

# Prevalence and risk factors for gastroesophageal reflux in pregnancy

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## Abstract

**Background and aim** Prevalence of gastroesophageal reflux (GER) increases during pregnancy, due to several factors like decreased lower esophageal sphincter pressure, increased intra-abdominal pressure secondary to the enlarged gravid uterus and alteration in gastrointestinal transit. The present study aimed to determine the prevalence of GER in pregnancy in a southern State of the Indian subcontinent and determine the risk factors associated with it.

**Methods** Consecutive pregnant females ( $n=400$ ) at various stages of pregnancy attending the antenatal clinic or admitted in the antenatal wards were enrolled. Patients with heartburn or regurgitation or both ( $n=182$ ) for at least a week were defined as cases, and controls were those without these symptoms ( $n=218$ ). Data on demographic variables and symptoms were analyzed using Pearson chi-square, Yates corrected chi-square and Fischer exact test and student independent  $t$ -test as appropriate;  $p<0.05$  was considered significant.

**Results** Demographic characteristics between cases and controls were similar. The mean age of cases ( $23.68\pm 3.37$  years) was similar to that of controls ( $23.25\pm 3.31$  years). The overall prevalence of GER was 45.5% (182/400), 77 (19.3%) had heartburn (GER-HB), 54 (13.5%) had regurgitation (GER-R) and 51 (12.8%) had both (GER-HB + R). Age and gravida did not influence the frequency of symptoms. Symptoms were more frequent in the second (43.1%) and third trimester (54.1%) as compared to the first trimester (9.5%) in pregnant women with GER ( $p<0.001$ ).

Atypical symptoms were uncommon. GER was common among non-vegetarians ( $p=0.02$ ) and frequent aerated beverage users ( $p=0.001$ ).

**Conclusions** GER prevalence was high in pregnancy, often in second and third trimester. Non-vegetarianism and aerated beverages increased the risk of reflux in pregnancy.

**Keywords** Gastroesophageal reflux · Pregnancy

## Introduction

Heartburn is estimated to occur in 30–50% of pregnant women. Its prevalence is as high as 80% in some populations [1]. It often manifests during pregnancy and disappears following the delivery [2]. However, heartburn tends to recur in subsequent pregnancies [3]. Several factors like decreased lower esophageal sphincter pressure, increased intra-abdominal pressure secondary to the enlarged gravid uterus and alteration in gastrointestinal transit have been linked in the pathogenesis of gastroesophageal reflux (GER) during pregnancy.

Gastroesophageal reflux disease (GERD) is less prevalent in Asia than in the West [4]. With recent changes in lifestyles, it is on an increase in Asia [4]. The risk of GERD is increased by the presence of heartburn during pregnancy [5]. The present study aimed to determine the prevalence of GERD in pregnancy in southern India and determine the risk factors associated with it.

## Methods

Consecutive pregnant women ( $n=400$ ) at various stages of pregnancy attending the antenatal clinic or admitted in the antenatal wards of the obstetric unit were enrolled. Their demographic details like age, occupation, literacy status, per

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capita income, social habits like smoking, alcoholism, and type of house was recorded. The diet questionnaire was a 7-day food frequency questionnaire. Dietary details included information on average number of items taken per day along with the frequency. Diet specific information on consumption of cereals, fruits, fried and/or spicy food, beverages was noted.

Pregnancy-related details included parity and the trimester. Symptoms of GER in earlier pregnancy were also recorded. Clinical information pertaining to gastroesophageal reflux (GER) such as heartburn, regurgitation, nocturnal symptoms, aggravating factors (food, bending and supine posture) and relieving factors (food, antacids) and response to treatment were elicited. The presence of atypical symptoms such as globus sensation, increased salivation, vomiting, belching, chest pain, sore throat or dry cough not responding to antibiotics and hiccup along with the duration was recorded.

For study inclusion, cases were defined as pregnant women with heartburn (GER-HB) or regurgitation (GER-R) or both (GER-HB + R) for at least a week and controls were pregnant women who did not have these symptoms.

The study was approved by the institutional review board and written informed consent was obtained from all the pregnant women who participated in the study.

#### Statistical analysis

Quantitative data were expressed as mean (SD). Qualitative data were given as frequency (%). Data on demographic variables and symptoms were analyzed using Pearson chi-square, Yates corrected chi-square and Fischer exact test as appropriate. The continuous variables were analyzed using student independent *t*-test.  $p < 0.05$  was considered significant.

#### Results

Among the 400 pregnant women studied, 182 had GER (45.5%). The demographic characteristics between pregnant women with GER and those without GER were comparable (Table 1). Seventy-seven (19.3%) pregnant women had heartburn (GER-HB), 54 (13.5%) had regurgitation (GER-R) and 51 (12.8%) had both (GER-HB + R).

**Table 1** Demographic characteristics

Parameters	Cases <i>n</i> (%) 182 (45.5%)	Controls <i>n</i> (%) 218 (54.5%)	<i>p</i> -value	
Age (years) (Mean ± SD)	23.68 ± 3.37	23.25 ± 3.31	0.20	
Occupation	House wife	167 (91.8)	204 (93.6)	0.08
	Maid	8 (4.4)	2 (0.9)	
	Manual laborer	7 (3.8)	12 (5.5)	
Literacy	Uneducated	16 (8.8)	22 (10.1)	0.27
	Elementary school	58 (31.9)	85 (39)	
	High school	99 (54.4)	97 (44.5)	
	Graduate	9 (4.9)	14 (6.4)	
Per capita income (Indian Rupees)	<1000	52 (28.6)	64 (29.4)	0.69
	1000–2500	70 (38.5)	74 (33.9)	
	2500–5000	49 (26.9)	63 (28.9)	
	>5000	11 (6)	17 (7.8)	
Social habits	Alcohol	0	0	
	Smoking	0	0	
	Tobacco chewing	2 (1.1)	1 (0.5)	
Type of house <sup>a</sup>	Kutcha	44 (24.2)	51 (23.4)	0.90
	Pucca	137 (75.3)	165 (75.7)	
	Semi	1 (0.5)	2 (0.9)	
Gravida	Primi	79 (43.4)	90 (41.3)	0.66
	Multi	103 (56.6)	128 (58.7)	
Trimester	First	2 (1.10)	19 (8.7)	0.001
	Second	101 (55.49)	132 (60.6)	
	Third	79 (43.41)	67 (30.7)	
Weight gain during pregnancy (kg)	8.0 ± 2.4	7.8 ± 3.0	0.43	
Heartburn during previous pregnancy	58 (56.3)	69 (53.9)	0.96	

<sup>a</sup> Using the standard definition of kutcha house for a hut, a pucca for a permanent structure and semi-pucca for a temporary structure, with either the wall, flooring or ceiling

**Table 2** Dietary habits

Parameters		Cases	Controls	<i>p</i> -value
Cereal	Rice	164 (90.1)	198 (90.8)	0.83
	Wheat	0	0	
	Mixed	18 (9.9)	20 (9.2)	
Vegetarian		0	8 (3.7)	0.02
Non-vegetarian		182 (100)	210 (96.3)	
Fruits	Daily	53 (29.1)	69 (31.7)	0.44
	Alternate days	54 (29.7)	66 (30.3)	
	Once a week	75 (41.2)	83 (38)	
Fried food	Daily	23 (12.6)	29 (13.3)	0.40
	Alternate days	43 (23.6)	51 (23.4)	
	Once a week	116 (63.8)	138 (63.3)	
Spicy food	Daily	47 (25.8)	49 (22.5)	0.90
	Alternate days	12 (6.6)	12 (5.5)	
	Once a week	105 (57.7)	135 (61.9)	
Beverages	Tea/Coffee	169 (92.9)	195 (89.4)	0.23
	Soft drinks	70 (38.5)	46 (21.1)	

Age and gravida did not influence the prevalence of GER. The symptoms were more frequent in the second (43.3%) and third trimester (54.1%) when compared to first trimester (9.5%) ( $p < 0.001$ ). Nocturnal symptoms were observed in 99 (51%) women. Post prandial worsening of GER was noticed by a majority of patients (82%). Bending and stooping forward also worsened symptoms. Atypical symptoms were uncommon; globus sensation was the predominant symptom (43.4%), followed by abdominal pain (11%). GER was common amongst non-vegetarians ( $p = 0.02$ ) and those who had frequent aerated drinks ( $p = 0.001$ ) (Table 2). The atypical symptoms of GER, aggravating and relieving factors and the response to treatment are summarized in Table 3.

## Discussion

The prevalence of gastroesophageal reflux disease in the western world ranges from 30 to 80%. Across the Asian countries, the prevalence ranges from 2.5 to 7.1% [6]. Though the overall prevalence in Asian countries is low, in recent times there has been a changing trend towards a rising incidence of GERD and its complications, coinciding largely with a decline in *Helicobacter pylori* infection [7, 8].

There are very few studies from the Indian subcontinent on the prevalence and severity of GER. A community-based cross-sectional study amongst hospital employees reported a prevalence of 162/1000 [9]. In another study, GER prevalence amongst medical students was 49% [10]. Also endoscopic esophagitis amongst the south Indian adult population was reported as mild in most cases [11].

In the present study, GER prevalence amongst south Indian pregnant women was 45.5%; 77 (19.3%) pregnant

women had heartburn, 54 (13.5%) had regurgitation and 51 (12.8%) had combination of both. Studies amongst Singaporean pregnant women has shown reflux type symptoms to be rather low [12]; the prevalence of heartburn alone, acid regurgitation alone and combination of both was 5.7%, 17.1% and 17.1%, respectively.

Studies [13] in the past have shown reflux symptoms to increase from 22% in the first trimester, to 39% in the

**Table 3** Atypical symptoms of gastroesophageal reflux in pregnancy

Atypical symptom	No (%)
Globus sensation	79 (43.4%)
Increased salivation	14 (7.7%)
Vomiting	13 (7.1%)
Belching	14 (7.7%)
Chest pain	6 (3.3%)
Hoarseness	14 (7.7%)
Halitosis	3 (1.6%)
Dry cough	10 (5.5%)
Hiccough	4 (2.2%)
Upper abdominal pain	20 (11%)
Aggravating and relieving factors	
Meals	
Increases	149 (81.9%)
No change	32 (18.1%)
Bending/Lying	
Increases	85 (46.7%)
No change	97 (53.3%)
Nocturnal symptoms	99 (54.4%)
Treatment response	
Life style change	51 (28%)
Dietary change	81 (44.5%)
Drug treatment	60 (33%)
Response to antacids	45 (24.7%)

second trimester and 72% in the third trimester ( $p < 0.0001$ ) and this has been attributed to a cumulative increase in weight [14]. In the present cross-sectional study, prevalence of GER was 9.5% in the first trimester, 43.3% in the second trimester and 54.1% in the third trimester ( $p < 0.001$ ). A longitudinal survey published in 2007 reported that although the prevalence of heartburn increased with gestational age, the incidence remained the same in all three trimesters [14].

Approximately, 50% of our pregnant women experienced nocturnal symptoms, food aggravated the symptoms in 82% and 50% had worsening of symptoms with change in posture. The symptoms of reflux in pregnant women are similar to those described in the general population. Heartburn and acid regurgitation are the typical symptoms reasonably specific for diagnosis of GER. These symptoms are aggravated after meals and after assuming a recumbent posture [15–19]. Globus sensation was observed in 43.4% of pregnant women. Other less frequent symptoms included increased salivation, vomiting, halitosis, belching, sore throat, chest pain, dry cough, hiccup and upper abdominal pain.

Several factors predispose to GER in pregnancy. These include an increase in plasma progesterone levels, gestational age, heartburn antecedent to the pregnancy and multiparity. Body mass index before pregnancy, weight gain during pregnancy, or race does not predict heartburn. Also pregnancy in older age seems to have a protective effect [13].

In the present study, non-vegetarianism and cold aerated beverage consumption was associated with greater risk for GER. Age, gravida, weight gain during pregnancy, heartburn during previous pregnancy and dietary habits (spicy food, fried food, cereals, and fruits) did not influence the occurrence of reflux symptoms during the current pregnancy. Lifestyle changes and dietary modifications alleviated GER in about two-third of our pregnant women and nearly a quarter were relieved of symptoms with antacids.

In conclusion, the prevalence of GER in pregnancy is high. Follow up of pregnancy for GER symptoms from first trimester until term and delivery, for severity and risk factors is likely to be more informative.

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**Conflicts of Interest** None

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## References

1. Bassy O. Pregnancy and heartburn in Nigerians and Caucasians with theories about aetiology based on manometric recordings from the oesophagus and stomach. *Br J Obstet Gynaecol.* 1977;84:439–43.
2. Barr W. Heartburn in pregnancy. *J Obstet Gynaecol Br Emp.* 1958;65:1019–21.
3. Bainbridge ET, Temple JG, Nicholas SP, et al. Symptomatic gastro-oesophageal reflux in pregnancy: a comparative study of white Europeans and Asians in Birmingham. *Br J Clin Pract.* 1983;37:53–7.
4. Goh KL. Changing epidemiology of gastroesophageal reflux disease in the Asian-Pacific region: an overview. *J Gastroenterol Hepatol.* 2004;19 Suppl 3:22–5.
5. Bor S, Kitapcioglu G, Dettmar P, Baxter T. Association of heartburn during pregnancy with the risk of gastroesophageal reflux disease. *Clin Gastroenterol Hepatol.* 2007;5:1035–9.
6. Wu JC. Gastroesophageal reflux disease: an Asian perspective. *J Gastroenterol Hepatol.* 2008;23:1785–93.
7. Dent J, El-Serag HB, Wallander MA, Johansson S. Epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut.* 2005;54:710–7.
8. Fock KM, Talley NJ, Fass R, et al. Asia-Pacific consensus on the management of gastroesophageal reflux disease: update. *J Gastroenterol Hepatol.* 2008;23:8–22.
9. Sharma PK, Ahuja V, Madan K, Raizada A, Sharma MP. Prevalence of symptomatic GERD: interim analysis of an adult community-based cross-sectional study. *Indian J Gastroenterol.* 2004;23 Suppl 2:A11.
10. Kumar S, Karthik Selvaraj M, Jayanthi V. Prevalence of symptoms of gastro-oesophageal reflux amongst medical students. *Indian J Gastroenterol.* 2006;25:168–9.
11. Jayanthi V. Severity of esophagitis in southern Indians. *Indian J Gastroenterol.* 2002;21:205.
12. Ho KY, Kang JY, Viegas OA. Symptomatic gastro-oesophageal reflux in pregnancy: a prospective study among Singaporean women. *J Gastroenterol Hepatol.* 1998;13:1020–6.
13. Marrero JM, Goggin PM, de Caestecker JS, Pearce JM, Maxwell JD. Determinants of pregnancy heartburn. *Br J Obstet Gynaecol.* 1992;99:731–4.
14. Rey E, Rodriguez-Artalejo F, Herraiz MA et al. Gastroesophageal reflux symptoms during and after pregnancy: a longitudinal study. *Am J Gastroenterol.* 2007;102:2395–400.
15. Klauser AF, Schindlbeck NE, Muller-Lissner SA. Symptoms in gastro-oesophageal reflux disease. *Lancet.* 1990;335:205–8.
16. Andersen LI, Madsen PV, Dalgaard P, Jensen G. Validity of clinical symptoms in benign esophageal disease, assessed by questionnaire. *Acta Med Scand.* 1987;221:171–7.
17. Baron TH. Gastrointestinal motility disorders during pregnancy. *Ann Intern Med.* 1993;118:366–75.
18. Al Amri SM. Twenty-four hour pH monitoring during pregnancy and at postpartum: a preliminary study. *Eur J Obstet Gynaecol Reprod Biol.* 2002;102:127–30.
19. Klinkenberd-Knoll E, Castell DO. Clinical spectrum and diagnosis of gastroesophageal reflux disease. In: Castell DO, editor. *The Esophagus.* Boston: Little, Brown and Co.; 1993. p. 441–8.