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Effect of patoladi ghanasara on ethanol-induced gastric lesions in rats

S.L. Munasinghe, D.K. Vithanage, W.D. Ratnasooriya*
*Departments of Dravyaguna Vignana and Zoology**
University of Colombo, Sri Lanka

Reprint request to: Professor W.D. Ratnasooriya,
Department of Zoology, University of Colombo, Sri Lanka.

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Abstract

Patoladi Ghanasara (PG) consisting of five ingredients *(Termimlia chebule Retz; Terminania belarica Roxb; Phillenthus emblica Linn; Tricosenthus cucumarina Linn; Azadirachta indica A Juss)* is recommended for the treatment of gastric lesions (Amlapitta) in Ayurvedic medicine. Recently, we showed using rat ethanol-induced gastric lesion technique that Patoladi decoction has strong gastroprotective activity when given orally. The aim of this study was to investigate whether semisolid preparation of this decoction, namely (PG) has gastroprotective activity when assessed with the same technique and method of administration. Three different concentrations of the PG were used: 30%, 15% and 7.5%. The results show that PG has overall gastroprotective activity but is less effective than PD (in terms of both number and length of gastric haemorrhgic lesions).

Key words: Patoladi ghanasara, Patoladi decoction, Amlapitta, Gastric lesion, Gastro protection, Ayurveda, Sri Lanka.

1. Introduction

Prevalence of gastric lesions is increasing in developing countries (Shayne, 2002) including Sri Lanka. The number of patients seeking Ayurvedic treatment for gastric lesions (Amlapitta) at the Colombo Ayurvedic Teaching Hospital has increased over the last few years (Dr. M.M.Chandrasena, Consultant Physician). One of the decoctions given for gastric lesion in this Hospital is Patoladi decoction which contain five ingredients: pericarp of dry fruit *of Terminalia chebula* Retz:.(Family; combretacae, "aralu" in Sinhala "kadukkay" in Tamil), *Terminalia belerica Roxb.(Family;* combretacae "bulu" in Sinhala "akkam" in Tamil), *Pyllenthus emblica*

Linn.(Family; euphorbiaceae, "Nelli" in Sinhala, "Nellika" in Tamil), dry whole plant of *Tricosenthes cucumarina Linn.* (Family; cucubritaceae, "dummella" in Sinhala, "Pudal" in Tamil) and dry bark of *Azadirachta indica A. Juss. (Family:* meliacea, "kohomba" in Sinhala and "Vappu" in Tamil). Recently, using the rat ethanol-induced gastric lesion technique we showed that the Patoladi decoction possesses strong gastroprotective activity (Munasinghe *et al.*, 2002) providing scientific justification for its use on the treatment of gastric lesions.

However, at present, many patients show a general reluctance to use decoctions: mainly due to difficulties in making decoctions, inability to store the decoction for more than a day, necessitating daily preparation and also due to their bitter taste. In addition, quite often, for a single dose of decoction large quantities has to be orally administered. As an attempt to overcome this problem in India some decoctions are given as Ghanasara (semi solid preparation) which can be stored and be taken in small quantities (Tivari, 1983). However, in making Ghanasara a possibility exists that the claimed therapeutic properties of the decoction may be lost.

The aim of this study was to investigate whether a Ghanasara preparation of Patoladi decoction possess gastroprotective activity so that it may be made it Ayurvadic Hospitals and given to patients.

2. Materials and Methods

Dry fruits of *T. chebula Retz, T. belerica Roxb, P. embliac Linn,* and whole dry plant of L *cucumeria Linn.* were purchased from a Ayurvedic drug outlet in Colombo, Sri Lanka. Dry bark of *A. indica* was obtained from a mature tree at the garden in the Institute of Indigenous Medicine University of Colombo, Sri Lanka. Identification of these ingredients were authenticated by Dr M.M.Chandrasena, Department of Materia Medica, University of Colombo.

The Patoladi Ghanasara (PG) was made as described in the Ayurvedic text (Vishnu, 1946). Briefly, 12 g of each ingredient in dried form was introduced into a clay pot and 1920 ml of tap water was added. This was boiled down to 240 ml using a low flame. The resulting decoction was filtered using a stainless steel strainer. This filtrate was evaporated (about 2h) until black gummy semisolid was formed. This was considered as the 100% (PG).

Healthy adult male cross bred albino rats (175-225g) from the Department of Zoology, University of Colombo, Sri Lanka were used in this study. They were housed individually in raised mesh bottomed cages (to prevent

coprophagia) under standardized animal house conditions (temperature: 28-30^0 C. photoperiod: about 12 h light and 12 h dark; relative humidity: 50-55%) with free access to pelleted food (Master Feed Ltd. Colombo, Sri Lanka) and tap water *adlibidum.*

Food was withheld for 36 h and water for 12 h in 24 rats before the commencement of the experiment. These rats was randomly divided into 4 equal groups (N=6) and treated orally with PG in the following manner: group 1, with I ml distilled water (DW) 2, with 1 ml 30% PG, 3, with 1 ml 15% PG and 4, with lml 7.5% PG. 30 minutes later gastric lesions were induced in these rats with absolute ethanol (Ratnasooriya *et al* 1995).

One hour following ethanol treatment the animal were killed by an overdose of ether (B.D.H Chemicals Ltd., Poole, UK). The stomachs were removed immediately and were instilled with 5ml of 10% formal saline (v/v) and left immersed in 10% formal saline in a beaker for 6-10 min. Then stomachs were slit opened along the greater curvature and were examined macroscopically for linear haemorrhagic lesions in the mucosa of the glandular portion. The number of linear haemorrhagic lesions were recorded and the length (mm) of the linear haemorrhagic lesions were measured with a vernier caliper (Fisions Scientific Equipment, Loughborough, UK) and each length was summed per stomach.

A part of PG was dissolved in a minimum volume of DW and this solution and Patoladi decoction was separately partitioned into Chloroform. These were applied to TLC plates precoated with silicagel,GF254 and Chloroform soluble was separated using Chloroform 95: Methanol 5 solvent system. Rf values were determined directly under UV light 254 nm and 366 nm. Then the TLC plates were sprayed with Vanillin sulphate and heated for 10 min. at 110^0 C. Rf values were determined. (This TLC analysis was done by Ceylon Institute of Scientific and Industrial Research, Bauddhaloka Mawatha , Colombo 07, Sri Lanka).

The results were expressed as means $\pm$ S.E.M. statistical analysis was made by Mann -Whitney U- test. The level of significance was set at $P<0.05$.

3. Results

As shown in Table I prominent gastric lesions were evident on rats treated with DW and mid dose of PG. On the other hand, high and low doses of PG inhibited the number (low :by 44% and high by 82%) and length (low by 60% and high by 81%) of gastric heamorrhagic lesions markedly and significantly ($P<0.05$).The Rf values obtained for Chloroform soluble at

UV light 254 for PG and Patoladi decoction were respectively 0.23, 0.35, 0.47, 0.58, 0.65, and 0.35, 0.47, 0.58, 0.69, and at UV light 366 were 0.04, 0.41,0.73 and 0.04, 0.40, 0.52, 0.73 respectively. The Rf values obtained after spraying for PG were 0.04, 0 1, 0.17, 0.23, *0.35,* 0.41, 0.45, 0.47, 0.56, 0.58, 0.65, 0.73 and for Patoladj decoction were 0.04, 0.1, 0.16, 0.35, 0.4, 0.47, *0.52,* 0.56, *0.58,* 0.65, 0.73. This indicates that both preparations have compounds of similar Rf values.

4. Discussion

The results of this study show that the low and high doses of PG have marked gastroprotective activity (in terms of both number and length of gastric haemorrhagic lesions) but not the mid dose. In this study, we did not investigate the reasons for this pharmacological heterogeneity (why the activity was not dose-related). But, such pharmacological heterogeneity are reported with allopathic drug such as chlortalidone (Anonymous, 2000) and Ayurvadic decoctions such as aqueous bark extract of *Ficus recemosa* (Ratnasooriya *et al,*2003). Patoladi decoction is shown to excert its gastroprotection action by increasing the carbobydrate and mucus content of the gastric mucosa (Munasinghe *et al,* 2002). It is very likely that the PG has a similar mode of action.

When the data of the present study is compared with what has been reported for Patoladi decoction, the PG is less effective (number of lesions; low dose by 44 % mid by 10 % and high by 82 % and length of lesions; low dose by 60 %, mid by 17 %and high by 82 %).This reduction in effectiveness is unlikely to be due to complete loss of chemical constituents as revealed by the TLC analysis of Chloroform soluble. However, it may result from, at least, partial destruction of chemicals due to the mode of preparation of PG.

It is concluded that PG is not as affective as Patoladi decoction as a gastro protective agent. It may not beneficial to replace Patoladi decoction with PG in the treatment of gastric lesions

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Table 1

Effect of 1ml of different concentrations of Patoladi Ghanasara (PG) on the number and length of ethanol-induced gastric lesions in rats (means ±SEM; ranges in paranthesis)

Rout of administration	Treatment	N	Number of lesions	Length of lesions (mm)
Oral	Vehicle (DW)	6	9.0 ± 0.8 (5-16)	81.0±7.2 (50-145)
	30% (PG)	6	1.7 ± 1.2^{++} (3-7)	15.0 ±13.4++ (10-82)
	15% (PG)	6	8.2 ± 1.9 (1-12)	67.5±15.9 (2-4)
	7.5% (PG)	6	5.0 ± 1.2^{++} (2-10)	32.5±9.8^{++} (7-195)

As compared with control **P< 0.01**$^{++}$