Biomedical and Biopharmaceutical Research
Abbreviation: Biomed. Biopharm. Res.
Volume: 22: Issue: 01 |Year: 2025
Page Number: 555-557

Ethanolic Extract of Tamarind Leaves - A Promising Safer Antioxidant to Check MRSA Endocarditis and Heat Stress

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Article Received:20-03-2025

Article Accepted:28-04-2025

Abstract

MRSA endocarditis and heat Stress are two major health challenges in humans and pets. Both the disease conditions cause significant morbidity and mortality. Conventional treatments of these two disease conditions consist uses of synthetic MRSA sensitive antibacterial drug with synthetic steroidal or nonsteroidal drug for MRSA endocarditis depending on severity and hydrating electrolytes and or nomal saline intravenous infusion with synthetic steroid administration in a severe degree of heat stress. However, conventional treatments of MRSA endocarditis and heat stress may fail in some cases. Moreover, uses of synthetic drugs may result in side or adverse effects in patients. A safer antioxidant i.e. ethanolic extract of tamarind leaves has potential to be used as a promising strategy to check MRSA endocarditis and heat stress if these disease conditions are diagnosed promptly by registered medical practitioners in humans and by veterinary doctors in pet animals or domestic animals although ruminant animals are generally not susceptible to these disease conditions.

Keywords: Clinical Observation, Ethanolic Extract of Tamarind Leaves , Safer Antioxidant , Effects on MRSA Endocarditis , Effects on Heat Stress , Safety of Ethanolic Tamarind Leaves' Extract in Humans.

INTRODUCTION

Tamarind tree grows naturally in Asia, Africa and the Americas. The evergreen tree of pea family is more valued for fruits and seeds for medicinal activities and as food items in different edible forms. The beautiful small flowers of Tamarind tree are found to appear at 8 to 9 years of age of the tree. Tamarinds as ripe fruits become available after approximately 5 months of flowering of the tree. However, tamarind laves are easily accessible throughout the year. A research project was designed to evaluate effects of aqueous and ethanolic extracts of tamarind laves in chronic fluoride toxicosis by exposing female albino rats to 200 ppm of sodium fluoride continuously through drinking water for consecutive 60 days [1]. Aqueous and ethanolic extracts of tamarind leaves were administered at two different dose levels at 200 mg/Kg and 300 mg/Kg respectively orally once daily for consecutive 60 days to four separate groups of orally fluoride exposed rats keeping one group as healthy control and another orally fluoride exposed rats to sodium fluoride through drinking water at 200 ppm for consecutive 60 days as control chronic fluoride toxicity group. Different biochemical parameters like superoxide dismutase, catalase, erythrocyte lipid peroxidation activities with reduced glutathione level and protein concentration were done from blood and tissue homogenates of liver, kidney and heart tissues to assess protective effects of water and ethanolic extracts of tamarind leaves. The protective effects of both water and ethanolic extracts of tamarind leaves were observed mainly exerting antioxidant effects due to the free radical scavenging activities [1]. Antioxidant activities along with body fluoride accumulation reducing activities were better produced at 300 mg/Kg of ethanolic and water extracts of tamarind leaves. Stress relieving activities were produced better by ethanolic extract compared to aqueous extract of the leaves as evidenced by observation of clinical signs between the different extracts treated groups considering control chronic fluoride toxicity group as highly stressed group. Stress relieving signs of rats were becoming active from a fatigued condition, normal movement compared to static posture, consumption of sufficient food during night time compared to reduced food intake during nighttime in chronic fluoride toxicity group because rats have nocturnal food intake habit.

Another research work was planned to test effectiveness of ethanolic extract of tamarind leaves in septic arthritis model of rabbit. The safety study of ethanolic extract of tamarind leaves was also conducted by oral dosing at a single dose of 5 gm/Kg bodyweight (Acute oral toxicity study) and sub-acute oral toxicity study following repeated oral dosing at 2 gm/Kg bodyweight once daily for consecutive 28 days in rabbits [2]. Ethanolic extract of tamarind leaves was orally administered to septic arthritis induced rabbits at 500 mg/Kg bodyweight and 1000 mg/Kg bodyweight once daily for consecutive 14 days. Ethanolic extract of tamarind leaves both in acute oral and sub – acute oral toxicity studies did not produce any kind of adverse effect in rabbits. Ethanolic extract of tamarind leaves more particularly at 1 gm/Kg bodyweight significantly reduced profuse swelling of the joint, redness and lameness of the affected leg with a satisfactory histomorphological scoring indicating recovery of rabbits from septic arthritis [2]. The research findings signaled that the ethanolic extract of tamarind leaves at 1 gm/Kg bodyweight orally once daily for consecutive 14 days can counteract both sepsis and inflammation.

The antioxidant, stress relieving, anti-inflammatory activities along with satisfactory activity to check sepsis by ethanolic extract of tamarind leaves at 1 gm/Kg bodyweight may be well utilized to prevent heat stress by oral consumption once daily for consecutive 28 days in domestic animals, pets as well as in humans as the leaf extract was proved safe and practically non toxic. People and animals are more susceptible to heat stress during summer season particularly in Africa and Asia continents. Many people also work for a longer period during day time in summer season being exposed to scorching sun. Animals including birds are susceptible to heat stress during summer season. The ethanolic extract of tamarind leaves at recommended dosage regimen can be effectively used to control heat stress. A Germany patent (Utility Model No. 20 2022 103 574) had been granted to the author entitled “A system for evaluating the effectiveness of an ethanolic extract from *Tamarindus indica* L. leaves for the treatment of septic arthritis”.

METHOD

Clinical observations and recording of signs of aqeous and ethanolic extracts of Tamarind leaves' treated at 200 mg / Kg and 300 mg / Kg bodyweight orally once daily for consecutive 60 days to chronic fluoride toxicity group of albino rats compared to control chronic fluoride toxicity group of albino rats and healthy group of albino rats were duly done.

Clinical observations of signs of ethanolic extract of tamarind leaves treated at 500 mg / Kg and 1000 mg / Kg bodyweight once daily orally for consecutive 14 days to septic arthritis induced rabbits that was experimentally induced by *Staphylococcus aures* and showed resistance to methicillin following antibiotic sensitivity test (AST) comparing to same *Staphylococcus aureus* induced septic arthritic rabbits treated by a recommended oral dosage regimen of linezolid for rabbits were also recorded.

A safety study along with observation of clinical signs was also conducted in humans from November' 2025 to April' 2025 for those were suffering from septic arthritis duly diagnosed by their family doctors and who willingly consumed dried ethanolic extract of tamarind leaves at 1 gram / Kg bodyweight mixing with sufficient volume of drinking water orally once daily for consecutive 14 days.

RESULTS AND DISCUSSION

Methicillin Resistant Staphylococcus Aureus (MRSA) may sometimes cause endocarditis in humans or pet animals which become difficult to treat due to its resistance to most of the antibiotics and or antibacterial drugs including methicillin.MRSA endocarditis remains as a growing concern as the disease causes significant morbidity and mortality more particularly in prosthetic valve endocarditis. Endocarditis caused by MRSA is not only the infection of inner lining of heart's chambers and valves but, an inflammatory condition of the cardiac tissues present in inner lining of cardiac chambers and valves. Administration of antibacterial drugs like vancomycin, linezolid, daptomycin or teicoplanin are conventionally employed for treatment of MRSA endocarditis in human patients though vancomycin with rifampicin or gentamicin is often preferred more particularly for treatment of prosthetic valve endocarditis.

Although these bactericides can kill MRSA but , can not protect the cardiac tissues from MRSA induced inflammatory damage to cardiac tissues of heart's chamber and valves. Therefore, the conventional treatment of MRSA endocarditis many times need administration of steroidal or nonsteroidal drug in some complicated cases of MRSA endocarditis by learned medical practitioners. Moreover , administration of these antibacterial drugs or antibiotics more often by intravenous route along with synthetic steroidal or synthetic anti - inflammatory drug in some complicated cases may result in adverse side effects. But , the tested ethanolic extract of tamarind leaves was found to be safe and effective in human septic arthritic patients particularly after oral consumption of the dried ethanolic extract of tamarind leaves mixing with sufficient volume of drinking water following 2 hours of breakfast once daily for consecutive 14 days (the written documents of the recovery of human septic arthritic patients without any marked adverse effect are kept by the author and may be documented whenever asked by competent human health regulatory authority).

The effectiveness of ethanolic extract at 1 gram / Kg bodyweight orally once daily for consecutive 14 days for treating *Staphylococcus aureus* (found to be resistant to methicllin by antibiotic sensitivity test) induced septic arthritic rabbits without any kind of adverse effect was well established[2]. The ethanolic extract of tamarind leaves at 300 mg / Kg bodyweight once daily orally for consecutive 60 days also exerted comparatively better protective effects primarily by

producing antioxidant activities in different tissues of rats those were given long term (consecutively for 60 days) sodium fluoride in continuous drinking water at 200 ppm for inducing chronic fluoride toxicity in albino rats.
The active principles present in ethanolic extract of tamarind leaves have potential to reach at a sufficient concentration to heart's chambers and valves as heart is a highly perfused organ in the body and is pharmacokinetically considered as one of the components of central compartment in the body.
The ethanolic extract of tamarind leaves was also found to protect heart tissue from induced chronic fluoride toxicity associated oxidative damage in albino rats in our earlier study[1].
Therefore, the dried ethanolic extract of tamarind leaves mixing in sufficient volume of drinking water can be administered orally once daily for consecutive 14 days after 2 hours and dried ethanolic extract of tamarind leaves at 1gm / Kg body weight mixing in sufficient volume of drinking water orally once daily for consecutive 28 days after 2 hours of breakfast in peak summer can be used as a safer antioxidant to check MRSA endocarditis in human patients and pet animal patients as well as to zoo animals.

DISCLOSURE

Bundesrepublik Deutschland

Urkunde

über die Eintragung des
Gebrauchsmusters Nr. 20 2022 103 574

Bezeichnung:
Ein System zur Bewertung der Wirksamkeit eines ethanolischen Extrakts aus Tamarindus Indica L. Blättern für die Behandlung von septischer Arthritis

IPC:
C12Q 1/00

Inhaber/Inhaberin:
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Tag der Anmeldung:
28.06.2022

Tag der Eintragung:
09.08.2022

Die Präsidentin des Deutschen Patent- und Markenamts

Cornelia Rudloff-Schäffer

München, 09.08.2022

Die Voraussetzungen der Schutzfähigkeit werden bei der Eintragung eines Gebrauchsmusters nicht geprüft. Den aktuellen Rechtsstand und Schutzumfang entnehmen Sie bitte dem DPMAregister unter www.dpma.de.

REFERENCES

1. Pandey AK., et al. “Protective effect of aqueous and ethanolic extracts of Tamarindus indica L. leaf on oxidative stress induced by sodium fluoride in different tissues of rat”. Annals of Phytomedicine 6.1 (2017): 136-142.
2. Sinha BP., et al. “Efficacy evaluation of ethanolic extract of Tamarindus indica L. leaves as possible alternate therapy in septic arthritis model of rabbit”. BMC Complementary and Alternative Medicine 19 (2019): 261.