Effect of late defecation on mechanical ventilator weaning in critically ill patients

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Abstract

Late defecation can be a significant clinical challenge that can compromise mechanical ventilator (MV) weaning management plans and prolong an intensive care unit (ICU) stay. **The purpose of this study** was to explore the effect of late defecation on mechanical ventilator weaning, and the factors associated with late defecation in mechanically ventilated patients. **Study design:** A quantitative descriptive research design was used in this study. **Sampling and setting:** Purposive sample of 120 mechanically ventilated patients in three ICUs for ≥ 48 hours were investigated, and their defecation status was assessed during the first week after admission. The patients were divided into two groups: normal defecation, and late defecation. **Four tools were used in this study**; patient assessment sheet, acute physiology and chronic health evaluation II score, The Victoria Bowel Performance Scale, and the patient outcomes assessment tool. **Result**: Incidence of weaning failure was 24.5% among patients in the normal defecation group and 52.2% among patients in the late defecation group, with a statistically significant difference (P value = 0.002*). (30.2 %) and (55.2 %) of patients in the normal defecation and the late defecation groups respectively received muscle relaxants with statistically significant difference (P value= 0.006*). **Conclusion**: The use of muscle relaxants, sedatives, and vasopressors may be associated factors of late defection development. Late defecation has a negative effect on MV weaning in critically ill patients. **Recommendation**s: Frequent monitoring of gastro-intestinal motility and applying evidence based guidelines for management of disturbance in gastro-intestinal motility should be routine care in ICU.

Keywords: Defecation, mechanical ventilator, weaning, outcomes.

Background

Although defecation is a fundamental bodily function, clinicians in intensive care units (ICUs) that monitor gastrointestinal processes record characteristics like the volume of gastric aspirate and the frequency of bowel motility rather than its absence. It is understandable that it can be challenging to keep a record of this function when multiple nurses are caring for the same patient due to shift work. As a result, it's possible to overlook the occurrence of late defecation in critically ill patients and its consequences (**De Azevedo et al., 2015**).

Patients receiving mechanical ventilation, it took nearly 6 days before the first faces were passed. The fact that these patients are confined to beds, the use of analgesics and sedatives, neuromuscular blockers, vasopressors, inflammatory mediators, shock, electrolyte abnormalities, poor fluid supply, and a lack of fiber in the enteral diet all increase their risk of late defecation (**Fukuda et al., 2016**). If constipation occurs, overgrowth of gram-negative bacteria in the digestive tract may induce due to fecal stasis. Translocation of bacteria and endotoxins may lead to

infections and enhanced systemic inflammatory response. Critically ill patients already have a life threatening problem that may inhibit beginning feeding early and affect feeding route or type. They may also suffer from electrolyte disturbance or dehydration that may affect gastrointestinal dehydration and perfusion (**El-Saman and Ahmed, 2017**).

Late defecation is linked to higher infection rates, diminished organ function, longer stays in intensive care units, and higher ICU mortality. Constipation should be prevented and treated because it can lead to complications such as abdominal distension, vomiting, restlessness, intestinal obstruction and perforation and others still poorly elucidated. Constipation was identified as an independent prognostic factor in the evolution of critically ill patients and its treatment can result in better prognosis (**Azevedo and Machado, 2013; Reintam et al., 2013; Trexler et al., 2014;, De Azevedo et al., 2015**).

Nurses in critical care units treat patients holistically and create nursing care plans for them based on priority, prioritizing interventions for life-threatening issues while ignoring patients' elimination issues unless they result in a significant fluid or electrolyte disruption. One of the elimination issues that arise in critical care units is late faces, so nurses must take this into account and develop a strategy to avoid any negative late effects on the patient's state (**El-Saman and Ahmed, 2017; Mahran et al., 2022)**. In order to ensure patient safety and comfort, nurses should play a crucial role in assessing and managing elimination issues. They should carefully monitor parameters pertaining to critically ill patients in order to determine the prevalence of late defecation among them (**Collins and O'Brien, 2015).** So this study was to explore the effect of late defecation on mechanical ventilator weaning in critically ill patients.

Significance of the study:

One of the gastrointestinal issues that affect critically ill patients is late defecation. (**McClave, 2022**) found that late defecation occurred up to 83% of patients ICUs. Although gastroparesis, increased gastric residual volumes, and small bowel ileus receive a lot of attention, late defecation in the ICU receives little attention, frequently goes unrecognized, and continues to be a low priority in overall treatment. In the critical care setting, it is common to overlook and disregard the evaluation of the time of defecation. In order to provide patients with holistic treatment, it is hoped that nurses and doctors include critically ill patients' defecation times into their practices to improve patient outcomes **(El-Saman and Ahmed, 2017**). This study investigated the issue of delayed defecation effects on mechanical ventilator weaning of critically ill patients.

The aim of this study:

The main aim of this study was to explore the effect of late defecation on mechanical ventilator weaning in critically ill patients.

Specific objectives:

- To investigate the factors associated with late defecation in mechanically ventilated patients.
- To assess the effect of late defecation on ICU stay and mortality rate in critically ill patients.

Methods

Design:-

In this study, a quantitative descriptive research design was utilized. A quantitative descriptive research approach is defined as the process of gathering data from a sample of people by way of their answers to questions; it is frequently employed to describe and investigate human behaviour. Historically, large-scale population-based data gathering has been a component of survey research. The main goal of survey research was to quickly obtain data

describing the characteristics of a large sample of individuals of interest. The most popular data collection techniques for survey research are questionnaires and interviews. Survey research is clearly beneficial in describing and examining variables and constructs of interest (**Polit and Beck, 2012**).

Research questions:

- What is the effect of late defecation on mechanical ventilator weaning of critically ill patients?
- What are the associated factors with late defecation among patients on mechanical ventilation?

Setting:

This study was conducted at three intensive care units at Assiut University Hospital, Egypt. These units include the general intensive care unit (16 beds in four separate rooms, 8 head nurses, 40 nurses, 4 assistant nurses, nurse patient ratio 1:3), the trauma intensive care unit (16 beds in three separate rooms, 5 head nurses, 28 nurses, 6 assistant nurses, nurse patient ratio 2:3), and the anesthesia intensive care unit (12 beds in three separate rooms, 7 head nurses, 35 nurses, 4 assistant nurses, nurse patient ratio 1:2).

Patient selection

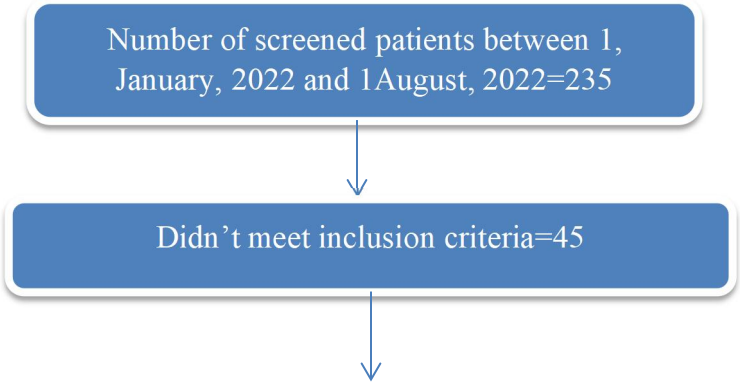
Purposive sampling technique was used to enroll 120 Adults mechanically ventilated patients (≥18 years old) treated in previously mentioned ICUs between January 1, 2022, and August 1, 2022, were screened for inclusion in this study. Patients who stayed in the ICU for <7 days were excluded. The reason for the 7-day cut off point was to match the definition of late defecation. The other exclusion criteria were as follows: patients who presented with bloody stools, who had a permanent colostomy, who were mechanically ventilated for >2 days, who underwent abdominal surgery immediately ≤7 days after admission, or who were withdrawn from aggressive treatment.

Calculation of sample size:

The sample size was calculated using Epicalc 2000 software with the following inputs:

The minimal sample size will be 110 + 10 patients added as a drop factor, so the number of patients equal 120

- Type I error (α) =5% with confidence level 95%.
- Study power 90 % (power of test) with type error II 10% (Beta).
- The significance level (α) at 0.05*.



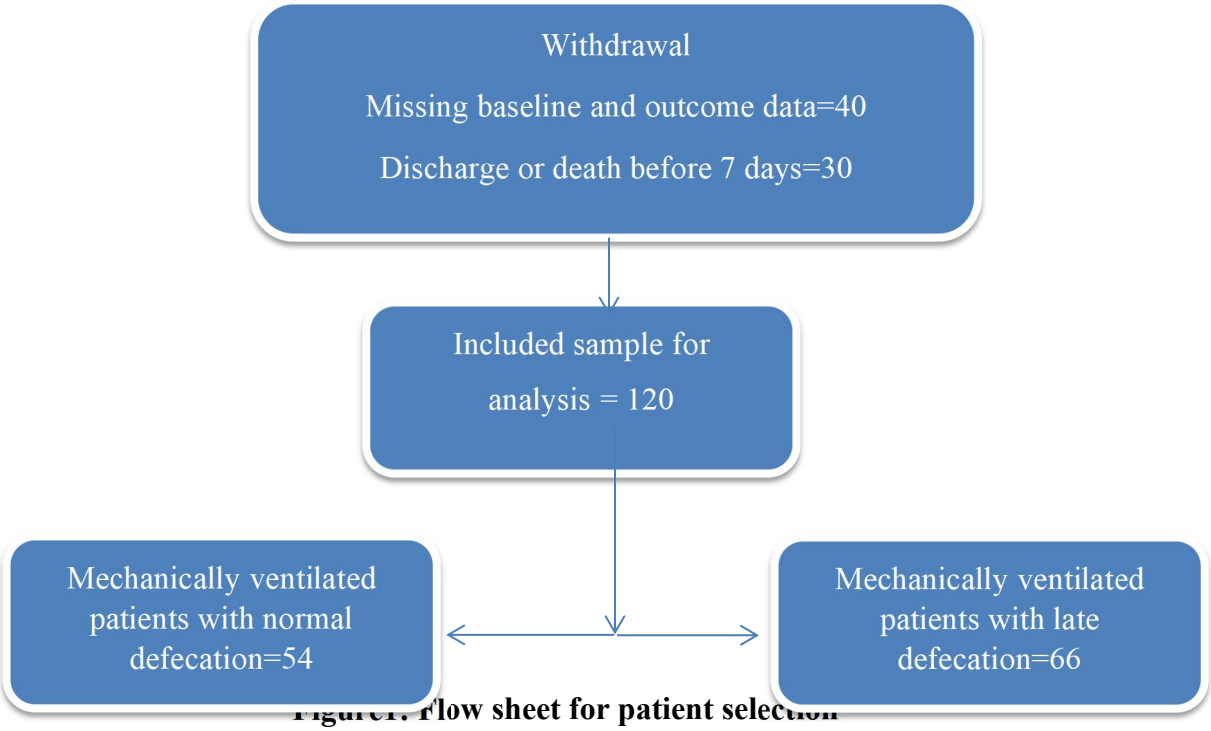


Figure1: Flow sheet for patient selection

Four tools used in this study to collect data:

To fulfill the aim of the study four tools were utilized to collect data pertinent to the current study as follows

Tool 1:- Patient assessment sheet: After analyzing the literature, the researchers developed this tool to collect patients' baseline data (**Prat et al., 2016**). There are three sections to this tool.

Part one: The patient's demographic and medical Data: It involved patient age, sex, diagnosis, and dates of intensive care unit admission and discharge. Medical data include assessment of medication utilized as laxative therapy, vasopressors, muscle relaxants, sedatives or opioids that affect in bowel motility.

Part two: Nutritional (the feeding formula) parameters assessment: It involved time of starting feeding if less or more than 24 hours, description of the feeding formula and technique (routine formula according to hospital routine diet as milk, fruit juice, and sometimes homemade mashed green vegetables, high protein, high fiber formula).

Part three: Defecation frequency record: It included recording time of first defection and frequency of passage stool per day.

Tool 2: Assessment of acute physiology and chronic health evaluation II (APACHEII) score:

The APACHE-II score was utilized to evaluate the severity of disease for adult patients admitted to ICUs. There are three sections to the APACHE-II score. The APACHE-II score's first component (biggest component) is generated from 12 clinical measurements taken within 24 hours of admission to the ICU. The variables are internal temperature, heart rate, mean arterial pressure, respiratory rate, oxygenation, arterial pH, serum sodium, serum potassium, serum creatinine, hematocrit, white blood cells count and Glasgow coma scale. The second component is age adjustment, which adds one to six points for patients over 44 years old. Chronic health evaluation is the APACHE-third II's component. An

additional adjustment is made for patients with severe and chronic organ failure involving the heart, lungs, kidneys, liver and immune system, he Acute Physiology Score (APS) measures the physiological condition of the critically ill patients in intensive care units. The APACHE II Score scale ranges from 0, least severe, to 60, most severe **(Naved et al., 2011; Rafiee et al., 2020).**

Tool 3: The Victoria Bowel Performance Scale

The Victoria Bowel Performance Scale (BPS) is a patient-centered assessment tool of bowel function and is the only tool that evaluates late defecation and diarrhea. The BPS **(Figure 2)** is intended to rapidly and easily assess changes in bowel status, particularly in critically care ill patients. This bipolar, 9-point ordinal scale ranges from –4 (late defecation) to +4 (diarrhea) and includes 3 assessment parameters: stool frequency, consistency, and the patient's ability to control evacuation. The health professional collaborates with the patient to complete the BPS to reach a single score based on the overall ''best vertical fit'' in the assessment parameters **(Downing, et al., 2007; Hawley et al., 2011)**.

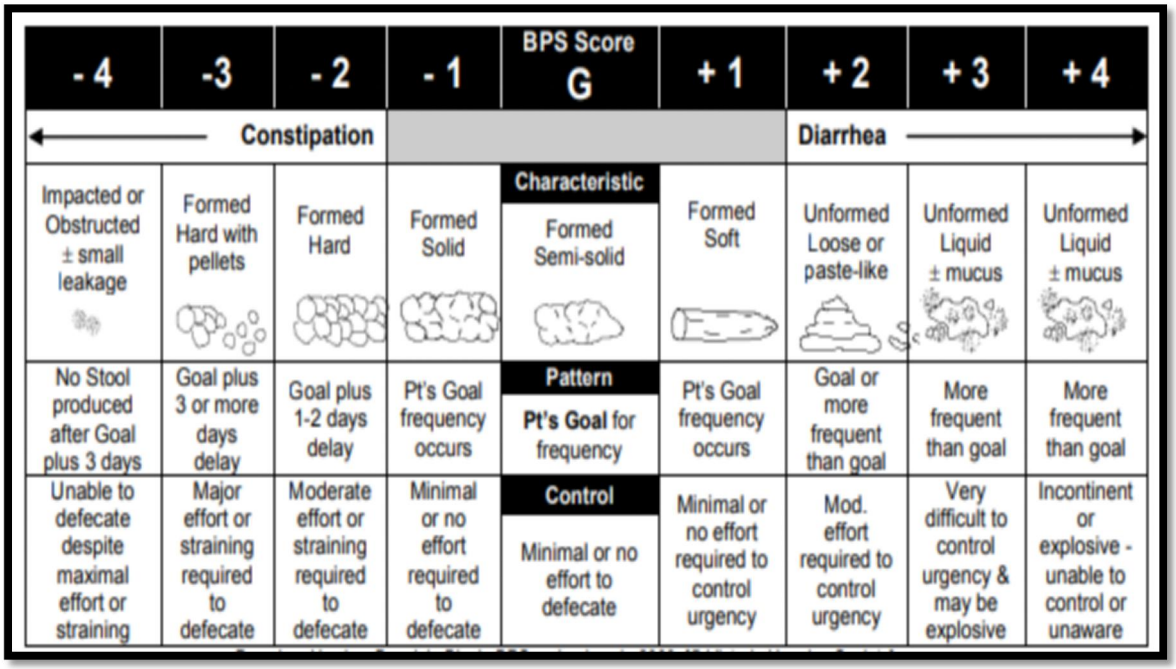


Figure 2: The Victoria Bowel Performance Scale (Downing, et al 2007; Hawley et al., 2011)

Tool 4:-Patient outcomes assessment tools:

The researchers designed this instrument to assess patient outcomes based on the related literatures **(Fukuda et al., 2016; Brasiel PGA et al, 2020; Ali et al., 2022)**. It included assessment of primary outcomes (duration of MV and weaning status) as well as assessment of secondary outcomes (length of ICU stay and mortality rate)**.**

Field work: the researchers were carried out this study in two phases.

1) Preparatory phase: The phase involved:

- **Ethical consideration:**
  - An official permission from the Research Ethics Committee, Faculty of Nursing, Assiut University.
  - After explaining the study's purpose to the competent authorities at Assiut University's general, anesthetic, and trauma intensive care units, an official and non-official

authorization to conduct the study was obtained, the researcher started to recruit the sample of patients. The purpose of the study was simply explained to one of the close relatives (father, mother, husband, or wife), who officially agreed to participate in the study prior to any data collection. During the implementation of the research, there was no risk to the study subjects. The investigation was conducted in accordance with standard clinical research ethics. Anonymity and confidentiality are assured through coding the data. All of the information obtained was secure.

- **The tools were tested for face and content validity** by five specialists in the field of critical care medicine and critical care nursing to evaluate the readability, content and feasibility, and some modifications were made to the clarity of some items.
- **The tools' reliability** was also assessed utilizing Cronbach's alpha to test their internal consistency, and they received an excellent internal consistency reliability level (= 0.987).
- **Pilot study**: A Pilot study was carried out with 12 patients from the sample under study to test the applicability, clarity and efficiency of the tools. The patients who participated in the pilot study included in the study sample.

2) Assessment Phase:

- **The following data were obtained from the patients' medical records:** age, sex, main diagnosis, date of admission, (APACHE) II score, time of the first defecation, frequency of defecation, date of initial enteral feeding, use of mechanical ventilation, and use of medications. Use of medications" was defined as the continuous administration of medications, such as sedatives, opioids, and vasopressors, for >24 h. Use of mechanical ventilation" was defined as the use of a ventilator for >24 h after intubation.
- **Feeding formula and technique:**
  - The feeding formula (routine formula according to hospital routine diet as milk, fruit juice, and sometimes homemade mashed green vegetables, high protein, high fiber formula).
  - The identical technique for achieving the enteral nutrition (EN) target was employed in groups, starting with bolus EN administration at 25 mL/h and rising by 25 mL/h every 6 hours until the goal of 85 mL/h was reached.
  - Patient positioned in bed semi fowler's (head of bed 45-60 degrees) as tolerated.
  - We assessed the ability of patients to enterally feed. Failure to feed was defined as stopping of enteral feeding because of large gastric aspirates (when the volume of fluid aspirated after a 4±6 h feeding period, which was tried again after a rest period of 4±6 h, was more than 50% of the volume administered) or repeated vomiting. Metoclopramide 10 mg and, if unsuccessful, erythromycin 125 mg were given intravenously if poor upper intestinal motility was suspected.
- **Defecation assessment:**
  - Defecation was assessed by nurses using more systematic instrument (the Victoria Bowel Performance Scale).
  - Based on the previous studies by **(Fukuda et al, 2016; Prat et al, 2016**) early defecation was defined as defecation at ≤5 days after ICU admission and late defecation was defined as defecation ≥6 days after ICU admission.
  - According to the above definitions, the participants were divided into two groups (normal defecation, late defecation) based on their defecation status during the first week in the ICU.
- **Weaning status:**
  - A weaning trial was defined as the first attempt to discontinue mechanical ventilation support through a spontaneous breathing trial (SBT) with either of the following methods: continuous positive

airway pressure (CPAP), pressure support ventilation (PSV), or synchronized intermittent mandatory ventilation (SIMV), T-piece **(Diaz-Soto et al., 2020)**.

- Weaning from mechanical ventilation was started when the cause or disease process necessitating mechanical ventilation had significantly improved or resolved, gas exchange was adequate (arterial oxygen tension >8 kPa and inspired oxygen fraction <0.5), sedation was being reduced with appropriate neurological and muscular status, cardiovascular function was stable, and the patient was considered ready to wean.
- Failure of weaning (to reduce or discontinue ventilator support or a trial of spontaneous breathing) was recorded if a patient had any of the following: ventilator frequency more than 35 bpm, arterial oxygen saturation less than 90%, heart rate more than140 beats min±1 or less than 20% sustained increase or decrease in heart rate, or systolic arterial pressure more than 180 mm Hg, or agitation, anxiety, or sweating.
- The general treatments, procedures for weaning from MV and nutritional support for both groups were based on local protocols.

▪ **The clinical outcomes:** The length of ICU stay, the length of mechanical ventilation, and ICU mortality were recorded as the clinical outcomes.

Statistical analysis

All analyses were performed with IBM SPSS Statistics for Windows version 19.0 (SPSS Inc., Chicago, IL). The independent sample t-test was used to compare quantitative variables between the studied groups as well as the chi-square test was utilized to compare qualitative variables. $P < 0.05$ was considered significant.

Results

Table 1: The basic characteristics reveal that the mean and standard deviation of age was (44.28 ± 11.42& 44.32±11.30) while, 34(64.2%) and 50 (74.6%) of them were male in the normal defecation group and the late defecation group respectively. Traumatic brain injury 14 (26.4%) was the most common diagnosis in the normal defecation group while circulator disorders 30 (44.8%) was the most common diagnosis in the late defecation group. This explained by these patients received vasopressor which increase the risk of late defecation. The mean and SD of APACHE 11 was (20.05 ± 8.56 & was 21.76±7.99) in the normal defecation group and the late defecation group respectively. There was no statistically significant difference in all basic data.

Table 2: This table shows that 30.2 % and 55.2 % of patients in the normal defecation group and the late defecation group respectively received muscle relaxants with statistically significant difference (P value= 0.006*). All patients in the two groups received laxative and sedation to synchronize mechanical ventilator.

Table 3 shows that (58.5%) of patients received feeding within the first 24 hours of admission in the normal defecation group while, (64.2%) of patients received feeding after 24 hours of admission in the late defecation group with statistically significant difference between both groups.

Table 4: This table shows that 45 (84.9%) of the studied patients in the normal defecation group defecate within the first three days of ICU admission versus 67 (100%) of the patients in the late defecation group defecate after six days of ICU admission, with a statistically significant difference between the two groups (P value 0.05). In the normal defecation group, the frequency of patients defecating more than twice in the first week was 33 (62.3%),

with a statistically significant difference between the two groups (P 0.05).

Table 5 shows that (24.5%) versus (52.2%) of patients in the normal defecation and the late defecation groups failed to wean from the first trial, respectively, with statistically significant difference (P value = 0.002*). Regarding the mean and SD of duration of MV in the normal defecation group and the late defecation group was (7.30 ± 3.69 & 9.71 ± 3.69), respectively, with statistically significant difference (P value <0.001).

Table 6 reveals that frequency of survival was (73.6%) in comparison with (62.7%) in the normal defecation group and the late defecation group respectively without statistically significant difference (P value = 0.2). Patients in the late defecation group stay for a longer period than patients in the normal defecation group within the mean duration (10.69 ± 3.42 & 13.00±3.87), respectively, with a statistically significant difference (P value = 0.001*).

Figure 3 reveals positive correlation between APACHE score and time of first defecation**.**

Figure 4 reveals positive correlation between duration of mechanical ventilation and time of first defecation.

Table (1): Frequency distribution of studied patients regarding demographic characteristics and medical Data: (n=120):

Item		Normal defecation group (n=53)	Late defecation group (n=67)
Age		**44.28±11.42**	**44.32±11.30**
Sex	Male	**34 (64.2%)**	**50 (74.6%)**
	Female	19 (35.8%)	17 (25.4%)
Diagnosis	Respiratory diseases	12(22.6%)	10 (14.9%)
	Sepsis	6 (11.3%)	6 (9%)
	Traumatic brain injury	**14 (26.4%)**	10 (14.9%)
	Chest trauma	2(3.8%)	1(1.5%)
	Renal failure	3 (5.7%)	3 (4.5%)
	Cancer	3 (5.7%)	4 (6%)
	Organ phosphorous poisoning	2 (3.8%)	3 (4.5%)
	Circulatory	11 (20.8%)	30 (44.8%)
APACHE II score		**20.05±8.56**	**21.76±7.99**

*APACHE: Acute Physiology and Chronic Health Evaluation.

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables.
- Independent samples t-test is used for comparing Mean and SD between the two groups.

Table (2): Frequency distribution of studied patients regarding receiving medication effect on defection during stay in ICU (n=120):

Item	Normal defecation group (n=53)	Late defecation group (n=67)	P value
Receiving muscle relaxants	16(30.2%)	37 (55.2%)	**0.006***
Receiving laxative	53(100%)	67(100%)	a
Receiving vasopressor	28(52.8%)	40 (59.7%)	0.45
Receiving sedative	53(100%)	67(100%)	a

a. No statistics are computed because sedation is a constant.

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables

Table (3): Frequency distribution of studied patients regarding feeding time during stay in ICU (n=120):

Item	Normal defecation group (n=53)	Late defecation Group (n=67)	P value
Receive feeding before 24 h of admission	31(58.5%)	24 (35.8%)	**0.013***
Receive feeding after 24 h of admission	22(41.5%)	43 (64.2%)	**0.013***
Receive feeding after 48 h of admission	3(5.7%)	8 (11.9%)	0.23

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables

Table (4): Frequency distribution of studied patients regarding time of first defecation and frequency of defection during stay in ICU (n=120):

Item		Normal defecation group (n=53)	Late defecation group (n=67)	P value
Time of first defecation from ICU admission	Within the first 3 days	8 (15.1%)	0 (0%)	**0.001***
	4- 6 days after admission	45 (84.9%)	0 (0%)	
	After the first 6 days	0(0%)	67 (100%)	
	(Mean ±SD)	3.58±0.90	6.19±0.94	
Defecation more than two times during the first week		33(62.3%)	0 (0%)	**0.001***

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables

- Independent samples t-test is used for comparing Mean and SD between the two groups.

Table (5): Frequency distribution of studied patients regarding mechanical ventilator outcomes (n=120):

Item	Normal defecation group (n=53)	Late defecation group (n=67)	P value
1st trial of weaning failure	13(**24.5%**)	35 (**52.2%**)	**0.002***
More than one trial weaning failure	2(3.8%)	9 (13.4%)	0.06
Duration of MV	7.30 ± 3.69	9.71 ± 3.69	**0.001***

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables

Table (6): Frequency distribution of studied patients regarding survival and stay in ICU (n=120):

Item		Normal defecation group (n=53)	Late defecation group (n=67)	P value
Survival	**Survivor**	**39 (73.6%)**	**42 (62.7%)**	0.20
	Died	14 (26.4%)	25 (37.3%)	
ICU stay		10.69±3.42	13.00±3.87	**0.001***

* Significant difference p .value < 0.05.

- Chi-square test is used for qualitative variables
- Independent samples t-test is used for comparing Mean and SD between the two groups.

Figure 3: Correlation between APACHE score and time of first defecation: Show positive correlation

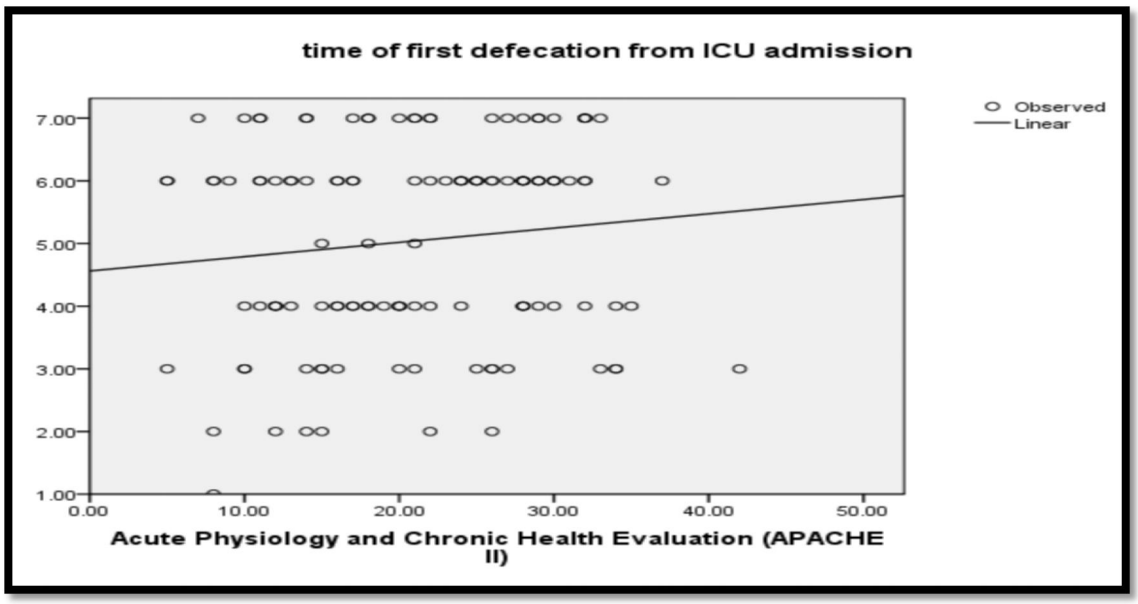
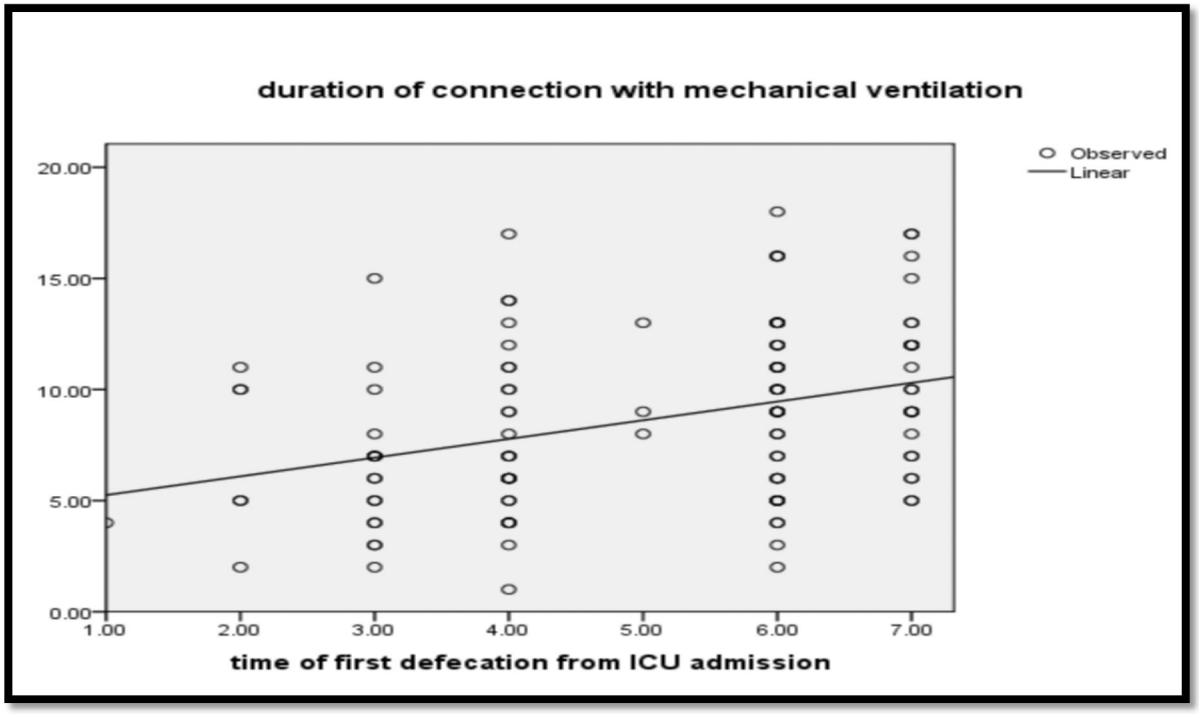


Figure 4: Correlation between duration of mechanical ventilation and time of first defecation: Show positive correlation



Discussion:

There were different definitions of late defecation in earlier studies, so the incidence of late defecation varied. **(Hay et al., 2019)** reported that patients who had no defecation for more than six days had greater negative outcomes than other patients, despite the fact that many prior studies had utilized the criteria of no defecation for less than three days. As a result, we were able to define late defecation in the current study as less than six days since ICU admission without defecation.

Out of 120 critically ill patients in our study, more than half of them delayed defecation without statistically significant socio-demographic differences. This high incidence could be caused by MV or immobility, and more patients in the late defecation group received a muscle relaxant. According to **(McClave, 2022)**, the majority of the patients they evaluated experienced delayed defecation, and age, sex, and entrance diagnosis had no bearing on this. This study's findings were comparable to those of earlier studies in which 34-58% of patients had late defecation (**Ali et al., 2022; Fukuda et al. 2016**).

Additionally, the current findings showed that there were no statistically significant variations in APACHE II score between the study groups. Similar findings were made by **(Spodniewska et al., 2013)** discovered that patients with and without constipation had identical APACHE II scores. On the other hand, (**De Azevedo et al., 2015**), who used a multivariate analysis to determine the relationship between the APACHE II score and late defecation. They discovered that in ICU patients, late defecation has been linked to increased mortality and worsening of organ dysfunctions, both of which can be estimated by the APACHE II score.

In terms of medication, more patients in the late defecation group received muscle relaxants and vasopressors than in the

normal defecation group. In critically ill patients, late defecation is linked to the use of vasopressors. One theory is that selective intestinal ischemia caused by shock, which necessitates the use of vasopressors, results from decreased gut motility, which causes intestinal atony and functional ileus. In this line, **(Ali et al., 2022**) showed that delayed defecation is related to the use of vasopressors; however, it is impossible to tell whether the late defecation results from the use of vasopressors or from the severity of the sickness for which the medicine was initially prescribed.

The current study emphasizes that sedation was given to all patients in both groups. This may be due to the use of sedative to synchronize intubation and MV, decrease bowel motility, and restrain the patients' body activities for many days, which may increase the risk of late defecation. This is in line with the findings of **(Fukuda et al., 2016)**, who concluded that the administration of sedatives was independently associated with late defecation. Also, Sedation and late defecation had a 79% stronger correlation in **(Ali et al., 2022**) analysis (P<0.001).

According to the recent statistics, practically every patient in both groups took laxatives at some point during the study in order to improve the mechanically ventilated patients' daily defecation despite participants in late defecation group pass after 6 days of admission. This could be contributed that the use of sedative, and immobility, which reduce bowel motility, may be underlying causes for late defecation, even use of laxatives. Our results were consistent with those of **(Lacy et al., 2016; Fennessy et al., 2017; Webster et al., 2017)** who recommended that prophylactic laxative use has clinical advantages and can successfully avoid late defecation in critically ill patients.

Regarding to feeding time and time of first defecation and it's frequency during stay in ICU, **The majority** of participants received enteral feeding after (> 24) hours of admission in the late defecation group. This could be contributed that late defecation may be related to late enteral nutrition due to disrupting the peristaltic activity's mechanical stimulation. (**Guerra et al., 2013; Brasiel PGA et al, 2020**) reported similar outcomes that patients who were on mechanical ventilation and received nutrition within 72 hours of ICU admission had greater frequencies of late defecation (72%). Similar findings were reached by **(Fennessy et al., 2017; Webster et al., 2017)** and about the advantages of early enteral feeding for critically sick patients with limited motility and documented that late defecation in these patients was linked to low or absent dietary fiber intake or was brought on by a decrease in gastrointestinal tract motility.

According to **(Spodniewska and Guha, 2013)**, a delayed bowel movement lasting more than 5 days is associated with a protracted mechanical breathing duration and MV weaning failure. According to the same theory, **(Guerra et al., 2013)** reported that individuals who were mechanically ventilated had a higher rate of late defecation. This is consistent with the current study findings that, more patients in the late defecation group statistically significant failed to wean more than once and spent more duration in the MV. This can be attributed by that increasing abdominal distension, which can affect respiratory function and lead to edema and atelectasis by reducing lung compliance and raising intra-thoracic and pleural pressure. Delays in weaning off artificial breathing may be caused by the diaphragm shifting upward, pain, and restlessness in response to late defecation. Late fecundation may cause elevated intra-abdominal pressure in some people **(Azevedo and Machado 2013)**. The attempt to wean off of artificial ventilation

can be affected by the occurrence of late defecation, as shown in the study by **(Guerra et al. 2016)**, in which weaning failure reached 42.5 %.

It is unclear how late defecation affects critically ill patients, but observational studies **(Rafiee et al., 2020; McClave, 2022)** have found links between it and longer hospital stay, increased mortality, feeding intolerance, abdominal distension, vomiting, restlessness, difficulty in weaning from mechanical ventilation, bowel obstruction, and perforation, which can occur if late defecation is not treated and can be associated with pneumonia caused by aspiration of gastric contents.

The results of the current study revealed that participants in the late defecation group statistically stay longer period in ICU. This may be explained by the fact that late defecation increases the danger of intra-abdominal hypertension, which in turn causes organ failure and rise in hospital expenses. Patients with fecal stasis have been documented to have acquired bacterial infections and this can result in prolonged stay in ICU, translating into increased hospital costs. This results supported with **(Fukuda et al., 2016**) who documented that late enteral feeding, and sedative were the independent causes for late defecation for patients in ICUs and late defecation was related to a prolonged intensive care unit stay. On the other way, **(Guerra et al., 2016; Marfil-Garza et al., 2018)** observed no statically correlation between late defecation and the length of intensive care unit stay. All patient mortality and poor hospital outcomes are linked to prolonged length of stay (LOS)

This study findings, showed a clinical increase in number of survivor in the normal defecation group than the late defecation group without statistically significant difference (P value = 0.2). On the other wise, the study of **(Ali et al., 2022)** reported that late defecation did not increase mortality in critically ill patients, an opposite study reported a significant impact of fecal impaction on mortality rates, as much as 22% **(Sommers et al., 2019).**

Conclusion

Critically ill patients have multi causes contributing to late defecation development. Some causes have direct effect, and others are indirect. Late defecation occurrence was high among the studied groups. The use of muscle relaxants and sedatives to synchronize mechanical ventilator, vasopressors and starting enteral feeding after 24 hours may be associated factors of late defection development. Late defecation has a negative effect on MV weaning in critically ill patients. Late defections indirectly increase the mortality rate and prolong duration of stay in ICUs.

Recommendations

Frequent monitoring of gastro-intestinal motility in critically ill patients, particularly those who are unconscious and on mechanical ventilation, and applying evidence based guidelines for management of disturbance in gastro-intestinal motility should be routine care in ICU. Critically ill patients should receive early enteral feeding with high-fiber content.

Limitations of the study:

There are a few restrictions on this study. First off, as all data were gathered via nursing and medical records. Second, because just one university hospital was involved in this study, it is possible that the findings cannot be applied to community hospitals or other institutions. Therefore, more research facilities may need to be used in future studies in order to increase the generalizability of the results.

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Conflict of interest

The authors declare no conflict of interest in this study.

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Author contributions

Dr Ghada was the owner of the idea of research. Dr Ghada and Dr Asmaa Atiaa conceptualized and designed the study. All authors contributed to data analysis, drafting the manuscript, gave approval of the final version to be published, and agreed to be accountable for all aspects of the work.

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