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The Relationship of Food Insecurity and Quality of Life with Helicobacter Pylori Infection

Soudeh Talezadeh Shirazi; MSc[1,2]; Mohammad Hassan Eftekhari; PhD [*2]; Afsane Ahmadi; MSc[2,3]; Zohreh Mazloom; PhD[2]; Mohammad Fararouei; PhD[4] & Maryam Ranjbar Zahedani; PhD[2]

[1] *Nutrition Research Center, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.*
[2] *Department of Clinical Nutrition, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.*
[3] *Research Center for Health Sciences, Institute of Health, Shiraz University of Medical Sciences, Shiraz, Iran.*
[4] *Department of Epidemiology, School of Health Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.*

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Corresponding author
h_eftekhari@yahoo.com
Department of Clinical Nutrition, School of Nutrition and Food Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.

Postal code: 71536-75541
Tel: +98-71-37251002

ABSTRACT

Background: *Helicobacter pylori* (*H pylori*) is the most prevalent human infection in half of the world population. Few studies investigated the reasons of infection to *H pylori* in societies. The current study was designed i to examine the relationship of food insecurity and quality of life with *H pylori* infection. **Methods:** In this case-control study, 200 candidates were selected among the people who referred to Shiraz Imam Reza Clinic. They were asked to complete the general questionnaire, food security, and quality of life questionnaires. The *H pylori* excremental diagnosis test was also taken from them. **Results: T**he prevalence of *H pylori* infection was 28%. No relationship was observed between *H pylori* and age, gender, household size, and body mass index. However, the prevalence of *H pylori* infection was significantly higher in married individuals and housewives and volunteers with lower educations and those who took digestive medications. In addition, food insecurity ($P = 0.04$) and low quality of life ($P < 0.001$) were significantly high in individuals with *H pylori* infection. However, the possibility of suffering from *H pylori* infection in individuals who consume digestive medicines was 3.97 times higher than other individuals (95% CI: 2.11-7.40). Furthermore, with reduction of quality of life, the possibility of suffering from *H pylori* infection increased 1.77 times (95% CI: 1.203-2.591). **Conclusion:** The data indicated a statistically significant increased risk of *H pylori* in marital status, occupation, educational level, quality of life, and food insecurity in the affected individuals. The association of food insecurity and quality of life with *H pylori* infection should be examined in future studies in different populations.

Keywords: *Helicobacter pylori; Food insecurity; Quality of life*

Introduction

Helicobacter pylori (*H pylori*) is a gram-negative, pronate, spiral, and micro-europhilic bacterium with excremental–oral and or oral-oral transmission to human (Grunert, 2005). *H pylori* has been known as one of the most prevalent human chronic infections in half of the world population, which is the major factor in the outbreak of several diseases such as gastric cancer

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(Ajdarkosh *et al.*, 2015). This is the fourth prevalent malignancy in the world and the second cause of death due to cancer in the world (Modaresi-Esfeh *et al.*, 2011). *H pylori* as both initiating and effective factor in gastric cancer progress was entitled death offshoot (Lee and Derakhshan, 2013). Prevalence of *H pylori* infection reaches 25-50% in advanced countries and to more than 80% in the developing countries (Talebibezminabadi, 2013). Based on the conducted studies, the prevalence rate of *H pylori* in Asia (Talebibezminabadi, 2013) and Iran (Miwa *et al.*, 2015, Modaresi-Esfeh *et al.*, 2011) was estimated at approximately 90%. *H pylori* infection can enter human stomach, due to the neonatal period and remains asymptotic for years in most cases (Grunert, 2005). Asia- Oceania health regulations adjustment association strategies has recently stated that *H pylori* infection should be extensively screened and treated in order to reduce the gastric cancer risk in high-risk populations (Fuccio *et al.*, 2008). It should be mentioned that *H pylori* is accepted by scientists as an index for predicting the possibility of suffering from gastric cancer (Uemura *et al.*, 2001) and no vaccine has been discovered and prepared for it (Matysiak-Budnik and Mégraud, 2006).

Conversely, food insecurity has been known as the public health dilemma in the world and considered by health policy makers (Jamieson *et al.*, 2013). Food insecurity status is different in various regions of the world and even in Iran. For instance, in numerous studies, the unsafe food rates consumed by Iranian people (including healthy and ill) were 20-42.5% in Tehran (World Health Organization, 2010, Zerafati_Shoae *et al.*, 2007) and 44% in Shiraz (Ramesh *et al.*, 2010). The prevalence of food insecurity had a direct and significant relationship with low income, unemployment, low educations, increase of household size, increase of the number of children, and increase of the epidemic and non-epidemic diseases like heart diseases and depression (Boyle- Baise, 1998, Kendall *et al.*, 1995, Mohammadzadeh *et al.*, 2010, Nord *et al.*, 1999, Seligman *et al.*, 2009, World Health Organization, 2010). In Iran, these relationships have been strongly observed; they indicate the potential effect of environmental factors on the creation of food insecurity (Dastgiri *et al.*, 2006, Hakim *et al.*, 2011, Mohammadi *et al.*, 2008, Omrani *et al.*, 2013, Rahim *et al.*, 2011, Zerafati_Shoae *et al.*, 2007). In addition, increasing prevalence of *H pylori* infection was high in low social-economic healthy levels of human societies (Mohammadzadeh *et al.*, 2010, Zerafati_Shoae *et al.*, 2007).

The index of quality of life and dimensions of physical and mental health had a great relationship with human health (Kaptein *et al.*, 2005). Mostly, patients' quality of life was examined by public measures (examination of disease symptoms and the physician report) and social dimensions of the quality of life were greatly overlooked. Moreover, the impact of social–mental factors on the outbreak of colon-brain interactions causes reduction of quality of life in digestive patients (Chang, 2004). Reduction of family income level, low educations, aging, and reduction of the health level had also a direct relation with reduction of quality of life (Chang, 2004, Gralnek *et al.*, 2000, Mogharab *et al.*, 2011, Omrani *et al.*, 2013). However, weak social- economic and healthy status were related to increased prevalence of *H pylori* (Hosseini *et al.*, 2012, Talebibezminabadi, 2013).Thus, according to the researchers, quality of life in patients with *H pylori* infection requires more systematic studies, especially as one of effective criteria in randomized clinical trials (Kaptein *et al.*, 2005).

Considering the necessity of utilizing strategies for preventing cancer and scarcity of the related studies, this study was designed for discovering the relationship of food insecurity and quality of life with *H pylori* infection.

Materials and Methods

Study design and participants: The present case-control study was conducted in 2016 on people who referred to Imam Reza sub-specialist clinic affiliated to Shiraz University of Medical Sciences. The required sample size was obtained as 192 based on the study conducted by Modarresi et al.

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(2010) in Tabriz (Modaresi-Esfeh *et al.*, 2011) and the participants were selected by convenient sampling method.

Short invitation letters were distributed among all clients of Imam Reza clinic. For accelerating and facilitating sampling, the individuals were also provided with a notification of free and voluntary participation in the study along with a complete explanation about the plan, exclusion and inclusion criteria, as well as the researcher's contact address and phone number at the health center's main entrance door and all floors.

For participating in the study, 360 persons volunteered and completed the inclusion criteria forms. The inclusion criteria included having 25-65 years of age, no addiction to smoking, drugs, and alcohol, as well as not suffering from incurable diseases (such as heart disease, diabetes, hepatic and renal diseases, and various types of cancer). Pregnant and breastfeeding women and those who had special nutrition habits such as mere vegetarian regimens were removed from the sample population.

Measurements: These people initially answered the questions and then were introduced to the laboratory. Some of the volunteers had the history of experiencing dyspepsia symptoms and had consumed digestive medicines without physician prescription. They were not aware of the existence of H pylori infection in their stomach and this issue made them to truly answer the questions without mental background from *H pylori* existence.

All volunteers were required to sign ethical consent forms for participating in the study. The questionnaires employed in the study were anonymous and general, family food insecurity and life quality questionnaires were completed for all volunteers by a skillful expert. General demographic specifications, including age, gender, education level, occupation, marital status, family dimension, and consumption of digestive medicines were asked and participants' weight and height were measured using standard methods. Body mass index (BMI) was also calculated using the formula of dividing weight (kg) by height square (m^2) (Zerafati_Shoae *et al.*, 2007). It should be stated that provision of individual consultation and diet were an act of appreciation for the participants' cooperation. Then, the Sample container for collecting feces were delivered to volunteers for diagnosis of *H pylori* antigen with Eliza method.

Among the people whose test results were positive, 100 persons were selected for the case group and among those whose result was negative, 100 were selected for the control group.

Food security in this study was investigated using family food security inventory of United States Department of Agriculture (USDA) (Mohammadzadeh *et al.*, 2010). This inventory was validated for epidemiologic studies and its validity and reliability were confirmed in Iranian studies (Mohammadzadeh *et al.*, 2011, Ramesh *et al.*, 2010). This questionnaire examines the family food safety in the past 12 months**.** Based on the scores obtained, the individuals were classified in two the main classes of food secure (0-1.8) and food insecure (1.8-9.3) (Bickel *et al.*, 2000).

One of the most common and comprehensive instruments for examining the participants' quality of life regarding health is the 36-question inventory "SF-36" (the Short Form Health Survey), which has been established as the golden standard. It calculates 8 multi-item scales of physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. It also contains 2 summary scales of the physical component summary (PCS) and the mental component summary (MCS). The score obtained from each subscale can range between 0-100 and a score of mental and physical health varies between 0- 400. Finally, the obtained scores were interpreted in both dimensions qualitatively and quantitatively:

Scores below 100: bad quality of life; Scores 100-200: Average quality of life; Scores 200-300: good quality of life; Scores above 300: very good quality of life (Ware Jr and Gandek, 1998) . This scale was translated and validated in Iranian studies (Fouladvand *et al.*, 2009, Montazeri and Vahdaninia, 2005).

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Data analysis: Data were collected using SPSS software version 23 and analyzed by chi-square and independent t-test. For examining the joint impact of variables on each other, all variables with significant results in univariate analysis stage entered a multivariate logistic regression model in which the final independent variables were identified using backward method. The P-value of less than 0.05 was considered as the significance level.

Results

The prevalence rate of infection to *H pylori* was 28%. By comparing the case and control groups, no significant relation was observed between increase of *H pylori* infection risk and age, gender, family dimension, and BMI. However, a significant relationship was observed between the risk of *H pylori* infection and marital status, occupation, education, and background of consuming digestive medicines (**Table 1**).

Comparison of the two groups showed a significant difference with respect to food insecurity. Furthermore, the quality of life (generally) as well as physical and mental health showed a significant and reverse relationship with the possibility of suffering from *H pylori* infection (**Table 2**).

In backward logistic regression and in the presence of all variables which became significant in univariate analysis, the quality of life (generally) and medicine consumption background remained in the model (**Table3**).

The possibility of suffering from *H pylori* was 3.97 times higher in individuals who had a history of digestive medicines consumption (95% CI: 2.11-7.40). In addition, by reduction of life quality, the possibility of suffering from *H pylori* improved 1.77 times (95% CI: 1.20-2.59).

Table 1. Comparing demographic- social specifications frequency between case and control groups

Quantitative variables	**Mean ±SD**		**P-value** [a]
Age (years)			0.13
Case	41.82 ± 11.74		
Control	39.31 ± 11.60		
Body mass index (kg/m^2)			
Case	25.38 ± 4.17		0.85
Control	25.50 ± 4.53		
Qualitative variables	**Case N (%)**	**Control N (%)**	**P-value** [b]
Sex			
Male	38 (46.9)	43 (53.1)	0.47
Female	62 (52.1)	57 (47.9)	
Marital status			
Single	16 (30.8)	36 (62.9)	0.001
Married	84 (56.8)	64 (43.2)	
Occupation			
Housekeeper	43 (63.2)	25 (36.8)	0.007
Worker	57 (43.2)	75 (56.8)	
Education level			
< Diploma	22 (66.7)	11 (33.3)	0.014
Diploma	49 (53.8)	42 (46.2)	
> Diploma	29 (38.2)	47 (61.8)	
Household size			
1-4 Persons	78 (52.4)	71 (47.6)	0.728
> 4 Persons	22 (49.4)	29 (50.6)	
Past use of gastrointestinal drugs	60 (71.4)	24 (28.6)	<0.001

[a]: Student t-test; [b]: Ch-square test

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Table 2. Comparing food security and quality of life between the case and control group in the present study

Variables	Case N (%)	Control N (%)	P-value[a]
Food insecurity			
Secure	70 (46.0)	82 (54.0)	0.047
Insecure	30 (62.5)	18 (37.5)	
Quality of life			
Bad	5 (71.4)	2 (28.6)	
Average	37 (71.2)	15 (28.8)	<0.001
Good	37 (46.8)	42 (53.2)	
Very good	21 (33.9)	41 (66.1)	
Mental health aspect			
Bad	11 (73.3)	4 (26.7)	
Average	27 (57.4)	20 (42.6)	0.014
Good	41 (53.2)	36 (46.8)	
Very good	21 (34.4)	40 (65.6)	
Physical health aspect			
Bad	8 (72.7)	3 (27.3)	
Average	31 (66.0)	16 (34.0)	0.016
Good	27 (46.6)	31 (53.4)	
Very good	34 (40.5)	50 (59.5)	

[a]: Chi-squar test

Table 3. Multivariate logistic regression analysis of different variables

	OR	P-value	95% C.I
Marriage	2.170	0.035	1.055 - 4.463
Past use of gastrointestinal drugs	0.278	≤ 0.001	0.147 - 0.526
Mental health aspect of quality of life	0.996	0.014	0.992 - 0.999

Discussion

Epidemiologic studies use various variables for assessing the relationship between quality of human life and its various effective factors such as suffering from diseases (Chang, 2004). In the present study, no relation was observed between female gender and suffering from *H pylori* infection. In a study in Mashhad, the rate of *H pylori* prevalence was equal in girls and boys (Keramati *et al.*, 2012).The results of other studies did not indicate any significant difference between men and women with respect to suffering from HP (Forman and Burley, 2006, Kargar *et al.*, 2013, Khodarahmi *et al.*, 2008, Mirzaei and Zahedi, 2015). In the present study, the age variable was considered in a fixed range in order to exclude its falsifying impact on other variables, since gastric cells atrophy and reduction of the body immune system power could make old people vulnerable to *H pylori* infection (Grunert, 2005). The results indicated higher age average of people with *H pylori* infection than the healthy people. However, the findings did not show any significant difference with respect to the comparison among the studied groups age average (Fakhr Yaseri *et al.*, 2005, Fuccio *et al.*, 2008, Rosenstock *et al.*, 2000) (7,39,40,41). The comparison of marital status between both groups revealed that infection of *H pylori* was higher in married individuals. Previous studies reported that after one year follow-up of couples with or without infection and single people with *H pylori*, wives of infected people became significantly infected with *H pylori*, which could be due to the person to person transfer as a result of

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couple's usage of common resources and their reduction of individual health (Salih, 2009, Singh *et al.*, 1999). Moreover, a significant difference was found regarding occupational status between the two studied groups and most *H pylori* infected people were householders. It was seen that parents' infection, especially mothers had a key role in transferring *H pylori* infection to the child (Fakhr Yaseri *et al.*, 2005).

Education level was introduced as the most significant factor in *H pylori* infection (Kendall *et al.*, 1995). In social groups with lower education, outbreak of *H pylori* infection and other subsequent problems were significantly reported (Grunert, 2005, Mohammadzadeh *et al.*, 2010). Our results showed that the prevalence of *H pylori* infection in people with academic education was significantly lower. A study on children revealed that the possibility of *H pylori* infection was higher in parents with lower education level and greater family dimension (Mirzaei and Zahedi, 2015). It appears that income reduction and low educations make these people to stand in low social classes, which along with reduction in public health result in more suffering from infections such as *H pylori*. Numerous studies reported significant increase of *H pylori* infection risk in poor societies (Malaty *et al.*, 1998, Talebibezminabadi, 2013). The findings of previous studies stated a significant and direct relationship between increased possibility of *H pylori* infection and increased household size (Mirzaei and Zahedi, 2015, Seligman *et al.*, 2009, World Health Organization, 2010). However, the present study could not show a significant relation between household size and possibility of *H pylori* infection. In examining the household size, it was observed that when a child in a family is infected by *H pylori*, the mother and other children's possibility of infection is about 75-80% (Rowland, 2000). Apparently, increase in the household size causes reduction of families' access to social and economic welfare, reduction of education and health level, and increase of infection possibility.

After comparing the background of medicines used in treating dyspepsia problems and digestive diseases, a significant and direct difference was found between the two studied groups. This relationship strongly states that although people with *H pylori* infection in the present study were not aware of their infection, *H pylori* infection directly increased their consumption of digestive medicines. Pilotto et al. showed a significant increase in digestive medicine consumption in people with dyspepsia (without microbe infection), various digestive diseases, and even cancers (Pilotto *et al.*, 2011).

In few studies, body weight and BMI were mentioned as an index for assessing the relationship with *H pylori* infection (Zerafati_Shoae *et al.*, 2007). In the present study, no significant relation was observed between weight and *H pylori* infection. In other words, people with *H pylori* had lower weight average and BMI than healthy individuals, which could be as a result of their lower health and economic status. In some studies, BMI higher than normal was considered as the risk factor of *H pylori* infection, but its mechanism is still not specified (Fuccio *et al.*, 2008). A meta-analysis stated that the BMI of *H pylori* infected people was a little higher than that of the healthy individuals (Pilotto *et al.*, 2011). However, researchers of Persian Gulf healthy heart could not show a relationship between BMI and the risk of *H pylori* infection (Ostovar *et al.*, 2014) .However, it appears that after *H pylori* treatment, BMI raises significantly due to increased plasma ghrelin level, which results in improved appetite and higher stored body fat (Lane *et al.*, 2011, Nwokolo *et al.*, 2003).

A comparison of food insecurity status between the studied groups showed that food insecurity increased by increase of the *H pylori* infection. No study is available for confirming or rejecting these results; so, this mechanism cannot be clearly explained. This result can be due to poorer social, economic, and health status of individuals with *H pylori* infection compared with other participants of this study. Considering the prevalence of *H pylori* on one hand and the prevalence of food insecurity on the other hand, both prevalence of *H Pylori* and the prevalence of food insecurity in the lower social-economic classes was significant**.** It was also confirmed by our results; so, it can be said that food insecurity in these individuals has resulted increased

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H pylori infection in the current studied group. Possibly, low income, social poverty, and reduction of access to health services resulted in an increase in food insecurity. Given the great differences of societies in food insecurity and prevalence of *H pylori* infection, designing more comprehensive studies with larger samples is necessary for assessing the relationship between food insecurity and *H pylori* infection.

The present study showed a significant and reverse relation between the possibility of *H pylori* infection, quality of life, and both dimensions of physical and mental health. About 71% of individuals with *H pylori* infection have bad and moderate life quality. This finding emphasizes the necessity of monitoring the poor social classes with respect to *H pylori* infection and preventing them from serious complications such as digestive ulcers and gastric cancer. Of course, no study was available over the relation between *H pylori* infection and quality of life. Although the case group individuals (*H pylori* infected) in this study were not aware of their *H pylori* infection, perhaps we can say that *H pylori* infection complications reduced life quality score in their physical and mental health dimensions or vice versa. In other words, low level of life quality as well as physical and mental health have made them susceptible to *H pylori* infection. Conversely, people with *H pylori* infection in the present study were from weak classes of the society with low educations, *H pylori* prevalence, and low level of life quality. In the present study, the relation between *H pylori* infection and quality of life was reversely significant. Low income and social welfare increased neural pressures (mental health reduction) and reduction of stomach antioxidant capacity; so, the individual became vulnerable to *H pylori* infection. This can be justified by saying that *H pylori* existence causes reduction of vitamin C secretion to gastric juice and this mechanism can reduce gastric juice anti-oxidant capacity and helps in the extension of pre-cancerous symptoms (atrophy, metaplasia, and dysplasia) (Russo *et al.*, 2001). As a result of this infection, physical health and consequently life quality are reduced. Previous studies stated that 60% of patients with gastric ulcer had at least one severe mental pressure during their life and this issue indicates that mental changes precede physical alterations (Mogharab *et al.*, 2011). In spite of high prevalence of *H pylori* infection in more than 93% of patients with duodenum ulcer, 80% of patients with gastric ulcer, and low level of quality of life in these patients (Kaptein *et al.*, 2005), it seems necessary for researchers to consider finding ways of reducing *H pylori* infection risk and designing cohort studies. In examining quality of life in individuals with chronic diseases, Gralnek et al. used SF-36 inventory and showed that in patients with irritable bowel syndrome quality of life was significantly reduced owing to continuous annoying digestive symptoms (Gralnek *et al.*, 2000). Furthermore, a cross-sectional study showed that by increase of age, the score of physical health was reduced and by increase of education level, general score of both physical and mental health dimensions increased. In fact, increase in family income was accompanied with increase in mental health score (Omrani *et al.*, 2013). In numerous previous studies, the quality of life was merely reported by examining symptoms and function status instead of the disease consequences (Kaptein *et al.*, 2005). However, in the present study, SF-36 inventory was employed as a golden standard for examining quality of life in healthy and ill people.

The limitation of the present study was lack of multilateral dominance owing to food increase, reduction of life quality score, and obscure relations of these indexes with other demographic and health specifications of studied people. In this way, *H pylori* infection caused reduction of life quality and increased food insecurity or vice versa. Perhaps this study could not obviously show or interpret the results obtained from the present results, because there are always some limitations in scientific studies

Conclusion

In conclusion, the prevalence of *H pylori* was significantly higher in married people, householder women, and people with low levels of education.

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In addition, the history of digestive medicines was higher in *H pylori* infected people and showed the greatest correlation among the examined indexes in the study. In the *H pylori* infected population, food insecurity significantly increased and the quality of life reduced in both dimensions of physical and mental health. Thus, we hope that *H pylori* infection can be reduced by enhancing social-economic and health conditions such as improving food insecurity status and quality of life in the societies, especially the weak social classes. On the contrary, regarding high prevalence of *H pylori* infection in various countries and weak classes of a society, especially Iran and in order to prevent its painful and expensive consequences including chronic digestive ulcers and gastric cancer, *H pylori* screening performance and designing extensive studies are necessary for finding approaches to reduce *H pylori* infection risk.

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Authors' contributions

Talezadeh Shirazi S, Eftekhari MH and Mzloom Z designed and developed this study. Fararouei M analyzed the data. Ranjbar Zahedani M conducted the study, wrote the manuscript, and participated in the data collection. All authors read and approved the final manuscript.

Conflict of interest

There is not any conflict of interest.

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