CLINICAL STUDY

A Controlled Clinical Study to Evaluate the Comparative Effect of Anuloma DS Tablet and Lactitol + Ispaghula Powder in Functional Constipation

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ABSTRACT

Background: The International Classification of Diseases (ICD) has described constipation as decrease in normal frequency of defecation accompanied by difficult or incomplete passage of stool and/or passage of excessively hard, dry stool (ICD10-CM-K59). Overall, the average prevalence of constipation in adults has been estimated as 16% worldwide (varies between 0.7% and 79%); in adults aged 60 to 110 years, the prevalence has been estimated to be 33.5%. **Objective:** To evaluate and compare the efficacy of tablet Anuloma DS and lactitol + ispaghula powder in constipation. **Materials and methods:** Sixty-two subjects with constipation were divided into two groups: Group A with 32 subjects and Group B with 30 subjects. Group A received 1 Anuloma DS tablet at bedtime and Group B received lactitol + ispaghula powder 5 g at bedtime for 15 days. **Results:** Twenty-eight patients in Group A showed significant improvement in stool consistency of stool, whereas just 8 patients showed improvement in consistency of stool in Group B. Twenty patients showed improvement in frequency of stool in Group A, whereas only 3 patients showed this improvement in Group B. Twenty-nine patients in Group A reported good improvement in feeling after defecation compared to 9 patients in Group B. Pain in abdomen improved in 21 patients in Group A versus 9 patients in Group B. Improvements were also seen in scores on the Constipation Assessment Scale, Patient Assessment Scale, and Quality of Life Questionnaire. **Conclusion:** Anuloma DS showed significant clinical benefits in the treatment of constipation compared to lactitol + ispaghula powder.

Keywords: Anuloma DS, constipation, Constipation Assessment Scale, ispaghula, lactitol

The fast-paced, lifestyle adopted by many individuals in today's competitive society has had a significant impact on the health of the gastrointestinal tract resulting in a rising prevalence of gastrointestinal disorders.

Constipation, or *Vibandha*, is one such outcome. *Vibandha* is not mentioned in Ayurvedic texts as a specific disease but has been mentioned as a *Nidana* (causative factor), *Lakshana* (symptoms), and *Upadrava* (complications) of several diseases. It can be considered as a *Lakshana* in *Udavarta* (retention of feces, flatus, and urine) like *Anaha* (obstruction), *Adhmana* (distension), *Malaavastamba* (hardness of feces) due to the *Pratiloma Gati* (reverse flow) of *Apana Vayu*[1].

Vibandha (constipation) is the obstruction of the *Purisha* (feces) in the *Purishavaha Srotas* (excretory system). Constipation is a warning sign for many current or imminent disorders.

The International Classification of Diseases, (ICD10-CM-K59), defines constipation as the decrease in normal frequency of defecation accompanied by difficult or incomplete passage of stool and or passage of excessively hard and dry stool. The prevalence of constipation in India is estimated to be 16.8% and that of self-reported constipation is 24.8%[2]. Overall, the average prevalence of constipation in adults has been estimated to be 16% worldwide (varies between 0.7% and 79%), whereas the prevalence in adults aged 60 to

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110 years was 33.5%[3]. Epidemiological studies show that the prevalence of constipation increases with the age and is more common in women than in men[4].

Various pharmacological agents such as bulk laxatives, stimulant laxatives, stool softeners, osmotic agents, lubricant laxatives, suppositories, and enema are used in clinical practice to treat constipation. However, their long-term use may cause electrolyte disturbance, dehydration and mineral deficiencies, and may even produce drug dependency.

Hence, there is a need for an alternative therapeutic approach, which not only manages the condition, but also minimizes the recurrence of symptoms.

Anuloma DS is an Ayurvedic proprietary medicine that contains different medicinal plants such as *Cassia lanceolata* (Senna), *Apium leptophyllum* (Ajamoda), *Cuminum cyminum* (Cumin or Jeeraka), *Terminalia chebula* (Haritaki), *Glycyrrhiza glabra* (Liquorice), *Zingiber officinale* (Ginger or Shunti), and Halite (Rock salt). These drugs are *Agnideepaka* (increase the digestive fire), *Katu Rasa* (pungent taste), *Ushna Veerya* (hot potency), and *Katu Vipaka*[5].

The primary objective of this comparative study was to evaluate the efficacy of Anuloma DS tablet and lactitol + ispaghula powder in relieving constipation. Improvements in the Quality of Life Questionnaire, Constipation Assessment Scale, and Patient Assessment Scale were the secondary objectives of the study.

METHODS

The study designed as an open-label comparative double arm clinical study enrolled 62 subjects visiting medicine OPDs of our hospital for the treatment of constipation. After screening, eligible subjects were instructed to take either Anuloma DS 1 tablet at bedtime with warm water or lactitol + ispaghula powder 5 g at bedtime with warm milk for a period of 15 days. Written informed consent was obtained from all participants on Day 1. The study was undertaken after approval by the Institutional Ethics Committee.

The inclusion criteria were male and female adults aged 18 to 70 years, who were suffering from functional constipation, were willing to sign consent form and were able to present for follow-ups.

The primary study objective assessed changes in symptoms of constipation such as consistency of stool, frequency of stool, nature of evacuation, pain in abdomen, generalized weakness, headache, body ache, and muscle cramps. Secondary end points were changes in the Constipation Assessment Scale, which evaluates 8 domains such as abdominal distension, change in amount of gas pass rectally, less frequent bowel movement, oozing of liquid stool, rectal fullness, rectal pain, small stool size, and urge but inability to pass stool. Patient assessment of constipation contain 12 domains such as discomfort- pain-bloating in abdomen, stomach cramp, painful bowel movement, rectal burning, rectal bleeding, incomplete bowel movement, hard bowel movement, small bowel movement, straining to pass bowel movement, and false alarm. And the Patient Assessment of Constipation Quality of Life (PAC-QOL) questionnaire is a brief but comprehensive tool, which evaluates constipation through daily individual health assessment and functioning.

Constipation was diagnosed based on the Rome IV criteria[6] as follows:

- Fewer than 3 spontaneous bowel movements per week.
- Straining for more than 25% of defecation attempts.
- Lumpy or hard stools for more than 25% defecation attempts.
- Sensation of anorectal obstruction or blockage for more than 25% of defecation attempts.
- Sensation of incomplete defecation for more than 25% of defecation attempts.
- Manual maneuvering required to defecate for more than 25% of defection attempts.

Exclusion criteria were the presence of irritable bowel syndrome, inflammatory bowel disorder, colon carcinoma, medication known to cause constipation (opioid analgesics, antidepressants, anticonvulsants, amitriptyline), uncontrolled systemic ailments or neurological illness, pregnancy and lactation.

The study participants were evaluated at baseline and two assessment points (Visit 1- Day 1 and Visit 2- Day 15). Patients underwent history and physical examination at all assessments points. They were also enquired about constipation signs and symptoms and evaluated with the Constipation Assessment Scale, Patient Assessment Scale, and Quality of Life Questionnaire. Concomitant medication and adverse events were also assessed.

Data comparison between baseline and follow-up visit was performed using a Friedman test, Wilcoxon signed rank test, Mann-Whitney test, unpaired and paired *t*-tests. A p value of 0.05 was considered statistically significant. Statistical analysis was done using statistical software SPSS 21.0.

RESULTS

A total of 62 subjects were enrolled in the study. Two subjects were dropped as they did not come for follow-up. Hence, 60 subjects were included in the final analysis. Age-wise distribution of subject shows that 28 subjects belong to the age group 18 to 27 years, while 10 subjects belonged to 48 to 57 years. Out of 60 subjects, 34 were females and 26 were males. Thirty-eight subjects belonged to middle class and the diet-wise distribution showed equal number in both vegetarian and mixed diet. Table 1 describes the demographic characteristics of the participants.

Table 1. Demographic Data of the Enrolled Subjects (n = 60)

Age (years)	Group A (Anuloma DS)	Group B (Lactitol + Ispaghula)
18-27	15	13
28-37	2	4
38-47	3	4
48-57	3	7
58-67	7	2
Gender	**Group A**	**Group B**
Male	13	13
Female	17	17
Diet	**Group A**	**Group B**
Mixed	15	18
Vegetarian	15	12

Assessment of Signs and Symptoms of Constipation

Constipation symptoms such as reduced appetite, distension of abdomen, pain in abdomen, general weakness, headache, body ache, muscle cramps, consistency of stool, frequency of stool, nature of evacuation, feeling after defecation were assessed on a 4-point scale. The mean symptom scores were significantly improved in Group A compared to Group B as shown in Tables 2 & 3 and Figure 1.

Constipation Assessment Scale and Patient Assessment Scale

Significant improvements were observed in the Constipation Assessment Scale and Patient Assessment Scale in Group A (Anuloma DS) ($p < 0.00$) (Table 4 and Fig. 2).

Assessment of Quality of Life

Group A had significantly greater improvement in quality of life than Group B as assessed via the Quality of Life Questionnaire (Table 5).

DISCUSSION

Constipation is a common condition that affects people of all ages. It is often erroneously attributed to the natural aging process. Although aging is associated with changes in the gastrointestinal tract and may predispose one to develop constipation, the disorder usually has a multifactorial etiology.

Etiologically, constipation can be broadly divided into two main groups: primary and secondary[7]. Primary or functional constipation is defined as constipation for more than 6 months[8], which is not due to any underlying cause such as medication side effect or an underlying medical condition. It can be distinguished from irritable bowel syndrome based on the absence of abdominal pain. It is the most prevalent type of constipation and frequently has multiple causes. Diets, such as consuming too little fiber or water, or behaviors such as engaging in less physical activity are the main culprits[9].

The incidence of gastrointestinal diseases had an unprecedented hike in recent years. This is mainly due to changes in lifestyle, food habits, behavioral changes, etc. *Annavaha Sroto dushti Vikaras* (disease of gastrointestinal system) explained in Ayurveda classics share similarity with gastrointestinal disorders in terms of etiopathogenesis and symptomatology. *Vibandha* (constipation) is a disease of *Annavaha Srotas* (gastrointestinal system) caused by disturbances of *Agni* (digestive fire). Irregular dietary habits, behavioral changes, stress, etc. lead to *Agnimandya* (weakened digestive fire), which causes *Ajeerna* (indigestion) and then constipation.

Abnormalities of *Samana* (kindling *vata*) – *Apana Vayu* (descending *vata*), *Pachaka Pitta* (digesting *pitta*), and *Kledaka Kapha* (moistening *kapha*) also play significant roles in causing constipation. Along with the difficulty in passing stools, other symptoms like pain in abdomen, flatulence, rectal pain, hemorrhoids, headache can also be associated with constipation. Chronic uncontrolled cases of constipation can lead to complications like *Udavarta*, *Vataja* gulma, *Vatodara*.

Management of constipation includes correction of *Agni*, movement of *Apana Vata* and normalizing the vitiated *Pachaka Pitta* and *Kledaka Kapha*. Different formulations like *Churna*, *Kashaya*, *Arishta*, *Ghrita* are indicated in the management of *Vibandha.*

Management of constipation in contemporary medicine includes lifestyle modifications such as introduction

Table 2. Comparison of Mean Changes in Symptom Score from V1 and V2 (n = 60)

Parameters	Group A (Study Group)			Group B (Control Group)		
	Visit	Mean score (Mean ± SD)	P value	Visit	Mean score (Mean ± SD)	P value
Reduced appetite	V1	1.40 ± 0.724	0.00	V1	1.17 ± 0.747	0.317
	V2	0.47 ± 0.507		V2	1.13 ± 0.730	
Distension of abdomen	V1	1.43 ± 0.626	0.00	V1	1.33 ± 0.711	0.01
	V2	0.40 ± 0.498		V2	1.10 ± 0.712	
Pain in abdomen	V1	0.93 ± 0.785	0.00	V1	0.70 ± 0.750	0.003
	V2	0.20 ± 0.484		V2	0.40 ± 0.498	
Generalized weakness	V1	1.03 ± 0.850	0.00	V1	0.90 ± 0.885	0.002
	V2	0.23 ± 0.430		V2	0.57 ± 0.679	
Headache	V1	0.57 ± 0.858	0.00	V1	0.50 ± 0.777	0.03
	V2	0.10 ± 0.403		V2	0.33 ± 0.606	
Body ache	V1	0.60 ± 0.770	0.00	V1	0.53 ± 0.937	0.03
	V2	0.10 ± 0.305		V2	0.37 ± 0.669	
Muscle cramps	V1	0.57 ± 0.898	0.00	V1	0.80 ± 1.031	0.01
	V2	0.17 ± 0.461		V2	0.60 ± 0.814	
Stool consistency	V1	2.27 ± 0.583	0.00	V1	2.17 ± 0.531	0.01
	V2	1.10 ± 0.305		V2	1.90 ± 0.607	
Stool frequency	V1	1.37 ± 0.556	0.00	V1	1.20 ± 0.407	0.08
	V2	1.00 ± 0.00		V2	1.10 ± 0.305	
Nature of evacuation	V1	2.33 ± 0.479	0.00	V1	2.30 ± 0.535	0.01
	V2	1.27 ± 0.450		V2	2.07 ± 0.640	
Feeling after defecation	V1	2.30 ± 0.466	0.00	V1	2.30 ± 0.596	0.01
	V2	1.20 ± 0.407		V2	2.00 ± 0.695	

Table 3. Comparison of Mean Changes in Symptom Score (n = 60)

	Reduced appetite		Distension of abdomen		Pain in abdomen		Generalized weakness		Headache	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
MR	23.2	37.8	22.7	38.3	27.2	33.8	26.65	34.35	27.5	33.4
SR	695.0	1135.0	681.0	1149.0	816.0	1014.0	799.5	1030.0	827.0	1003.0
P	0.0		0.00		0.06		0.04		0.05	

	Body ache		Muscle cramps		Stool consistency		Stool frequency		Nature of evacuation		Feeling of defecation	
	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B	Group A	Group B
MR	27.8	33.1	26.3	34.7	20.3	40.7	29.0	32.0	21.1	39.9	21.3	39.3
SR	835.5	994.5	789.0	1041.0	609.0	1221.0	870.0	960.0	632.0	1198.0	639.0	1191.0
P	0.08		0.02		0.00		0.08		0.00		0.00	

MR: Mean Rank; SR: Sum Rank; P: P value

Figure 1. Comparison of mean changes in symptom score from V1 to V2 (n = 60).

RA: Reduced appetite; DA: Distension of abdomen; PA: Pain in abdomen; GW: Generalized weakness; HD: Headache; BA: Body ache; MC: Muscle cramps; CS: Stool consistency; FS: Stool frequency; NC: Nature of evacuation; FD: Feeling after defecation.

Table 4. Comparison of Mean Changes in Constipation Assessment Scale and Patient Assessment Scale from V1 to V2 (n = 60)

Parameters	Group A				Group B			
	Visit	Mean ± SD	SE	P value	Visit	Mean ± SD	SE	P value
Constipation Assessment Scale	V1	5.03 ± 2.13	0.388	<0.00	V1	5.77 ± 2.72	0.498	0.02
	V2	1.73 ± 1.20	0.225		V2	5.60 ± 2.64	0.483	
Patient Assessment Scale	V1	11.8 ± 6.08	1.110	<0.00	V1	12.3 ± 5.37	0.981	0.002
	V2	6.0 ± 3.37	0.061		V2	11.9 ± 5.10	0.931	

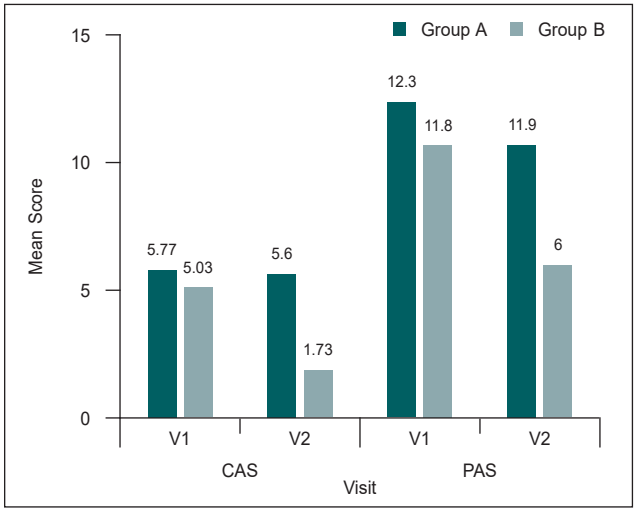

Figure 2. Comparison of mean changes in Constipation Assessment Scale and Patient Assessment Scale from V1 to V2 (n = 60).

CAS: Constipation Assessment Scale; PAS: Patient Assessment Scale.

of high-fiber diet, plenty of water intake, physical exercise, and good bowel habits. Various classes of laxative medications include fiber supplements, osmotic laxatives, stimulant laxatives, lubricants, stool softeners, etc. Enemas and suppositories are used when the above treatments yield no result[10].

Various studies report that women are more than twice as likely to develop constipation as men. This is attributed to the slower gut transit in women due to the changing levels of progesterone and estrogen or damage to the pelvic floor in a women's obstetric history.

Considering the socioeconomical background and dietary habits of the locality, it is not possible to draw any conclusions. Out of 60 subjects, 22 were of *Vata-Kapha Prakriti* and 16 were of *Vata-Pitta Prakriti*. *Vibandha* (constipation) is a *Vata-Dosha Pradhana Vyadhi* (main disease), which may be common among people with *Vata*-predominant *Prakriti*.

Table 5. Comparison of Mean Changes in Quality of Life (PAC-QOL) from V1 to V2 (n = 60)

Parameters	Group A				Group B			
	Visit	Mean ± SD	SE	P value	Visit	Mean ± SD	SE	P value
Quality of life	V1	50.6 ± 13.2	2.404	<0.00	V1	49.5 ± 12.4	2.235	0.001
	V2	29.9 ± 10.3	1.886		V2	33.8 ± 11.4	2.083	

SD = Standard deviation; SE = Standard error.

In this study, patients in Group A (Anuloma DS tablet) showed significant improvement in primary and secondary outcome measures compared to Group B (lactitol + ispaghula powder) after 15 days of intervention.

Appetite was improved in 26 subjects of the study group and remained same in 4 subjects. In the control group, appetite improved in 1 subject, but remained same in 29 subjects of the control group. Anuloma DS contains *Agnideepaka* herbs like *Ajamoda*, *Shunti* and *Jeeraka, Katu Rasa, Ushna Veerya*, and *Katu Vipaka*, which help in improving the appetite.

Distention of abdomen was found to be reduced in 28 subjects of study group and 7 subjects in control group after intervention. This can be attributed to the *Vata Anulomana* property of Haritaki, which properly digests the *Mala* and facilitates the passage of *Apana Vata*.

Pain in abdomen was reduced in 21 subjects and remained same in 9 subjects of study group and 9 subjects showed reduced symptoms and remained same in 21 subjects in control group. *Shunti* and *Ajamoda* possess *Shoolaghna* property, which helped reduced the abdominal pain.

Generalized weakness was reduced in 20 subjects and remained same in 10 patients. *Agnideepaka* drugs helped in normalizing the *Agni* thereby facilitating digestion and absorption. This might have helped in reducing the generalized weakness. Reduction in generalized weakness is also attributed to *Yashtimadhu*, which is a *Jeevaniya dravya* having *Balya, Glanihara*, and *Kshayahara* properties.

Headache was reduced in 11 subjects, but remained the same in 19 subjects in Group A. Body ache was reduced in 13 subjects and remained same in 17 subjects. Muscle cramp was reduced in 8 subjects and remained same in 22 subjects.

Consistency of stool was improved in 28 subjects and remained same only in 2 subjects and 8 subjects improved and 22 subjects remained in control group. Haritaki is *Anulomana dravya*, which does the *Malapaka* resulting in improved consistency of stool.

Frequency of stool was improved in 20 subjects and remained same in 10 subjects and 3 subjects showed improvement and 27 subjects remain in control group. Sonamukhi is *Adhoshodhaka* (laxative) dravya and *Saindhava Lavana* is *Vibandha Hara dravya*. Both helped in improving the stool frequency.

Nature of evacuation was improved in 27 subjects and 7 subjects in study and control group, respectively. Feeling after defecation was improved in 29 subjects and 9 subjects in study group and control, respectively. This was due to the improvements observed in appetite, digestion, consistency, and frequency of stool. Ingredients of tablet Anuloma DS were not only effective in facilitating defecation, but also helped in increasing appetite and digestion. This helped in proper absorption, formation and elimination of stools. This was significantly evident in secondary outcome measures such as Constipation Assessment Scale, Patient Assessment Scale of constipation and Quality of Life Scale.

CONCLUSION

Functional constipation refers to a condition where individuals experience hard, infrequent bowel movements that are often difficult or painful to pass. It is not caused by any apparent physical abnormalities or specific diseases; instead, it is diagnosed by ruling out other potential causes. The current study as demonstrated significant improvement in signs and symptom of constipation such as stool consistency and frequency, nature of evacuation, feeling of defecation, reduced appetite, pain and distention of abdomen, general weakness, headache, body ache, and muscle cramps with Anuloma DS tablets compared to the lactitol + ispaghula powder in patients with functional constipation. The improvement observed in PAC-QOL, Constipation Assessment Scale, Patient Assessment Scale show that Anuloma DS was highly effective for the treatment in functional constipation vis-à-vis lactitol + ispaghula powder. It was also safe as no treatment-related adverse effects were reported by any of the study participants. This beneficial effect can be attributed to the synergistic therapeutic action of its constituent herbs.

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