

Chapter - IV

STUDIES ON GASTRIC MUCOSAL MUCUS IN  
EXPERIMENTAL ULCERS : ROLE OF  
AMLAKI ( Emblica officinalis Linn.)

## CHAPTER - IV

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To study the effect of amlaki (Emblica officinalis Linn.) on gastric mucosal mucus during experimental ulcerations, collected stomachs ( page. 20 ) were processed by the following methodologies. Nature of ulcerogenic drugs/methods, type of animals, doses of drugs and amlaki (Emblica officinalis Linn.) and their route of administration, duration of anaesthesia and operative techniques were essentially same as described in Chapter - I.

### Materials

Essentially same as described in Chapter - III (Page : 43-46).

### Methodologies

Collection of gastric mucus from stomach was done by the technique of Menguy <sup>138</sup>. The entire glandular mucosa of clean stomach was scraped off the underlying muscularis. Each mucosal sample was immediately frozen and then lyophilized. After lyophilization, each sample of mucosa was carefully homogenized. One part of the homogenized sample

was then hydrolysed with three parts of 6(N) hydrochloric acid at 100°C for two hours to release neutral and amino sugars<sup>134</sup>. The hydrolysates were neutralised with 0.1(N) sodium hydroxide, volume made upto 3 ml and 1 ml each was utilized for the estimation of total hexose<sup>137</sup>, hexosamine<sup>136</sup> and methyl pentose<sup>137</sup>. Remaining part of the homogenized sample was hydrolysed with its three volume of 0.1 (N) sulphuric acid at 100°C for one hour to liberate the sialic acid<sup>134</sup>. The hydrolysate was neutralised with 0.1(N) sodium hydroxide, volume made upto 1 ml and was used for the estimation of sialic acid by thiobarbituric acid method of Warren<sup>135</sup>.

Methodologies for the estimation of total hexose, hexosamine, methyl pentose and sialic acid were essentially same as described in Chapter - III ( Page : 47 - 51 ). The sum of total hexose, hexosamine, methyl pentose and sialic acid i.e. total carbohydrate was taken as the index of the level of gastric mucus as suggested by Menguy<sup>5</sup>, was expressed in terms of  $\mu\text{g}/\text{mg}$  of dry tissue.

Student's 't' test was applied to evaluate the data.

### Results

Results are given in and from Table 31 to Table 40.

Aspirin induced ulcer : Effect of amlaki (*Emblia officinalis* Linn.) on gastric mucosal mucus.

Effect of amlaki (*Emblia officinalis* Linn.) on the carbohydrate components of gastric mucosal mucus in aspirin induced peptic ulcers in albino rats was given in Table 31.

It appears from the table that aspirin (100 mg/kg), when given to the rats intraperitoneally once in a day for consecutive

TABLE -31 : Showing the effect of amlaki (Emblice officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in aspirin induced peptic ulcers in albino rats.

Group	No. of animals.	Dose used.	Ulcer index.	Carbohydrate components of gastric mucosal mucus				Amount of mucus represented by total carbohydrate. ( $\mu\text{g}/\text{mg}$ of dry tissue)
				$\mu\text{g}/\text{mg}$ of dry tissue				
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	25	-	Nil	20.1 $\pm 3$	18.2 $\pm 2.1$	5.2 $\pm 0.6$	2.1 $\pm 0.3$	45.6 $\pm 4.5$
ASPIRIN	30(5)	100 mg/kg.	23.1	** 8.2 $\pm 2$	** 18.1 $\pm 1.1$	** 2.2 $\pm 0.8$	*** 0.9 $\pm 0.09$	*** 21.4 $\pm 2.1$
ASPIRIN +	32(2)	100 mg/kg	11.2	** 18.8 $\pm 2.5$	*** 20.1 $\pm 2$	** 6.0 $\pm 0.8$	** 2.0 $\pm 0.3$	*** 46.9 $\pm 4.2$
AMLAKI		1 g/kg						

Results are mean  $\pm$  S.E., \* : Sign of significance, \*\* :  $p < 0.01$ , \*\*\* :  $p < 0.001$ .  
 Brackets in parenthesis indicate the animals died during experiment.

three days caused a significant decrease in the levels of total hexose (p  $\leq .01$ ), hexosamine (p  $\leq .01$ ), methyl pentose (p  $\leq .01$ ), sialic acid (p  $\leq .001$ ) and thus in total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucus when compared to those values for control animals. Amlaki (Embllica officinalis Linn.) treatment | 1 g/kg given orally to the rats once in a day for consecutive three days alongwith aspirin |, on the other hand, increased significantly the  $\chi^2$  levels of total hexose (p  $\leq .01$ ), hexosamine (p  $\leq .001$ ), methyl pentose (p  $\leq .01$ ), sialic acid (p  $\leq .01$ ) and thus the total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucin when compared to those of aspirin treated group.

Salicylic acid induced ulcer : Effect of amlaki (Embllica officinalis Linn.) on gastric mucosal mucin.

Results are given in Table 32. It appears from the table that salicylic acid (100 mg/kg) when given to albino rats intraperitonially once in a day for three consecutive days, decreased significantly the levels of total hexose (p  $\leq .01$ ), hexosamine (p  $\leq .01$ ) methyl pentose (p  $\leq .025$ ), sialic acid (p  $\leq .001$ ) and thus the total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucin when compared to the control data. Alongwith salicylic acid in the dose stated above when amlaki (Embllica officinalis Linn.) was given orally to the rats in the dose of 1 g/kg once in a day for consecutive three days, significant increase in the levels of total hexose (p  $\leq .01$ ), hexosamine (p  $\leq .01$ ), methyl pentose (p  $\leq .025$ ), sialic acid (p  $\leq .001$ ) and thus in total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucin was observed when compared with those values in salicylic acid group.

TABLE - 32 : Showing the effect of amlaki (Emblca officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in salicylic acid induced peptic ulcers in albino rats.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus.				Amount of mucus represented by total carbohydrate. ( $\mu\text{g}/\text{mg}$ of dry tissue)
				$\mu\text{g}/\text{mg}$ of dry tissue				
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	30	Nil	19.9 $\pm 2.9$	18.0 $\pm 2.2$	6.0 $\pm 0.7$	3.0 $\pm 0.29$	46.9 $\pm 4.8$
SALICYLIC ACID	100 mg/kg	32(6)	24	** 8.0 $\pm 2.1$	** 11.0 $\pm 1.2$	* 3.2 $\pm 0.82$	*** 1.0 $\pm 0.02$	*** 23.2 $\pm 2.1$
SALICYLIC ACID	100 mg/kg	30(3)	13.4	** 17.8 $\pm 2.6$	** 17.0 $\pm 1.7$	* 5.8 $\pm 0.62$	*** 3.1 $\pm 0.3$	*** 43.7 $\pm 4.0$
+								
AMLAKI	1 g/kg							

Results are mean  $\pm$  S.E., \* : Sign of significance, \* :  $p \leq 0.025$ , \*\* :  $p \leq 0.01$ , \*\*\* :  $p \leq 0.001$ . Brackets in parenthesis indicate the no. of animals died during experiment.

Paracetamol induced ulcer : Effect of amlaki (Embluca officinalis Linn.) on gastric mucosal mucus.

Results are given in Table 33. When paracetamol (100 mg/kg) was given to albino rats intraperitoneally once in a day for consecutive three days, significant decrease was observed in the levels of total hexose (p  $\angle$ .01), hexosamine (p  $\angle$ .025), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) and thus in total carbohydrate (p  $\angle$ .001) of gastric mucosal mucosa when compared to the control data. Amlaki (Embluca officinalis Linn.) treatment | 1 g/kg, once in a day for consecutive three days orally | alongwith the aforesaid doses of paracetamol, on the other hand, significantly increased the levels of total hexose (p  $\angle$ .01), hexosamine (p  $\angle$ .025), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) and thus in total carbohydrate of gastric mucosal mucosa when compared to these values obtained in paracetamol treated rats.

Indomethacin induced ulcers : Effect of amlaki (Embluca officinalis Linn.) on gastric mucosal mucus.

Results are given in Table 34. It appears from the table that significant decrease was observed in the levels of total hexose (p  $\angle$ .025), hexosamine (p  $\angle$ .01), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) and thus in total carbohydrate (p  $\angle$ .001) of gastric mucosal mucus in comparison to control data when rats received indomethacin (25 mg/kg) intraperitoneally once in a day for consecutive three days. When amlaki (Embluca officinalis Linn.) in the dose of 1 g/kg was given orally to the rats once in a day for three consecutive days alongwith indomethacin, significant increase was found

TABLE - 33 : Showing the effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in paracetamol induced peptic ulcers in albino rats.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. (ug/mg of dry tissue)				Amount of mucus represented by total carbohydrate. (ug/mg of dry tissue)
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	29	Nil	18.2 ±2.8	17.5 ±2.3	9.8 ±0.6	2.9 ±0.22	44.4 ±4.2
PARACETAMOL	100 mg/kg	35(6)	25	** 8.0 ±1.9	* 10.8 ±1.5	*** 3.0 ±0.4	*** 1.1 ±0.1	*** 22.9 ±2.1
PARACETAMOL	100 mg/kg	33(2)	8.3	** 17.9 ±2.0	* 17.2 ±2.1	*** 6.0 ±0.5	*** 3.2 ±0.3	*** 44.3 ±5.0
+								
AMLAKI	1 g/kg.							

Results are mean ± S.E., \* : Sign of significance, \* : p/0.025, \*\* : p /0.01, \*\*\* : p /0.001. Brackets in parenthesis indicate the no. of animals died during experiment.



TABLE - 34 : Showing the effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in indomethacin induced peptic ulcers in albino rats.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus.				Amount of mucus represented by total carbohydrate. (/ug/mg of dry tissue)
				T (ug/mg of dry tissue)				
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	26	Nil	17.0 ±2.5	16.8 ±2.0	6.0 ±0.52	3.0 ±0.25	42.8 ±4.0
INDOMETHACIN	25 mg/kg	28(2)	27.5	* 8.8 ±1.7	** 10.0 ±1.2	*** 3.2 ±0.29	*** 1.5 ±0.12	*** 23.5 ±2.3
INDOMETHACIN + AMLAKI	25 mg/kg 1 g/kg	25(1)	11	** 16.8 ±1.8	* 16.0 ±1.9	*** 5.8 ±0.60	*** 2.9 ±0.21	*** 41.5 ±4.2

Results are mean  $\pm$  S.E., \* : Sign of significance, \* : p  $\leq$  0.025, \*\* : p  $\leq$  0.01, \*\*\* : p  $\leq$  0.001. Brackets in parenthesis indicate the no. of animals died during experiment.

in the levels of total hexose (p  $\angle$ .01), hexosamine (p  $\angle$ .025), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) - thus in total carbohydrate (p  $\angle$ .001) of gastric mucosal mucin when compared to those values obtained in indomethacin group.

Prednisolone induced ulcer : Effect of amlaki ( Embllica officinalis Linn.) on gastric mucosal mucus.

Effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in prednisolone induced peptic ulcers in albino rats was given in Table 35.

Prednisolone in the dose 30 mg/kg, when given to rats intraperitoneally once in a day for consecutive three days, decreased significantly the levels of total hexose (p  $\angle$ .025), hexosamine (p  $\angle$ .01), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) - thus the total carbohydrate (p  $\angle$ .001) of gastric mucosal mucus in comparison to the control values. When amlaki (Embllica officinalis Linn.) was given to the rats orally in the dose 1 g/kg once in a day for consecutive three days alongwith the aforesaid dose of prednisolone, significant increase was found in the levels of total hexose (p  $\angle$ .01), hexosamine (p  $\angle$ .001), methyl pentose (p  $\angle$ .001), sialic acid (p  $\angle$ .001) thus in total carbohydrate (p  $\angle$ .001) of gastric mucosal mucus when compared with the values obtained in prednisolone group.

Hydrocortisone induced ulcer : Effect of amlaki ( Embllica officinalis Linn.) on gastric mucosal mucus.

Results are given in Table 36.

A significant decrease was noticed in the levels of

TABLE - 35 : Showing the effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in prednisolone induced peptic ulcers in albino rats.

Group	Drug used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. ( $\mu\text{g}/\text{mg}$ of dry tissue)				Amount of mucus represented by total carbohydrate. ( $\mu\text{g}/\text{mg}$ of dry tissue)
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	30	Nil	20.0 $\pm 3.2$	10.0 $\pm 2.0$	5.5 $\pm 0.6$	2.8 $\pm 0.2$	46.3 $\pm 5.0$
PREDNISOLONE	30 mg/kg	33(4)	22.4	* 10.2 $\pm 2.0$	** 10.0 $\pm 1.0$	*** 2.5 $\pm 0.24$	*** 1.0 $\pm 0.1$	*** 23.7 $\pm 2.0$
PREDNISOLONE + AMLAKI	30 mg/kg 1 g/kg	37(2)	8.2	** 18.0 $\pm 1.8$	*** 17.0 $\pm 1.1$	*** 5.0 $\pm 0.50$	*** 2.6 $\pm 0.23$	*** 42.6 $\pm 4.5$

Results are mean  $\pm$  S.E., \* : Sign of significance, \* :  $p \leq 0.025$ , \*\* :  $p \leq 0.01$ , \*\*\* :  $p \leq 0.001$ . Brackets in parenthesis indicate the no. of animals died during experiment.

TABLE - 36 : Showing the effect of amlaki (Emblica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in hydrocortisone induced peptic ulcers in albino rats.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. (/ug/mg of dry tissue)				Amount of mucus represented by total carbohydrate. (/ug/mg of dry tissue)
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	25	Nil	18.8 <u>+3.5</u>	17.2 <u>+3.5</u>	5.0 <u>+0.52</u>	3.0 <u>+0.32</u>	44.0 <u>+4.8</u>
HYDROCORTISONE	50 mg/kg	28(2)	26	* 9.0 <u>+2.0</u>		*** 2.8 <u>+0.2</u>	*** 1.5 <u>+0.1</u>	*** 22.5 <u>+2.2</u>
HYDROCORTISONE	50 mg/kg	28(0)	10	** 17.5 <u>+2.2</u>	15.6 <u>+2.8</u>	*** 5.1 <u>+0.42</u>	*** 2.9 <u>+0.22</u>	*** 41.1 <u>+3.7</u>
+ AMLAKI	1 g/kg							

Results are mean  $\pm$  S.E., \* : Sign of significance, \* :  $p \leq 0.025$ , \*\* :  $p \leq 0.01$ , \*\*\* :  $p \leq 0.001$ . Brackets in parenthesis indicate the no. of animals died during experiment.

total hexose (p  $\leq .025$ ), methyl pentose (p  $\leq .001$ ), sialic acid (p  $\leq .001$ ) and in total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucus in hydrocortisone treated rats in comparison to control data. Hydrocortisone (50 mg/kg) was given to rats intraperitoneally once in a day for consecutive three days. This dose of hydrocortisone, however, did not exert any effect on the level of hexosamine of gastric mucosal mucus.

In addition to this dose of hydrocortisone when amlaki (Embllica officinalis Linn.) | 1 g/kg/day | was given to rats orally once in a day for consecutive three days, significant increase was found in the levels of total hexose (p  $\leq .01$ ), methyl pentose (p  $\leq .001$ ), sialic acid (p  $\leq .001$ ) and in total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucus when compared to the values of hydrocortisone group. Hexosamine part of gastric mucosal mucus did not show any significant change by amlaki (Embllica officinalis Linn.).

Phenyl butazone induced ulcer : Effect of amlaki (Embllica officinalis Linn.) on gastric mucosal mucus.

Results related to the effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in phenyl butazone induced peptic ulcers in guinea-pigs are given in Table 37. It appears from the table that phenyl butazone (100 mg/kg) when given to guinea-pigs orally once in a day for consecutive three days caused a significant decrease in the levels of total hexose (p  $\leq .025$ ), methyl pentose (p  $\leq .001$ ), sialic acid (p  $\leq .001$ ) and in total carbohydrate (p  $\leq .001$ ) of gastric mucosal mucus in comparison to control data. Hexosamine of gastric mucosal mucus, however, did not show any change by phenyl butazone.

TABLE - 37 : Showing the effect of amlaki (Emblice officinalis Linn.) on the carbohydrate components of gastric mucosal mucosa in phenyl butezone induced peptic ulcers in guinea-pigs.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucosa. ( $\mu\text{g}/\text{mg}$ of dry tissue )				Amount of mucus represented by total carbohydrate. ( $\mu\text{g}/\text{mg}$ of dry tissue ).
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	30	Nil	22.5 $\pm 4.0$	20.0 $\pm 3.2$	7.2 $\pm 0.62$	5.2 $\pm 0.5$	54.9 $\pm 5.8$
PHENYLBUTAZONE	100 mg/kg	32(6)	30.2	* 10.0 $\pm 2.0$		*** 4.0 $\pm 0.4$	*** 2.8 $\pm 0.2$	*** 28.0 $\pm 2.0$
PHENYLBUTAZONE	100 mg/kg	30(2)	12.5	* 20.8 $\pm 3.8$		*** 18.9 $\pm 3.0$	*** 7.0 $\pm 0.68$	*** 5.0 $\pm 0.48$
+ AMLAKI	1 g/kg							

Results are mean  $\pm$  S.E., \* : Sign of significance, \* :  $p \leq 0.025$ , \*\* :  $p \leq 0.01$ , \*\*\* :  $p \leq 0.001$ . Brackets in parenthesis indicate the no. of animals died during experiment.

When amlaki (Embllica officinalis Linn.) in the dose of 1 g/kg was given to guinea-pigs orally once in a day for consecutive three days alongwith the aforesaid dose of phenylbutazone, significant increase was observed in the levels of total hexose ( $p \leq .02$ ), methyl pentose ( $p \leq .001$ ), sialic acid ( $p \leq .001$ ) and in total carbohydrate ( $p \leq .001$ ) of gastric mucosal mucus in comparison to the values in phenyl butazone group. Hexosamine of gastric mucosal mucus was not affected by amlaki (Embllica officinalis Linn.) treatment.

Histamine induced ulcer : Effect of amlaki (Embllica officinalis Linn.) on gastric mucosal mucus.

Results are given in Table 38. Histamine (33  $\mu$ g/mouse) when given to mice intraperitoneally once in a day for consecutive three days, decreased significantly the levels of total hexose ( $p \leq .025$ ), hexosamine ( $p \leq .01$ ), methyl pentose ( $p \leq .01$ ), sialic acid ( $p \leq .001$ ) thus the total carbohydrate ( $p \leq .001$ ) of gastric mucosal mucus when compared to those of control data. Alongwith histamine when the mice received amlaki (Embllica officinalis Linn.) in the dose of 1 g/kg once in a day for consecutive three days through oral route, significant increase in the levels of hexosamine ( $p \leq .01$ ), methyl pentose ( $p \leq .025$ ), sialic acid ( $p \leq .001$ ) and in total carbohydrate ( $p \leq .001$ ) of gastric mucosal mucus was observed when compared to the values in histamine group. Total hexose part of gastric mucosal mucus, however, was not affected by amlaki (Embllica officinalis Linn.)

Restraint ulcer : Effect of amlaki (Embllica officinalis Linn.) on gastric mucosal mucus.

Results are given in Table 39. Restraint stress

TABLE - 38 : Showing the effect of amlaki (Emblica officinalis Linn.) on the carbohydrate components of gastric mucosal mucosa in histamine induced peptic ulcers in mice.

Group	Dose used.	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. (/ug/mg of dry tissue)				Amount of mucus represented by total carbohydrate. (/ug/mg of dry tissue)
				Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	-	40	Nil	15.2 ±1.8	14.0 ±1.8	5.0 ±0.52	2.5 ±0.26	36.7 ±3.5
HISTAMINE	33 ug/ mouse.	46(5)	25	* 10.2 ±2.0	** 7.0 ±0.80	** 3.2 ±0.3	*** 1.2 ±0.1	*** 21.6 ±2.0
HISTAMINE +	33 ug/ mouse	50(2)	9.8	14.8 ±2.0	** 13.5 ±2.2	* 4.8 ±0.4	*** 2.2 ±0.2	*** 35.3 ±3.0
AMLAKI	1 g/kg							

Results are mean ± S.e.; \* : Sign of significance, \* : p /0.025, \*\* : p /0.01, \*\*\* : p /0.001. Brackets in parenthesis indicate the no. of animals died during experiment.



TABLE - 39 : Showing the effect of amlaki (Embllica officinalis Linn.) on the carbohydrate components of gastric mucosal mucosa in restraint ulcers in albino rats.

Group	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. ( /ug/mg of dry tissue )				Amount of mucus represented by total carbohydrate. ( /ug/mg of dry tissue )
			Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	32	Nil	18.2 ±2.1	16.8 ±1.8	5.2 ±0.62	3.3 ±0.31	43.5 ±4.1
RESTRAINT	38(5)	27	*** 9.0 ±1.0	*** 9.2 ±0.8	** 3.2 ±0.3	*** 2.0 ±0.18	*** 23.4 ±2.2
RESTRAINT +	35(4)	10.2	*** 18.0 ±1.9	** 16.2 ±1.9	** 5.0 ±0.5	** 3.0 ±0.29	*** 42.2 ±4.0
AMLAKI (Dose used, 1g/kg)							

Results are mean ± S.E., \* : Sign of significance, \* : p /0.025, \*\* : p /0.01, \*\*\* : p /0.001. Brackets in parenthesis indicate the no. of animals died during experiment.

TABLE - 40 : Showing the effect of amlaki (Emblica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in Shay ulcers in albino rats.

Group	No. of animals.	Ulcer index.	Carbohydrate components of gastric mucosal mucus. (ug/mg of dry tissue)				Amount of mucus represented by total carbohydrate. (ug/mg of dry tissue).
			Total hexose.	Hexose amine.	Methyl pentose.	Sialic acid.	
CONTROL	30	Nil	17.8 ±2.0	17.0 ±1.9	5.8 ±0.60	3.0 ±0.30	43.6 ±4.2
SHAY ULCER	32(4)	20	*** 9.2 ±2.0	*** 8.0 ±0.7	*** 3.1 ±0.3	*** 1.8 ±0.1	*** 22.1 ±2.0
SHAY ULCER + AMLAKI (Dose used, 1g/kg)	33(4)	7	*** 18.0 ±2.1	*** 16.8 ±1.8	*** 5.2 ±0.42	*** 2.9 ±0.12	*** 42.9 ±4.1

Results are mean ± S.E., \* : Sign of Significance, \* : p /0.025, \*\* : p /0.01, \*\*\* : p /0.001. Brackets in parenthesis indicate the no. of animals died during experiment.

in albino rats caused a significant decrease in the levels of total hexose (p  $\leq$ .001), hexosamine (p  $\leq$ .001), methyl pentose (p  $\leq$ .01), sialic acid (p  $\leq$ .001) and in total carbohydrate (p  $\leq$ .001) of gastric mucosal mucus in comparison to control values. Alongwith restraint stress when amlaki (Emblica officinalis Linn.) was given to rats ( it was given in the dose of 1 g/kg, once in a day for consecutive three days prior to give restraint stress ) through oral route, significant increase was observed in the levels of total hexose (p  $\leq$ .001), hexosamine (p  $\leq$ .01), methyl pentose (p  $\leq$ .01), sialic acid (p  $\leq$ .01) and thus in total carbohydrate (p  $\leq$ .001) of gastric mucosal mucus.

Shay ulcer : Effect of amlaki (Emblica officinalis Linn.) on gastric mucosal mucus.

Results related to the effect of amlaki (Emblica officinalis Linn.) on the carbohydrate components of gastric mucosal mucus in Shay ulcers in albino rats are given in Table 40. It appears from the table that Shay technique when applied to rats caused a significant decrease (p  $\leq$ .001) in the levels of total hexose, hexosamine, methyl pentose, sialic acid and thus in total carbohydrate of gastric mucosal mucus when compared the values with control data. Pretreatment with amlaki (Emblica officinalis Linn.) in the dose 1g/kg orally once in a day for consecutive three days before the application of Shay technique caused a significant increase (p  $\leq$ .001) in the levels of total hexose, hexosamine, methyl pentose, sialic acid and thus in total carbohydrate of gastric mucosal mucus in comparison to those values obtained in 'Shay group'.