

Age Related Changes in Prostaglandin E₂, Nitric Oxide and Vascular Endothelial Growth Factor in Gastric mucosa during the Healing of Acetic Acid Induced Ulcer

A.F Ajayi, B.D Kehinde, O.M Lateef, B.A Akorede

Introduction

- Gastric ulcer is a break in the duodenal mucosa, it relates to the corrosive action of pepsin and hydrochloric acid.
- The integrity of the upper gastrointestinal is dependent upon the balance between hostile factors and protective factors affecting gastrointestinal mucosa. (Prabha *et al.*, 2009)
- The incidence of many GI dysfunctions, including gastric and duodenal ulcers, increases with aging (Geokas *et al.*, 1985; Steinheber, 1985).
- Aging is associated with reduction in mucosal protective mechanisms that may predispose aged animals to mucosal injury (Gronbech and Lacy, 1994; Lee and Feldman, 1994).
- Ulcer healing is a complex process, in which the tissue repairs itself after injury, attempting a restitution towards integrity. It has been proposed that such a process can be distinguished in sequential, partly overlapping, phases: haemostasis, inflammation, proliferation and remodeling (Stadelmann *et al.*, 1998).
- VEGF, PGE₂ and NO are fundamental regulators of angiogenesis and play an important role in ulcer healing process. (Brzozowski *et al.*, 2005a).

Aim

- The aim is to study the age related Changes in PGE₂, NO and VEGF in Gastric mucosa during the Healing of Acetic Acid Induced Ulcer.

Significant of the study

- The gastric mucosa represents a source of continuous PGE₂, NO, and VEGF productions which are regarded as crucial factors for the maintenance of mucosal integrity and protection against injuring factors (Halter *et al.*, 2001; Brzozowski *et al.*, 2005a).
- Insight into their possible changes during gastric ulcer healing with advancing age could give a guide to the right prescription for older people, which may possibly reduce adverse effects and improve compliance with treatment procedures

Materials and Methodology

DISTRIBUTION OF ANIMALS

DAYS/AGES	GROUP 1 (3 MONTHS)	GROUP 2 (6 MONTHS)	GROUP 3 (18MONTHS)
3 DAYS	5	5	5
7 DAYS	5	5	5
14 DAYS	5	5	5

PARAMETER	METHODS	REFERENCES
ULCER INDUCTION	ACETIC ACID ULCER MODEL	Susumu and Kikuko, 2005
HISTOLOGY OF THE STOMACH	H & E STAIN, X100	Ajayi and Olaleye, 2015
NO CONCENTRATION	SPECTROPHOTOMETRY	
VEGF CONCENTRATION	ELISA	Elabscience, China
PGE2 CONCENTRATION	SPECTROPHOTOMETRY	
VEGF EXPRESSION	IMMUNOHISTOCHEMISTRY	
Ethical approval	Oyo state research ethical review committee, ministry of health secretariat Ibadan	AD 13/479/459

Statistical Analysis

- All values were presented as Mean ± SEM. The statistical significance of differences among groups was assessed using one-way ANOVA and value of p<0.05 was considered significant

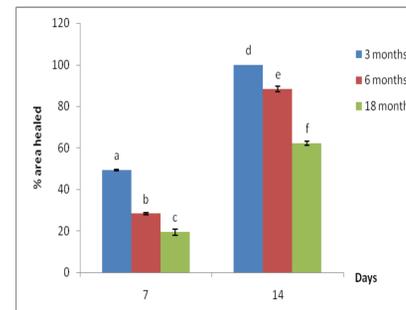


Figure 1: Percentage area of ulcer healed on days 7 and 14 post induction

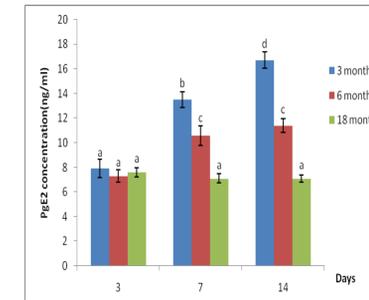


Figure 2: Concentration of prostaglandin E₂ in gastric tissue post induction of ulcer.

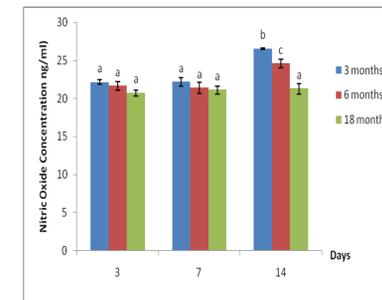


Figure 3: Nitric Oxide concentration in stomach tissue post-induction of ulcer.

Bars carrying different letters are statistically significant at p<0.05

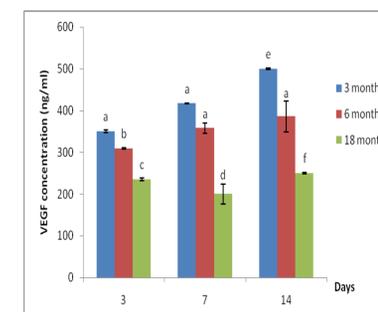


Figure 4: VEGF concentration in stomach tissue post-induction of ulcer.

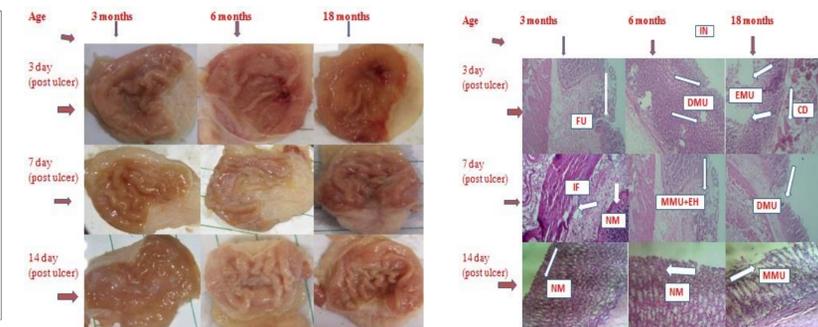


Plate 1: Gross pictures of the stomach post induction of gastric ulcer with acetic acid.

Plate 2: Photomicrograph collage of the stomach histology of 3-, 6-, and 18-month old rats post acetic acid induced ulceration. (H & E STAIN, X100).

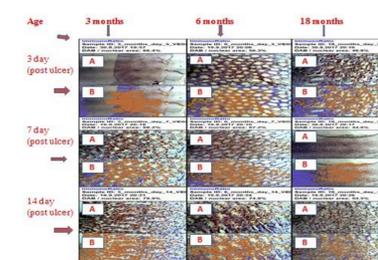


Plate 3: Photomicrograph of Expression of VEGF on days 3, 7 and 14-post induction of ulcer.

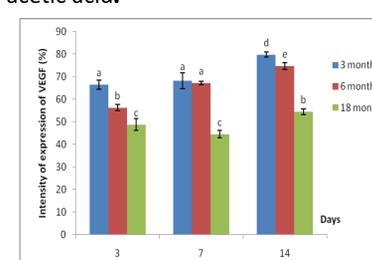


Figure 5: Percentage intensity of expression of VEGF post induction of gastric ulcer.

Discussion

- It was observed that the percentage ulcer area healed was inversely proportional to age. This implies that healing was faster in the younger rats' mucosa. This finding is similar to a previous report by Prabha *et al.*, 2009.
- This study showed that there were significant increased in the concentration of PGE₂, NO and VEGF in younger rats mucosa, in line with the work of Mark *et al.*, 1999.

Conclusion.

- In conclusion, this study revealed that NO, PGE₂ and VEGF are important components of gastric mucosa protective factors which aid in ulcer healing and are present in young stomach than in aged gastric mucosa.
- From this study, it was discovered that the rate of ulcer healing is relative to the concentrations of NO, PGE₂ and VEGF in the gastric tissue and this may be responsible for the faster healing observed in younger rats than in aged rats.