MEDICAL SCIENCE

Prevalence and risk factors of irritable bowel syndrome among medical students in Saudi Arabia

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ABSTRACT

Background: A chronic functional gastrointestinal illness known as irritable bowel syndrome (IBS) is primarily distinguished by changed bowel habits, abdominal pain and bloating/distention. There are a considerable proportion of medical students in Saudi Arabia who suffers from IBS due to different risk factors. Our study aimed to determine prevalence of irritable bowel syndrome (IBS) and its risk factors among many medical students from different universities in Saudi Arabia. *Methodology:* This is an observational cross-sectional study conducted in Saudi Arabia from July 2022 to January 2023. The sample size was involving 402 with a 95% confidence interval, a 5% margin of error. The data was collected through a standardized clear questionnaire and its analysis will be done using SPSS version 25. *Results:* 18.7% of the studied population was previously with IBS. 26.6% always face a lot of stress, 34.6% sometimes consume sugar to deal with stress. 42.5% had a positive family history for IBS. 7.2% had previously undergone an abdominal surgery. 13.7% take NSAIDS regularly. *Conclusion:* The prevalence of IBS was higher among females than among males and was highest among fifth-year medical students. Most of the participants had moderate or high levels of anxiety. Stress management activities and student counseling sessions are recommended to decrease anxiety levels.

Keywords: Irritable bowel syndrome, medical students, cross-sectional study, Saudi Arabia.

1. INTRODUCTION

Irritable-bowel-syndrome (IBS) is a prevalent chronic illness that appears without any observable structural or biochemical pathologic process and is clinically defined by recurring abdominal pain that is eased by bowel evacuation (Hakami et al., 2019). Stress, worry and unusual attitudes towards the disease are a few physical and physiological elements known to contribute to the etiology of IBS which worsen the circumstances of the

patient (Of et al., 2020). IBS's pathogenesis has not yet been fully elucidated and its cause is yet unclear. However, some risk factors that are related to the disease have been linked to its development (Alqahtani and Mahfouz, 2022). The chance of developing IBS is enhanced by a variety of conditions. These include being a woman, having IBS in the family, experiencing psychological stress, anxiety and depression, as well as dietary concerns and sleep issues. All of these aspects of medical students' and junior doctors' unhealthy lifestyle make them more susceptible to IBS (Eid et al., 2018). One of the most challenging and stressful fields of study is medicine, which explains the high prevalence of IBS (Shafique et al., 2021). The pathophysiologic factors that trigger the onset of IBS include increased intestinal permeability, visceral hypersensitivity, intestinal mucosal activation and small intestine bacterial overgrowth (Ahmed et al., 2020).

A meta-analysis of 80 different study populations involving 260,960 people reports that the pooled prevalence was estimated to be 11.2 percent (95 %C1, 9.8% - 12.8%) (Anthea et al., 2021). IBS is thought to cost the healthcare system in the United States more than $20 billion a year (Akbayram, 2021). IBS is more common in western countries than in Asian regions, with prevalence rates of 10% – 15% and 1% – 10%, respectively (Fadl et al., 2022). In 2022 research showed that 6.6% of MDs had IBS, using Rome IV criteria. Male MDs were more affected and IBS strongly correlated with having a positive family history, occasionally taking analgesics and being a highly anxious student (El-Sharawy et al., 2022; Farah et al., 2022). In a study done in Saudi Arabia, the IBS-M subtype was the most prevalent one. According to Korean research, 29.2% of 319 medical students had IBS (Almezani et al., 2018).

Several researches have been done in the kingdom of Saudi Arabia to estimate the approximate prevalence of IBS among medical students. However, the majority took place at certain universities. In this study, our sample will be medical students from all academic years from many universities in Saudi Arabia without showing any bias toward any university. The purpose of this research was to estimate the prevalence of irritable-bowel-syndrome among medical students from all academic years in Saudi Arabia.

2. MATERIALS AND METHODS

Study design/sitting

This is an observational cross-sectional study that was conducted in Saudi Arabia from July 2022 to January 2023.

Inclusion and Exclusion criteria

This study has included all medical students of all academic years who live in Saudi Arabia. Non-medical students, graduated medical students and medical students who didn't agree to participate in this study have been excluded.

Sample size

This study comprised male and female medical students of all academic years from many universities in Saudi Arabia. A (Raosoft Inc., Seattle, WA) calculator was used to determine the sample size with a 95% confidence interval, a 5% margin of error and a 50% response distribution.

Method for data collection and instrument (Data collection Technique and tools)

Data was gathered using a specially created questionnaire according to the (ROME-IV) criterion. In addition to taking weight and height measurements for the purpose of calculating body mass index (BMI). The questionnaire asked about socio-demographic information (age, gender, study years, GPA, marital status, hometown region, living in high altitude and family income), physical examination (weight, height), personal and dietary habits (smoking, alcohol use, the stress in addition to dietary intake of sugar, consume of dairy products, fruits, vegetables, protein and spicy foods) and medical history (family history of IBS, history of GIT disease, previously diagnosed with IBS, appendectomy or any abdominal surgery, previous intestinal infection, suffering from anxiety, depression or stress, using drugs like NSAIDs, antibiotics-and oral-contraceptive-pills). Additionally, we asked questions concerning potential symptoms like abdominal pain (location and association with defecation), change in the appearance of stool and frequency, heartburn, bloating and nausea.

Analyzes and entry method

The "Microsoft Office Excel Software" program was used to enter the data. Afterward, the data was loaded into the SPSS software program, version 25, to conduct a statistical analysis.

3. RESULTS

Table 1 shows the sociodemographic-characteristics of the participants. 94.5% of the participants were between 20 and 25 years old, most of which were Saudis. 17.2% were 6th year medical students, 25.4% were in the 5th year, 26.6% were in the 4th year and 24.6% were in the 3rd year of MBBS. Cumulative GPA of the respondents was higher than 4 in more than half of them (52.7%). Only 4.5% were currently married. Living in altitude was positive in 28.4%. 11.7% had lower monthly income than 5000 Saudi Arabian Riyal (SAR), while 9.5% had higher than 50000 SAR. Regarding BMI, 15.7% were obese, 22.4% were overweight, 47.0% had normal BMI and 14.9% were underweight.

Table 1 Socio-demographic-characteristics of participants (n=402)

Parameter		No.	%
Age	Less than 20	10	2.5
	20 – 25	380	94.5
	26- 30	12	3.0
Gender	Male	190	47.3
	Female	212	52.7
Nationality	Saudi	373	92.8
	Non-Saudi	29	7.2
Academic year	1st year of MBBS	11	2.7
	2nd year of MBBS	14	3.5
	3rd year of MBBS	99	24.6
	4th year of MBBS	107	26.6
	5th year of MBBS	102	25.4
	6th year of MBBS	69	17.2
Cumulative GPA	Less than 2	4	1.0
	2 – 2.9	34	8.5
	3- 3.9	152	37.8
	4 – 5	212	52.7
GPA maximum value	4	123	30.6
	5	279	69.4
Marital status	Married	18	4.5
	Single	372	92.5
	Widowed	1	.2
	Divorced	11	2.7
Live in altitude	Yes	114	28.4
	No	288	71.6
Income	Below 5000 Rs	47	11.7
	5000-10,000 Rs	54	13.4
	11,000-15,000 Rs	62	15.4
	16,000-20,000 Rs	73	18.2
	21,000-30,000 Rs	62	15.4
	31,000-40,000 Rs	40	10.0
	41,000-50,000 Rs	26	6.5
	More than 50,000 Rs	38	9.5
Residence region	Al-Baha	2	.5
	Al-Jouf	1	.2
	Al-Medina	9	2.2
	Aseer	45	11.2
	Eastern province	75	18.7

	Jazan	25	6.2
	Jeddah	91	22.6
	Makkah	60	14.9
	Najran	1	.2
	Other	45	11.2
	Qassim	15	3.7
	Riyadh	33	8.2
BMI	Underweight	60	14.9
	Healthy	189	47.0
	Overweight	90	22.4
	Obese	63	15.7

Table 2 illustrates the predisposing and associated factors of IBS among the participants. 72.1% of the participants never smoke, 89.3% never consume alcohol, 26.6% always face a lot of stress, 34.6% sometimes consumes sugar to deal with stress, 45.5% sometimes can deal with stress and relieve it. 27.1% and 38.6% very often and sometimes, respectively, consume sugar daily. Only 8.2% always eat fruits, 10.4% always eat vegetables, 12.9% always eat spicy food and 22.4% always consume dairy products.

Table 2 Predisposing and associated factors of IBS among the participants (n=402)

	Always	Never	Rarely	Sometimes	Very often
Smoke	36 9.0%	290 72.1%	15 3.7%	36 9.0%	25 6.2%
Consume any alcohol	9 2.2%	359 89.3%	7 1.7%	12 3.0%	15 3.7%
Undergo a lot of stress	107 26.6%	19 4.7%	31 7.7%	113 28.1%	132 32.8%
Consume sugar to deal with stress	51 12.7%	55 13.7%	82 20.4%	139 34.6%	75 18.7%
Deal with stress and relieve it	46 11.4%	20 5.0%	64 15.9%	183 45.5%	89 22.1%
Consume sugar daily	67 16.7%	13 3.2%	58 14.4%	155 38.6%	109 27.1%
Eat fruits	33 8.2%	11 2.7%	131 32.6%	152 37.8%	75 18.7%
Eat vegetables	42 10.4%	19 4.7%	107 26.6%	149 37.1%	85 21.1%
Eat proteins	173 43.0%	8 1.9%	17 4.2%	74 18.4%	130 32.3%
Eat spicy food	52 12.9%	43 10.7%	92 22.9%	119 29.6%	96 23.9%
Consume dairy products	90 22.4%	14 3.5%	42 10.4%	138 34.3%	118 29.4%

18.7% of the studied population were previously with IBS (Figure 1). IBS and associated parameters among the studied population, Self-assessed of physical activity level among the participants was very good in 12.4%, good in 23.4%, acceptable in 30.6%, poor in 28.1% and very poor in 5.5%. 42.5% had a positive family history for IBS. 7.2% had previously undergone an abdominal surgery. 13.7% take NSAIDS regularly. 57.0% had reported that they suffer from anxiety, depression or stress. Only 15.4% of the respondents regularly exercise (Table 3).

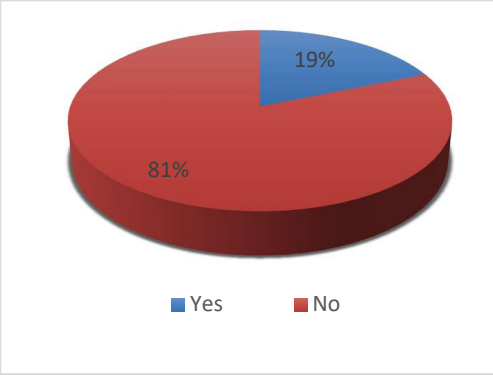

Figure 1 Illustrates Prevalence of Irritable-Bowel-Syndrome among the studied population (n=402)

Table 3 Illustrates IBS and associated parameters among the studied population (n=402)

Parameter		No.	%
Physical activity	Very good	50	12.4
	Good	94	23.4
	Acceptable	123	30.6
	Poor	113	28.1
	Very poor	22	5.5
Family history of IBS	Yes	171	42.5
	No	231	57.5
Diagnosed with IBS	Yes	75	18.7
	No	327	81.3
If yes, when?	1st academic year of MBBS	11	14.7
	2nd academic year of MBBS	13	17.3
	3rd academic year of MBBS	11	14.7
	4th academic year of MBBS	8	10.7
	a) Before MBBS	32	42.7
Undergone an appendectomy before	Yes	25	6.2
	No	377	93.8
Undergo any abdominal surgery before	Yes	29	7.2
	No	373	92.8
Take any medications continuously	Antihistamines	23	5.7
	Antibiotics	12	3.0
	Iron supplements	29	7.2
	Urinary incontinence medications	4	1.0
	Anti-depressants	33	8.2
	Proton pump inhibitors	20	5.0
	NSAIDs	37	9.2
	I do not take any medication	263	65.4
	Other	53	13.2
Take NSAIDs regularly	Yes	55	13.7
	No	347	86.3
Use antibiotics often	Yes	36	9.0
	No	366	91.0
Consume oral contraceptive pills	Yes	34	8.5
	No	368	91.5
Other GIT diseases	Yes	61	15.2
	No	341	84.8

Get traveler's diarrhea previously	Yes	63	15.7
	No	339	84.3
Get an intestinal infection before	Yes	97	24.1
	No	305	75.9
Suffer from anxiety, depression or stress	Yes	229	57.0
	No	173	43.0
Level of anxiety, depression or stress	Mild	140	34.8
	Moderate	110	27.4
	Normal	118	29.4
	Severe	34	8.5
Exercise	Always	62	15.4
	Never	45	11.2
	Occasionally	143	35.6
	Rarely	152	37.8

Table 4 shows the results of survey of IBS diagnostic criteria and recurring symptoms among the studied population. According to the findings, the true prevalence of IBS regardless of being previously diagnosed by a physician should be roughly estimated at between 32.6% and 54.2%. Figure 2 shows, 41.5% among the studied population have diffuse pain and only 5.7% have pain in the right lower part of the abdomen.

Table 4 Survey of IBS recurring symptoms among the studied population (n=402)

Parameter		No.	%
Have abdominal pain in the last 3 months	Yes	196	48.8
	No	206	51.2
Change in the appearance of the stool	Yes	131	32.6
	No	271	67.4
Change the frequency of the stool	Yes	159	39.6
	No	243	60.4
Have pain or discomfort in the abdomen relieved by defecation	Yes	191	47.5
	No	211	52.5
Other symptoms	Bloating	149	37.1
	Nausea	106	26.4
	Heartburn	104	25.9
	I did not experience any symptoms	178	44.3
Recurrent symptoms	Constipation	76	18.9
	Diarrhea	47	11.7
	Mixed (alternating between diarrhea and constipation)	95	23.6
	There is no symptom that I commonly suffer from	184	45.8

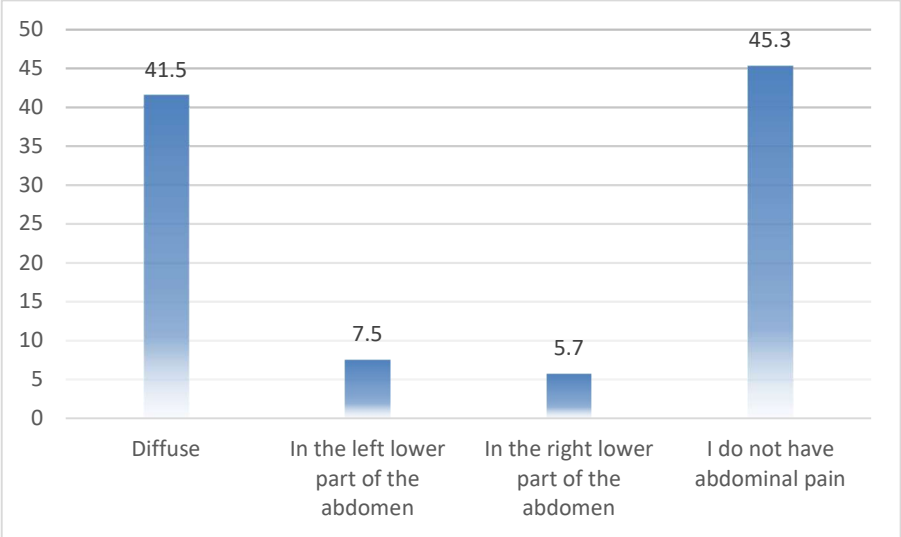

Figure 2 Describe abdominal pain among the studied population (n=402)

Table 5 illustrates the relation between IBS and age, gender, nationality, academic year, cumulative GPA, maximum value of GPA, marital status, living at a high altitude and BMI. There was an insignificant relation between those variables and having been diagnosed with IBS.

Table 5 The relation between IBS and age, gender, nationality, academic year, cumulative GPA, maximum value of GPA, marital status, living at a high altitude and BMI

		Diagnosed with IBS before		Total (N=402)	P value
		Yes	No		
Age	Less than 20	3	7	10	0.164
		4.0%	2.1%	2.5%	
	20 – 25	72	308	380	
		96.0%	94.2%	94.5%	
	26 – 30	0	12	12	
		0.0%	3.7%	3.0%	
Gender	Male	37	153	190	0.691
		49.3%	46.8%	47.3%	
	Female	38	174	212	
		50.7%	53.2%	52.7%	
Nationality	Saudi	68	305	373	0.432
		90.7%	93.3%	92.8%	
	Non-Saudi	7	22	29	
		9.3%	6.7%	7.2%	
Academic year	1st year of MBBS	3	8	11	0.320
		4.0%	2.4%	2.7%	
	2nd year of MBBS	3	11	14	
		4.0%	3.4%	3.5%	
	3rd year of MBBS	21	78	99	
		28.0%	23.9%	24.6%	
	4th year of MBBS	21	86	107	
		28.0%	26.3%	26.6%	
	5th year of MBBS	21	81	102	
		28.0%	24.8%	25.4%	

	6th year of MBBS	6	63	69	
		8.0%	19.3%	17.2%	
Cumulative GPA	Less than 2	0	4	4	0.673
		0.0%	1.2%	1.0%	
	2 - 2.9	8	26	34	
		10.7%	8.0%	8.5%	
	3 - 3.9	29	123	152	
		38.7%	37.6%	37.8%	
	4 – 5	38	174	212	
		50.7%	53.2%	52.7%	
Maximum value of GPA	4	23	100	123	0.988
		30.7%	30.6%	30.6%	
	5	52	227	279	
		69.3%	69.4%	69.4%	
Marital status	Married	1	17	18	0.301
		1.3%	5.2%	4.5%	
	Single (never got married)	71	301	372	
		94.7%	92.0%	92.5%	
	Widowed	0	1	1	
		0.0%	0.3%	0.2%	
	Divorced	3	8	11	
		4.0%	2.4%	2.7%	
Live at a high altitude	Yes	16	98	114	0.135
		21.3%	30.0%	28.4%	
	No	59	229	288	
		78.7%	70.0%	71.6%	
BMI	Underweight	16	44	60	0.081
		21.3%	13.5%	14.9%	
	Healthy	26	163	189	
		34.7%	49.8%	47.0%	
	Overweight	18	72	90	
		24.0%	22.0%	22.4%	
	Obese	15	48	63	
		20.0%	14.7%	15.7%	

4. DISCUSSION

Irritable-bowel-syndrome (IBS) is a chronic gastrointestinal condition that is clinically manifested by recurring abdominal pain or discomfort, which is relieved after bowel emptying and associated with changes in bowel habits. IBS affects around 10–20% of adults worldwide and tends to be more common in women and adults under 50 years (Horwitz and Fisher, 2001). IBS's specific-cause is still unclear; however potential-causes include bacterial overgrowth, aberrant serotonin-modulation and post-infectious IBS. Twin-studies have also suggested a genetic basis of IBS. Moreover, people have long-been regarded to be predisposed to IBS by psychosocial-variables (Longstreth et al., 2006).

Nothing is identified about the-prevalence of IBS in Saudi-Arabia (SA), specifically amongst students of the university. Some cross-sectional studies, using Rome III diagnostic criteria, have reported that IBS is common-among undergraduate-students (Lee et al., 2007). For example, per the reports from Riyadh-Jeddah, 31.8precent and 21precent, respective, of medical-students satisfied the requirements for an IBS-diagnosis. However, IBS-prevalence numbers vary, thus several elements, such as research techniques, diagnostic-standards and sample-size, should be considered when conducting-research. Stress may play a part in explaining the high-frequency of IBS among university-students, especially medical-students. Individuals with IBS cause more costs for the health care system compared to healthy individuals. Low quality of life, the ambiguity of the underlying causes, frequency of symptoms,

and coexisting health problems lead to recurrent hospital visits and costly investigations for IBS patients (Heidelbaugh et al., 2015). Our study aimed to determine prevalence of irritable bowel syndrome (IBS) among many medical students from different universities in Saudi Arabia.

In our study, we have found that 18.7% of the studied medical students had history of IBS. Of which, 4% were under the age of 20 and 96% between the ages of 20 and 25. 49.3% of them were males and 50.7% were females and both age and gender had no significant role in prevalence of IBS. Another-paper in KSA (Talley, 2006), relieved that the overall prevalence rate of IBS in the study population was 15.8%, which is consistent with what has been reported by international and local studies (Ibrahim et al., 2013; Saito et al., 2005), similar-findings were made (Heidelbaugh et al., 2015), that explored that 15.6 percent of Jeddah's medical-students fulfill the Rome III criteria for IBS (Alaqeel et al., 2017). IBS is 20.5 percent more prevalent in Western-countries, as demonstrated by a Canadian-study of medical-students working midnight-shifts.

In the Far East, a study in Malaysia and an investigation in China reported lower prevalence of 15.8% and 15.7%, respectively (Hasosah et al., 2017). In contrast, one study in Korea and another investigation that included medical and nursing students in Japan reported higher prevalence of 29.2% and 35.5%, respectively (Okami et al., 2011). IBS is ubiquitous in the Middle-East, with undergraduates in health-related disciplines making up half of cases, according to recent research from Lebanon those included-students from various-majors. Nationally, a-Jeddah investigation on medical-interns and students found that 31.8percent of them had IBS. These differences in prevalence could be due to cultural, ethnic and dietary habits in various countries and may also be attributable to the sample sizes, age groups and diagnostic criteria used by different investigations (Jung et al., 2011).

Regarding risk factors of IBS, we have found that, neither nationality nor academic year had a role in prevalence of IBS. Naeem et al., (2012) demonstrated that IBS was most prevalent among final-year students, followed by second-year students. The implementation of a block-system for 2nd year students and the growing workload of 5th year students may be factors in these high-rates. The same outcome about the prevalence of IBS being higher among students in their last year was found in a local findings-reported in Jeddah. In comparison, a systematic-analysis from Iran found that the 1st- and 2end-year students had the greatest-frequency of IBS (Wells et al., 2012). One research in (Ontario; Canada), demonstrated no appreciable differences in the-frequency of IBS across pre-clinical and clerkship-students (Tan et al., 2003).

In our study, we have found that 57% suffer from anxiety, another study-performed in the nation of Pakistan-found that 55.8percent of people with IBS experienced-psychological-anxiety-symptoms. Also, several-studies from across the world have shown that people with IBS and high-levels of-anxiety had more IBS-symptoms than people without such conditions (Savas et al., 2009; Shen et al., 2009; Tan et al., 2003).

Regarding gender, we have found that, 50.7% of diagnosed cases of IBS were females and 49.3% were males. A cross-sectional study revealed that the prevalence of-IBS was higher among-females than among males, with a female to male ratio of 1.27:1. This is in agreement with previous reports that found a female predominance in IBS prevalence (Sperber et al., 2017). In a systemic-review and meta-analysis of 55 studies including 162,543 subjects, women showed a higher-prevalence of IBS-than men (Chang and Heitkemper, 2002). Possible explanations for this difference include physiologic differences and different medical care-seeking behaviors (Kim and Kim, 2018), in the same study, students of medical colleges were 7.2 times more likely, than non-medical students, to meet the standards for an IBS-diagnosis. These-evidence-points to the necessity of interventional-research that take this epidemiologic-picture into account. Offering medical counseling for medical students may help in relieving their stress and possibly, their IBS symptoms (Lee, 2010).

5. CONCLUSION

In this research-project, the frequency of IBS was 18.7 percent overall, higher in women than in males, but higher in both genders among 5th year students. The-majority of students-reported moderate to high levels of anxiousness. Stress-management exercises and student counseling sessions are advised to reduce anxiety and help students cope with various-pressures during their educational-journey.

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Author Contributions

The authors confirm contribution to the paper as follows: study conception and design Khalid Alghamdi, Nouran Alshehri, Khames Alzahrani; data collection: Shahad Alshehri, Amal Alkhaldi, Huriyyah Alotaibi, Norah Alqutami, Maryam Alshams, Saad Alshehri.

Draft manuscript preparation: Khalid Alghamdi, Nouran Alshehri, Shahad Alshehri, Amal Alkhaldi Huriyyah Alotaib, Norah Alqutami, Maryam Alshams, Saad Alshehri, Khames Alzahrani6. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The research proposal was approved by the Regional Research and Ethics committee of ministry of health in Jeddah with letter number (A01547).

Informed consent

Written informed consent was obtained from all individual participants included in the study.

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This study has not received any external funding.

Conflict of interest

The authors declare that there is no conflict of interests.

Data and materials availability

All data sets collected during this study are available upon reasonable request from the corresponding author.

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