Pharmacodynamics effects of *origanum majorana* on isolated smooth muscles

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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.

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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. 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 purshased 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 oscillographe and transducers

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

2.2. Methods:

The method explained by (Valeri *et al.* ,1990) was used for studying the effect of *Origanum majorana* on the isolated ileum of guinea pigs. The method described by (Staff members of the Department of Pharmacology, University of Edinburgh ,1970) was used for studying the effect of *Origanum majorana* on isolated rabbit's duodenum, rat's colon and uterine muscle of rats at various stages of sex cycle.

3. RESULTS

The effect of *Origanum majorana* on isolated guinea pig's ileum, rabbit's duodenum, rat's colon and table [1]. The effect of *Origanum majorana* on uterine motility of female rats at various stages of sex cycle was recorded in table [2]. Trials were performed to locate the site of action of *Origanum majorana* on the gasrtointestinal motility and the results showed that, *Origanum majorana* had a direct intestinal smooth muscles relaxant effect (Figure 1). *Origanum majorana* depressed the uterine motility at various stages of sex cycle and these effects on smooth muscles might be attributed to the direct effect of *Origanum majorana* as shown in figure (2).

4. DISCUSSION

The present investigation showed that, *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 came in aggreement with (Begrow *et al.*,2010) who concluded that *Thymus vulgaris* L. (Lamiaceae) possesed a concentration-dependent antispasmodic effect on rat's colon independent of the type of stimulation (acetylcholine, K^+ or Ba^{++}) 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

Concentrations (µg/ml bath)	Response of		
	Guinea pig's ileu	Rabbit's duodenum	Rat's colon
2.5	No effect	No effect	No effect
5 -10	Slight inhibition in the force	Slight inhibition in the force	Slight inhibition in the force
20-25	Marked inhibition in the force and frequency	Marked inhibition in the force and frequency	Marked inhibition in the force and frequency
50	Complete relaxation	Complete relaxation	Marked inhibition in the force and frequency
100	……	…….	Complete relaxation

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

Concentrations (µg/ml bath)	Response of uterine motility			
	Non-estrus	Estrus	Early pregnant	Late pregnant
2.5 – 5	No effect	No effect	No effect	No effect
10	Slight inhibition in the frequency	Slight inhibition in the frequency	Slight inhibition in the frequency	No effect
20	Slight inhibition in the force and frequency	Slight inhibition in the force and frequency	Slight inhibition in the force and frequency	No effect
50	Marked inhibition in the force and frequency	Marked inhibition in the force and frequency	Marked inhibition in the force and frequency	Marked inhibition in the force and frequency
200	Complete relaxation	Complete Relaxation	Complete relaxation	Complete relaxation

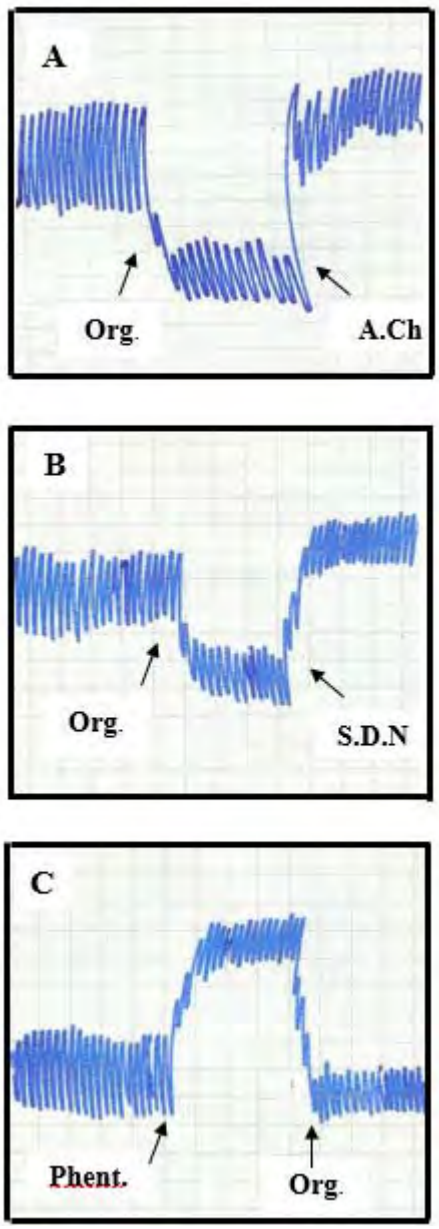

Figure (1): Site of action of *organium majorana* on isolated rabbit's duodenum.
(A) 25 µg/ml bath *organium majorana* (Org.) followed by 10 µg/ml bath acetylcholine (A.Ch). (B) 25 µg/ml bath *organium majorana* (Org.) followed by 10 µg/ml bath of nicotine (S.D. (C) 2.5 × 10-6 m Mol/L bath phentolamine (Phent.) followed by 25 µg/ml bath *organium majorana* (Org.).

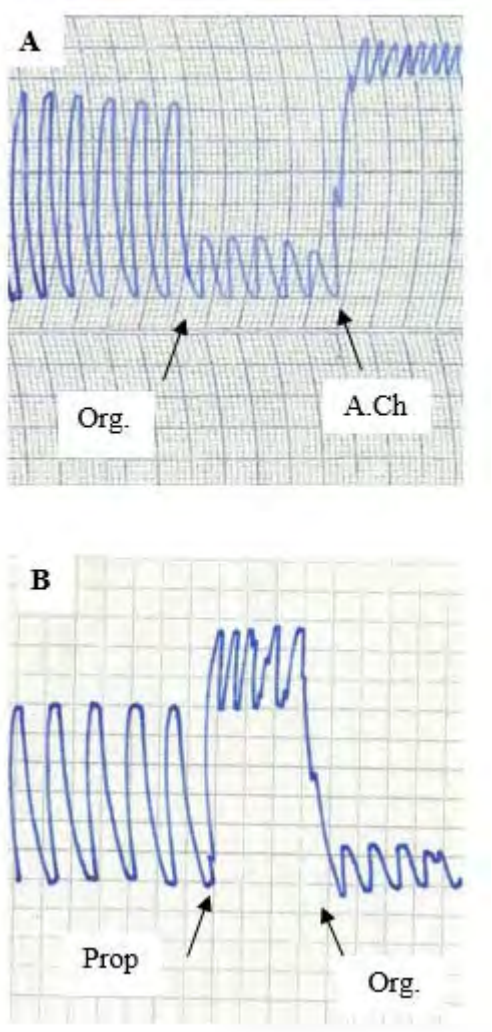

Figure (2): Site of action of *organium marjorana* on isolated rat's uterus during estrus stages. (A) 50 µg/ml bath *Organium majorana* (Org.) followed by 0.25 µg/ml bath acetylcholine (A.ch). (B) 1µg/ml bath propranolol (Prop) followed by 50 µg/ml bath *Organium majorana* (Org.).

dependant. These effects might be attributed to the direct action of the *Origanum majorana* on the isolated uterus.These obtained results came in aggreement 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.

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التأثيرات الفارماكوديناميكية لنبات البردقوش على العضلات الملساء المعزولة

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الملخص العربي

استهدف هذا البحث دراسة بعض التأثيرات الفارماكوديناميكية لنبات البردقوش على حركة العضلات الملساء. وقد تحقق الارتخاء التام للأمعاء الدقيقة المعزولة من الارانب الغينية والقولون المعزول من الفئران عند تركيز 50 ميكروجرام/سم3.بينما تحقق الارتخاء التام للاثني عشر المعزول من الارانب عند تركيز 100 ميكروجرام/سم3. كما تم دراسة تأثير الزيادة المتدرجة في تركيزات البردقوش على عضلات الرحم المعزولة من الفئران. وقد تبين من الدراسة ان البردقوش له تأثير مباشر على العضلات الملساء المعزولة من القناة الهضمية وتلك من الرحم. وتشير هذه النتائج ان البردقوش له تأثير ملحوظ كمضاد للتقلصات مما يمكن استخدامه لعلاج لاضطرابات الجهاز الهضمي مثل المغص.

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