Correlation between Body Mass Index and Gastrointestinal Symptoms among Hospitalized Patients

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Abstract

Background: Gastrointestinal problems are highly prevalent in all age groups .The literature and recent studies are inconsistent about the association between body mass index (BMI) and gastrointestinal symptoms. **The aim of this study** was to determine the relationship between BMI and gastrointestinal symptoms among hospitalized patients**. Research Design** was   descriptive exploratory correlational design. **Research question:** what is the relationship between body mass index and gastrointestinal symptoms? **Setting:** Different medical critical care units and medical wards at Cairo university hospitals**. A sample of convenience of adult male and female patients who met the inclusion criteria was included. **Tools:** (a) the Structured Interview Questionnaire (SIQ). It covered personal data namely; age, sex, marital status, etc... and Medical history which included chief complaint, present history , past history. (b)Gastrointestinal assessment questionnaire (GIAQ), it included bowel habit assessment, common gastrointestinal symptoms and gastrointestinal diseases, and (c) body mass index (BMI). Patients were assigned into four groups based on the BMI using the classification of the World Health Organization. Results: A total of 489 patients were included (25.56%) were overweight (13.49%) were obese. Overall, in obese patients the prevalence of constipation (87.875) distention (83.33%) compared with normal weight; constipation (8.68%) , distention (6.94%) and dyspepsia (4.51%) Conclusion: there is a relationship between body mass index and some gastrointestinal symptoms such as constipation, dyspepsia, heart burn. A positive correlation was found between age and both constipation as well as heart burn and dyspepsia. **Recommendation:** Replicate the study on a large probability sample to realize generalizability and ensure consistency of results.

Key words: Body Mass Index, Gastrointestinal symptoms, Hospitalized patients

Introduction:

Gastrointestinal problems are highly prevalent in the subcontinent and the Middle East, but it's overshadowed by the huge attention given to cardiac and other ailments, (Sajjad, 2013).Gastrointestinal disorders can affect one or many organs in the gastrointestinal tract, as well as liver and pancreas. Common gastrointestinal disorders include: gastroesophageal reflux disease (GERD), peptic ulcer disease (ulcers), gastritis, and irritable bowel syndrome (IBS), inflammatory bowel disease (IBD; Crohn's disease, ulcerative colitis), (Resnick, 2014).

Gastrointestinal disorders include dyspepsia. It is defined as any troublesome pain or discomfort. It is a common symptom with an extensive differential diagnosis and a heterogeneous pathophysiology. It occurs in approximately 25 percent of the population each year, but most affected people do not seek medical care, (Longstreth & Lacy, 2013).

Irritable Bowel Syndrome (IBS) is a functional gastrointestinal disorder in which abdominal discomfort or pain is associated with changes in bowel habits, stool consistency and other features of disordered defecation. It is considered to be one of the most frequent clinical problems in gastroenterology, (European Medicines Agency, 2013). IBS is caused by changes in the gastrointestinal tract, which affects bowel movements, (Armas, 2013).

Gastroesophageal reflux disease (GERD), (acid reflux) is a condition in which the acidified liquid content of the stomach backs up into the esophagus. GERD may damage the lining of the esophagus, thereby causing inflammation (esophagitis), although usually it does not. The symptoms of uncomplicated GERD are heartburn, regurgitation, and nausea, (Marks, 2013).

Symptoms of gastrointestinal disorders can include abdominal pain, nausea, vomiting, loss of appetite, unexplained weight loss, constipation, bloating, and diarrhea. (Resnick,2014 and Armas, 2013). The symptom severities of pain/discomfort and bloating were associated with colonic transit abnormalities, (Sadik , Björnsson ,& Simrén 2010).

Constipation is a common condition; it has varied meanings for different individuals. Although medical personnel define constipation as <3 bowel movements per week, patients often equate constipation with stool consistency, feelings of incomplete emptying, straining, and urge for defecation. Furthermore, the normalcy of bowel habit ranges widely from 3 bowel movements per day to 3 per week, (Leung, et al., 2011).

Functional gastrointestinal diseases are prevalent in all age group. The prevalence of being overweight and obesity has been increasing worldwide, (Longstreth et al.,2011). It has increased at an alarming rate during the last three decades, and this appears to be more pronounced in women. The prevalence of obesity parallels increased industrial development and the resultant impact on rapid urbanization and improved living conditions, (Badran and Laher 2011). On a global level, the WHO warns of a chronic disease epidemic and projects that by 2015 there will be 2.3 billion overweight adults, plus more than 700 million obese adults. The WHO estimates that currently around one in every three of the world's adults is overweight, while nearly one in every ten is obese, (Charbel, 2014).

The World Health Organization (WHO) defines obesity as a body mass index (BMI) of 30 kg/m2 or more and considers obesity as a visible but neglected health issue that has only received recognition during the last 15 years, (Haslam and James,2011). The relationship between GI symptoms and obesity has yet to be completely clarified. Obesity is considered a multifactorial disease, that results from a mixture of genetic predisposition, environmental influences (e.g., sedentary lifestyle), and behavioral components (e.g., food as a reward), (Santonicola, et al., 2013). The rate of obesity has more than doubled over the past 30 years. Being overweight and obese are well-known causes of morbidity and mortality, (Reaven, 2011).

Several cross-sectional studies and one meta-analysis have demonstrated a positive association between elevated body-mass index (BMI) (the weight in kilograms divided by the square of the height in meters) and symptoms of gastroesophageal reflux disease. However, in these previous studies, analyses were restricted to overweight and obese subjects, with those who had a BMI of less than 24 or less than 25 serving as a reference group, (Jacobson et al., 2006).

Weight loss is a recognized alarm symptom for organic gastrointestinal (GI) disease, yet the association between obesity and specific GI symptoms remains poorly described. Overall, significant associations between GI symptoms and increasing BMI were found for upper abdominal pain, gastroesophageal reflux, diarrhea, chest pain/heartburn, vomiting, retching, and incomplete evacuation. However, no significant associations were found for all abdominal pain, lower abdominal pain, bloating, constipation/hard stools, fecal incontinence, nausea and anal blockage. Several key GI symptoms are associated with increasing BMI and obesity. In addition, there were a number of other GI symptoms that had no relationship with obesity, (Eslick , 2012). Hence, obesity is considered as a risk factor for many functional digestive disorders, (Fysekidis et al., 2012).Therefore this study was conducted to determine the relationship between body mass index and gastrointestinal symptoms among hospitalized patients.

2-Aim of the Study:
The aim of this study was to determine the relationship between body mass index and gastrointestinal disorders among hospitalized patients.
3-Research questions:
The following research question was formulated to achieve the aim of the study:
What is the relationship between body mass index and gastrointestinal symptoms?

4. Subjects and Methods:
4.1. Design: descriptive exploratory correlational research design was utilized   .
4.2. Sample:
   A sample of convenience of 489 male and female conscious adult patients admitted at the medical departments and medical critical care units; (369 from medical departments and 120 patients were medical critical care units). The exclusion criteria were patients who had terminal disease, on mechanical ventilator and didn't accept to participate in the study   .
4.3. Setting:
   The study was conducted at medical departments and critical care units at one of the Cairo university hospitals in Egypt.
4.4. Tools:
Three tools were utilized in the current study:
4.4.1.Tool 1 : The Structured Interview Questionnaire (SIQ) was designed by the researchers based on literature review, it included   (a) personal data namely; age, sex, marital status, educational level, employment status ,   etc... and (b) Medical history that includes chief complaint, present history past history, as (hypertension, hypotension, anemia, colitis,…..etc
4.4.2. Tool 2: Gastrointestinal assessment questionnaire (GITAQ), it was developed by the researchers after

extensive review of literature, it included; bowel habit assessment, common gastrointestinal symptoms and gastrointestinal diseases.

4.4.3. Body Mass Index (BMI): participant's weight and height were measured and used to calculate the body mass index (BMI [kg/m2]). Patients were assigned to four groups based on the BMI using the classification of the World Health Organization as follows: Group I (underweight) - BMI < 20.0 kg/m2; Group II (normal weight) - BMI 20.0 - 24.9 kg/m2; Group III (overweight) - BMI 25.0 - 29.9 kg/m2; Group IV (obesity) - BMI > 30.0 kg/m2.

4.5. Ethical Consideration:

Permission to conduct the study was obtained from the hospital authorities. Prior to the initial interview, the researchers introduced themselves to patients who met the inclusion criteria; each potential patient was fully informed with the purpose and nature of the study, and then an informed consent was taken from participants who accept to participate in the study. The researchers emphasized that participation in the study is entirely voluntary and withdrawal from the study would not affect the care provided; anonymity and confidentiality were assured through coding the data..

4.6. Content validity and Reliability:

The developed questionnaires tools were reviewed by three panel of experts in critical care nursing to ensure its validity. The reliability of the knowledge was confirmed by alpha Crobach of 75 % and the positive inotropic checklist was tested and retested and its items were significantly correlated with Pearson correlation (r=0.81,p 0.00).

4.7. Pilot Study:

A pilot study was carried out on 20 patients to test feasibility, objectivity, and applicability of the study tools. Based on the results of the pilot study, the needed refinements and modifications were made. The sample included in the pilot study was excluded from the final study sample.

5. Procedure:

An official permission was obtained from the assigned departments to conduct the proposed study. Once permission was granted to proceed with the proposed study, the researchers met the patients who fulfilled the inclusion criteria, the purpose, nature of the study, and tools were explained and written consent was taken from the literate patients and oral consent was taken from illiterate patients who accept to share in the study. The Structured Interview Questionnaire (SIQ) was read, explained and the choices of answers from patients were recorded by the researchers. For more validation of information, patients' files were revised to complete the needed information. The Gastrointestinal assessment questionnaire (GITAQ), was filled out by the researchers from the patients. Then, measure participant's height using a measurement tape and weight using foot scale with light clothes in the morning time. The measured values of weight and height were used for calculation of the body mass index (BMI = body weight divided by the square of the height). Accordingly ,the studied populations were classified into four groups as follows ; Group I (underweight) - BMI < 20.0 kg/m2; Group II (normal weight) - BMI 20.0 - 24.9 kg/m2; Group III (overweight) - BMI 25.0 - 29.9 kg/m2; Group IV (obesity) - BMI > 30.0 kg/m2. Each participant was interviewed individually and the data collection time for each patient lasted about10 to 15 minutes. Data collection of this study lasted from April to September 2013.

6-Statistical analysis

SPSS–PC 20 was used for statistical analysis. Results were reported as frequency and percentage distributions and chi square test was used to compare data. In addition Bivariate correlations were used in order to evaluate the relationship between selected socio demographic variables and selected gastrointestinal symptoms. Pearson correlation coefficient was calculated. P value of less than 0.05 was considered statistically significant.

Results:

The data obtained by the designed tools were tabulated, analyzed and presented as follow and the details of the table can be found in the Appendix at the end of this article:

Table (1) presents frequency distribution of demographic variables by their body mass index A total of 489 hospitalized patients in medical departments and critical care units .their mean age was 28.13 $\pm$ 16.1; there were 52.76 % male and 47.24 female. Most of participants (67. 49%) were single and (80.98%) low educated. In addition, most of participants (62.58%) were unemployed, (77.5%) not smoker, and (65.04 %) not tea drinker.

Table (2) presents distribution of gastrointestinal symptoms of the studied sample by their gender. It shows that the highest percentage (37.98%) of males in the study have constipation, while the highest percentage (54.11%) and (40.25%) of females have abdominal distension and Flatus respectively. There are significant differences between male and female regarding dyspepsia, nausea & vomiting, heart burn, flatus, and abdominal distension (p =0.00).

Table (3) presents frequency distribution of gastrointestinal symptoms by body mass index. It illustrates that the highest percentage of the study sample who have constipation (88%) were overweight ; while the highest percentage having distension (83.33%), dyspepsia(72.72%), flatus(72.72%),, piles (72.72%), and heart burn (45.45%) were obese.

Table (4) Shows the highest percentage of study sample who have normal weight (38.54%) their bowel habit is twice per day, while more than half of overweight and obese groups their bowel habit every other day and more than 2 days (68.0% and 61.11% respectively).

Table (5): presents Correlation between selected demographic variables and gastrointestinal symptoms. it revealed that age is significantly positive correlated with constipation and dydpepsia and heart burn. (r= 0.3, p=0.00, and r=0.36, p=0.00 respectively),and negative correlation with heart burn (-0.1, p= 0.03). Low education is significantly correlated with piles (r=0.15,p=0.001); while there is no correlation between high education and any gastrointestinal symptoms. A negative correlation was found between employed as well as un employed with dyspepsia (-0.26,p=0.00, and -0.258, p= 0.00 respectively); also with heart burn and flatus. Moreover, smoking is significantly correlated with dyspepsia and heart burn while no correlation were exist between non smoker and any Gastrointestinal symptoms. Finally, the findings revealed that body mass index is only significantly correlated with constipation (r=0.13,p=0.02).

Table (6): Presents Distribution of medical history and diagnosis in relation to body mass Index. it revealed that the highest percentage of participants with normal weight and overweight patients have headache (27.08% & 25.6% respectively),while the highest percentage of obese group (31.8%) has hypertension. In addition, it is apparent that the obese group has ischemic heart diseases (25.7%), Diabetes (16.6%), cerebral stroke (16.6%), chest infection (12.12%) and chronic renal failure (12.12%) when compared to other groups. On the hand gastrointestinal diseases are not prevalent in all groups except few cases in overweight that were liver cirrhosis (3.2%).

Table (7) presents distribution of patients by medical management in relation to their body mass index. It is apparent from this table that the majority of the obese groups were being administered broad spectrum antibiotics (75.75%), laxatives (69.60%), coronary vasodilators (48.48), analgesics (45.45%), anticoagulants (40.90%), and antihypertensive (37.87%). On the other hand, the overweight patients were administering analgesics, antihypertensive, anticoagulants. In relation to the patients with the normal weight, they were receiving analgesics, broad spectrum antibiotics. Finally, the highest percentage in all groups were receiving enteral nutrition .

8-Discussion
The aim of the present study was to examine the relationship of body mass index and gastrointestinal disorders with considering other potential confounding factors that may affect such as demographic variables, medical history , bowel habits , patient's diagnosis and medications that may affect the gastrointestinal functions. .Therefore the following discussion was classified to six sections. First; was description and distribution of demographic variables. Second , was distribution of gastrointestinal symptoms of the studied sample by their gender. Third, distribution of gastrointestinal symptoms among hospitalized patients by their body mass index categories .Fourth, the reported bowel habits pattern in relation to body mass index status . Fifth ;correlation of demographic variables and body mass index with common gastrointestinal symptoms .Sixth, distribution of patient's diagnosis and finally medical management by their body mass categories.

8.1.Distribution of demographic variables by body mass index categories
The current study shows that more than half of participants have normal weight, more than quarter have overweight group and more than tenth are obese. The majority of all of them are less than 50 years and more

than half of all groups are males. More than half of overweight and obese groups are males. This incongruent with Solhpour, (2010) who point out that after the age of 50, the high body mass index were increased in females, but were decreased in males. Whereas, Tamashiro (2008) studied gender differences in the relationships between obesity and lifestyle risk factors and revealed that obesity is more in male than female. Moreover, Charbel (2014) & WHO (2014) reported that the highest levels of overweight and obesity in Egypt, and in Arab countries. The prevalence of overweight and obesity in these countries ranges from 74% to 86% in women and 69% to 77% in men. These data indicate a much higher prevalence of obesity among adult women, while overweight is more marked among adult men.

   The current study illustrated that the majority of obese group were married, while the normal weight group was single. This might indicate to change of life style of Egyptian people after marriage as they get weight gain. This coincide with Badran and Laher,(2011) who mentioned that married people are more susceptible to being overweight and obese; moreover, Khader et al., (2011) in a randomized population study in Jordan, mentioned that the prevalence of obesity in married adults was 54% compared to 37% in unmarried adults. Similar findings were reported in studies done in other countries of the Arabian Gulf (Musaiger, et al., 2011, Al-Shammari, et al., 2011). One reason for this could be that married couples are less active and tend to eat together, likely reinforcing increased food intake (Jeffery & Rick, 2011).

   As regards level of education, the majority of studied sample were low educated So. The ratio of overweight and obesity is higher in low educated patients than highly educated patient .This finding is in congruent with Veghari, (2010) , Pourhoseingholi (2009) , Mack (2008) & Dukas,(2003) who mentioned that the obesity and overweight are more prevalent and tend to occur in low educated persons than highly educated ones. Badran and Laher (2011) added that there is evidence that illiteracy increases the level of obesity in the Arabic-speaking countries.

   The current study finding revealed that the higher percentage of overweight and obesity were higher in unemployed than employed patients; in addition , higher percentage of non-smokers were in normal, overweight and in obese groups. .Finally, more than half of the tea/coffee drinker were overweight and obese. These findings are agreed with Al-Windi .(2010) Who stated that Neither smoking nor physical activity were related to overweight or obesity and this is in line with Shapo et al (2003) who reported that income, smoking and leisure time physical activity were not associated with obesity but in contrast to Martinez et al (1999) who stated that smoking is linked with obesity supported by Tamashiro (2008) findings who studied gender differences in the relationships between obesity and lifestyle risk factors and revealed that obesity is more in male than female and is more prevalent in smoker persons.

8.2. Gastrointestinal symptoms of the studied sample by their gender.

    This study findings revealed that the highest percentage of males and female   have constipation. This finding is consistent with Sharma (2006) study that was conducted on 50 critically-ill patients admitted in I.C.U.s, and the results revealed 60% incidence of constipation among critically-ill patients. These findings were supported by Mostafa's findings (2003) who conducted a study on 48 critically-ill patients for 3 months and revealed that the number of constipated males were more than females   , but is inconsistent with Pourhoseingholi,(2010) & Shubbar (2006) who demonstrated that women were more likely to be constipated than men. Moreover, our study findings revealed that there was a significant statistical difference regard ing prevalence of bloating , heart burn and dyspepsia among male and female .These findings are supported by Pourhoseingholi,(2010) & Khoshbaten (2008) who revealed that bloating , heart burn and dyspepsia were more prevalent in women than males.

8.3.Gastrointestinal symptoms among hospitalized patients by their by body mass index

   The current study findings revealed that constipation , dyspepsia ,bloating ,heartburn and blood in stools were present in higher percentage among overweight and obese when compared to the other categories of body mass index .These findings are partially in congruent with Solhpour,(2010)   who mentioned that after the age of 50,the prevalence of dyspepsia symptoms and high body mass index were increased in females, but were decreased in males complemented by Khoshbaten (2008) findings revealed increased BMI is associated with increased digestive symptoms and signs such as constipation and bloating . Murray (2003) added that being above normal weight substantially increases the likelihood of suffering from heartburn and acid regurgitation and obese people are almost three times as likely to experience these symptoms as those of normal weight.

8.4. Reported bowel habits pattern and patients' body mass index categories

In the current study the researchers investigated the patients' reported average frequency of defecation in relation to their body mass index and revealed that the highest percentage of patients who have normal weight , their bowel habit is twice per day, while near half of the overweight and obese patients, their bowel habits were   every other day and more than 2 days respectively. This result is incongruent with Chen et al., (2010) study result that the prevalence of constipation is 7.1% in the population whose BMI is lower than 18.5, but it is 2.6% in the population whose BMI is higher than 25. One possible explanation may interpret this phenomenon is dietary and physical activity factors. As the hospitalized patients get t low intake of fiber diet and they may experienced anorexia as a result of their disease process. In addition, their limited activity and movement, could lead to decrease bowel movement. The other possible factor that may affect the frequency of defection in obese and overweight is that hospitalized patients receiving opiates, analgesics, and other drugs that were more likely to lower gastrointestinal motility. This findings is supported by Chappell, (2008) who stated that Opioid-induced bowel dysfunction encompasses delayed gastric emptying accompanied by increased gastroesophageal reflux, as well as constipation .   Another cause that may led to constipation in the current study among obese patient excessive use of diuretics The present study finding is supported by Sanjoaquin (2003) who mentioned that women had fewer bowel movements on average than men, and were less likely to have daily bowel movements and There were also significant positive associations between bowel movement frequency and body mass index (BMI).

8.5. Correlation between demographic variables and gastrointestinal symptoms.

The researchers studied the correlation between the selected demographic variables such as age ,educational level , employment statues ,smoking status and body mass index and among selected common complaint gastrointestinal symptoms in the studied sample. The present findings revealed positive significant correlations between patients' age and some gastrointestinal symptoms that were; constipation, dyspepsia, and heart burn. The current study finding is partially consistent with Zasshi (2011) who revealed there is significant positive correlation between constipation and both age and female gender complemented with Yazdanpanah,(2012) & Wallander (2007) who revealed that there is positive correlation between age and dyspepsia   and stated that dyspepsia in people over 60 was higher than those under 40 (2.12 times). And explained that these differences may be the result of various care statuses, environmental and nutritional factors, or drug consumption. Moreover, Pourhoseingholi (2012) revealed that there is a positive correlation between age and heart burn.

As regards correlation between educational level and selected complained gastrointestinal symptoms . The current study revealed that positive correlation were exist between low educational level and piles. The current study finding is consistent with Wronski (2012) who mentioned that no significant statistical correlation between gender, age, education, place of residence and the presence of internal hemorrhoids and recommended to conduct a multi-center study, which would explain the exact etiology of this disease and would help develop effective prevention and treatment.

As regards correlation between smoking and gastrointestinal symptoms, the current study findings   revealed that there were negative correlation existed as regards dyspepsia, heart burn and flatus . These findings contradicted with   Talley(1994) who revealed that no association between smoking, employment   and dyspepsia could be detected .

8.6. Clinical Characteristics of Patients by BMI Group

The investigator studied the prevalence of diseases and general symptoms among patients according to their body mass index categories .the study findings revealed that the highest percentage of patients with normal weight and overweight have got headache. While most of obese patients have got, hypertension, ischemic heart diseases ,cerebral stroke, Diabetes, chest infection, and chronic renal failure when compared to other categories of body mass index. This study finding is consistent with Ali (2013) who studied the correlation between body mass index in obese and non obese critically ill patients and revealed that hypertension ,diabetes ,coronary heart diseases , dysrhythmias, cerebral stroke , cerebral hemorrhage ,chronic obstructive pulmonary diseases and respiratory failure are more prevalent among obese male when compared to the non obese male. on the other hand , hypertension, diabetes , coronary heart diseases, and stroke are more prevalent in obese female as compared to non obese female. Moreover, the current study finding is agreed with Field et al. (2001) who mentioned that ischemic stroke was 75% in women aged 30–55 with higher body mass index > 27. While Rexrode et al. (1997) mentioned 13.7% higher in those with a   BMI > 32, compared with women who had a

BMI < 21.

8.7.Distribution of medication in relation to patients' body mass index

   The current study findings revealed that high rate of all groups were being received broad spectrum antibiotics and analgesics/NSAIDs. Through empirical observation, it was observed that most obese patients consume analgesics that explain the presence of many health problems more than other BMI categories. Moreover, high rate of obese group administered laxatives; this could indicate the presence of constipation among this group. This study also demonstrate that high rate of obese group being received coronary vasodiators , anticoagulants, hypoglycemic agents, Iron supplements, anti acids, and inotropics. The possible explanation for this phenomenon that the obese patients in the current study findings have got more than one diseases and depended on symptomatic treatment such as chest pain, dysnea, dyspepsia, heart burn, and headache; in addition to medical treatment of their diseases. than other categories who have the same diseases.

Regarding types of nutrition, the study exemplify that the highest percentage in all BMI groups had parentral nutrition, this could be due to fluid and electrolyte deficit as a result of their diseases process. Moreover , restricted fluid intake have been reported in a cases in obese group; this could be due to their nature of disease which necessitate restriction of fluids such as pulmonary odema and kidney failure.

9-Conclusion

   Based on findings of the current study, it can be concluded that there is a relation between body mass index, as increased body mass index is positively related to some gastrointestinal symptoms such as constipation, dyspepsia, heart burn. Moreover, there   is positive correlation between   socio demographic variables such   as age and constipation as well as heart burn and dyspepsia.

10-Recommendation

-Repetition of the study on a larger population to ensure generalization of results
 -Conduction of study to test correlation between body mass index and constipation

Acknowledgement

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Appendix:
Table (1) Distribution of demographic variables by body mass index (BMI) categories (N= 489).

Demographic data	Under weight N=10	Normal weight N=288	Overweight N=125	Obese N=66	Total N=489
	N (%)	N (%)	N (%)	N (%)	N (%)
Age:					
≤50	9 (90)	277 (96.18)	101 (80.8)	34 (51.51)	421 (86.09)
>50	1 (10.)	11 (3.81)	24 (19.2)	32 (48.49)	68 (13.90)
Mean age= 28.13 ± 16.1					
Sex:					
Male	5 (50.0)	150 (52.08)	64 (51.2)	39 (59.09)	258 (52.76)
Female	5 (50.0)	138 (47.92)	61 (48.8)	27 (40.91)	231 (47.24)
Marital status					
Married	0 (0.0)	56 (19.44)	50 (40.0)	53 (80.30)	159 (32.51)
Single	10 (100)	232 (80.56)	75 (60.0)	13 (19.70)	330 (67.49)
Education					
Low	0 (0.0)	248 (86.11)	95 (76.0)	53 (80.30)	396 (80.98)
High	10 (100)	40 (13.89)	30 (24.0)	13 (19.70)	93 (19.02)
Employment					
Employed	1(10)	105(36.45)	49 (39.2)	28 (42.42)	183 (37.42)
unemployed	9 (90)	183(63.55)	76 (60.8)	38 (57.58)	306 (62,58)
Smoking					
Yes	3 (30)	66 (22.91)	25 (20.0)	16 (24.24)	110 (22.50)
No	7 (70)	222 (77.09)	100 (80.0)	50 (75.76)	379 (77.50)
Tea / coffee drinker					
Yes	4 (40)	65 (22.56)	64 (51.2)	38 (57.57)	171 (34.96)
No	6 (60)	223 (77.44)	61 (48.8)	28 (42.43)	318 (65.04)

Table (2) Distribution of Gastrointestinal symptoms of the studied sample by their gender (N=489).

GI. Symptoms	Male N=258) N (%)	Female (N =231) N (%)	X^2	P value
Dyspepsia	19 (7.36)	88 (38.09)	**72.42**	**0.00 ***
Anorexia	7 (2.71)	7 (3.03)	0.09	n.s
Nausea& Vomiting	11 (4.26)	23 (9.95)	7.59	**0.02 ***
Heartburn	13 (5.03)	41 (17.74)	**32.36**	**(0.00) ***
Constipation	98 (37.98)	97 (41.99)	3.18	n.s
Diarrhea	4 (1.55)	4 (1.73)	0.05	n.s
Flatus	17 (6.58)	93 (40.25)	**68.32**	**0.00***
Distension	23 (8.91)	125 (54.11)	**116.27**	**0.00 ***
Piles	8 (3.10)	17 (7.35)	4.85	n.s
Blood in stools	2 (0.77)	0 (0.0)	1.76	n.s

* Significant   n.s =non significant

Table (3):Distribution   of gastrointestinal   symptoms by patients' body mass categories (n= 489).

GI symptoms	Under weight N=10 N (%)	Normal weight N=288 N (%)	Overweight N=125 N (%)	Obese N=66 N (%)
Constipation	2 20)	25(8.68)	110 (88)	58 (87.87)
distension	3 (30)	20(6.94)	70 (56)	55 (83.33)
dyspepsia	2 (20)	13(4.51)	44(35.2)	48 (72.72)
Flatus	2 (20)	20(6.94)	40(32)	48 (72.72)
Flatus	2 (20)	20(6.94)	40(32)	48 (72.72)
piles	2 (20)	3(1.04)	5 (4)	15 (22.72)
anorexia	4 (40)	4(1.38)	3(2.4)	3 (4.54)
Nausea& Vomiting	3 (30)	12(4.16)	11(8.8)	8 (12.12)
Heartburn	3 (30)	3 (1.04)	18 (14.4)	30 (45.45)
Diarrhoea	2(20)	2(0.69)	1 (0.8)	3(4.54)
Blood in stools	-----	------	1 (0.8)	1(1.51)

Table (4) Distribution of reported bowel habits pattern by their body mass index status (n= 489).

frequency	Under weight N=10	Normal weight N=288	Overweight N=125	Obese N=66
	N (%)	N (%)	N (%)	N (%)
Once per day	3 (0.3)	79 (27.43)	15(12)	10(15.15)
Twice per day	4 (0.4)	**111 (38.54)**	15(12)	10(15.15)
3 times per day	0 (0.0)	55(19.09)	10(8)	5 (4.0)
Every other day	2 (0.2)	20(6.94)	**42 (33.6)**	**16(24.24)**
More than 2 days	1(10)	23(7.98)	**43 (34.4)**	**25(37.87)**

Table (5): Correlation between selected demographic variables, body mass index and gastrointestinal   symptoms.(n=489)

Items of correlates	Constipation	Dyspepsia	Piles	Heart burn	flatus
	r (P)	r (P)	r (P)	r (P)	r (P)
Age in years	**0.3 (0.00)** *	**0.36 (0.0)** *	-0.03 (0.4)	**-0.1 (0.03)** *	-0.12 (0.08)
Educational level					
Low education	0.03 (0.5)-	0.05 (0.20)	**0.15 (0.001)** *	0.07 (0.08)	0.02 (0.5)
High education	0.02 (0.03)	0.02(0.4)	0.01 (0.6)	0.07 (0.08)	0.02 (0.5)
Employment status					
Employed	-0.11 (0.6)	**-0.26(0.00)** *	0.03 (0.21)	-0.04 (0.07)	-0.22 (0.00)
Un employed	-0.12 (0.7)	**-0.258 (0.00)** *	0.05 (0.22)	**-0.09 (0.05)** *	**-0.1 (0.002)** *
Smoking status					
Smoker	-0.05 (0.2)	**-0.25 (0.00) ***.	-0.04 (0.33)	**-0.12 (0.006)** *	**-0.22 (0.00)** *
Not smoker	0.03 (0.21)	0.02 (0.4)	0.03 (0.21)	0.06 (0.07)	0.03 (0.21)
Body mass index	**0.13 (0.02)** *	-0.27 (0.54)	-0.008 (0.8)	-0.007 (0.8)	-0.01 (0.7)

Table (6) Clinical Characteristics of Patients by BMI Group (n=489)

Diagnosis/Disorder	Under Weight N (%)	Normal weight N (%)	Over weight N (%)	Obese N (%)
Gastrointestinal diseases / symptoms				
irritable colon	---	7(2.43)	5 (4.0)	---
gastritis	-----	1(0.34)	-----	1(1.51)
colitis	-----	1(0.34)	-----	0(0.0)
Gastric ulcer	-----	-----	1(0.8)	1(1.51)
Liver cirrhosis	-----	-----	4(3.2)	1(1.51)
Appendicitis	-----	-----	-----	1(1.51)
hepatitis	-----	-----	1(0.8)	1(1.51)
Inguinal hernia	-----	1(0.34)	1(0.8)	-----
Anal fistula	-----	1(0.34)	-----	-----
Cardio/ vascular diseases / symptoms				
hypertension	1(0.1)	3 (1.04)	**15(12.0)**	**21(31.8)**
hypotension	1(0.1)	2(0.69)	1(0.8)	1(1.51)
Ischemic heart disease	1(0.1)	2(0.69)	6(4.8)	**17(25.7)**
Rheumatic heart disease	-----	-----	-----	1(1.51)
Heart failure	-----	-----	1(0.8)	1(1.51)
palpitation	-----	1(0.34)	1(0.8)	-----
anemia	1(0.1)	**14 (4.86)**	2(1.6)	1(1.51)
dysrhythtmias	-----	-----	2(1.6)	3 (4.54)
dyslipidemia	-----	-----	-----	2(3.03)
Varicose veins	1(0.1)	1(0.34)	-----	-----
Cerebrovascular stroke	-----	3(1.04)	**9(7.2)**	**11(16.6)**
osteoarthritis	-----	2(0.69)	4(3.2)	-----
Respiratory diseases				
Chest infection	-----	3(1.04)	3(2.4)	**8(12.12)**
COPD	-----	1(0.34)	1(0.8)	4(6.06)
Bronchial athma	-----	-----	4(3.2)	5(7.57)
Respiratory failure	-----	-----	-----	1(1.51)
Renal diseases				
Renal stone	-----	3(1.04)	3(2.4)	1(1.51)
Chronic renal failure	-----	2(0.69)	4(3.2)	**8(12.12)**

Cont. of table (6) Clinical Characteristics of Patients by BMI Group (n=489)

Diagnosis/Disorder	Under Weight N (%)	Normal weight N (%)	Over weight N (%)	Obese N (%)
Others				
Diabetes	-----	3(1.04)	**10(8.0)**	**11(16.6)**
Headache	2 (0.2)	**78(27.08)**	**32 (25.6)**	4(6.06)
Headache	2 (0.2)	**78(27.08)**	**32 (25.6)**	4(6.06)
Septic shock	-----	1(0.34)	2(1.6)	3 (4.54)
Lumbar disc	-----	1(0.34)	1(0.8)	-----
Rheumatic arthritis	-----	2(0.69)	-----	-----
Insomnia	-----	-----	1(0.8)	-----
Dizziness	-----	7(2.43)	**10(8.0)**	2(3.03)

Table (7) Distribution of taken drugs and nutrition in relation to body mass index categories of hospitalized patients (n=489)

Drug name	Under Weight N=10 N (%)	Normal weight N=288 N (%)	Over weight N=125 N (%)	Obese N=66 N (%)
Narcotic analgesic	-----	-------	-------	7(10.60)
Analgesics/NSAIDS	3(30)	**65 (22.56)**	**32 (25.6)**	**30 (45.45)**
Muscle relaxants	--------	-------	-------	-------
Antidepressants	-------	-------	-------	-------
Anti acids	2(20)	10 (3.47)	1(0.8)	**12 (18.18)**
Hypoglycemic agents	-------	3 (1.04)	8(6.4)	**17 (25.75)**
Sedative/hypnotics	-------	-------	-------	**-------**
Laxatives/fiber supplement	-------	-------	5(1.73)	**40 (60.60)**
Antiemetic/ antispasmodic	3(30)	10 (3.47)	5(1.73)	**12 (18.18)**
Iron supplements	1	6 (2.08)	11(8.8)	**15 (22.72)**
Broad spectrum antibiotics	6(60)	**60 (20.83)**	12(9.6)	**50 (75.75)**
Anti-hypertensive	1(10)	7 (2.43)	**16(12.8)**	**25 (37.87)**
Diuretics	-------	1 (0.34)	5(4)	**13 (19.69)**
Inotropics	-------	1 (0.34)	2(1.6)	**10 (15.15)**
anticoagulants	1(10)	4 (1.38)	**14(11.2)**	**27 (40.90)**
Bronchodialators	1(10)	3 (1.04)	3(2.4)	5(7.57)
Antiarrhthmics	-------	3(1.04)	3(2.4)	7(10.60)
Coronary vasodiators	1(10)	1(0.34)	7(5.6)	**32(48.48)**
Type of nutrition				
Enteral nutrition	6(60)	210 (72,9)	110(88)	35(53.03)
Parentral nutrition	4(40)	78(27.08)	15(12)	28(42.42)
Restricted fluid intake	-------	---------	-------	3(4.5)

Note :more than one medication is administered