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Original Article

Effect of *Ocimum sanctum Linn (Tulsi) leaves* on pyrexia

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ABSTRACT

Background: Drug therapy of fever with Standard drugs, are always accompanied by side effects which is a well-known factor and the therapy is open to other alternative/adjuvant supplements/ medications with no/minimal side effects. Our traditional "holy herb" *Tulsi* are indicated for all reasons and in all the seasons. In view of this, a trial was conducted for their antipyretic activity. ***Objective***: To assess the anti-pyretic property of *Ocimum Sanctum Linn fresh (tulsi) leaves*, (native) preparation, in experimentally induced acute fever in animal models. ***Methodology:*** Adult *Wistar Albino Rats* of both sex weighing 125-150gms were randomly divided into 2 groups (n=6); First group were the control subjects (distilled water), and the second were the test group (fresh *Tulsi* leaves (400mg/kg). After recording the basal temperature, fever was induced by injecting 15% of brewer's yeast. 18 hrs after giving injection, each rat was fed orally with vehicle and test drug accordingly. Temperature was recorded to all animals at every 30, 60,120 and 180 minutes respectively. ***Results:*** There was a significant reduction of fever in *Tulsi* group whereas the temperature control was not significant statistically in control group. ***Conclusion:*** Tulsi may be used as primary drug in the therapy of fever.

Key words: *Ocimum Sanctum Linn (tulsi)*, Effect, Fever

INTRODUCTION

Medicinal properties of Ocimum *sanctum Linn (Tulsi)*, are known from ancestral age by various civilizations of the world. In recent years there has been a resurgence of interest in investigating the traditional health promoting uses of *Tulsi.* The success behind the nutritional and pharmacological properties of the whole herb in its natural form being used, traditionally may results from the synergistic interactions of many different active phytochemicals constituents present and the effects of *Tulsi* cannot be fully duplicated with isolated compounds or extracts[1]. Because of their inherent botanical and biochemical complexity, *Tulsi* standardization has been so far, eluded modern science. Although, *Tulsi* is known as a general vitalizer and increases physical endurance, it does not contain either caffeine, or other CNS stimulants. While recognizing the importance of broadening western medical perspective, the World Health Organization has recommended that, by integrating the traditional health and folk medicine systems with modern medical therapies, can address the health problems more effectively worldwide [2].

Tulsi is "The Queen and the mother medicine of nature" meaning, a plant with innumerable bio pharmacological properties for curing and preventing many diseases**,** including fever [3]. *Tulsi* is described as a "holy medicinal plant" in ancient literature. The medicinal values of *Tulsi* are well documented in the Hindu Mythology and considering the health beneficial effects of *Tulsi* our ancestors in India has insisted, to plant a *Tulsi* sapling in each and every household. The name *Tulsi* is derived from Sanskrit', which means "matchless one". *Tulsi* belongs to the family Labiatae, characterized by square stem and specific aroma. Botanical name of *Tulsi* is Ocimum sanctum (Linn). Ayurvedic texts categorise *Tulsi* as a stimulant, aromatic and antipyretic [4,5,6]. The various biopharmacological activities of *Tulsi* are, antibacterial, antioxidant, antiulceric, antimalarial, antidiabetic, anti-inflammatory, antilipidemic, anticancer and immunomodulatory properties[7]. Eugenol (l-hydroxy-2-methoxy-4-allylbenzene), the active constituent present in Ocimumsanctum *Linn*, has been found to be largely responsible for the various pharmacological activities [8,9]. Scientific explorations of medicinal properties of

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Tulsi was given importance mostly after the middle of the 20th century only. The maximum tolerated dose of Ocimum sanctum is more than 4000mg/kg body weight and the approximate LD_{50} is 4505 mg/kg body weight. *Tulsi* is one of the safest and well tolerated herbal medicine, which was proved in various studies [10]. The only side effect reported was constipation. *Ocimum sanctum* is known to have antistress, rejuvenating property and it also increases longevity by its anti-aging properties [11]**.** This has been recently proved by Sembulingam et al, for its antistress effects against a different type of stress i.e. noise pollution in rats. Studies had been reported in the literature to explore Gas liquid chromatographic analysis of fixed oil of *Ocimum sanctum* revealed the presence of five fatty acids (stearic, palmitic, oleic, linoleic and linolenic acids) which in further studies, demonstrated significant anti-inflammatory activity [12,13]. Scientific evidences are available on various medicinal aspects i.e. antimicrobial, adaptogenic, antidiabetic, hepato-protective, anti-inflammatory, anti-carcinogenic, radioprotective, immunomodulatory, neuro-protective, cardio-protective, mosquitorepellent *etc* [14,15]. Recent studies suggest *tulsi* may be a COX-2 inhibitor, like many modern pain killers, due to its high concentration of eugenol (1-hydroxy-2-methoxy-4-allylbenzene [16**]**. So on consideration of the bio-pharmacological properties of *Tulsi,* we have undertaken a trial to prove its antipyretic activity. It is evident that, the treatment with conventional drugs, are always accompanied by adverse effects and there is always a search for other medications with no/minimal side effects [17]. So for, various extracts of *Tulsi* was used for its biopharmacological actions like analgesic, anti-inflammatory activities and only few trials are available for its antipyretic property with native preparation. Hence, we have undertaken this project to prove the antipyretic property in rat model.

METHODOLOGY

This present randomized control trial was conducted after getting approval from the Institutional Animal Ethics Committee. *Wistar Albino Rats* weighing 125-150 grams of either sex were selected. They were randomly divided into 2 groups (n=6). The first group was treated with placebo and the second group, fed with fresh *Tulsi* preparation, dissolved in distilled water (400mg/kg). The rectal temperature was recorded by using thermocouple (thermometer) specially meant for animals. Only those animals with a temperature of 38 degree centigrade were included in this research. After recording the basal temperature in all the animals, fever was induced by 15% of brewer's yeast suspension, injected subcutaneously behind the nape of the neck. The injection site was massaged to spread the medicine. 18 hrs after post challenge, each group was fed orally with the placebo (distilled water) and test drug respectively. Again temperature recordings were done to all animals at every 30, 60,120 and 180 minutes. All the parameters recorded were analyzed for statistical significance.

Statistical analysis and Interpretations

The randomized control trial (RCT) within placebo and drug treated groups were analyzed and interpreted by student paired "t" test. The between two groups were analyzed on different occasions, by repeated measures of ANOVA and confirmed accordingly. The P-values less than or equal to 0.05 ($P \leq 0.05$) was treated as statistically significant.

RESULTS

The placebo and Tulsi groups were studied within them from basal to 30 mints, 30-60mints, 60-120mints, 120-180 mints respectively and base to 180 mints. The mean weight of the placebo group were 133.7±12.9 gram and that of experimental were 136±11.8 gram. The difference of weight between the groups was not statistically significant ($P>0.05$) and hence the two groups were comparable.

DISCUSSION

The above results showed that there was no significant fall of temperature in the control group, whereas in respect of test group the temperature was decreased in first half an hour (from basal-30 mints) which was highly significant statistically ($P<0.05$). Thereafter from 30-60mints, 60-120 mints, and 120-180 mints the temperature was either decreasing or increasing and basal to 180 mints was also not significant because being an acute study, the subsequent doses were not repeated. We have used only natural (crude) preparation which itself has reduced temperature significantly in the initial period. Detailed large group studies are needed for confirming the antipyretic prospect in future. The observations made in this project is well in accordance with one study, wherein they have used methanolic and aqueous extracts for treating typhoid and paratyphoid A/B Vaccine induced fever. In their study the antipyretic activity was weaker and lasted for shorter period [18**]**. This native preparation was very well tolerated by our study subjects, as there was no change in their behavior, food and water consumption. This trial was on par with another toxicological study in which, they have proved no change in either morphological, hematological,

biochemical, or histological variables. All the study subjects did not show any hazardous sign of CNS/ANS toxicities [19**]**. Being an acute study, we have not done any bio-chemical and other variables because no animal was sacrificed. So *Tulsi* is going to be one of the well tolerated and safe drug, and the same was proved in our trial also.

CONCLUSIONS

This scientific research has proved that, the crude natural preparation of *Tulsi* itself, without any processing has effective antipyretic action, which in future may be used as a primary/adjuvant drug along with other standard medications in the therapy of fever with a reduction in their dosage/minimal side effects, and to a lesser cost to the beneficiary.

Suggestions for important major burning issues: In this stressful era, the fragmented approach of modern allopathic medicine has not been able to cope with the growing array of chronic degenerative environmental, lifestyle and personal stress-related disorders that plague modern society. Scientific evidences has proved *Tulsi's* stress-bursting and antioxidant properties, in addition to many specific therapeutic applications, and the powerful general adaptogenic properties at cellular level itself offer significant preventive and curative potential in respect to the stress-related degenerative diseases endemic to industrialized population.

1. Keeping the various bio-pharmacological actions of *Tulsi*, further human trials can be done with the natural components pertaining to the management of life style related metabolic disorders like diabetes and hyperlipidaemia, which could be potentially health beneficial but comparatively less toxic as the existing standard therapies are with proven adverse effects.
2. Significant complementary role is emerging for traditional herbal medicines. So it can be stated that, *Tulsi* will definitely reduce the economical burden to our Health Machinery. *Tulsi* being very well grown in tropical and subtropical region and its easy availability and affordability, it can be concluded that *Tulsi* is going to be a great boon to the developing countries like India.

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TABLE -1: EFFECT OF PLACEBO FROM BASAL THROUGH 180 MINUTES:

Levels (mints)		I		II		Effects				
I	**II**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**"t"**	**df**	**Sig**
Basal	30	98.9	0.8	97.8	0.8	1.0	0.4	2.455	5	P>0.05
30	60	98.8	0.9	98.5	1.3	0.3	1.6	1.702	5	P>0.05
60	120	98.5	1.3	99.0	0.8	0.5	1.9	0.629	5	P>0.05
120	180	99.0	0.8	100.0	0.8	1.0	1.3	1.872	5	P>0.05
Base	180	98.8	0.8	100.0	0.8	1.2	1.4	2.036	5	P>0.05

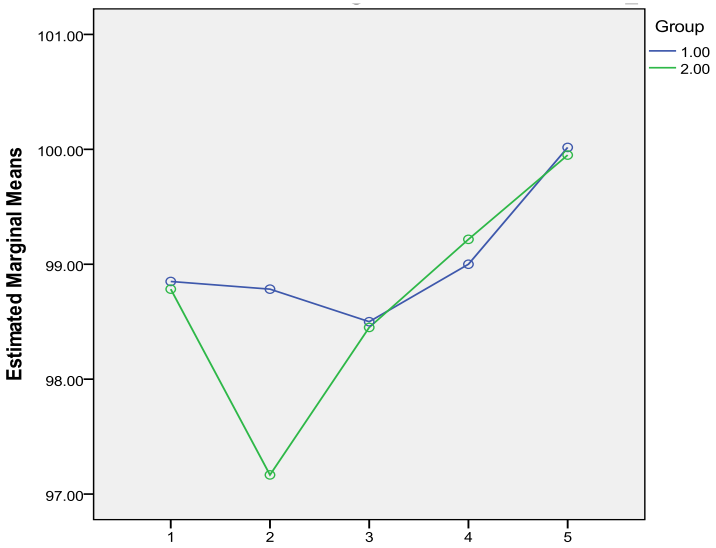
The table -1: shows the fluctuations of temperatures from basal through 180 minutes. The reduction of temperature was not statistically significant from basal through 180 minutes as shown in the table (P>0.05).

TABLE-2: EFFECTS OF TULSI FROM BASAL THROUGH 180 MINUTES:

Levels(mints)		I		II		Effects		"t"	df	Sig
I	**II**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**			
Basal	30	98.8	1.8	97.2	2.5	1.6	0.8	4.701	5	P<0.01
30	60	97.2	2.5	98.4	0.8	1.3	2.4	0.962	5	P>0.05
60	120	98.4	1.6	99.2	1.5	0.8	1.0	0.198	5	P>0.05
120	180	99.2	1.5	100.0	0.9	0.7	2.1	0.872	5	P>0.05
Base	180	98.4	2.1	100.0	0.9	1.2	2.3	1.355	5	P>0.05

The above Table-2: Indicates the trends of temperature fluctuations from basal through 180 minutes. The mean temperature of basal was 98.8±1.8 and at 30 minutes was 97.5±2.5.the difference of temperature reduction was statistically highly significant (P<0.05). The other trends were not differed with statistical significance (P>0.05).

FIG-1: **COMPARISON OF TEMPERATURE REDUCTIONS BETWEEN THE TWO GROUPS FROM BASAL THROUGH 180 MINUTES FOR CONFIRMATION.**



***Trends of temperature*:**

Levels at minutes: Base 30 60 120 180

The above Fig-1: states the temperature of both groups and compare the trends of temperature in different levels at base, 30 minutes, 60 minutes, 120 minutes and 180 minutes.

REFERENCES

1. Skaltsa H et al. Phytochemical study of the leaves of *Ocimum sanctum.Fitoterapia* 1987; 8: 286.
2. Priyabrata Pattanayak et al. *Ocimum sanctum Linn.* A reservoir plant for therapeutic applications: J Ayurveda Integr Med. An overview Pharmacogn Rev 2010; 4(7):95–105.
3. Kalabharathi H L et al. Anti-Inflammatory Activity of Fresh *Tulsi Leaves* (*Ocimum Sanctum*) in Albino Rats. International Journal Of Pharma And Bio Sciences 2011; Vol 2,Issue 4:45-49
4. Shankar Mondal1 et al. Bijay R. Mirdha And Sushil C. Mahapatra1.The Science Behind Sacredness Of *Tulsi (Ocimum Sanctum Linn.)* Review Article; Indian J Physiol Pharmacol 2009; 53 (4) : 291–306
5. Sen P. Therapeutic potentials of *Tulsi* from experience to facts. Drugs News & Views 1993; 1(2): 15–21.
6. Gupta S et al. Antidiabetic, hypocholestrolaemic and antioxidant effect of *Ocimum sanctum* (Linn) seed oil. *Indian J Exp Biol* 2006; 44: 300–304.
7. Vogel HG. Analgesic, anti-inflammatory and antipyretic activity. In:Vogel WH, Scholkens BA.eds. Drug discovery & evaluation Pharmacological Assays, 2nd edition, New York, Springer 2002; pp.759-767.
8. Prakash P, Gupta N. Therapeutic uses of *ocimum sanctum linn (tulsi)* with a note on eugenol and its Pharmacological actions), ashort review. Indian J Physiol Pharmacol 2005;49 (2) : 125–131.
9. S.A. Dahanukar et al. Pharmacology Of Medicinal Plants And Natural Products Indian Journal Of Pharmacology 2000 ; 32: S81-S118
10. M.K Gautham, RKGoel. Toxicological studies of *Ocimum sanctum* Linn. *(Tulsi)* in Hematological, Biochemical and Histopathological studies.*New Botanist* 2014; 21: 139–146.
11. H.S.Puri. Rasayana: Ayurvedic Herbs for Longevity and Rejuvenation. CRC Press 2002; pp. 272–280.
12. Bakkali F et al. Biological effects of essential oils-A review. FoodChem Toxicol 2008; 46: 446–475.
13. Norr H, Wanger H. New Constituents from *Ocimum sanctum*. Planta Med 1992 ; 58: 574.
14. Singh V et al. *Ocimum Sanctum* (tulsi): Bio-pharmacological Activities. Webmed Central Pharmacology 2010; 1(10):WMC001046
15. Marc Maurice Cohen.Tulsi - *Ocimum sanctum*: A herb for all reasons: Pharmacogn Rev 2014; 5(4):251–259.
16. Shokeen P et al. In vitroactivity of eugenol, an active component from *Ocimum sanctum*, against multi -resistant and susceptible strains of *Neisseria gonorrhoeae*. *IntJ Antimicrob Agents* 2008; 32: 174–179.
17. Kuhn M A et al. Winston & Kuhn's Herbal therapy And Supplements: A Scientific And traditional Approach, 2nd Edition, Lippincott Williams & Wilkins Publisher 2007; Pp.260
18. Godhwani S et al. "*Ocimum sanctum*: an experimental study evaluating its anti-inflammatory, analgesic and antipyretic activity in animals." J Ethnopharmacol 1987; 21(2):153-63).
19. Singh S, Majumdar DK. Toxicological studies of the fixed oil of *Ocimum sanctum* Linn. (Tulsi).*New Botanist* 1994; 21: 139–146.