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## Colonic Transit Time Evaluation in Patients with Functional Constipation

Masoud Taheri<sup>1</sup>-Rahmatollah Rafiei<sup>2</sup>✉- Zahra Torabi<sup>3</sup>-Ali Toghiani<sup>4</sup>- Sina Taherzadeh<sup>4</sup>

<sup>1</sup> Associate Professor, Department of Radiology, Islamic Azad University, Najafabad Branch, Najafabad, Isfahan, Iran

<sup>2</sup> Associate Professor, Department of Internal Medicine, Islamic Azad University, Najafabad Branch, Najafabad, Isfahan, Iran

<sup>3</sup> Researcher, Isfahan University of Medical sciences, Isfahan, Iran

<sup>4</sup> Student Research Committee, Islamic Azad University, Najafabad Branch, Najafabad, Isfahan, Iran

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### Abstract

**Introduction:** Functional constipation is one of the most common gastrointestinal symptoms which could affect patients' quality of life. The colonic transit time test could be used for determining functional constipation subtypes. The aim of our study was to determine the abnormalities of the subtypes of functional constipation using CTT. **Methods and Materials:** This cross-sectional study was performed on 85 patients in 2011 in Shariaty Hospital, Isfahan. All the patients received 60 radio-opaque markers, and they underwent radiological evaluation 5 days afterwards. Functional constipation was determined according to the distribution of the markers in the colon. **Result:** The samples consisted of 24 males and 61 females at a mean age of  $42.7 \pm 16.28$  years. The colonic transit time results showed that 71 patients had normal transit time, 6 had a composite type, 5 had slow transit, and 3 had pelvic delay. There was no significant difference between sex and colon transit time types ( $P$  value = 0.32). The mean colon transit time in our study was  $51.8 \pm 16.3$  hours. **Conclusion:** Functional constipation patients should undergo CTT, especially those who use maneuvers for defecation and those who need more time for defecation. [GMJ. 2012;1(2):48-52]

**Keywords:** Constipation; Colonic Diseases; Functional; Gastrointestinal Transit

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### Introduction

Constipation is one of the most common gastrointestinal complaints. Many etiologies have thus far been reported for constipation such as neurogenic disorders (diabetes mellitus, multiple sclerosis, Parkinson's disease) and non-neurogenic disorders (hypothyroidism, hypokalemia, panhypopituitarism, pregnancy). Moreover, there are some drugs

which can cause constipation such as anticholinergics (antidepressants, antipsychotics), cation-containing agents (iron supplements, antacids, sucralfate), neurally active agents (opiates, antihypertensives, 5HT<sub>3</sub> antagonists, calcium channel blockers)<sup>(1)</sup>. Functional gastrointestinal disorders (FGID) are among the most common gastrointestinal disorders, and constipation is among the most common complaints. Diagnosis is based on the ROME

III criteria. According to the ROME III diagnostic criteria, patients must meet a minimum two of these sign and symptoms: A) straining during at least 25% of defecations; B) lumpy or hard stool at least 25% of defecations; C) sensation of anorectal obstruction/blockage at least 25% of defecations; and D) manual maneuvers to facilitate at least 25% of defecations (e.g., digital evacuation, support of the pelvic floor) or patients with fewer than 3 defecations per week. These criteria should be fulfilled for the last 3 months and symptoms must begin in at least 6 months prior to diagnosis. Additionally, irritable bowel syndrome should be rolled out<sup>(2)</sup>. The pathology and etiology of functional constipation is still unknown. Nevertheless, there are some hypotheses such as rectal dynamics and paresthesia in the brain-gut axis<sup>(3,4)</sup>.

There are many reports about the prevalence of functional constipation, the rate of which varies between 2- 27% in the general population<sup>(5)</sup>.

The colonic transit time test (CTT) is a radiological test for determining functional constipation subtypes. In the CTT, radio-opaque markers are used to determine normal transit, pelvic delay, composite, and slow transit types<sup>(6)</sup>. Many studies have been conducted on the colonic transit time in different countries, but the results are conflicting<sup>(7-10)</sup>. The aim of our study was to determine the abnormalities of the subtypes of functional constipation using the CTT. To our knowledge, little information is available about the subtypes of idiopathic constipation in Iran.

## Material and Methods

This was a cross-sectional study performed on patients with functional constipation in Shariaty Hospital, Isfahan, between March and November 2011. All the participants were evaluated by a gastroenterologist, and the ROME III criteria were employed for functional constipation diagnosis.

The patients' information and symptoms were collected using a questionnaire, which was based on the ROME III criteria. Adibi et al.<sup>(11)</sup> in 2010 reported that the sensitivity of the Farsi version of the questionnaire was 90.5%

with a Cronbach's alpha of 0.68.

This questionnaire contains questions about straining during defecation, lumpy or hard stool, sensation of anorectal obstruction/blockage during defecation, using manual maneuvers to facilitate defecations (e.g., digital evacuation, support of the pelvic floor), number of defecation per week and intervals, time needed for defecation, and disease duration.

Our study population consisted of adults over 19 years of age diagnosed with functional constipation. Patients who had malignancy or any other disease which could cause constipation, as well as those who had addiction or were using medications which could cause constipation such as opiates, antihypertensives, 5HT3 antagonists, calcium channel blockers, antispasmodics, antipsychotics, and antacids were excluded. Informed consent was obtained from all the patients.

The CTT was described by Abrahamsson et al.<sup>(12)</sup> Sixty sterilized radio-opaque markers made from angiography wires were used as markers. The length of the markers varied between 2 and 5 mm. These markers were placed in three capsules, with each capsule containing 20 markers. In order to conduct the CTT, the five-day method was chosen. All the 60 markers (3 capsules) were given to the patients on the first day, and abdominal X-rays were planned for 5 days after marker ingestion. All the participants were instructed by a radiologist not to take any medication or laxatives which could affect gut motility.

Each CTT radiograph divided into three areas. Right colon, left colon and rectosigmoid colon. Normal transit is defined when 80% of markers were passed, Slow transit is when we detect 20% of markers in ascending and descending colon, pelvic delay is defined when 20% of markers were detect in rectosigmoid and combine type is defined when 20% of markers are distributed in colon.

The data was recorded by a brief questionnaire entered to a computer data base.

Data was analyzed by Statistical Package for the Social Sciences version 14.0 (SPSS Inc., Chicago, IL).

Statistical procedure was done by Statistical Program for Social Sciences software (SPSS) version 18. ANOVA and Chi-Square tests

were used for data analyses. The significance level (P) was set at 0.05. This study was approved by research committee of Islamic Azad University, Najafabad Branch.

## Results

The study population consisted of 85 patients, 24 (28.2%) male and 61 (71.8%) female, at a mean age of  $42.7 \pm 16.28$  years (range =6-66 years). The mean age was  $39.5 \pm 17.78$  years in the normal transit time group,  $42.1 \pm 15.43$  years in the composite group,  $33.6 \pm 11.53$  years in the slow transit group, and  $42.6 \pm 14.93$  years in the pelvic delay group.

The CTT results showed that 71 patients had a normal transit time (19 males and 52 females), 6 (3 males) had a composite type, 5 (1 male and 4 females) had a slow transit time, and 3 (1 male and 2 females) had pelvic delay. The chi-square test demonstrated no significant difference between sex and the colon transit time types (P value =0.32).

The mean duration of functional constipation was 5.1 years (range =1-20 years). The mean colon transit time was  $51.8 \pm 16.3$  hours: the mean colon transit time in the normal CTT group was  $43.12 \pm 10.73$  hours; the mean CTT in the composite type group was  $53.84 \pm 13.43$  hours; the mean CTT in the pelvic delay group was  $62.31 \pm 12.98$  hours; and the mean CTT in the slow transit group was  $42.58 \pm 13.02$  hours. There was no significant difference between the groups in terms of CTT (P value =0.427).

Disease duration was  $5.22 \pm 2.72$  years in the patients who had a normal CTT,  $3.6 \pm 1.48$  years in the composite group,  $4.6 \pm 2.36$  years in the slow transit group, and  $5.6 \pm 3.12$  years in the pelvic delay group. The ANOVA test showed that there was no statistical difference between the groups (P value =0.88)

Defecation intervals were  $3.57 \pm 1.68$  days in the patients with a normal CTT,  $5.5 \pm 2.78$  days in the composite group,  $2.6 \pm 1.21$  days in the slow transit group, and  $6.33 \pm 3.32$  years in the pelvic delay group. The ANOVA test showed that there was a statistical difference between the groups (P value =0.01)

The mean time that the patients needed for

defecation was  $12.7 \pm 8.73$  minutes in the patients with a normal CTT,  $20.23 \pm 11.06$  minutes in the composite group,  $15.12 \pm 7.53$  minutes in the slow transit group, and  $18.33 \pm 10.87$  minutes in the pelvic delay group, with the ANOVA test revealing a statistically significant difference between the groups (P value =0.008) Twelve subjects in the normal CTT group, 3 in the composite group, 2 in the slow transit group, and one in the pelvic delay group used maneuvers (pushing on or around the bottom) for defecation. The chi-square test showed that there was no statistical difference between normal and abnormal CTT groups (P value =0.165) Hard and lumpy stool was seen in 61 patients in the normal CTT group, 5 in the composite group, 4 in the slow transit group, and 3 in the pelvic delay group. The chi-square test demonstrated that there was no statistical difference between the normal and abnormal CTT groups (P value =0.881)

Having a sensation that the stool could not be passed was reported by 38 patients of the normal CTT group, 3 of the composite group, 3 of the slow transit group, and 3 of the pelvic delay group, and the chi-square test showed no statistical difference between the normal and abnormal CTT groups (P value =0.452).

The results are summarized in Table 1.

## Discussion

This study was designed to determine the CTT in patients diagnosed with functional constipation. According to the results of the CTT, the patients were divided into four groups: normal CTT; pelvic delay; slow transit; and composite type. The study population comprised 85 patients at a mean age of 42.7 years, and our results showed that 71 (71.8%) patients had a normal CTT, 6 (7.1%) had a composite type, 5 (5.9%) had slow transit, and 3 (3.5%) had pelvic delay.

Mansoori<sup>(13)</sup> in 2010 evaluated 36 Iranian patients (25 female, 11 male) and reported that 22 (61.1%) patients had normal transit, 9 (25%) pelvic delay, 7 (19.4%) slow transit, and 2 (5.6%) composite type. In their study, normal and composite transit had a higher prevalence and slow and pelvic delay types had a lower prevalence than those seen in

Tabel 1. summarized of results

Symptoms and characteristics	Normal CTT	Abnormal CTT			Total	P value
		Composite type CTT	Slow transit type CTT	Pelvic delay type CTT		
Mean age (year)	39.54	42.1	33.6	42.6	39.21	0.62
Disease duration (Years)	5.22	3.6	4.6	5.6	4.5	0.88
Colon transit time (Hour)	43.12 ± 10.73	53.84 ± 13.43	42.58 ± 13.02	62.31 ± 12.98	54 ± 11.21	0.42
Defecation intervals (Days)	3.57	5.5	2.6	6.33	4.64	0.01
time needed for defecation (Minutes)	12.7	20.23	15.12	18.33	17.85	0.00
Using maneuver for defecation	12	3	2	1	6	0.16
Lumpy stool	61	5	4	3	12	0.88
Having a sensation that the stool could not be passed	38	3	3	3	9	0.45

our study; these differences, however, do not constitute statistical significance and may be because of the small sample size in the Mansoori report. Nyam et al.<sup>(14)</sup> reported that 59% of their patients had normal transit, 25% pelvic delay, 13% slow transit, and 3% composite type. Their findings chime in with those of the Mansoori report. In contrast, our findings showed that the prevalence of the composite type was higher than that of the slow transit and pelvic delay types. Ansari et al.<sup>(15)</sup> evaluated 50 Iranian patients with functional constipation and 50 patients with constipation predominant irritable bowel syndrome (IBS-C) in 2010 and reported that the total transit time was 52.2 hours in the functional constipation group and 41.2 hours in the IBS-C group. They also reported that the mean rectosigmoid transit time was the slowest in the functional constipation group (pelvic delay). Their results are in agreement with our

findings. Raahave et al.<sup>(16)</sup> reported that the CTT was 40.71 in the constipated patients and 20.75 in the healthy control group. Our results showed a higher CTT.

In conclusion, according to our results and considering the significant difference between normal and abnormal CTT findings in the patients who used maneuvers for defecation and those who needed more time for defecation, we recommend the CTT test in constipated patients.

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