

# Prevalence and Associated Factors of Gastro-Esophageal Reflux Disease among a Sample of Undergraduate Medical Students in Baghdad

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Sarah H. Abdulwahhab\*

MBCbB

Ban A.R. Al Hashimi\*\*

FICMS.FM

Nawal M. Alkhalidi\*\*\*

CABM.FICMS (GE&H)



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## Abstract:

**Background:** Gastroesophageal reflux disease (GERD) is a common gastrointestinal disorder in adults. It develops when the stomach contents reflux into the esophagus as a result of lower esophageal sphincter dysfunction. It is a multifactorial disease with both environmental and genetic risk factors as suggested by several epidemiological studies. The classical symptoms of GERD are heartburn, usually after eating, regurgitation and chest pain. There are very few studies on the magnitude of GERD among students. Most medical students who suffer from GERD and/or dyspeptic symptoms do not reach out to a doctor since they either consider these symptoms insignificant or do self-medication.

**Objectives:** This study was conducted to determine the prevalence of GERD among a group of medical students and the potential risk factors associated with it.

**Methods:** A cross-sectional study was conducted on a sample of 300 undergraduate students of the College of Medicine / University of Baghdad by simple random sampling from 15th of January to 1st of June 2020. All participants answered online questionnaire for GERD symptoms. The questionnaire included demographic data (age and gender), anthropometric data (height and weight), and lifestyle and dietary habits. Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 25. Results with a P value of <0.05 were considered statistically significant.

**Results:** Of the sample studied, 216 (72%) were females and 84 (28%) were males. The mean±SD for age was 21.9 ± 1.81 years and the prevalence of GERD was 13.3%. A positive family history of GERD was found in 86 (28.7%) of the participants which was statistically significant (P =0.001). Of the students studied, 28 (9.3%) were sleeping within one hour of eating a meal (P =0.001). Those taking antacids and PPIs were 38 (12.7%) and 41 (13.7%) respectively, with a significant association with GERD (P =0.001). Frequent belching was reported by 20 (6.7%) (P =0.001). No significant association was found between GERD score, general characteristics and dietary habits.

**Conclusions:** GERD Prevalence was 13.3%. Family history of GERD and late dinners were associated factors with GERD, while Oesophageal-Gastro-Duodenoscopy (OGD) was an associated diagnostic procedure, and belching was an associated symptom.

**Keywords:** Gastro-Esophageal Reflux, Students, Oesophageal-Gastro-Duodenoscopy, dietary habits

## Introduction:

Gastroesophageal Reflux Disease (GERD) is one of the most common gastrointestinal disorders that affect almost all age groups (1). It develops when the reflux of stomach content into the esophagus causes troublesome symptoms and /or complications (1).

The pathophysiology of GERD includes transient relaxation of lower esophageal sphincter, defects at the gastro-esophageal junction, lower esophageal Sphincter dysfunction and formation of hiatal hernia (2). It is a multifactorial disease with both environmental and genetic risk factors as suggested by several epidemiological studies (3). The classical symptoms of GERD are heartburn, usually after eating, regurgitation and chest pain (3). Younger age, female sex, family history, mental stress, smoking, alcoholism, fatty meals, shorter dinner to bed time, caffeine intake, carbonated soft drinks, drugs like Non-Steroidal Anti-inflammatory Drugs (NSAIDs), obesity and elevated body mass index are known risk factors for this disorder(3-5). A study from Iraq showed that (40.6%) of the surveyed group reported heartburn or acid regurgitation(6). A limited number of studies are available regarding the prevalence and

Baghdad Teaching Hospital/ General directorate of the Medical City.

Correspondence E-mail: [shlmdshlmd@gmail.com](mailto:shlmdshlmd@gmail.com).

\*\*AIDubbat PHCC for family physicians, Al-Rusafa health directorate.

\*\*\* Gastroenterology and hepatology teaching hospital in Baghdad city/ General directorate of the Medical City.

magnitude of GRED in young adults, medical students in particular (4). Most medical students who suffer from GRED and/or dyspeptic symptoms do not reach out to a doctor since they either consider these symptoms insignificant or do self-medication (5). Studies showed that undergraduate medical students especially have high levels of stress. Possible factors such as difficulty in coping with the curriculum, staying away from home, disordered or poor eating habits may contribute to psychological distress(1). GRED may affect the quality of life and thus affect daily activities, college attendance, and students' wellbeing (5).

**Methodology:**

A cross-sectional descriptive study was conducted on a sample of 300 undergraduate medical students from the College of Medicine / University of Baghdad from 15th of January – 1st of June 2020 using online questionnaire for GERD symptoms. The number of female students in the college was approximately double that of males; in addition; about half of male students that were selected randomly refused to participate in the study. The questionnaire included 1) Demographic data like age, gender, 2) Anthropometric data (height, weight and Body Mass Index (BMI)), 3) lifestyle and dietary habits and 4) Gastro-Esophageal Reflux Disease Questionnaire (GERDQ) which consisted of six questions about GERD symptoms(2).

**Inclusion criteria:** Students attending the College of medicine / University of Baghdad during the period of the study. The number of female students in the college was approximately double that of males and about half of male students who were selected randomly refused to participate in the study.

**Exclusion criteria:** Those who have not completed the questionnaire by the end of the study, or were unwilling to participate.

Approval was obtained from the Arab Board Committee and the Ministry of Higher Education and Scientific Research.

For each student and before filling the questionnaire online, the aim of the study was explained, the permission of the participant was sought and the privacy of each participant was taken into consideration. The data was analyzed using the Statistical Package for Social Sciences (SPSS) version 25. A P- value of <0.05 was considered statistically significant. Scoring: Gastro-Esophageal Reflux Disease Questionnaire (GERDQ) was used, it

is a type of ordinal scale and used generally to assess GERD symptoms.

Scoring for symptoms/ week:

None = 0

For 1 Day symptoms = 1

For 2-3 days symptoms = 2

For 4-7 days symptoms = 3

It is a questionnaire that has been developed as a patient-centered self-assessment and to assist the health care providers in assessing the symptoms of the disease and making the diagnoses of GERD. Those with GERDQ score of ≥8 were considered to have GERD, while others who got a score of <8 were not (2).

**Results:**

Participants' age ranged from 18 to 24 years with a mean±SD of 21.9 ± 1.81 years. The majority were between 21-24 years (71%) and females (72%) with a male to female ratio of 1:2.6. Two thirds had a normal BMI (66%), Table (1).

**Table 1: Distribution of studied participants by general characteristics**

Characteristics	Categories	No. (n=300)	Percentage
Age (Years)	≤20	71	23.6
	21-24	213	71.0
	>24	16	5.4
Gender	Male	84	28.0
	Female	216	72.0
BMI	Normal	198	66.0
	Underweight	18	6.0
	Overweight	66	22.0
	Obese	18	6.0
Grade	First	10	3.3
	Second	38	12.7
	Third	43	14.3
	Forth	36	12.0
	Fifth	114	38.0
	Sixth	59	19.6

The distribution of studied participants by dietary habits is shown in figure (1). The participants said that they were consuming fast fried food (59.3%), three meals/day (57.7%), eating meals quickly in less than 10 minutes (52.7%), having meals on regular times infrequently (49.3%), spicy food frequently in the last three months (48.3%), soft drinks frequently in last three months (28%), skipping meals daily (23%), energetic drinks infrequently in the last 3 months (18.7%), more than three cups of tea or coffee/day (16%), and midnight snacks daily (13.7%).

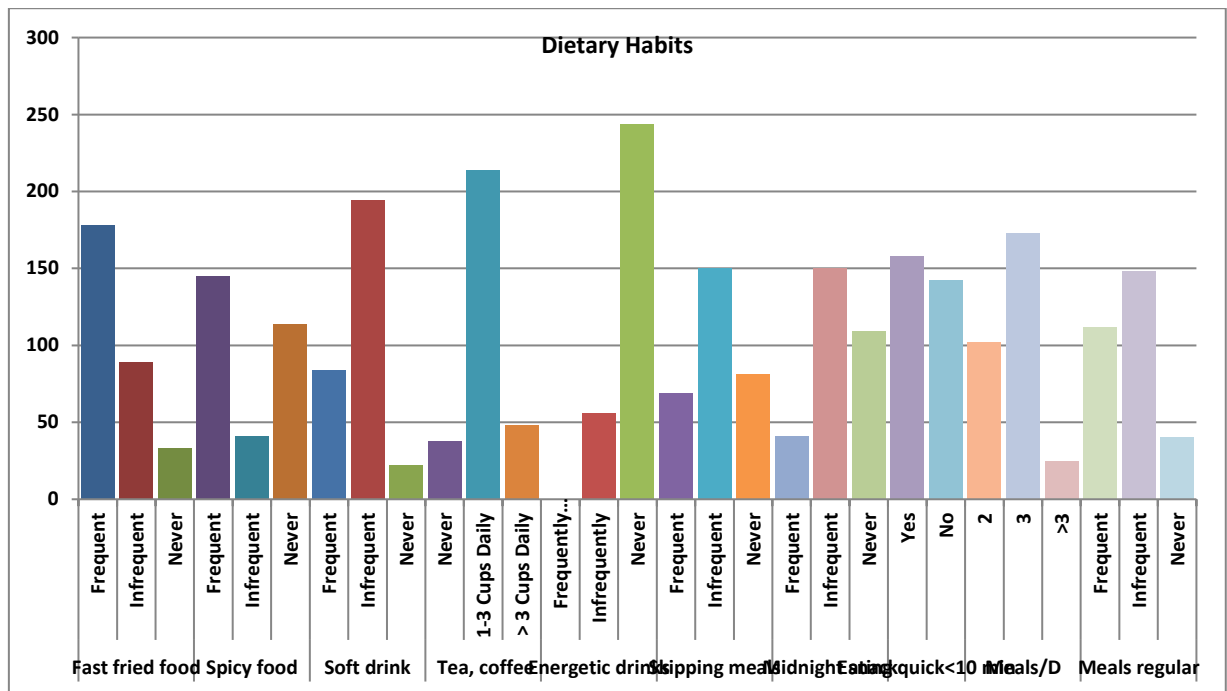


Figure 1: Distribution of studied participants by their dietary habits

Figure 2 shows the distribution of studied participants by social, medical, family, drug, and surgical history. Of the participants, 5% were current smokers, 1% were alcohol consumers, 9.3% were sleeping within one hour after dinner, 14.3% were diagnosed with medical diseases, 28.7% had a positive family history of heartburn/regurgitation/GERD, 20.3% were taking

NSAIDs, 12.7% were taking antacids, and 13.7% were taking PPI like omeprazole. Lack of physical activity was seen in 39%, 10.3% had had previous Oesophageal-Gastro-Dudenoscopy (OGD), and 6.7% were suffering from belching, but infrequently.

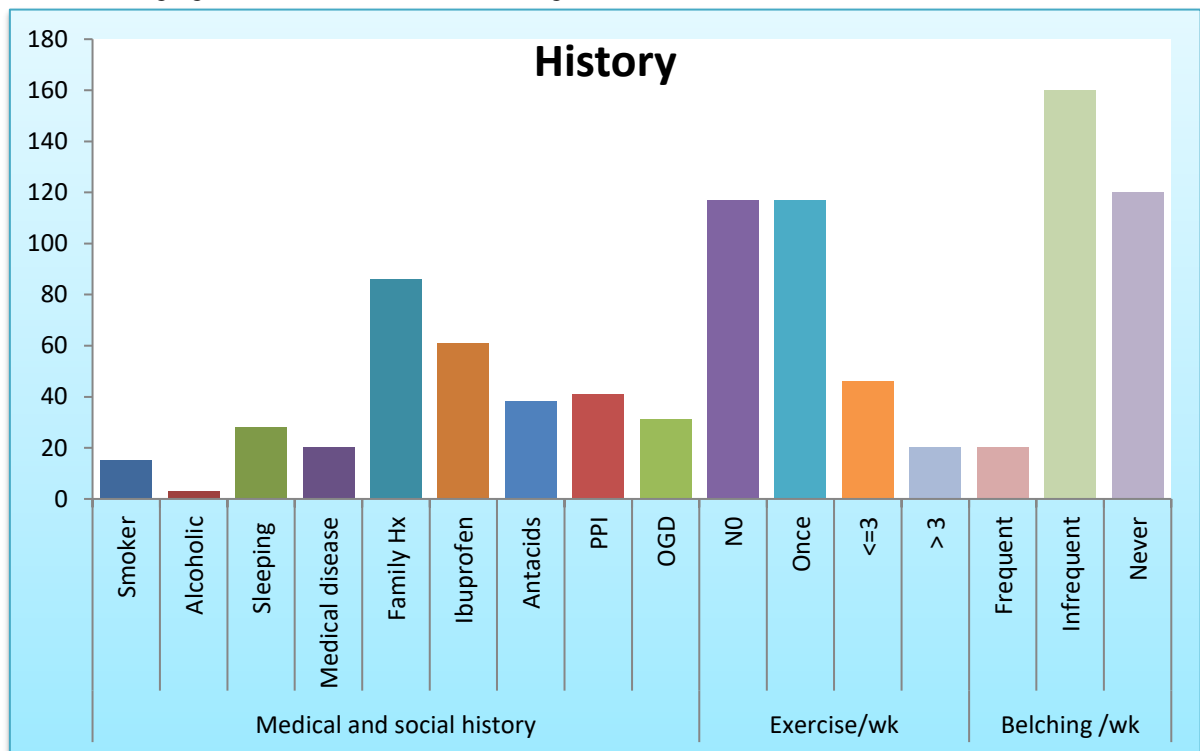


Figure 2: Distribution of studied participants by social, medical, family, drug and surgical history

Table (2) shows the distribution of the results of GERD score and general characteristics, with no statistical significant associations ( $P \geq 0.05$ ).

**Table 2: Association between GERD Score and general characteristics**

Characteristics	Categories	Results of GERD Score		Total (%) n= 300	P - Value
		Greater (%) n= 40	Low (%) n= 260		
Age (Years)	< 20	12 (16.9)	59 (83.1)	71 (23.7)	0.598
	21 – 24	26 (12.2)	187 (87.8)	213 (71.0)	
	≥ 24	2 (12.5)	14 (87.5)	16 (5.3)	
Gender	Male	7 (8.3)	77 (91.7)	84 (28.0)	0.112
	Female	33 (15.3)	183 (84.7)	216 (72.0)	
BMI	Normal	30 (15.2)	168 (84.8)	198 (66.0)	0.438
	Underweight	1 (5.6)	17 (94.4)	18 (6.0)	
	Overweight	6 (9.1)	60 (90.9)	66 (22.0)	
	Obese	3 (16.7)	15 (83.3)	18 (6.0)	
Grade	First	2 (20.0)	8 (80.0)	10 (3.3)	0.958
	Second	6 (15.8)	32 (84.2)	38 (12.7)	
	Third	6 (14.0)	37 (86.0)	43 (14.3)	
	Forth	4 (11.1)	32 (88.9)	36 (12.0)	
	Fifth	14 (12.3)	100 (87.7)	114 (38.0)	
	Sixth	8 (13.6)	51 (86.4)	59 (19.6)	

Table (3) shows the distribution of the results of GERD score by dietary habits, with no significant associations ( $P \geq 0.05$ ).

**Table 3: Association between results of GERD score and dietary habits**

Dietary habits	Categories	Results of GERD Score		Total (%) n= 300	P - Value
		Greater (%) n= 40	Low (%) n= 260		
Fast fried food in the past 3 months	Frequently / Daily	12 (6.7)	166 (93.3)	178 (59.3)	0.171
	Infrequently	12 (13.5)	77 (86.5)	89 (29.7)	
	Never	4 (12.1)	29 (87.9)	33 (11.0)	
Spicy food in the past 3 months	Frequently / Daily	15 (10.3)	130 (89.7)	145 (48.3)	0.149
	Infrequently	9 (22.0)	32 (78.0)	41 (13.7)	
	Never	16 (14.0)	98 (86.0)	114 (38.0)	
Soft drinks in the past 3 months	Frequently / Daily	9 (10.7)	75 (89.3)	84 (28.0)	0.527
	Infrequently	29 (14.9)	165 (85.1)	194 (64.7)	
	Never	2 (9.1)	20 (90.9)	22 (7.3)	
Tea / coffee daily	Never	5 (13.2)	33 (86.8)	38 (12.7)	0.962
	1-3 Cups Daily	28 (13.1)	186 (86.9)	214 (71.3)	
	> 3 Cups Daily	7 (14.6)	41 (85.4)	48 (16.0)	
Energetic drinks/week	Infrequently	11 (19.6)	45 (80.4)	56 (18.7)	0.123
	Never	29 (11.9)	215 (88.1)	244 (81.3)	
Skipping meals usually	Frequently / Daily	12 (17.4)	57 (82.6)	69 (23.0)	0.356
	Infrequently	16 (10.7)	134 (89.3)	150 (50.0)	
	Never	12 (14.8)	69 (85.2)	81 (27.0)	
Having midnight snacks	Frequently / Daily	4 (9.8)	37 (90.2)	41 (13.7)	0.731
	Infrequently	20 (13.3)	130 (86.7)	150 (50.0)	
	Never	16 (14.7)	93 (85.3)	109 (36.3)	
Eating quickly <10 minutes	Yes	16 (10.1)	142 (89.9)	158 (52.7)	0.08
	No	24 (16.9)	118 (83.1)	142 (47.3)	
Number of meals per day	Two	20 (19.6)	82 (80.4)	102 (34.0)	0.599
	Three	18 (10.4)	155 (89.6)	173 (57.7)	
	More than three	2 (9.1)	20 (90.9)	22 (7.3)	
Having meals on regular times	Frequently / Daily	20 (17.9)	92 (82.1)	112 (37.3)	0.203
	Infrequently	16 (10.8)	132 (89.2)	148 (49.3)	
	Never	4 (10.0)	36 (90.0)	40 (13.4)	

Table (4) shows the association between the results of GERD score with medical, surgical, drug, family, and social history. The prevalence of greater likelihood of GERD was significantly increased ( $P= 0.001$ ) in participants who were sleeping within one hour of dinner (39.3%), in those who had positive family history of heartburn/regurgitation/GERD (31.4%,  $P=0.001$ ), and among participants who took antacids and PPI (omeprazole) (34.2% and 43.9% respectively,  $P= 0.001$  for both). The prevalence of greater likelihood of GERD was highest among participants who had any previous OGD (25.8%) with a significant association ( $P= 0.03$ ). As for belching, 40% of those who were suffering from daily belching had greater likelihood of GERD with a significant association ( $P= 0.001$ ).

**Table 4: Distribution of the participants by the results of GERD score and social, medical, family, drug and surgical history**

History of	Categories	Results of GERD Score		Total (%) n= 300	P - Value
		Greater (%) n= 4	Low (%) n= 260		
Smoking	Yes	3 (20.0)	12 (80.0)	15 (5.0)	0.435
	No	37 (13.0)	248 (87.0)	285 (95.0)	
Drinking Alcohol	Yes	0 (0)	3 (100.0)	3 (1.0)	0.494
	No	40 (13.5)	257 (86.5)	297 (99.0)	
Sleeping within one hour after dinner	Yes	11 (39.3)	17 (60.7)	28 (9.3)	0.001
	No	29 (10.7)	243 (89.3)	272 (90.7)	
Diagnosed with any medical disease	No	38 (13.6)	242 (86.4)	280 (93.3)	0.649
	YES	2 (10.0)	18 (90.0)	20 (6.7)	
Having positive family history	Yes	27 (31.4)	59 (68.6)	86 (28.7)	0.001
	No	13 (6.1)	201 (93.9)	214 (71.3)	
Taking drugs (NSAIDs: ibuprofen)	Yes	9 (14.8)	52 (85.2)	61 (20.3)	0.714
	No	31 (13)	208 (87)	239 (79.7)	
Taking drugs (antacids)	Yes	13 (34.2)	25 (65.8)	38 (12.7)	0.001
	No	27 (10.3)	235 (89.7)	262 (87.3)	
Taking drugs (PPI: omeprazole)	Yes	18 (43.9)	23 (56.1)	41 (13.7)	0.001
	No	22 (8.5)	237 (91.5)	259 (86.3)	
Exercising physically (weekly)	No	16 (13.7)	101 (86.3)	117 (39.0)	0.945
	Once	15 (12.8)	102 (87.2)	117 (39.0)	
	2-3 Times	7 (15.2)	39 (84.8)	46 (15.3)	
	> 3 Times	2 (10)	18 (90)	20 (6.7)	
Having any (OGD)	Yes	8 (25.8)	23 (74.2)	31 (10.3)	0.003
	No	32 (11.9)	237 (88.1)	269 (89.7)	
Suffering from belching per week	Frequently	8 (40.0)	12 (60.0)	20 (6.7)	0.001
	Infrequently	17 (10.6)	143 (89.4)	160 (53.3)	
	Never	15 (12.5)	105 (87.5)	120 (40.0)	

**Discussion:**

The prevalence of GERD in our study was 13.3% which is very close to the result reported by Kathrik in South India(1) of 14.4% and that reported by Firoozi in Shiraz, Southern Iran(7) of 15.4%. However Sharma reported

GERD prevalence to be 25% among medical students in India(5) and Alrashed reported the prevalence to be 23.8% in Saudi Arabia(3). The lower prevalence in our study may be explained by the small sample size and the short duration of study (6 months). Hassan from Iraq reported a prevalence of 33%(8) while Al Obeidy, also from Iraq, reported that GERD and lax cardia rate was (8.8-15%).(9) Some reports have shown that college students, in particular, have a higher prevalence of GERD when compared to the general population.(10, 11) This is likely due to the fact that they are more exposed to various GERD risk factors, namely, stress and higher caffeine consumption.(12, 13) Gastroesophageal reflux disease (GERD) is one of the most common gastrointestinal disorders that affect almost all age groups(1). In the present study, we could not find an association between gender and GERD. The published literature has no agreement on this point. The majority of studies including a systematic review done in 2015 and a population-based study done in Arar, Saudi Arabia in 2017 reflected no relationship between the two.(14, 15) However, a study in southern India conducted on 1072 participants reported a significant association between male gender and GERD.(16) No association between high BMI and GERD was detected in our sample, while Murray in the UK(6) found that being overweight or obese substantially increases the likelihood of heartburn and regurgitation. Our result may be attributed to the low number of overweight and obese participants and the small sample size. Other studies showed a positive association, explained by the increase of thoracoabdominal pressure gradient and the reduction in the lower esophageal sphincter pressure.(17-19) Regarding dietary habits, no significant association with GERD was found in our study, in contrast to the results of Song in South Korea (20) who found a significant association. Atta(2), on the other hand found no association between tea/coffee consumption and GERD symptoms, while the study of Arivan in India(4) and Wei in Taiwan(21) both found that frequent tea /coffee consumption was associated with GERD. Regarding smoking habits, our results showed no association between smoking and having GERD. A high prevalence of unhealthy habits was reported by Alrashed (3) compared to our result and to other studies in Saudi Arabia and Iran.(22, 17) Alcohol consumption is a well-known risk factor for GERD.(23, 17, 18) In the current study no significant association was found, in contrast to the results of Ness-Jensen(24) and other studies(1, 2, 5) which found a strong association between alcohol consumption and GERD. This could be attributed to the low number of participants consuming alcohol in our study mostly due to religious and social barriers to alcohol intake in the community. Sleeping within one hour of dinner was found to be significantly associated with GERD in our study similar to the results of Atta (2), Sharma(5),

Song(20), Jarosz(25) and Firoozi(7). In the present study, a positive family history of GERD/ heartburn/ regurgitation was found to be significantly associated with GRED, similar to other studies (2, 3, 26, and 27). This suggests a genetic susceptibility and/ or similar environmental factors among family members leading to disease emergence. Intake of antacids and PPIs as a symptomatic treatment for GERD relief was statistically significant similar to other studies (1, 2, 5, 24, 28). Physical activity was not associated with GERD in our study and similar to the results of a Swedish study in 2012. (29) In the current study, OGD was done in a tenth of the cases, which was significant, suggesting the emerging role of OGD in the management of GERD in patients with alarming symptoms or detection of complications (30). Belching was found to be an important symptom of GERD in our study similar to the study of Lin in California, USA (27).

#### Conclusions:

GERD prevalence in our study was found to be 13.3%. Family history of GERD and late dinners were associated with GRED occurrence. Oesophageal-Gastro-Duodenoscopy (OGD), and belching were also associated with GRED as a diagnostic approach and an associated symptom respectively.

#### Authors contributions:

Sarah Hilmi Abdulwahhab: writing the project, collecting data, writing draft, and research.  
Ban Abdul Ridha Al Hashimi: 1st supervisor  
Nawal Mehdi Alkhalidi: 2nd supervisor

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## مدى الإنتشار والعوامل المصاحبة لمرض الإرتداد المعدي المريئي لدى عينة من طلاب كلية الطب في بغداد

د. ساره حلمي عبد الوهاب / مقيمه قديمى طب اسره / مستشفى بغداد التعليمي  
د. بيان عبد الرضا الهاشمي / استشاري طب الاسرة/مركز صحي الضباط / دائرة صحة الرصافة- بغداد  
د. نوال مهدي الخالدي: اختصاص الطب الباطني /تخصص دقيق في الجهاز الهضمي /مستشفى الجهاز الهضمي التعليمي في مدينة الطب / دائرة صحة  
مدينة الطب- بغداد

### الخلاصة

**المقدمة:** الإرتجاع المعدي المريئي هو اضطراب معدي مريئي شائع لدى البالغين، يحدث عندما ترجع محتويات المعدة وترتفع إلى المريء نتيجة خلل في العضلة العاصرة السفلية للمريء. كما إنه مرض متعدد العوامل مع عوامل الخطر البيئية والوراثية وتدعم العديد من الدراسات الوبائية هذا المفهوم. الأعراض التقليدية لمرض الارتجاع المعدي المريئي هي حرقة في المعدة، عادة بعد الأكل والإرتجاع وألم في الصدر. تم إجراء عدد قليل جداً من الدراسات حول حجم الارتجاع المريئي بين الطلاب. لا يتواصل معظم طلاب الطب الذين يعانون من إرتجاع المريء و / أو أعراض عسر الهضم مع الطبيب لأنهم يعتبرون هذه الأعراض غير مهمة أو يقومون بالتطبيب الذاتي. هدفت الدراسة إلى تحديد مدى إنتشار مرض ارتجاع المريء لدى عينة من طلاب كلية الطب /جامعة بغداد وعوامل الخطورة المحتملة المرتبطة به.

**الطريقة:** دراسة وصفية مقطعية أجريت على طلبة السنة المنتهية في كلية الطب / جامعة بغداد خلال الفترة الممتدة من 15 كانون الثاني – 1 حزيران 2020. أجاب جميع المشاركين على الاستبيان عبر الإنترنت حول أعراض الإرتجاع المريئي. تضمن الاستبيان بيانات ديموغرافية (العمر والجنس) وأنثروبومترية (الطول والوزن) ونمط الحياة والعادات الغذائية. تم تحليل البيانات الإحصائية باستخدام الحزمة الإحصائية للعلوم الإجتماعية واعتبرت النتائج ذات القيمة الاحتمالية الأقل من 0.05 ذات أهمية إحصائية.

**النتائج:** من بين الطلاب كان 216 (72%) من الإناث و 84 (28%) من الذكور يعانون من الإرتجاع المعدي المريئي، وكان متوسط عمر المشاركين  $9.21 \pm 1.81$  سنة. كان معدل إنتشار إرتجاع المريء 3.13%، وكان 86 (7.28%) من المشاركين لديهم تاريخ عائلي إيجابي للإرتجاع المعدي المريئي وكان لديهم إرتباط إحصائي كبير بأعراض إرتجاع المريء (القيمة الاحتمالية = 0.001)، وكان 28 (3.9%) ينامون بعد ساعة واحدة من تناول الوجبة (القيمة الاحتمالية = 0.001) وكان مستخدمو مضادات الحموضة ومثبطات مضخة البروتون 38 (12.7%) و 41 (7.13%) على التوالي (القيمة الاحتمالية لكل منهم = 0.001)، وكان 20 (7.6%) يعانون من التجشؤ المتكرر (القيمة الاحتمالية = 0.001) التي لها علاقة ذات دلالة إحصائية. خضع 31 (10%) منهم لناظور المرئ والمعدة والأثنى عشر (القيمة الاحتمالية = 0.03) ولا توجد علاقة ذات أهمية إحصائية بين نتائج إستبيان الإرتجاع المعدي المريئي والخصائص العامة والعادات الغذائية.

**الاستنتاج:** وجد أن إنتشار إرتجاع المريء بين 3.13% من الطلاب فقط. كان التاريخ العائلي للإصابة بالإرتجاع المعدي المريئي وتناول العشاء في وقت متأخر مرتبطان بالحالة، بينما كان تنظيف المريء والمعدة مرتبطا كفحص تشخيصي، والتجشؤ مرتبطا كعامل مؤدي إلى تفاقم إرتجاع المريء.  
**الكلمات المفتاحية:** الإرتجاع المعدي المريئي، التنظير الهضمي العلوي، العادات الغذائية