



## RESEARCH ARTICLE

### EFFECT OF INTERFERENTIAL THERAPY VERSUS AEROBIC EXERCISE ON CHRONIC CONSTIPATION

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#### ARTICLE INFO

##### Article History:

Received 20<sup>th</sup> March, 2021

Received in revised form

15<sup>th</sup> April, 2021

Accepted 18<sup>th</sup> May, 2021

Published online 30<sup>th</sup> June, 2021

##### Keywords:

Interferential Therapy;

Aerobic exercise;

Chronic constipation.

#### ABSTRACT

**Aim:** This Study aimed to compare the effect of interferential therapy versus aerobic exercise on the adult patient that suffer from chronic constipation. **Subject and Methods:** Thirty chronic constipation patients were participated in this study (16 female with percentage of 53% and 14 male with percentage of 47%). Their age ranged from 20-40. All patient were assessed by Abdominal Ultrasonic and constipation scoring system respectively. They were divided into two groups. Group A receive interferential therapy sessions three sessions per week for four weeks while group B receive aerobic exercise sessions in form of stationary bicycle three sessions per week for four weeks. **Results:** The analysis of the current study revealed a significant improvement in constipation scoring system for both Group A (interferential therapy Group) and also for Group B (Aerobic exercise Group) as follow: Increase frequency of bowel movement and decrease in (painful evacuation effort, feeling of incomplete evacuation, abdominal pain, minute in lavatory per attempt, type of assistance, Total constipation scoring system score and both group also show no significance difference in attempt for evacuation per 24 hours and duration of constipation (years). therefore no significance between the effect of interferential therapy versus aerobic exercise on chronic constipation patients. **Conclusion:** Both Interferential therapy and Aerobic exercise significantly affect constipation symptoms but no significance difference between the effect of interferential therapy versus aerobic exercise on chronic constipation patients.

#### INTRODUCTION

Constipation is a clinical diagnosis based on symptoms of incomplete elimination of stool, difficulty passing stool, or both. Patients typically experience other symptoms such as hard stools, abdominal bloating, pain, and distention. Constipation may be present with normal stool frequency, defined as at least one stool three times per week, or with daily bowel movements. Chronic constipation is characterized by the presence of symptoms for at least three months out of the preceding 12 months<sup>1</sup>. Constipation: is used to describe a variety of symptoms, including hard stools, excessive straining, infrequent bowel movements, bloating and abdominal pain.

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Constipation can be acute (typically <1 week duration) or chronic, which typically lasts >4 weeks or, in accordance with

consensus criteria, >3 months<sup>2</sup>. Chronic constipation is a complicated condition among older individuals, which is characterized by difficult stool passage<sup>3</sup>. In this regard, this condition has a close relationship with the patients' quality of life<sup>4</sup> and consuming health resources<sup>5</sup>. Chronic constipation (CC) with or without fecal incontinence (FI) affects 5–30% of children. There is a paucity of information and lack of scientific evidence to explain CC/FI and limited diagnostic evidence to guide and improve management. The pathophysiology of understanding symptoms of CC/FI within pediatrics remains multifactorial and rudimentary in comparison to the knowledge available in adults with CC/FI<sup>6</sup>. Functional constipation (FC), a common functional gastrointestinal disorder (FGID), is characterized by infrequent defecation, hard or lumpy stools, straining during defecation, the sensation of anorectal obstruction/blockage and incomplete evacuation.<sup>1</sup>

The estimated global prevalence of FC ranges from 6% to 29.6%.<sup>7-10</sup> In addition to the higher prevalence, FC significantly influences the patients' quality of life (QoL) and brings remarkable healthcare costs. <sup>11-13</sup> Currently,

pharmacotherapy for FC including cathartic is not satisfactory in improving persistent symptoms and the QoL of patients with FC. Besides, the side effects are often reported, 14 such as bloating, 15 diarrhoea<sup>16</sup> and nausea.<sup>17</sup> Therefore, it is urgent to find safe and effective treatment for FC. Women suffer from constipation more than men especially elderly women compared with men of the same age. <sup>18</sup> Interferential (IF) current: Is a type of electrical stimulation that uses two medium-frequency alternating currents to generate a low frequency beat effect in the tissue.<sup>19</sup> Interferential current therapy has been used in a variety of settings including low back pain and neurological disorders such as carpal tunnel syndrome. More recently, interferential current therapy has been found to be effective in small studies in managing conditions such as fecal incontinence and constipation. It has the benefit of being completely non-invasive, cost effective and convenient, as it can be self-administered at home. <sup>20</sup> The mild to moderate exercise has a positive effect in decreasing constipation symptoms while the vigorous exercise cause nausea, vomiting, diarrhea, gastrointestinal bleeding, and heartburn. <sup>21</sup>

## MATERIAL AND METHODS

**Subjects:** Thirty men and women suffered from chronic constipation will participate in this study with age ranged from 20-30 years old. They will be recruited from physical therapy students and post graduates. The study will be conducted in clinic of physical therapy, 6th October University. They signed a written consent form as shown in appendix I. The thirty patients will be divided into two groups. The first group (group A) will receive interferential therapy session 3 sessions/week for four weeks (Total: 12 sessions). <sup>22</sup> The second group will receive an aerobic exercise sessions in form of stationary bicycle 3 sessions/week for four weeks (Total: 12 sessions). <sup>23</sup>

### Procedure

**Assessment of constipation using abdominal ultrasonic:** Chronic constipation is a disorder frequently encountered in clinical practice. Here, we describe the use of ultrasonography as a new approach to the follow-up of adult patients with functional chronic constipation. Specifically, we report two cases of functional chronic constipation: fecal retention in the rectum and not fecal retention in the rectum. In the not fecal retention in the rectum patient, ultrasonography showed no evidence of fecal retention in the rectum, including no rectal fecaloma, whereas in the fecal retention in the rectum patient, fecal retention in the rectum was clearly recognized. Moreover, ultrasonography can guide the choice of laxative, enema, or appropriate manual maneuver to treat chronic constipation. As a simple and noninvasive method for assessing functional chronic constipation in adults, ultrasonography not only provides important clinical information but can also aid in determining the location of fecal retention. <sup>24</sup>

**Assessment of constipation using constipation scoring system:** A constipation scoring system has established validity and reproductivity and is designed to evaluate the severity of chronic primary constipation. The Cleveland criteria system of scoring produces a score ranging between 0 and 30, 0 being no constipation and 30 being severe constipation. A score of 15 indicate chronic constipation. <sup>25</sup> Each patient is asked to fill the interview questionnaire before and after the study period.

### Inclusion Criteria:

All patients will be included in the study will meet the following criteria:

- ) Chronic constipation patients.
- ) Age will range from 20 to 40 years.
- ) Both sex will be in the study.
- ) All understand the purpose from the session.

### Exclusion Criteria

Patients who had met one of the following criteria were excluded from the study:

- ) Pregnancy.
- ) Recent abdominal surgery.
- ) Patients with acute ischemic bowel disease.
- ) Intestinal obstruction.
- ) Endocrine, metabolic and neurological causes of chronic constipation.

### Statistical Analysis

- ) Unpaired t-test was conducted for comparison of the mean age, weight, height and BMI between groups.
- ) Mann-Whitney test was conducted for comparison of Constipation Scoring System scores between groups.
- ) Wilcoxon signed ranks test was conducted for comparison Constipation Scoring System scores between pre and post treatment in each group.
- ) The level of significance for all statistical tests was set at  $p < 0.05$ .
- ) All statistical measures were performed through the statistical package for social studies (SPSS) version 25 for windows.

## RESULTS

Thirty patients with chronic constipation participated in this study. Patients were divided into two groups, fifteen in each group. The first group was the group A who received interferential therapy; and the second group was the group B who received stationary bicycle. Data obtained from both groups pre and post treatment regarding Constipation Scoring System were statistically analyzed and compared.

### Subjects demographic data

**Group A:** Fifteen patients with chronic constipation were included in this group. Their mean  $\pm$  SD age, weight, height and BMI were  $25.73 \pm 5.17$  years,  $77.96 \pm 8.51$  kg,  $168.06 \pm 7.5$  cm and  $27.56 \pm 2.21$  kg/m<sup>2</sup> respectively as shown in table (1) and figure (1-4).

**Group B:** Fifteen patients with chronic constipation were included in this group. Their mean  $\pm$  SD age, weight, height and BMI were  $27.26 \pm 3.86$  years,  $75.46 \pm 4.4$  kg,  $165.66 \pm 6$  cm and  $27.54 \pm 1.86$  kg/m<sup>2</sup> respectively as shown in table (1) and figure (1-4). Comparing the general characteristics of the subjects of both groups revealed that there was no significance difference between groups in the mean age, weight, height and BMI ( $p > 0.05$ ). *Table 2 show no significance difference between Group A (interferential therapy Group) and Group B*

(aerobic exercise Group) pretreatment regarding the following constipation scoring system items :( Frequency of bowel movement- Difficulty- Completeness- Abdominal Pain- Time-Assistance- Failure- History(years)- Total score).

Table 3 show significance difference in the following constipation system criteria after treatment with interferential therapy sessions: increase frequency of bowel movement, decrease (painful evacuation effort, feeling of incomplete evacuation, abdominal pain, minute in lavatory per attempt ,type of assistance while no significance difference in unsuccessful attempt for evacuation per 24 hours, duration of constipation(years) and finally the total score show significant decrease after interferential therapy sessions(Group A).

**Pre and post treatment median values of Constipation Scoring System of group B:**Table 4 show significance difference in the following constipation system criteria after treatment with aerobic exercise sessions: increase frequency of bowel movement, decrease (painful evacuation effort, feeling of incomplete evacuation, abdominal pain, minute in lavatory per attempt ,type of assistance while no significance difference in unsuccessful attempt for evacuation per 24 hours duration of constipation(years) and finally the total score show significant decrease after aerobic exercise sessions(Group B).

**Post treatment median values of Constipation Scoring System of both groups (A and B):** While Table 5 show no significance difference between Group A (interferential therapy sessions) and group B (Aerobic exercise sessions) in the following items of the constipation scoring system. (frequency of bowel movement, painful evacuation effort, feeling of incomplete evacuation, abdominal pain, minute in lavatory per attempt, type of assistance, unsuccessful attempt for evacuation per 24 hours, duration of constipation(years) and finally the total score of the constipation scoring system. Statistical significance was established at the conventional 0.05 level.

## DISCUSSION

Regarding Constipation, The general consensus of a normal bowel movement frequency is quite broad. Three bowel movements a day or up to three bowel movements a week is generally considered to be within the normal range. While bowel movement infrequency can be distressing to patients, it is the quality of, or difficulty associated with, defecation that is the primary determinant of patient-described constipation. Symptoms such as straining, a sense of incomplete evacuation, hard or lumpy stools, or defecation requiring manual maneuvers to complete can often be elicited from patients who complain of constipation. Constipation can be defined as reduced frequency of defecation and stool passage, hardness of the stool, or feeling of incomplete evacuation that leads to patient dissatisfaction.<sup>26</sup> The aim of the study was to investigate the effect of interferential therapy versus aerobic exercise on chronic constipation. Thirty men and women suffered from chronic constipation were participated in this study with age ranged from 20-40 years old. They were recruited from physical therapy students and post graduates. The study were conducted in clinic of physical therapy, 6thOctober university .They signed a written consent form as shown in appendix I. The thirty patients were divided into two groups.

The first group (groupA) received interferential therapy session 3 sessions/week for four weeks (Total: 12 sessions).The second group received an aerobic exercise sessions in form of stationary bicycle 3 sessions/week for four weeks (Total: 12 sessions).constipation scoring system was assessed for all patients participated in the study before and after the training program. The analysis of the current study revealed a significant improvement in constipation scoring system (increase frequency of bowel movement, decrease painful evacuation effort, decrease feeling of incomplete evacuation, decrease abdominal pain, decrease minute in lavatory per attempt , decrease type of assistance, no significance difference in unsuccessful attempt for evacuation per 24 hours, no significance difference in duration of constipation(years) and finally the total score show significant decrease after interferential therapy sessions(Group A). Whereas the analysis of the study revealed also significant improvement in constipation scoring system after aerobic exercise sessions (Group B) as the following:

Increase frequency of bowel movement, decrease painful evacuation effort, decrease feeling of incomplete evacuation, decrease abdominal pain, decrease minute in lavatory per attempt, decrease type of assistance, no significance difference in unsuccessful attempt for evacuation per 24 hours, no significance difference in duration of constipation (years) and finally the total score show significant decrease after training with the aerobic exercise in form of stationary bicycle.

While the analysis of the study after the application of the constipation scoring system show no significance deference between Group A(interferential therapy sessions) and group B(Aerobic exercise sessions) in the following items of the constipation scoring system. (frequency of bowel movement, painful evacuation effort, feeling of incomplete evacuation, abdominal pain, minute in lavatory per attempt, type of assistance, unsuccessful attempt for evacuation per 24 hours, duration of constipation(years) and finally the total score of the constipation scoring system. Statistical significance was established at the conventional 0.05 level. In agreement with the result of the current study<sup>27</sup> Queralto et al Interferential therapy sessions significantly decrease the colonic transit time of slow transit constipation patient (seven patient out of eleven patient with a proportion of 63.6%. These results were supported by<sup>28</sup> Jacquelineet al who found that the bowel movement duration for the constipation patient was significantly decreased after the interferential sessions while the same study disagree with our study as the bowel movement frequency was not increased after the interferential sessions. These Study partially agreed with our result<sup>29</sup> Chase et al as the use of the interferential current stopped soiling in 7 children out of 8 and increase the frequency of spontaneous defecation in 5 children out of 8 and the result of the study remains for 3 months after termination of interferential therapy sessions. The results of this study are coincided with the results achieved by<sup>30</sup> Ikram et al as the frequency of defecation per week has increased ,the fecal soiling episode per day has decreased .the constipation score decreased ,the pain score decreased and the quality of life score increased after the termination of the Interferential therapy sessions.

1-Freucny of bowel movement		2-Difficulty:Painful evacuation effort	
0	1-2 times per 1-2 days	0	Never
1	2 times per week	1	Rarely
2	once per week	2	Sometimes
3	less than once per week	3	usually
4	less than once per month	4	Always
3-Completeness:feeling incomplete evacuation		4-Abdominal Pain	
0	Never	0	Never
1	Rarely	1	Rarely
2	Sometimes	2	Sometimes
3	usually	3	usually
4	Always	4	Always
5-Time:minute in lavatory per attempt		6-Assistance :type of assistance	
0	less than 5	0	Without assistance
1	5-10	1	Simulative laxatives
2	10-20	2	Digital assistance or enema
7-Failure:Unsuccessful attempts for evacuation per 24 hours		8-History: Duration of constipation(yr)	
	Never	0	0
1	1-3	2	1-5
2	3-6	3	5-10
3	6-9	4	10-20
4	More than 9	5	More than 20

**Table 1. Descriptive statistics and t test for the mean age, weight, height and BMI of group A and B**

	Group A	Group B	MD	t- value	p-value	Sig
	$\bar{x} \pm SD$	$\bar{x} \pm SD$				
Age (years)	25.73 ± 5.17	27.26 ± 3.86	-1.53	-0.92	0.36	NS
Weight (kg)	77.96 ± 8.51	75.46 ± 4.4	2.5	1.01	0.32	NS
Height (cm)	168.06 ± 7.5	165.66 ± 6	2.4	0.96	0.34	NS
BMI (kg/m <sup>2</sup> )	27.56 ± 2.21	27.54 ± 1.86	0.02	0.03	0.97	NS

**Table 2. Comparison of pretreatment median values of Constipation Scoring System between the group A and B**

Constipation Scoring System	Group A	Group B	U- value	p-value	Sig
	Median (IQR)	Median (IQR)			
Frequency of bowel movement	2 (3-1)	2 (2-1)	109	0.87	NS
Difficulty	3 (3-2)	3 (3-2)	108.5	0.84	NS
Completeness	3 (3-2)	2 (3-2)	89	0.28	NS
Abdominal Pain	3 (3-2)	2 (3-2)	102.5	0.64	NS
Time	2 (2-2)	2 (2-1)	97.5	0.36	NS
Assistance	1 (1-1)	1 (1-1)	105	0.31	NS
Failure	1 (1-1)	1 (1-1)	105	0.31	NS
History	2 (3-2)	2 (3-2)	112.5	1	NS
Total score	16 (18-14)	16 (17-14)	97.5	0.52	NS

**Table 3. Comparison between pre and post treatment median values of Constipation Scoring System**

Constipation Scoring System	Pre	Post	Z- value	p-value	Sig
	Median (IQR)	Median (IQR)			
Frequency of bowel movement	2 (3-1)	1 (2-1)	3.16	0.002	S
Difficulty	3 (3-2)	2 (2-2)	3.46	0.001	S
Completeness	3 (3-2)	2 (3-1)	3.05	0.002	S
Abdominal Pain	3 (3-2)	2 (2-1)	2.88	0.004	S
Time	2 (2-2)	1 (2-1)	2.44	0.01	S
Assistance	1 (1-1)	0 (0-0)	3.6	0.0001	S
Failure	1 (1-1)	1 (1-1)	0	1	NS
History	2 (3-2)	2 (3-2)	0	1	NS
Total score	16 (18-14)	13 (15-10)	3.46	0.001	S

IQR: Interquartile rangeZ- value: Wilcoxon signed ranks test valuep-value: Probability level; S: SignificantNS: Non Significant

**Table 4. Comparison between pre and post treatment median values of Constipation Scoring System of group B**

Constipation Scoring System	Pre	Post	Z- value	p-value	Sig
	Median (IQR)	Median (IQR)			
Frequency of bowel movement	2 (2-1)	1 (1-1)	3.05	0.002	S
Difficulty	3 (3-2)	2 (2-2)	3.35	0.001	S
Completeness	2 (3-2)	2 (2-1)	3.16	0.002	S
Abdominal Pain	2 (3-2)	2 (2-1)	2.17	0.007	S
Time	2 (2-1)	1 (2-1)	2.64	0.008	S
Assistance	1 (1-1)	0 (0-0)	3.6	0.0001	S
Failure	1 (1-1)	1 (1-1)	0	1	NS
History	2 (3-2)	2 (3-2)	0	1	NS
Total score	16 (17-14)	11 (13-10)	3.48	0.0001	S

**Table 5. Comparison of post treatment median values of Constipation Scoring System between the group A and B:**

Constipation Scoring System	Group A	Group B	U- value	p-value	Sig
	Median (IQR)	Median (IQR)			
Frequency of bowel movement	1 (2-1)	1 (1-1)	99.5	0.53	NS
Difficulty	2 (2-2)	2 (2-2)	105.5	0.69	NS
Completeness	2 (3-1)	2 (2-1)	102	0.64	NS
Abdominal Pain	2 (2-1)	2 (2-1)	112.5	1	NS
Time	1 (2-1)	1 (2-1)	90	0.26	NS
Assistance	0 (0-0)	0 (0)	105	0.55	NS
Failure	1 (1-1)	1 (1-1)	105	0.31	NS
History	2 (3-2)	2 (3-2)	112.5	1	NS
Total score	13 (15-10)	11 (13-10)	96	0.49	NS

IQR: Interquartile range U- value: Mann-Whitney test value p-value: Probability level; NS: Non significant

While we observed improvement in the ROME III criteria after interferential therapy sessions as the following:

1<sup>st</sup> Criteria (episode of fecal Case group 12 3 3 incontinence per week) has decreased from 10 times to 3 times

2<sup>nd</sup> Criteria (History of painful or hard Case group 30/40 5/40 6/40 bowel movements): the score decreased from 28/40 to 12/40.

3<sup>rd</sup> Criteria (History of retentive posturing or excessive volitional stool retention): the score has decreased from 12/40 to 8/40.

4<sup>th</sup> Criteria (Presence of a large fecal mass in the rectum): the score decreased from 12/40 to 10/40.

5<sup>th</sup> Criteria (Two or fewer defecations in the toilet per week): the score was reduced from 40 to 13.

The result of the study agreed with <sup>31</sup>Yik et al as the defecation frequency increased in 57 out of 62 constipation patient from 6 to 37 and the soiling frequency decreased from 4.8 to 1.1 days per week while the abdominal pain decreased from 1.7 to 0.3 days per week and the spontaneous urge to defecate improved so the mean transit index and the gastric emptying improved. Regarding the comparison of the effect of aerobic exercise in the treatment of constipation between our study and previous studies. The Study <sup>32</sup>Tantawy et al agreed as the group of 125 premenopausal women show significant improvement in body mass index, constipation complaint and overall quality of life after the use of aerobic exercise sessions. Also the result of our study coincided with the result of the study named <sup>33</sup>Gao et al as the use of the aerobic exercise in the treatment of constipation significantly improved constipation symptoms.

The result of the study <sup>34</sup>Cammack et al partially agreed with our study as the use of aerobic exercise sessions in the treatment of constipation accelerated gastric emptying but has no significant effect on the small bowel transit time. The result of the study <sup>35</sup>Bingham et al completely disagree with the result of our study as its findings as follow: No change was observed overall in mean daily fecal weight, transit time [ $55 \pm 20$  (control)], nor in fecal frequency, dry stool weight, pH, ammonia, or total nitrogen excretion so when diet is constant, exercise has marked effects on physical fitness but no consistent effect on large bowel function. The result of the study <sup>36</sup>Oettlé et al partially agreed with the result of our study as its findings as follow:

Transit time was dramatically accelerated by moderate exercise (both jogging and cycling); however, stool weight,

## Conclusion

This study demonstrated a significance difference in chronic constipation symptoms after the use of both interferential therapy and aerobic exercise while the comparison show no significant difference in the effect of interferential therapy versus aerobic exercise on chronic constipation patients.

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