

## Determinants of Gastro-esophageal Reflux Disease in Palestine

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### ABSTRACT

Gastro-esophageal reflux disease (GERD) is used to describe symptoms and changes of the esophageal mucosa that result from reflux of the stomach contents into the esophagus, which is affected by various lifestyle factors. Yet, it has never been investigated among Palestinian population. We aim to evaluate the potential determinants of GERD severity in Nablus district. A cross sectional study using a previously validated questionnaire was performed. A non-random purposive sampling technique was used of nearly 120 subjects from the outpatient clinics of three Hospitals and one private internal clinic in Nablus. SPSS software version 16 was used for data entry and analysis. Nearly 66.7% of the study participants were females while 34.2% were above 50 years old and 24.1% were between 20-30 years old. Among the Palestinian population, the number of family members, height, fatty food, coffee consumption and having antihypertensive drugs or non-steroidal anti-inflammatory drugs (NSAIDs) intake were related to GERD severity ( $p < 0.05$ ; bivariate analysis). In multivariate analysis however, factors found to be significantly associated with GERD severity were only chest pain (OR= 0.09; 95% CI: 0.02-0.52) and sleeping disturbances (OR= 0.05; 95% CI: 0.007-0.40). Patients showed an increase in the occurrence of GERD symptoms after they exposed to fatty food, coffee consumption and NSAIDs. Increasing public awareness, educating population about unhealthy life style and wrong eating habits are essential for an intervention steps.

**Keywords:** GERD, Palestine, Determinants, Hospitals.

### Background

The term gastro-esophageal reflux disease (GERD) is used to describe the symptoms and changes of the esophageal mucosa that result from reflux of stomach contents into the esophagus. It is a chronic, relapsing disorder, characterized by symptoms such as epigastric pain, heartburn, pharyngeal burning, regurgitation of gastric contents, esophageal injury, acidic taste dysphagia and various extra-esophageal symptoms [1]. The frequency and severity of these symptoms are varied among population and may be experienced daily, weekly or only few times per month [1-2]. Therefore, GERD is responsible for sickness absenteeism, impaired health-related quality of life and it is considered as a risk factor for esophageal adeno carcinoma and halitosis [3].

Based on definition of at least weekly heartburn and/or acid reflux, it was shown in earlier studies that the prevalence of GERD

in Asian countries was low 2.5-4.8%. This might be due to the scarce of prevalence and incidence studies in the Asian countries [2,4,5]. Since, it has recently become a common disease in Japan [6] and Arab countries [7,8] and their prevalence of GERD is becoming as close as in western countries 20% [2,4].

Dietary factors, like shorter dinner-to-bed time, high fat diet, obesity and smoking have been implicated in increasing the risk for GERD. Other lifestyle factors are also associated such as stress, alcoholism. Socioeconomic status and westernized diet are not confirmed yet as risk factors [2].

The aim of this study was to assess the determinants of severity and frequency of GERD disease's symptoms among the Palestinian population in Nablus district in order to implement preventive measures for controlling this disease and improving the symptoms. To the best of our knowledge, this

study is the first in Palestine that investigates such a relationship.

## MATERIALS AND METHOD

### *Study design, settings and population*

A cross sectional study was conducted. The study population was patients diagnosed of GERD symptoms recruited from the patients attended the outpatient clinic of Al Arabi Specialized Hospital, Al Watani Governmental Hospital, An-Najah National University Teaching Hospital and from a private internal clinic of a gastroenterologist in Nablus district, West Bank, Palestine.

### *Sample size*

A non-random purposive sampling technique was used. All those met the selection criteria (over 20 years old male and female) and were attended the study setting during the period of the study from August to October 2015, and voluntarily agreed to participate were included. Pregnant women were excluded. The total number recruited was 120 patients.

### *Ethical considerations*

The study protocol was approved by An-Najah National University Institutional Review Board (IRB) committee. Permissions and approval to conduct the study were obtained from the Palestinian Ministry of Health for the governmental hospitals and from the executive manager of An-Najah National University Teaching Hospital, Al Arabi Specialized Hospital, and from the private internal clinic.

### *Data collection*

This study was designed to collect data to assess the determinants of severity and frequency of GERD disease among the GERD patients admitted to the study setting

during its period of time. A self-administered questionnaire was used to collect the required information. The questionnaire was a validated and standardized questionnaire of GERD disease symptoms and adapted to the local Palestinian conditions with minor modifications after pilot testing. The questionnaire included mainly a self-reported list of socio demographic factors; exposure factors associated with GERD disease. A trained researcher made the interview or the telephone call with the study participants in order to take their approval to participate and fill the questionnaire. Those who were difficult to reach and interviewed by telephone, were giving their oral consent after explaining the study aim and details to them.

### *Data analysis*

All data was entered and analyzed using (Statistical Package for the Social Sciences; SPSS) version 16 [9]. In the bivariate analysis, Chi-square test and crude odds ratios were calculated using binary logistic regression to analyze the differences and relationships between the dependent and independent variables. Multivariate logistic regression analysis adjusting for possible confounders was then used. A *P*-value of less than 0.05 was considered as significant.

## Results

### *GERD severity classification*

GERD severity classification defined as low as two mild episodes of heartburn per week (mild/moderate cases) and as high as five daytime episodes and one nighttime episode per week (severe cases). As shown in table 1, the severe cases represented 65% of the study population, while 35% of the population was mild to moderate cases.

**Table (1):** Distribution of the study cases by the study setting

Variable	N (%)*	GERD Severity Classification**		Chi square P value	COR (95%CI) †
		Mild/Moderate	Severe		
<b>Site of diagnosis</b>					
- Al Watani Hospital	54 (45)	13(24.1)	41(75.9)	0.067	<b>2.47(1.03-5.94)</b> <b>1.27(0.44-3.73)</b> 0.26 (0.025-2.73) ----
- Al Arabi Hospital	21 (17.5)	8(38.1)	13(61.9)		
- An Najah Hospital	4 (3.3)	3(75)	1(25)		
- Private clinic <sup>§</sup>	41 (34.2)	18(43.9)	23(56.1)		
<b>Total</b>	120 (100)	42 (35)	78 (65)		

\*Data are expressed as number (percent) of each group. \*\*GERD Severity Classification defined as low as 2 mild episodes of heartburn per week and as high as 5 daytime episodes and 1 nighttime episode per week. # BMI=Body mass index (weight (Kg)/height<sup>2</sup> (m<sup>2</sup>)). § Reference category. † COR: crude odds ratio. CI: confidence interval

### Characteristics of the study population

Table 1 shows the distribution of the study population. The majority of the participants recruited from Al Watani Governmental hospital (n=54) who represent nearly 45% of the study population, border line significant difference was found between GERD severity and the study settings. The binary logistic regression analysis showed that patients from Al Watani hospital were shown to be significantly more likely to have severe symptoms compared with patients from the private internal clinic [COR (95%CI): 2.47(1.03-5.94)].

### Association of GERD severity with socio demographic factors

Nearly 66.7% of the study participants were females while 34.2% were above 50 years old and 24.1% were between 20-30 years old. As shown in the Table 2, no significant difference was found between GERD severity and all of socio-demographic factors except the family member variable, where a binary regression showed that families with (6-8) members were more likely to have severe GERD symptoms compared to families with more than eight members.

BMI and weight were not associated with GERD severity in our study. However, those who were shorter were found to be more likely to be severe cases compared to taller cases; COR (95%CI): 2.37(1.10-5.1).

**Table (2):** Association of GERD severity with sociodemographic factors

Variable	N (%)*	GERD Severity** Classification		Chi square P value	COR (95%CI)!
		Mild/Moderate	Severe		
<b>Sex</b>					
-Male	40 (33.3)	19(47.5)	21(52.5)	0.08	0.50 (0.23-1.96)
-Female \$	80 (66.7)	25(30.2)	55(68.8)		
<b>Age</b>					
- 20-30 yrs	29 (24.1)	14(48.3)	15(51.7)	0.167	0.66 (0.25-1.77)
- 31-40 yrs	26 (21.7)	12(46.2)	14(53.8)		0.54 (0.20-1.50)
- 41-50 yrs	24 (20)	6(25)	18(75)		1.76 (0.54-5.77)
- > 50 yrs \$	41 (34.2)	12(29.3)	29(70.7)		----
<b>Residence place</b>					
-City	55 (45.8)	19(34.5)	36(65.5)	0.529	4.47(0.38-52.73)
-Village	62 (51.7)	23(37.1)	39(62.9)		3.39(0.29-39.50)
-Refugees camp \$	3 (2.5)	2(66.7)	1(33.3)		----
<b>Educational level</b>					
-Illiterate	12 (10)	1(8.3)	11(91.7)	0.218	2.2(0.11-42.74)
-Primary/secondary	60 (50)	22(36.7)	38(63.3)		0.37(0.04-3.39)
-Diploma	8 (6.7)	3(37.5)	5(62.5)		0.33(0.03-4.40)
-Bachelor's	34 (28.3)	16(47.1)	18(52.9)		0.20(0.02-1.90)
-Postgraduate \$	6 (5)	2(33.3)	4(66.7)		----
<b>Marital status</b>					
-Married	94 (78.3)	33(35.1)	61(64.9)	0.37	3.88(0.34-44.37)
-Single	14 (11.7)	7(50)	7(50)		2.67(0.19-36.76)
-Widowed	9 (7.5)	2(22.2)	7(77.8)		7(0.40-123.35)
-Divorced \$	3 (2.5)	2(66.7)	1(33.3)		----

Variable	N (%)*	GERD Severity** Classification		Chi square P value	COR (95%CI)!
		Mild/Moderate	Severe		
<b>Work nature</b>					
-High physical exertion	6 (5)	3(50)	3(50)	0.841	0.67(0.07-6.87)
-Middle physical exertion	92 (76.7)	32(34.8)	60(65.2)		0.63(0.12-3.28)
-Only office work	14 (11.7)	6(42.9)	8(57.1)		0.44(0.07-3.03)
-No physical exertion \$	8 (6.7)	3(37.5)	5(62.5)		----
<b>Family member</b>				<b>0.044</b>	
-<3	23(19.2)	12(52.2)	11(47.8)		1.25(0.34-4.59)
-3-5	34(28.3)	13(38.2)	21(61.8)		1.63(0.48-5.55)
-6-8	48(40)	11(22.9)	37(77.1)		<b>3.84(1.14-12.99)</b>
-> 8 \$	15(12.5)	8(53.3)	7(46.7)	----	
<b>Salary</b>					
- < 2500 NIS	57(47.5)	18(31.6)	39(68.4)	0.271	1.80(0.84-3.87)
- ≥ 2500 NIS \$	63(52.5)	26(41.3)	37(58.7)		----
<b>Residence place</b>					
-High	46(38.3)	15(32.6)	31(67.4)	0.413	0.76(0.18-3.25)
-Middle	62(51.7)	26(41.9)	36(58.1)		0.49(0.12-2.00)
-Low \$	12(10)	3(25)	9(75)		----
<b>Height (cm)</b>					
- ≤ 165	73(60.8)	21(28.8)	52(71.2)	<b>0.025</b>	<b>2.37(1.10-5.1)</b>
- > 165 \$	47(39.2)	23(48.9)	24(51.1)		----
<b>Weight (kg)</b>					
- ≤ 80	60 (50)	21(35)	39(65)	0.705	1.34(0.63-2.85)
- > 80 \$	50 (50)	23(38.3)	37(61.7)		----
<b>BMI (kg/m<sup>2</sup>)#</b>					
- ≤ 29	61(50.8)	26(42.6)	35(57.4)	0.169	0.79(0.370-1.67)
- > 29 \$	59(49.2)	18(30.5)	41(69.5)		----

\*Data are expressed as number (percent) of each group. \*\*GERD Severity Classification defined as low as 2 mild episodes of heartburn per week and as high as 5 daytime episodes and 1 nighttime episode per week. # BMI=Body mass index (weight (Kg)/height<sup>2</sup> (m<sup>2</sup>)). \$ Reference category. ! COR: crude odds ratio. CI: confidence interval.

### **Association of GERD severity with exposure factors**

Nearly half of the subjects have other health problem in addition to GERD (n=61, 50.8%). As shown in Table 3, patients with diabetes or hypertension co-morbidity were more severe GERD symptoms compared to those with the absence of these co-morbidities. While 76 patients (63.3% of the population) taking drug for other health problem. Those who were taking antihypertensive drugs or Non-Steroidal Anti-Inflammatory drugs (NSAID) had a significant association with severe GERD symptoms in comparison with those not taking one of these drugs. Also, fatty food

and coffee consumption were shown to be significantly related to GERD severity; patients who were occasionally or not exposed to fatty food or coffee consumption were less likely to have severe GERD symptoms.

Nearly, 91.7% of the study population were using anti acid medication to treat their symptoms and about 64.5% of them were classified as severe cases, but no significant relationship was found between the dependent variable and GERD treatment (table 3). Intriguingly, it seems that traditional medication resulted in less sever patients.

**Table (3):** Association of GERD severity with exposure factor.

Variable	N(%)*	GERD Severity Classification**		Chi square P value	COR (95%CI)!
		Mild/moderate	Severe		
<b>Smoking</b>					
-Current smoker	24(20)	9(37.5)	15(62.5)	0.773	0.67(0.26-1.68)
-Ex-smoker	6(5)	3(50)	3(50)		0.48(0.09-2.50)
-Non smoked <sup>§</sup>	90(75)	32(35.6)	58(64.4)		----
<b>Cigarette number (n= 24)</b>					
- 1-5	5(20.8)	2(40)	3(60)	0.852	0.44(0.056-3.51)
- 5-10	4(16.7)	1(25)	3(75)		2.00(0.17-24.07)
- ≥ 10 <sup>§</sup>	15(62.5)	6(40)	9(60)		----
<b>Argela smoke</b>					
-current smoke	24(20)	12(50)	12(50)	0.259	0.517(0.21-1.28)
-Ex-smoker	5(4.2)	1(20)	4(80)		2.07(0.22-19.29)
-Non smoked <sup>§</sup>	91(75.8)	30(33)	61(67)		----
<b>Coffee consumption</b>					
-Rarely	21(17.5)	7(33.3)	14(66.7)	0.791	1.67(0.41-6.77)
-Occasionally	24(20.0)	7(29.2)	17(70.8)		2.00(0.50-8.00)
-Regularly	60(50)	24(40)	36(60)		1.00(0.32-3.17)
-Not at all <sup>§</sup>	15(12.5)	6(40)	9(60)		----
<b>Eating before sleep</b>					
-Go to bed directly after eating	16(13.3)	4(25)	12(75)	0.288	1.41(0.41-4.84)
-Go to bed less than 2hrs after eating	32(26.7)	15(46.9)	17(53.1)		0.53(0.23-1.25)
-Go to bed more than or 2 hrs after eating <sup>§</sup>	72(60)	25(34.7)	47(65.3)		----
<b>Family history</b>					
-No	69(57.5)	26(37.7)	43(62.3)	0.789	0.88(0.41-1.89)
-Yes <sup>§</sup>	51(42.5)	18(35.3)	33(64.7)		----
<b>Eating quickly</b>					
-Not at all	34(28.4)	9(26.5)	25(73.5)	0.287	2.36(0.86-6.48)
-Occasionally	36(30.0)	16(44.4)	20(55.6)		0.77(0.32-1.83)
-Always <sup>§</sup>	50(41.6)	19(38)	31(62)		----
<b>Physical activity</b>					
-No	75(62.5)	26(34.7)	49(65.3)	0.842	0.65(0.19-2.23)
-Occasionally	30(25)	12(40)	18(60)		0.63(0.16-2.46)
-Daily <sup>§</sup>	15(12.5)	6(40)	9(60)		----
<b>Co-morbidity Type<sup>@</sup></b>					
-Diabetes	16(13.3)	1 (6.2)	15(93.8)	<b>0.007</b>	<b>9.76(1.24-76.75)</b>
-Hypertension	43(35.8)	9(20.9)	34(79.1)	<b>0.008</b>	<b>2.35(1.01-5.44)</b>
-Hyper lipid	26(21.7)	10(38.5)	16(61.5)	0.830	1.02(0.41-2.54)
-Mental disorder	2(1.7)	1(50)	1(50)	0.693	1.68(0.10-27.57)
-Asthma	8(6.6)	1(12.5)	7(87.5)	0.142	4.04(0.48-34.02)
-Other	12(10)	5(41.7)	7(58.3)	0.705	1.09(0.31-3.84)

Variable	N(%)*	GERD Severity Classification**		Chi square P value	COR (95%CI)!	
		Mild/moderate	Severe			
<b>Taking drugs for other health problem</b>						
-Yes	44(36.7)	23(52.3)	21(47.7)	<b>0.007</b>	<b>2.80 (1.28-6.11)</b>	
-No <sup>§</sup>	76(63.3)	21(27.6)	55(72.4)			----
<b>Symptoms after drug</b>						
-Yes	39(49.4)	8(20.5)	31(79.5)	0.06	0.39(0.14-1.05)	
-No <sup>§</sup>	40(50.6)	16(40)	24(60)			----
<b>Co-morbidity Therapy<sup>®</sup></b>						
- Anti hypertensive drug	32(26.7)	7(21.9)	25(78.1)	<b>0.043</b>	<b>2.59(1.01-6.63)</b>	
- NSAID drug	47(39.2)	11(23.4)	36(76.6)	<b>0.016</b>	<b>2.89(1.25-6.67)</b>	
- Glucose lowering drug	10(8.3)	1(10)	9(90)	0.068	5.78(0.70-47.22)	
- Asthma drug	5(4.2)	1(20)	4(80)	0.430	0.45(0.05-4.17)	
- (CNS)drug	1(8)	1(50)	1(50)	0.693	0.60(0.04-9.75)	
- Lipid lowering drug	17(14.2)	5(29.4)	12(70.6)	0.503	1.35(0.44-4.12)	
- Aspirin	28(23.3)	11(39.3)	17(60.7)	0.743	0.79(0.33-1.88)	
- Hormone	8(6.7)	1(12.5)	7(87.5)	0.142	4.04(0.48-34.02)	
- Other drug	2(1.7)	1(50)	1(50)	0.693	0.60(0.04-9.75)	
<b>Symptoms after fatty food</b>						
-Not at all	13(10.9)	9(69.2)	4(30.8)	<b>0.000</b>	<b>0.14(0.04-0.49)</b>	
-Occasionally	22(18.3)	13(59.1)	9(40.9)			<b>0.21(0.08-0.57)</b>
-Always <sup>§</sup>	85(70.8)	20(23.5)	65(76.8)			-----
<b>Symptoms after coffee</b>						
-Not at all	54(45)	22(40.7)	32(59.3)	<b>0.042</b>	<b>0.31(0.11-0.88)</b>	
-Occasionally	32(26.7)	14(43.8)	18(56.2)			<b>0.28(0.09-0.85)</b>
-Always <sup>§</sup>	34(28.3)	6(17.6)	28(82.4)			-----
<b>Symptoms after stress</b>						
-Not at all	18(15)	9(50)	9(50)	0.131	0.40(0.14-1.14)	
-Occasionally	25(20.8)	11(44)	14(56)			0.51(0.20-1.29)
-Always <sup>§</sup>	77(64.2)	22(28.6)	55(71.4)			-----

\*Data are expressed as number (percent) of each group. \*\*GERD Severity Classification defined as low as 2 mild episodes of heartburn per week and as high as 5 daytime episodes and 1 nighttime episode per week. # BMI=Body mass index (weight (Kg)/height<sup>2</sup> (m<sup>2</sup>)). § Reference category. ! COR: crude odds ratio. CI: confidence interval

#### Association of GERD Severity with GERD Symptoms

As shown in the table 4, binary logistic regression showed that those occasionally or do not have chest pain during symptoms were less likely to have severe GERD

symptoms compared to those reported always feel. And those who reported occasionally experience hoarseness symptom were more likely to have severe GERD episodes compared to those reported always experience hoarseness.

**Table (4):** Association of GERD Severity with GERD Symptoms and consequences

Variable	N (%)*	GERD Severity Classification**		Chi square P value	COR (95%CI) !	
		Mild/moderate	Severe			
<b>Symptoms</b>						
<b>Chest pain during symptoms</b>						
-Don't feel	41(34.2)	23(56.1)	18(43.9)	<b>0.001</b>	<b>0.14 (0.05-0.44)</b>	
-Occasionally	46(38.3)	14(30.4)	32(69.6)			0.41 (0.13-1.28)
-Always <sup>§</sup>	33(27.5)	5(15.2)	28(84.8)			-----

Variable	N (%)*	GERD Severity Classification**		Chi square P value	COR (95%CI) !
		Mild/moderate	Severe		
<b>Hoarseness</b>					
-Not at all	76(63.3)	29(38.2)	47(61.8)	0.603	0.81(0.22-2.93)
-Occasionally	32(26.7)	9(28.1)	23(71.9)		1.28(0.31-5.32)
-Always <sup>§</sup>	12(10)	4(33.3)	8(66.7)		-----
<b>Consequences</b>					
<b>Sleeping disturbance</b>					
-Not at all	28(23.3)	20(71.4)	8(28.6)	<b>0.000</b>	<b>0.11(0.04-0.31)</b>
-Occasionally	29(24.2)	11(37.9)	18(62.1)		0.39(0.15-1.03)
-Always <sup>§</sup>	63(52.5)	13(20.6)	50(79.4)		-----
<b>Work Disturbance</b>					
-Not at all	43(35.8)	19(44.2)	24(55.8)	<b>0.036</b>	<b>0.30(0.12-0.76)</b>
-Occasionally	29(24.2)	14(48.3)	15(51.7)		0.37(0.14-1.03)
-Always <sup>§</sup>	48(40)	11(22.9)	37(77.1)		-----
<b>Eating Disturbance</b>					
-Not at all	26(21.7)	11(42.3)	15(57.7)	0.118	0.54(0.21-1.36)
-Occasionally	23(19.1)	12(52.2)	11(47.8)		0.43(0.16-1.13)
-Always <sup>§</sup>	71(59.2)	21(29.6)	50(70.4)		-----

\*Data are expressed as number (percent) of each group. \*\*GERD Severity Classification defined as low as 2 mild episodes of heartburn per week and as high as 5 daytime episodes and 1 nighttime episode per week. # BMI=Body mass index (weight (Kg)/height<sup>2</sup> (m<sup>2</sup>)). \$ Reference category. ! COR: crude odds ratio. CI: confidence interval

#### *Association of GERD severity with consequences of GERD*

The majority of the study cases had a disturbance of sleeping, work and eat (52.5%, 40%, 59.2%; respectively) as GERD consequences. However, chi square test showed significant relation between GERD severity with sleeping and work disturbances but not with eating disturbances (table 4).

#### *Multivariate logistic regression for the factors associated with GERD severity*

**Table (5):** Multivariate logistic regression for the factors associated with GERD severity.

Variable	N (%)*	GERD Severity Classification**		P value	AOR (95%CI)!
		Mild/moderate	Severe		
<b>Site of diagnosis</b>					
- Al Watani Hospital	54 (45)	13(24.1)	41(75.9)	0.730	1.33(0.27-6.54)
- Al Arabi Hospital	21 (17.5)	8(38.1)	13(61.9)	0.075	5.32(0.844-33.54)
- An Najah Hospital	4 (3.3)	3(75)	1(25)	0.565	3.04(0.069-134.93)
- Dr.Yaser Clinic <sup>§</sup>	41 (34.2)	18(43.9)	23(56.1)	---	---

Variable	N (%)*	GERD Severity Classification**		P value	AOR (95%CI)!
		Mild/moderate	Severe		
<b>Family member</b>					
- <3	23(19.2)	12(52.2)	11(47.8)	0.631	0.57(0.06-5.81)
- 3-5	34(28.3)	13(38.2)	21(61.8)	0.329	2.86(0.35-23.67)
- 6-8	48(40)	11(22.9)	37(77.1)	0.052	9.26(0.98-87.20)
- > 8 \$	15(12.5)	8(53.3)	7(46.7)	---	---
<b>Height</b>					
- ≤ 165	73(60.8)	21(28.8)	52(71.2)	0.074	3.20(0.89-11.46)
- > 165\$	47(39.2)	23(48.9)	24(51.1)	---	---
<b>Co-morbidity Type@</b>					
-Diabetes	16(13.3)	1 (6.2)	15(93.8)	0.190	11.31(0.30-424.69)
-Hypertension	43(35.8)	9(20.9)	34(79.1)	0.093	14.12(0.65-309.11)
<b>Taking drugs for other health problem</b>					
-Yes	44(36.7)	23(52.3)	21(47.7)	0.153	0.13(0.008-2.12)
-No \$	76(63.3)	21(27.6)	55(72.4)	---	---
<b>Co-morbidity Therapy@</b>					
-Anti hypertensive drug	32(26.7)	7(21.9)	25(78.1)	0.822	0.66(0.02-26.29)
-NSAID	47(39.2)	11(23.4)	36(76.6)	0.159	5.72(0.50-64.88)
<b>Symptoms after fatty food</b>					
-Not at all	13(10.9)	9(69.2)	4(30.8)	0.077	0.09(0.006-1.30)
-Occasionally	22(18.3)	13(59.1)	9(40.9)	0.105	0.29(0.07-1.30)
-Always \$	85(70.8)	20(23.5)	65(76.8)	---	---
<b>Symptoms after coffee consumption</b>					
-Not at all	54(45)	22(40.7)	32(59.3)	0.124	4.65(0.66-33.06)
-Occasionally	32(26.7)	14(43.8)	18(56.2)	0.403	0.45(0.07-3.90)
-Always \$	34(28.3)	6(17.6)	28(82.4)	---	---
<b>Chest pain during symptoms</b>					
-Don't feel	41(34.2)	23(56.1)	18(43.9)	<b>0.007</b>	<b>0.09(0.02-0.52)</b>
-Occasionally	46(38.3)	14(30.4)	32(69.6)	0.502	0.54(0.09-3.26)
-Always\$	33(27.5)	5(15.2)	28(84.8)	---	---
<b>Sleeping disturbance</b>					
-Not at all	28(23.3)	20(71.4)	8(28.6)	<b>0.004</b>	<b>0.05(0.007-0.40)</b>
-Occasionally	29(24.2)	11(37.9)	18(62.1)	0.395	0.50(0.10-2.53)
-Always\$	63(52.5)	13(20.6)	50(79.4)	---	---
<b>Work Disturbance</b>					
-Not at all	43(35.8)	19(44.2)	24(55.8)	0.223	2.73(0.54-13.70)
-Occasionally	29(24.2)	14(48.3)	15(51.7)	0.844	1.21(0.19-7.84)
-Always\$	48(40)	11(22.9)	37(77.1)	---	---

\*Data are expressed as number (percent) of each group. \*\* GERD severity classification defined as low as 2 mild episodes of heartburn per week and as high as 5 daytime episodes and 1 nighttime episode per week. @Each co morbidity and co morbidity therapy has been categorized into yes/ no categories, only yes answer is presented (no category is the reference category). \$ Reference category. !AOR: Adjusted odds ratio. CI: confidence interval. Enter method was used in the model



## DISCUSSION

The study's main findings were that eating fatty food and coffee consumption were found to be strong predictors for GERD severity episode among Nablus district population. These results are consistent with other previous studies [2,10,11]. Fatty food usually last longer in the stomach and consequently induce the stomach to produce more acid, while caffeinated products such as coffee may irritate the esophagus and weaken the lower esophageal sphincter (LES) muscle. Another important finding of this study was that the use of antihypertensive drug or non-steroidal anti-inflammatory drug (NSAID) increased the risk of GERD episodes that may be related to regular use of NSAID which could weaken the lower (LES) muscle, while anti-hypertensive drugs relax the lower (LES) muscle, making it easy for the acid moves back from the stomach. The study also reported a lack of association of GERD with benzodiazepines and use of oral contraceptives or hormone replacement therapy. These findings support other studies that identified the association of GERD with other disease and medication [2,12]. According to demographic variables, the study showed that population who were less or equal to 165cm height have a statistically significant association with GERD severity, this could be interpreted by that low height lead to high BMI, and high BMI has a positive association with gastro-esophageal reflux disease(GERD) as reported in other studies [5,13]

Our study could be limited by several factors. First, small sample size due to narrow geographical distribution of the study. Second, in this cross-sectional design, temporal relationship between exposure and disease is difficult to assess and therefore, our results should be interpreted with caution. However, we were limited by time and resources and this was a cheap and quick study design to be used. Third, the nature of this health problem, because GERD patients usually are outpatients and therefore, they don't have to stay in healthcare center, and consequently a bias due to potentially missed cases. Fourth, patients consider symptoms of GERD as benign problem that doesn't need healthcare; thus, under-estimation of the

reported determinants could have been occurred. Fifth, this is a recall study where an over or underestimation of reported symptoms could have been occurred. last but not least, the resulted GERD symptoms could have been attributed to some other factors or other confounders that haven't been taken into account in this study.

## CONCLUSIONS

Interventional programs are needed to increase awareness and enhance education regarding dietary intake and unhealthy lifestyle behaviors related to gastro-intestinal system. Furthermore, large prospective controlled trials are warranted to more precisely assess the factors associated with GERD symptoms among the palestinian population.

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## Authors' contributions

HA drafted the manuscript and conducted data analysis. MA contributed to study design, data collection, drafting the Manuscript and data analysis. YA, SA, AA and AH helped in editing and reviewing the manuscript and contributed to significant improvement of the manuscript. All authors read and approved the final version of the manuscript.

## CONFLICT OF INTERESTS

The authors declare that they have no financial and/or non-financial competing interests.

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