Доклади на Българската академия на науките
Comptes rendus de l'Académie bulgare des Sciences
Tome 75, No 5, 2022

MEDICINE
Clinical medicine

THE RELATIONSHIP BETWEEN *H. PYLORI* AND DIETARY HABITS IN OBESE FEMALE PATIENTS

Ulku Karaman[#], Yasemin Kaya[*], Yeliz Kasko Arıcı[**], Neval Berrin Arserim[***], Zuhal Karaca Karagöz[****], Cemil Colak[*****], Gamze Yolalan, Sermin Top[******]

Received on November 11, 2021
Presented by D. Damianov, Member of BAS, on December 21, 2021

Abstract

The purpose of this study is to investigate the relationship between the dietary habits of obese women aged above 18 and the *Helicobacter pylori* (*H. pylori*). Five hundred and sixty-one women aged above 18 were included in the study. Patients filled in questionnaires consisting of questions regarding their sociodemographic variables, chronic diseases and dietary habits. Blood samples taken from the patients were tested according to the *H. pylori* kit procedures and the results were categorized as positive and negative. In the study, obese and nonobese patients were compared and then *H. Pylori* positive and negative groups were compared. No significant difference was found between groups in terms of *H. pylori* in the comparison of obese and nonobese patients ($p = 0.272$). When *H. pylori* positive and negative groups of obese patients were compared in terms of their dietary habits, consumption rates of butter, whole-fat or low-fat milk, cookies-cake etc., and chocolate-candies were detected to be higher in the *H. pylori* positive group ($p < 0.05$). Red meat consumption ($p = 0.044$) and smoking rates were lower ($p = 0.001$). There was no significant difference between groups in terms of the consumption rates of bread, rice/pasta, corn, cheese, chicken, fish, sausages, fruit, vegetables, legumes and salt. No significant difference was found between obese and nonobese women in terms of *H. pylori* positivity. It was observed that *H. pylori* positive obese women

[#]Corresponding author.
Scientific Researches Coordination Unit (BAP) granted financial support (HD-1904).
DOI:10.7546/CRABS.2022.05.16

had higher consumption rates of butter, whole-fat or low-fat milk, cake-cookies etc., and chocolate-candies.

Key words: *Helicobacter pylori*, obesity, dietary habits

Abbreviations: BMI – body mass index, *H. pylori* – *Helicobacter pylori*, HDL-C – high-density lipoprotein cholesterol, TG – triglycerides, FBS – fasting blood sugar

Introduction. *Helicobacter pylori* (*H. pylori*) is an important common infectious agent that adheres to the human gastric mucosa, causing a wide range of disorders from asymptomatic carriage, non-ulcer dyspepsia, chronic gastritis, mucosa-associated lymphoid tissue lymphoma to gastric cancer [1,2]. It is estimated that more than 50% of the world adult population is infected [3,4]. *H. pylori* which causes infection in humans and animals is transmitted human-to-human via direct contact with saliva, feces or consumption of food and water contaminated with them as well as medical devices such as endoscopes [4].

As a result of studies to determine the main factors affecting the prevalence of *H. pylori*, the reported factors included age, education, low socioeconomic level, migrations, crowded families, infected family members, contaminated water consumption, shared use of tools such as glasses, spoons, forks and knives [5,6]. Furthermore, different results were reported in various studies that addressed variables including gender, age, smoking and drinking habits, fruit and vegetables consumption, etc. [7–9].

The aim of this study is to investigate the relationship between dietary habits of obese women aged above 18 and *H. pylori*.

Materials and method. The study was initiated following the approval of Clinical Researches Ethics Committee of Ordu University. Women admitted to the Internal Medicine polyclinic, aged above 18 years, agreeing to participate in the study, with normal mental functions were included in the study. The patients filled in questionnaires consisting of questions regarding their sociodemographic variables and dietary habits. The answers to these questionnaires were limited to the answers of participants. Their height was measured, and body weight was determined in order to calculate the body mass index. After the subjects were allowed to rest for 15 min, their arterial blood pressure levels were measured and recorded.

Five milliliters venous blood sample was taken from each patient. These blood samples were centrifuged at 3000 g for 10 min and the serums were removed. The collected samples were stored at $-80\,^{\circ}$C until further testing. *H. pylori* Ab (IgG) (human) (blood/serum/plasma) cassette; ABON™ Biopharm brand and IHP-302 number kit were used in the study. The samples were tested at *H. pylori* Ab (human) (blood/serum/plasma) cassette according to the kit procedures and the results were evaluated as either positive or negative (Fig. 1) [10]. For *H. pylori* examination, the samples were examined and recorded without waiting. In addition, fasting blood sugar (FBS), total cholesterol, triglycerides (TG) and high-density

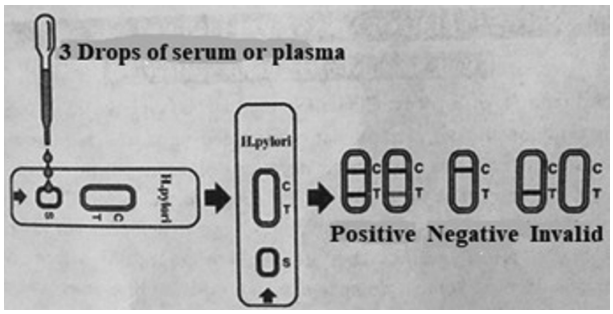

Fig. 1. *H. pylori* Ab (human) (blood/serum/plasma) cassette

lipoprotein cholesterol (HDL-C) parameters were also examined in the serum samples. FBS, total cholesterol, TG and HDL-C parameters were examined with the ELISA method.

Body bass index (BMI) was calculated by the formula

$$\text{BMI} = \text{Body weight (kg)}/\text{Height (m}^2\text{)}.$$

Patients were diagnosed with obesity according to the classification of WHO (underweight below 18.5 kg/m^2, normal weight between 18.5–24.9 kg/m^2, overweight between 25–29.9 kg/m^2, obese above 30 kg/m^2 and morbid obese above 40 kg/m^2) [11].

Statistics. Data were presented with median (min-max) or number (percentage). Data compatibility with normal distribution was determined by Kolmogorov–Smirnov test. Mann–Whitney U-test, Pearson chi-square test, Yates corrected chi-square test and Fisher exact chi-square test were used in statistical analyses where appropriate. $p < 0.05$ value was considered statistically significant and IBM SPSS Statistics 26.0 (Armonk, NY, IBM Corp.) program was used in analyses.

Results. The average age of 561 individuals participating in the study was 42.09 ± 12.48. *H. pylori* positivity was detected in 312 of them (55.6%). The BMI of 207 samples (36.8%) was found to be 30 and above. The average age of obese patients was 47.25 ± 11.80 and *H. pylori* positivity was 58.5%.

The sociodemographic characteristics of participants are presented in Table 1. Patients were categorized as obese and nonobese in Table 1. Obese patient group was older, had higher systolic/diastolic blood pressure, FBS, total cholesterol and TG levels and lower HDL-C than the nonobese patient group ($p < 0.001$).

Obese patients also had lower levels of income and education ($p = 0.008$). Illiteracy rate was 38.3% in obese patient group and 17.8% in nonobese patient group. Moreover, obesity rate was found as 7.2% in high school and university graduates while 31.7% of them were nonobese.

T a b l e 1

Comparison of sociodemographic characteristics of obese and nonobese patient groups

Variables		BMI ≥ 30 ($n = 207$) (Obese)	BMI < 30 ($n = 354$) (Nonobese)	p
Age (years), Median(Min-Max)		46 (20–80)	37 (20–82)	$\mathbf{< 0.001}^a$
Income, Median(Min-Max)		600 (100–8000)	750 (100–5000)	$\mathbf{0.008}^a$
Height (cm), Median(Min-Max)		156 (134–172)	159 (142–181)	$\mathbf{< 0.001}^a$
Weight (kg), Median(Min-Max)		82 (63–138)	64 (39–85)	$\mathbf{< 0.001}^a$
Waist circumference (cm), Median(Min-Max)		99 (76–132)	80 (57–103)	$\mathbf{< 0.001}^a$
Systolic blood pressure (mmHg), Median(Min-Max)		120 (70–220)	110 (70–195)	$\mathbf{< 0.001}^a$
Diastolic blood pressure (mmHg), Median(Min-Max)		80 (40–140)	70 (40–110)	$\mathbf{< 0.001}^a$
FBS (mg/dl), Median(Min-Max)		94 (67–400)	88 (67–340)	$\mathbf{< 0.001}^a$
TG (mg/dl), Median(Min-Max)		130 (44–900)	108 (30–877)	$\mathbf{< 0.001}^a$
T. cholesterol (mg/dl), Median(Min-Max)		202 (81–332)	187 (104–365)	$\mathbf{< 0.001}^a$
HDL-C (mg/dl), Median(Min-Max)		48 (31–90)	52 (28–92)	$\mathbf{< 0.001}^a$
Education (n/%)	Illiterate	79 (38.3)	63 (17.8)	$\mathbf{< 0.001}^b$
	Literate	13 (6.3)	19 (5.4)	
	Primary school	87 (42.2)	127 (35.9)	
	Middle school	12 (5.8)	33 (9.3)	
	High school	11 (5.3)	65 (18.4)	
	University	4 (1.9)	47 (13.3)	
Marital status (n/%)	Married	171 (83)	297 (83.9)	$\mathbf{< 0.001}^b$
	Unmarried	4 (1.9)	31 (8.8)	
	Widow	24 (11.7)	19 (5.4)	
	Divorcee	7 (3.4)	7 (2)	
Occupation (n/%)	Housewife	198 (96.1)	282 (79.7)	$\mathbf{< 0.001}^b$
	Worker	–	2 (0.6)	
	Civil servant	1 (0.5)	25 (7.1)	
	Student	–	12 (3.4)	
	Farmer	–	2(0.6)	
	Seasonal worker	–	1 (0.3)	
	Small business owner	1 (0.5)	4 (1.1)	
	Self-employed	9 (2.9)	26 (7.3)	
Family type (n/%)	Nuclear family	162 (78.6)	292 (82.5)	0.310^b
	Extended family	44 (21.4)	62 (17.5)	
Hypertension (n/%)	Yes	82 (39.9)	58 (16.4)	$\mathbf{< 0.001}^b$
	No	129 (61.1)	296 (83.62)	
Diabetes mellitus (n/%)	Yes	39 (18.9)	24 (6.8)	$\mathbf{< 0.001}^b$
	No	168 (81.1)	330 (93.2)	
Hyperlipidemia (n/%)	Yes	70 (33.8)	67 (18.9)	$\mathbf{< 0.001}^b$
	No	137 (66.2)	287 (81.1)	
Coronary artery disease (n/%)	Yes	3 (1.5)	3 (0.8)	0.670^c
	No	204 (98.5)	351 (99.2)	

Table 1

(continued)

Variables		BMI ≥ 30 ($n = 207$) (Obese)	BMI < 30 ($n = 354$) (Nonobese)	p
Heart failure (n/%)	Yes	6 (2.9)	5 (1.4)	0.226[c]
	No	201 (97.1)	349 (98.6)	
Smoking (n/%)	Yes	38 (18.4)	111 (31.4)	**< 0.001[b]**
	No	169 (81.6)	243 (68.6)	
Alcohol consumption (n/%)	Yes	3 (1.4)	8 (2.3)	0.754[c]
	No	204 (98.6)	346 (97.7)	
Exercising (n/%)	Yes	41 (19.9)	69 (19.5)	0.928[b]
	No	166 (80.1)	285 (80.5)	
H. pylori (n/%)	Yes	121 (58.7)	191 (54.0)	0.272[b]
	No	85 (41.3)	163 (46.0)	

[a]Mann–Whitney U-test, [b]Pearson chi-square test, [c]Fisher exact chi-square test
FBS – Fasting blood sugar, TG – triglycerides, T. cholesterol – Total cholesterol
HD-C – HDL cholesterol

A statistically significant difference was detected in terms of marital status ($p < 0.001$). 1.9% of the obese patient group were unmarried, 11.7% of them were widows while 8.8% of the nonobese patient group were unmarried and 5.4% of them were widows.

In terms of occupation, it was found that 96.1% of the obese patient group were housewives and 79.7% of the nonobese patient group were housewives. A difference was also detected in occupation groups such as workers, civil servants, etc. ($p < 0.001$).

No difference was found between groups in terms of the family type ($p = 0.310$). However, FBS, hypertension and hyperlipidemia rates were higher in obese patients ($p < 0.001$). Smoking rate was higher in the nonobese patient group ($p = 0.001$). There was no significant difference between groups in terms of *H. pylori* positivity ($p = 0.272$) (Table 1).

In terms of dietary habits, no difference was detected between groups in the type of fat/oil consumed, whole-fat/low-fat milk consumption, type of bread, white meat and chicken skin consumption, high consumption of vegetables and boiled potatoes ($p < 0.05$). However, in the nonobese patient group, daily coffee consumption, quantity of sugar put in tea and coffee, red meat consumption, low-fat food and vegetable oil consumption, weekly egg consumption and salt consumption were found significantly higher ($p < 0.05$). In the obese patient group, on the other hand, the consumption of fries, less sugar, less salt, cookies, cakes, etc., chocolate, candies and salt were lower ($p < 0.05$) (Table 2).

T a b l e 2

Comparison of dietary habits of obese and nonobese patient groups

Variables		BMI ≥ 30 ($n = 207$) (Obese)	BMI < 30 ($n = 354$) (Nonobese)	p
Tea (No of glasses/day), Median (Min-Max)		6 (1–20)	5 (1–20)	0.4695
Coffee (No of cups/day), Median (Min-Max)		0 (0–2)	0 (0–7)	**0.0167**
Sugar in tea (No/glass), Median (Min-Max)		1 (0–5)	2 (0–7)	**0.0219**
Sugar in coffee (No/cup), Median (Min-Max)		0 (0–4)	0 (0–5)	**0.0304**
Oil/Fat consumed (n/%)	Vegetable oil	43 (20.9)	109 (30.8)	
	Margarine	–	1 (0.3)	
	Butter	6 (2.9)	11 (3.1)	
	Mixed	59 (28.6)	89 (25.1)	
	I don't know	98 (47.6)	144 (40.7)	
Milk (n/%)	Whole-fat	56 (27.2)	108 (30.5)	0.471[c]
	Low-fat	28 (13.6)	55 (15.5)	
	Fat-free	1 (0.5)	5 (1.4)	
	I don't drink milk	121 (58.7)	186 (52.5)	
Type of bread 0.239[c] (n/%)	Rye	3 (1.4)	5 (1.4)	
	White	110 (54.2)	216 (61.5)	
	Whole-wheat	45 (22.2)	55 (15.7)	
	Flat bread	45 (22.2)	75 (21.4)	
No meat (n/%)	Yes	5 (2.5)	5 (1.4)	0.508[c]
	No	198 (97.5)	349 (98.6)	
Red meat (n/%)	Yes	129 (65.8)	256 (74.0)	**0.044**[b]
	No	67 (34.2)	90 (26.0)	
Chicken skin (n/%)	Yes	159 (78.3)	261 (74.6)	0.319[b]
	No	44 (21.7)	89 (25.4)	
White meat (n/%)	Yes	113 (55.1)	192 (54.7)	0.923[b]
	No	92 (44.9)	159 (45.3)	
Low-fat (n/%)	Yes	61 (30.5)	137 (39.6)	**0.033**[b]
	No	139 (69.5)	209 (60.4)	
Oil (n/%)	Yes	137 (66.5)	273 (77.1)	**0.007**[b]
	No	69 (33.5)	81 (22.9)	
Boiled potato (n/%)	Yes	125 (60.7)	204 (57.6)	0.479[b]
	No	81 (39.3)	150 (42.4)	
French fries (n/%)	Yes	136 (66.7)	199 (56.2)	**0.015**[b]
	No	68 (33.3)	155 (43.8)	
More vegetables (n/%)	Yes	96 (46.6)	156 (44.1)	0.561[b]
	No	110 (53.4)	198 (55.9)	

Table 2

(continued)

Variables		BMI ≥ 30 ($n = 207$) (Obese)	BMI < 30 ($n = 354$) (Nonobese)	p
Less sugar	Yes	77 (37.4)	103 (29.1)	**0.043**[b]
(n/%)	No	129 (66.6)	251 (70.9)	
Less salt	Yes	78 (37.9)	102 (28.8)	**0.027**[b]
(n/%)	No	128 (62.1)	252 (71.2)	
Cake, cookies, etc.	None	101 (49)	131 (37.0)	**0.020**[b]
(n/%)	1–2/week	76 (36.9)	159 (44.9)	
	3–5/week	26 (12.6)	49 (13.8)	
	6–7/week	3 (1.5)	15 (4.2)	
Chocolate, candies	None	116 (56.3)	140 (39.5)	**< 0.001**[c]
(n/%)	1–2/week	63 (30.6)	132 (37.3)	
	3–5/week	23 (11.2)	55 (15.5)	
	6–7/week	4 (1.9)	27 (7.6)	
Eggs	None	66 (32)	91 (25.9)	**0.060**[b]
(n/%)	1–2/week	77 (37.4)	149 (42.3)	
	3–5/week	46 (22.3)	63 (17.9)	
	6–7/week	17 (8.3)	49 (13.9)	
Salt consumption	I don't add salt onto my meal	87 (42.2)	106 (29.9)	**0.012**[b]
(n/%)	I add salt if it tastes bland	110 (53.4)	226 (63.8)	
	I always add salt before tasting the food	9 (4.4)	22 (6.2)	

[a]Mann–Whitney U-test, [b]Pearson chi-square test, [c]Fisher exact chi-square test

When obese patient groups were compared in terms of *H. pylori* positivity, it was detected that the *H. pylori* positive group had higher consumption rates of butter, whole-fat or low-fat milk, cookies, cakes, etc., and chocolate and candies ($p < 0.05$). Red meat consumption rate and smoking rate were also lower ($p < 0.05$). No significant difference was found between groups in terms of the type of bread consumed, rice/pasta, corn, cheese, chicken, fish, sausages, fruit, vegetables, legumes, and salt consumption rates (Table 3).

Discussion. In studies where serum anti-Hp IgG was examined with ELISA method in asymptomatic patients in Turkey, prevalence was reported between 53–82%. It was found between 41–96% in studies investigating the *H. pylori* presence with invasive methods in certain patient groups [4]. The serum anti-Hp IgG method used in the study is a fast-chromatographic immunological measurement tool to determine the *H. pylori* antibodies in serum or plasma [10]. These tests were reported to indicate contact with microorganisms but not an ongoing infection. It was found that *H. pylori* antibodies could be present in blood for at least one year even in treated patients [11]. Therefore, *H. pylori* was found as 55.6% in women above 18 and as 58.5% in obese women in this study where serum anti-Hp IgG

T a b l e 3

Comparison of dietary habits of *H. pylori* positive and negative patients in obese groups

Variables	BMI ≥ 30 (Obsese) ($n = 207$)		p
	H. pylori pos ($n = 121$)	*H. pylori* neg ($n = 86$)	
Oil/Fat consumed (n/%)			**0.034**[c]
Vegetable oil	25 (20.7)	18 (20.9)	
Margarine	–	–	
Butter	5 (4.1)	1 (1.2)	
Mixed	26 (21.5)	33 (38.4)	
I don't know	65 (53.7)	94 (39.5)	
Milk (n/%)			**0.050**[c]
Whole-fat	40 (33.1)	16 (18.6)	
Low-fat	17 (14)	11 (12.8)	
Fat-free	0 (0.0)	1 (1.2)	
I don't drink milk	64 (52.9)	58 (67.4)	
Type of bread (n/%)	0.711[c]		
Rye	1 (0.8)	2 (2.4)	
White	67 (56.3)	43 (50.6)	
Whole-wheat	25 (21)	21 (24.7)	
Flat bread	26 (21.8)	19 (22.4)	
Rice/pasta (n/%)			0.579[b]
None	12 (9.9)	7 (8.1)	
1–2/week	75 (62)	47 (54.7)	
3–5/week	26 (21.5)	25 (29.1)	
6-7/week	8 (6.6)	7 (8.1)	
Corn (n/%)			0.448[c]
None	118 (97.5)	82 (95.3)	
1–2/week	3 (2.5)	3 (3.5)	
3–5/week	–	–	
6–7/week	–	1 (1.2)	
Cheese (n/%)			0.273[b]
None	10 (8.3)	5 (5.8)	
1–2/week	20 (16.5)	8 (9.3)	
3–5/week	13 (10.7)	7 (8.1)	
6–7/week	78 (64.5)	66 (76.7)	
Chicken (n/%)			0.646[c]
None	40 (33.1)	24 (27.9)	
1–2/week	68 (56.2)	53 (61.6)	
3–5/week	11 (9.1)	6 (7)	
6-7/week	2 (1.7)	3 (3.5)	
Fish (n/%)			0.240[c]
None	109 (90.1)	71 (82.6)	
1–2/week	10 (8.3)	14 (16.3)	
3–5/week	1 (0.8)	1 (1.2)	
6–7/week	1 (0.8)	–	
Red meat (n/%)			**0.050**[b]
None	36 (29.8)	13 (15.1)	
1–2/week	59 (48.8)	47 (54.7)	

Table 3

(continued)

Variables	BMI ≥ 30 (Obsese) ($n = 207$)		p
	H. pylori pos ($n = 121$)	*H. pylori* neg ($n = 86$)	
3–5/week	19 (15.7)	16 (18.6)	
6–7/week	7 (5.8)	10 (11.6)	
Sausage (*n*/%)			0.463[c]
None	92 (76)	69 (80.2)	
1–2/week	21 (17.4)	11 (12.8)	
3–5/week	4 (3.3)	5 (5.8)	
6–7/week	4 (3.3)	1 (1.2)	
Fruit (*n*/%)			0.383[b]
None	11 (9.1)	6 (7)	
1–2/week	24 (19.8)	14 (16.3)	
3–5/week	29 (24)	15 (17.3)	
6–7/week	57 (47.1)	51 (59.3)	
Vegetable (*n*/%)			0.327[c]
None	2 (1.7)	1 (1.2)	
1–2/week	15 (12.4)	5 (5.8)	
3–5/week	19 (15.7)	11 (12.8)	
6–7/week	85 (70.2)	69 (80.2)	
Legumes (*n*/%)			0.429[c]
None	74 (61.2)	51 (59.3)	
1–2/week	39 (32.2)	33 (38.4)	
3–5/week	3 (2.5)	1 (1.2)	
6–7/week	5(4.1)	1(1.2)	
Cake, cookies, etc. (*n*/%)			**0.042**[c]
None	62 (51.2)	40 (46.5)	
1–2/week	49 (40.5)	27 (31.4)	
3–5/week	9 (7.4)	17 (19.8)	
6–7/week	1 (0.8)	2 (2.3)	
Chocolate, candies (*n*/%)			0.068[c]
None	67 (55.4)	50 (58.1)	
1–2/week	40 (33.1)	23 (26.7)	
3–5/week	10 (8.3)	13 (15.1)	
6-7/week	4 (3.3)	–	
Salt consumption (*n*/%)			0.248[c]
I don't add salt onto my meal	56 (46.3)	31 (36)	
I add salt if it tastes bland	59 (48.8)	52 (60.5)	
I always add salt before tasting the food	6 (5)	3 (3.5)	
Smoke (*n*/%)			0.058[b]
Yes	17 (14.0)	21 (24.4)	

[b]Pearson chi-square test, [c]Fisher exact chi-square test

method was used. The positivity rate was similar in tests performed. Furthermore, in the present study, *H. pylori* prevalence was 82.5% in women above 18, 86% in women between 30–39 and 77% in women above 70.

In Turkey TURDEP-II study, the obesity prevalence was reported as 30.3% (41% in women, 20.5% in men) in adults aged above 18 [12]. In the United States of America, the obesity rate was reported as 34.9% in individuals aged 20 and above according to data of years 2011–2012 [11]. Similarly, the obesity rate was found to be 36.8% in this study.

In literature studies investigating the relationship between obesity and *H. pylori*, different results were obtained. In a study by Xu et al. [13] it was reported that obesity was a risk factor for *H. pylori*. den Hollander et al. [14] in contrast, found no relationship between obesity and *H. pylori* in their study. Chen et al. [15] in a study conducted with 1713 women aged between 30 and 50, mentioned that the women infected with *H. pylori* had higher rates of obesity and *H. pylori* increased the obesity risk. In this study, no difference was detected between obese and nonobese women in terms of *H. pylori* positivity.

Obese and *H. pylori* positive women were found to consume higher quantities of butter, whole-fat or low-fat milk, chocolate-candies, cake-cookies, etc. ($p < 0.05$). This suggests that these foods may increase the bacteria infection rate. Red meat consumption rate and smoking rate were lower ($p < 0.05$). This suggests that infection rate may be lower with the consumption of these foods. No significant difference was found between groups in terms of the type of bread consumed and the consumption rates of rice/pasta, corn, cheese, chicken, fish, sausages, fruit, fresh vegetables, legumes, and salt. Also, in the present study, differently from other studies [13,15], the failure to detect a relationship between the bacteria and obesity may have resulted from the study population and the method used. Den Hollander et al. [14] also obtained similar results with regard to the relationship between bacteria presence and obesity in their study.

Different results were achieved in literature studies investigating the relationship between foods and dietary habits and *H. pylori*. Assaad et al. [16] found no relationship between *H. pylori* positivity and dietary habits in hospitalized patients. Monno et al. [17] reported in their study a significant correlation between the consumption of uncooked sea food (mussels and other mollusks), uncooked vegetables, municipal water and cups of coffee per week and *H. pylori* positivity. Similarly, Mard et al. [18] stated that low consumption of vegetables may increase the *H. pylori* positivity and infection severity. Shu et al. [19] also indicated that *H. pylori* risk decreased as fresh vegetable consumption decreased but high salt consumption increased the risk of bacterial infection. Xia et al. [20] showed that a diet rich in carbohydrates and sweets was positively correlated with the prevalence of *H. pylori* infection and that high consumption of offal, fish, seafood and poultry was associated with decreased *H. pylori* prevalence. In this study, a difference was found between butter, carbohydrates, low-fat and whole-fat milk consumption, and *H. pylori* positivity. It can be interpreted that consuming these carbohydrate foods may facilitate the adherence of bacteria. Differences in studies may have resulted from different study groups, methods used, and areas researched.

Conclusion. In the present study, it was detected that *H. pylori* positivity in obese female patients was correlated with high consumption of butter, whole-fat or low-fat milk, chocolate-candies, and cakes-cookies, etc. Obese patients who consumed high quantities of these foods had higher risk of bacterial infection. It was concluded that the bacteria could be transmitted via these foods or such foods could facilitate the adherence of bacteria. Whether these foods have an impact on the adherence or transmission of bacteria can be determined with controlled studies. It was also thought that decreased consumption of foods and drinks such as butter, whole-fat or low-fat milk, chocolate-candies, and cakes-cookies, etc. by obese female patients with *H. pylori* positivity may enable the bacteria eradication and thus the obese patients can lose weight with a certain dietary programme and the bacteria can be eradicated.

REFERENCES

[1] Ozden A., S. Dumlu, O. Donderici, H. Cetinkaya, K. Soylu et al. (1992) Seroepidemiology of *Helicobacter pylori* infection in our country, Gastroenteroloji, **4**, 664–648.

[2] Samsar U., Y. Ustundag, S. Aydemir, I. Ozer Tekim, E. Kocak (2003) *Helicobacter pylori* seropositivity in patients with reflux esophagitis, Turk. J. Gastroenterol., **14**(4), 282–283.

[3] Eusebi L. H., R. M. Zagari, F. Bazzoli (2014) Epidemiology of *Helicobacter pylori* infection, Helicobacter, **19**, 1–5.

[4] Simsek I., O. B. Binicier (2011) *Helicobacter pylori*, Ic Hastaliklari J., **18**, 13–26.

[5] Salih B. A. (2009) *Helicobacter pylori* infection in developing countries: the burden for how long?, Saudi J. Gastroenterol., **15**(3), 201–207.

[6] Azevedo N. F., J. Huntington, K. J. Goodman (2009) The epidemiology of *Helicobacter pylori* and public health implications, Helicobacter, **14**, 1–7.

[7] Goh K. L., W. K. Chan, S. Shiota, Y. Yamaoka (2011) Epidemiology of *Helicobacter pylori* infection and public health implications, Helicobacter, **16**, 1–9.

[8] Mhaskar R. S., I. Ricardo, A. Azliyati, R. Laxminarayan, B. Amol et al. (2013) Assessment of risk factors of *Helicobacter pylori* infection and peptic ulcer disease, J. Glob. Infect. Dis., **5**, 60–67.

[9] Eslami O., M. Shahraki, T. Shahraki, H. Ansari (2017) Association of *Helicobacter pylori* infection with metabolic parameters and dietary habits among medical undergraduate students in southeastern of Iran, J. Res. Med. Sci., **22**(1), 12, doi: 10.4103/1735-1995.199091.

[10] ABON™ Biopharm Marka One Step *H. pylori* Test Device, Ref. No 1156119501.

[11] World Health Organization (1998) Obesity preventing and managing the global epidemic: Report of a WHO Consultation on Obesity, WHO/NUT/NCD/1998, The World Health Organization, Geneva.

[12] Turkey Nutrition and Health Research 2010 (2014) Evaluation Report of Nutritional Status and Habits, Hacettepe University, Faculty of Health Sciences, Department of Nutrition and Dietetics, General Directorate of Health Research Publication No: SB-SAG-2014/02, Ankara, Şubat, 635 pp (in Turkish). Available

from: https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/diger-kitaplar/TBSA-Beslenme-Yayini.pdf.

[13] Xu X., W. Li, L. Qin, W. Yang, G. Yu et al. (2019) Relationship between *Helicobacter pylori* infection and obesity in Chinese adults: A systematic review with meta-analysis, PLoS One, **14**(9), e0221076, doi: 10.1371/journal.pone.0221076.

[14] Den Hollander W. J., L. Broer, C. Schurmann, D. Meyre, C. M. Den Hoed et al. (2017) *Helicobacter pylori* colonization and obesity – A mendelian randomization study, Sci. Rep., **7**(1), 1–7.

[15] Chen L. W., S. F. Kuo, C. H. Chen, C. H. Chien, C. L. Lin et al. (2018) A community-based study on the association between *Helicobacter pylori* infection and obesity, Sci. Rep., **8**(1), 10746.

[16] Assaad S., R. Chaaban, F. Tannous, C. Costanian (2018) Dietary habits and *Helicobacter pylori* infection: A cross sectional study at a Lebanese Hospital, BMC Gastroenterol., **18**(1), 48.

[17] Monno R., V. de Laurentiis, P. Trerotoli, A. M. Roselli, E. Ierardi et al. (2019) *Helicobacter Pylori* infection: Association with dietary habits and socioeconomic conditions, Clin. Res. Hepatol. Gastroenterol., **43**(5), 603–607.

[18] Mard S. A., H. Khadem Haghighian, V. Sebghatulahi, B. Ahmadi (2014) Dietary factors in relation to *Helicobacter pylori* infection, Gastroenterol. Res. Pract., **2014**, Art. ID 826910, 5 pp, doi: 10.1155/2014/826910.

[19] Shu L., P. F. Zheng, X. Y. Zhang, Y. L. Feng (2019) Dietary patterns and *Helicobacter pylori* infection in a group of Chinese adults ages between 45 and 59 years old: An observational study, Medicine (Baltimore), **98**(2), e14113, doi: 10.1097/MD.0000000000014113.

[20] Xia Y., G. Meng, Q. Zhang, L. Liu, H. Wu (2016) Dietary patterns are associated with *Helicobacter pylori* infection in Chinese adults: A cross-sectional study, Sci. Rep., **6**, 32334, doi: 10.1038/srep32334.

Department of Parasitology
Medical Faculty
Ordu University
e-mails: ulkukaraman44@hotmail.com
gamze2705@hotmail.com

**Department of Internal Medicine*
Medical Faculty
Ordu University
e-mail: ysmnkcmz@gmail.com

***Department of Biostatistics*
Medical Faculty
Ordu University
e-mail: yelizkasko@yahoo.com

****Department of Microbiology*
Faculty of Veterinary Medicine
Dicle University
e-mail: nevalb@dicle.edu.tr

*****Department of Endocrinology*
Elazıp Fetih Sekin City Hospital
e-mail: dr.zuhalkaraca@gmail.com

******Department of Biostatistics*
Medical Faculty
Malatya University
e-mail: cemilcolak@yahoo.com

*******Department of Microbiology*
Medical Faculty
Giresun University
e-mail: davidsonhrly@gmail.com