Pharmacodynamics effects of *Origanum majorana* on isolated smooth muscles

A.A. Elkomy *a*, M.G.A. Elsayed *a* and Nehal M. Abd El-Mageed *a*

*a* Department of pharmacology, Faculty of Veterinary Medicine, Benha University

**Abstract**

The aim of the present study is to investigate the pharmacodynamic effects of *Origanum majorana* (Lamiaceae) on isolated smooth muscles preparations. Maximum relaxation of isolated guinea pig's ileum and rat's colon was achieved by addition of 50 μg of *Origanum majorana*/ml bath. While in isolated rabbit's duodenum, it was achieved by addition of 100 μg of *Origanum majorana*/ml bath. The effect of graded increased concentrations of *Origanum majorana* on isolated rat's uterine muscles was examined during various stages of sex cycle. Maximum relaxation of isolated rat's uterine muscles was achieved by addition of 200 μg of *Origanum majorana*/ml bath. It was concluded that, *Origanum majorana* directly inhibits the smooth muscles of gastrointestinal tract and those of uterus. These findings indicated that *Origanum majorana* had a significant antispasmodic effects and might have some clinical benefits for treatment of gastrointestinal disorders as colic.

**Key words**: *Origanum majorana*, Lamiaceae, Smooth muscles, uterine muscles, Antispasmodic.

**1. Introduction**

The genus *Origanum* (Family Lamiaceae) comprises about 30 species of perennial herbs native to the countries bordering the Mediterranean Sea (Bailey, 1953). Members of the genus have been used medicinally since antiquity (Ibn Sina, 1935) and (Ibn El Bitar, 1980). Uses in folk medicine include respiratory problems, coughs, rhinitis, colic, headache, upset stomach and painful menstruation (Batanouny *et al.*, 1999) and (Marderosian and Beutler, 2002). Some *Origanum* Spp. may have antioxidant effects due to the phenols carvacrol and thymol, hydroxycinnamic acid derivatives, and flavonoids (Baricevic and Bartol, 2002).

**2. Materials and Methods**

**2.1 Materials:**

**2.1.1 Plant**

*Origanum majorana* (Oregano) is a spice herb from the family Lamiaceae. The fresh dried leaves of *Origanum majorana* were purchased from local market and were used for preparing the watery extract of *Origanum majorana* according to (Emadi *et al.*, 2008). One gram of dry Oregano powder was added to 200 ml of distilled water and boiled until the volume was reduced to 100 ml. The extract was then stirred at room temperature for 24 hours. Water soluble extracts were obtained following centrifugation at 10,000 rpm for 14 min.

**2.1.2 Laboratory animals**

Guinea pigs of both sexes and different weights (300-450 gm) were used for investigating the effect of *Origanum majorana* on the isolated ileum. Rabbits of both sexes and different weights (1500-2000 gm) were used for studying the effect of *Origanum majorana* on isolated duodenum. Rats of both sexes and different weights (150-220 gm) were used for studying the effects of *Origanum majorana*.
on isolated colon and uterine muscles in different stages of sex cycle.

2.1.3. Devices

2.1.3.1. Glass jar bar

A glass water bath of about 750 ml capacity fitted into a metal stand in which a movable electric heater was located to maintain the temperature as required. An inner glass tube (organ bath) of 40 ml capacity passed through the bottom of the stand and was connected by a T-shaped glass tube.

2.1.3.2. Harvard universal oscillograph and transducers

Two channels curvilinear oscillograph (HARVARD U.K) with an isotonic transducer (HARVARD APP LTD) which was employed for recording the effect of 

2.2. Methods:

The method explained by (Valeri et al., 1990) was used for studying the effect of 

3. RESULTS

The effect of 

4. DISCUSSION

The present investigation showed that, 

These effects on smooth muscles might be attributed to the direct effect of 

Origanum majorana as shown in figure (2).

Origanum majorana in-vitro inhibited the contractility of guinea pig's ileum, rat's colon and rabbit's duodenum. The inhibitory effect of Origanum majorana was proportional to the graded tested concentrations. These results proved that, the Origanum majorana might directly inhibits the intestinal smooth muscles of guinea pig's ileum, rabbit's duodenum, and rat's colon. These obtained results were similar to those obtained by (Aydn and Seker 2005) who found that the aqueous extract of Origanum onites L. inhibited acetylcholine-induced contractions of isolated rat fundus, duodenum and ileum. Similar results were obtained by (Mamadou et al., 2011) who reported that in-vitro pre-treatment of rat intestine with the aqueous crude extract of Origanum vulgare induced dose dependent relaxation. In addition, this relaxation was accompanied by a reduction of frequency and amplitude of spontaneous contractions. These results were in agreement with (Begrow et al., 2010) who concluded that Thymus vulgaris L. (Lamiaceae) possessed a concentration-dependent antispasmodic effect on rat's colon independent of the type of stimulation (acetylcholine, K⁺ or Ba²⁺) due to its content of thymol and carvacrol. These results also similar with those obtained by(Jensen and Dyrud, 1962) who stated that Thymus vulgaris decreased acetylcholine-induced contractions of guinea pig's ileum.

Origanum majorana inhibited the uterine motility during non pregnant stages (estrus and non estrus) and pregnant stages (early and late pregnant stages). The effect was dose
Table (1): Effect of *organium majorana* on isolated guinea pig’s ileum, rabbit's duodenum and rat's colon

<table>
<thead>
<tr>
<th>Concentrations (µg/ml bath)</th>
<th>Guinea pig's ileu</th>
<th>Rabbit's duodenum</th>
<th>Rat's colon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>2.5</td>
<td>Slight inhibition in the force</td>
<td>Slight inhibition in the force</td>
<td>Slight inhibition in the force</td>
</tr>
<tr>
<td>5 - 10</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
</tr>
<tr>
<td>20-25</td>
<td>Complete relaxation</td>
<td>Complete relaxation</td>
<td>Complete relaxation</td>
</tr>
<tr>
<td>50</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>100</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
</tr>
<tr>
<td>200</td>
<td>Complete relaxation</td>
<td>Complete Relaxation</td>
<td>Complete relaxation</td>
</tr>
</tbody>
</table>

Table (2): Effect of *organium majorana* on uterine motility of rats at various stages of sex cycle.

<table>
<thead>
<tr>
<th>Concentrations (µg/ml bath)</th>
<th>Non-estrus</th>
<th>Estrus</th>
<th>Early pregnant</th>
<th>Late pregnant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Response of uterine motility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
<td>No effect</td>
</tr>
<tr>
<td>2.5 – 5</td>
<td>Slight inhibition in the frequency</td>
<td>Slight inhibition in the frequency</td>
<td>Slight inhibition in the frequency</td>
<td>No effect</td>
</tr>
<tr>
<td>10</td>
<td>Slight inhibition in the frequency</td>
<td>Slight inhibition in the frequency</td>
<td>Slight inhibition in the frequency</td>
<td>No effect</td>
</tr>
<tr>
<td>20</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
</tr>
<tr>
<td>50</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
<td>Marked inhibition in the force and frequency</td>
</tr>
<tr>
<td>200</td>
<td>Complete relaxation</td>
<td>Complete Relaxation</td>
<td>Complete relaxation</td>
<td>Complete relaxation</td>
</tr>
</tbody>
</table>
Figure (1): Site of action of organium majorana on isolated rabbit’s duodenum.

(A) 25 µg/ml bath organium majorana (Org.) followed by 10 µg/ml bath acetylcholine (A.Ch).

(B) 25 µg/ml bath organium majorana (Org.) followed by 10 µg/ml bath of nicotine (S.D.

(C) 2.5 × 10^{-6} m Mol/L bath phentolamine (Phent.) followed by 25 µg/ml bath organium majorana (Org.).
dependant. These effects might be attributed to the direct action of the *Origanum majorana* on the isolated uterus. These obtained results came in agreement with those obtained by (Soliman et al., 2007) who concluded that both the essential oil 70% ethanol extract (200 μg/ml) of *Origanum syriacum* L. subsp. *sinaicum* produced marked inhibitions in the uterine contractility of non-pregnant rats, oxytocin- and KCL-induced uterine contractions were significantly decreased following addition of either the essential oil or the 70% ethanol extract of *Origanum syriacum*. Similar results were obtained by (Jensen and Dyrud, 1962) who concluded that *Thymus vulgaris* (Lamiaceae) decreased acetylcholine-induced contractions of rat's uterus. In contrast these obtained results were inconsistent with (Ma YM et al., 2000) who reported that *Leonurus cardiaca* L. (Lamiaceae) increased the frequency and average amplitude of uterus slow waves of in rats. These results were also dissimilar with (Attah et al., 2012) who concluded that aqueous extracts from *Hyptis suaveolens* (Lamiaceae) and *Ocimum*
*gratissimum* (Lamiaceae) induced significant sustained increases in human myometrial smooth muscle cells contractility, with varying efficiencies, depending upon time and dose of exposure.

5. REFERENCES


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التأثيرات الفارماكونيميكية لنبات البردوقوش على العضلات الملسية المعزولة

أشرف عبد الحكيم أحمد الكومي، مسعد جمال الدين أحمد السيد، نهال محسن عبد المجيد
قسم الفارماكولوجيا – كلية الطب البيطرية جامعة بنها

الملخص العربي

استهدف هذا البحث دراسة بعض التأثيرات الفارماكونيميكية لنبات البردوقوش على حركة العضلات الملساء. وقد تحقق الارتخاء التام للأعماق الدقيقة المعزولة من الأرانب الغينية والقولون المعزول من الفئران عند تركيز 50 ميكروجرام/سم3 بينما تحقق الارتخاء التام للأعماق البالغة المعزولة من الأرانب عند تركيز 100 ميكروجرام/سم3. كما تم دراسة تأثير الزيادة المدرجة في تركيزات البردوقوش على عضلات الرحم المعزولة من الفئران. وقد تبين من الدراسة أن البردوقوش له تأثير مباشر على العضلات الملسية المعزولة من القناة الهضمية وتلك من الرحم. وتشير هذه النتائج أن البردوقوش له تأثير ملحوظ كمضاد للقلق، مما يمكن استخدامه لعلاج اضطرابات الجهاز الهضمي مثل المغص.

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