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ORIGINAL CONTRIBUTIONS

SUBJECTIVE LACTOSE INTOLERANCE IN APPARENTLY HEALTHY ADULTS IN SOUTHERN IRAN: IS IT RELATED TO IRRITABLE BOWEL SYNDROME?

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ABSTRACT

BACKGROUND: The main symptoms of lactose intolerance are bloating, abdominal cramps, increased flatus and loose watery stools. These symptoms are similar to those of irritable bowel syndrome (IBS), which is a prevalent entity in the community. OBJECTIVE: As there was no data available on the prevalence of LI and the correlated factors, this study aimed to determine these correlations and their relation to IBS symptoms in an apparently healthy population in Shiraz, southern Iran. MATERIALS AND METHODS: A survey among 1,978 individuals older than 35 years was conducted in Shiraz, southern Iran, using a questionnaire that consisted of items regarding demographic data, life style, subjective gastrointestinal symptoms of LI and IBS symptoms according to ROME II criteria. RESULTS: A total of 562 subjects reported LI (28.41%). The prevalence was significantly higher in females, in subjects taking NSAIDs or acetaminophen and in cases reporting IBS symptoms. Subjects with LI avoided certain foods and drinks; and in order to relieve their symptoms, they used OTC drugs, herbal medicine or visited a physician. On the other hand, no relation was found between LI and age, smoking or the number of meals per day. CONCLUSIONS: Although we found that individuals with IBS had significantly more subjective LI than those without IBS, in the absence of documented lactose malabsorption, it is hard to tell whether the reported symptoms indeed are those of LI or simply those of IBS. So, a period of dairy product avoidance and/ or requesting a test for lactose malabsorption may be beneficial in this area.

Key words: Iran, irritable bowel syndrome, lactose intolerance

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Dr. Mehdi Saberi-Firoozi, Gastroenterohepatology Research Center, Nemazee Hospital, Shiraz University of Medical Sciences, PO Box: 71345-1744, Shiraz, Iran. E-mail: saberifm@sums.ac.ir Most adults cannot drink milk without the symptoms of lactose intolerance (LI), which is due to the absence of lactase in the gut.^[1] In some people, the ability to digest and absorb lactose decreases to less than 10% as they get older due to a decline in lactase-phlorizin hydrolase (LPH) enzyme secretion.^[2] The presence of malabsorbed lactose in the colonic lumen causes gastrointestinal

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symptoms.^[3] The symptoms of LI are seen clearly in some people but are not so obvious in others.^[4] LI is an organic pathologic condition,^[5] defined as 'a clinical syndrome of one or more of the following: abdominal pain, diarrhea, nausea, flatulence and/ or bloating after the ingestion of lactose or lactose-containing food substances.'[6] Lactose malabsorption is 'the physiologic problem that manifests as LI and is attributable to an imbalance between the amount of ingested lactose and the capacity for lactase to hydrolyze the disaccharide."[6] Though malabsorption of lactose is determinable by hydrogen breath test, which is reasonably simple and inexpensive, or by jejunal biopsy, intolerance can only be confirmed by challenge with lactose-containing food.[5]

IBS is a group of functional bowel disorders in which abdominal pain or discomfort is associated with defecation or a change in bowel habit and with features of disordered defecation. It is diagnosed according to Rome II criteria.^[7] The relationship between symptomatic subtypes of IBS and LI is controversial.^[8] Some studies showed an increased prevalence of LI in IBS,^[9–10] whereas others found the same prevalence of lactose malabsorption in IBS as in the general population.^[11]

Most studies on LI are small in size, which limits our understanding of the actual incidence of its symptoms in certain populations.^[12] This study aimed to investigate the prevalence of subjective LI in Shiraz, southern Iran, and to determine the correlated factors in apparently healthy adults.

MATERIALS AND METHODS

This population-based study was performed

on a large sample size of apparently healthy adults as the first study of LI in our region. Based on municipality division of Shiraz into seven districts, 3,600 subjects were selected by cluster random sampling method. The study was approved by the Ethical Committee of Shiraz University of Medical Sciences, and all subjects gave informed consent. The research project was explained to each subject, and he/ she was invited via a letter to refer to Mottahari Digestive Clinic of Gastroenterohepatology Research Center affiliated to the university. The study was undertaken for a period of 5 months – from April to September 2004 – while 1,978 subjects completed the questionnaire. The inclusion criteria were being over 35 years old, of both genders and of urban and rural population.

Each subject completed a questionnaire that consisted of 53 items regarding demographic data, life style and gastrointestinal symptoms experienced after consumption of dairy products. A team of trained interviewers completed the questionnaires with face-toface interviews, and the data were fed into a computer database.

The subjects were defined as having subjective LI if they reported experiencing gastrointestinal symptoms (abdominal pain, diarrhea, nausea, flatulence and/ or bloating) after ingestion of milk or other dairy products. Diagnosis of IBS was made on the basis of Rome II criteria.^[7] Sociodemographic variables were age; gender; and life style, such as dietary habits, cigarette smoking and the use of aspirin, acetaminophen and NSAIDs. Statistical analysis was performed using the SPSS computer software package.^[13] A *P*-value of 0.05 or less was considered to be statistically significant, and all reported *P*-values were two sided using chi-square tests.

RESULTS

Among 3,600 individuals invited, the questionnaire was completed in 1,978 subjects (response rate: 54.9%). The mean age was 49.90 ± 11.14 years, and 29.4% of the subjects were male.

The prevalence rate of subjective LI was 28.41% (562 subjects). The results in Table 1 show that prevalence was significantly higher in females (384, 30.3%; P = 0.015). In fact, females were 1.29 times more likely to have subjective LI compared to males (95% CI = 1.05-1.59). The prevalence was also higher in the 35-44 and 45-54 years age groups but not statistically significant (P = 0.388). Table 2 shows the prevalence of subjective

LI in relation to smoking and dietary habits. A higher prevalence was found in cigarette/ water pipe smokers (146, 30.8%), but the difference did not reach statistical significance. LI was inversely related to the duration of meals. That is, as subjects spent longer periods for taking meals, they reported less LI, and this association was highly significant (P < 0.001). Compared to subjects who spent more than 20 min for taking meals, the chance of subjective LI was 1.83 and 1.44 times higher in those who spent ≤ 10 or 10-20 min respectively (95% CI = 1.35-2.49 and 1.08-1.94). On the other hand, the prevalence was highest in subjects taking two meals a day and lowest in those who ate more than three meals per day, but the difference was not statistically significant.

The relation of LI with analgesic use and 'health care'-seeking behavior is demonstrated

Table 1: Frequency of subjective lactose intolerance and correlation with age and gender in southern Iran (n=1978)

		Subjective	Intolerance	Odds	95% CI for odds		X2	DF	P-value
	.9	lactose		ratio	Lower	Upper			
		Yes	No						
Gender	Male n=709	178 (25.1)	531 (74.9)	1	-		5.491	1	0.015
	Female n=1269	384 (30.3)	885 (69.7)	1.29	1.05	1.59			
	35-44 n=734	219 (29.8)	515 (70.2)	1	-	-			
Age (years)	45-54 n=646	191 (29.6)	455 (70.4)	0.99	0.78	1.24			
.9	55-64 n=343	85 (24.8)	258 (75.2)	0.78	0.58	1.04	4.133	4	0.388
	65-74 n=200	53 (26.5)	147 (73.5)	0.85	0.60	1.21			
	≥75 n=53	13 (24.5)	40 (75.5)	0.76	0.40	1.50			

Figures in parentheses indicate percentage

Table 2: Prevalence of subjective lactose intolerance according to life style

		Subjective	Intolerance	Odds	95% CI for odds		X2	DF	P-value
		lactose		ratio	Lower	Upper			
		Yes	No						
Cigarette/ water	Yes n=474	146 (30.8)	328 (69.2)	1.16	0.93	1.46	1.749	1	0.186
pipe smoking	No n=1504	416 (27.7)	1088 (72.3)	1	-	-			
	≤10 n=617	207 (33.5)	410 (66.5)	1.83	1.35	2.49			
Duration of	10-20 n=965	275 (28.5)	690 (71.5)	1.44	1.08	1.94	15.347	2	0.001
meals (min)	≥20 n=342	74 (21.6)	268 (78.4)	1	-	-			
	2 times n=175	63 (36.0)	112 (64.0)	1.53	1.08	2.15			
Number of meals	3 times n=975	276 (28.5)	699 (71.7)	1.07	0.87	1.32	5.850	2	0.054
per day	>3 times n=828	223 (26.9)	605 (73.1)	1	-	-			

Figures in parentheses indicate percentage

Aspirin (58, 29.0%); but differences were significant only for the first two groups (OR = 1.38, 95% Cl = 1.11-1.72, P = 0.003; and

= 1.38, 95% CI = 1.11-1.72, P = 0.003; and OR = 1.33, 95% CI = 1.04-1.71, P = 0.023 respectively). In relation to 'health care'-seeking behavior, subjective LI was highly associated with restricting of diet, herbal medicine intake, using over-the-counter-drugs and visiting physician (P < 0.001).

in Table 3. LI was more common in subjects

taking NSAIDs (174, 33.4%), acetaminophen/

acetaminophen codeine (460, 29.6%) and

Table 4 demonstrates the prevalence of LI in relation to IBS. LI was more common among IBS patients (77, 35.8%), and the association was statistically significant (P = 0.011). In fact, IBS patients were 1.47 times more likely to have subjective LI when compared to individuals without IBS (95% CI = 1.09-1.98).

DISCUSSION

Our results showed that 28.41% of the subjects reported LI, which is similar to the result obtained by Vesa et al., where 31% reported intolerance to dairy products.^[10] Lactose maldigestion was 17% in Finland, 15-50% in Central Europe and 6-19% in white North Americans.^[10] The method applied to determine LI may explain the difference in our results. Most studies used breath hydrogen test or jejunal biopsy^[14]; whereas we relied on selfreport, which may be a limitation of our study. As Table 1 shows, females significantly suffered more than males. This finding is supported by previous studies.[4,10,15] We found no association between LI and age, which is in agreement with the findings of other studies.^[10,16]

Our study showed no significant association

Table 3: Analgesic use and 'health care'-seeking behavior in subjective lactose intolerance

		10		Subjective Intolerance C		95% CI	95% CI for odds		DF	P-value
	Ó	1	lactose		ratio	Lower	Upper			
		r (Yes	No						
NSAID	Yes		174 (33.4)	347 (66.6)	1.38	1.11	1.72	8.641	1	0.003
	No		388 (26.6)	1069 (73.4)	1	-	-			
Acetaminophen/		5	12							
Acetaminophen	Yes)	460 (29.6)	1093 (70.4)	1.33	1.04	1.71	5.182	1	0.023
codeine	No		102 (24.0)	323 (76.0)	1	-	-			
Aspirin	Yes		58 (29.0)	142 (71.0)	1.03	0.75	1.43	0.038	1	0.846
. Co	No		504 (28.3)	1274 (71.7)	1	-	-			
i S	Restricting diet	Yes	286 (41.1)	410 (58.9)	2.54	2.08	3.11	84.879	1	<0.001
	5	No	276 (21.5)	1006 (78.5)	1	-	-			
Health care-	Herbal medicine	Yes	271 (37.1)	460 (62.9)	1.94	1.59	2.31	42.753	1	<0.001
seeking	0	No	291 (23.3)	956 (76.7)	1	-	-			
Behavior	Using OTC drugs	Yes	163 (46.4)	188 (53.6)	2.67	2.10	3.39	68.172	1	<0.001
		No	399 (24.5)	1228 (75.5)	1	-	-			
	Visiting physician	Yes	237 (35.4)	432 (64.6)	1.66	1.36	2.03	24.447	1	<0.001
		No	325 (24.8)	984 (75.2)	1	-	-			

OTC: Over-the-counter, Figures in parentheses indicate percentage

Table 4: Correlation of irritable bowel syndrome with subjective lactose intolerance

		Subjective	Intolerance	Odds	95% CI for odds		X2	DF	P-value
		lactose		ratio	Lower	Upper			
		Yes	No						
Irritable bowel	Yes	77 (35.8)	138 (64.2)	1.47	1.09	1.98	6.479	1	0.011
syndrome	No	485 (27.5)	1278 (72.5)	1	-	-			

Figures in parentheses indicate percentage

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between LI and cigarette/ water pipe smoking. To the best of our knowledge, there was no data in literature regarding this subject, which probably shows that such an association is unlikely. We found that subjective LI was inversely related to duration of meals. According to Vesa et al., regularity of meals was not associated with subjective LI.[15] In relation to use of analgesics, we demonstrated that LI was significantly associated with taking NSAIDs and acetaminophen but not Aspirin. These results are in accordance with other studies.[17,18] Our patients avoided certain foods and drinks: and in order to relieve their symptoms, they used OTC drugs, herbal medicine or visited a physician. These could impose an economical burden on the family and community while affecting the individual's quality of life too.

Although we found that individuals with IBS had significantly more subjective LI than those without IBS, in the absence of documented lactose malabsorption, it is hard to tell whether the reported symptoms indeed were those of LI or simply those of IBS. Some other studies had similar finding. Vesa et al. reported a fivefold increase in risk of subjective LI within IBS patients.^[10] Milk-related symptoms and symptoms after intake of lactose were significantly more common in patients with IBS than in healthy volunteers, but the prevalence of lactose malabsorption was the same in both groups.^[19] The most likely explanation is hypersensitivity to the gut distension due to hydrogen gas produced by bacterial fermentation of unabsorbed lactose.^[20,21] Another explanation may be a placebo effect. IBS patients probably look for association between food and symptoms and are aware of the association between lactose ingestion and symptoms of bloating, flatulence

and diarrhea.^[22] Moreover, etiopathogenesis of IBS includes pathophysiologic as well as psychophysiologic disturbances. Subjects with IBS might experience more symptoms after lactose ingestion than do healthy controls, due to altered intestinal motility or a lowered perception threshold for gastrointestinal symptoms.^[10]

Our results are also in accordance with other studies using hydrogen breath test.^[23,24] Vernia et al. also noticed almost identical results of lactose breath test in patients with IBS and subjects with self-reported milk intolerance and suggested that the two conditions overlap to such an extent that the clinical approach should be the same.^[25] Several other studies, however, reported no association between IBS and LI or maldigestion.^[9,11,19] Although LI can initiate IBS symptoms, this does not mean LI causes IBS. The association between these two conditions is probably a coincidence because both are common and would be expected to occur together.^[9] There is little advantage in trying to separate patients who malabsorb lactose from those with IBS.[20]

Although LI symptoms were more common in IBS patients, in the absence of documented lactose malabsorption, we cannot be certain that the reported symptoms indeed are those of LI or simply those of IBS. So, a period of dairy product avoidance and/ or a test for lactose malabsorption may be beneficial in these patients.

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