



Constipation Prevalence and Related Risk Factors among Orthopedic Patients

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ABSTRACT

Background Risk factors of constipation have not yet been wholly clarified among patients with fractures, especially in Egypt. **Aim:** this study designed to investigate the prevalence of constipation and its related risk factors among orthopedic patients. **Methods:** A cross-sectional design with a purposive sample of 150 patients was used to conduct this study. Three questionnaires were administered: (A) demographic and medical history sheet; (B) Bristol Stool Scale; and (C) Constipation Risk Assessment Scale. **Results:** The patients mean age was 39.5 ± 10.6 years. Patients were at moderate risk for constipation with average scores of 12.9 ± 4.1 . Multivariable logistic regression was established to identify constipation factors as follow: length of hospital stay (odds ratio [ORa]= .248, 95% confidence interval [CI]: .129-.475), previous constipation history (ORa= 4.566, 95% CI: 1.213-17.190), difficulty in bowel excretion in hospital (ORa= 2.028, 95% CI: 1.068-3.849), colorectal/abdominal diseases (ORa= .639, 95% CI: .416-.980), and Iron supplementation (ORa= 1.703, 95% CI: .952-3.046), were the risks that could significantly predict occurrence of constipation among orthopedic patients. **Conclusion:** This study concluded that frequency of constipation was low among orthopedic patients. However, many risks remarkably predicted susceptibility to having constipation. **Recommendations:** Nurses must take the identified risk factors seriously into consideration during assessing and caring for orthopedic patients. Evidence-based nursing interventions must be designed to control the adverse effects of these risks on bowel function.

Keywords: Constipation, Orthopedic Patients, Risk Factors.

INTRODUCTION

Fecal defecation is a complex process (Andrews & Storr, 2011). Several factors coordinate to maintain the homeostatic balance of this process, including, for example, anal muscle structure and strength, rectal compliance, stool consistency, and intestinal mobility, alongside the interaction among rectal filling, recognition of filling, capability to push the stool and relaxation of pelvic muscles (Munch, et al., 2016; Chen et al., 2020). Moreover, fecal defecation can be influenced by psychological, emotional and environmental factors. Therefore, normal fecal defecation is easily disturbed, leading to unhealthy

responses, including defecation problems such as constipation (Trads, et al., 2018).

Constipation is identified by bowel symptoms such as the hard or infrequent stool passage associated with feeling of incomplete evacuation (Novaes, et al., 2015). Difficult passage of stool has been classified as acute, chronic, or transient constipation, where many factors causing it, such as diet, medications, activities of daily livings (ADLs), and biopsychosocial factors (Forootan, et al., 2018). Acute constipation is considered a more severe problem among patients receiving specific medical treatment such as (opioids), or hospitalized with longevity immobilization (Chu et

al., 2014; Trads & Pedersen, 2015). This constipation type often resolves naturally or require short-term fiber supplement, dietary changes or laxatives. However, patients may not have essential knowledge of preventing or treating constipation (Sharma & Rao, 2016).

General health, social function and mental health, are lower in constipated individuals than healthy people and very low in hospitalized patients compared with people in the community, as reported by the American Gastroenterological Association (2013). Patients with constipation may experience a variety of unpleasant symptoms that can affect their quality of life, such as headache, fatigue, feelings of excess gasses, loss of appetite, nausea and vomiting, and distended abdomen (Lamas et al., 2015). Constipation is a distressing condition that can happen to anyone; however, it is of much concern in patients with limited physical activities, such as orthopedic conditions (Mathews, et al., 2021).

Patients with bone fractures should stay immobilized for a long time as it is one of the main principles of fracture healing. Therefore, these people are at a high risk of bowel complications resulting from immobility and analgesics, especially constipation. The hospital environment can interrupt ADLs, such as eating, toileting, and activity level of hospitalized patients (Wald, 2016). Therefore, normal defecation presents a challenge during a hospital stay with bed rest, as those patients might lack privacy during elimination.

Early exploration of constipation and its risk factors among hospitalized orthopedic patients has gained the attention of researchers worldwide (Sendir et al., 2012; Trads & Pedersen, 2015). However, the magnitudes risk factors of constipation have not yet been entirely clarified among patients with fractures,

specifically among Egyptian orthopedic patients where the context of caring is different, and resources are shortage. So it is not apparent which risk factor is dominant in causing constipation (Bharucha, et al., 2013). Hence, this study results will enhance the insight of health care professionals, especially orthopedic nurses, about the constipation prevalence and related risk factors among orthopedics patients to determine the appropriate plan of care.

SIGNIFICANCE OF THE STUDY

Constipation has a negative effect on patients' quality of life (QoL). Indeed, it has a considerable burden on healthcare resources. Constipation can increase the risk of postoperative complications and prolong the length of hospital stay. Consequently, it increases the financial cost and the nursing staff time required for care (Lamas et al., 2015). Patients with no history of bowel problems develop constipation for the first time during their hospital stay while others already suffering from constipation will often find their symptoms worsen (Munch, et al., 2016).

Therefore, this condition presents a challenge during hospital stay, as those patients strive for bowel balance; and struggle to find a solution. To develop the care in this area, it is necessary to gather information on the magnitude and risk factors of constipation. Hence, this study results will enhance the health care professionals, especially the nurses' insight about the prevalence of constipation and its risk factors among these population in order to develop the appropriate treatment plan.

AIM OF THE STUDY

The current study aimed to explore the prevalence of constipation and related risk factors among orthopedic patients during their hospital stay.

RESEARCH QUESTIONS

The current study aimed to answer the following four research questions:

1. What is the prevalence of constipation among orthopedic hospitalized patients?
2. What are the differences in constipation risk factors according to demographic data?
3. What are the factors contributing to constipation among orthopedic hospitalized patients?

SUBJECTS AND METHODS

Design: A descriptive and comparative cross-sectional design was used to achieve this study aim. This design is a snapshot data collection method that aims to collect a large amount of data in a short time in order to explore the prevalence and risk factors of the research variables. Descriptive exploratory research is a subtype of the cross-section design that provides an accurate portrayal of the characteristics of a particular individual, situation, or group. This research design is a mean of discovering new meaning, describing what exists, determining the frequency with which something occurs, and categorizing information (Myers, Well & Lorch 2013).

Setting:

The study was carried out in four orthopedic surgery departments at one of the University Teaching Hospitals in Cairo, Egypt.

Subjects:

A purposive sample of 150 participants admitted to the orthopedic departments with fractures was invited to participate from November 2019 to May 2020. Patients must meet the following **inclusion criteria** to be entitled to participate in this study: aged ≥ 18 years old, had fracture that causes complete bed rest, admitted to the hospital with not less than five days during an invitation to participate in this study,

and gave informed consent. On the other hand, if the patient had been medically diagnosed with gastrointestinal (GI) problems such as colitis, diverticulitis, GI stoma (i.e., colostomy, ileostomy), and (ii) had postoperative surgery at the last three days before data collection was not eligible to participate. This equation was used to calculate sample size with a significance level of 95%:

$$n = \frac{z^2 * p * (1-p) / e^2}{1 + \frac{z^2 * p * (1-p)}{e^2 * N}}$$

Where $z = 1.96$ is the z-score associated with the significance level chosen

$P = 0.5$ is the proportion of bullying in the population

$e = 0.05$ is the margin of error

$N = 300$ is the population size

Tools for data collection

Data was collected using the following tools:

A- The demographic and medical related data questionnaire: It was designed by the researcher to collect variables as age, gender, marital status, education, occupation, body mass index (BMI), length of hospital stay, smoking and previous constipation history

B- The Bristol Stool Scale (BSS): It is a frequently used scale for assessing the bowel elimination problem (constipation vs none constipation) (Lewis & Heaton, 1997; Longstreth, et al., 2006). BSS categorizes stools form into seven categories using photos based on Rome III criteria. Types 1 and 2 are identified as constipation, types 3, 4 and 5 as normal stools, and types 6 and 7 as very soft or watery diarrhoea. Participants were requested to notice the photographs and select the photo that reflects their most recent stool form. BSS is valid in monitoring variations in intestinal function, such as changes in transit time

are associated with stool form changes. Thus, BSS has been recommended for use in and out of hospital settings. It is reliable to describe bowel movements, with a kappa of 0.63 (95% CI: 0.45–0.82) (Chumpitazi, et al., 2016).

(C) **The Constipation Risk Assessment Scale (CRAS):** It is a standardized scale that nurses established to help nurses identify the risks for constipation (Richmond & Wright, 2008). The CRAS has 25 items that categorized under eight subscales: (1) gender, (2) mobility, (3) fiber intake, (4) fluid intake, (5) personal beliefs, (6) hospital toilets usage or bedpans/commodos, (7) pathophysiological conditions, and (8) pharmacological agents, with each subscale has subsections in ascending order. CRAS total score ranges from 2 to 33, which can be categorized into three levels of risk for constipation based on a cutoff point for risk of constipation: score ≤ 10 shows “low risk”, a score 11–15 shows “medium risk” or a score ≥ 16 shows “high risk”. Moreover, based on the determined cut off point for constipation risk, the score can be converted from the three-ordinal level to two dichotomous variables ‘at constipation’ risk for or ‘not at constipation risk (Richmond & Wright, 2008).

Ethical Considerations

Ethical approval (code 2019-6-2) was attained from the Research Ethics Committee of the Faculty of Nursing, Cairo University. Also, official permission of the hospital administrator was obtained before conducting the study. Each patient was informed about the study purpose before giving their consent. They were informed that their participation in the study is exclusively voluntary, and they can refuse or withdraw from the study without any penalty. The participants’ anonymity and confidentiality were secured through coding the data.

Data Collection Procedure

An individualized interview was conducted to collect data after finding the eligible participant. A printed card showing the different stool types was presented to patients to identify which stool type they had after first five days of admission. In this study, the researcher considered patients were constipated if they had hard and dry stool types 1 and 2 at the BSS. After that, the Constipation Risk Assessment Scale was completed to investigate the related risk factors.

Data Analysis

Data were manipulated and run by the Statistical Package for Social Sciences (SPSS), version 22. Nominal and categorical variables were assessed by frequency distribution, and continuous variables were analyzed by the mean and standard deviation or median if it was not normally distributed. Univariate analyses, including Pearson Correlation Coefficient, Chi-Square Fisher Exact test, the independent t-test, were done to identify factors associated with bowel elimination problems. Mann-Whitney U test and Kruskal-Wallis test were performed where the data was not normally distributed. Logistic regression analysis was done to find risks of constipation. A *P*-value of ≤ 0.05 was considered statistically significant.

RESULTS

Demographic Characteristics

Table (1) showed that (60%) of participants were male, (40%), of them aged between 35 > 45 years old. (63.3%) were non-smoker, (66.7%) were married. (48.7%) of them stayed in the hospital for at least three weeks and (46.6%) & (44.7%) of subjects had primary school and worked as farmers consecutively.

Table 1: Participants' Characteristics (n=150).

Variable	No. (%)	Variable	No. (%)
Gender		BMI	
Male	83 (60)	Underweight	0 (0%)
Female	67(40)	Normal	90(60)
Age (year)		obesity	55(36.7)
18 > 25	16(10.7)	Morbid obesity	5(3.3)
25 > 35	30(20)	Smoking	
35 > 45	60(40)	yes	55(36.7)
≤ 45	44(29.3)	no	95(63.3)
Marital status		Length of hospital stay	
Single	26(17.3)	1 week	21(14)
Married	100(66.7)	2 weeks	39(26)
Divorced	11(7.3)	3 weeks	73(48.7)
Widow	13(8.7)	4 weeks and more	17(11.3)
Educational status		Previous constipation history	
Cannot read or write	24(16)	Yes	40(26.7)
Can read and primary school	70(46.6)	No	110(73.3)
Preparatory and Secondary school	49(32.7)	^a Last time of constipation	
University and higher	7(4.7)	One-week	4(10)
Occupation		Two-weeks	16(40)
Housewife	40(26.7)	Three-weeks or more	20(50)
Farmer	67(44.7)	^a Percentage was calculated according to this number	
Worker	32(21.3)		
Employee	11(7.3)		

Figure (1) illustrates that 23.3% of the participants had constipation, according to BSS.

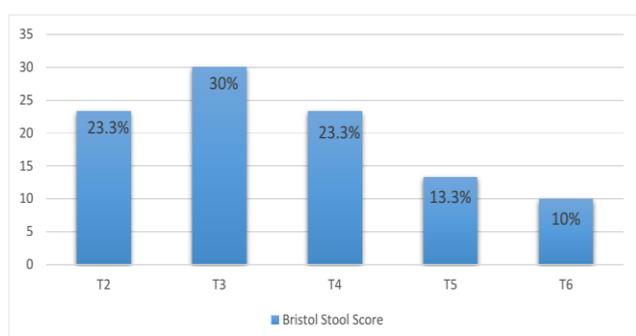


Figure 1. Prevalence of Constipation (n=150).

Types of Constipation Risks

Table (2) highlights that the CRAS patients' mean score was 12.9 ± 4.1 , indicating a moderate risk. Subscale 1 had the highest score (4.77 ± 1.56), while subscale 4 had the lowest (2.7 ± 1.8). Most of the participants could move independently

(45.3%) to the toilet, consume five pieces or more vegetables/ fruits per day (52%), and consume 6-9 cups/glasses per day (68.7%). Nevertheless, more than half did not consume wholegrain products daily (56%). Around three quarters (74.7%) believe in intending towards constipation. 72% did not use a laxative, 64% had no difficulty with bowel elimination using hospital toilets, and 60.7% did not experience difficulties with using a bedpan. 32% had neuromuscular diseases, and 71% had used analgesics.

Table 2. Frequency Disruption of Constipation Risks (n=150).

Constipation Risk Assessment subscales	No. (%)	Score (Min-Max)	(X ± SD)
Subscale 1: Mobilization			
Dependent for walking/ assistance from others	68 (45.3%)	2-7	4.77 ± 1.56
Restricted to bed and chair	37 (24.7%)		
Spinal cord injury/spinal cord compression	45 (30%)		
Fibre intake			
Consuming five slices or more fruits/vegetables per day	78(52%)		
Consuming 3 or 4 slices of fruit/vegetables per day	46 (30.7%)		
Consuming 2 or less fruits/vegetables per day	26(17.3%)		
Daily wholegrain product consumption			
Yes	66 (44%)		
No	84 (56%)		
Fluid intake			
Consuming 10 cups/glasses or more per day	11 (7.3%)	0-4	2.8±1.5
Consuming 6-9 cups/glasses per day	103 (68.7%)		
Consuming 5 cups/glasses or less per day	36 (24%)		
Personal Beliefs: Tendency to constipation			
Yes	112 (74.7%)	0-10	3.1 ±2.3
No	38 (25.3%)		
Laxative use for constipation			
Yes	42 (28%)	0-6	2.7±1.8
No	108 (72%)		
Subscale 2: Difficulty in bowel excretion in hospital toilets			
Yes	39 (26%)	0-6	2.7±1.8
No	111 (64%)		
Problems during bedpan use			
Yes	59 (39.3%)	0-6	2.7±1.8
No	91 (60.7%)		
Subscale 3: Physiological & Psychological conditions			
Metabolic diseases	13(8.9%)	0-10	3.1 ±2.3
Pelvic conditions	16(10.7%)		
Neuromuscular diseases	48(32%)		
Endocrine diseases	30(20%)		
Colorectal/Abdominal diseases	28(18.7%)		
Psychiatric diseases	5 (3.3%)		
Learning disorders or dementia	7 (4.7%)		
Subscale 4: Drugs[*]			
Calcium channel blockers	5(3.2%)	0-6	2.7±1.8
Iron supplementation	17(11%)		
Non-opioid analgesic	110 (71%)		
Antispasmodics	8(5.2%)		
Cytotoxic chemotherapy	3 (1.9%)		
Total score		3-23	12.9 ± 4.1

*More than one drug was used.

Risk for Constipation According to Demographic Characteristics Table (3) shows a statistically significant correlation between marital status, occupation, BMI, smoking and demonstrating alternative treatments for constipation and risk for constipation ($P \leq 0.05$).

Table 3. The Difference in CRAS According to Demographic and Medical Variables (n=150).

Demographic variables	X ± SD	Statistical Test/p-value*
Gender		
Male	13.21 ± 3.85	1.340(.185)
Female	12.29 ± 4.31	
Age (year)	39.5 ± 10.6	-0.061(0.455)
Marital status		
Single	13.78 ± 3.72	1.973(0.050)
Married	12.41 ± 4.14	
Educational level		
Uneducated	12.47 ± 3.92	1.320(0.270)
Low educated	13.63 ± 4.28	
High educated	12.71 ± 3.86	
Occupation		
Work	12.44 ± 4.18	2.139(0.034)
Not work	14.02 ± 3.44	
Body mass index (BMI)		
Normal	13.68 ± 3.52	3.136(0.002)
Obese	11.63 ± 4.47	
Smoking		
Yes	13.92 ± 4.37	2.484(0.014)
No	12.25 ± 3.73	
Length of hospital stay		
One week	12.80 ± 4.28	.070 (0.945)
More than a week	12.87 ± 4.025	
Previous constipation history		
Yes	13.12 ± 4.731	.677(0.499)
No	12.67 ± 3.45	
Alternative treatments for constipation		
Yes	10.96 ± 4.39	2.948(0.004)
No	13.34 ± 3.82	

*Significant at p-value ≤ 0.05

Factors Contributing to Constipation

Table (4) shows the analysis of logistic regression that was done to determine the effect of a number of independent factors on the probability that participants (n=150) would likely to have constipation. Findings revealed that length of hospital stay (odds ratio [ORa]= .248, 95% confidence interval [CI]: .129-.475), Previous constipation history (ORa= 4.566, 95% CI: 1.213-17.190), Difficulty in bowel excretion in hospital (ORa= 2.028, 95% CI: 1.068-3.849), Colorectal/

Abdominal diseases (ORa= .639, 95% CI: .416-.980), and Iron supplementation (ORa= 1.703, 95% CI: .952-3.046) were risks that could significantly predict occurrence of constipation.

Table (4): Predictors of Constipation Using Logistic Regression (n=150).

Variables	Odds ratio	95% Confidence Interval		Sig.
		Lower	Upper	
Age	.995	.953	1.040	.834
Gender	1.010	.255	3.998	.989
Education	.562	.289	1.093	.090
BMI	.588	.230	1.507	.269
Smoking	2.695	.758	9.584	.126
Length of hospital stay	.248	.129	.475	.0001*
Previous constipation history	4.566	1.213	17.190	.025*
Last time of constipation	1.250	.752	2.078	.390
mobility	2.434E7	.000	.000	.992
Fiber intake	.370	.081	1.683	.198
Fluid intake	.743	.059	9.326	.818
Daily wholegrain product consumption	.000	.000	.000	.991
Tendency to constipation	.657	.147	2.930	.582
Laxative use	1.796E8	.000	.000	.991
Difficulty in bowel excretion in hospital	2.028	1.068	3.849	.031*
Problems during bedpan use	1.275	.820	1.982	.281
Metabolic diseases	1.316	.707	2.451	.387
Pelvic conditions	.001	.000	.000	.998
Neuromuscular diseases	1.165	.876	1.550	.293
Endocrine diseases	1.001	.711	1.408	.996
Colorectal/Abdominal diseases	.639	.416	.980	.040*
Psychiatric diseases	.000	.000	.000	.999
Learning disorders or dementia	.000	.000	.000	.999
Calcium channel blockers	.000	.000	.000	.999
Iron supplementation	1.703	.952	3.046	.05*
Non-opioid analgesic	.830	.609	1.131	.238
Antispasmodics	1.280	.550	2.980	.567
Cytotoxic chemotherapy	.001	.000	.000	.999

*Significant at p-value ≤ 0.05

DISCUSSION

As far as we know, this study is the first to report the prevalence of constipation and its contributing risk factors among orthopedic patients, mainly in Egypt.

The current study findings clarified that more than half of the study participants were male, young adults (between 35 > 45 years old years old). These findings support previous studies that reported that orthopedic related constipation was most common among middle-aged male patients (Lamas et al., 2015, Farahat, et al., 2019). These findings could be interpreted in light of the fact that males are more

susceptible than females to orthopedic problems because of their work types; orthopedic accidents are most frequently among males. Furthermore, more than half of the participants were married, nearly half of them had primary school education and worked as farmers. The findings are consistent with a previous national study (Mohamed & Hanafy, 2013). This result could be related to the fact that most of the attendees to the general governmental hospital are patients with lower education and economic status since the services are free of charge.

The most important findings in the current study were that about a quarter of the participants have constipation during their stay in the hospital for more than five days. In a previous study, about one third of patients had constipation within the first four weeks after a hip replacement surgery (Trads & Pedersen, 2015). These results confirm that although the frequency of constipation seems low among orthopedic patients, there is an association between the timespan of health conditions and the pattern of fecal defecation wherever the place of caring, home or hospital. The regression analysis test in our study confirms that increasing length of hospital stay can increase the incidence of constipation.

Using the univariate analysis test displayed that the risk of constipation was higher among single, not working, smokers, and consuming alternative treatments for constipation. These results agree with previous studies that found constipation complaints usually increase in those singles and overweight (Costilla & Foxx-Orenstein, 2014; Fahmy et al., 2015). However, it is interesting that patients who had average body weight were more likely to have constipation than overweight patients. This finding goes beyond previous studies findings, which showed that a high constipation prevalence was found in adults with obesity (Pourhoseingholi, et al., 2009; Silveira, et al., 2021). This finding may raise a concern about the relationship

between constipation and body weight which can be addressed in a future study by comparing patients according to their BMI in terms of frequency and types of food intake and consumption of fluid.

When all variables entered the logistic regression model, only five variables could significantly predict constipation, including length of hospital stay, previous constipation history, difficulty in bowel excretion in hospital, colorectal/abdominal diseases, and iron supplementation. Identifying these findings is essential since it helps understand the common risks for constipation among orthopedic patients that nurses must consider while caring for them. Congruent with former research, prolonged hospital stay, inability to evacuate bowel in hospital bathrooms, decrease intestinal peristalsis due to abdominal diseases and side effects of iron supplementations were found main risks for constipation (Rajput & Saini, 2014; Celik et al., 2015; Farahat et al., 2019).

It is apparent that constipation is likely to increase with low consumption of fiber, wholegrain products and insufficient fluid intake. The result is parallel with the earlier studies in which these variables significantly affected bowel movements and defecation (Costilla & Foxx-Orenstein, 2014).

CONCLUSION

The study demonstrated that the frequency of constipation was low among orthopedic patients. However, many risks remarkably predicted susceptibility to having constipation, such as length of hospital stay, previous constipation history, bowel excretion difficulty in hospital, colorectal/abdominal diseases, and Iron supplementation.

Study strengths and limitations

Although the study has contributed to the current knowledge by reporting the magnitude risks of constipation among orthopedic patients, few limitations must be counted while interpreting the findings. First,

the snape data collection has made it impossible to build a causal relationship between the risk factors and constipation. Second, assessing constipation and its risks using a questionnaire could not collect other objective risks, such as abnormal anatomical changes in the anal canal, like a hemorrhoid that can impair the normal defecation process. Therefore, using standardized questionnaires, physical examination alongside history taking can be administered in future research to identify other unobvious risk factors.

RECOMMENDATIONS

The following recommendations are proposed based on the study findings: (1) Nurses must take the identified risk factors seriously when assessing and care for orthopedic patients. (2) Therefore, a future longitudinal study could develop a causative relationship between the risk factors and constipation from the first day of admission till complete recovery. (3) Future longitudinal research that could develop a causative relationship between the risk factors and constipation from the first day of admission till complete recovery is required.

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Conflict of interest

There is no conflict of interest to declare

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