EFFECT OF TECTONA GRANDIS STEM EXTRACT ON ESTRADIOL BENZOATE INJECTED UTERUS OF FEMALE ALBINO WISTAR RATS

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Abstract: Tectona Grandis is one of the well known Indian herbs. In Ayurveda Tectona grandis stem extract has tocolytic effect. The main syndrome of preterm birth is caused by uterus contractions from excitatory factors. Administration of tocolytic agents is a strategy to prevent the occurrence of preterm births. The aim of this study was to investigate the effects of Tectona grandis stem extract on the contractions of uterine strips isolated from non-pregnant female Wistar rats (250~350 g) prior injected (Before 24 Hrs) Estradiol benzoate.

Contractions of the uterus were induced with Oxytocin 0.01 IU. The results compared with standard drugs like Magnesium Sulfate (75 mg), Nifedipine (0.18 mg), and Isoxsuprine (0.18 mg) along with their effect on frog blood vessels, rat and frog heart, skeletal muscle. After seeing these effects we conclude that Tectona grandis stem extract possess the same tocolytic effect as that of standard drugs.

Keywords: Tectona grandis, tocolytic, magnesium sulfate, nifedipine, isoxsuprine.

INTRODUCTION

After pregnancy, the endocrinology of the body of pregnant women obviously changes, including uterine contraction agonist receptors (such as oxytocin receptor, prostaglandin receptor, β-adrenergic receptor, and corticotrophin releasing hormone receptor), and ion channel proteins which determine the resting membrane potential and excitability of myocytes. Dysfunction of uterine contractions can lead to premature delivery. Spontaneous preterm labour and delivery occurs for approximately one-third of preterm births, which is the predominant cause of prenatal mortality and morbidity. The wide range of tocolytic agents in use is testament to the fact that we still do not have an ideal drug available. Therefore, development of new and effective tocolytic agents is an important research topic.

Many unknown and lesser known plants are used in folk and tribal medicinal practices in India. The medicinal values of these plants are not much known to the scientific world. Tectona grandis (family: Verbenaceae) is one such medicinal plant.

According to Ayurveda, Tectona grandis wood is acrid, cooling, laxative, sedative to gravid uterus and useful in treatment of piles, burning sensation, diabetes, leprosy and skin diseases. [5] Lapacho, a naphthoquinone isolated from the roots of Tectona grandis have an anti-inflammatory effect, on subsequently induced experimental gastric and duodenal ulcers in rats and guinea-pigs. [7] Tectona grandis sawdust extract inhibited the growth of Aspergillus Niger the active compound was identified as deoxylapachol and tectoquinone. [8] Tectona grandis has been investigated for nitric oxide scavenging activity. [9] Wound healing activity in rat. [10] Tectona grandis contains tannin, which are used as anti-inflammatory agents and also used topically for treatment of burns. [11,12] The effect of Tectona grandis stem extract on the uterus is still unknown. The tocolytic effect of Tectona grandis is demonstrated in the present study.

MATERIALS AND METHODS

Materials

The fresh stems of an herbal plant Tectona grandis Linn, were collected from Mahatma Gandhi Institute of Medical Sciences College Campus area and authenticated by local Botanist. The stems were shade dried and powdered. The powder was macerated for 24 hours in 70 % v/v ethanol. Then they were subjected to percolation by using 70 % v/v ethanol as a solvent. Percolated solution was again shade dried and the extract was used to prepare an aqueous solution in desired concentration just before use every time. Oxytocin, Nifedipine, Magnesium sulphate, Isoxsuprine drugs solution was prepared in desired concentration in distilled water just before use. Estradiol benzoate 100 µg/ kg subcutaneously 24 hours before experiment used to get rat uterus in estrus phase. De Jalon's Physiological salt solution for rat uterus: NaCl– 9 gm /L, KCl– 0.42 gm /L, CaCl2– 0.06 gm /L, NaHCO3– 0.5 gm / L, Glucose – 0.5 gm / L added to 1 liter of distilled water.

Animals

From Pharmacy College of Borgaon (Meghe), National Centre For laboratory Animal Sciences (N.L.N Hyderbad) after taking permission from local ethical committee. They were caged in wire mesh cages in the animal room of Department of Pharmacology under standard condition of environment, temperature, food and water. The animals were allowed to take rest for a period of one week, so that they are adapted to the new surrounding before subjecting them to experimentation.

Wistar rats: Healthy non pregnant female adult wistar rats weighing (250~350 g) were used to evaluate the effect of test on oxytocin induced uterine contractions.

Methods

Effect of Tectona grandis stem extract on oxytocin induced rat uterus contractions

The rat uterine preparation was done according to Vogel HG method. [13] This experiment was done to study the effect of hydroalcoholic stem extract of Tectona grandis Linn preincubated on oxytocin induced contraction in rat uterus and evaluating the effect on the basis of prostaglandin biosynthesis described by Vane and Williams in 1973.

Adult female rats were primed with single dose of estradiol benzoate (100 µg/ kg, subcutaneously) 24 hours before experiment. The rat was anesthetized by ether and abdomen opened. Two horns of uterus were identified, dissected out and transferred to a dish containing De Jalon’s solution. The two horns were separated and free from fat and each was cut opened longitudinally so that the preparation was a sheet of muscle instead of narrow tube.

A thread was attached to each end of piece and preparation was mounted in 20 ml organ bath perfuse with De Jalon’s solution which was aerated with oxygen (95%) and carbon dioxide (5%). The tissue was equilibrated till spontaneous contractions were abolished during which the physiological saline solution was replaced every 10 minutes and temperature of (30-32 °C) was maintained.
Table 1. Effect of Tectona grandis extract on oxytocin induced contraction in rat uterus

<table>
<thead>
<tr>
<th>Group</th>
<th>Drug</th>
<th>Concentration</th>
<th>Height of contractions (cm) (mean ± SD)</th>
<th>% Inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Oxytocin</td>
<td>0.01 IU/ml</td>
<td>5.1 ± 0.5</td>
<td>-</td>
</tr>
<tr>
<td>II</td>
<td>T.G extract + Oxytocin</td>
<td>8 mg/ml + 0.01 IU/ml</td>
<td>1.7 ± 2.1</td>
<td>66.6%</td>
</tr>
<tr>
<td>III</td>
<td>T.G extract + Oxytocin</td>
<td>16 mg/ml + 0.01 IU/ml</td>
<td>0.4 ± 0.3</td>
<td>92%***</td>
</tr>
<tr>
<td>IV</td>
<td>T.G extract + Oxytocin</td>
<td>32 mg/ml + 0.01 IU/ml</td>
<td>0</td>
<td>100%***</td>
</tr>
<tr>
<td>V</td>
<td>Nifedipine + Oxytocin</td>
<td>75 mg + 0.01 IU</td>
<td>0</td>
<td>100%***</td>
</tr>
<tr>
<td>VI</td>
<td>Isoxsuprine + Oxytocin</td>
<td>0.18 mg/ml + 0.01 IU/ml</td>
<td>0</td>
<td>100%***</td>
</tr>
</tbody>
</table>

n = 6; SD = Standard deviation; IU=International units; TG = Tectona grandis Linn stem extract. *** p value < 0.001

The response of uterine tissue to oxytocin (0.01 IU/ml or 0.02 µg/ml) before and after incubation of tissue with stem extract of Tectona grandis Linn. (8-32 mg) for three minutes were recorded on a physiograph along with other drugs like magnesium sulfate (75mg), Nifedipine (0.18 mg) and Isoxsuprine (0.18mg). The percentage inhibition of original response was calculated indicating inhibitory action on the basis of prostaglandin biosynthesis.

Statistical analysis

The results are expressed as the mean ± SD of several preparations (n) from different animals. Agonists were added until the steady, largest amplitudes were defined as the maximal contractions. Relaxation was expressed as a percentage of inhibition of the maximal contraction obtained by adding the drug. Statistical significance of differences between groups was assessed using Student’s t-test. P values of < 0.05 were considered significant.

RESULTS

Effect of Tectona grandis extract on oxytocin induced contractions in rat uterus
The *Tectona grandis* extract in different doses (8, 16, 32 mg) showed significant (p < 0.001) inhibition of height of contraction induced by oxytocin (0.01 IU/ml) in a dose dependent manner. The maximum inhibition of height of contraction by *Tectona grandis* was observed in 32 mg/ml dose. While standard drug like magnesium sulfate, nifedipine and isoxsuprine shows the inhibition of uterine contraction on their therapeutic doses in rat i.e. 75 mg, 0.18 mg and 0.18 mg in 250-350 gm rat (Table 1, Figure 1, 2, 3).

**DISCUSSION**

Activity of stem extract of *Tectona grandis* on rat uterine contraction induced by oxytocin studied by the method described by H. Gerhard Vogel march 2002 [13] on the basis of prostaglandin biosynthesis as per

**REFERENCES**