



Prevalence of Irritable Bowel Syndrome and Its Imprint on the Quality of Life of Undergraduate Students at a Malaysian Medical University

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Authors' contributions

This work was carried out in collaboration between all authors. Authors CG and AC designed the study, managed the literature search, collection, interpretation of data, manuscript writing, constant editing and proof reading. Authors TW and AKKM did the statistical analysis and interpretation of data. Rest of the authors contributed in collection of data and discussion. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2018/41013

Editor(s):

(1) Georgios Tsoulfas, Assistant Professor of Surgery, Aristoteleion University of Thessaloniki, Thessaloniki, Greece.

Reviewers:

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- Complete Peer review History: <http://www.sciencedomain.org/review-history/24503>

Original Research Article

Received 23rd February 2018

Accepted 28th April 2018

Published 7th May 2018

ABSTRACT

Background: Albeit not life-threatening, symptoms of irritable bowel syndrome (IBS) interfere with routine activities and compromise the quality of life (QOL). Except for one survey on the prevalence of IBS among students in Malaysia a decade back, there are no other reports. QOL in IBS is yet to be investigated in this region.

Objective: To determine the prevalence of IBS and its impact on QOL among students at a Malaysian medical university.

Methodology: A cross-sectional, questionnaire-based, self-reported study was conducted among

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#Equally contributed

1104 students. The IBS-QOL questionnaire based on Rome III criteria and a demographic questionnaire were used.

Results: The overall prevalence of IBS was found to be 45.3%, with a female preponderance of 49.8%. It was also found to be predominant among Chinese 55% and physiotherapy students 61.7%. IBS Mixed type (IBS-M) was found to be common among all students (78.6%). The mean score for QOL for all IBS symptom positive students was 74.2±22.3.

Conclusion: The overall prevalence of IBS has escalated, particularly in Chinese, females and physiotherapy students with IBS-M type being the commonest. Chinese, IBS Diarrhoea type (IBS-D) and those with low-grade symptom severity enjoy a better QOL. Routine screening for IBS symptoms, mindfulness-based stress reduction, encouraging physical activity and reviewing curriculum overload will go a long way to improve the QOL in IBS.

Keywords: Irritable bowel syndrome; prevalence; quality of life; undergraduate students.

1. INTRODUCTION

Irritable Bowel Syndrome is a common health problem addressed by gastroenterologists and diagnosed by solely by symptom criteria and by exclusion of systemic diseases [1-4]. There is no biochemical marker of the disease or clinical test available to confirm the diagnosis of IBS [5].

Many countries have shown growing concern over the rise in IBS, associated increase in the health cost through investigations, treatment, surgery and lost hours of work [6, 7, 8]. A rising prevalence has been noted among medical students in Pakistan (28.3%) [9], Jeddah (31.8%) [10], China (32.1%) [11], Japan (35.5%) [12], Korea (29.2%) [13] and Canada (22%) [14,15]. Although not fatal, IBS significantly affects the Quality of Life [5,16-18]. Anxiety, depression in students with an inability to cope with the academic pressure leads to symptoms of IBS [12,19,20].

A survey among young Malaysian medical students more than a decade back using Rome I criteria has reported the prevalence of IBS to be 15.8% [20]. With the exception of this study, no other study among medical students has been reported in this region. The quality of life (QOL) among medical students with IBS has also not been explored in Malaysia.

Considering the rising trend in the prevalence of IBS among students of higher education group worldwide, this study is an attempt to evaluate the current prevalence of IBS among students in a Malaysian medical university and to estimate the QOL for the first time in this region.

2. MATERIALS AND METHODS

This study was conducted face-to-face questionnaire-based, which included a

sociodemographic and IBS QOL questionnaires based on Rome III criteria, which included the screening, algorithm for subtypes, symptom frequency, bothersomeness and QOL questions. Trained facilitators obtained consent after briefing the project. The anonymity of students was preserved and confidentiality was ensured. The Research and ethics committee of the University approved the study protocol.

2.1 Sample Size

1104 students from the faculties of Medicine, Dentistry, Physiotherapy and Nursing.

2.2 Inclusion Criteria

All students from medicine, dentistry, physiotherapy and nursing who consented to participate.

2.3 Exclusion Criteria

Students with history of red flags/alarm signs like peptic ulcer, anemia, bowel surgery and those who did not consent to participate. The Rome criteria are reliable only when there is no abnormal intestinal anatomy or metabolic process. As other disorders are to be considered first in the presence of alarm signs, those with alarm signs were excluded from the study.

2.4 Demography Questionnaire

Included questions on age, gender, alcohol consumption, physical activity and childhood trauma like death in the family in the recent years, broken family, major surgery and financial constraints.

2.5 IBS-QOL Questionnaire

Included the screening questionnaire for bowel symptoms based on Rome III Criteria. IBS

positive cases were classified using the algorithm for classification of IBS into IBS-C (constipation predominant), IBS-D (diarrhoea predominant) or IBS-M (mixed type). For assessing QOL, students completed the 34 item IBS specific questionnaire developed by Patrick, Drossman and colleagues [2,21]. A five point Likert scale (not at all, slightly, moderately, quite a bit and extremely or quite a great deal) was used to evaluate the extent to which the statement described the feelings of the student. All the 34 items fell under 8 subscales. The subscales were dysphoria, interference with activities, body image, health worry, food avoidance, social reaction and relationships. Items IBS 01, 06, 07, 09, 10, 13, 16, 30 referred to dysphoria, items 03, 18, 19, 22, 27, 29, 31 to interference with activities, items 05, 21, 25 and 26 to body image, while items 04, 15, 32 pointed to health worry, items 11, 23, 28 to food avoidance, items 02, 14, 17, 34 to social reaction and items 08, 24 and 33 to relationships. Two items pertaining to sexual activities were not examined owing to cultural reasons. All items scores were summed to calculate the total scores and transformed to a 0-100 scale (0 refers to poor quality of life and 100 refers to good quality of life).

2.6 Symptom Frequency and Bother-someness Questionnaire

Contained 13 items, based on symptoms of Rome Criteria. Symptom frequency and bothersomeness were used as a measure of perceived impairment. Students were asked how frequently they had any of the symptoms in the past 30 days. Symptom frequency was assessed on a 7-point response scale (0- never to 6- always). Symptom bothersomeness was also similarly assessed on a 7- point response scale (0-not bothersome to 6- extremely bothersome). The possible scores on both measured range from 0-78. Mean scores were transformed into ordinal scale using cut-off points and symptom severity was classified as mild, moderate and severe.

(NOTE: IBS-QOL contact information and permission to use: MAPI Research Trust, Lyon, France. Email: PROinformation@mapi-trust.org – Internet: www.mapi-trust.org)

2.7 Data Analysis

SPSS version 19 was used for data entry and analysis. For all hypothesis tests, level of significance was p-value less than 0.05 and 95 %

confidence intervals were also reported. Continuous data were presented as the mean \pm standard deviation (SD) and categorical data were presented as frequencies and proportions. Sociodemographic data of the different IBS subtypes were analyzed by univariate analysis. Continuous variables were analyzed using analysis of variance and two-sample independent *t*- test. Spearman correlation coefficient was used to analyze association between QOL and symptom score. ANOVA and multiple linear regression were performed to find significant association between IBS –QOL and factors like age, gender, race, IBS type, consultation, medication, physical activity, alcohol and childhood trauma. The significance of relationship between frequency, bothersomeness and IBS – QOL was determined by analysis of variance and Bonferroni test.

3. RESULTS

3.1 Socio-demographic Profile (Table 1)

A total of 1104 students aged 18 years to more than 22 years, from the Faculty of Medicine, Dentistry, Physiotherapy and Nursing took part in the study. Majority of the students were aged more than 22 years, from the Faculty of Medicine and females.

Among the early childhood adverse events, death among family members was the commonest. Major surgery was minimally reported. Majority of students claimed to have regular physical activity.

3.2 IBS Shows Predilection for Students More Than 22 Years, Females, Chinese and Those with Childhood Trauma (Table 2)

The overall prevalence of IBS was (45.3%). IBS was found to be more common in students more than 22 years with a predilection for females. Symptoms of IBS were prevalent in all races and found highest among the Chinese, followed by other races, Malays and Indians. IBS symptoms were observed predominantly among Physiotherapy students followed by that of Nursing and Medical students. Symptoms of IBS were low among Dentistry students. Among the students with positive symptoms of IBS, 12% stated that they consumed alcohol and 12.4% (62/500) had had consultations. 13.6% students had taken medications for abdominal pain or altered bowel movement. Childhood trauma

associated with death in family preceded other risk factors in contributing to IBS.

3.3 IBS-M Emerges as the Predominant Type

The most common type of IBS was the mixed type (IBS-M) (35.6%). Constipation-predominant type (IBS-C) and Diarrhea-predominant type (IBS-D) had an equal distribution of 4.89% and 4.8% respectively.

Females showed an equal distribution of 4.79% with IBS-C and IBS-D. In males, IBS-C emerged with a slightly higher prevalence than IBS-D (IBS-C: 5.24% vs. IBS-D: 4.84%) (Table 3).

3.4 Lower Severity Scores for Symptom Frequency in IBS-D (Table 4)

Severity of symptom frequency was significantly lower (38.6 ± 11.1 , $p < 0.002$) in IBS-D subtype, in comparison to IBS-C and IBS-M subtypes. The severity scores for frequency and bothersomeness did not differ significantly between males and females or between the faculties.

3.5 IBS Quality of Life (QOL) in Various Ddomains (Table 5)

Statistical analysis by ANNOVA showed the mean overall score for IBS-QOL to be 74.17% (QOL score range being 1-100,

Table 1. Socio-demographic profile of participants

Variables	Frequency(n/N)	%
No. of participants	1104	100
IBS positive	500/1104	45.3 (42-48)*
No IBS	604/1104	54.7
IBS (Sub-types)**		
IBS_C	54	4.9
IBS_M	393	35.6
IBS_D	53	4.8
Age group		
Young	221	20
Old	883	80
Faculty		
Nursing	82	7.4
Physiotherapy	230	20.8
Dentistry	116	10.5
Medicine	676	61.2
Gender		
Female	856	77.5
Male	248	22.5
Race		
Malay	387	35.1
Chinese	378	34.2
Indian	246	22.3
Other	93	8.4
Alcohol	159	14.4
Medication	87	7.9
Consultation	102	9.2
Childhood trauma		
Death in Family	234	21.2
Broken Family	35	3.2
Major Surgery	7	0.6
Financial Problem	29	2.6
Physical activity >30 min, 3days/wk	875	79.3

* 95% Confidence Interval; ** proportionate distribution of IBS sub-types is Constipation- predominant 54(10.80%), diarrhoea predominant 53 (10.60%) and mixed type 393 (78.6)

where 1 denotes poor quality of life). The mean scores for those with IBS-D was 81.6 ± 21.8 , IBS-C was 77.6 ± 23.0 and IBS-M was 72.7 ± 22.0 . The mean QOL scores in relationships and food avoidance domains were 82.5 ± 21.4 and 82.5 ± 21.6 respectively. A lower mean QOL score of 77.1 ± 21.6 was noted with interference with activity domain.

The mean QOL score for females was low in the body image domain. Students with IBS-D type had a better quality of life in all domains. Chinese and other races group exhibited a high QOL in all domains. Those who received medications for the symptoms had a lower QOL than those who did not. Consulters experienced a lower QOL than non-consulters.

Table 2. Prevalence of irritable bowel syndrome

Variables	Frequency (n/N)	% positive for IBS
Age group		
Young	92/221	41.6
Old	408/883	46.2
Faculty		
Nursing	40/82	48.7
Physiotherapy	142/230	61.7
Dentistry	45/116	38.8
Medicine	273/676	40.4
Gender		
Female	426/856	49.8
Male	74/248	29.8
Race		
Malay	164/387	42.3
Chinese	208/378	55.1
Indian	79/246	32.1
Other	49/93	52.7
Alcohol	60/500	12
Medication	68/500	13.6
Consultation	62/500	12.4
Childhood trauma		
Death(s) in family	129/500	25.8
Financial problems	7/500	1.4

Table 3. Irritable bowel syndrome types and gender

IBS- screening	Female	Male	Total
No IBS	430	174	604
	50.23	70.16	54.71
constipation predominant	41	13	54
	4.79	5.24	4.89
mixed type	344	49	393
	40.19	19.76	35.60
diarrhea predominant	41	12	53
	4.79	4.84	4.80
Total	856	248	1,104
	100.00	100.00	100.00

Chi-square test $P < .001$

Table 4. Frequency and bother someness in IBS

IBS subtypes	IBS C (n=54)	IBS M (n=393)	IBS D (n=53)	
Frequency*	43.59 (7.50)	43.19 (8.71)	38.60 (11.14)	
Bothersomeness	36.66 (12.44)	37.89 (12.96)	33.86 (13.89)	
Faculty	Nursing (n=40)	Physiotherapy	Dentistry	Medicine
Frequency	42.9 (8.92)	42.05 (9.7)	42.8 (8.07)	43.08 (8.75)
Bothersomeness	35.65 (10.54)	37.23 (14.10)	39.86 (15.03)	37.21 (12.46)
Gender	Male (n=74)	Female (n=426)		
Frequency	42.98 (10.68)	42.71 (8.66)		
Bothersomeness	37.01 (13.71)	37.38 (12.94)		

* P = .002 with Analysis of variance, Bonferroni post-hoc test; Data expressed as mean (SD)

Table 5. Quality of life (QOL) of irritable bowel syndrome (IBS) positive students using IBS specific QOL questionnaire

		Mean (SD)	Dysphoria	Interference with activity	Body image	Health worry	Food Avoidance	Social reaction	Relationship
Gender	Male	79.94(17.38)	83.83(15.17)	79.95(18.81)	85.42(15.40)	84.55(15.42)	86.07(18.16)	83.77(17.92)	85.20(20.07)
	Female	73.12(22.93)	79.00(21.68) [^]	76.62(22.06)	76.82(21.64) ^{^^}	78.22(22.89) [^]	81.84(22.07)	77.95(21.48) [^]	82.08(21.67)
Age	18-19 (n=4)	27.01(24.71) [†]	33.0(17.10) [†]	43.18(37.94) [†]	41.07(17.86) [†]	34.09(27.15) [†]	37.5(25.00) [†]	38.46(34.97) [†]	67.00(45.00)
	20-21(n=88)	77.72 (22.36)	82.09(19.00)	81.02(24.29)	80.36(19.17)	82.14(20.45)	86.02(19.91)	84.07(21.94)	85.41(20.44)
	>22(n=406)	73.95(21.74)	79.66(20.85)	76.63(20.55)	77.97(21.16)	78.98(21.88)	82.15(21.43)	78.11(20.23)	82.09(21.34)
IBS	all types	74.17(22.29)	79.71(20.91)	77.11(21.62)	78.09(21.05)	79.16(22.04)	82.46(21.58)	78.82(21.08)	82.54(21.45)
IBS type	IBS-C (n=54)	77.56(23.04)	79.33(22.36) [*]	81.14(19.87)	81.61(21.83) [*]	77.77(23.86) [*]	84.10(22.27)	84.33(19.36)	87.59(20.46)
	IBS-M (n= 393)	72.66(22.04) [*]	78.95(20.81)	75.82(21.72) [*]	76.50(21.10)	78.68(21.31)	81.47(21.18) [*]	77.26(21.16) [*]	80.53(21.97) [*]
	IBS-D (n=53)	81.67(21.84)	85.66(19.55)	82.81(21.63)	86.11(17.68)	84.04(25.01)	88.05(23.19)	84.47(20.60)	92.07(14.19)
Race	Malay	70.37(23.99)	76.68(21.40)	71.34(24.57) [#]	76.39(20.37)	73.11(24.69) [#]	84.65(18.66)	73.29(22.91) [#]	79.81(23.00)
	Chinese	78.80(20.46)	83.17(20.09)	82.31(17.99)	82.05(19.35)	83.88(20.67)	83.01(23.82)	83.39(18.69)	85.81(20.39)
	Indian	68.12(21.34) [#]	72.72(21.90) [#]	72.08(21.19)	69.75(23.25) [#]	78.55(17.14)	76.40(20.25) [#]	78.10(21.11)	77.56(21.14) [#]
	Others	77.96(20.80)	86.12(16.43)	83.11(18.96)	80.32(22.56)	80.89(20.68)	82.31(21.62)	79.27(20.18)	85.86(18.32)
	Medication	Received	56.99(24.91) [¶]	71.88(25.20) [¶]	64.69(22.78) [¶]	63.11(26.16) [¶]	64.57(30.78) [¶]	71.32(27.86) [¶]	67.00(22.26) [¶]
	Not received	76.66(20.77)	80.93(19.93)	79.01(20.3)	80.44(19.13)	81.50(19.36)	84.22(19.89)	80.54(20.37)	87.28(19.79)
Consultation	Yes	53.73(25.01) [£]	64.26(28.86) [£]	59.46(23.79) [£]	60.14(19.55) [£]	55.43(29.20) [£]	70.97(20.73) [£]	66.75(22.51) [£]	68.06(26.35) [£]
	No	77.02(20.34)	81.87(18.61)	79.66(20.08)	80.67(20.00)	82.58(18.50)	84.10(21.23)	80.47(20.36)	84.61(19.85)

[^] P = .05; ^{^^} P = .01 between male and female IBS patients [†] P < .001 pairwise comparison between age groups

*P < 0.05 pairwise comparisons to IBS- D and IBS-M # P < .002, between races, Malays had significantly low QOL in interference with activity, health worry & social reaction domains; Indians had low QOL in all other domains [¶] P < .01 between those who received medications and not received medications [£] P = .01 between those who had consultations and had no consultation Data expressed as mean (SD)

Table 6. Severity scores for frequency index

FQI	Overall	Dysphoria	Interference with activity	Body image	Health worry	Food avoidance	Social reaction	Relationship
Low grade	84.10(19.66)*	88.58(17.82)*	86.13(19.48)*	87.66(17.51)*	89.47(16.21)*	87.5(18.95)*	84.67(19.34)*	90.52(16.90)*
Moderate	74.01(19.11)	79.93(18.76)	74.71(21.06)	77.77(17.44)	77.13(20.83)	84.47(17.59)	80.09(19.49)	83.6(18.18)
High	65.52(23.68)	71.69(22.15)	71.43(21.51)	69.85(23.35)	71.68(24.20)	76.21(25.31)	72.57(22.32)	74.72(24.78)

* $P < .001$ with Analysis of variance, Bonferroni post-hoc test;
 Data expressed as mean \pm standard deviation (SD), FQI- Frequency index

Table 7. Severity scores for bother someness index

BQI	Overall	Dysphoria	Interference with activity	Body image	Health worry	Food avoidance	Social reaction	Relationship
Low grade	87.65 \pm 16.7*	91.91 \pm 14.69*	88.65 \pm 17.67*	89.86 \pm 15.73*	91.66 \pm 12.25*	90.01 \pm 17.47*	87.59 \pm 18.1*	94.16 \pm 11.5*
Moderate	73.26 \pm 18.6	78.7 \pm 16.92	74.56 \pm 19.54	76.77 \pm 18.52	76.01 \pm 22.2	84.47 \pm 18.83	79.29 \pm 18.12	82.25 \pm 16.79
High	61.24 \pm 23.13	67.9 \pm 23.19	68.07 \pm 22.3	67.04 \pm 22.15	69.10 \pm 23.75	72.29 \pm 24.27	69.28 \pm 22.88	70.87 \pm 26.73

* $P < .001$ with Analysis of variance, Bonferroni post-hoc test;
 Data expressed as mean \pm standard deviation (SD) BQI- Bother someness index

3.6 Multiple Regression Analysis in the IBS domains

In comparison to Malay, Chinese enjoyed a better QOL in all domains ($P=05$). Indians were found to have lower QOL particularly in body image and food avoidance domains ($P<0.001$). Other races group had better QOL in all domains than Malay except with social reaction. Students with IBS-D type had better QOL than those with IBS-C and IBS-M ($P=05$). Males differed significantly from females with better body image ($P=01$). History of alcohol intake, broken families, consultations and medications among students were associated with a low QOL in all domains ($P=05$). Multiple regression analysis confirmed the findings of ANOVA. In addition, physical activity had a positive influence on IBS QOL especially in dysphoria and body image ($P =.05$) domains. Alcohol intake was associated with low QOL in body image and history of broken families had a low QOL in food avoidance domain ($P=05$). In both individual domain scores and overall scores, QOL was better in those >22years age group.

3.7 Symptom Severity for Frequency and Bothersomeness

Low symptom severity for frequency (Table 6) and bothersomeness (Table 7) was significantly associated with a better quality of life in all domains ($P<.001$)

4. DISCUSSION

Students undergoing stressful and demanding professional courses like medicine are more likely to develop the symptoms of IBS [22]. In Malaysia, an earlier survey among young Malaysian medical students reported the prevalence of IBS to be 15.8% [20]. After a decade, this study among undergraduate students in a private Malaysian university reports a much higher prevalence of IBS of 45.3% (500/1104), with IBS-M type being the most common type. Although several studies have shown the association between the increased prevalence of IBS and lower QOL among students in other countries [5,16-18], IBS-QOL has not yet been explored in the Malaysian context. This study, for the first time, unveils the link between IBS and the QOL among gender, age, race, predominant type of IBS and symptom severity.

4.1 IBS-M the Commonest Type

The most common type of IBS observed in this study was the mixed type, similar to the observations of medical and nursing students in China [11] and Egyptian university students [23]. Prior Malaysian studies including one among medical students by Tan et al [20] and another among multiethnic population had reported IBS-C as the predominant type [24]. The difference in the predominant type of IBS between these studies and the present study may be explained by the influence of multiethnic groups differing in dietary habits, environmental factors and the diagnostic criteria used [25].

4.2 Increased Prevalence of IBS Linked with a Moderate Decline in QOL

The increase in prevalence of IBS observed in this study, is comparable to that reported among medical students worldwide [9-11,26]. This increase in the Asian countries may be attributed to psychosocial stress, westernization of diet and loss of protective gut immunity in early life [26,27]. Visceral hypersensitivity, increased activation of the anterior cingulate cortex, enhanced pain perception and childhood trauma increase the responsiveness of HPA axis to stress in IBS [28].

The overall mean IBS-QOL score for all IBS symptom positive students was 74.2 ± 22.3 in this study and comparable to the mean QOL score of 74.4 ± 4.242 reported among University students in China [29]. Lack of exercise was a common risk factor for the moderate decline in QOL in both these studies. The increase in prevalence of IBS observed in the present study was associated with a moderate decline in QOL, particularly in IBS-D type, consistent with the report from Sweden [30]. The better QOL in patients with IBS-D type was ascribed to less pronounced body awareness, symptoms of psychological disorder and higher C-peptide levels [31]. The mean score for Quality of Life was high with IBS-D followed by IBS-C. IBS-M type was found to score the least. This confirmed earlier reports that depression, anxiety, anger [32] increased prolactin levels and cholecystokinin caused more distress in IBS-M and IBS-C lowering the quality of life [33]. Thus, the increased prevalence in IBS among Malaysian students was linked with modest decline in QOL.

4.3 Propensity for IBS and Its Impact on QOL

The female predominance in IBS was similar to the western countries and Asian counterparts [11,19,20,29,34-38]. The role of ovarian hormones and the response of HPA axis to stress in women support this [39-42]. Countries with Chinese population as majority have not claimed the female preponderance [43].

A high prevalence of IBS was noted among the Chinese similar to another Malaysian survey [24]. A high prevalence among other races including international students was noted similar to an Iranian study about students living away from home [22]. This is attributable to problems with acculturation, attitude to body image among students of varying ethnic and cultural background [44]. IBS was more common among students aged > 22 years in accordance with the other researchers [10 38 45 46] This may be due to students undergoing professional courses having to endure a loaded curriculum, long hours of study, work and less sleep [47].

Despite the high prevalence of IBS, Chinese and other races enjoyed a better QOL than Malays. This is possibly because symptom bothersomeness was not significant in Chinese. We found no significant association with education level similar to the Japanese study [48]. Other researchers found that less than high school education was linked with low QOL [18]. Research among Iranian students with IBS found low GPA score to be associated with a low QOL [49]. It is implied in this paper that IBS was found to be prevalent among the Chinese race and increasing years of education but the QOL was unperturbed.

4.4 Alcohol in IBS and QOL

In this study, alcohol intake was not significantly associated with IBS. Alcohol consumption in moderate and less amount has been shown not to be associated with symptoms of IBS [50]. Another study claims that alcohol aggravates the symptoms of IBS [51]. The association between alcohol and IBS has not been proven to be a direct link but moderated by psychological stress [52]. Despite the lack of symptoms of IBS with alcohol intake multiple regression analysis showed a low QOL in body image domain.

4.5 Consultation Seeking Behavior in IBS and QOL

This was observed only in 12.4% of IBS positive students. Another study also had reported similar (13%) findings among young Malaysian students [20]. However this was much lower compared to students in Iran and Bangladesh with 37.7% and 35% respectively [22,53]. Low consultations observed in this study is probably because symptoms of IBS were tolerable, a low health care seeking culture among Malaysian students and the habit of self- medications. Intriguingly, low QOL in all the domains was observed among those who had consultations. Perhaps, this was owing to severe symptoms not controlled by self-medication or the associated psychosocial factors, not been addressed adequately.

4.6 Physical Activity in IBS and QOL

Exercise for 30 minutes, at least thrice a week, was associated with reduced risk of IBS. This is in concurrence with other reports, which showed that lack of exercise is associated with IBS [39,54]. The present study also reports that regular physical activity was linked with better QOL, particularly in dysphoria and body image domains, conforming with several studies showing the same [29,55,56]. Physical activity overcomes the effects of stress, fatigue, anxiety, depression and increases the QOL [55].

4.7 Broken Families were Linked with Increased IBS and Lower QOL

Broken family or living with single parent turned out to be a risk factor for IBS and this was possibly due to negative early life events damaging the intestinal mucosal barrier, facilitating infections, altering the microflora, aggravating stress, all culminating in IBS later in life [56,57]. A significantly lower QOL was observed among IBS-positive students with negative life events. Traumatic incidents precipitate IBS [28] and cause a decline in QOL [58].

4.8 Symptom Severity, IBS-QOL and Psychotherapy

In this study, worsening QOL was observed with increasing IBS symptom severity. Prior studies in France [59] and the United States reported similar findings [17]. In contrast, a study among nurses in China contended that psychological

symptoms did not correlate with severity of symptoms of IBS QOL [26]. However, psychotherapy was shown to markedly improve the QOL in IBS patients over a long period, despite the symptoms remaining the same throughout [60]. The differences in the studies are probably because of the varying degree of psychological symptoms and other pathophysiological factors involved in the patients.

5. CONCLUSION

This study reports a high prevalence of IBS among under-graduate students with a decline in QOL. This phenomenal rise in the prevalence may be attributed to academic stress, stress in the learning environment, family background, living away from the family and lack of physical activity. IBS remains underreported owing to low health care seeking behavior among students. IBS impairs the QOL of the students.

6. RECOMMENDATIONS

Regular screening for IBS symptoms, mindfulness-based stress reduction, regular physical activity, reviewing curriculum overload, encouraging early health-seeking behavior are recommended to lighten the economic burden on health resources and improve the quality of life.

7. LIMITATIONS OF THE STUDY

The study was limited to one university and was self-reported questionnaire-based, subjective to individual student bias. HRQOL was not assessed in the non-IBS students. Alcohol consumption was not quantified.

8. STRENGTH

A validated instrument (IBS-QOL QUESTIONNAIRE) and a multiracial student population of 1104 enrolled in the study. This is the first report in this country on the Quality of Life of IBS among undergraduate students.

ACKNOWLEDGEMENTS

We extend our sincere thanks to the Management, Vice Chancellor and Research Centre of MAHSA University for approving the conduct of this research and all Deans and students from the Faculties of Medicine, Dentistry, Nursing and Physiotherapy who

willingly extended their cooperation for the conduct of the study. We would like to express our sincere thanks to Drossman, Patrick et al and MAPI Research Trust for providing the IBS specific QOL questionnaire.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

CONSENT

All authors declare that 'written informed consent was obtained from the participants of the study.

ETHICAL APPROVAL

As per the international standard or university standard, written approval of ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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