

Assessment of Antipyretic Activity of the Marine Gastropod Tonnadolium (L)

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Abstract- The present study has been carried out to analyze the antipyretic activity of the marine mollusk Tonnadolium. Methanol extract of Tonnadolium was subjected to antipyretic activity on Wister albino rats by Brewer's yeast induced pyrexia. The extract when administered at a dose of 400 mg / kg body weight caused significant antipyretic activity by lowering the body temperature (36.20 ± 0.04) at 4th hour of exposure compared to standard drug paracetamol (36.88 ± 0.02). The methanolic extract of Tonnadolium at the concentration of 200 mg / kg and 400 mg / kg showed a significant ($P < 0.05$) antipyretic activity.

Key words: Antipyretic Activity, Methanol, Tonnadolium, paracetamol. GC-MS.

INTRODUCTION

The ocean, the "mother of origin of life" wrap over 70% of the earth surface and contain highly ecological, chemical and biological diversity starting from microorganism to vertebrates. This variety has been the resource of unique chemical compounds, which holds great pharmaceutical perspective (Chiranjib Chakrabarty et al., 2009). Comprehensive research into the medicinal properties of marine organisms in 1960's examined a large number of shell fish products, particularly with an aim to isolate possible natural compounds for the treatment of many diseases. Molluscs represent good candidates for drug product research considering their evolutionary and ecological significances (Sreejamole and Radhakrishnan, 2013). Pyrexia or fever is defined as an elevation of body temperature. Fever generally occurs due to the infections by virus, bacteria, protozoa and other micro-organism that produce pyrogens. It is also a response due to tissue damage, inflammation, malignancy or graft rejection, cytokines, interleukin, interferons and tumour necrosis factor ∞ (TNF ∞) are formed in large amount under these condition, which increase PGE₂ which in turn triggers hypothalamus to elevate body temperature (Rajani et al., 2011). Fever is associated with symptoms of sickness behavior which includes metabolic disturbances, increase blood pressure, lethargy, depression, anorexia, sleepiness and inability to concentrate. This increase the muscle tone and shivering (Ravichandran, 2012).

Antipyretics are drug which can reduce elevated body temperature. Search for safe natural remedies with potent antipyretic activity received momentum recently as the available antipyretics such as paracetamol, aspirin, nimusulide etc., which have toxic effects to the various organ of the body (Tajuddin et al., 2011). Natural antipyretic agents are favoured over the chemical ones for their compatibility to the human physiological system, easy availability and rich knowledge about the traditional healing systems. So the

present study has been carried out to isolate and characterize the antipyretic activity compounds from Tonnadolium and evaluate their pharmacological potential.

MATERIAL AND METHOD:

The specimens of Tonnadolium were collected from the Gulf of Mannar Coastal Region of Thoothukudi. It was collected by trawl nets operated for capturing the crabs brought to the laboratory cleaned and washed with fresh sea water to remove all impurities. The shells were removed and dried in hot air oven at 56° c for 48 hrs. The dried tissues was immersed with 100% AR methanol and then it was filtered with Whatman No 1 filter paper and the methanol extract was reduced by vacuum evaporation. Mature adult Wister Albino rats of either sex weighing between 180-200 gm were maintained in S.B college of Pharmacy Sivakasi and used for further studies. Either sex of albino rats having the body temperature between 36.5°C and 38.5°C were selected. The animals were divided into four groups of four animals, each group were injected subcutaneously with 20% aqueous suspension of Brewer's yeast (20ml/ kg). The animal developing 0.5 ° C and more rises in rectal temperature, 18 hours after were selected for further studies. Group 1 received distilled water (5 ml/kg) alone and group II received paracetamol 10 mg / kg p.o. The other 2 groups were treated with methanol extract of Tonnadolium at 200 mg / kg and 400 mg/kg p.o levels respectively. The rectal temperature was recorded at 1, 2, 3 and 4 hrs after the administration of test drugs.

STATISTICAL ANALYSIS:

The data was expressed as mean \pm S.E. statistical significance of the difference between control and treated groups were accessed by the method of analysis of one way ANOVA followed by Dunnett's t-test. $P < 0.05$ statistically significance of the data was found out.

Mean:

The average (\bar{X}) is calculated as follows.

$$\bar{X} = \frac{\sum x}{N}$$

Where,

X = data obtained
 $\sum x$ = Sum of all the Values
 n = total number of sample

$$\text{Group sum squares} = (\sum x)^2 - C$$

Where N- Number of observation in each group

$$\text{Error Sum of square} = \text{Total SS} - \text{Group SS}$$

Considering the degrees of freedom for each source of variance, mean square was calculated.

$$\text{Total SS} = \text{Number of values}$$

$$\text{Group SS} = \text{Number of groups} - 1$$

$$\text{Error SS} = \text{df of total SS} - \text{df group SS}$$

Standard Error ($S.E \bar{x}$)

$$S.E \bar{x} = S/\sqrt{n}$$

Analysis of Variance (ANOVA)

One way Analysis

Sum of X for all the values was squared and a correction factor 'C' was obtained.

$$C = \frac{(\sum x)^2}{N}$$

Total sum of squares = $(\sum x)^2 - C$ where X^2 represents the sum of squared values.

RESULT:

The results of the methanol extract of T.dolium on yeast induced pyrexia in albino rats are depicted in table 1. The extract produced significant ($p < 0.05$) antipyretic effects in both the concentrations. The subcutaneous injection of yeast suspension markedly elevated the rectal temperature after 18 hours of administration. Treatment of methanolic extracts of Tonnadolium at 200 mg /kg and 400 mg / kg caused significant ($p < 0.05$) lowering of body temperature at 3 hours following its administration in control (ie 37.10 ± 0.01) than 200 mg /kg (37.01 ± 0.02) and 400 mg / kg (36.20 ± 0.04). Thus there was a significant reduction ($P < 0.05$) in temperature at 4 hours after the administration of the test drug that is the methanol extract of T.dolium.

Table 1: Antipyretic activity of methanol extract of Tonnadolium on Albino rats

Treatment	Dose mg/kg p.o	Initial temp.	Temp.after 18 hrs of yeast administration	Mean time reduction in temp.± S.E			
				1 hr	2 hr	3 hr	4 hr
Control	1 ml	36.55±0.01	37.60±0.012	37.51±0.012	37.44±0.02	37.28±0.012	37.10±0.01
Paracetamol	10 mg	36.66±0.011	36.60±0.03	37.39±0.012	37.22±0.011	36.98±0.02	36.88±0.02
Tonnadolium	200 mg	36.52±0.03	37.82±0.04	37.48±0.03	37.33±0.013	37.20±0.05	37.01±0.02
Tonnadolium	400 mg	36.12±0.012	37.40±0.02	37.12±0.02	37.01±0.01	36.66±0.029	36.20±0.04
One way ANOVA	F	6.8440	12.3810	22.2003	21.1018	4.7810	48.7980
	DF	20.4	20.4	20.4	20.4	20.4	20.4
	P						P<0.05

DISCUSSION:

Pharmaceutical industry now accepts the world aquatic environments as a major frontier for medical research. Pharma MAR (Spain and USA) has taken leading position in the development of drugs from the aquatic environment. The present agree well with the findings of Kumar(2003) on *Cypraeaerronesand C.arabica*,(Shanthi et al, 2012) on *B.zeylanica*, Rajesh and Murugan (2013) on *E.viride* and Sanker et al., (2013), on *Zoobotryonverticillatum*. Generally plants and animal extracts showing the antipyretic and analgesic activity (Devan et al., 2000). In the present study also presence of 9, 12- Octadecadienoic acid (Z,Z)-, 2-(acetyloxy)-1-[(acetyloxy)methyl] ethyl ester and cholesta – 3,5 diene have been isolated from the methanol extract of *T.dolium* which might be responsible for the anti – pyretic action.

Methanolic extract of *T.dolium* produced significant ($P<0.05$) antipyretic effect in both the concentrations (i.e.200 and 400mg/kg). The subcutaneous injection of yeast suspension marked by elevated the rectal temperature after 18 hours of administration. The extract at both the dose levels caused significant ($P<0.05$) lowering of body temperature at 4 hours following their administration (36.20 ± 0.04 and 37.01 ± 0.02) than the control (37.10 ± 0.01).

The difference in the rectal temperature of rats between the control and drug treated groups at 4 hours interval were observed as statistically significant in the test mollusc ($P<0.05$). This suggests short acting antipyretic effect of the drug but it denotes the potential therapeutic application in pain related diseases.

Yeast induced fever is called pathogenic fever. Its etiology includes production of prostaglandins, which set the thermoregulatory centre at a higher temperature. Inhibition of prostaglandin synthesis could be possible mechanism of antipyretic action. Also there are several mediators of multiprocessors underlying the pathogenesis of fever. Inhibition of any of these mediators may bring the antipyretic effect which requires further investigation (Shanthi, 2012). It is interesting to note that the 200 mg/kg and 400 mg/kg doses were significant statistically. Many marine organisms like *Cypraeaerronesand Cypraeaarabica* were shown to possess antiipyretic activity (Kumar, 2003). The reduction in temperature was prominent in the 1st hour and stabilized after that. This may be due to the fact that the test extract and standard drug may be due to the fact that the test extract and standard drug may be metabolized within one hour (Lane et al., 2002).In support of the result of the present study Joselin and Thilaga (2016) observed the antipyretic activity of the methylene chloride extract of the two sponges *Axinelladonnani* and *clathriaprocera* decreased the yeast induced pyrexia raised body temperature in albino rats and Devanathan et al (2002) in *cypraeamoneta*.

CONCLUSION:

The methanol extract of *Tonnadolum* showed significant antipyretic activity . In conclusion the result of the present study verify the use of gastropod in the treatment of febrile condition. However further investigation is necessary not only to isolate and characterize the active principle of the marine

gastropods responsible for antipyretic activity but also to elucidate the exact mechanism of action.

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