ABSTRACT:
The present study was conducted to investigate the physiological and pharmacological effect of Somina (herbal Preparation) on cardiac activity of Frog. The dose of Somina (20mg/ml) competitively acts on muscarinic receptor and reduced the heart rate while increased the cardiac force and duration of cardiac cycle. It is therefore concluded that somina drug regulates the cardiac activity by increasing efficiency of heart.

Key words: Somina; Acetylcholine; Atropine and Muscarinic receptor.

INTRODUCTION

Plants have been used as a source of medicines for centuries and it is estimated that 20,000 species are used as medicine throughout the world (Phillipson, 1993). In Unani system of medicine plants (whole or parts) are used as herbal drugs to cure various ailments, quite prevalent and is practiced equally in cities, towns and villages. The herbal medicine has potential for improving health and lowering the cost of treatment and thus makes health care affordable for all.

Hamdard Laboratories (Waqf) Pakistan has been manufacturing and practicing herbal drugs since long time. These medicines have been prepared from a single herb as well as by mixing the ingredients of many herbals. One of such medicine is Somina.

Somina is composed of five ingredients that belong to five different medicinal plants. *Sesamum indicum*, *Prunus amygdalus*, *Papaver somniferum*, *Lactuca scariola*, and *Lagenaria vulgaris*.

i) *Sesamum indicum* belongs to family Pedaliaceae. Beckstrom-Sternberg *et al.* (1994a) reported that *Sesamum indicum* has been found cardio protective. Cooney *et al.* (2001) demonstrated that the use of Sesame seed increases the plasma gamma-tocopherol concentration and vitamin - E activity, which are believed to prevent heart disease.

ii) *Prunus amygdalus* belongs to family Rosaceae, has been found to exhibit hypotensive actions (Vulpe, 2002).

iii) *Papaver somniferum* belongs to family Papaveraceae, in minute doses it first stimulates brain, heart and respiration. Later, this effect is soon followed by general depression (Khan, 1997).

iv) *Lactuca scariola* (seed extracts) belongs to family Compositae/Asteraceae. It is useful against nervousness, palpitation etc. Seeds and powder are effective against fevers, in decoction for insomnia (Khan, 1997).
v) *Lagenaria vulgaris* belongs to family Cucurbitaceae, its pulp is diuretic and excrete fluid contents in the body (Khan, 1997).

On the basis of above physiological and pharmacological effects reported in literature regarding the individual constituents of Somina, this study was conducted to investigate effects of Somina on cardiac activity. In addition, its receptor activity was assessed for comparison on using Acetylcholine chloride (Ach) and Atropine (Atr).

**MATERIALS AND METHODS**

**Drugs:**

Somina (herbal drug) was used in the present study that was obtained from Hamdard laboratories (Waqf) Pakistan in powdered form. The dose of Somina 20mg/ml was prepared by dissolving its powdered in warm distilled water for experimental use. In addition cholinergic agent, i.e., Acetylcholine chloride (Merck) (10⁻³ M) and anti-cholinergic agent Atropine (10⁻³ M) (Boehringer Ingelheim) have been used for the purpose of comparison with the above herbal drug. All dilutions were freshly prepared in 0.65% saline (Isotonic for amphibians) before each experiment.

**Animals:**

In the present study both male and female adult frogs (*Rana cyanophlictis*) were used.

**Experimental Procedure:**

This study was carried out on using the method described previously by Ahmed *et al* (1999). After using the pithing procedure, the unconscious frog was fixed on frog board, an incision was made on ventral side of the body. Then, skin was carefully removed by using scalpel. Later, removing its pericardium exposed the heart. Exposed heart was then fixed with the heart lever through a nylon thread and hook, inserted at the apex of heart. During experiment, normal Ringer solution (NaCl, 115mM; KCl, 2.5mM; CaCl₂, 1.8mM; Na₂HPO₄, 2.15mM; NaH₂PO₄, 0.85) as quoted by Ahmed *et al*. (1999) was continuously poured on heart to protects its drying. The movements of heart lever (Harvard Apparatus Cat. No. 50-0660) was recorded through an ink stylus on Harvard Kymograph Universal Model (Cat. No.50-7392) by revolving its drum at the speed of 10mm/sec. After getting the normal record, the heart was continuously poured with Ach (10⁻³ M), Atr (10⁻³ M) and Somina (20mg/ml) one by one. Care was taken to pour the drug for at least 3 to 5 minutes before recording. After the recording of effect, the heart was washed with normal Ringer solution for 3 to 5 min, before the other drug was tested.

**Measurements:**

The records obtained were used for the measurements and calculations of heart rate (per min), cardiac cycle (sec), cardiac force (gm), by using kymograph speed (10mm/sec) and heart lever calibration (2gm weight).

**STATISTICAL ANALYSIS**

All the data was normalized to percent of control. And using standard statistical tools, i.e., mean and standard Error for its analysis.

**RESULTS**

**Effect of Somina on Various Cardiac Parameters:**

- **Effect on Heart rate:**
  
  The dose of Somina (20mg/ml) when poured on exposed heart had demonstrated a decrease in heart rate by 20% than its respective control (Table 1 and Fig.1a).

- **Effect on Cardiac Force:**
  
  The above dose of Somina (20mg/ml) has also demonstrated an increase in the cardiac force (Fig. 1a) that was 15% higher than its respective control as shown in Table 1.

- **Effect on Cardiac Cycle:**
  
  A similar dose of Somina (20mg/ml) has also showed an increase in the duration of
cardiac cycle, which was 25% higher than its control (Table 1 & Fig. 1a).

Table-1
Effect of Somina (20mg/ml) on various Cardiac parameters

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Mean ± S.E.(n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>80.3 ± 1.627 (65)</td>
</tr>
<tr>
<td>Cardiac Force</td>
<td>115.5 ± 2.6 (65)</td>
</tr>
<tr>
<td>Cardiac Cycle</td>
<td>125.8 ± 2.28 (65)</td>
</tr>
</tbody>
</table>

The values have been presented as percent of control.

Determination of Receptor Activity of Somina:
Effect on Heart rate:
Somina (20mg/ml) has been found to decrease the heart rate (Fig. 1a) by 20% than its control as shown in Table 2. While, on pre-treatment with Atr (10^{-3} M) the 20mg/ml dose of Somina was found to decrease the heart rate. This reduction was 7% than its control (Table 2 & Fig. 1d). However, the use of Ach (10^{-3} M) has resulted in tremendous fall in heart rate (Fig. 1b) that was 46% lesser than its respective control. Further, on pre-treatment with Atr (10^{-3} M) the Ach (10^{-3} M) did not

Fig. 1 Comparison of cardiac effect obtained from Frog by administering Somina, Acetylcholine and Atropine.
show decline in heart rate as shown earlier without Atr (10^{-3} M) pre-treatment. This decline with Atr (10^{-3} M) pre-treatment was only 11% than its control (Table 2 and Fig.1c).

Effect on Cardiac Force:
The dose of 20mg/ml Somina has demonstrated an increase in the cardiac force (Fig. 1a) that was 15% higher than its control. On the other hand similar dose of Somina (20mg/ml) has increased the cardiac force by only 9% in the presence of Atr (10^{-3} M) (Table 2 & Fig. 1d). However, 10^{-3} M of Ach was found to decrease the cardiac force (Fig. 1b) that was 40% lesser than its control. While, this Ach (10^{-3} M) in the presence of cholinergic antagonist Atr (10^{-3} M) had reduced the cardiac force, which was only 7% than its control (Table 2 and Fig. 1c).

Effect on Cardiac Cycle:
Somina in its dose of 20mg/ml has been found to produce a marked increase in the duration of cardiac cycle. This increase was 25% than control (Table 2 & Fig. 1a). When Somina (20mg/ml) was used on Atr (10^{-3} M) pre-treated heart, then increase in the duration of cardiac cycle was 4% (Table 2 & Fig. 1c) than control. In addition 10^{-3} M Ach has demonstrated an increase in the duration of cardiac cycle, which was 83% of control (Table 2 & Fig. 1b). Further, the use of Ach (10^{-3} M) on Atr (10^{-3} M) pre-treated heart has been found to increase the duration of cardiac cycle by 12% (Fig. 1c) only when compared to its respective control (Table 2).

DISCUSSION

In present study the drug Somina has been tested for its effects on cardiac parameters. The results presented (Table 1) clearly shows that Somina drug have the ability to increase the cardiac force (Fig. 2). In our opinion, Somina enhances the availability of calcium because one of its constituents (sesame seed) has more calcium than milk, cheese or nuts (Home Cooking 1998). It is suggested that calcium is participating in enhanced excitation and contraction of the cardiac muscles and may be responsible for calcium induced calcium release from sarcoplasmic reticulum (Fabioato, 1983). Out of this calcium only 25-30% is required for the activation of myocardial contraction (Bers et al., 1996). Therefore, Somina increases the strength of cardiac muscle contraction by increasing the quantity of intracellular calcium available for binding by muscle proteins, hence it is a positive inotrope.

In the present study, it is also observed that somina has the ability to decrease the heart rate (Fig. 2). Aftab (1995) has reported

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Somina (20 mg/ml)</th>
<th>Atr (10^{-3} M) + Somina (20mg/ml)</th>
<th>Ach (10^{-3} M)</th>
<th>Atr (10^{-3} M) + Ach (10^{-3} M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Rate</td>
<td>80.30±1.627 (65)</td>
<td>93.59±1.90 (30)</td>
<td>54.62±4.67 (10)</td>
<td>89.32±0.96 (39)</td>
</tr>
<tr>
<td>Cardiac Force</td>
<td>115.5±2.6 (65)</td>
<td>109.70±5.54 (30)</td>
<td>60.29±8.72 (10)</td>
<td>93.77±4.02 (39)</td>
</tr>
<tr>
<td>Cardiac Cycle</td>
<td>125.8±2.28 (65)</td>
<td>104.98±2.81 (30)</td>
<td>183.04±20.04 (10)</td>
<td>112.4±1.42 (39)</td>
</tr>
</tbody>
</table>

All the values have been calculated as percent of control and presented as mean ± S.E (n).
that *Sesamum indicum*, one of the constituent of Somina, used in the present study, reduces the blood pressure and heart rate in anaesthetized normotensive rats. It is probably due to the presence of another constituent of Somina, i.e., *Papaver somniferum*. The *Papaver somniferum* has been reported to depresses the thalamus, sensory cortex, respiratory and cough centers and slows the heart rate by affecting the vagus nerve (Deshaprabhu, 1966). Therefore, it is confirmed that *Sesamum indicum* and *Papaver somniferum* in the Somina drug, decreases the heart rate (Fig. 2).

It is important to note that the reduction in heart rate (Fig. 2) has been associated with an increase in cardiac force (Fig. 1a). It suggests that this drug is increasing the efficiency of heart by reducing the heart rate, increasing the cardiac force and the duration of the cardiac cycle (Fig. 1a and 2). It suggests that this drug is increasing the efficiency of heart by reducing the heart rate, increasing the cardiac force and the duration of the cardiac cycle (Fig. 1).

Fig. 2: Effect of Somina (20mg/ml) on various cardiac parameters.

The receptor activity of Somina has also been tested in the present study by using cholinergic agonist Ach and Cholinergic competitive antagonist Atr. The results demonstrates that Ach and somina both when administered alone have reduced the heart rate by 46% and 20% respectively than their control (Fig. 3a & 3b). On the other hand the use of Ach and Somina on Atr pre-treatment heart did not show such decline in heart rate as shown earlier without Atropine pre-treatment. It means that Atr has occupied the cholinergic receptor and Somina and Ach have decreased the heart rate by only 17% and 11% respectively (Figs. 3a and 3b). These results clearly indicate that Somina’s effect is mediated through same receptor and mechanism as established for Ach. However, it...
is also observed that Somina has produced some cholinergic response even in the presence of Atr. Thus, indicating that the constituents of Somina that is cholinergically active is available in greater concentration than that of the Atr used (Schild, 1947). These finding confirm that Somina is a physiologically active cholinergic drug and it contains active constituents that decreases heart rate by the activation of muscarinic receptors.

CONCLUSION

From the above discussion it is concluded that Somina is a physiologically and pharmacologically active drug that regulates cardiac activity by lowering the heart rate, while increasing the duration of cardiac cycle and cardiac force.

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REFERENCES


