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## Irritable Bowel Syndrome Among Female Students in Princess Nourah University in Kingdom of Saudi Arabia

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### Abstract

In this study, our objective was to explore the knowledge of Irritable Bowel syndrome (IBS) among university female students in the Kingdom of Saudi Arabia (KSA). A cross-sectional study was conducted where 307 university students were surveyed using a self-administered questionnaire to assess their awareness. The questionnaire was based on the socio-demographic and life-style characteristics of the students to evaluate the prevalence of IBS in the community. About 60% of the population in the age group of 18-20 years are at a high risk of suffering from IBS. However, no significant difference is demonstrated between lifestyle habits such as consumption of fast and spicy foods and physical activities and onset of IBS among the students. Nevertheless, frequent episodes of exercise in a week may reduce the probability of IBS onset. Interestingly, almost half of the student population mentioned that they were taking antibiotics and their sleep was interrupted as they woke up in the middle of the night. Also, majority of the population indicated that their stool texture was different, either hard or loose associated with a pain and distended abdomen followed with gastritis. Abdominal discomfort, feeling of bloating, altered texture of stool and urgency to defecate could be due to the development of psychological stress associated with academics, which possibly intensifies the disease symptoms. Initial findings from our study justifies the need of future longitudinal surveys to validate the existence of psychological stressors and other risk factors in the development of IBS subtypes.

**Keywords:** Irritable Bowel Syndrome; female; cross-sectional ; university students ; lifestyle.

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## **1. Introduction**

Over the years, the consensus definition of IBS has evolved from an exclusively functional gastrointestinal disorder to a conglomeration of multi-symptomatic disorder of the brain-gut axis [1]. IBS can be classified into 3 categories namely, constipation dependent (IBS-C), diarrhea based (IBS-D) and a mixed bowel pattern predominant (IBS-M) which markedly impairs the health-related quality of life (HRQOL) with no significant difference between the 3 subtypes [2]. IBS is one of the most commonly diagnosed functional disorder of the bowel movement. Symptoms such as chronic abdominal discomfort associated with defecation, fecal urgency, consistency, and frequency, define the underlying pathology of IBS. IBS is associated with a dysfunctional large intestine. However, existing evidence also implicate the involvement of small bowel in the process [3]. Psychological and physiological factors that contribute to the etiology of IBS include anxiety, stress, depression, visceral hypersensitivity, brain-gut interactions etc., imposing a burden on the social well-being of the patients [4]. IBS patients avoid socializing, exclude food types from their diet, refrain from leisure activities and are absent at work which in turn has a vast impact on the anticipated grimness of their condition.

IBS affects 14- 24% of the women. Interesting research based on genome-wide association studies of IBS also reveal the involvement of variants at 9q32.1 chromosomal locus identifying females with increased risk of developing IBS [5]. Further research extrapolates a female to male ratio ranging from 1.1 – 2.6 based on the existing symptoms of IBS [5]. However, depending on the extent of defecation, the HRQOL is significantly diminished with individuals having worse bowel movement. Due to the absence of any biological marker that can clinically define IBS, physicians have been resting on external symptom-based criteria such as Manning and Rome. Manning criteria, a diagnostic algorithm which is used by the physicians to diagnose IBS is based on manifestations such as, abdominal discomfort, pain associated with increased frequency of passing loose stools, distended abdomen, mucus in the feces and a sensation of incompleteness after defecation. On the other hand, the Rome criteria is an international database that also aids in the diagnosis of functional gastrointestinal diseases like IBS, dyspepsia etc [6].

Several epidemiological studies show that approximately 5.7-34% of the population worldwide suffers from IBS while in Asia, a highly variable range is observed i.e. 2.3% - 34% [7]. On the other hand, in the African rural population, approximately 31.6% of the population suffer from IBS specific symptoms with a male-to-female ratio of 1:37.1. IBS statistics significantly varies depending upon the demographic location and the diagnostic criteria used for assessment. Moreover, due to the social stigma associated with the disease, only a small part of the population seeks health care advice for therapeutic intervention [8]. However, there are little known facts about the prevalence of IBS in the Middle Eastern countries especially among the medical students in Saudi Arabia. The population of medical students were chosen because of the fast and unhealthy life style that they experience. The medical students remain under perpetual stress to finish their studies, take care of both in and out-patients, conducting night shifts etc., thereby, adding to their stress level, especially for girls belonging to remote areas [9]. This is especially true for students who indulge in unhealthy junk foods to alleviate the stress of medical school.

PNU located in Riyadh, Kingdom of Saudi Arabia, is the largest university for women in the whole world.

Being a university graduate is indeed a matter of honor and pride and so women are incessantly pursuing higher education in Saudi Arabia. Since the employment rates are low among the tertiary educated women, universities offering graduate degrees are considered safe haven for high school women graduates, albeit temporarily [10]. These students are usually under stress in the academics and eventually after graduating from the university to obtain a job. Since, everyday stress, anxiety play an important role in the emergence of IBS, it was our prime interest to explore the awareness of IBS among these female students at PNU. Then correlate the socio-demographic and life-style factors with the occurrence of IBS in their everyday life.

## **2. Materials and Methods**

### ***2.1. Study Setting and Ethics statement***

A cross-sectional study was conducted from February 1–April 15, 2016 at PNU students campus, at A4 station, Riyadh, Kingdom of Saudi Arabia. A total of 307 undergraduate students in the age group of 18-25 years participated in the study. They were provided a structured questionnaire to understand the prevalence of IBS. The research protocol was approved by the Research Ethics Committee of the college of medicine at PNU.

### ***2.2. Sample Size Determination***

The sample size was calculated using Epi Info 3.5. Prevalence of knowledge of IBS was estimated to be 15% of the population, with an error estimate of 5% and 95% confidence interval.

### ***2.3. The Structured Questionnaire***

The Bowel Disease Questionnaire (BDQ), a structured instrument is used to measure and discriminate the functional gastrointestinal disorders such as chronic peptic ulcer, functional dyspepsia and IBS. The questionnaire has been developed by the World Gastroenterology Organization, with Danone support. For this study, the questionnaire was translated from English to Arabic version <http://www.worldgastroenterology.org/UserFiles/file/wdhd-2009-test-for-diagnosing-ibs.pdf>.

The definition of IBS was based on Rome III criteria [11]. The collected data originated from the self-reported questionnaire. The exclusionary diagnostic criteria to meet IBS, includes abdominal pain or discomfort at least 3 days per month in the last 3 months, associated with two or more of the following three symptoms: (i) improved defecation, (ii) altered frequency of stool, and (iii) altered consistency of stool. To confirm clinically positive IBS, the onset of the symptoms should be before 6 months and the students were required to experience the criteria listed above in the last 3 months.

The questionnaire also addressed socio-demographic factors such as age, sex, discipline and year of study etc., in order to explore its relationship with QOL of IBS patients. Questions relevant to QOL included factors such as consumption of high-fat foods, spicy foods and emotional stability relevant with exam related stress development.

In this study, the questionnaire was prepared relevant to the ‘Severity of IBS’ which used a scoring system based on five criteria for the clinical diagnosis of IBS. The list of criteria to validate the existence of IBS included, severity of the perceived pain, frequency of abdominal pain, severity of abdominal distension, a feeling of satisfaction after bowel movements, and the symptom based interference in the patient’s general lifestyle.

**2.4. Data management and analysis**

To explore the association between the possible risk factors included as categorical variables and IBS, Pearson’s  $\chi^2$  test was used. Adjusted and unadjusted odds ratios (OR) with 95% confidence interval was calculated to indicate the strength of association between the variables and IBS onset. The p values were calculated using two-tailed test and  $p < 0.05$  was considered statistically significant.

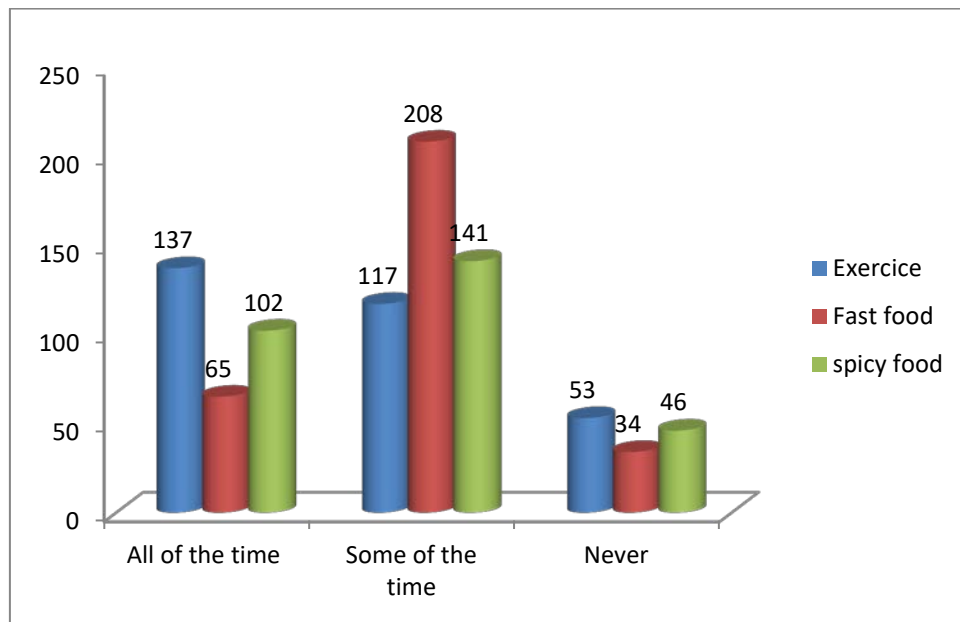
**3. Results**

A total of 307 students participated, out of which, 292 students (95.3%) were unmarried. Regarding their age, 104 students (34%) were below 18 years of age followed by 169 students (55%) in the age group of 18-20 years. The remaining 34 students (11%) were above 20 years old. Of the 307 students who were screened for IBS related symptoms, students belonging to different age groups, both below 18 and in the age group of 18-20 years were at a likelihood of developing IBS. Distribution pattern of IBS based on age-related factor shows that majority of the students belonging to the age group of 18-20 years old were at a higher risk of suffering from IBS (n = 203, 66%) followed by students who were above 20 years (n = 104, 34%). Probability of IBS prevalence was significantly higher in age group between 18-20 years ( $\chi^2 = 41.304, p < 0.001$ ).

**Table 1**

Disease infection		AGE			Total
		Under 18 years old	between 18 and 20 years	over 20years old	
no suffering	Count	104	169	34	307
	% of Total	34%	55%	11%	71.7%
may suffer from IBS	Count	0	203	104	307
	% of Total	0	66%	34%	100
suffering from IBS	Count	0	0	0	0
	% of Total	.3%	.0%	.0%	.3%
Total	Count	104	169	34	307
	% of Total	33.9%	55.0%	11%	100.0%

Regarding quality of life such as fitness related conditions, graph (2) shows that there is no statistically significant correlation between the students practicing physical activities and the probability of IBS prevalence ( $\chi^2 = 5.114$ ;  $p > 0.05$ ). Food types such as eating fried junk foods was not correlated with IBS development; 34 students (11%) never ate junk foods compared to 65 students (21%) who always ate street fast foods ( $\chi^2 = 8.246$ ;  $p > 0.05$ ). The graph (2) shows no statistically significant correlation between the probable onset of IBS and eating spicy foods; 46 students (14%) never ate spicy foods compared to 102 students (33%) who always ate spicy foods ( $\chi^2 = 6.305$ ;  $p > 0.178$ ). This survey shows that there is no statistically significant difference in IBS development between students exercising daily compared to students who exercised infrequently. Surprisingly, regular consumption of junk or spicy food compared to intermittent consumption also does not have any significant correlation with IBS development.



**Figure 1**

Regarding any sort of therapeutic application, primarily if the students were subjected to any sort of antibiotics treatment, out of 307 students, 25% of the population with 76 individuals were not subjected to any particular antibiotic administration. However, 52% of the population with 159 students did receive antibiotic treatment to relieve some sort of symptoms. As regards to the pattern of unintentional weight loss among the female students, 47 individuals (15.3%) out of a total of 307 students, lost weight inadvertently. Whereas, majority of the students with a population of 260 individuals (84.7%) did not lose weight unpremeditatedly. Only a small population of the students who may be suffering from IBS while the study was conducted was experiencing weight loss probably attributed to the onset of IBS. Regarding wake up at night symptoms, 49% of the population of students comprising of 150 individuals (49%) did wake up in the night due to the severity of the symptoms whereas the other half of the population ( $n = 132$ ; 43%) had uninterrupted sleep pattern. This study shows that almost half of the population who did manifest some signs of IBS onset did not sleep incessantly.



**Figure 2**

The students were then questioned regarding the frequency of abdominal discomfort they experienced in the last 3 months. The entire population of students (n = 307) mentioned that they did suffer from abdominal pain sometimes. The students were further asked if the pain occurred in the last 6 months, regarding which approximately 116 students (38%) did mention that there was at least a single episode of abdominal pain in the last 6 months whereas 52 students (17%) answered that the pain was present beyond 6 months. Then, the students were asked if the pain was linked with menstrual bleeding, to which only 11% (n = 33) students mentioned that there was pain during menstruation. Remaining, 208 students (68%) did not complaint of any associated pain during menstruation. To correlate the association of the pain with bowel movement, 33% of the population (n = 101.31) stated that the abdominal pain subsided after passing stool. Interestingly, the same population of students indicated that the frequency of bowel movements intensified with the onset of the abdominal pain indicating a possible strong association of abdominal pain with IBS onset. On questioning regarding the consistency of the stool passed, 73% of the population (n = 224) mentioned that they had passed loose stools. On the other hand, 135 students (44%) followed by 162 individuals (53%) mentioned that while defecating the consistency of the stool passed was hard and often lumpy respectively. Surprisingly, almost the remaining half of the population (n = 150; 49%) indicated that they had loose, watery and mushy stool in the last 3 months. The students were next questioned regarding their feeling of satisfaction after defecation, to which 184 students (60%) expressed a feeling of dissatisfaction due to a feeling of incompleteness after passing stools. On the other hand, 34% (n = 104) of the student population had to quickly rush to the bathroom as soon as the students felt the urge to defecate. To investigate whether the students experienced a feeling of bloating, 52% of the population (n = 159) did experience being bloated with a distended abdomen in the last 3 months. Interestingly, majority of the population, 85% of the students felt that they were gassy and passed excess wind in the last 3 months. Since the probability of IBS prevalence was higher in the age group of 18-20 years, it would be interesting to explore the chance occurrence of gut diseases such as colon cancer, celiac and inflammatory bowel syndrome in their families.

This will help us understand if there is any genetic basis for IBS development. In this context, prevalence of colon cancer, celiac and inflammatory bowel syndrome were reported in the families of 55 (18%) followed by 162 (53%) and 89 (29%) students respectively suggesting possible genetic correlation in the onset of IBS symptoms.

#### **4. Discussion**

Pathogenesis of IBS primarily focuses on the symptom management with no trace of anatomic or metabolic biomarkers that contribute to the etiology of the disease. Present day related research conducted on IBS management is to provide effective treatment to the IBS patients with better outcomes [12]. The primary aim of our study was to raise awareness among the university students about IBS symptoms. Our studies conclude that most of the students who were in the age group of 18-20 years old were probably at a higher risk of developing IBS. Since these students were attending university, it was also essential to assess their quality of life, as they were expected to be under perpetual stress, required to perform well in the academics. However, neither, physical activities, nor consuming junk or spicy foods could possibly aggravate IBS symptoms suggesting that the quality of life the students maintained to complete university education did not possibly trigger IBS. However, regular exercise may assist in stress management which in turn will increase the intestinal membrane permeability and visceral sensitivity, thus changing the normal physiological function of the gut. The sleep pattern of these students was also considered. This is because, the students were expected to possibly have erratic schedule, studying late nights before and during exam times which could lead to increasing the severity of the disease. Indeed, our study shows that almost half of the population did wake up in the middle of the night which shows their sleep pattern was disturbed possibly contributing to IBS development. With regards to weight loss, only a minor population of students lost weight unknowingly which could probably be attributed to their psychological stress associated with academics and future prospects. This stress developed could directly or indirectly affect IBS onset. In co-relation with our observations, a cross-sectional study in the USA found that nurses, especially those working on night and rotating shifts, are at a higher risk of developing IBS. This happens primarily due to the absence of any conformity between the endogenous circadian rhythm and the external environment leading to increased prevalence of bowel disorders [13]. While assessing the life style factors, it was crucial to also know if the students were prescribed any antibiotic regime for a particular disease condition in our study. Our study represents that about half of the population were on some form of antibiotics while this study was conducted which suggests that intake of medicines in the form of antibiotics could also trigger IBS. To the best of our knowledge, prevalence of IBS and its associated factors, especially psychological factors among the students of PNU, Riyadh city have not been explored before. The aims of this study were to evaluate the life-style factors, food habits, sleep patterns, medicinal intakes of the students that could be considered as potential factors targeting IBS onset.

After assessing the quality of life, the study was directed to focus on the IBS specific symptoms that the students were suffering from. Although, the entire population of the students did mention about intermittent episodes of abdominal pain existing in the last 3 months, only a minor population of 17% did report that they experienced abdominal discomfort over a prolonged period extending beyond 6 months. Our study depicted an interesting association between abdominal pain and frequency of bowel movement. The study shows that almost one third of the population reported that the frequency of bowel movements intensifies with the abdominal pain. The discomfort alleviates after defecation indicating that abdominal pain could be a critical symptom associated with IBS. While questioning on the texture of the stool, there were two groups of student population who had two different texture of stool. One population passed hard and lumpy stool while the other half of the population had loose motion with the onset of the abdominal pain. This could possibly indicate that the students suffered from

both IBS-C and IBS-D types. In fact, more than half of the population also indicated that they were not satisfied and had a feeling of incompleteness after passing motion. In parallel with this finding, one third of the population mentioned that they had constant urge to defecate while they experienced the pain suggesting that possible IBS related abdominal pain is linked with increased frequency and urge to defecate. Our findings show that in the last 3 months more than 80% of the population suffered from gastritis, passing excess wind and about half of the population felt bloated with a distended abdomen. Precisely, about half of the population suffered from abdominal discomfort, distended abdomen and gastritis in the last 3 months and either passed hard or loose stools during the pain suggesting that the students are possible victims of symptomatic IBS subtypes. Psychological disorders such as stress and certain related lifestyle factors have a greater influence on the students particularly susceptible to the development of IBS. Based on the findings from the present study, the unhealthy aspects of the QOL of the university students can be rectified in future to help manage possible outburst of stress which is an indirect causative factor affecting the onset of IBS.

## **5. Conclusion**

PNU Medical students are known to suffer from substantial amounts of stress and anxiety, a major factor that has increased the prevalence of IBS among them, along with other factors. Despite its prevalence, awareness needs to be raised among students about IBS. More research studies need to be performed to get the accurate data for the correlation of the quality of life and the IBS prevalence among medical students.

## **References**

- [1]. Eriksson EM, Andrén KI, Kurlberg GK, Eriksson HT. Aspects of the non-pharmacological treatment of irritable bowel syndrome. *World J Gastroenterol*. 2015 Oct 28;21(40):11439-49 (4).
- [2]. Raika Jamali, Mostafa Raisi, Mohammad Matini, Alireza Moravveji, Abdollah Omid, and Jaleh Amini. Health related quality of life in irritable bowel syndrome patients, Kashan, Iran: A case control study. *Adv Biomed Res*. 2015; 4: 75 (5).
- [3]. J E Kellow, S F Phillips, L J Miller, and A R Zinsmeister. Dysmotility of the small intestine in irritable bowel syndrome. *Gut*. 1988 Sep; 29(9): 1236–1243 (1).
- [4]. H Y Qin, C W Cheng, X D Tang, and Z X Bian. Impact of psychological stress on irritable bowel syndrome. *World J Gastroenterol*. 2014 Oct 21; 20(39): 14126–14131 (2).
- [5]. Bonfiglio F, Zheng T, Garcia-Etxebarria K, Hadizadeh F, Bujanda L, Bresso F, Agreus L, Andreasson A, Dlugosz A, Lindberg G, Schmidt PT, Karling P, Ohlsson B, Simren M, Walter S, Nardone G, Cuomo R, Usai-Satta P, Galeazzi F, Neri M, Portincasa P, Bellini M, Barbara G, Latiano A, Hübenal M, Thijs V, Netea MG, Jonkers D, Chang L, Mayer EA, Wouters MM, Boeckxstaens G, Camilleri M, Franke A, Zhernakova A, D'Amato M. Female-specific Association Between Variants on Chromosome 9 and Self-reported Diagnosis of Irritable Bowel Syndrome. *Gastroenterology*. 2018 Apr 4; S0016-5085(18)30407-4 (3).
- [6]. Brian E. Lacy and Nihal K. Patel. Rome Criteria and a Diagnostic Approach to Irritable Bowel Syndrome. *J Clin Med*. 2017 Nov; 6(11): 99.
- [7]. Syed Saad Naeem, Efaza Umar Siddiqui, Abdul Nafey Kazi, Akhtar Amin Memon, Sumaiya Tauseeq



- Khan and Bilal Ahmed. Prevalence and factors associated with irritable bowel syndrome among medical students of Karachi, Pakistan: A cross-sectional study. *BMC Research Notes* 2012, 5:255.
- [8]. Okeke EN<sup>1</sup>, Ladepe NG, Adah S, Bupwatda PW, Agaba EI, Malu AO. Prevalence of irritable bowel syndrome: a community survey in an African population. *Ann Afr Med.* 2009 Jul-Sep; 8(3):177-80.
- [9]. Sarah Rauf Qureshi,<sup>1</sup> Ahmed M Abdelaal,<sup>1</sup> Zaynab A Janjua,<sup>1</sup> Hajar A Alasmari,<sup>1</sup> Adam S Obad,<sup>1</sup> Abdulhadi Alamodi,<sup>1</sup> and Mohammad Abrar Shareef. Irritable Bowel Syndrome: A Global Challenge Among Medical Students. *Cureus.* 2016 Aug; 8(8): e721.
- [10]. Nagat Elmulthum, Ilham Elsayed. Prospects of Saudi Women's Contribution to Job Market under Saudi Vision 2030: An Empirical Analysis 1999-2015. *International Journal of Applied Sociology* 2017, 7(1): 20-27
- [11]. David Q. Shih, MD and Lola Y. Kwan, MD. All Roads Lead to Rome: Update on Rome III Criteria and New Treatment Options. *Gastroenterol Rep.* 2007 WINTER; 1(2): 56–65
- [12]. Chun-Yan Li and Shu-Chuen Li. Treatment of irritable bowel syndrome in China: A review. *World J Gastroenterol.* 2015 Feb 28; 21(8): 2315–2322.
- [13]. Borko Nojkov, Joel H. Rubenstein, William D. Chey, and Willemijntje A. Hoogerwerf. The Impact of Rotating Shift Work on the Prevalence of Irritable Bowel Syndrome in Nurses. *Am J Gastroenterol.* 2010 Apr; 105(4): 842–847.
- [14]. Katsinelos P<sup>1</sup>, Lazaraki G, Kountouras J, Paroutoglou G, Oikonomidou I, Mimidis K, Koutras C, Gelas G, Tziomalos K, Zavos C, Pilpilidis I, Chatzimavroudis G. Prevalence, bowel habit subtypes and medical care-seeking behaviour of patients with irritable bowel syndrome in Northern Greece. *Eur J Gastroenterol Hepatol.* 2009 Feb;21(2):183-9.
- [15]. QiQi Zhou, Buyi Zhang, and G. Nicholas Verne. Intestinal Membrane Permeability and Hypersensitivity In the Irritable Bowel Syndrome. *Pain.* 2009 Nov; 146(1-2): 41–46.