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Prevalence and risk factor of gastro-esophageal reflux disease among university student in Saudi Arabia

Lotfi Fahmi Issa[1, 2], **Turki Alharthi**[3*], **Thamer Alsufyani**[3], **Abdulrhman Alsufyani**[3], **Awadh Alasmari**[3], **Humood Alshareef**[3], **Afnan Almurashi**[4]

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Authors' Affiliation:
[1]Department of Family and Community Medicine, College of Medicine, Taif University, Taif, Saudi Arabia
[2]Department of Public Health and Community Medicine, Faculty of Medicine, Al-Azhar University, Cairo, Egypt
[3]Medical Student, College of Medicine, Taif University, Taif, Saudi Arabia
[4]Medical Resident, Ibn Sina Hospital, Makkah, Saudi Arabia

*Corresponding author
Medical Student, College of Medicine, Taif University, Taif, Saudi Arabia

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ABSTRACT

Background: Gastro-esophageal reflux disease is among the highest prevalent disorders in Europe, the United States as well as in Saudi Arabia. It has an impact on quality of life and can lead to serious complications. The objectives of this study were to determine the prevalent of Gastro-esophageal reflux disease among college students and the risk factors associated with it. *Methods:* A cross sectional study was conducted among university students in Saudi Arabia using a multi stage random sample technique. An online valid questionnaire including demographic data, and questions related to risk factors of GERD was used for data collection. Collected data was entered and analyzed using SPSS program. *Results:* Our total sample was 246 participants. The prevalent of GERD among participants were 45 (18.3%). Male and female were (54.1%), (45.9%) respectively. The average age was 21.37 years. The only statistically significant factor was family history (45.9%, 0.015 p-value). In contrast, there was no association between GERD's prevalence and gender, age, and any other risk factor ($P > 0.05$). *Conclusion:* Our investigation discovered that university students in Saudi Arabia had a lower prevalence of GERd than the general population. The only risk factor we found that can cause GERD in university students was family history. In our sample, we weren't able to identify any additional risk factors or protective factors related to GERd.

Keywords: GERD, Prevalence, Risk factor, University students, Saudi Arabia.

1. INTRODUCTION

GERD or gastro-esophageal reflux disease is among the most frequent disorders in Europe and the United States (Wang et al., 2016). It's a long term condition caused by the improper exposure of the esophagus mucosa to refluxed stomach contents (Mostaghni et al., 2009). It impacts one's life quality and may cause major issues, including esophageal stricture, gastrointestinal bleeding Barrett's esophagus in certain individuals (Jarosz & Taraszewska,

2014). Although the interest has increased in the epidemiology of GERD over the last several decades, interpretation of GERD epidemiological research has frequently been hindered by the use of conflicting symptom based definitions of the illness (Dent et al., 2005). The GERDQ was created as a tool to encouragement in the diagnosis of GERD and the selection of appropriate treatment options based on response assessment. It was created using data and information gathered from recent high quality clinical research (Ayazi et al., 2009). The prevalence of (GERD) is predicted to range from 18.1 % to 27.8 percent in North America, 8.8 % to 25.9% in Europe, 2.5 % to 7.8% in Eastern Asia, 8.7 % to 33.1 % in the Middle East, 23.0% in South America and 11.6% in Australia (Vossoughinia et al., 2014). On the other hand, The prevalent of (Gastro-esophageal reflux disease) in Saudi Arabia has not been thoroughly investigated, according to recent research, the prevalence rates in Arar and Riyadh were 29% and 45% respectively in Saudi Arabia (Alsaleem et al., 2021). Other study made on Saudi Arabia showed a prevalence of 28.7% in general (Alsuwat et al., 2018). GERD is correlated with a variety of risk factors, including analgesics (e.g., nonsteroidal anti-inflammatory medicines (NSAIDs), types of food, types of drinks, smoking, family history, high body mass index (BMI), physical activity, salt or pickles use with meals and fast food (Alkhathami et al., 2017). Previous research has shown that college students are a susceptible demographic population with a greater risk of GERD than the overall population (Awadalla, 2019). The link between GERD on one hand, and age, gender, and life style behaviors such as cigarette smoking, alcohol, coffee use, medication intake such as aspirin and NSAIDs and nutrition on the other hand is not well understood, the population based research has yielded mixed results (Saberi et al., 2007). In view of the above, our study has been undertaken to estimatethe prevalent of (Gastro-esophageal reflux disease) among university student and the risk factors associated with it. Identification and better understanding of the prevalence & risk factors of GERD among university students are the essential steps to plan and implement prevention program for decreasing the prevalent of (Gastro-esophageal reflux disease) among university student and their community.

2. MATERIALS AND METHODS

A cross sectional study was conducted on students to measure the prevalence & risk factors of GERD among university students in Saudi Arabia between Dec 2021 August 2022 by using a multi stage random sample technique, the population was divided into three stages. In stage 1, by simple random sampling, we chose three from 28 governmental universities obtained from the Ministry of Education that were accepted based on our inclusion criteria. In Stage 2, by the same method, a college was chosen from each university. In Stage 3, from the chosen colleges we took all levels of a randomly selected major. The first population was students of the Radiology department in College of Applied Medical Sciences at King Saud bin Abdulaziz University for Health Sciences (KSAUHS). The second population was students of the Respiratory Therapy department in medical rehabilitation Sciences College at Taibah University. The last population was students of the Computer Science department in college of computing and information technology at Shaqra University. The sample size was 273 with a response rate was (90.1%). A questionnaire was obtained from (Alkhathami et al., 2017) with permission; this questionnaire was validated by the research ethics committee at Taif University, Taif, Saudi Arabia (application number: 38-36-0042). The online questionnaire was shared through the social media application (WhatsApp) from the period (December 2021 May 2022). The questionnaire covered three parts. The first part includes demographic questions (gender, age, marital status, BMI, blood group). The second part includes questions about risk factors & life style choices, such as physical activities frequency, type of analgesics used, number of meals per day, most types of food, most types of drinks, improvement with proton pump inhibitors (PPIs) drugs, smoking, family history of GERD, salty & pickle seating with meals, fast food, using of analgesics and fibers consumption. The third part includes the GerdQ questionnaire for the diagnosis of gastro-esophageal reflux disease

GerdQ

The GerdQ has been created as a tool to help with the diagnosis of GERD and to aid in the selection of an appropriate course of action based on response assessment. It was created using data and proof gathered from current, excellent clinical trials (Talley et al., 2007). The Gerd Question's consists of 6 Question's: Two about the negative GERD predictors & 4 about the + G-ERD predictors (heart burn, regurgitation, sleep disturbances brought on by heart burn and regurgitation, and utilizing over the counter (OTC) drugs nausea and epigastria pain.

GERD Question's score

For the + (GERD) pre doctor's, the scores range from (0, 1, 2 and 3) respectively, and for the (GERD) pre doctor's, the grading range is reversed. The score card of the Gerd Question's depends on how frequently these symptoms occurred during the previous week

(below than once, once, 2–3 times, and 4–7 times). When the scores are added up, a patient is said to have GERD if they receive 8 or more.

Inclusion criteria

We have included certain criteria: Saudi, both genders, students in governmental universities in the age range 18 - 26 years old.

Exclusion criteria

We have excluded certain criteria: Non Saudi, students less than 18 or more than 26, students in private universities, students in worldwide universities (Islamic University of Madinah).

Analysis and entry of data

The "Microsoft Office Excel Software" software (2016) for Windows was used to enter data on the computer. The data was statistically analyzed using the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp). Both descriptive and analytical statistics were employed. Chi square test was utilized to test the association between variables. P value considered significant if less than 0.05.

3. RESULT

The total number of university students who participated in the study was two hundred forty six (246) from two hundred seventy three (273) students that got chosen, the response rate was (90.1%). The prevalent of (Gastro-esophageal reflux disease) among participants were 45 (18.3%) (Figure 1).

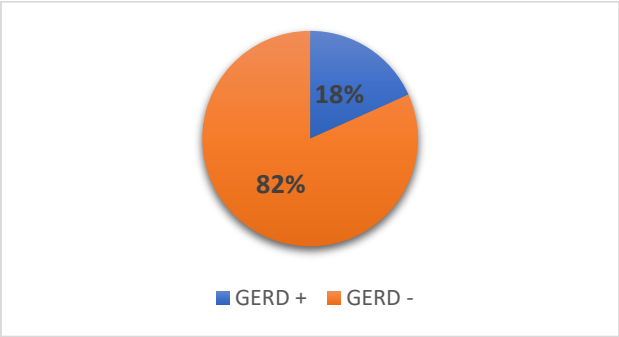

Figure 1 Prevalence of GERD

Male participants were 133 (54.1%) while female participants were 113 (45.9%). The average age was 21.37 years with standard deviation (SD) ± 1.551 years. Single participants formed 239 (97.2%) seven were married (2.8%). The mean and SD of the BMI is 23.763 ± 5.873 kg/m2 respectively, (15.9%) were underweight {BMI <18.5}, (50%) of the participants had a normal weight {BMI 18.5-24.9}, and (34.1%) were overweight or more {BMI >25}. The blood groups percentage were as follow: O+ (39.8%), O- (3.7%), A+ (23.2%), A- (1.2%), B+ (11%), B- (0.8%), AB+ (3.7%), AB- (0.8%), and those who didn't know their blood group were (15.9%) (Figure 2). For complete results about socio demographic characteristics of the participants look at (Table 1).

Table 1 Socio demographic characteristics of the participants

Parameter's		No	Percent
Gender	Male	133	54.1%
	Female	113	45.9%
Age	18-20	87	31.7%
	21-23	151	61.3%
	≥24	17	7.0%
Marital status	Single	239	97.2%
	Married	7	2.8%
BMI	Underweight (<18.5)	39	15.9%
	Normal weight (18.5-24.9)	123	50.0%

	Overweight (25.0-29.9)	43	17.5%
	Obesity class 1 (30.0-34.9)	31	12.6%
	Obesity class 2 (35.0-39.9)	7	2.8%
	Obesity class 3 (>40)	3	1.2%
Blood Group	O+	98	39.8%
	O-	9	3.7%
	A+	57	23.2%
	A-	3	1.2%
	B+	27	11.0%
	B-	2	0.8%
	AB+	9	3.7%
	AB-	2	0.8%
	Don't know	39	15.9%

BMI: body mass index.

The relationship between GerdQ results and demographic data (gender, age, BMI, blood group) are documented in Table (2).

Table 2 GerdQ relationship with demographic data

Parameter's		**GERD (n = 246)**				**P-value**
		Negative (n = 201)		Positive (n = 45)		
		No	%	No	%	
Gender	Male	106	79.7%	27	20.3%	0.377
	Female	95	84.0%	18	16.0%	
Age	18-20	65	83.3%	13	16.7%	0.781
	21-23	124	82.1%	27	17.9%	
	≥24	12	70.5%	5	29.5%	
Marital status	Single	195	81.5%	44	18.5%	0.781
	Married	6	85.7%	1	14.3%	
BMI	Underweight (<18.5)	30	76.9%	9	23.1%	0.628
	Normal weight (18.5-24.9)	100	81.3%	23	18.7%	
	Overweight (25.0-29.9)	38	88.3%	5	11.7%	
	Obesity class 1 (30.0-34.9)	24	77.4%	7	22.6%	
	Obesity class 2 (35.0-39.9)	6	85.7%	1	14.3%	
	Obesity class 3 (>40)	3	100%	0	0%	
Blood Group	O+	81	82.6%	17	17.4%	0.243
	O-	5	55.5%	4	44.5%	
	A+	48	84.2%	9	15.8%	
	A-	2	66.7%	1	33.3%	
	B+	23	85.1%	4	14.9%	
	B-	2	100%	0	0%	
	AB+	5	55.5%	4	44.5%	
	AB-	2	100%	0	0%	
	Don't know	33	84.6%	6	15.4%	

GERD: Gastro-esophageal reflux disease. BMI: body mass index. **Statistically significant <0.05

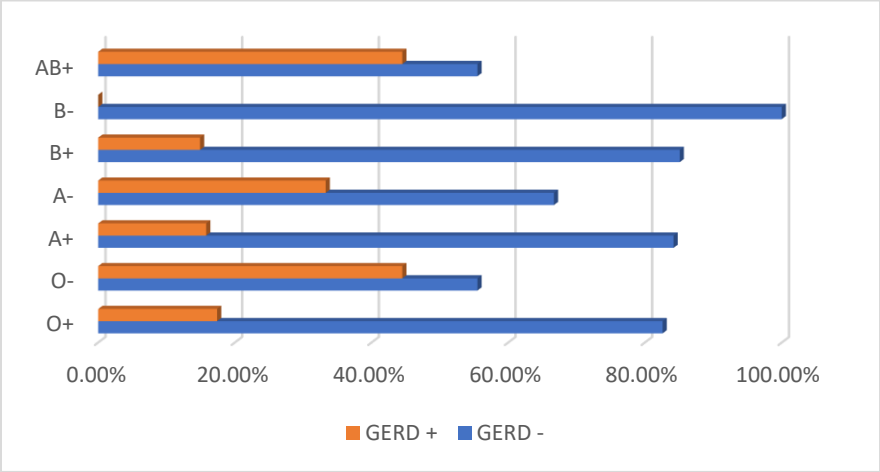

Figure 2 The relationship between Blood Group and Gastro-esophageal reflux disease

Among the students (37%) didn't do 30 minutes of physical activities in their last week, (32.1%) did it once, (19.5%) did it 1-3 times, (11.4%) did it >3 times (Figure 3). (48.8%) of the participants have <3 meals per day, (39%) have 3 meals per day, (12.2%) >3 meals per day. The most common food preferences among the participants were greasy (58.9%), spicy (22.8%), chocolate (15%) and tomatoes (3.3%). In takes of fibers, fast food and salt or pickles were (77.6%), (61.8%) and (69.5%) respectively. The most common type of drinks was coffee (38.2%), followed by Tea (32.9%), soft drinks (23.2%), citrus juice (2.8%) and peppermint (2.8%). From the participants (28%) didn't take any analgesic drugs, (6.5%) took NSAID (Diclofenac, Brufen, Aspirin …etc.), and (65.4%) took Paracetamol (Panadol, Fevadol etc...). In terms of the response to PPIs use, (10.2%) of participants improved, (2%) did not improve, (69%) did not use PPIs and (18.3%) did not know the PPIs. From the participants (12.2%) were regularly using analgesia. (11.8%) were smokers. (45.9%) of our participants has family history. The relationship between GerdQ results in one hand, and GERD risk factors, life style choices (physical activities, type of analgesics used, meals per day, types of food, types of drinks, improvement with (PPIs) drugs, smoking, family history, salt or pickles consumption, fast food, using of analgesics and fibers consumption) on the other hand are documented in (Table 3).

Table 3 GERD relationship with risk factors & life style choices

Parameter's		GERD (n = 246)				P-value
		Negative (n = 201)		Positive (n = 45)		
		No	%	No	%	
Physical activities 30 mins / week	Never	71	78.0%	20	22.0%	0.662
	1	65	82.2%	14	17.8%	
	1-3	41	85.4%	7	14.6%	
	> 3	24	85.7%	4	14.3%	
Number of meals / day	< 3 meals	100	83.3%	20	16.7%	0.712
	3 meals	76	79.1%	20	20.9%	
	> 3 meals	25	83.3%	5	16.7%	
Types of foods	Greasy	122	84.1%	23	15.9%	0.253
	Spicy	41	73.2%	15	26.8%	
	Chocolate	32	86.4%	5	13.6%	
	Tomatoes	6	75.0%	2	25.0%	
Consumption of fibers	Yes	159	83.2%	32	16.8%	0.245
	No	42	76.3%	13	23.7%	
Consumption of fast food	Yes	123	80.9%	29	19.1%	0.685
	No	78	82.9%	16	17.1%	

Consumption of salt and pickles	Yes	141	82.4%	30	17.6%	0.646
	No	60	80.0%	15	20.0%	
type of drinks	Tea	64	79.0%	17	21.0%	0.400
	Coffee	80	85.1%	14	14.9%	
	Soft drinks	47	82.4%	10	17.6%	
	Citrus juice	6	85.7%	1	14.3%	
	peppermint	4	57.1%	3	42.9%	
Most type of analgesics used	Non	57	82.6%	12	17.4%	0.780
	NSAID	14	87.5%	2	12.5%	
	Paracetamol	130	80.7%	31	19.3%	
Improvement with PPI	Yes	16	64.0%	9	36.0%	0.117
	No	4	80.0%	1	20.0%	
	Not used	143	83.6%	28	16.4%	
	Don't know	38	84.4%	7	15.6%	
Regular using of analgesics	Yes	24	80.0%	6	20.0%	0.796
	No	177	81.9%	39	18.1%	
Smoker	Yes	24	82.7%	5	17.3%	0.876
	No	177	81.5%	40	18.5%	
Family History of GERD	Yes	85	75.2%	28	24.8%	0.015**
	No	116	87.2%	17	12.8%	

GERD: Gastro-esophageal reflux disease; NSAID: Non-steroidal anti-inflammatory drugs; PPI: Proton pump inhibitors; **statistically significant <0.05

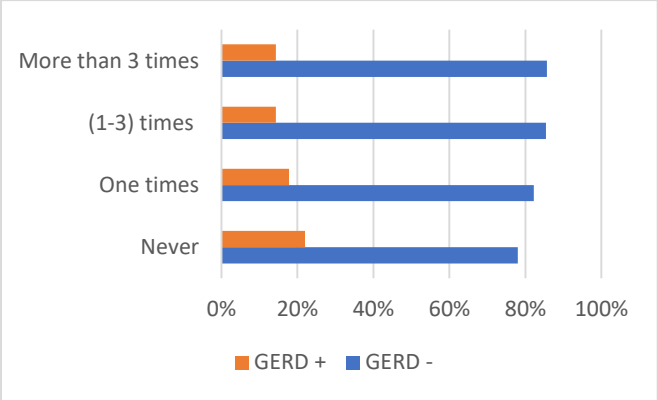

Figure 3 GERD relationships with Physical activities 30 mins/week

4. DISCUSSION

Our study showed that the prevalent of (Gastro-esophageal reflux disease) among university student in Saudi Arabia is (18.3%). Another prevalence study done in Saudi Arabia showed (28.7%) prevalence of GERD among Saud is in general, with an average age of 29.6 years (Alsuwat et al., 2018). Another study conducted in south western Saudi Arabia demonstrated a high prevalence (32.2%) of GERD symptoms with over half (58.9%) of the participants aged 36–50 year (Kariri et al., 2020). A global study of the prevalence of (GERD) in adults (≥15 years old) found a prevalence of (14.8%) overall, with China having the lowest prevalence at (2.5%) and Greece having the highest at (52.1%) (Eusebi et al., 2018). A study conducted in India on medical students showed 25% of them had GERD symptoms (Sharma et al., 2018). Comparing our results to the Saudi Arabia studies, our study has a lower prevalence percentage than them, but our prevalence is close to the global study. On the other hand, comparing it to the Indian study, the prevalence is also lower than them. Many studies show that there is no relation between gender and GERD (Alsaleem et al., 2021; Alsuwat et al., 2018; Span ideas et al., 2016), but a study shows a relation between GERD and female gender (Saberi et al., 2007). Our data indicates that there is no relation between gender and GERD. There was no correlation between age and GERD in our study. According to a study conducted in Tehran, there is no link between age and GERD (Nasseri et al., 2008). Another study

found that people aged 30 to 70 had a higher prevalence than those aged 18 to 29 (Wang et al., 2004). A study done in Saudi Arabia showed that GERD was more common in elderly people (Almadi et al., 2014). Our study shows no relation between GERD and marital status. On the other hand, several studies show there is an increase in GERD prevalence in married or divorced people (Kariri et al., 2020; Nasseri et al., 2008; Zhang et al., 2021).

In our study, BMI had no relationship with GERD, contrary to the findings of most other studies (Alkhathami et al., 2017; Yamamichi et al., 2012). A global study showed that the prevalence of (GERD) was higher in obese compared with non obese subjects (Eusebi et al., 2018). In our study, blood type was not correlated with GERD. A study in Saudi Arabia also showed no correlation between blood group & GERD. Another study conducted in Saudi Arabia about the prevalence of (GERD) among school teachers said that GERD was most common in patients who have AB+ blood type, as 70.5% of them reported symptoms. However, the relationship between blood group and GERD is not statistically significant as the P value was 0.424 (Altwigry et al., 2017). So, based on our study and the other two studies' results, there's no correlation between blood type and GERD. Physical activity results also showed no relationship with GERD in our study, despite a significant relationship with GERD in another Saudi Arabian study (Alkhathami et al., 2017). Another study said that physical activity in obese subjects lowers the occurrence of GERD, but in normal weight or over weight subjects showed no association (Djärv et al., 2012). A study about activity after a meal showed improvement in GERD patients. Unfortunately, in our study, we did not have the details about the improvement of GERD after physical activity. In our study, the number of meals a day doesn't relate to GERD and it's consistent with another study (Alkhathami et al., 2017). However, dietary habits in other studies showed a significant relationship with GERD, like having dinner before sleeping (Yamamichi et al., 2012). Many studies failed to confirm the role of diet in triggering GERD symptoms (Festi et al., 2009; Jarosz & Taraszewska, 2014; Mansouret al., 2013; Mostaghni et al., 2009; Wang et al., 2004). On the other hand, a recent study found that diet plays an important role in the development of GERD (Rasool et al., 2021).

However, our study demonstrated there is no positive association observed between GERD and the type of food (greasy, spicy, chocolate, tomatoes). Concerning dietary habits, fast food was a significant factor associated with a higher prevalence of GERD among individuals consuming fast food in previous studies (Alkhathami et al., 2017; Alsaleem et al., 2021; Kariri et al., 2020). In our study, we found no association. According to our study, salt or pickle consumption was not associated with GERD symptoms. However, some studies have found that pickles and salt have a strong relationship with GERD (Rasool et al., 2021). A study found high fiber foods such as beans, vegetables, and fruits were found to reduce reflux symptoms (Festi et al., 2009). Our study showed that dietary fiber has no correlation with GERD. Furthermore, drinks' impact on the induction of GERD symptoms is not clear (Murao et al., 2011). Similar to our results, tea, coffee, soft drinks, citrus juice, and peppermint were not associated with symptoms of GERD (Festi et al., 2009; Mansour et al., 2013; Mostaghni et al., 2009; Saberi et al., 2007; Wang et al., 2004), while in another study, there was a role of the drinks in increasing GERD symptoms (Jarosz & Taraszewska, 2014). Regarding analgesic use, it has been associated with a higher risk of developing GERD in some studies (Dent et al., 2005; Mostaghni et al., 2009), but not in others (Vossoughinia et al., 2014).

The present study found that consumption of analgesia was not associated with GERD symptoms. PPIs are the first choice of treatment, not only for GERD but also for other acid related diseases (Karim et al., 2017). The symptom improvement with PPIs in GERD patients in our study was 20%. Different studies have shown that PPIs are more effective in treating the symptoms of GERD and esophageal mucosal healing (Scarpignato et al., 2016). Regarding smoking, in several previous studies in which smoking has been identified as a risk factor for GERD (Du et al., 2007; Mostaghni et al., 2009), in our study, we did not find an association between cigarette smoking and the risk of GERD, as shown in other studies conducted in Saudi Arabia, Iran, and India (Atta et al., 2019; Mansour et al., 2013; Sharma et al., 2018). Interestingly, the only risk factor we found to have a relationship with GERD is family history. An association of GERD with a relevant family history has been seen in previous studies (Atta et al., 2019; Jia et al., 2010; Saberi Firoozi et al., 2007), and the results of twin studies in Sweden and the UK have also demonstrated a genetic component to the disease (Cameron et al., 2002; Mohammed et al., 2003; Zhang et al., 2021). These results were identical to our data.

5. CONCLUSION

In conclusion, our study showed that the prevalent of GERD among university student is lower than the general population in Saudi Arabia. The only risk factor we found that can cause GERD in university students was family history. We didn't find any other risk factor or protective factor that relate with GERD in our population.

Ethics statement

Ethical approval was obtained from the Research Ethical Committee at Faculty of Medicine in Taif University, Taif, Saudi Arabia (Ethical approval number: 38-36-0042). Participants were informed that their participation is voluntary and filling the questionnaire indicates their consent to participate.

Abbreviation

GERD, gastro-esophageal reflux disease; GerdQ, gastro-esophageal reflux disease questionnaire; BMI, body mass index; NSAIDs, non steroidal anti-inflammatory drugs; PPIs, proton pump inhibitors.

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Conflict of interest

The authors declare that there is no conflict of interests

Data and materials availability

All data associated with this study are present in the paper.

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