The Effect of Ginger on The Histopatholoical Lesions Of *Salmonella Typhimurium* in Mice Liver in Comparison with Cephalexin

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Abstract

The present study carried out to investigate the effect of Ginger in comparison with Cephalexin on the histopathological lesions of liver mice occurred after induction of *Salmonella typhimurium* orally at a concentration of (1×10^4 cfu/ml), then (7) days the extreme susceptibility of liver at female mice to the infection. Histopathological examination of liver revealed severe infiltration of inflammatory cells and massive tissue necrosis, involved in this study were 15 mice that were divided into 5 groups, 3 mice in each group (A, B, C, D and E). Those in group A, B, C, and D, constituted the test groups whereas group E served as the control for 7 days, test group A abandoned without any treatment, but group B was fed with ginger per day , also group C inoculated with cephalexin per day, otherwise the group D was inoculated with normal saline per day, group E served as the control per day, the histopathological observations show that difference between them .

Introduction

Ginger, the underground stem or rhizome of the plant zingiber officinale has been used as a medicine in Asian , Indian and Arabic herbal traditions, Ginger grows in fertile, moist, tropical soil, ginger is a knotted, thick , beige underground stem (rhizome), the stem extends roughly (12) inches above ground with long, narrow ribbed green leaves and white or yellowish green flowers (witchtl, 2004). Sine ancient times in China for example, ginger has been used to aid digestion and treat stomach upset, diarrhea and nausea for more than 2000 years ago, ginger has also been used to help treat arthritis, colic diarrhea and heart conditions. (Mascolo, *et al.,* 1989).

In addition to these medicinal uses ginger continues to be valued around the world as an important cooking spice and is believed to help treat the common cold, flu-like symptoms, headaches an even painful, native to Asia where its use as a culinary spice spans at least 4.400 years (Ody., 2000).

The important active components of the ginger root are thought to be volatile oils, and pungent phenol compounds such as (gingerols and shogaols) (Ali, *et al.*, 2008).

Salmonella typhimurium is a gram-negative facultative intercellular bacterium that causes a systemic infection. (Collins, 1970) During natural infection with *Salmonella typhimurium* only a small fraction of the ingested bacteria, cross the intestinal epithelium, reach the blood stream through the mesenteric lymph nodes and disseminate further into the reticuloendothelial system (spleen and liver) of the host to causes disease. After systemic dissemination of *Salmonella*, the courses of nature and experimental parenteral infections are equivalent, as shown by similar histopathological changes in reticuloendothelial as infiltration of polymorphonuclear leukocytes (PMN) and macrophages associated with degeneration and necrosis of hepatocytes throughout the parenchyma (Collins, 1972, Carter & Collins1974).

The aim of study

This study reveals the role of ginger to reduced the liver damage by Salmonella typhimurium and comparison with cephalexin

Materials and methods

a- Bacterial strains

Strains of *Salmonella typhimurium* had been taken from collage of Science/ department of biology university of mosul and diagnosed using the biochemical tests /strains were subculture in nutrient broth and incubated at 37C° under aerobic condition for 24 hr. then stored at 4Cº in refrigerator until used . (Finegold & Martin,1982)

b- preparation of Ginger

obtained from private market (powdered form),a extract of it prepared by (Riose *et. al* .1987) .

1-Dissolved 10gm/100ml distilled water

2-Mixing by using magnetic sterrier

3-Keep the extract for 24hr. in the refrigerator.

4-Then the extract was filtered through a 0.45mm membrane

5-Finally the extract will be used as a powder after used Lyophilization ,which filled in a capsule 250mg .

Our study Consists of :

1- In vivo experimental. study
2- In vitro experimental study **.**

1- In vivo experimental study .

(15) mice were used in this study , their ages ranged between 10-12 weeks from *Mus Musculas* by weight (20) gm of female mice distributed randomly in (5) groups (A, B, C, D and E), (3mice in each group).

- The group A, B, C, D administrated orally by (1×10^4 cfu /ml) of *salmonella typhimurium*, and these mice were left for the following (7)days to ensure the occurrence of infection, (Topley and Wilson ,1984) *In the same time, the group A abandoned without any treatment.

*The group B was fed with ginger (3 gm) per day for (7) days.

*The group C inoculated with cephalexin (500 mg) (1 mg / m1) in drinking water twice daily for (7) days.

*The group D was inoculated with normal saline (10 ml) daily for (7) days.

-The group E was served as the control without inoculated with *salmonella typhimurium* and was fed ginger only .

At the end of the (7) days, the mice were sacrificed and the Liver was obtained and immediately fixed in 10% formalin solution for histological examination .

C- Histological examination

Histological sections were prepared and stained by haematoxylin and eosin (Luna, 1968).

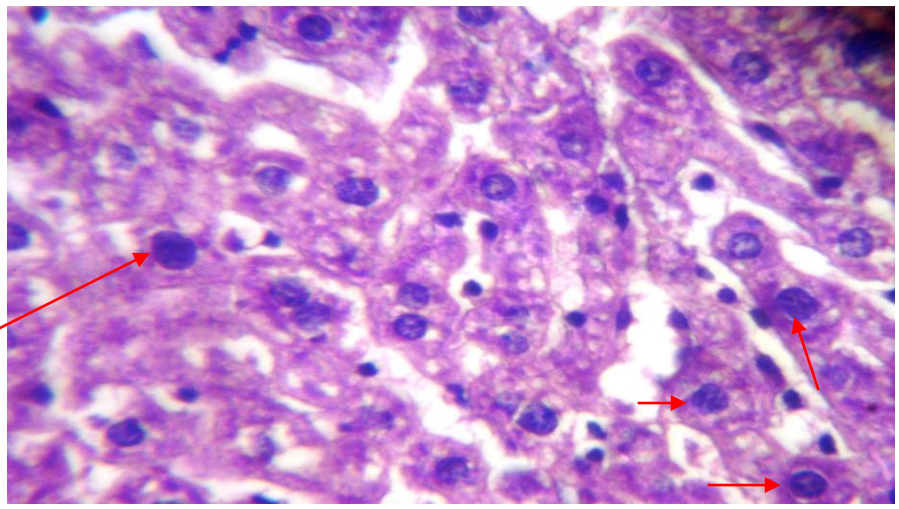
2- In vitro experimental study:

a- *Salmonella typhimurium* was inoculated in nutrient broth, incubated for 24 hr . at 37 Cº.

b- Nutrient agar plates were inoculation with (0.1 ml) of liquid inoculum prepared for the strains of *Salmonella typhimurium*, three discs impregnated with the tested materials were placed on the surface of the nutrient agar plates, the first disc was impregnated in ginger (3 gm in 10 ml) of sterile distilled water, the second disc was impregnated with cephalexn by concentration 500 mg (1 mg/ ml) in sterile distilled water while the third disc was impregnated in normal saline and used as a control. Results were recorded after incubation for 24 hr. at 37 Cº .

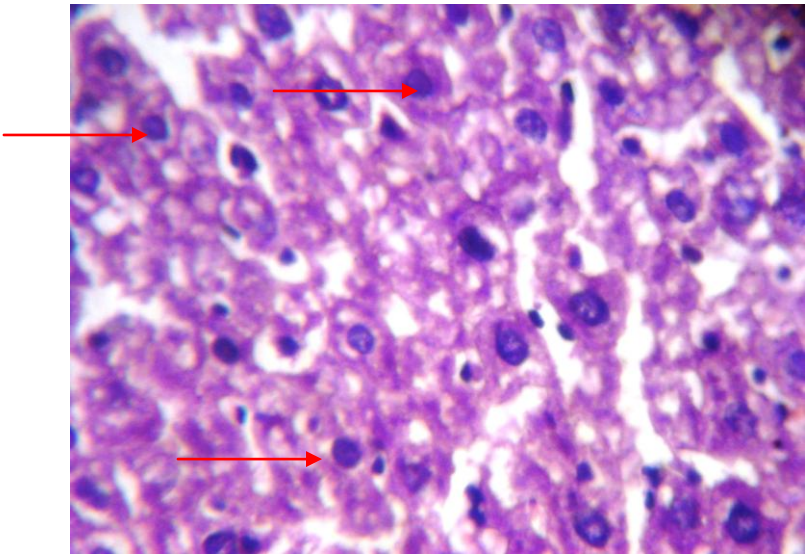
Result and Discussion

The histopathological observations showed an infiltration of inflammatory cells in liver, induced patchy necrosis of liver hepatocytes, and vacuolar degeneration of hepatocytes (group A), (figure 1) , this agreed with (Collins, 1972, Aderem & Ulevitch 2000. Thomson, *et al*. 2002 and white 2007).



Group(A) Fig.(1) showed an infiltration of inflammatory cells in liver (⟶), induced patchy necrosis of liver hepatocytes (⟶).H & E . 40 × 2

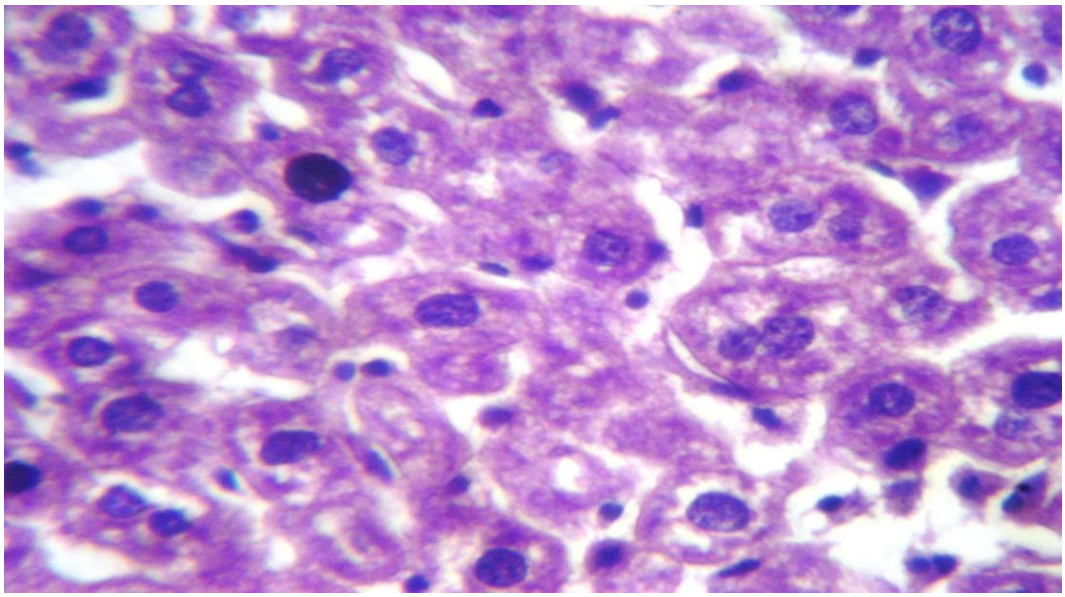
The effect of ginger toward infection by *Salmonella typhimurium* induced liver damage in mice (group B), (figure 2) this agreed with (Langner, *et al.*1998, chaiyakunapruk ,2006 and Ayalogu , *et al* . 2007).



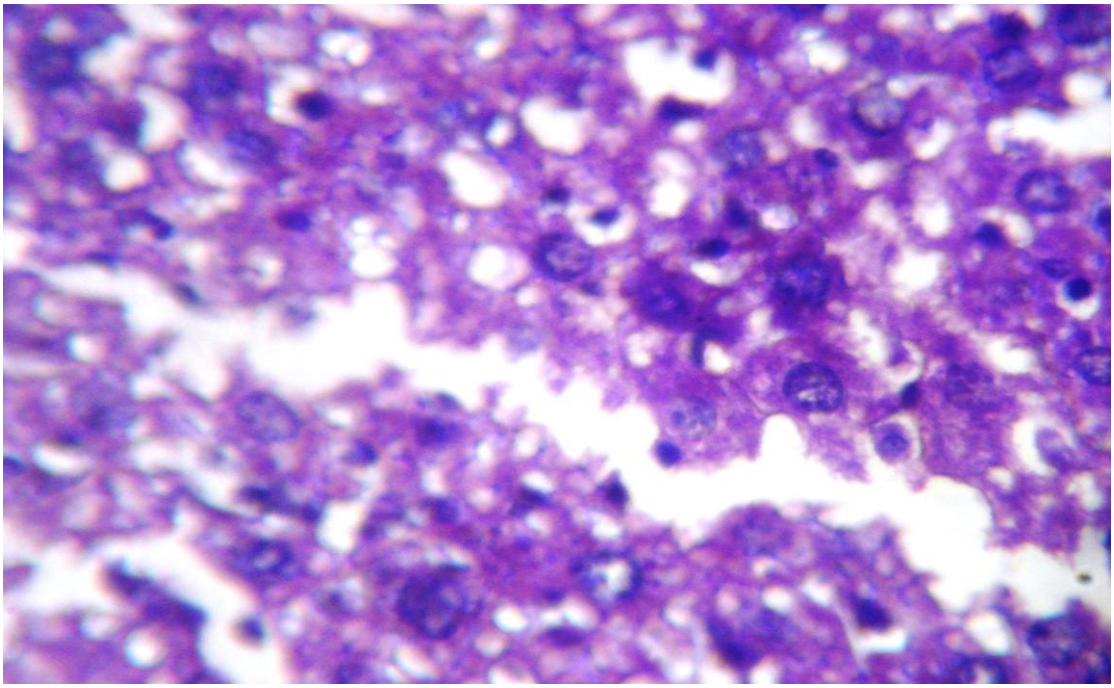
Group(B) Fig.(2) showed the effect of ginger on histopathological lecions „(⟶) H & E . 40 ×2 .

It is also used as a digestive aid for mild stomach upset , as support in inflammatory conditions such as arthritis and may even be used in heart disease (Lavalle, *et al* .2000.Altman & Marcussen, 2001 and Willetts, *et al* 2003).

(Figure 3) showed less histopathological changes were demonstrated in liver following administration of cephalexin (group C), but (figure 4) showed that no histopathological changes were following administration of normal saline (group D), this agreed with (Jama , 1997)

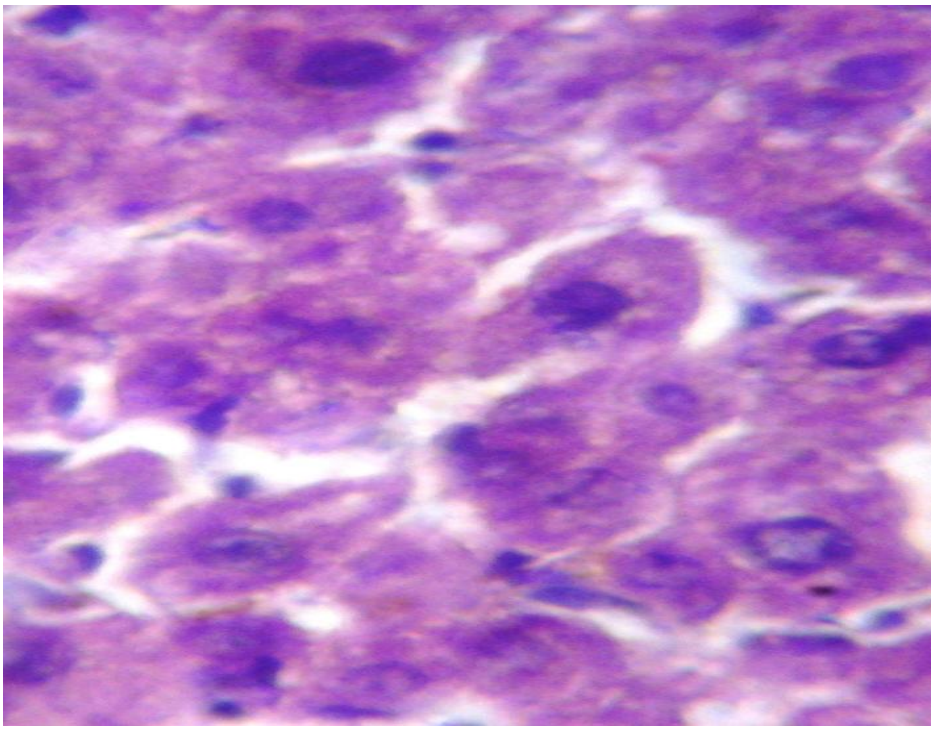


Group(C) Fig.(3): showed less histopathological changes in the liver following administration of cephalexin . H & E . 40 × 2



Group(D) Fig.(4): showed no histopathological changes were seen following administration of normal saline H&E 40 × 2 .

(Figure 5) showed healthy liver without any infection of *Salmonella typhimurium* because of inoculation of ginger only (group E), this agreed with (Vera & Hudson 2000) .



Group(E) Fig. (5) showed healthy liver without any infection of *Salmonella typhimurium* H & E 40 × 2 .

Signification similar in the rate of healing of diarrhea were observed between control diarrhea treated with normal saline and diarrhea treated with either ginger, antibiotic. Ginger gave the same result of antibiotic to treatment of this case (diarrhea), therefore the ginger to help prevent or treat nausea and vomiting associated with motion sickness , pregnancy and cancer chemotherapy, these scientific evidences showed that ginger appeared some pharmacological properties lead to reduced the liver damage by any infection, this agreed with (Thomson *et.al*. 2002, white, 2007 and Nwaopara & M.A.C.O .dike, 2007), this was the results of in vivo experimental study, the same results was obtained in vitro experimental study, zone of inhibition against *Salmonella typhimurium* for ginger was the same results that inhibition for antibiotic against *Salmonella typhimurium*, but control disc (normal saline) showed no zone of inhibition by length (3.2 cm), (3.5 cm), (0 cm) respectively (figure 6)

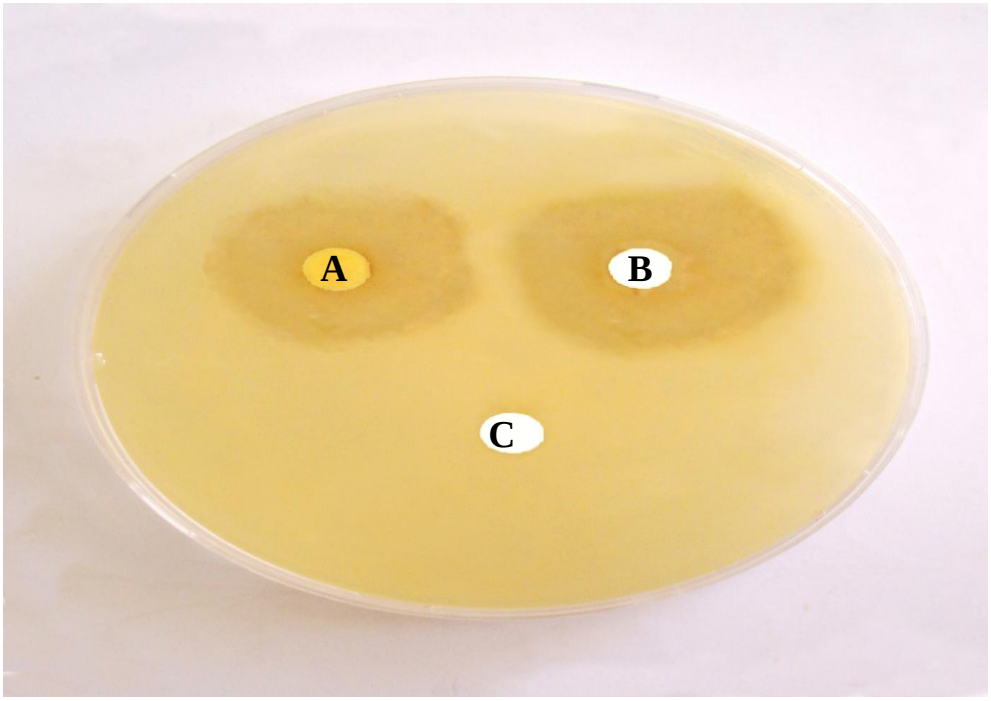


Fig. (6): zone of inhibition of ginger , antibiotic , normal saline against *Salmonella typhimurium*

A- Ginger
B- Antibiotic
C- Normal saline

Other studies showed ginger extract has long been used in tradition medical practices to reduce inflammation such as ulcerative colitis, (Metz & Mcupp. 2000 and Apariman, *et al* 2006), another studies affirmed the ginger appeared analgesic properties, anti tumorigenic effect, revealed hypoglycaemic effect,(Mascolo, *et al*, 1989, Blumenthal, *et al*, 2000 and Mccann, 2003).

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تأثير الزنجبيل على الآفات المرضية النسجية المحدثة بـ *Salmonella Typhimurium* في كبد الفئران مقارنة مع المضاد الحيوي Cephalexin

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الخلاصة

تضمنت هذه الدراسة قدرة *Salmonella typhimurium* على احداث الاصابة بعد تجريعها فمويا بتركيز (١×١٠ ٤ وحدة تكوين المستعمرة /مل) اذ بينت الدراسة قابلية إصابة كبد إناث الفئران وظهور الأعراض المرضية النسجية المتمثلة بـ ارتشاح الخلايا الالتهابية في الكبد وتنخر نسيجي لذلك صممت دراستنا على استخدام الزنجبيل للتقليل من هذه الاعراض المرضية والتي شملت (١٥) فارة وقسمت إلى (٥) مجاميع وكل مجموعة تتكون من (٣) فئران (A, B, C, D, E) وتعتبر مجاميع A, B, C, D قيد البحث في حين المجموعة E قيد السيطرة ولمدة (٧) أيام حيث المجموعة A تركت بدون معالجة فقط إحداث إصابة ، في حين المجموعة B عولجت بالزنجبيل يوميا والمجموعة C عولجت بـ Cephalexin يوميا والمجموعة D عولجت بالمحلول الفسلجي في حين المجموعة E كانت قيد السيطرة وعند تشخيص المقاطع النسجية لوحظ وجود اختلافات ما بين المجاميع الخمسة.