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Research Article

Antioxidant Activities of *Allium sativum* on some Biochemical parameters following Ethanol Induced Lesion in the Gastric Mucosa of Adult Male Wistar Rats

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Abstract: This study was carried out to investigate, the protective potential of *Allium sativum* on the stomach following ethanol-induced mucosal lesions in Adult male wistar rats (*Rattus novergicus*). Twenty four Adult male Wistar rats were used in the study and divided randomly into 3 groups (8 animals in each); Group A received orally, Phosphate Buffered Saline (PBS) and served as control; groups B and C received 1.0 mL of 35% ethanol orally every 24 h and group C received freshly prepared Garlic Homogenate (FGH) (300 mg/kg/body weight) once daily one hour prior to ethanol administration. The study was for 21 days after which the animals were sacrificed following cervical dislocation and the stomach being the organ of study were excised. The excised stomach was homogenised in 5% sucrose solution for biochemical studies and there was significant increase in the level of GSH-Px of FGH treated group when compared to those treated with ethanol only. Marked increase in the level of G-6-PDH and TBARS in ethanol treated group was observed compared to FGH treated and the control groups.

Keywords: Allium sativum, glucose-6-phosphate dehydrogenase (G-6-PDH), gluthathion peroxidise (GSH-Px), *Rattus novergicus*, Stomach, thiobabituric acid (TBARS)

INTRODUCTION

Herbal medicine also called botanical medicine or phyto-medicine, refers to using a plant's seeds, berries, roots, leaves, bark, or flowers for medicinal purposes. Herbalism has a long tradition of use outside of conventional medicine. It is becoming more relevant as improvements in analysis and quality control along with advances in clinical research show the value of herbal medicine in the treating and preventing disease (Kraft, 2009).

Garlic (*Allium sativum)* has been used medicinally since before the time of the Sumerian civilization (2600-2100 BC), by when it was already widely cultivated in India and China (Harris *et al*., 2001). Traditionally, it is used as an antimicrobial agent, has also been reported to modulate cardiovascular and immune functions as well as having antioxidant and anticancer properties (Cavallito *et al*., 1944).

Garlic exhibits potentially beneficial clinical activity as an anti-hyperlipidemic, (Silagy and Niel, 1994) antioxidant, (Borek, 2001) and anti-diabetic (Sheela *et al*., 1995) agent. It is also said to improve memory, reducing age-related cognitive disorders (Kosuge *et al*., 2003, Moriguchi *et al*., 1994).

In test tube studies garlic has been found to have antibacterial, antiviral and antifungal activity. However, these actions are less clear in humans. It is also claimed to help prevent heart disease (including atherosclerosis, high cholesterol and high blood pressure) and cancer (UMM, 2009).

It is believed in the traditional medicine that consumption of garlic can cure stomach problems (Ross, 1999). However, clinical studies carried out with different garlic preparations indicate that garlic irritates gastric mucosa and can produce gastric lesions (Hoshino *et al*., 2001). Further, garlic extracts were reported to inhibit the effect of prostaglandin E, a cyto-protective agent in the stomach (Gaffen *et al*., 1984).

This study aims to investigate the antioxidant activities of garlic (*Allium sativum*) on ethanol induced gastric mucosa lesions taking into consideration gluthathion peroxidise (GSH-Px), thiobabituric acid (TBARS) and glucose-6-phosphate dehydrogenase (G-6-PDH) in adult male wistar rats.

MATERIALS AND METHODS

Animals: The investigation was conducted on presumably healthy 24 adult male wistar rats of 220±10 g average body weight bred in the animal house of Department of Anatomy, Faculty of Basic Medical Sciences, College of Health Sciences, University of

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Ilorin and Ilorin. The animals were kept under standard and good laboratory conditions (light, temperature, humidity and ventilation). The animals were randomly grouped into 3 groups, A, B and C of 8 animals in each. They were fed with pellet rat diet and water was available *ad libitum*.

Collection and preparation of garlic homogenate: Raw garlic bulbs were purchased from Oja-Tuntun market in Ilorin, kwara State Nigeria. The garlic used was freshly prepared raw Garlic Homogenate (FGH). The garlic bulbs were peeled off and homogenized with mortar and pestle with a sufficient amount of water (1 g of garlic in 2 mL of water). Then, the resulting solution was used in the investigation.

Treatments: Group A received 1 mL Phosphate buffered saline (PBS) with PH 7.2 (Bertram, 2006) orogastrically for 21 days and served as the normal control. Group B received 1 mL of 35% ethanol per day and served as the ethanol control. While group C were also given 1 mL of 35% ethanol 1 h after pre-treatment with 1 mL of FGH 300 mg/kg/body weight. All the animals were weighed and the readings were recorded on the daily basis.

The experimental administrations lasted for 21 days. Animal sacrifice was carried out 24 h after the last administration by cervical dislocation. The stomachs were excised and each stomach was opened along the greater curvature, rinsed under tap water and examines the lesion in the glandular parts of the stomach.

BIOCHEMICAL STUDY

The samples needed for biochemical estimation were immediately blotted dry, weighed, homogenized in 5% sucrose solution, with mortar and pestle in cold media. The following biochemical tests were carried out; thiobarbituric acid test TBARS, glutathione peroxidise (GSH-Px) and G6PDH, were also evaluated using sigma kit.

Physical observation: Animals were observed to be presumably healthy at the onset and throughout the investigation.

The control group (group A) animals remain active throughout of the investigation period. The ethanol treated groups (group B and C) showed agitation and didn't feed for some minutes after which they became calmed and feed respectively. Animals in group B showed agitation compared to other groups, but tend to become calm and normal towards the end of the investigation.

There were no observable changes in the droppings of all the animals across the groups, since their

Table 1: Showing the average body weight change (g), Thiobabituric acid test (TBARS) (UI/g Tissue), G6PDH (UI/g Tissue), GSH-Px (UI/g Tissue)

GROUPS	Average body weight change (g)	TBARS (UI/g Tissue)	G6DPH (UI/g Tissue)	GSH –Px (UI/g Tissue)
A) Control, 1mL of PBS	8.50±0.04	0.14±0.004	50.05±0.19	60.37±0.44
B) Ethanol 1mL of 35%	-4.50±0.02	0.24±0.011*	75.39±0.29*	58.74±0.88*
C) FGH 300 mg/ kg/ b.w/ day + Ethanol 1mL of 35%	-3.00±0.15	0.20±0.012*+	70.26±0.72*	59.51±0.28*

All expressed in Mean ±S.E.M; *: $p<0.05$ significant vs control (group A); **: $p<0.05$ significant vs group B and +: $p<0.05$ not significant vs group B

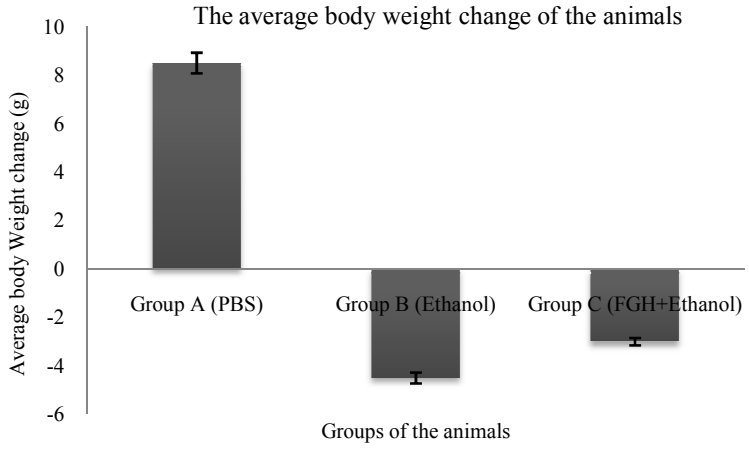

Fig. 1: Showing the average body weight change of the animals across the groups

droppings seem normal when compared to the control group.

Weight observation: Daily weight of the animals were monitored throughout the experiment by measuring the weight of animals using SALTUN®EK5055Max weighing balance which was made available by the Department of Anatomy University of Ilorin, kwara state Nigeria. The average body weight change of animals per group was shown in the Table 1 (Fig. 1).

DISCUSSION

The study also went further by checking out the effect of ethanolic extract of freshly prepared garlic homogenate on some enzymes (G-6-PDH, MDA (TBARS) and GSH-Px) activities in the stomach of the experimental animals used for the study. Without enzymes, life would not be possible (Rodwell, 1993).

The levels of TBARS were found to increase significantly in ethanol and FGH pre-treated group compared with the control group. The level of increase were found less in FGH pre-treated group compared with ethanol treated but not significant as shown in Fig. 2. The level of G-6-PDH was also investigated and found that there was significant increase in the level in ethanol treated and FGH pre-treated group compared with control. Comparing ethanol group with FGH group also shows significant increase in the enzyme level as shown in Table 1 and demonstrated in Fig. 3. The third

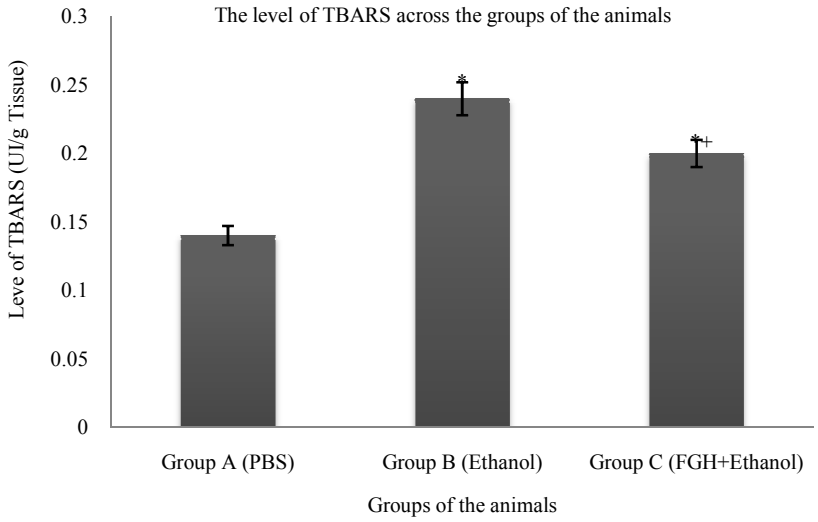

Fig. 2: Showing the level of TBARS across the groups; *: $p<0.05$ significant vs control (group A); +: $p<0.05$ not significant vs group B

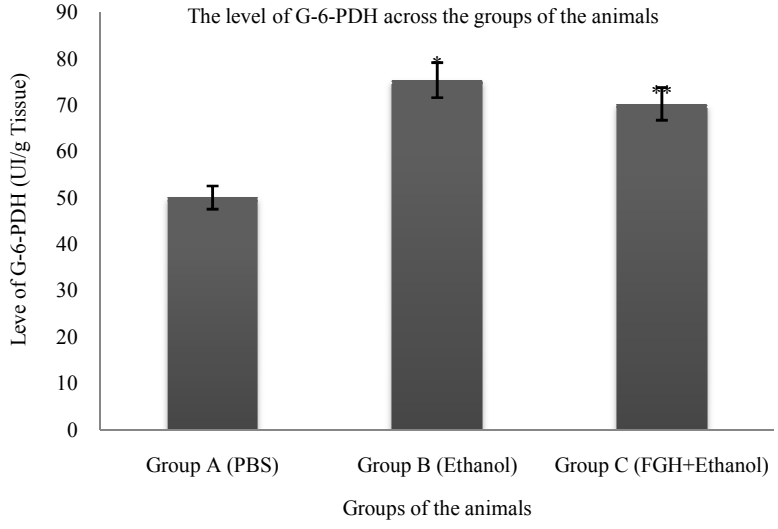

Fig. 3: Showing the level of G-6-PDH across the groups; *: $p<0.05$ significant vs control (group A); **: $p<0.05$ significant vs group B

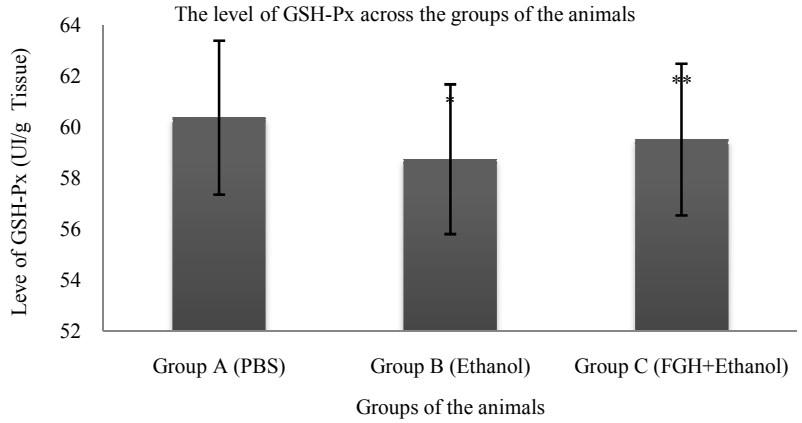

Fig. 4: Showing the level of GSH-Px across the groups; *: $p<0.05$ significant vs control (group A); **: $p<0.05$ significant vs group B

enzyme level investigated was the level of GSH-Px which shows a significance decrease in ethanol group compared with the FGH pre-treated group and the control group and in group C compared with control group. GSH-Px is an important enzyme which plays a key role in the elimination of hydrogen peroxide and lipid hydroperoxides in the gastric mucosa cells (Halliwell *et al*., 1992) (Fig. 4).

Based on the observations and the results obtained in this investigation, the following can then be suggested:

- Ethanol administration reduced the average body weight change of the rats.
- Garlic reduces the effects of ethanol on the submucosal layer of stomach.
- Garlic reduces the effects of ethanol on the enzymes or marker of oxidation such as G-6-PDH, TBARS and GSH-Px.

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