

# Anorectal Manometry Profile among Patients with Chronic Constipation and Faecal Incontinence in Western India: A Retrospective Study

SHANKAR LAL JAT<sup>1</sup>, PRATIBHA MAAN<sup>2</sup>, UTKARSH SHARMA<sup>3</sup>, VIVEK MOHAN SHARMA<sup>4</sup>, AMIT MATHUR<sup>5</sup>, URVASHI VIJAY<sup>6</sup>, NIDHI V SHIHORA<sup>7</sup>



## ABSTRACT

**Introduction:** About 50% of patients referred to tertiary care centre for constipation in the western countries have faecal evacuation disorder. A diagnosis of faecal evacuation disorder requires specialised investigations such as anorectal manometry. Anorectal manometry is a method to measure pressure exerted by the muscles in anus and rectum.

**Aim:** To evaluate the characteristics of anorectal pressure in a cohort of western Indian patients with chronic constipation and faecal incontinence. Also, to evaluate the types of faecal evacuation disorders in patients with chronic constipation.

**Materials and Methods:** The present retrospective study was conducted from January 2020 to May 2022 at Department of Gastroenterology, National Institute of Medical College and Research, Jaipur, India. Total of 115 patients who presented with chronic constipation and faecal incontinence were included in the study. Sigmoidoscopy or full-length colonoscopy, Balloon

Expulsion Test (BET) and anorectal manometry test were done in all the patients. Mean resting and squeeze pressure were measured by anorectal manometry. Continuous variables were summarised using means and standard deviations for normally distributed data. Statistical analysis was performed using Statistical Package for Social Sciences software (SPSS) version 20.0 (IBM Corp, Armonk, NY, USA).

**Results:** Among 115, 62 were (53.9%) males and 53 (46.1%) females with mean age  $51.9 \pm 16.2$  years. In High Resolution Anorectal Manometry (HRAM), the mean resting anal pressure was  $67.2 \pm 34.24$  mmHg (range 14-183 mmHg) and mean squeeze pressure was  $113.4 \pm 60.9$  mmHg (range 30-290 mmHg). In present study type I dyssynergic defecations was most common with 20 (17.4%) patients.

**Conclusion:** The present study showed that almost half of the patients had defecation disorders and type I dyssynergic defecations was most common, followed by type IV.

**Keywords:** Balloon expulsion test, Dyssynergic defecation, Solitary rectal ulcer syndrome

## INTRODUCTION

Anorectum has an important role in regulation of defecation and in maintenance of continence [1]. During defecation either incomplete relaxation or paradoxical contractions of pelvic floor muscles are considered as dyssynergic defecation [2]. In various community-based surveys chronic constipation was reported between 12% to 30% [3,4]. Prevalence of constipation is 14-29 % in adults of the western countries [5,6]. About 50% of patients referred to tertiary care centre for constipation in the west have faecal evacuation disorders [7,8].

A study by Rajput M and Saini SK from North India showed prevalence of self-reported constipation within 1 year was 24.8%. This study also showed prevalence of constipation was more in female and non working [9]. A study by Bajjal R and Jain M from India in 178 chronic constipation patients showed half of the patients of chronic constipation had normal study while 47% patient had pelvic floor dyssynergia [10]. A study by Ghoshal UC et al., in 249 chronic constipation found 86 patients (34%) had faecal evacuation disorder [11].

A diagnosis of defecatory dyssynergia requires specialised investigations such as anorectal manometry, Balloon Expulsion Test (BET), defecography. BET is used as screening test. High Resolution Anorectal Manometry (HRAM) is considered a first line diagnostic tool for diagnosis and subtyping of chronic constipation and defecatory disorders [12-14]. HRAM test is used in diagnosis of chronic constipation, faecal incontinence, anal sphincter tone and pelvic floor dyssynergia. Clinical data on

HRAM used in constipation patients from the Asian countries are limited [12].

Hence, this present study was done because the data is not available about western India in literature as per the best knowledge of authors. This will help in better understanding and may improve the treatment protocol in routine clinical practice and will also allow to understand the details. The present study aimed to evaluate the characteristics of anorectal pressure in a cohort of western Indian patients with chronic constipation.

## MATERIALS AND METHODS

In this retrospective study, data were collected from January 2020 to March 2022 and were analysed from April 2022 to May 2022 at Department of Gastroenterology, National Institute of Medical College and Research, Jaipur, Rajasthan, India. This study was approved by the Institutional Ethical Committee (IEC-NO NIMSUNI/IEC218/22) and informed consent was taken.

**Inclusion criteria:** Patients with chronic constipation diagnosed according to the Rome IV Criteria [15] and with faecal incontinence were included in study.

**Exclusion criteria:** Patients with history of prior anorectal surgery, inflammatory bowel disease or anorectal malignancy were excluded from study.

**Sample size calculation:** Sample size was calculated at 80% study power and  $\alpha$  error of 0.05 by using statcalc of Epi info 7 software. Final calculated sample size was 113, hence for the present study 115 patients were included.

## Procedure

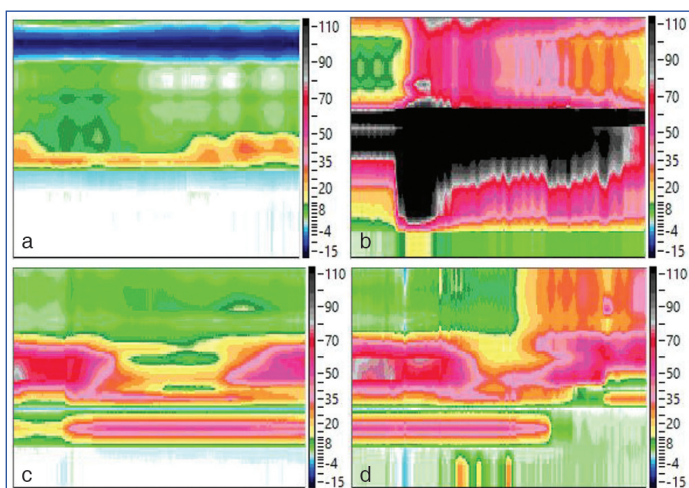
Baseline characteristics (e.g. age, gender), relevant clinical and laboratory data (duration of symptoms, presence of pain abdomen, feeling of incomplete evacuation, history of digital evacuation, history of enema, painful evacuation efforts, history of bleeding per rectum) were taken from all patients. All patients underwent flexible sigmoidoscopy or full-length colonoscopy either in the study centre or elsewhere to rule out colonic malignancy, ulcerative colitis and rectal ulcerations. Mean resting and squeeze anal pressure was measured in all the patients.

**Balloon Expulsion Test (BET):** BET was done in all patients. For BET, a latex balloon was tied on tip of manometry catheter. Balloon was filled with 50 mL water, the patient was asked to evacuate, if patient was unable to evacuate in one-two minutes, then gradually increase in weight at another end of catheter to support evacuation (maximum weight up to 200 g) was done. A normal person is able to expel the balloon (condom) without addition or at most 200 g added weight. If patient was unable to evacuate despite 200 g weight, then was considered as abnormal BET [13,14].

During balloon inflation, balloon was inflated with 60 mL air and recto-anal inhibitory reflux was checked whether present or absent. The patient was also asked to report about feel for the first-time sensation, urge or desire to defecate and at that point maximum tolerable limit was measured. Anorectal Manometry (ARM) signal was analysed by using Trace 2.1 software from G S Hebbard (Australia).

## High Resolution Anorectal Manometry Procedure (HRAM):

Anorectal manometry was performed in all patients by using The Royal Melbourne Hospital High Resolution Manometry and 16 channel water perfusion system. An anorectal manometry catheter was of 4.2 mm in diameter and 16 radial ports. A latex balloon was tied at tip of manometry catheter, was used for BET and rectal sensory testing. No bowel preparation was given and all patients were studied in left lateral position with knee and hips flexed. Resting, squeeze and bear down was explained to patient before catheter was inserted into anorectum. Manometry catheter was inserted deep inside the rectum and then it was pulled slowly till it was positioned in sphincter zone which is high pressure and it should be in middle, low-pressure area of rectum and exterior above and below that high pressure zone [Table/Fig-1a-d]. Length of high-pressure zone and basal anal sphincter pressure was measured. All maneuvers were performed in accordance to published international minimal standards using a previously published protocol [15,16]. After five minutes of rest to make patient comfortable, the resting or basal anal pressure (denotes internal anal sphincter activity) was measured, the patient was asked to squeeze the sphincter (denotes external anal sphincter activity) and squeeze sphincter pressure was measured. The patient was asked to bear down as done during defecation.



**[Table/Fig-1]:** High Resolution manometry; a) Decreased anal or resting anal pressure (24 mmHg); b) Normal squeeze anal pressure; c) Recto-Anal Inhibitory Reflux (RAIR) present; d) Type IV dyssynergia, inadequate intra-recta pressure and incomplete anal relaxation.

Defecation disorder was classified into Rao's types [16,17] [Table/Fig-2]. Both intra-rectal and intra-anal pressure were measured by anorectal manometry during BET.

Type	Description
Normal	An adequate increase in rectal pressure ( $\geq 40$ mmHg) accompanied by a simultaneous reduction in anal pressure
Type I	An increased intra-rectal pressure ( $\geq 40$ mmHg) with a paradoxical increase in the intra-anal pressure
Type II	An inadequate increase in rectal pressure of ( $\leq 40$ mmHg, poor propulsive force) and paradoxical simultaneous increase anal pressure
Type III	An increase in rectal pressure ( $\geq 40$ mmHg) and failure of reduction in anal pressure ( $\leq 20\%$ baseline pressure)
Type IV	An inadequate increase in rectal pressure of ( $\leq 40$ mmHg, poor propulsive force) and failure of reduction in anal pressure ( $\leq 20\%$ baseline pressure)

**[Table/Fig-2]:** Rao's classification of defecation disorder [16,17].

**Analysis of manometry signal:** ARM signal was analysed by using Trace 2.1 software from G S Hebbard (Australia). According to standard criteria, a resting anal pressure more than 68 mmHg, squeeze pressure more than 164 mmHg and length of anal high pressure zone (denotes sphincter) more than 3.6 cm in female and more 4 cm in male were considered abnormal. Threshold volume for first sensation at  $>20$  mL in both gender, an urge to defecate at  $>80$  mL in male and  $>60$  mL in female and maximum tolerable volume of  $>126$  mL were taken as abnormal (high) [10,17-19].

## STATISTICAL ANALYSIS

Continuous variables were summarised using means and standard deviations for normally distributed data. Pearson's correlation test used to analyse the data. The medians and inter-quartile ranges were used to describe non nominal data. Statistical analysis was performed using SPSS version 20.0 (IBM Corp, Armonk, NY, USA). A p-value  $<0.05$  was considered significant.

## RESULTS

A total 115 patients underwent anorectal manometry during the study period. Mean age of patients was  $51.9 \pm 16.2$  years (range, 15-76 years). The cohort included 62 (53.9%) males and 53 (46.1%) females [Table/Fig-3].

Parameters	Values	
	Mean $\pm$ SD	Range
Age (in years)	$51.9 \pm 16.2$	15-76
Duration of symptoms (in months)	$13.5 \pm 2.1$	3 months-3.5 years
<b>Gender</b>	<b>(n,%)</b>	
Male	62 (53.9%)	
Female	53 (46.1%)	
Pain abdomen	12 (10.4%)	
Feeling of incomplete evacuation	23 (20%)	
History of digital evacuation	9 (7.8%)	
History of enema	7 (6.1%)	
Painful evacuation efforts	11 (9.5%)	

**[Table/Fig-3]:** Demographic characteristics of patients (N=115).

Indications of anorectal manometry was chronic constipation in 68 (59.1%), faecal incontinence in 36 (31.3%) and bleeding per rectum in 11 (9.6%) patients [Table/Fig-3,4]. Sigmoidoscopy was normal in 86 (74.8%) patients, Solitary Rectal Ulcer Syndrome (SRUS) in 23 (20%) and rectal ulcerations in 6 (5.2%) patients [Table/Fig-4].

In HRAM, the mean resting anal pressure was  $67.2 \pm 34.24$  mmHg (range 14-183 mmHg). Mean squeeze pressure was  $113.4 \pm 60.9$  mmHg (range 30-290 mmHg). High Pressure Zone (HPZ) length was  $3.2 \pm 1.0$  cm. Mean volume of first sensation was 40 mL, mean volume for urgency was 75 mL and maximum tolerable volume was 125 mL [Table/Fig-5].

Indications	n (%)
Constipation	68 (59.1%)
Bleeding per rectum	11 (9.6%)
Faecal incontinence	36 (31.3%)
<b>Sigmoidoscopic findings</b>	
Normal	86 (74.8%)
SRUS	23 (20%)
Rectal ulcerations	6 (5.2%)

**[Table/Fig-4]:** Indications for anorectal manometry and sigmoidoscopic findings in study patients.

SRUS: Solitary rectal ulcer syndrome

Variables	Value
Maximum resting pressure (mmHg)	183
Mean resting pressure (mmHg)	67.2±34.24
Maximum squeeze pressure (mmHg)	290
Mean squeeze pressure (mmHg)	113.34±60.90
High pressure zone (HPZ) length (in cm)	3.2±1.0
Duration of sustained squeeze (in seconds)	15.6±6.0
Mean volume of first sensation (in mL)	40
Mean volume for urgency (in mL)	75
Maximum tolerable volume (in mL)	125

**[Table/Fig-5]:** Characteristics of anorectal pressure in patients with chronic constipation and faecal incontinence (N=115).

In attempted defecation, anorectal manometry was normal in 32 (27.8%) patients and abnormal anorectal manometry was present in 83 (72.2%) patients. Type I was the most common 20 (17.4%) present on HRAM according to Rao's classification followed by type IV in 16 (13.9%), type II in 14 (12.2%) and type III in 3 (2.6%) patients [Table/Fig-6].

Line-plot patterns	n (%)
Normal	32 (27.8%)
Abnormal	83 (72.2%)
Type I	20 (17.4%)
Type II	14 (12.2%)
Type III	03 (2.6%)
Type IV	16 (13.9%)
Weak anal sphincter	30 (26.1%)

**[Table/Fig-6]:** Distribution of dyssynergic pattern and faecal incontinence in study population.

BET were abnormal in 53 (46.1%) patients in which faecal evacuation disorders were present while rest 62 (53.9%) patients were normal. Recto-Anal Inhibitory Reflux (RAIR) was present in all patients. Weak anal sphincter was present in 30 (26.1%) patients. Rectal ulcerations and SRUS were more common in defecatory disorder. SRUS and rectal ulcerations were significantly positive correlations with defecatory disorder (correlation coefficient,  $r=0.41$ ,  $p$ -value  $<0.001$  and  $r=0.25$ ,  $p$ -value  $=0.006$  respectively).

## DISCUSSION

The present study showed that in 83 (72.2%) patients with chronic constipation had abnormal anorectal manometry. Out of these abnormal manometry, type I dyssynergia was the most commonly present on anorectal manometry according to Rao's classification followed by type IV, type II and least was type III. Weak anal sphincter was present in almost 1/3<sup>rd</sup> patients presented for anorectal manometry in present study.

Prevalence of defecation disorders in patients with chronic constipation is 10-30% depending on patient population [3,4]. Prevalence of constipation is 14-29% of adults in the western countries [5,6]. A study by Rajput M and Saini SK showed

prevalence of 24.8% in constipation and was significantly more frequent in females than in males (20% vs. 13%) and in non working population than in working population (20% vs. 12%) [9]. A study by Bajjal R and Jain M that 47% patient had pelvic floor dyssynergia [10]. It is important to diagnose defecatory disorder patient with chronic constipation because these patient responds by anorectal biofeedback therapy. HRAM is a gold standard test to diagnosed defecatory disorders. A study from Surrenti E et al., showed pelvic floor dysfunction as most common cause of severe constipation among the 70 patients presenting to tertiary referral motility clinic, further slow transit constipation and irritable bowel syndrome occurred equally [20]. Defecatory disorders is a common cause of chronic constipation in tertiary care practice in the west [21]. Ghoshal UC et al., showed that 86 patients (34%) had faecal evacuation disorder [11].

Another study from India by Bajjal R and Jain M in 178 patients presenting with anorectal disorders showed faecal incontinence in 11 (6.7%), dyssynergic defecation in 104 (58.4%), Irritable Bowel Syndrome (IBS) type constipation in 53 (29.7%), Hirschsprung's disease 4 (2.24%) and IBS with pain 4 (2.24%) patients [10]. In a study Gonlachanvit S and Patcharatrakul T, 103 patients of chronic constipation from Thailand, 40% had faecal evacuation disorder and 11% also had associated slow transit constipation [22]. In current study, type I dyssynergic defecations is most common 20 (17.4%) followed by type IV in 16 (13.9%), type II in 14 (12.2%) and type III in 3 (2.6%) patients. These findings were supported by study published in Zhao Y et al., from China in 82 chronic constipation patients. In this study type I was the most common ( $n=24$ ) presented on HRAM according to Rao classification's, followed by type IV ( $n=13$ ), type II ( $n=12$ ) and type III ( $n=11$ ) [23]. SRUS and rectal ulcerations were significantly positive correlations with defecatory disorder (correlation coefficient,  $r=0.41$ ,  $p$ -value  $<0.001$  and  $r=0.25$ ,  $p$ -value  $=0.006$  respectively). Present result supported by a study by Ghoshal UC et al., SRUS patients more often 17/40 (43%) had defecation disorder as compare to healthy [11]. Patient with SRUS with abnormal BET had thicker internal anal sphincter [24].

In a population study from Turkey in 4002 subjects, 67.5% patients had pelvic floor disorders including faecal incontinence, constipation and faecal evacuation disorder [25]. The present study showed that in 83 (72.2%) patients had abnormal anorectal manometry and almost half (46%) patients had defecatory disorders.

## Limitation(s)

This study is important in clinical perspective but has a few limitations such as retrospective design, did not include healthy subjects for HRAM test as a control group. BET in left lateral position has been thought to be non physiological as compare to that in seated position. Another limitation of our study is lack of data on defecatory index in all the patients.

## CONCLUSION(S)

The present study showed that almost half (46%) patients had defecation disorders and type I dyssynergia was most common. Rectal ulcerations and SRUS were more common in patients with defecatory disorders. Type of dyssynergia is helpful for treatment because these patients respond to biofeedback therapy along with laxatives. More prospective studies are needed on this issue.

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**PARTICULARS OF CONTRIBUTORS:**

1. Associate Professor, Department of Gastroenterology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India.
2. Assistant Professor, Department of Pathology, SMS Medical College and Attached Hospitals, Jaipur, Rajasthan, India.
3. Consultant Pathology, Department of Pathology, Dr. B Lal Institute, Jaipur, Rajasthan, India.
4. Senior Resident, Department of Gastroenterology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India.
5. Professor and Head, Department of Gastroenterology, National Institute of Medical Sciences and Research, Jaipur, Rajasthan, India.
6. Research Scientist, Department of Multidisciplinary Research Unit, SMS Medical College and Attached Hospitals, Jaipur, Rajasthan, India.
7. Senior Resident, Department of Pathology, SMS Medical College and Attached Hospitals, Jaipur, Rajasthan, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Shankar Lal Jat,  
10A, North Part, Nemi Nagar Vistar, Vaishali Nagar, Jaipur, Rajasthan, India.  
E-mail: drshankar02@gmail.com

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