



ANTIULCEROGENIC EFFECT OF ALOE VERA GEL ON CYSTEAMINE INDUCED DUODENAL ULCER IN ADULT MICE.

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ABSTRACT

Peptic ulcer is major health common disorder affecting the mankind. The present study examined the ulcer protective potential of *Aloe vera* via the assessment of NP-SH and glutathione concentration of duodenal mucosa of adult mice. The non-protein sulfhydryl groups (NP-SH) and glutathione level decreased in ulcerated mice, level of both were variable in response to duodenal mucosal injury. *Aloe vera* gel treatment showed protection against mucosal damage caused by cysteamine HCL induced ulceration. The present findings showed that aloe vera gel possess huge potential of ulcer recovery by its antiulcer effect.

Key words : Duodenal ulcer, *Aloe vera*, antiulcer, erosion.

I. INTRODUCTION

Nowadays recent lifestyle and dietary modifications increases the risk of diseases. Peptic ulcer is major health disease (Garg, *et al.*, 2014) which affects annually approximately 10 –15% of the population worldwide. Duodenal ulcer is a public health major gastrointestinal disorder caused by the altered functional activity of metabolic factors such as acid – pepsin secretion, bile secretion, enhanced free radical formation and decreased antioxidant enzyme activities, altered mucosal resistance, imbalanced mucus secretion, prostaglandins, bicarbonate secretion & lowered blood flowing capacity with regenerative capacity of cell after injury (Allen, *et al.*,1993). Various non-steroidal anti-inflammatory drugs are also responsible for formation of gastric ulcer (Ariyphisi *et al.*,1986). Dietary lifestyle directly show effects on mucosal offensive and defensive factors. Recently, different clinical practices applied for duodenal ulcer includes either enhancing duodenal mucosa

defenses or counteracting detrimental factors or a combination of both. Number of synthetic drugs currently available which reduces or neutralizes gastric acids secretion they include proton pump inhibitors (PPIs): lansoprazole and omeprazole and H₂-receptor antagonists: ranitidine and famotidine as well as antibiotic therapy. However, the long-term use of these synthetic drugs can cause numerous undesired harmful effects.

All over the world from ancient times natural phytoproducts are used as remedy for various diseases. Different research studies have shown potential gastro protective activities of plant-based extracts that demonstrate good effectiveness with fewer adverse effects and superior compatibility with human body system. *Aloe vera* plant used in various folk medicine. They possess active phytoconstituents which include *acemannans*, *sapononins*, *barbalin*, anthraquinone c-glycosides, anthrones, lectins *Aloe vera* is directly used to treat various skin disorders (Rajeswari, *et al.*, 2012). According to previous vast use of *Aloe vera* and their phytochemicals, the present work was designed to investigate the ulcer protective effect on the duodenum.

II MATERIAL AND METHODS

Healthy Swiss strain albino mice, *Mus musculus* mice (5 to 6 month old age) weighing 35 to 42 ± 2 gm/BW were used for the present investigation. The breeding pairs were obtained from (Rajarambapu college of Pharmacy, Kasegaon, 209/CPCSEA). Animals were reared in air-conditioned departmental animal house. Food (and water *ad libitum*. Food (Amrut mice feed, Pranav Agro Industries, Pvt. Ltd, Sangli) and water were provided *ad libitum* throughout the experiments.

Duodenal ulcer induced group: The duodenal mucosal lesions were induced with injection of cysteamine HCl according to the method described by (Szabo, 1978). Mice were given subcutaneous injection of cysteamine HCl (40mg/100gm/BW) dissolved in 0.5 ml distilled water.

***Aloe vera* gel treated group:** Both duodenal ulcer induced male and female adult mice were given oral administration of *Aloe vera* gel 200 mg/kg dissolved in 0.5ml distilled water/ day/ mouse for 15 days (Subramanian, *et al.*, 2007).

After completion of the treatment control, cysteamine HCl administered and *Aloe vera* gel treated animals were weighed and sacrificed by cervical dislocation. The duodenum were removed, weighed and were proceed for GSH (Ellman's, 1986) and Non-Protein Sulphydryl (NP-SH) Group (Sedlak *et al.* 1968).

Statistical analysis:

All values were expressed as mean ± S.D. The statistical analysis was performed using student's 't' test. A value of P<0.001 was considered statistically highly significant.

RESULT AND DISCUSSION

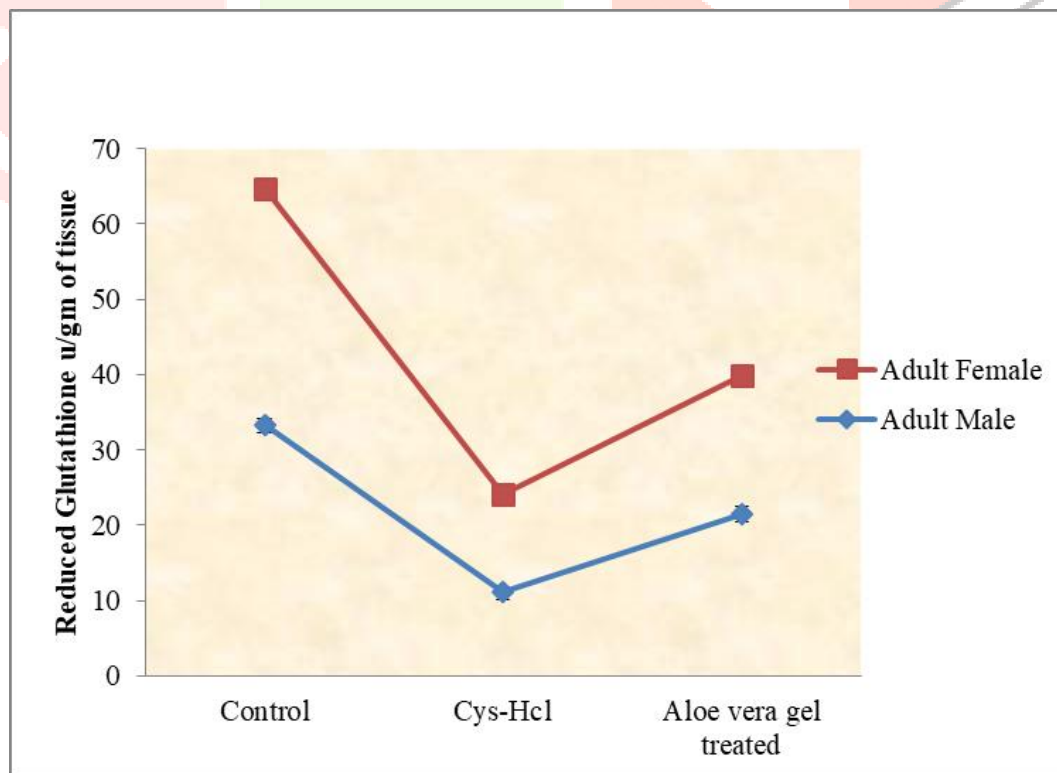
The table no. 1 and graph no. 1 exhibited mean concentration of GSH (μg of wet tissue) in the control group male and female adult mice was evaluated to be 33.334 ± 0.8248 and 31.40 ± 1.2942 whereas it was decreased to 10.60 ± 0.6519 and 13.00 ± 0.7906 in duodenal ulcerated group (1:2, $P < 0.001$).

After the treatment of *Aloe vera* gel (200 mg/kg body weight) the Reduced Glutathione (GSH) concentration was found significantly increased to 21.40 ± 1.084 and 18.40 ± 0.8216 respectively (2:3, $P < 0.001$).

Table No.1 Effect of *Aloe vera* gel on Reduced Glutathione (GSH) concentration (μg of wet tissue) in Cys-HCL induced duodenal ulcer of Adult male and female mice. Values are mean \pm S.D.

Sr.No.	Groups Treatment and dose	n	Reduced Glutathione (GSH) concentration (μg of wet tissue)	
			Male mice	Female mice
1.	Control	5	33.334 ± 0.8248	31.40 ± 1.2942
2.	Cys-HCL induced duodenal ulcer	5	10.60 ± 0.6519	13.00 ± 0.7906
3.	Cys-HCL duodenal ulcer + <i>Aloe vera</i> gel treated	5	21.40 ± 1.084	18.40 ± 0.8216

Graph No.1 Effect of *Aloe vera* gel on Reduced Glutathione (GSH) concentration (μg of wet tissue) in Cys-HCL induced duodenal ulcer of Adult male and female mice. Values are mean \pm S.D.



The table no. 2 and graph no. 2 exhibited mean concentration of Non-Protein Sulphydryl (NP-SH) ($\mu\text{g}/100\text{mg}$ of wet tissue) in the control group male and female adult mice was evaluated to be 4.84 ± 0.1673 and $4.51 \pm$

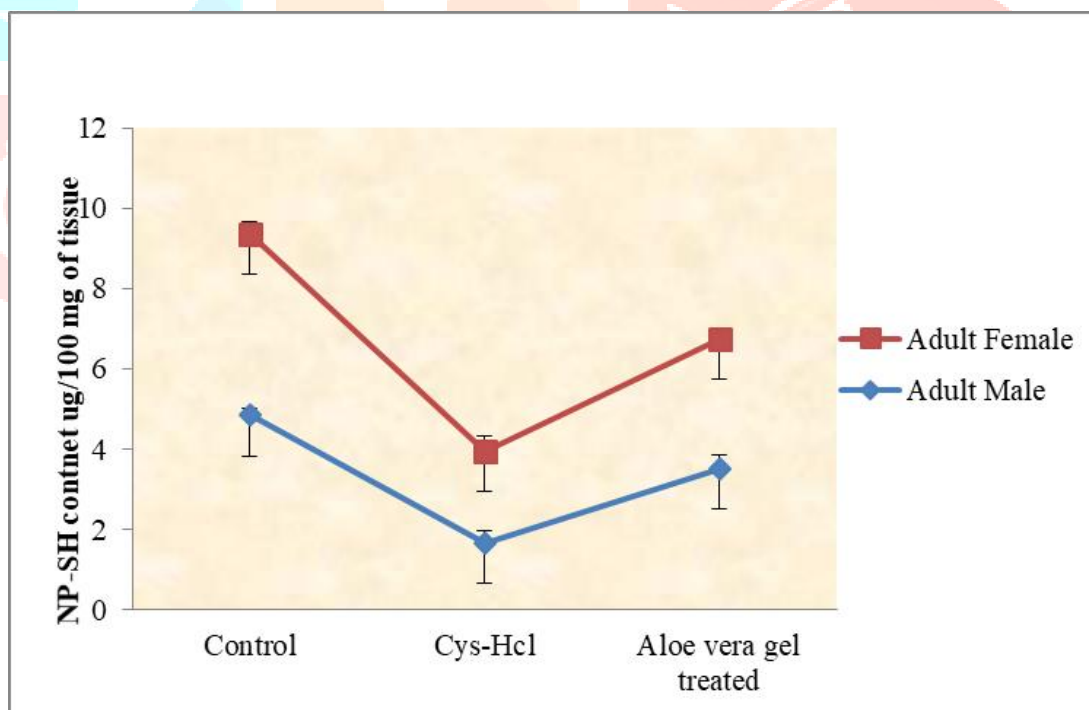
0.3170 whereas it was decreased to 1.68 ± 0.2775 and 2.26 ± 0.3975 in duodenal ulcerated group (1:2, $P < 0.001$).

After the treatment of *Aloe vera* gel (200 mg/kg body weight) the Non-Protein Sulphydryl (NP-SH) concentration was found significantly increased to 3.52 ± 0.3327 and 3.22 ± 0.1483 respectively (2:3, $P < 0.001$).

Table No. 2 Effect of *Aloe vera* gel on Non-Protein Sulphydryl (NP-SH) concentration ($\mu\text{g}/100\text{mg}$ of wet tissue) in Cys-HCL induced duodenal ulcer of Adult male and female mice. Values are mean \pm S.D.

Sr.No.	Groups Treatment and dose	n	NP- SH concentration ($\mu\text{g}/100\text{mg}$ of wet tissue)	
			Male mice	Female mice
1)	Control	5	4.84 ± 0.1673	4.51 ± 0.3170
2)	Cys-HCL induced duodenal ulcer	5	1.68 ± 0.2775	2.26 ± 0.3975
3)	Cys-HCL duodenal ulcer + <i>Aloe vera</i> gel treated	5	3.52 ± 0.3327	3.22 ± 0.1483

Graph No.2 Effect of *Aloe vera* gel on Non-Protein Sulphydryl (NP-SH) concentration ($\mu\text{g}/100$ mg of wet tissue) in Cys-HCL induced duodenal ulcer of Adult male and female mice. Values are mean \pm S.D.



Gastric mucosal region contains high concentration of reduced glutathione (Boyd, *et al.*, 1981) specifically high amount of NP- SH. NP-SH played protective role against various induced gastric injury (Szabo *et al.*, 1981) and enhanced the secretion, activity of mucosal goblet cell. In previous studies gastric wall thickness decreased due to ethanol treatment (Chen, *et al.*, 2005) similar results was observed in our present work cys HCl induced ulceration. *Aloe vera* extract possesses gastric acid secretion inhibitory properties (Yusuf

et al, 2004) and gastro protective activity (Keshavarzi, *et al*, 2014). *Aloe vera* also stimulate the secretion of prostaglandins synthesis that enhances the mucus secretion protect the mucosa from gastric injury (Cappasso, *et al.*, 2003). Our result demonstrated that the *Aloe vera* gel protect the duodenal mucosa of mice against erosion caused by Cys- HCl induced ulceration.

In our previous histopathological study duodenal mucosa in ulcerated mice showed severe destruction and desquamation of villi, duodenal glands, mild edema and necrosis in mucosal layers. These result agreement with finding of Cysteamine HCL responsible for duodenal erosion by suppressing the secretary activity of intestinal glands leads to decreased secretion of mucus, hemorrhages in intestinal tissue (Szabo *et al*,1981) .

Cysteamine -HCL causes necrotic erosion in the duodenal mucosa in different ways.It can alter the structural integrity of mucosa by impairing the secretary activity, alter the function of duodenal cells and destruct the normal structure of mucosal layer (Szabo, 1985). These effects occurred probably due to imbalanced antioxidant enzymes, such as formation of free radicals altered lipid peroxidation concentration, oxidative stress, damaged cell structure, disturbed cellular permeability and synthetic activity (Repetto and Llesuy, 2002). Sulfhydryl compounds suppresses the free radicals activity binding with them which was produced in tissues by cytotoxic compounds (Al-Harbi *et al.*, 1997).

NP-SH played significant role in protection of gastrointestinal tract from free radicals and maintenance of gastric mucosal integrity (Szabo, 1992). NP-SHs react with reactive oxygen species to convert them into inert products and maintain sulfhydryl groups of proteins in reduced form (Nagy, *et al.*,2007).They also responsible for recycling internal antioxidant vitamins, thereby preventing lipid peroxidation (Adhikary, *et al.*,2011).

Our present data showed that significant reduction in the level of NP-SH and reduced glutathione might be due to cys-HCL induced oxidative stress via free radicals generation. These free radicals are capable of inactivation of enzymes or depletion of GSH and NADPH (Sathyaprabha, *et al.*, 2010), decreased endogenous SH concentration (Alsaif , 2004). The result of present work clearly stated that NP-SH and GSH concentrations was restored at normal level by *aloe vera* gel. This protection seems to occur due to the activation of antioxidant systems and the involvement of chemical constituents of *Aloe vera* in the antioxidant mechanism that help to improve and maintaining the level of antioxidant enzymes or by they directly involved in scavenging the free radicals (Akinloye, *et al.*, 2019).

Our result demonstrate that *Aloe vera* gel recover the GSH and NP-SH concentration by its antioxidant and antiulcer mechanism.

ACKNOWLEDGEMENT

The authors are thankful to Principal, MJSM, Shrigonda, Dist: Ahmednagar for kindly co- operation and Department of Zoology, S. G. M.College, Karad (M.S.) India for providing basic necessary facilities during the entire period of research work.

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