cyminum* L. Seed Extracts on Pain and Inflammation, *Journal of Natural Remedies*, Vol 14 (2) | July 2014.
41. Purnima N, Hossain N, Saha M, Shahnaj R, Mohammed R. Antihyperglycemic and Analgesic Studies with Methanol Extract of a Mixture of *Cuminumcyminum* and *Coriandrumsativum* Seeds. *Journal of Chemical and Pharmaceutical Research*, 2015; 7: 80-84.
42. S. I. Shivakumar, et.al. Anti-inflammatory activity of fruits of *Cuminum cyminum* Linn, *Der Pharmacia Lettre* 2010; 2 (1) 22-24.
43. Zahra Sepehri, et al. Antibacterial Activity of *Cuminum cyminum* and *Piper nigrum* against antibiotic resistant *Klebsiella pneumonia*, *Bull. Env. Pharmacol. Life Sci.*, Vol 3 [Special Issue V] 2014: 17-19.
44. Mominul Islam Sheikh, et.al, Control of Some Human Pathogenic Bacteria by Seed Extracts of Cumin (*Cuminum cyminum* L.), *Agric. conspec. sci.* Vol. 75 (2010) No. 1.
45. Asif Hanif Chaudhry, et.al. Physico-Chemical Investigation and Antimicrobial Activity of Essential Oil of *Cuminum cyminum* L. *World Applied Sciences Journal* 19 (3): 330-333, 2012.
46. Lin-Feng Hu, et.al. Optimization of supercritical CO₂ extraction and characterization of antifungal activity of essential oils in *Cuminum cyminum* L, *Australian Journal of Crop Sciences*, 7(12):1809-1813 (2013).
47. AL Juhaimi, F. Y. and Ghafoor, K., Extraction optimization and in vitro antioxidant properties of phenolic compounds from Cumin (*Cuminum cyminum* l.) seed, *International Food Research Journal* 20(4): 1669-1675 2013.
48. Chauhan PS, Satti NK, Suri KA, Amina M, Bani S. Stimulatory effects of *Cuminum cyminum* and flavonoid glycoside on cyclosporine-A and restraint stress induced immunosuppression in swiss albino mice. *Chem Biol Interac.* 2010;185:66-72.
49. Aamir Mushtaq, et.al. Hepatoprotective investigations of *Cuminum cyminum* dried seeds in nimesulide intoxicated albino rats by phytochemical and biochemical methods, *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol 6, Issue 4, 2014.
50. Mushtaq A, Mahmood A, Jabeen Q. Hepatoprotective action of a polyherbal aqueous ethanolic extract against nimesulide intoxicated albino rats. *IJPRBS*, 2013; 2(6): 332-347.
51. Prakash E, Gupta DK. Cytotoxic Activity of Ethanolic Extract of *Cuminumcyminum* Linn against Seven Human Cancer Cell Line. *Universal Journal of Agricultural Research*, 2014; 2(1): 27-30.
52. Sharma R, Kaur D. An Update on Pharmacological Properties of Cumin. *IJRPS*, 2012; 2: 14-27.
53. Ibid
54. Vasudevan K, Vembar S, Veeraraghavan K, Haranath PS. Influence of intragastric perfusion of aqueous spice extracts on acid secretion in anesthetized albino rats. *Indian J. Gastroenterol.* 2000;19:53-6.
55. Milan KSM, Dholakia H, Tiku PK, Vishveshwaraiah P. Enhancement of digestive enzymatic activity by cumin (*Cuminum cyminum* L.) and role of spent cumin as a bionutrient. *Food Chem.* 2008;110:678-83
56. Ven Katalakshmi, Kambakam. Phytochemical Investigation of Antiulcer and Antistress Activity in the Seeds of *Cuminum cyminum* (linn). *RGUHS*, 2010; 1-2.
57. M.M. Mohamadein, R. M. Farrag, A. A. I. Mekawey, Antiviral and Antidermatophytic Activity of a Compound Extracted from *Cuminum cyminum* Seeds, *Biomedical & Pharmacology Journal*, Vol. 8(2), 573-580 (2015).
58. Johri RK. *Cuminum cyminum* and *Carum carvi*: An update, *Pharmacogn Rev.*, 2011; 5(9): 63-72.
59. Harpreet Kaur Dhaliwal, et.al. Phytopharmacological properties of *Cuminum cyminum* linn. as a potential medicinal seeds: An overview, *World Journal of Pharmacy and Pharmaceutical Sciences*, Volume 5, Issue 6, 478-489.
60. Daljeet Kaur, Ramica Sharma. An Update on Pharmacological Properties of Cumin, *International Journal of Research in Pharmacy and Science*, 2012, 2(4), 14-27.
61. Prof Dr Ali Esmail Al-Snafi, The pharmacological activities of *Cuminum cyminum* - A review, *IOSR Journal of Pharmacology*, Volume 6, Issue 6 Version. 2 (June 2016), PP. 46-65.

Cite this article as:

Dilip Jani, Jasmine Gujarathi. Pharmacological Appraisal of *Cuminum Cyminum* L. In *Dysmenorrhoea: An Ayurvedic Approach in Consideration of Current Evidences*. *International Journal of Ayurveda and Pharma Research*. 2016;4(12):29-35.

Source of support: Nil, Conflict of interest: None Declared

***Address for correspondence**

Dr Jasmine Gujarathi

Associate Professor,
Dept. of Striroga and Prasuti,
G. J. Patel Institute of Ayurvedic Studies
and Research Centre, New Vallabh
Vidyanagar, Anand, Gujarat, India.

Email: jassyleo@gmail.com

Phone: 09408365891