Review Article

A Brief Review of Pre-Clinical and Clinical Researches on *Vacha* (*Acorus calamus* Linn.)

Journal of Indian System of Medicine

Pravin Masram[1] Dhiraj Singh Rajput[2]

[1]Ph.D.Scholar, Department of Kaumarbhritya I.P.G.T. & RA Gujarat Ayurved University Jamangar Gujarat, [2]Asst. Professor, Department of Rasashatra And Bhaishajyakalpana, Ashwin Rural Ayurveda Collage and Hospital, Manchi Hill Sangamner, Maharashtra

JISM1410N Received: April 29, 2014; Accepted: September 14, 2014

How to cite the article: Pravin Masram, Dhiraj Singh Rajput, A Brief review of pre-clinical and clinical researches on Vacha (Acorus calamus Linn), J-ISM, V2 N3, July-September 2014, pp.143-147

Abstract:

Vacha (Acorus calamus Linn.*)* is a useful medicinal plant which gives benefit in different fields of medicines. This herb is generally used from the Ancient and Vedic periods due to its wonderful power of rejuvenation of brain, nervous system and normalizing the appetite. *Vacha* leaves and rhizomes have been used medicinally against different ailments such as fever, asthma, bronchitis, cough and mainly for digestive problems such as gas, bloating, colic, and poor digestive function**.** *Acorus calamus* has many wide varieties which were used in different studies possesses antimicrobial, anti-inflammatory, antioxidant, antidiarrheal, antiulcer, antispasmodic, immunosuppressant and mitogen inhibitor activity. They were also used in the treatment of simple diseases such as stomach cramps, toothache, colic, fever, throat irritation, and cough and also in the treatment of the severe diseases like nephropathy, chronic diarrhea, tumors and epilepsy. Some research works has been published on the beneficial effects of this drug. Hence in present study an attempt has been made and review work has been carried out on various therapeutic aspect of *Acorus calamus.*

Key words: *Vacha, Acorus calamus,* Pre-Clinical and Clinical researches

Introduction:

Acorus calamus or sweet flag or bunch plant has been known as medicinal plant since from ancient period. It is one of the most utilized and valuable plant in the Indian medical system almost throughout the India. The word 'acorus' is originated from the Greek divine word 'acoron' used by the Dioscorids derived from the 'coreon' word means 'pupil' because it is used in the treatment of eyes diseases and its inflammation [1].

The rhizome is extensively used as nervine tonic, hypotensive, sedative, analgesic, spasmolytic, and anticonvulsant. It is also used for bronchial catarrh; The Ayurvedic Pharmacopeia of India indicates the use of dried rhizomes as a brain tonic for memory impairment and epilepsy [2]. Wide range of utility of this drug has attracted traditional as well as modern researchers. There are numerous formulations of *Acorus calamus* found mentioned in classical texts which indicated therapeutic importance of this drug. Some research works are also conducted and published on specific property of *Acorus calamus.* Although such published works have some limitations as they emphasis on single property of test drug and it is well known truth that a single drug can be utilized in treating various ailments. According to various published research works, Acorus calamus contain various active constitutes which are beneficial as antibacterial, antifungal, antidiabetic, anti-inflammatory, antihepatotoxic, antispasmodic, anti-diarrhoeal, anticancer, bronchodilatory, anti-depressant and in

ischemic heart disease. Hence in present work an attempt has been made to make a brief review on pre-clinical and clinical research work done on *Acorus calamus.* Present work will help in knowing wide range of therapeutic properties of Acorus calamus and will also establish importance of this valuable drug in the field of medical science.

Material and methods:

A brief review of pre-clinical and clinical published research works done on *Acorus calamus* Linn has been collected, studied and the valuable conclusions has been withdrawn. The compiled information was interpreted with the therapeutic properties of *Acorus calamus*. mentioned in Ayurvedic classics and the probable mode of action with its significance is discussed to establish therapeutic importance of this medicinal herb. An attempt has also been made to establish the pharmacodynamic and pharmacokinetic action based on findings of research works and the phytoconstitute present in *Acorus calamus*.

Antibacterial study:

According to an anti-microbial study, the leaf and rhizome part of *Acorus Calamus* are found to possess the antibacterial activity. The methanolic extract of *Acorus Calamus* showed the inhibitory action against the bacterial strains of *Salmonella typhi, Pseudomonas aeruginosa, Klebsiella pneumoniae,* and *Staphylococcus aureus* [3]. This study supports the use of *Acorus calamus* mentioned in Ayurveda such as *Krimighna* (anti-microbial) and *Jwaraghna* (anti-pyretic).

Antifungal study:

An in-vitro study on β-asarone compound fraction obtained from the crude methanolic extract of *Acorus Calamus* rhizomes has been reported to possess the antifungal activity against the yeast strain of *Candida Albicans*, *Cryptococcus Neoformans, Saccharomyces Cerevisae [4],* and also against *Aspergillus Niger [5].* The α- and β- asarone compound which were isolated from the different extracts of *Acorus calamus* has been found to be good inhibition on the fungi strains of *Pencillium Chrysogenum*, *Aspergillus Niger, Aspergillus Flavus, Microsporum Canis* and yeast strain of *Cryptococcus Gastricus* and *Candida Albicans [6] Acorus calamus* has been included as an ingredient in many formulations indicated in treating various *Kushtha* (skin disease). As mentioned earlier, *Acorus calamus* is *Tikta* and *Katu* in *Rasa,* has *Katu Vipak* and *Ushna Virya.* All these properties are very useful in restoring the malfunction of *Bhrajaka* and *Ranjaka Pitta* (types of *Pitta Dosha* which are responsible for colour, appearance of skin and normal formation of blood cells respectively). Thus *Acorus calamus* acts as good anti-fungal drug.

Antidiabetic study:

Acorus calamus is widely used in the treatment of diabetes in the traditional folk medicine of America and Indonesia. A research work utilized four fractions obtained from the radix of *Acorus calamus* to study insulin releasing or alpha-glucosidase inhibitory action [7]. The ethyl acetate fraction of *Acorus calamus.* has been found to possess hypoglycemic, hypolipidemia and other beneficial effects through the mechanism of insulin sensitizing and hence possess the great potential for the treatment of diabetes and other cardiovascular complications [8]. Use of *Acorus calamus* for anti-diabetic purpose is limited in Indian system of medicine but utilized as nerve tonic and memory enhancer. It is understood that properties of *Acorus calamus* such as *Tikta Rasa* and *Medhya* are good anti-hyperglycemic effect and to prevent diabetic neuropathy.

Anti-inflammatory study:

Acorus calamus is a traditional remedy for the inflammation problems but their biological function in the human skin cells not well characterized. In an anti-inflammatory study, *Acorus calamus* has been found to inhibit the expression of polyI: C-induced IL-6 and IL-8 which indicates their inhibitory effect on the expression of the cytokines which were likely to be in association with the suppression of NF-κB activation and phospho-rylation of IRF3 which shows *Acorus calamus* can

be used as a promising immunomodulatory agent in the inflammatory skin diseases [9]. *Acorus calamus* has been also found to have inflammatory activity in the tested rat model of vincristine induced painful neuropathy and chronic constriction injury induced neuropathic pain in rats [10].

Antihepatotoxic study:

A research work had found that *Acorus calamus* possesses good anti-hepatotoxic activity. According to this research work, the antihepatotoxic activity of the ethanolic extract of the plant is due to increase in the level of serum hepatic enzymes such as glutamate oxaloacetate transaminase (GOT), glutamase pyruvate transaminase (GPT), alkaline phosphatase (ALP) and total bilirubin in tested models which has in turn showed their recovery from hepatocellular damage in the hepatotoxicity induced animal model. This indicates the ethanol extract brings the anti-lipid peroxidation and / or adaptive nature of the systems against the free radicals damaging effect [11].

Antispasmodic and Anti-diarrheal study:

An antispasmodic and anti-diarrheal study was conducted in rabbits by using calcium channel blockers. According to this study, in the isolated rabbit jejunum preparation the crude extract (Ac. Cr), which tested positive for the presence of alkaloid, saponins and tannins, caused inhibition of spontaneous and high K^+ (80 mm) induced contractions, with respective EC_{50} values of 0.42 ± 0.06 and 0.13 ± 0.04 mg/mL, thus showing spasmolytic activity, mediated possibly through calcium channel blockade (CCB). These results suggest that the spasmolytic effect of the plant extract is mediated through the presence of CCB-like constituent(s) which is concentrated in the n-hexane fraction and this study provides a strong mechanistic base for its traditional use in gastrointestinal disorders such as colic pain and diarrhea [12]. In Ayurvedic classical texts *Acorus calamus* is advised for *Vibandha* and *Udara Shula* which is equivalent to antispasmodic and anti-diarrheal effect, but it can be interpreted that *Acorus calamus* possesses these activities but they are not its main indications. There are other superior drugs than *Acorus calamus* regarding these activities. It may be the reason that *Acorus calamus* is not much utilized in Ayurveda for antispasmodic and anti-diarrheal effect.

Anticancer activity:

An anticancer study was done on the oil obtained from *Acorus calamus.* Essential oil obtained from this plant is b-asarone which is also responsible for its anticarcinogenic activity [13].

Bronchodilatory Activity

In Ayurveda *Acorus calamus* is clearly indicated for cough and asthma. This claim is supported by a recent study which was undertaken to provide a pharmacological basis for traditional use of *Acorus calamus* in airways disorders. For this purpose isolated guinea-pig trachea and atria were suspended in organ baths bubbled with carbogen and mechanisms were found using different parameters. Result shows crude extract of *Acorus calamus* was more effective than carbachol in causing relaxation of high K^+ (80 mM) preconstruction's, similar to verapamil, suggesting blockade of calcium channels [14].

Memory enhancers:-

*Medhya (*memory enhancers*)* is the main indication of *Acorus calamus.* This drug is a very vigorous brain tonic, because it shows results in a very short time. A study on **t**raditional Indian memory enhancer herbs and their medicinal importance showed that *Acorus calamus* increases the overall memory of the person and strengthens the nervous system. In almost all studied civilizations, there have been attempts to discover the best herbs for brain enhancement with minimum side-effects. All the herbs Ayurveda uses for its brain tonics have minimum side-effects and are quite safe for the human beings and *Acorus calamus* is found one of the best drugs among studied herbs [15].

Clinical Study:

Ischemic Heart Disease (IHD):

In clinical trial on 45 patients of IHD at OPD of S. S. Hospital BHU Varanasi the efficacy of the drugs *Acorus calamus* was tested. The patients were

randomly divided into three groups. The first group was given trial drugs in the dose of 1.5-3 g/day in divided dose for 3 months were given. The second group was given purified *Guggulu* (*Commiphora Wightii* (Arn.) Bhandari) in the dose of 9-6 mg/day in divided dosages for 3 months while the third groups was the controlled groups was given capsule containing lactose powder for 3 months .There was an encouraging improvement in the first group and group. The drugs was found to effective in the improvement of chest pain, dyspnea on effort, reducing of the body weight index, improving ECG, decreased serum cholesterol, decreased SLDL (serum low density lipoproteins) and increased SHDL (serum high density lipoproteins) [16].

Depression:

In this clinical study fifty cases of depression at OPD of the S.S Hospital BHU Varanasi; *Acorus calamus* (500 mg in doses of 2 tab three time a day after meal with water) given for a six weeks showed reduction in the degree of severity of depression and better rehabilitation. There was also a significant improvement in the assessment based in the rating of symptoms on Hamilton depression rating scale. The rate of improvement before and after treatment was statically significant.($p<0.001$) [17]. This study strongly elaborates the classical claim of *Acorus calamus* as brain tonic.

Discussion:

Few herbs mentioned in classical texts are found highly useful in treating large number of different ailments. *Acorus calamus* is one of such herb. Classical texts have mentioned its properties in brief but utilized this drug in numerous formulations. The dried rhizomes of *Acorus calamus* is emetic, stomachic used in dyspepsia, colic and as nerve tonic, It considered to passes antispasmodic, carminatives, insect fuse and anthelmintic properties and are used for the treatment of host disease such as epilepsy and other mental ailments, chronic diarrhea and dysentery, bronchial catarrh, intermittent fever, snake bite and glandular and abdominal tumors. It is also employed for kidney and liver, troubles rheumatisms and eczema. The rhizome is used in the form powder, balm, enemas, and pills and also in ghee preparation. The skin of rhizomes is said to hemostatic.

Conclusions:

The above studies support that *Vacha* is the good Ayurvedic herb for medicinal purpose. *Acorus calamus* is effective against bacteria and fungi and can be used as antibacterial and antifungal drug. *Acorus calamus* is a very good brain tonic and possesses significant memory enhancer effect. Experimental studies indicate that *Acorus calamus* is useful in the diabetes, as an anti-inflammatory, in IHD, Anti-cancer, anti-spasmodic, anti-bacterial, bronchodilator, anti-hepatotoxic activity and in depression. These all research works elaborates all indications mentioned in Ayurvedic classical texts.

References:-

[1] Divya G, Gajalakshmi S, Mythili S, Sathiavelu A. Pharmacological activities of Acorus calamus: a review: J Asian J Biochemical and Pharmace Rese 2011;4:1:2231-2560

[2] Khare CK. Indian Medicinal Plants, an Illustrated Dictionary, Springer Science, Springer-Verlag, Berlin/Heidelberg 2008, p. 16.

[3] K. Pokharel, B.R. Dhungana, K.B. Tiwari & R.B. Shahi., Antibacterial Activities of Some Indigenous Medicinal Plants of Nepal, http://kiranbabutiwari.blogspot.com/2008/07/antibacterial-of-some-html. **LAD**

[4] Phongpaichit S, Pujenjob N, Rukachaisirikul V, Ongsakul M. J Sci Technol 2005,27

[5] Tiwari N, Chaudhary A, Mishra A, Bhatt G. Intern J Chemi and Anal Sci. 2010:1:9::211

[6] Asha S, Deepak G. Antimicrobial activity of Acorus calamus (L.) rhizome and leaf extract. Acta Biologica ,2009;53:1:45

[7] M.M. Si , J.S. Lou, C.X. Zhou, J.N. Shen, H.H. Wu, B. Yang, Q.J. He & H.S. Wu., Journal of Ethanopharmacology., 2010, 128, 154.

[8] Wu HS, Zhu DF, Zhou CX, Feng CR, Y. Lou J, Yang B. He QJ. J Ethnopharmacology. 2009;123: 288

[9] Kima H, Hanb TH, Leea SG. J Enthanopharmocology. 2009:122:149

[10] Muthuraman A, Singh N, Jaggi AS. Food and Chemical Toxicology. J Complem and Altern Med. 2011;11:24

[11] Palani S, Raja S, Kumar P, Venkadesan D, Devi K, Sivaraj A, Kumar S. Intern j Interg Biology, 2009;7:1:39.

[12] Gilani AH, Shah AJ, Ahmad M, Shaheen F. Antispasmodic effect of acorus calamus Linn. in rabbits mediated through calcium channel blockade. Phytother Res 2006;20:1080-4

[13] S. Palani, S. Raja, P. Kumar, P. Parameswaran, S. Kumar. Acta Pharmaceutica Sciencia, 2010; :52:89

[14] Nalamwar VP, Khadabadi SS, Aswar PB, Kosalge SB, Rajurkar RM et al. In vitro licicidal activity of different extracts of Acorus calamus Linn. (Araceae) Rhizome. Int J Pharm Tech Res 2009;1:96-100.

[15] Debjit B, Chiranjib, Tiwari P, Tripathi KK, Sampathkumar KP. Traditional Indian memory enhancer herbs and their medicinal importance; J Annals of Biological Res 2010;1:1:41-46

[16] Mamgain P, Singh RH. Control clinical trial of the Lekhaniya drug Vaca (Acorus calamus) in case of ischemic heart diseases. J Res Ayur Siddha 1994;15:35-51

[17]Tripathi AK, Singh RH. Clinical study on an indigenous drug Vaca (Acorus calamus) in the treatment of depressive illness. J Res Ayur Siddha 1995;16:24-34