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HISTOLOGICAL STUDY ON THE EFFECT OF MORINGA OLEIFERA LAM ON THE DUODENUM OF ADULT RATS TREATED BY DIFFERENT DOSES OF DICLOFENAC SODIUM (VOLTAREN)

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ABSTRACT

Diclofenac Sodium (DS) as one of Non-steroidal Anti-inflammatory Drugs (NSAIDS) is a commonly used and may be used in high or toxic doses by mistake or postoperatively. Consequently, the present study was designed to evaluate the possible protective role of Moringa Oleifera (MO) on the experimentally induced microscopical changes of duodenal mucosa of adult rats following administration of different high doses of DS**.** Forty five rats were divided into the following groups (15 each): Group I was served as a control group, Group II was subgrouped to IIa, b and c, that were administered oral 50, 100 and 150 mg/kg of DS respectively for 2 days after fasting for 20 hours. Group III was subgrouped to IIIa, b and c. These rats were maintained on oral MO (500mg/kg) daily for one week, and then they were administered the same doses as in the previous group. A variety of histological changes was observed in group II. The changes were ranged from loss of the brush border to cellular lysis, destruction of villi, monocellular infiltrations and basal glandular ulcerations. The PAS stained sections showed focal negative expression of the brush border together. Although the goblet cells appeared significantly decreased in number, they had increased acidic mucin secretion. In conclusion, the current study suggested that MO may have a limited and partial protective effect on the duodenal mucosa in cases of high dose administration.

Key words: *Moringa oleifera lam, Voltaren, LM, histology, duodenal mucosa*

INTRODUCTION

Moringa oleifera lam (MO) (horse radish tree) (Moringaceae) was a small sized tree, Which was native to south Asia and also grows in tropical Africa (Ghasi *et al*., 2000). Also, it can be cultivated in Egypt. Various parts of MO were generally known for their multiple pharmacological effects including their anti-inflammatory effects (Caceres *et al.*, 1992). It has shown anti-tumor, anti-inflammatory, hepatoprotective, and anti. hypertensive properties (Vinay *et al.*, 2012). The extract of MO had been found to have potent antioxidant action in vivo (Ashok Kumar and Pari, 2003), and in vitro studies (Siddhuraju and Becker, 2003). Accumulating evidence supported the protective effects of phenolic antioxidant from medicinal plants against oxidative stress-mediated disorders (Soobrattee *et al*., 2005). These results confirm the antiulcerogenic properties of Moringa oleifera, and that MO extract preserve the microanatomical integrity and dimensions of the various layers of pylorus and duodenum of Wistar rats. Therefore the extract prevents a decrease in gastrointestinal surface area following ethanol induced injury, via inhibition of oxidative damages that accompanies ethanol-induced gastrointestinal injuries (Olaibi *et al*., 2014).

Pharmaceutical studies revealed that the methanol extract of the root of *Moringa oleifera* was reported to possess anti- inflammatory effect in rats (Caceres *et al*., 1992), estrogenic and antiprogestational activities, significant antispasmodic activity as inhibition of acetylcholine-induced contraction (Caceres *et al*., 1992), hepatoprotective effect on liver damage, and inhibition of the growth of *Pseudomonas aeruginosa* and *Staphylococcus aureus* in vitro (Nwosu and Okafor, 1995; Nikkon *et al*., 2003; Caceres, 1991).

Non-steroidal anti-inflammatory drugs (NSAIDs) were commonly used for the treatment of rheumatoid diseases and to relief pain and inflammation due to their analgesic, antipyretic and anti-inflammatory properties. These drugs were used as prescription

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drugs and over the counter purchases (Teoh and Farrell, 2003).

The therapeutic value of NSAIDs in musculoskeletal pathologies or in pyretic and painful conditions was hindered by several side effects. The most severe side effect was observed on both the stomach and the intestine (Wolfe *et al.,* 1999). Small intestinal ulceration was a frequent and potentially serious condition associated with nonselective cyclooxygenase (COX) I&II inhibitors NSAIDs including diclofenac (LoGuidice *et al*., 2010). NSAID-induced permeability changes lead to inflammation of the small intestine in two-thirds of patients on long-term treatment with this drug. The intestinal inflammation may persist for up to 16 months after withdrawal of NSAID. NSAIDs might expose the mucosa to luminal bacteria as well as other luminal content which might have aggressive effects and produce inflammation (Bjarnason *et al*., 1987).

The objective of this study is to evaluate the possible protective role of Moringa oleifera lam on adult rat duodenal mucosa following administration of different high doses of Voltaren, (Diclofan sodium) by light microscopy.

MATERIALS AND METHODS

I. Chemicals

Moringa Oleifera lam (MO) leaves were purchased from Herbs & Seeds Co. Paranaque, Metro Manila, Philippines by mail. The dried leaves were grounded into fine powder and stored in a glass container at 4^{o}C. The powdered sample was extracted with distilled water (DW) using reflux method. The crude aqueous extract was concentrated *in-vacuo*, properly labeled and stored in the refrigerator at 4^{o}C (Trease and Evans, 1989).

Diclofenac Sodium (Voltaren Retard $^{@)}$-Novartis) (100mg)

The tablet packs were purchased from a local pharmacy (Jeddah). The purchased DS tablets were grounded into fine powder and stored in a glass container at 4^{o}C. The required doses were calculated according to the weight of each animal. The powder was dissolved in a solution of combined physiological saline and 1% carboxymethylcellulose (CMC). The used doses in the current study were selected according to a pilot study on different doses of DS to select the highest minimal non lethal dose.

II. Experimental animals

Forty five albino Wistar adult male rats weighing 200 to 250 g were purchased from animal house of KFRC (King Fahd research center) under the rules of Canadian ethical approval from the Local Biomedical ethical committee of King Abdulaziz University. The rats were housed in large cages environmentally controlled (25^{o}, 12-h light /12-h dark cycles). Commercial food and tap water were supplied ad libitum. They were sacrificed under light ether anesthesia with neck dislocation.

They were divided into control group (n=15) and were maintained on the dissolving vehicle (physiologic saline + CMC). The second group (n=15 animals) were maintained on vehicle (physiologic saline + CMC) once daily for 1 week then were fasted for 24 h. Then, they were subdivided into 3 subgroups (5 animals each) namely are: IIa, IIb and IIC. The animals of these subgroups were administered DS (50, 100 and 150 mg/kg) for 2 days respectively then were sacrificed after 3h from the second dose.

The third group (n=15) were administered MO orally in a dose of (500 mg/kg) once daily for 7 days. The animals of this group were subgrouped to the followings (5 animals each) namely are, Subgroup IIIa, subgroup IIIb and subgroup IIIc where animals were administered DS (50, 100 and 150 mg/kg) for 2 days respectively then were sacrificed after 3h from the second dose (Wallace *et al*., 1998).

Methods

Preparation of Tissues for Light microscopy:

Tissue samples were taken from the duodenum after washing by injection of saline followed by buffered formalin (BF) and then fixed in BF, processed through graded alcohols and xylene, and embedded in paraffin blocks in automatic processor of the pathology lab of King Abdulaziz university hospital. Serial sections of 4-6 µ were made on longitudinally and transversely oriented specimens. Sections were routinely stained with hematoxylin and eosin accordance to Drury and Wallington, (1980). And histochemically by PAS-Alcian blue stain to identify the type of the secreted mucin by Mulisch and Welsch (2010).

The histological changes in the duodenum were evaluated according to the level of tissue injury in accordance to Chiu' method knowledge of this on the belonging group of each rat, and were classified according to the degree of tissue lesion accordance to Chiu *et al.* (1970) into 5 levels as follows, namely are level 0 (Mucosa without changes), level 1 (Well-constituted velocities, no cellular lysis or inflammatory process, although there is formation of Grunhagen's sub-epithelial space at the villous tip, level 2 (Presence of cellular lysis, formation of Grunhagen's sub-epithelial space around the whole villous length and increased spacing among the villi, level 3 (Destruction of the free villosities section, presence of dilated capillaries and inflamed cells), level 4 (Structural destruction of the villosities, only traces of some villosities, formed by inflamed cells and necrotic material, with basal glandular ulceration,

and finally level 5 (Destruction of all the mucosa. no glandular structure can be seen, only the amorphous material lying on the sub-mucosal. tissue (Santos *et al*., 2008). Villus height and crypt depth of 20 well-oriented villi were measured from random field from the duodenum of controlled and treated animals and villus height: crypt depth ratio (V/C) was calculated as Abramoff (2004). Villus height was measured from the tip of the villus to the villus-crypt junction, whereas crypt depth was defined as the depth of the imagination between adjacent villi.

RESULTS

Group I: (Control group):

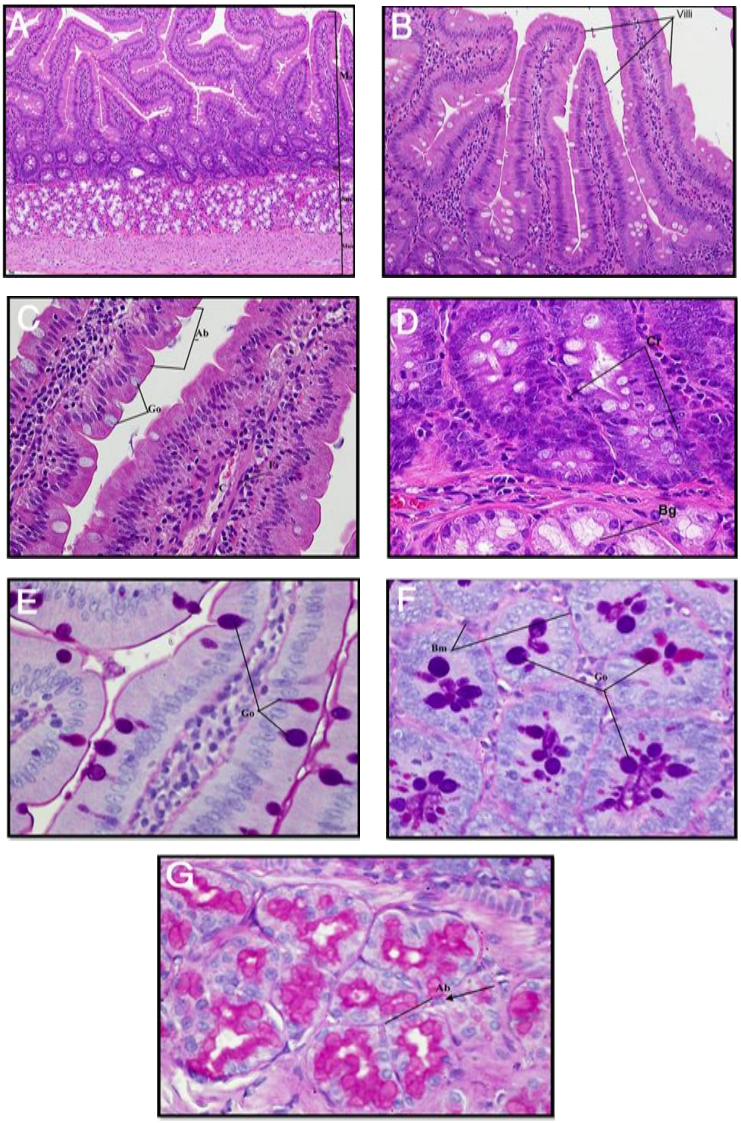

Fig. 1A- G: (1A): Duodenum of control rats showing different Layers of duodenum of a control rat as mucosa (Mu), submucosa (Sm), muscularis (Mu) and serosa. H&E.X100. (1B): the Leaf like appearance of the duodenal villi. Notice the high columnar absorbing cell with oval nuclei occupying the middle third of their cytoplasm. H&E X200. (1C): the lining columnar absorbing cells of the mucosa and few goblet cells (GO) in between. Notice the lamina propria of the villous core with smooth muscle fibers (f) and blood lacteal capillaries (c). H&E X400. (1D): the crypts and part of Brunner's gland (Bg). Notice mitotic figures of upper part of cell Lining the crypt (Cr). H&E X600. (1E): duodenal villi, showing goblet cells (Go) with variable intensity alcian blue-PAS positive reaction. Notice the continuous PAS positive apical brush border. PAS-alcian blue. X600. (1F): A photomicrograph of the crypts, showing the predominance of combined PAS-alcian blue positive reaction of goblet cells between the cells of the crypt. Notice the thin continuous PAS positive basement membrane. PAS-alcian blue .X600. (1G): A higher magnification of the acini of Brunner's gland in the submucosa, showing the apical PAS positive reaction of the lining epithelium. The basement membrane has a thin continuous PAS positive (Ab). PAS-alcian blue .X600.

The wall of control animals the duodenum was formed of mucosa, submucosa, musculosa and serosa (Fig. 1A). Most of the duodenal villi had a Leaf like appearance (Fig.1B). The mucosa was lined with columnar absorbing cells with few cup shaped goblet cells in between (Fig.1C). The lamina propria of the villous core showed smooth muscle fibers, blood and lacteal capillaries. The cells lining of the crypts showed frequent mitotic figures especially at the upper region of the crypts. The submucosa had studded with groups of mucous secreting acini of Brunner's gland (Fig.1D). In PAS-alcian blue stained sections the lining goblet cells of duodenal villi showed a mixed reactivity of variable intensity for both stains. The apical brush border of the cells lining villi reacted positively for PAS. (Fig.1E). With alcian blue-PAS combination, the goblet cells of the crypts revealed a positive reactivity for both stain. The basement membrane appeared as a thin continuous PAS positive membrane (Fig.1F). The apical borders of the cells lining the acini of Brunner's gland in the submucosa. Showed PAS positive reaction. (Fig .1G).

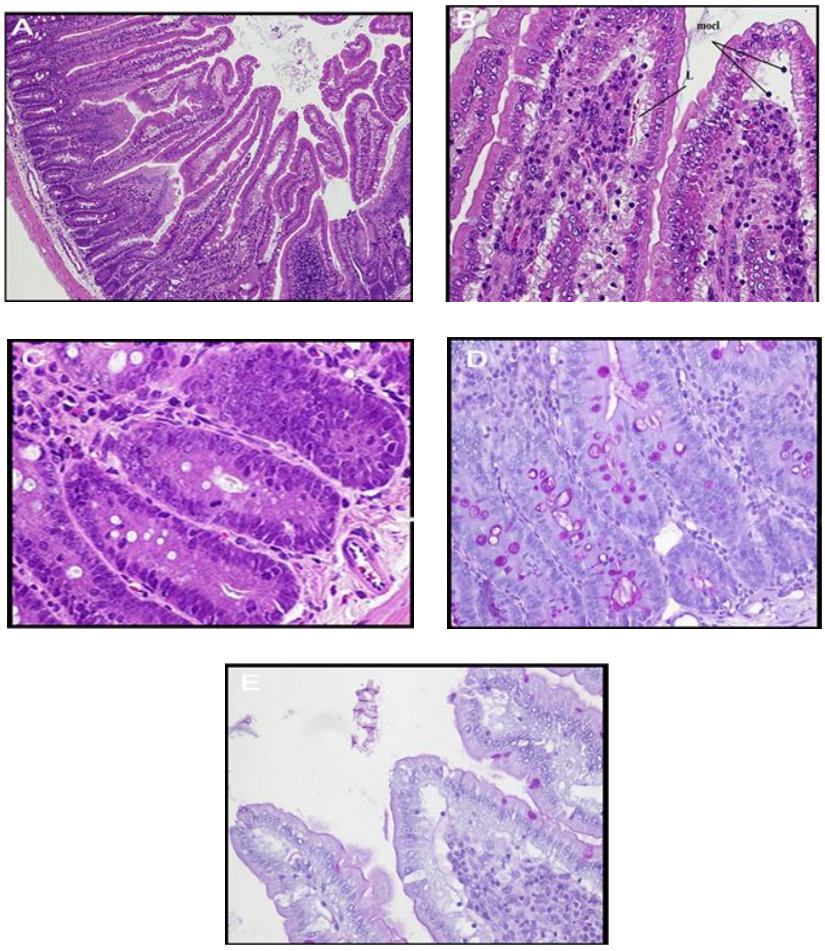

Fig. 2 A-E: (2A): Duodenal wall of rats received 50 mg DS showing apparent preservation of the crypt villous ratio as compared with the control sections. Subgroup IIa H&E X100. (2B, 2C): A higher magnification of some duodenal villi showing broadening of the villi with Grunhagen subepithelial spaces. Notice the blood lacteals (L). "Chiu's level I".Subgroup 2a H&E X40. (2 D, 2E): A higher magnification of some duodenal villi, showing focal loss of the apical PAS positive brush border with few goblet cells (A). B. showing apparent decrease in the PAS positive reaction of goblet cells between the cells of the crypt compared to control. Subgroup 2a. PAS-alcian blue X400.

Rats received 50mg of DS (subgroupIIa), sections of the duodenal wall showed the apparent preservation of the crypt/villous ratio similar to that of the control (Fig. 2A). The duodenal villi showed Grunhagen's subepithelial spaces with no cellular lysis. Most of the examined sections could be graded as Chiu's level 1. The higher magnification of the glandular crypt region showed a similar picture to control sections (Fig. 2B,2C). The Alcian PAS stained sections revealed focal loss of the apical PAS positive brush border with few goblet cells. The crypt region had apparent decrease in the PAS positive reaction of goblet cells compared to those observed in control group. (Fig. 2D, 2E).

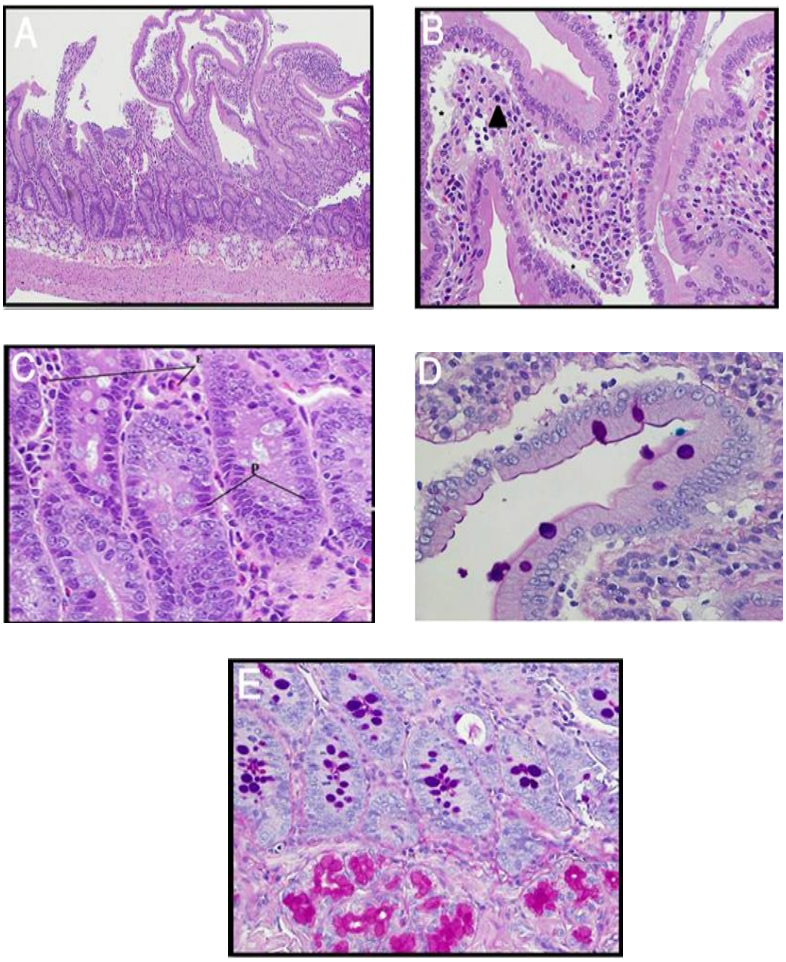

Fig. 3A-E: (3A): Longitudinal section of duodenum, showing different levels of affection detachment of the lining epithelium of many villi. Notice apparent disturbed crypt/ villous ratio. Chiu's level 2 and 3. **Subgroup** IIb H&E X100. (3B): A higher magnification of Longitudinal section of duodenum. The villous showing formation of Grunhagen's subepithelial spaces mostly all around the villous (Chiu's level 2). Notice marked polymorphic mononuclear cell infiltration of the lamina propria with dilated capillaries (arrowhead) (Chiu's level 3). (3C): showing some crypts with apparent control appearance. Notice few eosinophils (E) and paneth cells. Subgroup IIb. H&E X400. (3D showing the apical PAS positive reaction of the thick brush border (arrowhead) on unseparated cells. Notice the acidic alcian blue staining of most goblet cells compared to the PAS positive brush border. (3E): showing the predominance of positive alcian blue positive reaction of goblet cells between the cells of the crypt. Notice increased PAS positive reaction of cells lining the acini of Brunner's gland compared to control sections. Subgroup 2b. PAS-alcian blue X 400.

Rats received 100mg of DS (subgroup IIb), the mucosa of the duodenum showed different levels of injury according to the Chiu method. Most of the examined sections revealed a second level of injury in the form of Grunhagen's subepithelial space within the whole length of the villi together with necrosis and cellular lysis at the tip of the villi. Some villi appeared destructed (Chiu's level 3) (Fig.3A). Higher magnification of villi showed mononuclear cell infiltration of the lamina propria with dilated capillaries. Some crypts showed the apparent control appearance with few eosinophils and paneth cells (Fig.3B, 3C).

Examination of an alcian blue-PAS stained section revealed the thick apical PAS positive reaction of the brush border on unseparated cells alternating with no brush border over sloughed cells away from the villous. Most of goblet cells of the lining epithelium had an acidic alcian blue positive reaction compared to the PAS positive brush border. The goblet cells of crypts revealed predominance of positive acidic alcian blue reaction between the cells of the crypt. In the submucosa, the cells lining the acini of Brunner's gland showed apparent increased PAS positive reaction compared to those of the control group (Fig. 3D, 3E).

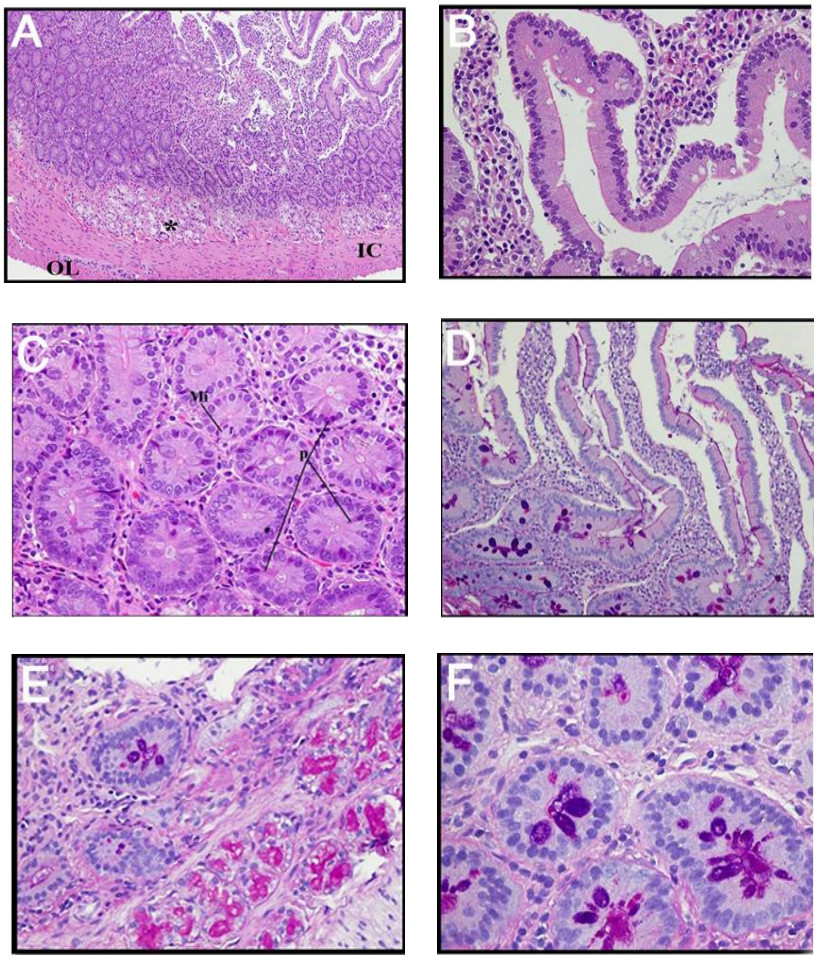

Fig. 4A-F: (4A): A Photomicrograph of a TS section of the duodenal wall showing marked disturbed vilous/crypt ratio with marked destruction of villous structure (Level. 3,4). Notice marked mononuclear cellular infiltration. Brunner's gland, inner circular (IC) and outer longitudinal layer muscle layer (OL). Subgroup IIc H&E X100. (4B): A higher magnification of duodenal villi showing detached epithelial cells with dark pyknotic nuclei with homogenous acidophilic cytoplasm. The lamina propria is markedly congested with severe mononuclear cellular infiltration. (4C): glandular region showing nearly appearance of control section except to intracellular lymphocytes (→). Notice the lamina propria is crowded by the congested capillaries and mononuclear cells. Paneth cells (p) and Mitotic figures (Mi). Subgroup IIc H&E X400. (4D) Photomicrographs of sections in the duodenum showing marked decrease of goblet cells over the villi. X200. (4E): Photomicrograph of the glandular part and submucosa of the duodenum, showing few goblet cells with acidic alcian blue positive reaction. Notice intense PAS positive reaction of cells lining the acini of Brunner's gland. (4F) showing the crypts of unaffected glandular part with predominance of positive combined PAS-alcian blue reaction of goblet cells. Subgroup IIc-PAS-alcian blue X400.

Rats received 150mg of DS (subgroup IIc), sections of the duodenal wall showed that the mucosa of the duodenum had levels 3 &4 according to the Chiu method. Most of the examined sections revealed predominance of third level of injury in the form of destruction of the villi. There was a marked disturbed villous/crypt ratio with marked destruction of villous structure and cell lysis (Fig.4A). The epithelial cells lining of the villi were detached with dark pyknotic nuclei and homogenous acidophilic cytoplasm. The lamina propria is markedly congested with severe mononuclear cellular infiltration. The glandular area appeared as control section with intercellular lymphocytes. The lamina propria is studded by the congested capillaries and mononuclear cells. Mitotic figures and paneth cells were seen (Figs.4B, 4C).

Examination of an alcian blue-PAS stained section showed a marked decrease of goblet cells over the villi (Fig.4D). Few goblet cells of the crypts were positively reacted with acidic alcian blue stain. There was an intense PAS positive reaction of cells lining the acini of Brunner's gland in the submucosa (Fig.4E). The goblet cells of the crypts were reacted positively with PAS-alcian blue combination. (Fig. 4F).

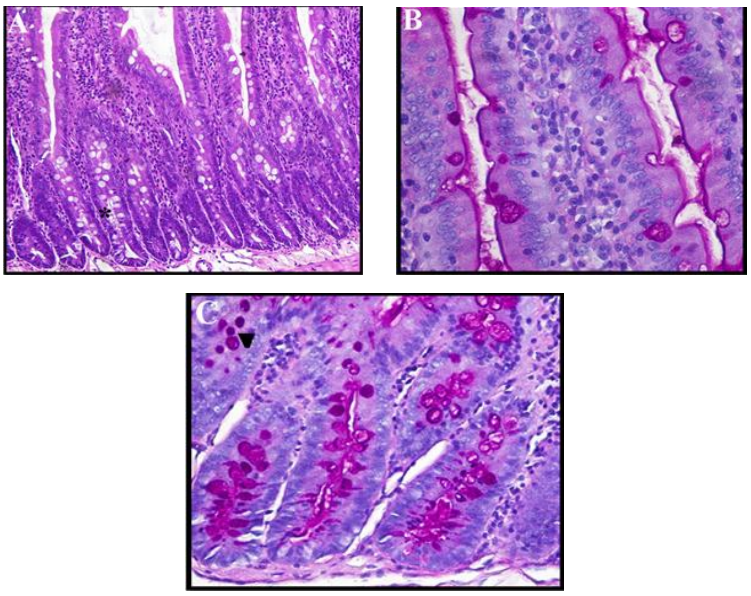

Fig. 5A-C: (5A): A photomicrograph of the rat duodenum, showing a similar arrangement of the villi to the control with mononuclear cell infiltration of the lamina propria. Notice the wide lumen of the crypt. Subgroup IIIa H&E X200. (5B): A higher magnification of villi, showing the intense PAS positive reaction of goblet cells with thick complete PAS positive brush border. (5C): the glandular area has apparent increased number of PAS positive cell as well as the luminal contents. Few goblet cells with a mixed alcian blue PAS staining were observe (◂). Subgroup IIIa PAS-alcian blue X600.

Rats received 50mg of DS and Moringa (GroupIII,a), sections of the duodenal wall showed the apparent preservation of the crypt/ villous ratio with apparent of similar crypt villi ratio to the control. (Fig.5A). The Alcian PAS stained sections showed complete thick apical PAS positive brush border with PAS positive reacting goblet cells. The glandular region elongated and lined by large number of PAS positive reacting goblet cells between the cells of the crypt. The luminal contents of the most crypts reacted strongly positive with PAS as compared to those of the controlled group. Few goblet cell in the neck region of the crypt showed a mixed reactively with combined PAS-alcian blue stain (Fig. 5B, 5C).

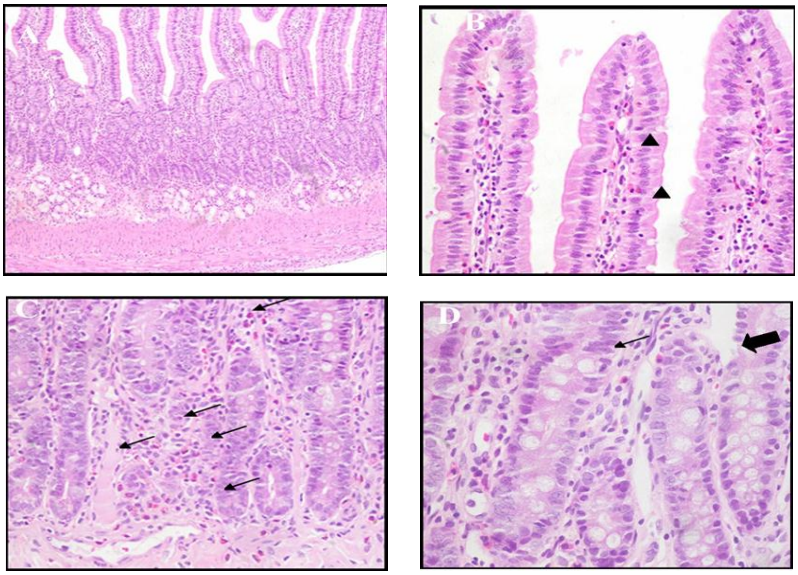

Fig. 6A-D: (6A): A photomicrograph of a transverse section showing A. whole thickness of duodenum with apparently broad glandular area. (6B): High magnification of some duodenal villi showing slender appearance of the villi with few Grunhagen's subepithelial spaces (→) and mononuclear cells of the lamina propria. Notice intraepithelial lymphocytes (headarrow). "Chiu's level I" Subgroup IIIb H&E X400. (6C): A glandular area showing mononuclear cells in the lamina propria between the crypts and even replacing some of them. Notice the predominance of eosinophils (→). (6D): A higher magnification of some crypts, showing large number of cells with pale vacculated cytoplasm with flat compressed nuclei (→). Notice large number of mononuclear cells (thick arrow). Subgroup IIIb. H&E X400.

Rats received 100mg of DS and Moringa (GroupIII,b), sections of the duodenum appeared as slender widely separated villi. There was an apparent preservation of the villous/crypt ratio with focal an increasing thickness of the glandular area (Fig.6A). Most of the examined duodenal villi could be graded as Chiu's level 1 or less, where the villi were well organized but with occasional Grunhagen's subepithelial spaces. The intraepithelial lymphocytes were still a prominent feature (Fig.6B). The higher magnification of the glandular crypt region showed mononuclear cells in the lamina propria between the crypts. The predominance of eosinophils was a frequent observation. A higher magnification of some crypt showed a large number of goblet cell with pale vacuolated cytoplasm and flat compressed nuclei. The lamina propria around the cypt was occupied by mononuclear cells (Figs.6C, 6D).

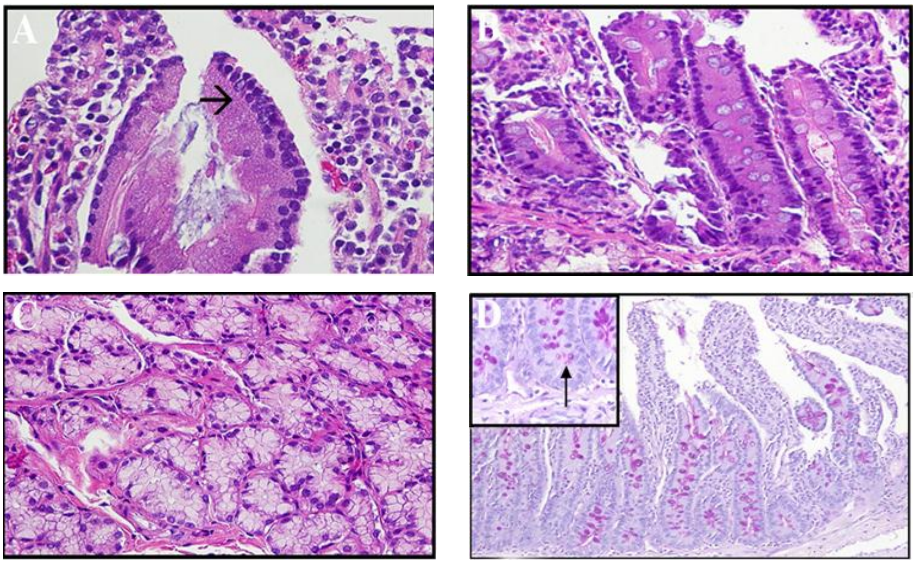

Fig. 7A-D: (7A): Photomicrographs of rat duodenum showing disorganized villi with sloughing of the columnar cells lining epithelium (→) with no difference from that administered DS (IIC). (7B): The glandular region shows dark pyknotic nuclei with wide lumen filled with secretion and large number of goblet cells. (7C): The cells lining the acin of Brunner' gland has dark peripheral nuclei with highly vacuolated cytoplasm. Subgroup IIIc H&E X400. (7D): A photomicrograph of rat duodenum, showing of the whole thickness of the duodenal mucosa with predominance of positive combined PAS-alcian blue positive reaction of goblet cells between the cells of the crypt. X200 Inset: shows the-PAS positive granules of the paneth cells in the base of the gland (→). X400. Subgroup IIIc PAS-alcian blue.

Rats received 150mg of DS and Moringa (GroupIII,c), sections of the duodenal wall, showed disorganization of the villi were with sloughing of the columnar cells lining epithelium. The glandular lining epithelium showed dark pyknotic nuclei and large number of goblet cells. Their Lumina appeared wide and filled with secretion. The acini of Brunner' gland showed dark peripherally located nuclei with highly vacuolated cytoplasm (Figs.7A,7B,7C).

The duodenal mucosa revealed the predominance of positive combined PAS-alcian blue positive reaction of goblet cells between the cells of the crypt. The paneth cells had PAS positive granules between the lining epithelial cells in the base of the gland (Fig.7D).

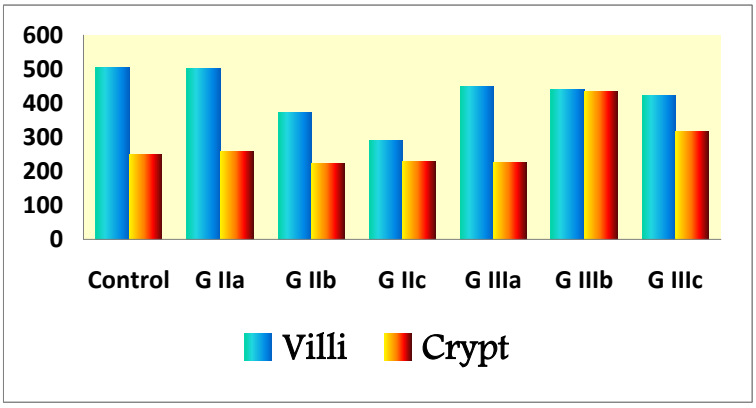

Fig. 8: Illustrate the changes in the mean villous height and crypt depth in the different groups.

Table 1: Changes in the villous height and crypt depth in different groups.

Groups	Villous height (µ) Mean ± SD	Crypt depth (µ) Mean ± SD	Villous/crypt ratio
Control	505±89	249±32	2.72
G IIa (V50)	501±150	259±134	1.93
G IIb (V100)	374±162*	222±60	1.68
G IIc (V150)	290±68*	229±79	1.26
G IIIa (V50 +M)	450±62	225±70	1.55
G IIIb (V100 +M)	440±152	435±75*	1.01
G IIIc (V150 +M)	422±110	318±81*	1.33

Significant = $p < 0.05$ =*

Morphometric results:
The recorded measurements of the villous height and the crypt depth were analyzed and summarized in Table (1) and (Fig.8). The statistical significant decrease in the villous height was observed in group II b and c. The statistical significant increase in the crypt depth was observed in groups III b and c.

DISCUSSION

Several investigators have shown that the administration of NSAIDs induces small intestinal damage (Sigthorsson *et al*., 1998; Langman and Worrall, 1985), demonstrated that intestinal adverse events, defined as hospitalization for intestinal perforation or hemorrhage, occurred in 72% of 286 patients who took 12 different NSAIDs. Up to date, there are no effective drugs to prevent NSAID-induced lower GI complications.

In the present study, the duodenum of control group showed the normal architecture with specifications to its components using different special stains such as alcian blue-PAS positive reaction, which showed the apical brush border of the absorptive cells and basement membrane had a PAS positive reaction. The apical borders of the cells lining the acini of Brunner's gland had PAS positive reaction. These findings were in accordance of that described by Junqueira, (2005).

In the present study, the duodenal wall of rat (subgroup IIa) (50DS) showed the apparent preservation of the crypt/villous ratio similar to that of the control. The duodenal villi showed Grunhagen's subepithelial spaces with no cellular lysis. These findings were extended from Chiu's level 1 to level 3 after exposure to DS 100. In Subgroup IIc (DS150), there was a predominance of third level of injury in the form of destruction of the villi with marked disturbed vilous/crypt ratio and marked destruction of villous structure with detached epithelium with dark pyknotic nuclei with homogenous acidophilic cytoplasm. The lamina propria was congested with severe mononuclear cellular infiltration that became more evident with increasing the administered dose. This progressive affection with increasing the dose was confirmed by another study, which mentioned that the NSAIDs cause intestine damage in many stages. As well as they concluded that the hindrance of phosphoric oxidation or the inhibition of electronic transport are considered the primary pathological aspect (Somasundram *et al*., 1997). Carvajal *et al.* (2004) reported that NSAIDs causes intestinal damages as inflammation in rodent models result from hyperalgesia to the increased malandialdehyde and a decrease glutathione levels.

In the present study, showed the duodenum of the animals treated (MO + DS 50, subgroup IIIa) revealed the apparent preservation of the crypt/villous ratio similar to that of the control. Also, subgroup IIIb (MO +DS100) showed slender widely separated villi. There was an apparent preservation of the villous/crypt ratio with occasional Grunhagen's subepithelial spaces. The present study showed intraepithelial lymphocytic and monocytic infiltration in the lamina properia. These results suggest that initiation of the inflammatory cascades started to occur. It is known that lymphocytes and monocytes are key-player both humoral and cellular immunity (Springer, 1990).

In conclusion, exposure of the experimental adult rats to different high doses of the NSAIDS can results in marked histological changes in the lining mucosa of the duodenum after fasting for 24 hours. *Moringa Oliefera Lam* leaves may have partial protective effects on the duodenal mucosa of rat that could expose to different high doses of the *diclofenac sodium*. Further assessment for the increased mononuclear cells in the lamina propria is recommended to identify its role in the immunological protection of the mucosa by immunohistochemical staining. It is also, recommended to identify the types of the mononulear cells by different antibody markers as it can clarify their role in the pathogenesis that accompanies administration of NSAIDS alone and in combination with *Moringa Oliefera Lam.*

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دراسة نسيجية عن تأثير المورينجا أوليفيرا على معى الاثنى عشر للجرزان البالغة بواسطة جرعات مختلفة من ديكلوفيناك الصوديوم (الفولترين)

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يعتبر ديكلوفيناك الصوديوم واحد من الأدوية الغير الستيرويدية المضادة للالتهابات وهي شائعة الاستخدام ويمكن استخدامها كجرعات عالية أو سامة عن طريق الخطأ أو بعد العمليات الجراحية. ونتيجة لذلك فقد تم تصميم هذه الدراسة لتقييم الدور الوقائي المحتمل للمورينجا أوليفيرا على التغييرات المجهرية التجريبيه للغشاء المخاطي لمعى الاثنى عشر للجرزان ابالغة بعد إعطاءها جرعات عالية مختلفة من ديكلوفيناك الصوديوم. تم تقسيم خمسة وأربعين جرزا إلى المجموعات التالية (١٥ لكل منهما): المجموعة الأولى قد عوملت كمجموعة ضابطة، والمجموعة الثانية قسمت لتحث المجموعه أ، ب، ج، التي كانت تعطى الجرعات التالية عن طريق الفم وهي ٥٠و ١٠٠ و ١٥٠ ملجم / كجم من ديكلوفيناك الصوديوم على التوالي لمدة ٢ أيام بعد الصيام لمدة ٢٠ ساعة. والمجموعة الثالثة قسمت إلى ثلاث تحت مجموعه أ، ب، ج. واعطيت هذه الفئران المورينجا أوليفرا عن طريق الفم (٥٠٠ ملجم / كج) يوميا لمدة أسبوع واحد، وبعد ذلك كانت تدار بنفس الجرعات كما هو الحال في المجموعة السابقة. ولوحظ وجود العديد من التغيرات النسيجية في المجموعة الثانية. وقد تراوحت التغييرات من فقدان زغب الجدر وتحلل الخلايا وتدمير الزوائد الدقيقة، ارتشاح وحيدات الخلية وتقرحات الغدد القاعدية. وأظهرت المقاطع المصبوغة بشيف حمض البريودك ملطخة التعبير السلبي البؤري من جدر معا. على الرغم من أن الخلايا الكأسية انخفضت بشكل ملحوظ في العدد، ومع زيادة في إفراز الميوسين الحمضية. في الختام، اقترحت الدراسة الحالية ان المورنجا أوليفرا قد يكون لها تأثير وقائي محدود وجزئي على الغشاء المخاطي الاثني عشر في حالات الحقن بالجرعات العالية.