In the last few years, efforts have been taken to identify new antiulcer drugs from natural sources. Plants are the sources of certain known antiulcer drugs. Digitrall (DG) is a polyherbal formulation (prepared by M/s. S.C. Pharmaceuticals Ltd., Kolkata, India) which contains aqueous extracts of Zingiber officinalis, Amomum sabulatum, Berberis aristata, Piper nigrum, Ptychotis ajowan, Carica papaya and Foeniculum vulgare. Zingiber officinalis have anti-inflammatory, antiemetic and carminative action,

Berberis aristata and Amomum sabulatum have beneficial role in gastroduodenal ulcer and hepatitis. Ptychotis ajowan and Amomum sabulatum have antiemetic activities. Piper nigrum and Carica papaya have roles in various gastric ailments, and Foeniculum vulgare has beneficial role in anorexia. Thus, DG is claimed to be useful in gastroduodenal ulcers and indigestion. However, the pharmacological effects need experimental evidence for their actions. The aim of the present study was to evaluate the effect of DG on the prevention of gastric ulcers in rats.

The DG was prepared and supplied by M/s. S.C. Pharmaceuticals Private Limited, Kolkata, in a liquid form. Chemicals and reagents such as indomethacin, superoxide dismutase (SOD), reduced glutathione (GSH), bovine serum albumin, 5,5'-dithio-bis 2-nitrobenzoic acid (DTNB), epinephrine hydrochloride and thiobarbituric acid (TBA), etc. were purchased from Sigma Chemical Co., USA.

A total of 36 male Wistar rats (150-225 g, b.w) were divided into six groups (n = 6): Group I (5 ml/kg saline), Group II (5 ml/kg, saline), Group III (1 ml/kg digitrall), Group IV (2 ml/kg digitrall), Group V (4 ml/kg digitrall) and Group VI (50 mg/kg ranitidine). All the drugs were administered orally, daily for 10 days, before gastric ulcers were induced in these rats (except Group I), with indomethacin (20 mg/kg) orally. All animals were killed under ether anesthesia after 3 h. of administration of indomethacin. The stomach of each animal was incised along the greater curvature for the examination of ulcers. The glandular part of the stomach was scrapped, homogenized in cold 0.9% saline and centrifuged at 3000 r.p.m. for 15 min. Malondialdehyde (MDA), superoxide dismutase (SOD), reduced glutathione (GSH) and protein were estimated from the supernatant.

The results of all the assays are reported as mean±SEM. Statistical significance was determined using one-way ANOVA followed by Duncan’s test or Neuman-Keul test. P<0.05 was considered significant.

By directly inhibiting cyclooxygenase enzymes, indomethacin is indirectly responsible for the overproduction of leukotrienes and 5-lipoxygenase, which are the prime agents responsible for gastric ulcers. Pretreatment with DG at doses of 1, 2 and 4 ml/kg significantly (P<0.001) and dose dependently (25%, 53%, and 61% respectively) prevented indomethacin-induced gastric mucosal damage while ranitidine (50 mg/kg) showed 68% inhibition. [Table 1]

Indomethacin also causes generation of reactive oxygen metabolites (such as superoxide anion, hydrogen peroxide, and hydroxyl radical), which damages the gastric tissue and causes ulcer formation. The pathogenesis of gastric mucosal lesions by indomethacin is associated with increased lipid peroxidation. Systemic administration of glutathione or SOD prevents gastric ulcers. In the present study, indomethacin-enhanced lipid peroxidation (233%), inhibited SOD (65%) and reduced glutathione (72%) concentration in the stomach tissue compared to normal rats. Treatment with DG caused dose-

### Table 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Ulcer index</th>
<th>MDA (ng/µg protein)</th>
<th>SOD activity (U/mg of protein)</th>
<th>GSH (ng/µg protein)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal control</td>
<td>-</td>
<td>0.9±0.01</td>
<td>122.5±8.2</td>
<td>208±6.7</td>
</tr>
<tr>
<td>Indomethacin (20 mg/kg)</td>
<td>25.1±1.5</td>
<td>3.0±0.02 * (+233)</td>
<td>42.8±6.0 * (-65)</td>
<td>58±4.2 * (-72)</td>
</tr>
<tr>
<td>Digitrall (1 ml/kg)</td>
<td>18.8±1.1 b (-25)</td>
<td>1.9±0.06 b (-37)</td>
<td>69.3±5.2 b (+62)</td>
<td>87±5.2 b (+50)</td>
</tr>
<tr>
<td>Digitrall (2 ml/kg)</td>
<td>11.6±1.5 b (-53)</td>
<td>1.5±0.05 b (-48)</td>
<td>79.6±7.7 b (+86)</td>
<td>93±4.8 b (+60)</td>
</tr>
<tr>
<td>Digitrall (4 ml/kg)</td>
<td>9.5±0.5 b (-62)</td>
<td>1.4±0.08 b (-53)</td>
<td>94.5±9.3 b (+120)</td>
<td>106±7.4 b (+82)</td>
</tr>
<tr>
<td>Ranitidine (50 mg/kg)</td>
<td>8.0±0.5 b (-68)</td>
<td>1.2±0.01 b (-58)</td>
<td>108.1±5.8 b (+152)</td>
<td>161±3.7 b (+177)</td>
</tr>
</tbody>
</table>

Values are mean±SEM; n=6 in each group; P values <0.01 * as compared to normal control, b as compared to indomethacin group; values within parentheses indicate the percent change; all drugs were given orally.
dependent reduction in the generation of MDA (37%, 48%, and 53%, respectively), while, enhanced the level of SOD (62%, 86% and 120%, respectively) and reduced glutathione (50%, 60%, and 82%, respectively) in gastric mucosal tissue. Reduced glutathione in the gastric mucosa acts as the major scavenger of the oxygen-derived free radicals. The standard drug, ranitidine corroborate these findings. Hence, it may be concluded that DG has preventive action on indomethacin-induced ulcer in rats. It is possible that the antioxidant effect of DG might also have played a role in the mechanism of antiulcer activity.

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