

# Cohort Studies on Potential Use of Homemade Yogurt for Systematic Treatment of Irritable Bowel Syndrome (IBS) for Remission and Cure

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## ABSTRACT

**Introduction:** Irritable Bowel Syndrome is a complex inflammatory disease of gastrointestinal tract affecting quality of life and productivity caused by alteration of the intestinal bacteria resulting in disruption of the Gut Brain Axis. Replenishing the gut microbiota with lactic acid bacteria (LAB) delivered through homemade yogurt is used to achieve remission and complete cure for IBS. Present study aimed to evaluate if homemade yogurts as dietary supplement without changing food habits in patients can provide remission and cure for Irritable Bowel Syndrome (IBS).

**Material and methods:** The background details on occurrence of IBS was collected on sample population (n=10330) from India in the age group of 45 - 90+ years from different distinct regions. Laboratory studies for strain identification, stability and suitability were conducted on yogurt. 150 patients identified were then treated with daily dosage of 24 ounces for a period of 400 days. 189 patients with severe IBS of age group 15 yr to 75 yrs in United States were treated following same protocol. Placebo studies were conducted on n=17 for a period of 400 days where patients were allowed to maintain their routine dietary habits.

**Results:** Yogurt has all desired physicochemical and microbiological characteristics to be used for treating IBS. 91% of the sample population achieved remission within 180+/-20 days and 96.4% achieved complete cure within 300 days. 98.2% of the population achieved remission and complete cure within 400 days in Indian trials. The IBS patients from the United States (n=189) achieved complete cure within 180-200 days. (P<.001)

**Conclusion:** Homemade yogurt has all desired probiotic characteristics and offers remission and complete cure for IBS without any side effects if consumed in sufficient quantities on regular basis.

**Keywords:** Irritable Bowel Syndrome; Probiotics; IBS Remission, IBS, Yogurt, Homemade Yogurt

## INTRODUCTION

Irritable bowel syndrome, or IBS, is a complex inflammatory disease of the gastrointestinal tract characterized by abdominal pain, bloating, distention, diarrhea, constipation, increased gastro-colic reflux, and feeling of incomplete emptying after bowel movement. There are four types of IBS and have been identified and treated based on the symptoms using Rome III criteria for diagnosis. Disruption of the gut brain axis signaling system is considered as the cause of IBS which generally occurs after a gall bladder surgery or intestinal infections due to interaction of intestinal micro biome with immune cells of the intestinal wall.<sup>1</sup>

IBS though not lethal, affects the productivity and quality of life in population across the world and has been subjected to extensive research.<sup>2-5</sup> As per the current estimates ten percentage of the United States population suffers from irritable bowel syndrome where as in agrarian countries like India it is much lesser.

Presently there are no specific treatments available for IBS and symptomatic treatment for pain; diarrhea, constipation, and bloating are provided to the patients. Prior art indicates Antidiarrheals, antidepressants, antispasmodics bulking agents, osmotic laxatives, lubiprostone, linaclotide, Rifaxamine are used to treat IBS. Alternative treatments include use of peppermint and probiotics.<sup>5-7</sup> Probiotic bacteria of the lactobacillus species have been extensively researched due to their ability to multiply and repopulate the gut micro biome as they can withstand the gastric acid and bile juice.<sup>8-15</sup> It gives a direction towards a mechanism to understand ways to replenish abnormal micro biota of the gastrointestinal tract.

Homemade yogurt has been investigated as a permanent cure for IBS as initial trials have indicated its lactic acid bacteria (LAB) population is providing clear benefits in this cohort study. Prior art indicates benefits and suitability of fresh yogurt and its ability to withstand severe acidic conditions of the stomach. It is consumed in different forms with very little known side effects and has been referred in traditional Indian medical systems like Ayurveda for treating lactose intolerance, colon cancer and stomach infections. Metchnikoff was the first to advocate LAB with health and longevity. The concept of probiotic microbes that he introduced has led to the widespread consumption of food preparations with yogurt, with the expectation that they will confer several health benefits such as reduction of cholesterol levels, improvement of immune function,

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resistance to infectious diseases, and prevention of colon cancer.<sup>3</sup> Fermented foods are traditionally used every day in many cultures. There are valid references quoting its origin to Mesopotamian civilization. Yogurt, prepared by fermentation of milk with inoculums of previously made yogurt, is used in most households in India where it constitutes a significant part of the daily diet. The microbiological characteristics and its inherent properties vary from region to region as there is no standardized starter culture.

## MATERIAL AND METHODS

In this study yogurt has been specifically investigated as a cure for IBS. Microbiological characteristics were evaluated to establish the suitability and stability. The study design comprised of a regional sample survey (n=640), extensive survey (n=10330), random patient trial (n=150); confirmatory study (n=189) and placebo (n=17). No regulatory approvals were required for the studies as no medicines or procedures were involved in the trials.

### Experimental

The reagents for the tests were obtained from Sigma Chemical Co., USA, unless otherwise stated. Suitability of yogurt for IBS treatment was evaluated for their suitability, stability and growth characteristics including growth curve, exponential growth phase. Time course studies were undertaken using yogurt as starter culture. All analysis was conducted in triplicate to check the statistical significance. The samples were placed on MRS agar and incubated overnight at 37°C. Microbial colonies that grew out in culture were identified by Gram stain, catalyses test and biochemical characterization. LAB were cultured on Lactobacillus MRS Broth (Himedia, Mumbai, India) for 16 h at 37°C with 10 per cent CO<sub>2</sub> under anaerobic conditions and used for testing. For fermentation of milk the inocula of fresh yogurt were used to seed three 150 ml aliquots of milk at 1 per cent (w/v) concentration. The milk was allowed to ferment for 48 h at room temperature and a 1.5 ml aliquot removed every 4 h for culture and for deoxyribonucleic acid (DNA) isolation. The isolates were screened for attributes such resistance to acid and pepsin, bile salt and pancreatin tolerance, antimicrobial resistance etc. The ability of the isolates to survive in the presence of hydrochloric acid (pH 1.0 and pH 3.0), pepsin (3 mg/ml, pH 2.0), pancreatin (1 mg/ml, pH 8.0) and bile salts (0.3% w/v Ox Gall) was measured.

All the trails and data collection were conducted through well trained primary health workers. 300 of them volunteered in this exercise which lasted over a span of 18months. Considering the cultural, demographic and dietary habits five zones South, North, East, West and Central zone from India, (640 persons) between the age group of 45 -90 years were screened for IBS and tabulated in Tables-1 - 5. Further the study population size was extended to 10330 from these regions and data is shown in Tables - 6-10.

The households chosen either belonged to volunteers or their known families who made yogurt each day at home using a small portion of yogurt to inoculate milk which was then left covered overnight at room temperature. 90% of the people

bought milk obtained from the cooperative society and packaged milk, with total solid fat over 3.5%. Others used the fresh milk available to them either from their own farm or neighborhood stores. For the present study benefits yogurt made from different sources of milk such as cow, buffalo, goat etc were not included nor was any branded yogurt used. The other parameters included were gender, age, any other lifestyle diseases, occurrence of autism in families, occurrence of Parkinson and Dementia. Patients were followed every 2 months for 6months. Daily consumption of yogurt and symptoms were recorded on a self-reported chart. Complete remission was defined as relief of pre-existing IBS symptoms and 1-2 normal formed bowel movements per day. 150 patients were taught to prepare yogurt and advised to consume 24 oz of it along with their regular meal without adding any flavors, salts or fruits for a period of 180days. No medication for IBS was taken by the patients during this period. Similarly 189 patients participated in United States with their prior consent in following all ethical standards through a well documented follow up. Patients were followed every 2 months for 6months. Daily consumption of yogurt and symptoms were recorded on a self-reported chart. Complete remission was defined as relief of pre-existing IBS symptoms and 1-2 normal formed bowel movements per day. 17 of the identified patients were advised to continue with their regular dietary habits which did not include any yogurt to find the placebo effect.

## RESULTS

Laboratory studies on LAB were undertaken on yogurt samples obtained from all regions following the test protocols. The identified species are *Lactobacillus fermentum*, *Lactobacillus fermentum*, *Leuconostoc lactis*, *Lactobacillus acidophilus*, *Lactobacillus acidophilus*, *Lactobacillus delbrueckii ssp. Delbrueckii*, *Lactobacillus acidophilus*, *Lactococcus lactis*, *Lactobacillus confusus*, *Lactobacillus lindneri*, *Lactobacillus fermentum*, *Leuconostoc mesenteroides ssp. Cremoris*, *Lactobacillus helveticus*, *Lactobacillus delbrueckii ssp. Lactis*, *Lactobacillus delbrueckii ssp. Bulgaricus*, and Yeast. The yogurt used in the studies were prepared by the families keeping in mind that it can be done regularly by patients

Region	Age Group	Male	Female	Total	IBS
South	45-50	6	6	12	0
	51-55	13	12	25	
	56-60	9	7	16	1
	61-65	11	9	20	
	66-70	8	7	15	2
	71-75	11	7	18	
	76-80	10	7	17	
	81-85	6	5	11	1
	86-90	3	1	4	
	90+	2	1	3	
		79	62	141	4

**Table-1:** Preliminary Data collected from Southern Region of India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS
North	45-50	10	8	18	0
	51-55	7	6	13	
	56-60	5	6	11	
	61-65	4	4	8	
	66-70	6	8	14	
	71-75	16	18	34	1
	76-80	11	10	21	
	81-85	9	9	18	
	86-90	10	7	17	
	90+	5	1	6	
		83	77	160	1

**Table-2:** Preliminary data collected from Northern Region India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS
West	45-50	6	8	14	0
	51-55	6	6	12	1
	56-60	5	6	11	
	61-65	3	4	7	1
	66-70	6	8	14	
	71-75	9	11	20	1
	76-80	11	10	21	
	81-85	5	1	6	
	86-90	10	7	17	
	90+	3	0	3	
		64	61	125	3

**Table-4:** Preliminary data collected from Western Region India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS
East	45-50	6	8	14	0
	51-55	5	4	9	
	56-60	7	9	16	1
	61-65	11	9	20	
	66-70	5	6	11	
	71-75	8	8	16	1
	76-80	4	4	8	
	81-85	6	3	9	
	86-90	3	3	6	
	90+	1	1	2	
		56	55	111	2

**Table-3:** Preliminary data collected from Eastern Region India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS
Central	45-50	8	4	12	0
	51-55	3	3	6	
	56-60	5	3	8	
	61-65	7	7	14	
	66-70	9	6	15	
	71-75	13	11	24	1
	76-80	6	2	8	
	81-85	6	2	8	
	86-90	5	1	6	
	90+	1	1	2	
		63	40	103	1

**Table-5:** Preliminary data collected from Central Region India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS M	IBS F	Total
North	45-50	186	163	349	1	1	2
	51-55	118	122	240	1	2	3
	56-60	149	144	293	0	1	1
	61-65	152	165	317	0	0	0
	66-70	83	61	144	1	0	1
	71-75	59	69	128	0	0	0
	76-80	91	107	198	0	0	0
	81-85	87	74	161	0	0	0
	86-90	83	61	144	0	0	0
	90+	17	11	28	0	0	0
		1025	977	2002	3	4	7

**Table-6:** Data Collected from Northern India (second phase) in age group 45-90yrs showing IBS profile in Male/Female population.

themselves and strains used for inoculation were native to the region. Preliminary studies on 640 people from 5 regions belonging to different age groups gave an indication that people who had regular consumption of yogurt had relatively low occurrence of IBS, though there were no evidence of correlation with other lifestyle diseases. (Table 1-5). This was further verified on sample population n=10330 and found that 1.62% had reported IBS occurrence. Northern region had shown 0.35% population suffering from IBS

while southern region has high of 2.6% followed by west, east and central region (Table 6-10). The study conducted in United States with 189 patients was very significant and P values were about 0.001. All the 189 patients responded positively and achieved remission within 180 days. Thereafter dosages were adjusted to 8 ounces per day. 10 patients from the available pool of 189 opted to stay out of the trials. On logistic regression analysis, duration of yogurt consumption for at least 6 months was associated

Region	Age Group	Male	Female	Total	IBS M	IBS F	Total
West	45-50	151	121	272	3	1	4
	51-55	155	133	288	1	1	2
	56-60	108	99	207	1	2	3
	61-65	106	100	206	4	8	12
	66-70	111	82	193	6	2	8
	71-75	117	89	206	3	1	4
	76-80	101	83	184	3	0	3
	81-85	114	103	217	2	2	4
	86-90	54	51	105	0	1	1
	90+	19	6	25	0	0	0
		1036	867	1903	23	18	41

**Table-7:** Data Collected from Western India (second phase) in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS M	IBS F	Total
East	45-50	108	121	229	4	1	5
	51-55	116	98	214	1	1	2
	56-60	97	103	200	1	1	2
	61-65	106	100	206	2	2	4
	66-70	109	91	200	1	2	3
	71-75	99	76	175	3	1	4
	76-80	110	95	205	3	1	4
	81-85	91	107	198	2	2	4
	86-90	88	42	130	0	1	1
	90+	21	20	41	0	0	0
		945	853	1798	17	12	29

**Table-8:** Data Collected from Eastern India (second phase) in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS M	IBS F	Total
South	45-50	231	180	411	3	1	4
	51-55	166	128	294	1	2	3
	56-60	100	109	209	5	2	7
	61-65	144	165	309	4	7	11
	66-70	89	69	158	9	5	14
	71-75	107	98	205	3	1	4
	76-80	141	101	242	7	4	11
	81-85	93	67	160	2	2	4
	86-90	112	80	192	0	1	1
	90+	14	9	23	0	0	0
		1197	1006	2203	34	25	59

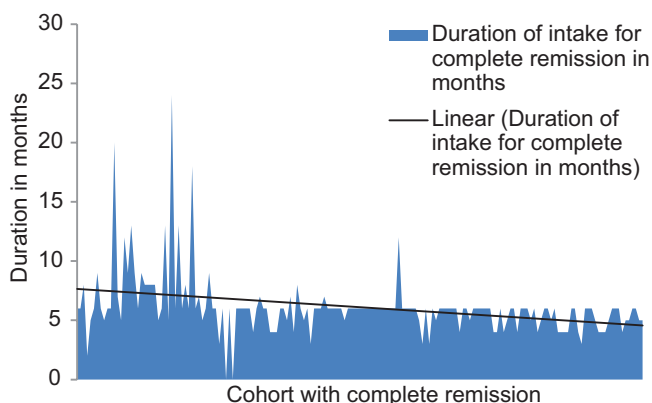
**Table-9:** Data Collected from Southern India (second phase) in age group 45-90yrs showing IBS profile in Male/Female population.

Region	Age Group	Male	Female	Total	IBS M	IBS F	Total
Central	45-50	181	184	365	2	1	3
	51-55	105	111	216	2	1	3
	56-60	178	181	359	1	2	3
	61-65	191	188	379	3	2	5
	66-70	100	69	169	3	2	5
	71-75	157	155	312	1	1	2
	76-80	115	111	226	4	2	6
	81-85	137	136	273	2	1	3
	86-90	58	51	109	0	1	1
	90+	10	6	16	0	0	0
		1232	1192	2424	18	13	31

**Table-10:** Data Collected from Central India (second phase) India in age group 45-90yrs showing IBS profile in Male/Female population.

Region	M	F	Total	180-200	201-360	360+	Total
South	32	21	53	48	51	52	52
East	17	12	29	26	28	28	28
West	23	18	41	37	40	40	40
North	3	4	7	6	7	7	7
Central	11	9	20	18	19	20	20
			150	137	145	147	147

**Table-11:** Data on remission/Cure from various regions on treatment with YOGURT of 24oz daily dosage.



**Figure-1:** Correlation between duration of homemade yogurt and patient reported complete symptom relief

with complete remission (95% CI: 5.69 - 6.51, (Figure1).

## DISCUSSION

There were no variations in the profile of LAB in samples obtained from different regions of India. Lactobacillus formed the major microbial population. People from each of the region had shown varied levels of consumption. Southern region average consumption per day was 1 oz and mostly they consumed it in diluted form as buttermilk along with rice as their staple food. 2.6% of the population has reported IBS during the study. Higher occurrence of IBS in this region could be attributed to the lower consumption along with less fibrous food. Western region had an average consumption of 1.5 oz and IBS occurrence of 2.1%. Though the region consumes large quantity, the higher recurrence can be attributed to the way the yogurt is being consumed. The yogurt preparation in Western region includes heating and addition of Turmeric and gram flour. In Eastern region, daily consumption was about 1.1 and IBS recurrence stood at 2.1%. Though they have culturally similar to that of certain segments of south, their meal had concentrated yogurt and has taken well along with both vegetarian and non vegetarian meal. The Central region of India, which has an average daily consumption of 0.5 oz and IBS recurrence in 1.3% of the population. The yogurt is consumed in raw form and in most cases within 48h of preparation. Northern part of India average daily consumption was about 2-3 oz and IBS of 0.35% in the population studied. In this region the meal included large quantities of fibrous food and protein and other dairy products. Across the region, patients reported remission in 180-200 days and have control over IBS once remission was achieved by consuming 8-10 oz of yogurt (Table-11). During the study diabetic people

were also monitored for increased sugar levels. There was no significant increase in blood sugar levels in the patients who had opted for the study. Data collected (n=10330) from the regions indicated lesser incidences of autism, dementia, Parkinson's in aged population which maintained regular consumption. However no clinical conclusions could be established as scope of present study was limited to IBS.

From the Table 11, it is evident that 91% of the patients studied achieved remission when yogurt was consumed for 180 – 200 days at a 24 oz daily without changing their other dietary habits. 96.4% of the population had achieved comfortable control within 360 days of regular consumption. 98.2% achieved complete remission and cure within 400 days of treatment. About 1.8% of the population could not maintain the regular consumption pattern due to personal reasons.

The study confirms that administering LAB with same characteristics over a period of time had helped replenishing the microbiota of the gut leading to cure IBS. Homemade yogurt can be used as a probiotics to provide an easy, affordable, established medium with nutritional benefits for patients suffering from all kinds of IBS.

## CONCLUSION

The study concludes that yogurt is an affordable, safe, dietary supplement and best probiotic with several health benefits and it can cure which is an incurable disease as of now.

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