

## Rome III survey of irritable bowel syndrome among ethnic Malays

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### Abstract

**AIM:** To survey irritable bowel syndrome (IBS) using Rome III criteria among Malays from the north-eastern region of Peninsular Malaysia.

**METHODS:** A previously validated Malay language Rome III IBS diagnostic questionnaire was used in the current study. A prospective sample of 232 Malay subjects (80% power) was initially screened. Using a stratified random sampling strategy, a total of 221 Malay subjects (112 subjects in a "full time job" and 109 subjects in "no full time job") were recruited. Subjects were visitors (friends and relatives) within the hospital compound and were representative of the local com-

munity. Red flags and psychosocial alarm symptoms were also assessed in the current study using previously translated and validated questionnaires. Subjects with IBS were sub-typed into constipation-predominant, diarrhea-predominant, mixed type and un-subtyped. Univariable and multivariable analyses were used to test for association between socioeconomic factors and presence of red flags and psychosocial alarm features among the Malays with IBS.

**RESULTS:** IBS was present in 10.9% (24/221), red flags in 22.2% (49/221) and psychosocial alarm features in 9.0% (20/221). Red flags were more commonly reported in subjects with IBS (83.3%) than psychosocial alarm features (20.8%,  $P < 0.001$ ). Subjects with IBS were older (mean age 41.4 years vs 36.9 years,  $P = 0.08$ ), but no difference in gender was noted ( $P = 0.4$ ). Using univariable analysis, IBS was significantly associated with a tertiary education, high individual income above RM1000, married status, ex-smoker and the presence of red flags (all  $P < 0.05$ ). In multiple logistic regression analysis, only the presence of red flags was significantly associated with IBS (odds ratio: 0.02, 95%CI: 0.004-0.1,  $P < 0.001$ ). The commonest IBS sub-type was mixed type (58.3%), followed by constipation-predominant (20.8%), diarrhea-predominant (16.7%) and un-subtyped (4.2%). Four of 13 Malay females (30.8%) with IBS also had menstrual pain. Most subjects with IBS had at least one red flag (70.8%), 12.5% had two red flags and 16.7% with no red flags. The commonest red flag was a bowel habit change in subjects > 50 years old and this was reported by 16.7% of subjects with IBS.

**CONCLUSION:** Using the Rome III criteria, IBS was common among ethnic Malays from the north-eastern region of Peninsular Malaysia.

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**Key words:** Irritable bowel syndrome; Malays; Prevalence; Rome III criteria; Malaysia

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## INTRODUCTION

In the West, irritable bowel syndrome (IBS) is a major gastroenterological condition seen in daily clinical practice, with a prevalence of 10%-20%<sup>[1-5]</sup>. The prevalence of IBS in the East is reportedly lower. Previous studies from Thailand and Singapore reported a prevalence of less than 5%<sup>[6,7]</sup>. Recent studies from Hong Kong, Beijing and India also reported a similar low prevalence, although the rate may differ depending on the criteria used<sup>[8-11]</sup>.

One of the earlier studies from Malaysia reported a prevalence of 15.8% among a group of young multi-ethnic medical students using Rome I criteria in central Peninsular Malaysia<sup>[12]</sup>. A later study by Rajendra *et al.*<sup>[13]</sup> reported a rate of 15.5% using Rome II criteria in a mixed urban and rural multi-ethnic population in the north-western region of Peninsular Malaysia. The prevalence rates of IBS reported among the ethnic Malays (12.4%-15.8%) from both studies were higher than that reported by a recent study from Singapore (6.8%-10.3%)<sup>[14]</sup>.

The north-eastern region of Peninsular Malaysia is more economically deprived and less developed compared with western and central parts of Peninsular Malaysia, and most of its population consists of ethnic Malays. We aimed to assess the prevalence of IBS among the Malay population in this region recruited within a hospital setting using a validated Malay language Rome III IBS Diagnostic Questionnaire. In addition, we also aimed to assess and compare the rates of red flags (alarm symptoms which may suggest the presence of organic diseases), psychosocial alarm features and other socioeconomic markers in IBS *vs* non-IBS in this population.

## MATERIALS AND METHODS

### Subjects

This was a prospective cross-sectional survey involving a native Malay population in the state of Kelantan situated in the north-eastern region of Peninsular Malaysia. The city of Kota Bharu is the state capital of Kelantan

with an estimated population of 570 000, and 90% of its population consists of ethnic Malays<sup>[15]</sup>. The university hospital of Universiti Sains Malaysia (USM), located in the heart of Kota Bharu, is the largest tertiary hospital serving the whole state of Kelantan. As the region is less developed compared to the west coast of Peninsular Malaysia, private practice is scarce and all layers of the Malay community (from the poor to the rich) tend to seek healthcare at the hospital.

Volunteers consisting of visitors (friends and relatives of patients) within the hospital compound were identified with the assistance of an independent research assistant who was blinded to the study but was trained to assess for inclusion of volunteers based on a set of predefined criteria. A random sampling strategy (stratified according to occupational status; volunteers with no full time job *vs* volunteers with a full time job) was then employed by the investigator. All subjects were recruited from different families in order to avoid ambiguity. Subjects of different ethnic backgrounds, past medical, surgical or psychiatric backgrounds, pregnancy and physical disabilities which did not allow them to complete the questionnaire or attend the interview were excluded from the study.

A total of 232 subjects were screened with a response rate of 95.2%. The sample size was calculated for the Malay population only and was based on a prevalence rate of 15%<sup>[12]</sup>, an alpha level of 0.05 and a power of 80%. There were 221 Malay subjects (109 with “no full time job” and 112 with a “full time job”) included in the study to answer the printed questionnaire booklet and/or face-to-face interview with a trained interviewer after giving informed consent. There were two subjects with no full time job whose responses were not complete or inadequate for analysis and were therefore excluded from the final analysis.

### Malay language Rome III IBS diagnostic questionnaire

The Rome III IBS diagnostic questionnaire was translated into the Malay language and validated according to guidelines set by the Rome foundation. The Rome III IBS diagnostic questionnaire contains 10 items with answers on an ordinal scale and individual frequency thresholds for each question. The 10 items include questions on symptom criteria (items 4 to 8), a question to exclude pain of gynecological origin (item 2), questions on time between transient and chronic gut symptoms (items 1 and 3), and questions to sub-type IBS according to stool form (items 9 and 10). Briefly, the Rome III symptom criteria for IBS included the following: (1) recurrent abdominal pain or discomfort at least 3 d a month in the last 3 mo with two or more of the following: improvement with defecation; onset associated with a change in frequency of defecation; onset associated with a change in form (appearance) of stool; and (2) the above criterion fulfilled for the last 3 mo with symptom onset at least 6 mo before diagnosis. The Malay language Rome III IBS diagnostic questionnaire has been reported to have an intra-class correlation coefficient (ICC) of 0.996 and a good discriminant valid-

**Table 1** Univariable and multivariable analysis of irritable bowel syndrome and non-irritable bowel syndrome among ethnic Malays in the north-eastern region of Peninsular Malaysia using Rome III criteria *n* (%)

Parameters	IBS ( <i>n</i> = 24)	No IBS ( <i>n</i> = 197)	Crude OR (95%CI)	Adjusted OR <sup>1</sup> (95%CI)	<i>P</i> value <sup>1</sup>
Age (yr, mean ± SD)	41.42 ± 13.5	36.87 ± 15.9	1.02 (-11.2, 2.13)	1.07 (0.99, 1.16)	0.08
Sex					
Male	11 (45.8)	93 (47.2)	0.95 (0.40, 2.21)	2.32 (0.39, 13.87)	0.36
Female	13 (54.2)	104 (52.8)	1.00	1.00	
Education level					
Primary education	1 (4.2)	40 (20.3)	0.08 (0.01, 0.61) <sup>2</sup>	0.15 (0.01, 2.70)	0.20
Secondary education	7 (29.2)	107 (54.3)	0.20 (0.08, 0.53) <sup>2</sup>	0.27 (0.05, 1.40)	0.12
Tertiary education	16 (66.7)	50 (25.4)	1.00	1.00	
Occupational status					
Not working	9 (37.5)	100 (50.8)	0.58 (0.24, 1.39)	1.36 (0.20, 9.04)	0.75
Work full-time	15 (62.5)	97 (49.2)	1.00	1.00	
Individual income					
Low income (≤ RM1000)	6 (25.0)	130 (66.0)	0.17 (0.06, 0.45) <sup>2</sup>	0.77 (0.1, 6.14)	0.80
High income (> RM1000)	18 (75.0)	67 (34.0)	1.00	1.00	
Marital status					
Single or divorced	4 (16.7)	74 (37.6)	0.33 (0.11, 1.01) <sup>2</sup>	0.64 (0.06, 6.42)	0.71
Married	20 (83.3)	123 (62.4)	1.00	1.00	
Number of children in family <sup>1</sup>	3.58 (2.3)	2.79 (2.9)	1.09 (0.95, 1.25)	0.87 (0.58, 1.32)	0.51
Smoking status					
Non-smoker	15 (62.5)	150 (76.1)	1.00	1.00	
Current smoker	2 (8.3)	31 (15.7)	0.64 (0.14, 2.97)	1.09 (0.18, 10.19)	0.94
Ex-smoker	7 (29.2)	16 (8.1)	4.37 (1.56, 12.31) <sup>2</sup>	1.92 (0.19, 19.52)	0.58
Red flag symptoms					
Symptoms absent	4 (16.7)	168 (85.3)	0.03 (0.01, 0.11) <sup>2</sup>	0.02 (0.004, 0.10)	< 0.001
Symptoms present	20 (83.3)	29 (14.7)	1.00	1.00	
Psychosocial alarm					
None	19 (79.2)	182 (92.4)	0.10 (0.01, 1.74)	0.19 (0.005, 7.64)	0.38
Non-serious problems	4 (16.7)	14 (7.1)	0.29 (0.01, 5.67)	0.20 (0.004, 10.37)	0.42
Serious problems	1 (4.2)	1 (0.5)	1.00	1.00	

<sup>1</sup>Adjusted for all parameters listed in Table 1, *P* < 0.05 significant; <sup>2</sup>Significant on univariate analysis with *P* < 0.05. OR: Odds ratio; RM: Ringgit Malaysia; IBS: Irritable bowel syndrome.

ity (*P* < 0.001)<sup>[16]</sup>.

We have included red flags and psychosocial alarm questionnaires in the current study since red flags and psychological symptoms have been commonly reported from previous studies but their association with IBS is unknown<sup>[12,17]</sup>. Briefly, the red flag questionnaire included a history in the past 3 mo of fever, weight loss, cancer in family members, blood mixed with stool, anemia and change in bowel habit after age 50. The psychosocial alarm questionnaire had seven items designed to identify those patients with psychological “problems” which can be “serious” or “non-serious”. The ICCs for the Malay language Red Flags and Psychosocial Alarm Questionnaires has been reported to be 0.962 and 0.994, respectively<sup>[16]</sup>.

Only one trained interviewer was involved to maintain consistency, and the interviewer was experienced with the Rome III questionnaires and Rome III diagnostic criteria for IBS. In addition, we incorporated additional questions in the survey including age, gender, educational level, individual income, marital status, number of children in the family, smoking status and presence of menstrual pain in females. Subjects with IBS were sub-typed based on Rome III supportive symptoms into the following categories: IBS-C, constipation-predominant; IBS-D, diarrhea-predominant; IBS-M, mixed type and IBS-U, un-subtyped.

The study was approved by the Human Ethics Committee of USM.

### Statistical analysis

All data are presented as frequency and percentage unless otherwise stated. Univariable logistic regression was used to test the association of independent variables (including age, sex, education level, occupational status, individual’s income level, marital status, number of children in the family, smoking status, red flags and psychosocial alarm features) with presence or absence of IBS, and reported as crude odds ratios (ORs) and 95% CIs. The same variables listed above were adjusted using multivariable logistic regression analysis and reported as adjusted ORs, 95% CI and *P* value. All analyses were carried out using SPSS version 18.0 (SPSS Inc, Chicago, IL, United States).

## RESULTS

Among the 221 surveyed Malay subjects, 10.9% (24/221) had features of IBS according to the Rome III criteria. The mean age of recruited subjects was 37.7 years (15.7 years) and although subjects with IBS were slightly older (mean age 41.4 years) this was not statistically significant (*P* = 0.08). There was no difference in the prevalence rate of IBS between genders among Malay subjects (*P* =

Table 2 Comparison of prevalence of irritable bowel syndrome across populations in Malaysia and Singapore

Studies	Region	Sample size (n)	Diagnostic criteria	Population type	Reported prevalence of IBS
Tan <i>et al</i> <sup>[12]</sup>	Klang Valley, Central Peninsular Malaysia	533	Rome I	Multi-ethnic; young; medical students Malays 278 (52.2%), Chinese 179 (33.6%), Indian 48 (8.6%)	Overall 84 (15.8%); Malays 15.8%, Chinese 16.2%, Indian 15.2%
Rajendra <i>et al</i> <sup>[13]</sup>	North-western Peninsular Malaysia	949	Rome II	Multi-ethnic; mean age 33.6 yr; mixed urban and rural; Malays 314 (33.1%)	Overall 148 (15.5%); Malays 12.4%, Chinese 17.5%, Indians 16.8%
Current study	North-eastern Peninsular Malaysia	221	Rome III	Malays only; mean age 37.7 yr; mixed urban and rural	Malays 24/221 (10.9%)
Gwee <i>et al</i> <sup>[14]</sup>	Singapore	2276	Manning, Rome I, II	Multi-ethnic; mean age 40 yr; urban; Malays 263 (11.6%)	Overall: Manning 11%, Rome I 10.4%, Rome II 8.6%; Malays: Manning 9.9%, Rome I 10.3%, Rome II 6.8%

IBS: Irritable bowel syndrome.

0.4) (Table 1). Red flag symptoms were present in 83.3% (20/24) of subjects with IBS and 22.2% (49/221) of the total subjects recruited ( $P < 0.001$ ) (Table 1). Psychosocial alarm features were present in 20.8 (5/24) of subjects with IBS and 9.0% (20/221) of the total subjects recruited ( $P = 0.4$ ) (Table 1).

With univariable analysis, tertiary education, high individual income ( $> RM1000$ ), married status, ex-smoker and presence of red flag symptoms were significantly associated with IBS among Malays (Table 1). With multiple logistic regression analysis, only the presence of red flags remained significantly associated with IBS (OR: 0.02, 95%CI: 0.004-0.1,  $P < 0.001$ ).

The commonest IBS sub-type was of mixed type, IBS-M (58.3%), followed by IBS-C (20.8%), IBS-D (16.7%), and IBS-U (4.2%). Four of 13 (30.8%) female subjects with IBS also complained of menstrual pain. Most subjects with IBS had at least one red flag (70.8%), 12.5% had 2 red flags and 16.7% had no red flags. A bowel habit change for those above 50 years old was reported in 16.7% of subjects with IBS.

## DISCUSSION

In the current study, the reported IBS rate of 10.9% among ethnic Malays was very similar to the study from Singapore (prevalence of 10.3% using Rome I criteria)<sup>[14]</sup> (Table 2). The reported IBS rate among ethnic Malays in the current study was relatively low compared with that in the study by Rajendra *et al*<sup>[13]</sup> (rate of 12.4% using Rome II criteria) and Tan *et al*<sup>[12]</sup> (rate of 15.8% using Rome I criteria) (Table 2).

These differences in prevalence rates between studies may be explained by differences in population demographic and socioeconomic backgrounds between different regions of Peninsular Malaysia. In the study by Tan *et al*<sup>[12]</sup>, the studied population consisted of highly educated and healthy young Malaysians (mean age  $22 \pm 1.8$  years) in the Klang Valley, a well-developed economic region in the central belt of the Peninsula. It is known

that IBS is more common in a younger and more educated population<sup>[9,18]</sup>. In the study by Rajendra *et al*<sup>[13]</sup>, the population from the north-western region of Peninsular Malaysia was a mix of urban and rural communities, was older (mean age  $33.6 \pm 13$  years) and was recruited based on race-stratified disproportionate random sampling to ensure sufficient representation of all ethnic minorities. The economy in this region of Malaysia is less developed than the Klang Valley but is more developed than the north-eastern region of Peninsular Malaysia. The older population and the mixture of a rural community might explain the lower prevalence of IBS reported in the study by Rajendra *et al*<sup>[13]</sup> as compared with the study by Tan *et al*<sup>[12]</sup>. Our current study recruited only ethnic Malays (mean age  $37.7 \pm 15.7$  years) who were visitors (friends and relatives) within a hospital setting. To ensure a homogenous representation of the general population, a random stratified sampling strategy based on occupation was used. An older population, a lower socioeconomic background compared with the other regions of the Peninsula and less education may have explained the prevalence seen in our current study. The similarity in prevalence rates between the Malays in our study and the study from Singapore somewhat validates our findings.

The diagnostic Rome criteria used was different across different studies from Malaysia and this can partially influence the reported prevalence rates<sup>[19]</sup>. The current study did not compare different Rome diagnostic criteria which is a limitation. The total sampling size was also different between studies but if the sample calculation on just the ethnic Malays was taken into account then it was not much different (221 subjects in the current study, 278 subjects in Tan *et al*<sup>[12]</sup>, 314 subjects in Rajendra *et al*<sup>[13]</sup> and 263 subjects in Gwee *et al*<sup>[14]</sup>).

There was no gender difference among the Malays with or without IBS in the current study. This was in contrast with the studies of Rajendra *et al*<sup>[13]</sup> and Tan *et al*<sup>[12]</sup> which reported a female preponderance in subjects with IBS. While the cause is unknown, it is possible that

in their studies, the women are more educated and have greater health-seeking behavior in the more developed west coast of Peninsular Malaysia. Alternatively, it could be an ethnic-specific phenomenon with more Chinese or Indian women reporting more IBS symptoms than the Malay women. Another possibility is that more women in their study may have misconstrued menstrual cramp as an IBS symptom. We have noticed that a third of the Malay women with IBS in the current study also complained of menstruation-related pain. It is also possible that males in our study seek more medical attention than the females, similar to what has been reported by hospital-based studies from India and Sri Lanka<sup>[11,20,21]</sup>.

The current study also included assessment for red flags and psychosocial alarm symptoms since they were commonly reported from previous studies but their association with IBS is unknown<sup>[12,17]</sup>. Of all surveyed subjects, 9% (20/221) with red flag signs might have gastrointestinal symptoms from various diseases. While the question on the change in bowel habit is present in both the red flag questionnaire and the Rome III IBS diagnostic questionnaire, the question on age is not included in the IBS diagnostic questionnaire. We have noticed a significant percentage of subjects over 50 years old with symptoms of IBS who also reported a change in their bowel habit. This is important since elderly subjects above 50 years old have a higher risk for other organic diseases especially colorectal cancer.

Psychosocial alarm features were not commonly reported in the Malay population, either in the IBS or non-IBS sub-group, and if they were present, they were often dismissed as not being serious. This is in contrast with the Western populations where psychological disturbances were fairly common in those subjects with IBS especially in females<sup>[22]</sup>. One of the reasons for this discrepancy is the questionnaire itself, which may not have identified the idioms of psychological distress in this population<sup>[23]</sup>. Secondly, the socio-cultural stigmata attached to psychological and mental disturbance in this largely traditional Malay population may have resulted in the under-reporting of symptoms. Finally, high levels of family support, religious beliefs and other unknown cultural factors may have protected them against psychological distress<sup>[24]</sup>.

The commonest sub-type of IBS reported in the current study was of mixed type followed by the constipation type which was similar to the study from Singapore<sup>[14]</sup>. This distribution was however different from the study by Rajendra *et al.*<sup>[13]</sup> where constipation-predominant was the commonest subtype followed by the mixed type and diarrheal type. Many subjects with mixed type IBS often have features of constipation rather than diarrhea, and therefore the distinction of mixed or constipation type needs further clarification on their symptoms. This is important since treatment targeted against serotonin receptors can have contrasting effects on constipation or diarrhea.

There were limitations worth noting in the current study. It could be argued that recruiting subjects within

the hospital compound might have led to sampling bias but this was unlikely. The recruited subjects involved all layers of the Malay community (from the poor to the rich) within a region of stable population dynamics and similar socio-cultural backgrounds. Furthermore, only native Malays were included in the current study and a proper stratified random sampling strategy was carried out. The sample size in the current study might have been relatively small but the study only involved ethnic Malays, and it was calculated with a good power. The current study did not report on results of investigations performed to rule out organic diseases in those subjects with red flags as this was not our research objective. However previous studies have shown that investigating these subjects very often has a low yield<sup>[25,26]</sup>. The current study did not compare the prevalence using different types of diagnostic criteria (Rome I, II and Manning criteria) for IBS. However this is the first study on IBS among ethnic Malays using a locally translated and validated Rome III IBS diagnostic questionnaire.

In conclusion, using the Rome III criteria, IBS was found to be prevalent among ethnic Malays from the north-eastern region of Peninsular Malaysia.

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## COMMENTS

### Background

There is variability in prevalence rates of irritable bowel syndrome (IBS) among the ethnic Malays (6.8%-15.8%) across South-East Asia. Previous reported studies from Malaysia and Singapore involved heterogeneous populations and different diagnostic criteria.

### Research frontiers

Using a validated Malay language Rome III diagnostic questionnaire, this study surveyed for IBS among ethnic Malays from the North-Eastern region of Peninsular Malaysia.

### Innovations and breakthroughs

Using Rome III criteria, IBS was found to be common among ethnic Malays from a poorly developed region of Peninsular Malaysia. They were generally older (mean age 41.4 years) with no difference between genders. Red flags were common in this population and this was similar to other reported studies.

### Applications

Exact reasons for higher prevalence rates of IBS among Malays are unknown and await further studies. Within the primary care setting, the validated questionnaire may be useful to identify this group of Malay subjects who often present with vague symptoms.

### Terminology

The new Rome III criteria for IBS are symptom-based (abdominal pain or discomfort and onset associated with a change in frequency and appearance of stools) and time-based (symptoms for the last 3 mo with onset at least 6 mo previously). Red flags and psychosocial alarm questionnaires are independent from Rome III diagnostic questionnaires and are helpful to identify subjects "at risk" for organic and psychological disorders.

### Peer review

Surveying IBS amongst ethnic Malays offers a somewhat different perspective showing firstly, a higher frequency compared to other South-East Asian studies, confirming other Malaysian reports and secondly, gender equivalence like stud-

ies from India.

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