

## Prevalence and risk factors of gastroesophageal reflux disease in Qashqai migrating nomads, southern Iran

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### Abstract

**AIM:** To investigate the prevalence and risk factors of gastroesophageal reflux disease (GERD) symptoms in Qashqai migrating nomads with a different life style in Fars province, southern Iran.

**METHODS:** In summer 2006, 748 Qashqai migrating nomads aged 25 years or more were enrolled using a multiple-stage stratified cluster random sampling method. A questionnaire consisting of demographic characteristics, lifestyle and GERD symptoms (heartburn, regurgitation, chest pain, dysphagia, hoarseness and cough) as completed for each subject.

**RESULTS:** The questionnaire was completed in 717 subjects. The prevalence rate of GERD, defined as reflux occurring at least one time per week in the preceding year, was 33% (237 subjects). The prevalence was higher in older individuals (36.0% vs 28.9%,  $P < 0.05$ ) and in those with other gastrointestinal complaints (51.0% vs 27.8%,  $P < 0.001$ ), but not different in obese and non-obese subjects. It was also higher in those consuming fruits

and vegetables more than once a week (36.2% vs 17.3%,  $P < 0.001$ ). GERD had a positive correlation with smoking (42.1% vs 27.8%,  $P < 0.001$ ), but a negative relation with non-alcoholic beverages. The association between GERD and non-steroidal anti-inflammatory drugs (NSAIDs) consumption was also significant (40.2% vs 25.4%,  $P < 0.001$ ).

**CONCLUSION:** The prevalence of GERD (33%) is very high in Qashqai migrating nomads which may be due to a lower socioeconomic and educational level of these people and difference in the life style. Older age, frequent consumption of fruits and vegetables, smoking and NSAIDs are risk factors for GERD in this population.

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**Key words:** Gastroesophageal reflux disease; Prevalence; Risk factors; Nomads; Iran

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### INTRODUCTION

Symptoms of gastroesophageal reflux disease (GERD) represent one of the most frequent health problems in the Western world<sup>[1]</sup>. It is a chronic disease that results from the abnormal exposure of esophageal mucosa to refluxed gastric contents<sup>[2]</sup>. Heartburn is the prominent symptom of GERD, impinging patients' quality of life<sup>[3]</sup>. Environmental factors are probably the main cause of GERD<sup>[4]</sup>. Various lifestyle factors are thought to be associated with gastroesophageal reflux symptoms (GERS), including body weight, nutrition, alcohol consumption, smoking and intake of non-steroidal anti-

inflammatory drugs and sleeping position. There are few population-based data on GERD in Asia<sup>[5-8]</sup>. Previously, we published on associated factors of GERD in Shiraz, southern Iran<sup>[9]</sup>. This cross-sectional study was carried out on Qashqai migrating nomads of Fars Province in southern Iran. They migrate between winter quarters near the Persian Gulf and summer quarters in the plateaus of Zagros mountains in the north of Fars Province. The life style of Qashqai migrating nomads differs greatly from urban lifestyle. They live with their animals, migrate more than 500 km in search of pasture for their domestic animals and do not bear the same stresses of urban population and do not consume the same food. They live in tents and are more active physically than urban people.

## MATERIALS AND METHODS

### Materials

This study was carried out on Qashqai migrating nomads from May to October, 2006. They lived in their summer quarters.

### Methods

The multiple-stage stratified cluster random sampling method was used to select 748 subjects aged 25 years or more and of both genders. The project was approved by Ethics Committee of Shiraz University of Medical Sciences and a written consent was provided from each participant. A team of interviewers, who received training, completed the standardized questionnaire consisting of demographics, lifestyle and GERS for each subject. To determine the validity and reliability of the study, a pilot study was undertaken by invitation of 100 subjects to the local health centers, while the same interviewers and physicians completed the questionnaire again. The validity and reliability was determined as 70% and 82%.

Height and weight of each subject was also recorded. The following definitions were used to identify 2 principal GERD symptoms in the questionnaire including heartburn: a burning feeling in epigastrium rises through the chest in substernal area; regurgitation: liquid coming back into the mouth leaving a bitter or sour taste.

The frequency of reflux symptoms was defined. Subject was defined to suffer from GERD when she/he reported heart burn and/or acid regurgitation in the preceding year with a frequency of at least one time per week, irrespective of its severity or duration<sup>[10-12]</sup>. The study subjects were also asked to classify the intensity of their GERD as follows: mild, when easily tolerated; moderate: when the discomfort interfered with normal activities; and severe, when the subject was incapacitated and unable to perform normal activities. Sociodemographic variables included age, gender, marital status, biological characteristics, such as BMI [weight in kilogram in fasting state divided by square of height in meters, resulting in 3 categories of normal weight (< 24.9 kg/m<sup>2</sup>), overweight (25-29.9 kg/m<sup>2</sup>) and obese (> 30 kg/m<sup>2</sup>), dietary habits, smoking (cigarette

Table 1 GERD in relation to demographic data and life style habits

	GERD <i>n</i> (%)		<i>P</i>	OR
	Present	Absent		
Sex: Male	93 (32.7)	191 (67.3)	0.887	0.98
Female	144 (33.3)	289 (66.7)		1.0
Age: ≥ 40	134 (36.0)	238 (64.0)	0.046	1.39
< 40	93 (28.9)	229 (71.1)		1.0
Marital status: Married	212 (34.2)	408 (65.8)	0.086	1.61
Single	22 (24.4)	68 (75.6)		1.0
BMI: Obese (> 30)	22 (38.6)	35 (61.4)	0.552	1.37
Over Wt.	55 (32.7)	113 (67.3)		1.06
Normal (< 25)	147 (31.5)	320 (68.5)		1.0
Hx <sup>1</sup> of headache: Yes	83 (49.1)	86 (50.9)	< 0.001	2.56
No	146 (27.4)	387 (72.6)		1.0
Hx of other GI <sup>2</sup> complaints: Yes	78 (51.0)	75 (49.0)	< 0.001	2.70
No	154 (27.8)	400 (72.2)		1.0

<sup>1</sup>Hx:History; <sup>2</sup>GI: Gastrointestinal.

or waterpipe), coffee and tea consumption and use of aspirin, non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen.

Dyspepsia was defined as pain or discomfort and/or post-prandial fullness and/or early satiety in the past year.

### Statistical analysis

Information was put directly into a computer database under supervision of professional biostatistician. Statistical analysis was performed using the SPSS computer software package. *P* < 0.05 was considered to be statistically significant. All reported *P* values were two sided using  $\chi^2$  tests.

## RESULTS

Seven hundred and forty eight Qashgai migrating nomads participated in the study and the interview questionnaire was completed in 717 subjects (response rate, 89%). Among the subjects, 284 (39.6%) were male and 433 (60.4%) were female. The mean age was 43.1 ± 14.2 years (max: 85, min: 18).

The prevalence rate of GERD, defined as reflux occurring at least one time per week in the preceding year, was 33% (237 subjects). Among them, 93 (39.2%) were male and 144 (60.8%) were female.

Table 1 shows the prevalence rate of GERD in relation to demographic data and life style habits. There was no difference between males and females regarding GERD, but GERD was more frequent in subjects older than 40 years (*P* < 0.05).

The prevalence of GERD was not related to marital status. In spite of a higher rate of GERD in obese subjects, the difference was not statistically significant (*P* = 0.55). We noticed that there was more history of headache in patients with GERD compared to those lacking suffering from such a present or past history of epigastric pain, distention, bloating and dyspepsia was also higher in subjects with GERD (*P* < 0.001).

**Table 2** GERD in relation to dietary, smoking and drinking habits and medication

	GERD <i>n</i> (%)		<i>P</i>	OR
	Present	Absent		
Hx fried food: Yes	208 (31.8)	447 (68.2)	0.012	0.51
No	29 (47.5)	32 (52.5)		1.0
Veg/Fruit: $\geq 1$ /wk	201 (36.2)	355 (63.8)	< 0.001	2.7
< 1/wk	23 (17.3)	110 (82.7)		1.0
Smoking: Yes	98 (42.1)	135 (57.9)	< 0.001	1.88
No	125 (27.8)	324 (72.2)		1.0
Tea: Yes	218 (32.5)	452 (67.5)	0.146	0.59
No	18 (45.0)	22 (55.0)		1.0
Water: Yes	221 (32.4)	460 (67.6)	0.133	0.54
No	15 (46.9)	17 (53.1)		1.0
Beverages: Yes	172 (30.7)	388 (69.3)	< 0.001	0.51
No	60 (46.5)	69 (53.5)		1.0
Yogurt drink: Yes	190 (31.4)	414 (68.6)	0.047	0.63
No	44 (41.9)	61 (58.1)		1.0
NSAIDs: Yes	144 (40.2)	214 (59.8)	< 0.001	1.97
No	91 (25.4)	267 (74.6)		1.0
Aspirin: Yes	5 (45.5)	6 (54.5)	0.380	1.70
No	233 (32.9)	475 (67.1)		1.0

Table 2 shows the prevalence of GERD in relation to dietary, smoking and drinking habits of the participants. The results indicated a lower prevalence of reflux in subjects having fried food ( $P < 0.05$ ) and in those consuming fruits and vegetables less than once per week ( $P < 0.001$ ).

There was an association between smoking habits and GERD; in those with history of cigarette and waterpipe smoking, GERD was more prevalent and in non-smokers, GERD was seen less often ( $P < 0.001$ ).

The prevalence of GERD was not statistically in subjects with history of drinking tea ( $P = 0.15$ ) or water ( $P = 0.13$ ) with meals compared to those without such a history. On the other hand, subjects with history of drinking spirit dough (yogurt with water and mixed with salt) with meals had less reflux symptoms ( $P < 0.001$ ,  $P < 0.05$ , respectively).

We noticed more symptoms in subjects taking NSAIDs and aspirin, but the difference was significant only for NSAID ( $P < 0.001$ ).

## DISCUSSION

In the present study, life style was associated with reflux symptoms in Qashqai migrating nomads in southern Iran. The average income and the level of education of nomads are lower than the national average. They consume more dairy products, like milk and yogurt, but rarely consume fast foods or readymade foods, because they live in tents together with their animals. They migrate more than 500 kms from summer to winter quarters and deprave many facilities of urban population.

In our study, the prevalence of GERD, as defined heartburn and/or acid regurgitation at least one time per week, was 33%, which is higher than most western societies in recent studies<sup>[13-15]</sup>. In a review of literature, Goh *et al*<sup>[16]</sup> found that the prevalence of heartburn in the West is 20%-40%, and 14% have weekly heartburn.

This prevalence is higher than Asian population. The authors also found that the prevalence of GERD in Asia is either increasing or being recognized more frequently. In a study from urban and rural population of southern Iran, the prevalence of reflux symptoms occurring at least 3 times per week was 15.4%<sup>[9]</sup>. Hu *et al*<sup>[17]</sup> demonstrated that only 4.8% of Chinese population had GERD. On the other hand, Wong *et al*<sup>[18]</sup> in a study by telephone contact, reported a prevalence of 29.8%. Geographic differences in GERD prevalence are difficult to interpret, due to different case definitions and questionnaires used<sup>[19]</sup>. In our study, the higher prevalence of GERD may be related to lower socioeconomic status and/or lower education of subjects. Jansson *et al*<sup>[20]</sup>, in a large population-based study, revealed in Norway, positive association between low socioeconomic status (based on occupation, education and maternal deprivation) and reflux symptoms. In a study in southern Iran, the prevalence of GERD was significantly higher in rural and illiterate subjects<sup>[9]</sup>. The relationship between lower educational level and the frequency of GERD which was discussed previously, probably reflects the action of certain unhealthy life style habits or less ability to modify such habits<sup>[14,21]</sup>. As shown in Table 1, the GERD prevalence was not different in males and females or different age groups. A population-based study in Olmsted county, Minnesota, did not demonstrate a relation between gender and GERD<sup>[13]</sup>. Some other studies demonstrated higher prevalence in females<sup>[7-9,14]</sup>.

Table 1 also shows that body mass index and marital status were not associated to GERD. The association of BMI and GERD has remained inconsistent. Some studies showed no association between BMI and reflux symptoms<sup>[9,22]</sup>, but some studies have shown higher prevalence of reflux symptoms in obese subjects<sup>[23]</sup>.

Our study showed that history of headache was higher in subjects with GERD ( $P < 0.001$ ). Subjects with GERD also had more other gastrointestinal symptoms like dyspepsia, abdominal pain and distention/bloating. The association between gastrointestinal symptoms and headache is frequently unrecognized. Meucci *et al*<sup>[24]</sup> found that patients with reflux-like and ulcer-like dyspepsia, the prevalence of migraine headache did not differ from that in control individuals, whereas a higher prevalence of migraine was noted in patients with dysmotility-like dyspepsia and in patients with nausea and vomiting alone. In the study by Aamodt *et al*<sup>[25]</sup> higher prevalence of headache was found in individuals with reflux, diarrhea, constipation and nausea. They suggested that headache sufferers generally are predisposed to gastrointestinal complaints.

Table 2 shows relationship between GERD symptoms and various food stuffs. Interestingly, we observed less reflux symptoms in subjects with history of higher consumption of fried food. In many studies, there is a direct correlation between dietary fat and GERD<sup>[23,26]</sup>. The inverse relationship with fried food should not be interpreted as a protective role for fat in diet. It is possible that nomads consume only small amounts of fried food with the traditional foods and this kind of food has a low volume anyway. However,



this question can not be answered within cross-sectional design of our study.

We also found higher prevalence of reflux symptoms in those who consumed fruits and vegetables more frequently (Table 2). Nocon *et al*<sup>[23]</sup> reported that consumption of fruits has a protective effect, while vegetable consumption had no significant association. Saberi-Firoozi *et al*<sup>[9]</sup> also reported protective effects of fruits and vegetables on reflux symptoms in Shiraz City, southern Iran.

In relation to lifestyle, smoking has often been cited as a risk factor for GERD. According to Nocon *et al*<sup>[23]</sup>, smoking was a risk factor for GERD and was dose-dependent. Our results also showed more reflux symptoms in both cigarette and water pipe smokers. On the other hand, we found no association between reflux symptoms, tea and water drinking with meals or around meal time. Nomads do not consume coffee, but almost always drink tea. Drinks such as tea were reported to be linked to GERD, but this is controversial. Although tea has been shown to increase acid secretion but it does not contribute to GERD<sup>[27]</sup>. Chang *et al*<sup>[28]</sup> found no link between coffee or tea consumption and the incidence of GERD. There was also no affect of tea or coffee on GERD in Nocon *et al*'s study<sup>[23]</sup>.

In relation to consumption of beverages, we found less frequent reflux symptoms in those who consumed beverage and churned sour milk (diluted yogurt with water and mixed with salt), which is a very popular non-alcoholic beverage in nomads. The cause is not clear, but it may be due to type and amount of soft drinks.

Some studies have observed an association between the use of aspirin or NSAIDs and presence of GERD<sup>[14,29]</sup>, whereas others have not<sup>[13,30]</sup>. A higher consumption of NSAIDs and aspirin were visible in subjects with GERD, but our study was statistically significant for NSAIDs. One reason for this statistical significance for aspirin may be the small number of subjects who consumed aspirin (11 subjects consumed aspirin, 5 had GERD and 6 didn't).

In conclusion, the prevalence of GERD (33%) was very high in Qashqai migrating nomads which may be due to lower socioeconomic and educational level of these people and different lifestyle. The prevalence was higher in older individuals and in those with other gastrointestinal complaints, but not different in obese and non-obese subjects. It was lower in those consuming fruits and vegetables less than once per week. Smoking had positive correlation with GERD, but non-alcoholic beverage had an inverse correlation with GERD. The association between GERD and NSAIDs consumption was also significant. Future longitudinal studies and follow ups needed to clarify other possible risk factors and association with GERD.

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## COMMENTS

### Background

Symptoms of gastroesophageal reflux disease (GERD) represent one of the most frequent health problems in Western world. Various lifestyle factors are thought to be associated with GERD, including body weight, nutrition, alcohol consumption, smoking and use of non-steroidal anti-inflammatory drugs and sleeping position. There are few population-based data on GERD in Asia and none in nomadic populations.

### Innovations and breakthroughs

Many other studies on GERD were conducted by telephone surveys or in the form of questionnaires. In our study, however, subjects were interviewed face-to-face by a team of trained interviewers. Study participants were Qashqai nomads who migrate more than 500 kms from summer to winter quarters and deprave many facilities of urban population. Their average income and level of education are lower than the national average. They consume more dairy products, like milk and yogurt, but rarely consume fast foods or readymade foods, because they live in tents together with their animals. The prevalence of GERD was high (33%) in this population and older age, frequent consumption of fruits and vegetables, smoking and NSAIDs were suggested as the risk factors.

### Applications

The findings of this study are helpful to both the clinicians in handling GERD patients in ethnic groups and patients in primary and secondary healthcare.

### Terminology

Heartburn: a burning feeling in epigastrium that rises through the chest in substernal area. Regurgitation: liquid coming back into the mouth leaving a bitter or sour taste. GERD: occurrence of heart burn and/or acid regurgitation in the preceding year with a frequency of at least once a week, irrespective of its severity or duration.

### Peer review

The study is well written and structured and the statistical management is good. Results are clearly exposed and discussion is complete. However, it may be interesting for developing countries where these kinds of populations still prevail.

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