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Research paper

Analgesic, hypoglycemic, sedative, antidiarrheal, thrombolytic, anti-Inflammatory activity of *Syzygium fruticosum* DC

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ABSTRACT

Context: *Syzygium fruticosum* DC. is a medicinal plant of Bangladesh. ***Objectives:*** testing analgesic, hypoglycemic, sedative, antidiarrheal, thrombolytic, and anti-inflammatory activities *in vivo.* ***Methods:*** organic extracts were given to swiss albino. ***Results:*** extracts exhibited various degrees of activities in all tests performed. ***Conclusion:*** our findings provide scientific validation for the plant's extensive traditional use in the Chittagong Hill tracts.

Keywords: medicinal plants, Bangladesh

INTRODUCTION

Plants, often regarded as the "Almighty's gift," hold a unique and indispensable role in the natural world (Ozioma et al., 2019). They provide numerous health benefits, forming a cornerstone of human survival and well-being (Kumar et al., 2012; Hamburger et al., 1991). Life on Earth would be unsustainable without plants, as they supply oxygen, food, shelter, and raw materials (Mancuso et al., 2015; Modak et al., 2007). Since ancient times, plants have been central to health systems, valued in both traditional and modern medicine for their natural therapeutic properties (Dias et al., 2012). Medicinal plant extracts preserve active secondary metabolites with therapeutic effects on organisms (Ehrman et al., 2007). Bangladesh, especially Sylhet, Chittagong Hill tract, and Sundharban are endowed with a vast source of medicinal plants (Saifullah et al., 2021; Ahmed et al., 2021). Most of the medicinal plants in Bangladesh have not been studied (Haque et al., 2020). One of these is *Syzygium fruticosum* locally

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known as khudijam (Elliot et al., 1990; Nigam et al., 2012; Chadni et al., 2015; Nasrin et al., 2018; Moni et al., 202; Uddin et al., 2022).

METHODS

Plant material

The mixture of ripe (blackish purple) and unripe (green) fruits of *S. fruticosum* was accumulated from the botanical garden of Jahangirnagar University, Savar. The plant and its fruit were authenticated (DACB-87367) by a scientific officer, Shaharina Hasin in Bangladesh National Herbarium (BNH), Mirpur, Dhaka, Bangladesh. Fruits were washed, sun-dried, ground into powder, and 480 g dried sample was dissolved in 1.7 liters of Methanol for 15 days. The resulting Methanol soluble Partition was filtered and dried using a rotary evaporator. 5 g dried methanolic extract was taken for partitioning into different solvents such as n-Hexane, Dichloromethane, Ethyl acetate and Aqueous by following modified Kupchan process (Emran et al., 2015). These Methanol soluble Partition (MESP), Hexane soluble partition (HSP), Dichloromethane soluble partition (DCMSP), Ethyl acetate soluble partition (EASP), and Aqueous soluble partition (AqSP) were investigated.

Animal study

Swiss albino mice, aged between four and five weeks, consisting of both males and females, were kept in the Pharmacy Department at the State University of Bangladesh for pharmacological research. Prior to the study, ethical approval was obtained from the Ethics Review Committee of the same department. The approved Animal Ethics Number is 2024-03-29/SUB/I-ERC/003. The mice were housed and maintained in plastic polypropylene cages under typical animal housing configurations (temperature 24 ± 2^0C), humidity levels ranging from 60%-70% and dark-light cycles (12/12) h the mice had limitless access to water ad libitum and conventional laboratory feed from Hindustan Animal Feeds. Animal study design according to Ali et al., 2024.

Central analgesic activity

Tail immersion method (Jahan et al., 2024).

Peripheral analgesic activity

Chemical nociception model (Ajaib et al., 2024).

Hypoglycemic activity

Glucose tolerance test (Ming et al., 2024).

Sedative activity

Thiopental Sodium-induced sleeping assay (Jahani et al., 2022).

Anti-diarrheal activity

Castor-oil induced method (Rahman et al., 2020).

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Thrombolytic activity
Thrombolytic method (Ramjan et al., 2014).

Hemolysis activity
Hypotonicity and heat-induced hemolysis methods (Yesmin et al., 2020; Aidoo et al., 2021).

Statistical analysis
Paired t-test analysis utilizing the GraphPad software, prism-10 edition (prism-10 for Windows, Version 10.0, GSL Biotech, California, USA). The data are presented as the mean ± SD. Standard Error Mean (SEM) was also recorded. The mean variation between the positive and negative control was deemed substantial at P values < 0.01 and 0.005.

RESULTS

Central analgesic activity
MESP at the dose of 600 mg/kg evoked after 90 mins a prolongation of time of reaction to pain of 620% (Figure 1)

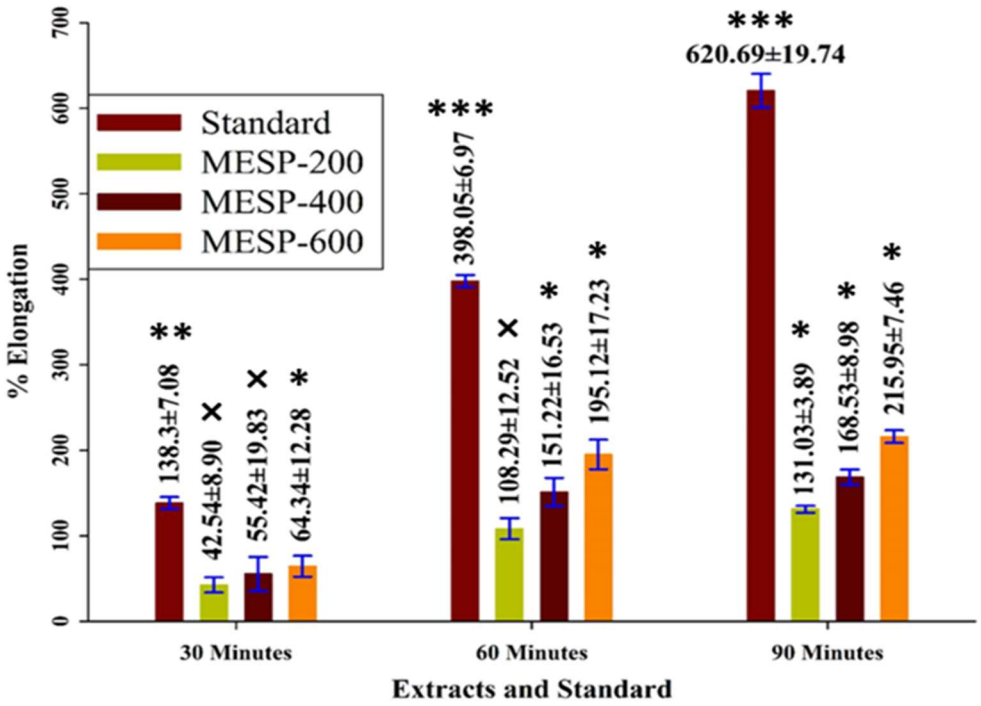

Figure 1: Central analgesic activity
% Time of standard and extracts at different time intervals. Values are expressed as mean ± SD (n = 4); ***p< 0.001 are very statistically significant, *p< 0.05 statistically significant and ×p> 0.05 compared to control followed by Dunnet test (GraphPad Prism 10). MESP = Methanol Soluble Partition

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Peripheral analgesic activity

Methanol extract at the dose of 600 mg/kg reduced writhing by 70.4% (Figure 2)

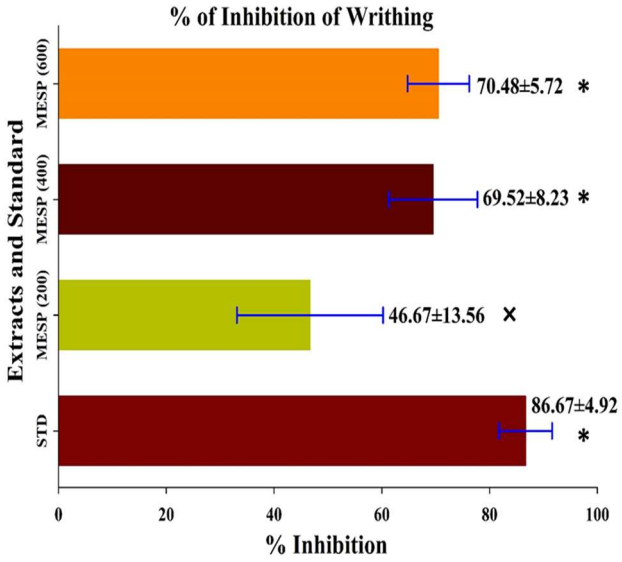

Figure 2: % Inhibition of writhing

Values are expressed as mean ± SD (n = 4); *p< 0.05 statistically significant and ×p> 0.05 compared to control followed by Dunnet test (GraphPad Prism 10). MESP = Methanol Soluble Partition

Hypoglycemic activity

MESP at the dose of 400 mg/kg decreased postprandial glycemia from 12.6 (control) to7.7 mmol/L at 30 min (Table 1, Figure 3).

Table 1. Hypoglycemic activity

Code No.	Plasma level of glucose (Mean ± SD)/ (mmol/L)			
	00 min	30 min	60 min	120 min
CTL	6.77±0.98	12.69±5.55	9.04±3.69	6.81±0.58
STD	3.55±0.31	7.12±2.03	5.18±1.63	3.38±0.71
MESP (200)	5.05±0.34	9.625±1.68	7.35±1.60	6.05±0.71
MESP (400)	4.89±0.53	7.78±1.04	6.92±0.85	5.36±0.49
MESP (600)	5.25±0.64	7.975±0.62	6.45±1.45	4.75±0.53

CTL= Negative control, STD= Standard Drug

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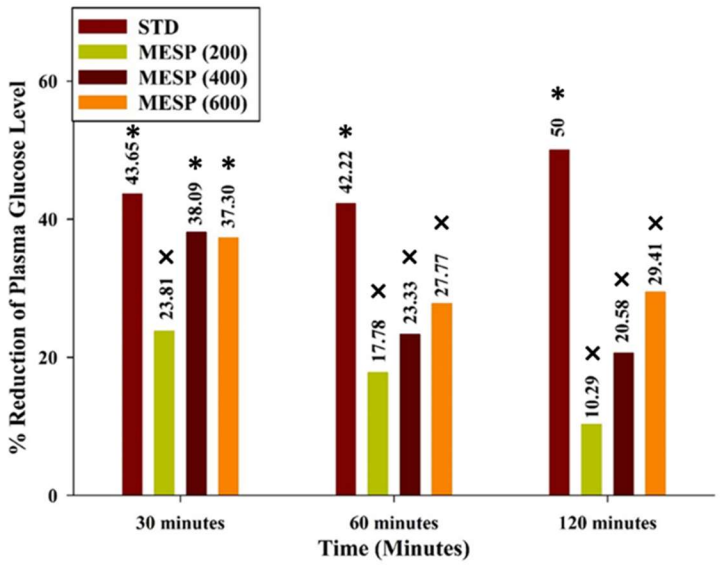

Figure 3: Hypoglycemic activity
Values are expressed as mean ± SD (n = 4); *p< 0.05 statistically significant and ×p> 0.05 compared to control followed by Dunnet test (GraphPad Prism 10). MESP = Methanol Soluble Partition

Sedative activity

MESP at the dose of 600 mg/kg was the most active (Figure 4).

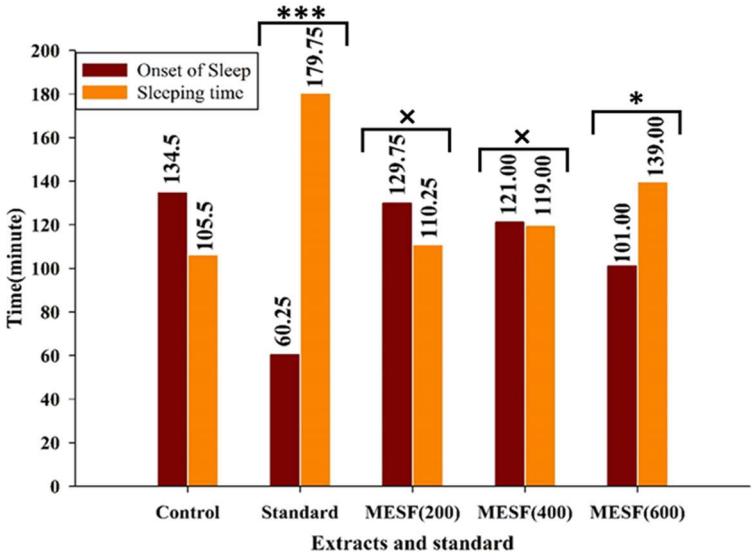

Figure 4: Sedative activity
Values are expressed as mean ± SD (n = 4); ***p< 0.001 are very statistically significant, *p< 0.05 statistically significant and ×p> 0.05 compared to control followed by Dunnet test (GraphPad Prism 10). MESP = Methanol Soluble Partition

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Anti-diarrheal activity

MESP at the dose of 600 mg/kg reduced diarrheal discharges by 61.1% (Table 2)

Table 2: Anti-diarrheal activity

Code No.	No of diarrheal feces (Mean)	% Reduction of diarrhea	Standard deviation SD	Standard Error of mean	t-test value	P value
STD	1.5	83.33	1	0.50	5.4232	0.0016
MESP (200)	4.25	52.77	2.5	1.25	2.6444	0.0006
MESP (400)	3.5	61.11	1	0.5	3.9754	0.0073
MESP (600)	3.0	66.67	2.16	1.08	3.5663	0.0118

Thrombolytic activity

EASP evoked a 19.4% of cloth lysis (Table 3)

Table 3. Thrombolytic activity

Fractions	**% Of clot lysis (w5/w4) x 100**
HSP	9.03
DCMSP	7.20
EASP	19.42
AQSP	19.10
MESP	9.31
Blank	5.22
streptokinase	65.67

Hemolysis activity

EASP was the most active (66.4 %) in the in hypotonic solution-induced hemolysis test (Figure 5) while MESP was the most active extract in the induced hemolysis test (74.5 %) (Figure 5).

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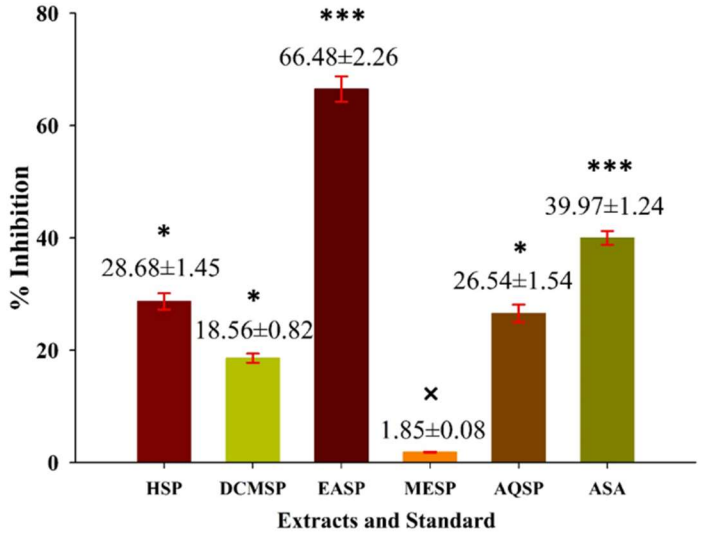

Figure 5: Membrane Stabilization activity of in hypotonic solution
Values are expressed as mean ± SD (n = 4); ***p< 0.001 are very statistically significant, *p< 0.05 statistically significant and ×p> 0.05 compared to control followed by Dunnet test (GraphPad Prism 10).

CONCLUSION

Our study provide preliminary evidence that *S. fruticosum* has analgesic, hypoglycemic, sedative, antidiarrheal, thrombolytic, and anti-inflammatory activities *in vivo*. These findings provide scientific validation for the plant's extensive traditional use in the Chittagong Hill Tracts.

DECLARATION OF CONFLICT OF INTEREST

No conflict of interest to declare.

DECLARATION OF HONOUR

We declare in our honor that our results are not fake and made up.

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