

OUTCOME OF BILWA (*Aegle marmelos*) PHALA MAJJA CHURNA ON INTESTINAL TRANSIT

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Abstract

Intestinal transit is define as length of the intestine travelled by chyme per unit time, an important factor for determination of intestinal mobility as well as bacterial growth which is important factor for development of gastrointestinal disorders. *Aegle marmelos* commonly known as Bilwa, its fruit has been used for treatment of gastrointestinal disorders like chronic diarrhoea, dysentery, peptic ulcers, as a laxative in traditional system of Indian medicine (Ayurveda) and possesses antioxidant, anti-diarrhoea, gastro-protective, anti-ulcerative, hepatoprotective, anti-diabetic properties. The main aim of the study is to assess the effect of Bilwa phala majja churna on intestinal transit. Study was conducted on eight inbred albino rats having 125- 225 g body weight and these animals were divided in to two groups (four animals in each group) of either sex. Bilwa phala majja churna was administered in the dose of 200 mg/100 g body weight of animals twice a day in drug treated group along with food & water and only food and water was administered in control group animals. After six days treatment, effect of body weight, diet consumption, intestinal transit was recorded of both groups. Body weight and diet consumption did not show any significant changes in between group. There was increased intestinal transit and decrease length of small intestine but these changes were not significant. Large intestine did not show any changes in their length where as its weight content was increased in drug treated group. Bilwa phala majja churna increase intestinal transit but did not affect body weight and diet consumption.

Key word: Bilwa phala majja churna; *Aegle marmelos*; Intestinal transit.

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INTRODUCTION

India has rich heritage of several important time-honored health care systems like Ayurveda, Siddha and Unani. It has been estimated that medicinal plants in India (7,500 of the 17,000 higher plant species are medicinal Plants) is higher than any country of the world with respect to the existing flora of that respective country.^{[1][2]} *Aegle marmelos* commonly known as Bilwa has enormous therapeutic value in traditional system of medicine.^[3] Its different parts like stem, bark, root, leaves etc. have different pharmacological properties at different stage of maturity like unripe or half ripe fruit have Snigdha (unctuous), Tikshna guna, Ushna virya, Deepana (digestive stimulant),^[4] Kaphavata shamaka properties and used as Sangrahika, deepaniya dravya.^[5] Besides this it has astringent, stomatic (a drug that strengthens the stomach and promotes its action), anti-scorbutic (a drug which prevents or cures scurvy), digestive and ripen fruit is aromatic, astringent, cooling and laxative properties.^[6] The crude extract of Bilwa has shown antioxidant,^[7] anti-ulcer^[8] and antimicrobial properties.^[9]

It is well established that the gastrointestinal (GI) microbiota impacts overall health and quantities and types of bacteria composing the microbiota can be optimized by dietary factors, particularly prebiotics and probiotics.^[10] Probiotics have traditionally been used to treat GI diseases and disturbances, including lactose intolerance, inflammatory bowel disease and constipation.^{[11][12]} Bilwa (*Aegle marmelos*) has been traditionally used in management of diseases of gastrointestinal tract.^[13] Its unripe fruit is used in Agnimanda (low digestive powder), Atisara (diarrhoea), Pravahika, Grahani (tropical sprue) and also used in Raktatarsha (dysentery), Raktarsha (bleeding piles).

In this study, an attempt has been made to evaluate the effect of Bilwa phala majja churna on intestinal transit to ascertain their pharmacological activity on intestinal motility.

MATERIAL AND METHODS

Bilwa phala was collected from garden of Banaras Hindu University during month of February – March and was authenticated by qualified taxonomist. These fruits were dried in sun light and pulverized to fine powder and stored in airtight container.^[14]

Animals

Study was conducted on eight inbred Charles foster albino rats weighing 125- 225 g of either sex were obtained from animal house of Institute of Medical Sciences, Banaras Hindu University. The animals were housed in plastic cages (43 x 27 x 15 cm) and kept under standard laboratory condition with controlled temperature ($25 \pm 5^{\circ}\text{C}$) and light.

Dose fixation

Human dose of Bilwa phala majja churna is one Karsha (12 g).^[15] The dose for the rats was calculated on basis of body surface area by referring to standard table of Paget and Barnes.^[16]

Study design

Animals were acclimatized for seven days in the animal house of department of Rasa Shastra, Faculty of Ayurveda, IMS, BHU, before commencement of the experiment. These animals were divided into two groups (four animals in each group) namely control and drug treated group. Only food and water was administered in control group animals. Second group animals were treated with Bilwa phala majja churna in the dose of 200 mg/100 g body weight, twice a day.

After six days treatment body weight, diet consumption was observed after that 5 ml of barium suspension in isotonic saline (0.9%w/v) containing 1.5 g of Barium Sulphate (Eskay Fine Chemicals, Mumbai) was given to animal. After half hour the animal was sacrificed and abdomen was opened by a mid line incision to measure length of the intestine.^[17] A wooden block, fixed with a meter scale was used for the purpose; upper surface of the block was kept continuously wet with 0.9%w/v saline (37 °C). Small intestine extending from gastro-intestinal junction to illeocecal junction was laid out on the block, closely along the meter scale and given manual stretch gently, on either of its end, until it was just straight, there after the organ was left lying free on the block for one minute. At the end of the period, its total length was measured and then cut open length wise, to ascertain accurately in the position of Barium-head on the scale. The stretch was isolated between two ligatures, one at the oesophago-gastric junction and the other gastro duodenal junction. The stomach was weighed and then cut open and washed for its luminal contents into a beaker with normal saline (0.9%v/v) till no Barium particles could be visualized on the mucosal surface. The wall of the stomach was dried mobbed with filter paper and weight of empty stomach was recorded.

RESULT

Body weight and diet consumption between control group and treated group do not showed significant changes during study period. (Table 1 and 2) There was increased in intestinal transit, weight and decrease in length of small intestine but these changes were not significant. (Table 3) Large intestine do not showed any changes in their length in both group where as weight of content was increased in drug treated group.^[18] (Table 4)

DISCUSSION

Intestinal transit (in percentage) is the length of the small intestine travelled by chyme per unit time^[19] and movement of chyme through the small intestine is a factor of the intestinal smooth muscle activity. It was reported that delay in intestinal transit time i.e. increase intestinal transit preceding intestinal bacterial over growth and suggested that impairment in intestinal motility probably played a role in development of bacterial overgrowth^[20] because intestinal motility served as a normal cleansing mechanism.^[21] Bilwa phala majja churna having grahi property indicated impairment of intestinal motility. Its anti diarrheal activity is also supported by phytochemical extract of unripe fruit pulp like it contains mucilage, pectin, sugar, tannin and Marmelosin. It was reported that, A. marmelos is effective in chronic cases of diarrhoea due to the presence of large quantities of mucilage, which act as a demulcent^[22] Additionally it has been shown to be effective in experimental models of irritable bowel syndrome and physiological diarrhoea^{[23][24]} besides this tannin,^[25] sarkara^[26] was also reported for antidiarrhoeal activity. It was also reported that *E. coli* adherence to intestinal mucosa delayed spike bursts^[27] reduced the frequency and amplitude of the intestinal contractions and inhibit small intestinal transit while Lactobacillus promoted regular spike burst activity, reduced the migrating motor complex period and accelerated small intestinal transit.^[27] It was also reported that phytochemical extracts of Bilwa were not active against the probiotic organisms Bacillus and Lactobacillus, indicating that it is not going to affect the gut micro flora.^[28] From above it is clear that *E. coli* like (pathogenic) bacteria inhibit intestinal transit while lactobacillus like (non pathogenic) bacteria increases intestinal transit.

Table 1: Effect of Bilwa phala majja churna on body weight of animals^[18]

Day	Control group	Treated group
1	169.75 ± 29.68	165.75 ± 54.31
2	174.50 ± 29.18	170.50 ± 53.61
3	179.75 ± 30.48	167.75 ± 52.20
4	172.00 ± 28.11	173.25 ± 53.24
5	173.00 ± 28.11	176.00 ± 55.35
6	169.00 ± 29.14	177.75 ± 56.28

n: 4 animals in each group, Values are Mean ±SD

Table 2: Showing Diet consumption (per gram body weight in milligram) animals^[18]

Day	Control group	Treated group
1	107±9.08	107±6.98
2	116±7.27	115±8.43
3	115±9.66	110±5.78
4	114±5.88	118±8.23
5	109±6.43	116±5.98
6	109±5.27	119±4.97

n: 4 animals in each group, Values are Mean ±SD

Table 3: Effect of Bilwa phala majja churna on small intestine^[18]

Small Intestine	Control group	Treated group
Length	102.75± 10.81	96.25 ±12.31
Intestinal Transit	73.75 ±7.89	78.00 ±13.36
Weight	7.32 ±0.95	8.65 ±2.51

n: 4 animals in each group, Values are Mean ±SD

Table 4: Effect of Bilwa phala majja churna on large intestine

Large Intestine	Control group	Treated group
Length	17.25± 1.71	17.25 ±3.69
Weight with contents	4.84 ±0.48	6.45 ±1.97
Weight without contents	2.57 ±0.27	3.23 ±0.93

n: 4 animals in each group, Values are Mean ±SD

In this study it was observed that intestinal transit of Barium meal was enhanced in treated animals, it might be possible that it helps lactobacillus like bacteria which is non pathogenic and beneficial to intestine. Animal treated with Bilwa phala majja churna given for daily for 6-7 days, showed decreased in reduction in length of small intestine. Bilwa phala have katu (pungent), tikta (bitter), kashay (astringent) rasa which increase vata dosha, causes sankoch (contraction) of small intestine due to this, length of intestine was decreased.

Reduction in intestinal transit time as well as length of small intestine increases its the weight because it might be possible that movement of food per unit length of intestine and weight of per unit length of intestine also increases which is helpful in addition of intestinal weight. In case of large intestine, weight content of large intestine increased in drug treated group but their length do not showed any changes this observation indicate that Bilwa pala majja churna does not affect the muscular tone of large intestine.

CONCLUSION

Bilwa phala majja churna did not influence the dietary consumption and normal body growth. It increase the intestinal transit, weight of both (small and large intestine) reduces length of small intestine but do not influences the length of large intestine.

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