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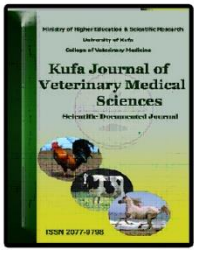

Study The Analgesic And Anti-Inflammatory Activity Of *Zingiber Officinale* Rhizome Extract Comparison With Ibuprofen In Male Mice

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Abstract

The aim of the present study was to explore the probable analgesic and anti-inflammatory activity of ethanolic extract of *Zingiber officinale* by using Hot plate test , acetic acid – induced writhing and Carrageenan induced inflammation in male mice. Thirty Albino male mice (average weight 20g) were used and randomly divided in this study (six animals were used in each groups test for *Zingiber officinale* in doses of 100, 200 and 300 mg/kg B.W, Ibuprofen 20mg/kg B.W and control (gave distilled water).The results were expressed as the Mean ±SEM and the statistical significance of differences between groups was analyzed by two Way Analysis of Variance (ANOVA) . The extract showed a significant inhibition of writhing response and increase in hot plate reaction time and also caused significant decrease $P<0.05$ in paw oedema that induced by Carrageenan comparable with Ibuprofen that standard drugs used. We can conclude from the outcome of the present work that *Zingiber officinale* extract exert an excellent analgesic and anti-inflammatory effect in the mice and exhibit peripheral and central analgesic effect and anti-inflammatory activity, which may be attributed to the various phytochemicals present in rhizomes of *Zingiber officinale* .

Keywords : *Zingiber officinale* , Ibuprofen , analgesic , anti-inflammatory

دراسة الفعالية المسكنة للالام والمضادة للالتهاب لمستخلص جذور نبات الزنجبيل مقارنة بعقار الابوبروفين في ذكور الفئران

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الخلاصة

اجري هذا البحث لدراسة الفعالية المسكنة للالآم مسكن والفعالية المضادة للالتهاب للمستخلص الكحولي لجذور نبات الزنجبيل من خلال استخدام اختبار الصفيحة الحارة , حامض الخليك –المحدث للتلوي واختبار الكاراجينان المحدث للالتهاب في الفئران. استخدم في هذه الدراسة 30 ذكر من الفئران البيضاء قسمت بصورة

عشوائية (ستة لكل مجموعة من الزنجبيل التي اعطيت على جرع 100, 200 و300 ملغم /كغم من وزن الجسم , دواء ابوبروفين 20ملغم/كغم من وزن الجسم ومجموعة السيطرة(اعطيت ماء مقطر) . اظهرت النتائج ومن خلال التحليل الاحصائي الطريقة الثنائية للتحليل المغاير ان المستخلص الكحولي للزنجبيل ثبط معنويا الاستجابة للتلوي وزاد من وقت الاستجابة للصفيحة الحارة وكذلك سبب قلة في الانتفاخ الحاصل نتيجة حقن مادة الكاراجينان المسببة للالتهاب في الفئران مقارنتا بعقار الابوبروفين . ونستنتج مما سبق اعلاه ان للزنجبيل فعل مضاد للالتهاب ومسكن للالآم نتيجة للفعل المحيطي والمركزي والذي يعزى لوجود بعض المركبات النباتية الفعالة في الزنجبيل.

Introduction

The traditional use of Plants for their medicinal properties in the treatment of different disease in man and animals dates for many decades ago (1). The recent medicine strength this convincement because of the appearance and observation of side effects of synthetic drugs (2). *Zingiber officinale* was reported to be useful in treating inflammation and rheumatism.. In traditional Chinese medicine, *Zingiber officinale* (ginger) is used to improve the flow of body fluids. It stimulates blood circulation throughout the body by powerful stimulatory effect on the heart muscle and by diluting blood . The improved circulation is believed to increase the cellular metabolic activity, thus contributing to the relief of cramps and tension (3). *Zingiber officinale* powder (500-600 mg) taken at the onset of migraine aura, followed by 4 hourly intake for 3-4 days, is reported to provide relief from migraine attacks. The rhizomes of *Zingiber officinale* are used as spice in food and beverages and in traditional medicine as carminative, ant pyrexia and treatment of waist pain rheumatism and bronchitis. It is used for the treatment of gastrointestinal disorders and piles (4). However it has no effect on gastric emptying rate (5), but has protective activity on gastric ulcer genesis (6). Organic solvent extract of *Zingiber officinale* rhizomes has also been shown to cause significant inhibition of skin tumor (7). On the basis of these common uses of this plant in traditional folk medicine and its above reported activities in the literature, we have evaluated the anti-inflammatory and analgesic properties of the rhizome extract of *Z. officinale* in mice .

Materials And Methods

The dried Rhizomes of ginger were purchased from local market and identified by national herbarium at Abu-Ghraib. The dry Rhizomes of ginger ground into powder by electrical grinder and the Rhizomes were extracted by hot continuous extraction process using soxhlet apparatus with 70% ethanol then the extract was evaporated to dryness (45 °C) under reduced pressure in rotary evaporator. The crude extract then was kept at -20°C until the time of use. Ibuprofen (Brufen) (S.D.I.-Iraq).

Experimental animals.

Swiss albino mice (average weight =20g) were purchased from animal house of Sera and Vaccines Institute, acclimatized for seven days at standard conditions.

Experimental design.

Analgesic activity :

1. **Hot plate test**:

Eighteen albino Swiss mice used in this experiment and divided randomly into (5) groups (6 each)

Group (1): Treated orally with distilled water only and served as control .

Group(2): Treated orally with 100mg/kg B.W of ZO extract.

Group(3): Treated orally with 200mg/kg B.W of ZO extract.

Group(4): Treated orally with 300mg/kg B.W of ZO extract.

Group(5): Treated orally with 10mg/kg B.W of Ibuprofen.

Thirty minutes after administration ,each animal in all groups were dropped gently on a plate maintained at 55± 1C.This temperature produces two behavioral components in mice that can be measured in terms of their reaction times, namely licking and flicking of the paw and jumping . (8) and (9).

2.Acetic acid induced writing:

Eighteen albino Swiss mice used in this experiment and divided randomly into (5) groups (6each):

Group 1: Treated orally with distilled water only and served as control.

Group 2: Treated orally with Ibuprofen at dose 10mg/kg B.W.

Group 3: Treated orally with (ZO) extract at dose 100 mg/ Kg B.W

Group 4: Treated orally with (ZO) extract at dose 200 mg/ Kg B.W

Group 5: Treated orally with (ZO) extract at dose 300 mg/ Kg B.W

Mice were injected intraperitonially with 0.6% aqueous acetic acid

(10 ml/kg) 1hr after oral administration of rhizome extract of *Z. officinale*, vehicle (Saline, 10 ml/kg). The control group was given movement of each mouse was counted for 10min starting from 5 min after the injection of acetic acid (10) .

Anti-inflammatory activity:

3. Carrageenan-induced paw edema in mice:

Carrageenan-induced paw inflammation was achieved according to the method described previously (11).The animals were randomly selected and divided into five groups and 6 each.

Group 1: Treated orally with distilled water only and served as control.

Group 2: Treated orally with Ibuprofen at dose 10 mg/kg B.W.

Group 3: Treated orally with (ZO) extract at dose 100 mg/ Kg B.W

Group 4: Treated orally with (ZO) extract at dose 200 mg/ Kg B.W

Group 5: Treated orally with (ZO) extract at dose 300 mg/ Kg B.W

Swiss albino mice were treated orally with normal saline (as control group) , *Zingiber officinale* extract and Ibuprofen at dose 20mg/kg , 60 min before 20 µl 1% carrageenan injection. Paw volume was measured before and 1, 2, 3,4, and 5 h after the injection of carrageenan. Measurements of the paw volume were done by means of a caliper . The paw edema volume was determined by the difference between the final and initial volumes(12).

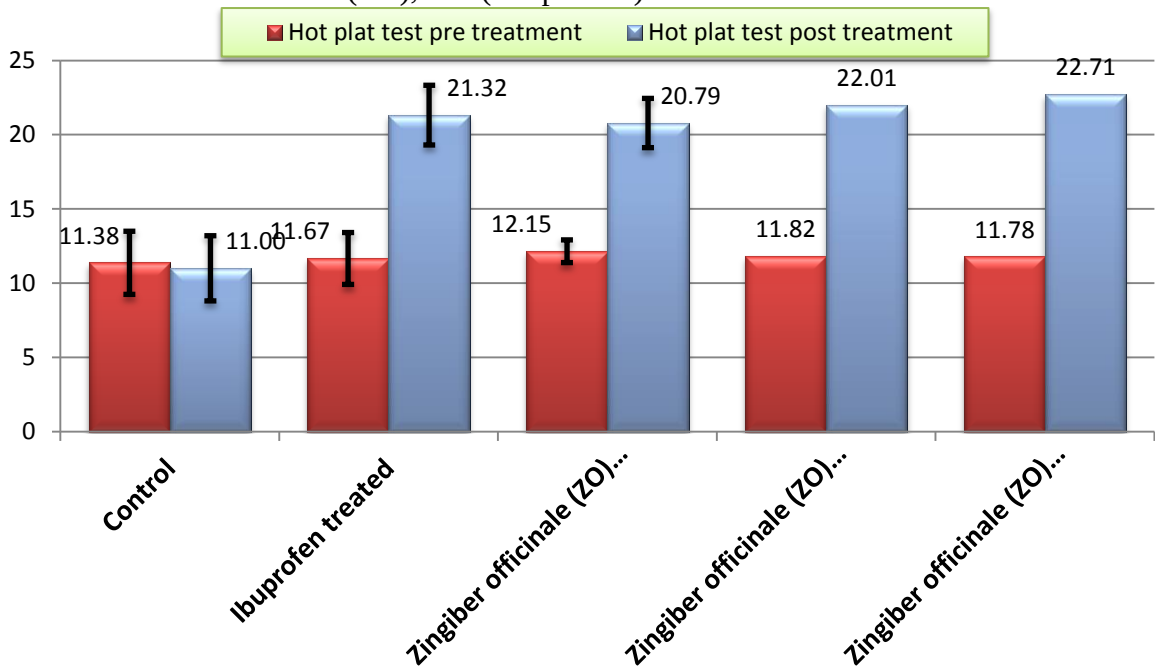
Statistical Analysis : Data are expressed as mean±SEM and were analyzed statistically by two way ANOVA procedures, followed by LSD test. A difference was considered significant at $p<0.05$.

Result:

The results of this study demonstrated the effect of *Zingiber officinale* analgesic and anti-inflammation compared with ibuprofen (Figures -1,2,3). The extract of *Zingiber officinale* showed slight effect and no significant $P<0.05$ compare with Ibuprofen group .

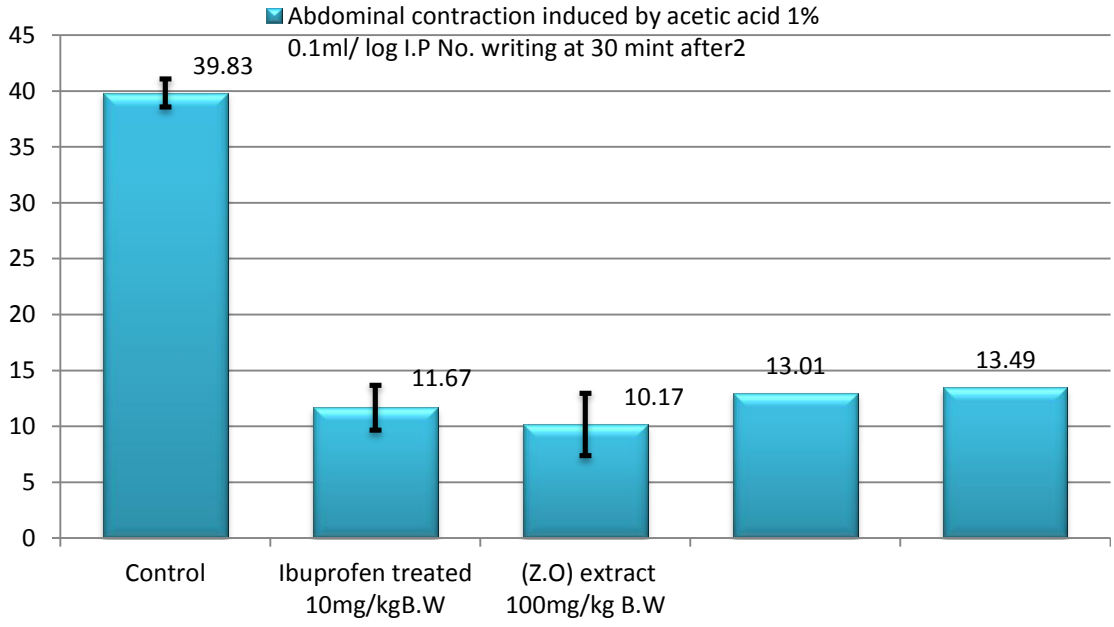
Hot Plate Test

Fig. 1 : The pain reactive time to the thermal stimuli (in seconds) in male mice treated with the extract of (ZO), and (Ibuprofen) .



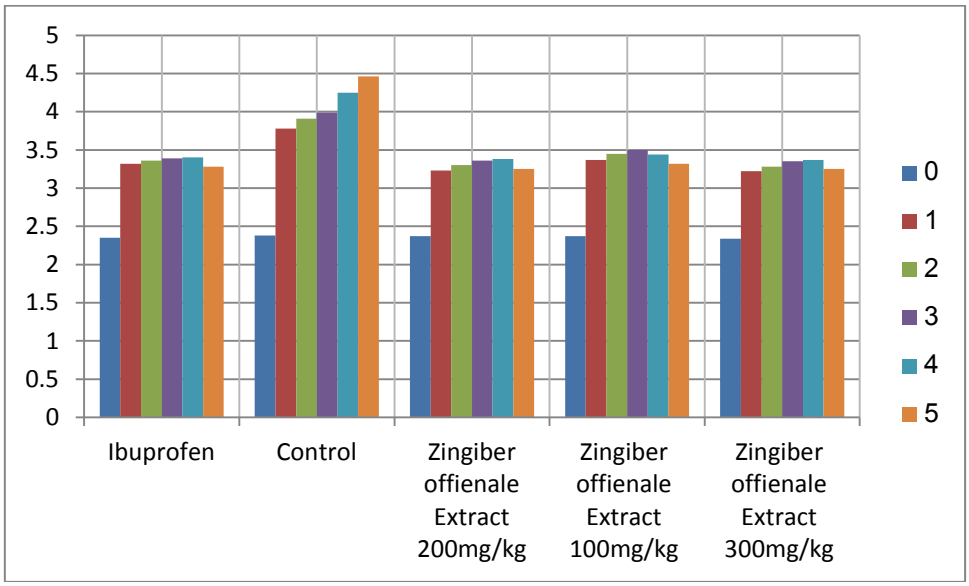
Acetic acid induced writing

Fig 2: Effect of (ZO) extract and Ibuprofen on acetic-induced writhing in male mice.



Carrageenan-induced inflammation in paw edema of mice

Fig 3 : Anti-inflammatory Effect of (ZO) extract and Ibuprofen on carragneenan-induced paw edema in male mice



Discussion.

The extract of *Zingiber officinale* (ZO) exhibited analgesic activity for its central and peripheral activities in mice, by inhibiting the hot plate test and acetic acid – induced writhing. Analgesic activity of *(ZO)* extract against acute pain was moderate as compared to the potent inhibitory activity of Ibuprofen. It is established that nonsteriodal anti-inflammatory drugs (NSAIDs) such as ibuprofen inhibits the synthesis of prostaglandin; which increases the sensitivity of nociceptor and perception of pain (13) .Various peripherally acting analgesic drugs such as ibuprofen, aspirin and indomethacin have been reported to inhibit acid induced writhing (8)and(9). Prostaglandin and bradykinin were suggested to play an important role in the pain process **(**14). Hot plate test is commonly used to assess narcotic analgesics, other centrally acting drugs, including sedatives and muscle relaxants or psychotomimetics have shown activity in this test(15). Therefore, it is likely that (*ZO)* extract might suppress the formation of these substances and exert its analgesic activity in hot plate test and acetic acid induced writhing test. In both methods; *(ZO)* extract showed high analgesic activity. Suggesting its peripheral and central analgesic activity . The analgesic activity may be due to the presence of total polyphenols , flavanoids and tannins in (ZO) extract . carrageenan – induced suplantar edema in mice is a valuable test used in predicting the value of anti-inflammatory agents acting by inhibiting the mediators of acute inflammation (16). Many substances have been proposed as inflammatory mediators, released locally at the site of inflammation and having biological properties that cause or enhance the signs and symptoms of inflammation (17). The effect of (*ZO)* extract becomes enhanced within 2 hours.. It is described as biphasic (18). The first phase (1 hr) involves the release of serotonin and histamine and the second phase (over 1 hr) is mediated by prostaglandins, the cyclooxygenase products, and the continuity between

the two phases is provided by kinins (19). The significant anti-inflammatory effect of *Zingiber officinale* extract was compared to that of ibuprofen, which could be related to its histamine, serotonin, kinin and prostaglandin inhibitory activities. Hence our present study revealed that of (ZO) extract showed significant anti-inflammatory activity. The anti-inflammatory activity may be due to the presence of sequiterpene, gingerol , inoleoresin and flavanoids in (ZO) extract (20). The result from this study showed the rhizome extract of *Zingiber officinale* exhibits anti-inflammatory and analgesic potentials. The analgesic and anti-inflammatory effects are approximate of ibuprofen, the standard anti-inflammatory drug used in this study .The above findings corroborate the various use of in various ailments. Further studies in progress in our laboratory are expected to identify the bioactive component responsible for the analgesic and anti- inflammatory activities of *Zingiber officinale* rhizome.

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