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Efficacy of Aqueous Extract of *Jati Patra* (Jasminum grandiflorum L.) against Staphylococcus aureus from *Dushta Vrana* (Non Healing Ulcer)

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ABSTRACT

Chronic non healing ulcers cause considerable morbidity especially in old people. Diabetic ulcer of the leg can be life threatening causing complications such as diabetic ketoacidosis and septicemia. *Jati* is a drug mentioned among *kushtaghnagana* in Ayurveda and studies have shown its antimicrobial effect against various micro organisms. In current study, action of aqueous extract of *Jatipatra* (*Jasminumgrandifloruml*.) for sensitivity against *Staphylococcus aureus* derived from pus of non-healing ulcer subjected to culture is evaluated. From this study, it is evident by observation and result of mean zone of inhibition that aqueous extract of *Jatipatra* possesses antimicrobial action against the bacterium *Staphylococcus aureus*. Further it is also evident that as the concentration of aqueous extract of *Jatipatra* increases the zone of inhibition for *Staphylococcus aureus* also increases.

KEYWORDS

Non healing ulcer, dushtavrana, jatipatra, pus culture and sensitivity, Staphylococcus aureus

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INTRODUCTION

Chronic non healing ulcers especially in old people cause considerable morbidity. Diabetic ulcer of the leg can cause life threatening complications such as diabetic ketoacidosis and septicemia[1]**.** An ulcer does not heal due to continuous infection by various microorganisms among them, more common are bacterial. Majority of bacteria are endogenous. Pus culture and sensitivity is identified as a tool to identify such organism responsible for the infection and through sensitivity evaluation appropriate drug is selected for management. *Staphylococcal* infections are among the most common of bacterial infections and range from trivial to fatal. Usually the infections are characteristically localized pyogenic lesions[2].Prehistoric people undoubtedly recognized the benefit or effects of many plant materials. Early written records list remedies of many types including a few that are still recognized as useful drugs today[3].

According to WHO (1993) almost 80% of the world's population is dependent on traditional medicine and a major part of traditional therapies involve the use of plant extracts or their active constituents. The traditional medicinal methods, specially the use of medicinal plants play a vital role to cover the basic health needs in developing countries. Therapeutic action is bestowed by most of the plant drugs by their krimighna (anti microbial) property. Hence such drugs needs be analyzed for action against specific microorganisms so that an upashaya effect of such drugs can be generated on micro organisms in vitro.

Jati is described to be useful for *vranashodhana* and *ropana*and is widely used in folklore practice**[4].**But its efficacy on *Staphylococcus aureus* from non-healing ulcer has not been investigated. In current study, action of aqueous extract of *Jati* leaves for sensitivity against *Staphylococcus aureus* derived from pus of non-healing ulcer subjected to culture is evaluated.

AIMS & OBJECTIVES

To evaluate the sensitivity of aqueous extract of *Jati patra (Jasminum grandiflorum L.)* on *Staphylococcus aureus* from pus of *dushta vrana* (non healing ulcer) subjects by culture and sensitivity in vitro.

MATERIALS AND METHODS

A minimum of 30 subjects aged between 18-70 years of either gender irrespective of caste, religion and presenting with non healing ulcer of at least more than six weeks duration with *Puyasrava* and with or without following *dushta vrana lakshanas*

like: *Kandu*, *Amanojnagandha*, *Atisamvrutha*, *Atimrdu*, *Atyavasanna*, *Rakta, Krishna, pandu varna*, covered with *putimamsa*, *Shotha*, *paka*, *unmargi vrana* and excessive *dushta shonita* discharge from outpatient and inpatient Departments of Tertiary Ayurveda Hospital, Hassan was included in the study.

Subjects with any other complication that may interfere in the course of study like Tubercular and malignant ulcer, AIDS and ulcer of less than six weeks duration was excluded from the study.

Research Design

An observational experimental study

METHODOLOGY

Aqueous extract of *Jati patra* was prepared by cold maceration method using 100g of fresh and clean *Jati* leaves weighed using a weighing balance. The leaves were then crushed in a clean mortar and pestle coarsely without adding water. Purpose of not adding water at this stage was to enhance the entry of distilled water an extracting solvent into the plant cells later in the process of aqueous extraction. This helps in easy release of active principles. Crushed *Jati* leaves were added to 300ml distilled water taken in a 1000ml capacity conical flask. This was then plugged tightly with cotton and was sealed with tape. The conical flask was shaken manually for 10-15min at an interval of every 3 hours. The procedure was repeated for 7 days during day time. On the 7th day, the content of conical flask was filtered, that yielded 210ml of filtrate. The filtrate was then kept over water bath in a petri dish at 70℃.7grams of aqueous extract of *Jati patra* was obtained by this process.

Pus sample was collected from subjects of *dushta vrana* by touching the vrana with a sterile cotton swab and streaking was done on Mc Conkey and blood agar plates. The plates were then kept for 24 hour culture in incubator at 37℃. Identification of bacteria was done by studying the colony morphology and microscopic examination by gram staining. Further coagulase test was performed to confirm *Staphylococcus aureus* as coagulase positive.

Different concentrations of aqueous extract of *Jati patra* were prepared by dissolving 5g of aqueous extract in 10ml of distilled water which gave a stock solution carrying 500µl/ml of drug concentration. From the stock solution different concentrations like 400µl/ml, 300µl/ml, 200µl/ml, 100µl/ml and 50µl/ml of the aqueous extract were prepared.

Muller Hinton agar plates were uniformly swabbed with standard McFarland inoculums. The different concentrations of drug were then subjected to anti bacterial sensitivity test by well diffusion method. Six equidistant wells were made on the

plates with the help of sterile cork baurer.100µl of aqueous extract of different concentrations were poured into labeled wells on different plates. All the plates were incubated at 37℃ for 24 hours after which zone of inhibition was measured with a ruler in mm.

Assessment criteria

If a drug is sensitive, a clear circular 'halo' (zone of inhibition) appears around the well that denotes absence of bacteria which in turn indicates the particular drug is effective against that bacterium.

OBSERVATION AND RESULTS

In vitro antibacterial activity of aqueous extract of *Jati patra* was evaluated by agar well diffusion method and zone of inhibition was measured as shown in table 1.

Table 1 Mean values of zone of inhibition at different concentrations of aqueous extract of *Jatipatra* against *Staphylococcus aureus*

Different concentrations of aqueous extract of *Jatipatra* (µl/ml)	500	400	300	200	100	50
Total number of patients (N)	30	30	30	30	30	30
Mean zone of inhibition (mm)	16.43	14.90	13.07	11.53	8.03	3.57

The invitro study showed that susceptibility of *Staphylococcus aureus* against aqueous extract of *Jati patra* is fairly evident between 20mm to 16mm. Hence it is considered sensitive, 14 to 12mm is intermediate, hence moderately sensitive and below 10 mm zone of inhibition is considered as resistant. In the present study *Staphylococcus aureus* organism is sensitive to 500 µl/ml; moderately sensitive to 400 µl/ml, 300 µl/ml 200µl/ml; whereas it is resistant to 100µl/ml and 50µl/ml.

DISCUSSION

In the present study 92 subjects with *dushtavrana* (non healing ulcer) were screened. Among them 30 subjects fulfilled the diagnostic and inclusion criteria and remaining 62 subjects were excluded. Among excluded 16 were without *Puyasrava*, 5 were not in inclusion age group, one had ulcer of less than 6 weeks duration, 37 samples had bacteria other than *Staphylococcus* on culture and 3 samples had *Staphylococcus* on culture, but turned coagulase negative.

Plants and their constituents are the best choice than any other synthetic chemical. Most of the drugs used in preparing formulations have their origin and roots in plants which form the chief natural source of medicine. In Charaka Samhita *Jati* has been mentioned under *kushtaghna gana*[5].Susruta has mentioned *Jati* as an ingredient of *samshodana*[6] and

ropanaghritha[7].He has mentioned its therapeutic use in *atisara pratisheda*[8], *shlemabhishyandapratisheda*[9] and *mukharogachikitsa*[10].*Jati* possesses *tikta* and *kashaya rasa*; *mrdu*, *laghu* and *snigdha guna*; *ushna veerya* and *katu vipaka*.It is *tridoshahara, vrana shodhana, vrana ropana, kushtaghna, kandughna, rakta prasadana, mutra janana* and *vishaghna*[11]. In present study cold maceration method was chosen as it is very easy to perform, cheap and simple without using any complex instruments but yields highly potent extract with many bio active principles.By assessing the mean values of zone of inhibition shown by the aqueous extract of *Jati patra* (*Jasminum grandiflorum*) against *Staphylococcus aureus* shows that the organism is sensitive to 500 µl/ml; moderately sensitive to 400 µl/ml, 300 µl/mland 200 µl/ml; whereas it is resistant to 100 µl/ml and 50µl/ml.

Active phytochemical constituents present in *Jati patra* aqueous extract interferes with different mechanisms with *Staphylococcus aureus* like altering the surface tension of the extra cellular medium of organism cell, complexing with extracellular and soluble proteins, obtruding with DNA of organism cell etc. Different strains of gram positive bacteria have antimicrobial effects involving inhibition of various cellular processes followed by an increase in plasma membrane permeability and finally ion leakage from the cells. Different concentrations of aqueous extract of *Jati patra* showed different zones of inhibition. This is because different components diffuse at different rates that produce varying zones of inhibition against the bacterium *Staphylococcus aureus*. In higher concentrations of aqueous extract, the drug content is more, hence showing significant zone of inhibition. On diluting the concentrations, the active components completely dissolve into the solution. So the drug is incapable to give antibacterial action even though it reaches and set at cell membrane. Even though the drug has active phytochemical contents, the variation of susceptibility of *Staphylococcus aureus* could also be attributed to its intrinsic properties, cytological characteristics and permeability of cell surface to the aqueous extract. Porosity of cell membrane also varies from cell to cell under different conditions and the membrane inhibits cell structure perturbations owing to its defense against phytochemical components.

CONCLUSION

From this study, it is evident by observation and result of mean zone of inhibition that aqueous extract of *Jati patra* (*Jasminum grandiflorum l.*) possesses antimicrobial

action against *Staphylococcus aureus* from pus of *dushta vrana* (non healing ulcer).Further it is also evident that as the concentration of aqueous extract of *Jati patra* (*Jasminum grandiflorum l.*) increases, the zone of inhibition for *Staphylococcus aureus* also increases.

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