

Prevalence of Symptoms and Use of Medication for Gastroesophageal Reflux in an Australian Community

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Abstract

Introduction Gastroesophageal reflux disease is common in Western societies, although the prevalence of reflux symptoms in the community is not well described. In this study we determined the prevalence of symptoms of gastroesophageal reflux and other “esophageal” symptoms, and the consumption of medication for reflux in an Australian community.

Patients and methods A population sample designed to accurately reflect the characteristics of the population aged 15 years or older in the State of South Australia was studied. Demographic data; symptoms specific to reflux, dysphagia, and abdominal bloating; and the consumption of antireflux medication were determined in a face-to-face interview. The frequency and severity of heartburn and dysphagia were assessed with analog scales.

Results A total of 2,973 people (age range: 15–95 years) were interviewed between September and December 2006. Approximately half experienced the symptom of heartburn; 21.2% experienced heartburn at least once a month, and 12.4% described frequent symptoms of heartburn (at least a few times each week). Of those with heartburn, 25.0% graded it as moderate or severe, 10.9% reported some dysphagia for solid foods, and 6.9% reported dysphagia for liquids. 3.7% described dysphagia for solids at least once a month. Abdominal bloating was reported by 48.2%. 16.9% were taking medications for reflux symptoms (10.1% proton pump inhibitors, 1.2% H₂-receptor antagonists, 2.1% simple antacids, 3.4% alternative medications). Heartburn was more common in individuals who consumed

medication. There were significant associations between heartburn and bloating, and between heartburn and dysphagia.

Conclusions Symptoms of gastroesophageal reflux and the use of medications to treat such symptoms are very common in the community of South Australia. Nearly 1 in 7 people over the age of 15 consume medication for the treatment of symptoms of reflux.

Introduction

Gastroesophageal reflux disease is common in all Western societies, and its incidence is increasing. Studies from British, Scandinavian, and North American populations have reported that 21–36% of people experience reflux symptoms at least monthly, and 4–7% experience symptoms at least once a day [1–3]. Although not well evaluated in Australia, it is likely that the magnitude of the problem of gastroesophageal reflux disease in Australia is similar. Indirect evidence supporting this likelihood is the significant expenditure of public funds on the prescription of proton pump inhibitor medications, which are used predominantly for the management of reflux. In 2004, more than A\$550 million was spent by the Australian Government on the prescription of proton pump inhibitor medications [4], and this figure represented approximately 25% of the total government expenditure on pharmaceutical products.

The main alternative therapy for gastroesophageal reflux is surgery. In Australia the number of antireflux procedures undertaken more than doubled from 1994 to 2006 [5], highlighting the significance of this problem. Many studies have determined the outcome of laparoscopic surgery for reflux. Randomized controlled trials have shown that

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Nissen fundoplication achieves better control of reflux than medical therapy [6–8], laparoscopic approaches are superior to the equivalent open operations [9–11], and partial fundoplications are followed by fewer side effects than Nissen fundoplication [12–14]. Some of the randomized trials that have addressed these issues were undertaken in our department [10, 12, 13].

These studies used standardized clinical scores to determine the prevalence of reflux symptoms and other symptoms before and after fundoplication [10, 12, 13, 15]. Interestingly, dysphagia and abdominal bloating are commonly present before surgery for reflux [12, 16]. Furthermore, although reflux symptoms and other esophageal symptoms such as dysphagia have been investigated widely in patients undergoing surgery for reflux, the incidence of such symptoms in the wider community is poorly understood. For this reason, we sought to determine the incidence of symptoms of gastroesophageal reflux, the prevalence of some so-called side effects of antireflux surgery, and the consumption of medication for reflux in the wider community. To do this, we used a set of questions similar to those we have previously used for the follow-up of patients undergoing antireflux surgery.

Patients and methods

The data for this study were obtained through participation in the 2006 South Australian Spring Health Omnibus Survey conducted by Harrison Health Research (198 Greenhill Road, Eastwood, South Australia) on behalf of the South Australian Department of Health. The survey was designed to survey a population sample, aged 15 years or older, that accurately reflected the characteristics of the population of the State of South Australia. This was achieved by using a random stratified sampling technique to identify participants, and questions were asked during a face-to-face interview. Demographic data were obtained as part of general questions asked to all participants. Symptoms specific to reflux and other esophageal symptoms and antireflux medication use were included in the survey at our request, and these data form the focus of this report. The questions are reproduced in Table 1. They addressed the frequency and severity of symptoms of heartburn, dysphagia, and bloating, as well as frequency and type of medications consumed. The questions were designed by the authors, modified by Harrison Health Research, and then tested in August 2006 in a pilot validation study of 50 participants to ensure the questions were well understood by both the interviewers and the interviewees. The questions were similar to questions we have used for the evaluation of patients undergoing antireflux surgery in previously reported randomized trials [10, 12, 13, 15–17].

Table 1 Symptom questionnaire

Questions about symptom frequency	
How often do you experience heartburn (burning in the lower chest associated with acid reflux)?	
How often do you experience difficulty swallowing liquids?	
How often do you experience difficulty swallowing solids?	
Answers for these questions chosen from the following:	
Never	
Rarely	
Once every 6 months	
Once every few months	
Once every month	
Few times a week	
Daily	
Multiple daily	
Don't know	
Refused	
Questions about symptom severity	
On a scale of 0 to 10, where 0 is no heartburn and 10 is severe heartburn, how severe is your heartburn?	
On a scale of 0 to 10, where 0 is no difficulty and 10 is severe difficulty, how much difficulty do you experience with swallowing liquids?	
On a scale of 0 to 10, where 0 is no difficulty and 10 is severe difficulty, how much difficulty do you experience with swallowing solids?	
Other questions	
Do you experience bloating of the stomach? Would you say.....	
Yes, regularly	
Yes, several times each week	
Yes, occasionally—less than once a week	
Yes, occasionally	
No	
Do you take medications for reflux?	
Yes, regularly	
Yes, several times each week	
Yes, occasionally—less than once a week	
Yes, occasionally	
No	
Have you ever had surgery for reflux	
Yes	
No	
Don't know	
Refused	
Question about type of medications used	
Which medications do you take?	
Acimax	20 mg
Antacid: Gaviscon, Ulcyte, Carafate	
Antacid: Mylanta, Gelusil, Gastrogel	
Ausfam	40 mg
Ausran	150/300 mg
Cimehexal	200/400/800 mg

Table 1 continued

Cimetidine	400/800 mg
Famohexal	20/40 mg
Famotidine	20/40 mg
Losec	10/20 mg
Magicul	200/400/800 mg
Meprazol	20 mg
Nexium	20/40 mg
Nizac	150/300 mg
Pamacid	20/40 mg
Pariet	20 mg
Pepcidine M	20/40 mg
Pepzan	20/40 mg
Probitor	20 mg
Rani 2	150/300 mg
Ranihexal	150/300 mg
Ranitidine	150 mg
Ranoxyl	150/300 mg
Somac	20/40 mg
Tagamet	200/400/800 mg
Tazac	150/300 mg
Zantac	150/300 mg
Zoton	15/30 mg
Other	

The subsequent larger survey aimed to interview 3,000 people 15 years of age or older. Interviews were conducted throughout the State of South Australia. The sample group included households in the metropolitan area of Adelaide and country centers with a population of 1,000 or greater. For the metropolitan sample, 432 Australian Bureau of Statistics 2001 Census collectors' districts were selected, with the probability of selection adjusted in proportion to the size of the population in the district. Within each district 10 dwellings were chosen using a predetermined selection process based on a "skip pattern" of every fourth household. For the country (rural) sample, all towns with a population of 10,000 or more in the 2001 Census were included. The remainder of the sample was chosen from towns with a population of 1,000 or more, with the probability of selection weighted according to size.

One face-to-face interview was conducted per household by interviewers who acted independently of the authors of this paper. The interviewers were familiarized with the questions by Harrison Health Research, and to minimize the risk of bias the questions were asked by all interviewers according to a standardized script. Where more than one person aged 15 or older resided in the household, the person who was last to have their birthday was chosen for the survey. The protocol required that, if necessary, up to six separate visits were made to each

selected household to conduct the interview. This was done to maximize the opportunity of interviewing someone in each selected household. In some cases more than six visits were undertaken to reach the selected participant. If the household was vacant or the individual selected was unable or unwilling to participate, the household was not replaced by another.

Data were deidentified by Harrison Health Research and provided to the authors as a computer file. The data were entered into a Microsoft Excel spreadsheet, and it was analyzed to determine the frequency of various symptoms and responses to the questions. The questionnaire and methodology for the survey were approved by the South Australian Department of Health Research Ethics Committee.

Results

A total of 5,600 households were selected for this study, and 2,973 people were interviewed between September and December 2006. The response rate for the survey was 55.0%: 1,277 (43%) participants were male, and 1,696 (57%) were female. Participants ranged in age from 15 to 95 years (median 49 years; mean 49.4 years).

The answers to the question about the frequency of heartburn are summarized in Table 2. Approximately half of the participants had never experienced the symptom of heartburn; 21.2% experienced heartburn at least once a month; and 12.4% described frequent symptoms of heartburn (at least a few times each week). The mean analog heartburn score was 1.98 (median 0). 49.8% of all participants scored the severity of their heartburn as 0 (no heartburn); 25.2%, as mild (score 1–3); 17.4%, as moderate (4 to 6); and 7.6%, as severe (7–10).

The frequency of dysphagia symptoms is summarized in Table 3: 10.9% of participants reported dysphagia for solid foods, and 6.9% reported dysphagia for liquids. Sixty-four (2.2%) participants reported episodes of dysphagia for

Table 2 Reported frequency of "heartburn"

Never	1481 (49.8%)
Rarely	598 (20.1%)
Once every 6 months	107 (3.6%)
Once every few months	146 (4.9%)
Once a month	262 (8.8%)
Few times a week	220 (7.4%)
Daily	125 (4.2%)
Multiple daily	24 (0.8%)
Don't know	9 (0.3%)
Refused	0 (0%)

Table 3 Reported frequency of dysphagia symptoms

Frequency	Liquids	Solids
Never	2768 (93.1%)	2649 (89.1%)
Rarely	104 (3.5%)	169 (5.7%)
Once every 6 months	15 (0.5%)	15 (0.5%)
Once every few months	18 (0.6%)	27 (0.9%)
Once a month	30 (1.0%)	48 (1.6%)
Few times a week	21 (0.7%)	39 (1.3%)
Daily	12 (0.4%)	18 (0.6%)
Multiple daily	3 (0.1%)	6 (0.2%)
Don't know	1 (0.03%)	1 (0.03%)
Refused	0 (0%)	0 (0%)

liquids at least once a month, and 110 (3.7%) reported dysphagia for solids at least once a month. The severity of dysphagia assessed by the 0–10 analog score is summarized in Table 4. The mean dysphagia score for liquids was 0.22 (median = 0); for solids, the mean score was 0.39 (median = 0).

Bloating symptoms were reported by 48.2% of participants, 35.3% of whom reported occasional bloating symptoms; 12.8% said that this symptom occurred several times each week, or more often.

A total of 501 (16.9%) participants were taking medications for reflux symptoms. The frequency of consumption of medications is summarized in Table 5. The majority of respondents who used medication for reflux took the medication regularly; 16.3% of the males interviewed were taking medications, versus 17.6% of the females ($p = 0.361$). Three hundred (10.1%) participants were taking a proton pump inhibitor (9.4% of males versus 10.6% of females; $p = 0.389$). Some 36 (1.2%) participants were taking an H₂-receptor antagonist, 63 (2.1%) were taking a simple antacid, and 102 (3.4%) were taking an alternative medication for reflux symptoms. In addition,

Table 4 Severity of dysphagia measured by analog score (0 = no dysphagia, 10 = severe dysphagia)

Score	Liquids score	Solids score
0	2792 (93.9%)	2699 (90.8%)
1–3	110 (3.7%)	134 (4.5%)
4–6	45 (1.5%)	77 (2.6%)
7–10	27 (0.9%)	62 (2.1%)

Table 5 Reported frequency of consumption of medications for reflux

Regularly	281 (9.5%)
Several times each week	46 (1.6%)
Less than once per week	174 (5.9%)
Not using medications	2,466 (83.1%)

47 (1.6%) indicated that they had undergone a previous surgical procedure for reflux. The nature of these procedures was not determined by the questionnaire.

Individuals who reported frequent bloating were more likely to report a higher heartburn score (Table 6). There was an association between the symptoms of dysphagia and the symptoms of heartburn, and statistically significant correlations were observed between the dysphagia score for liquids and heartburn ($r = 0.18$; Spearman's correlation coefficient), and the dysphagia score for solids and heartburn ($r = 0.20$). However, the rho value for each of these correlations was modest, suggesting a weaker clinical association.

Individuals who consumed medication for reflux, irrespective of the type, had significantly higher heartburn scores compared to individuals not taking medication for reflux (Table 7). The data also demonstrated an association between reflux and dysphagia. The dysphagia scores for both liquids and solids were significantly higher in individuals who were consuming either proton pump inhibitors (PPIs) or H₂-blockers, compared to individuals who were consuming antacids, alternative medications, or no medications (Table 7).

Discussion

Gastroesophageal reflux is common in Western countries [1, 2]. Nebel et al. [1] reported that 36% of individuals in North America experience "heartburn," and Delaney reported a 9% incidence of heartburn in Italy [18]. In a community study from Sweden, Wiklund et al. [3], reported that 27% of Swedes experienced heartburn of any severity, and 15.5% of Swedes had "clinically relevant" heartburn and/or regurgitation, which was defined as a Gastrointestinal Symptom Rating Scale score of 3 or higher (maximum score 7). Similar studies evaluating the frequency of reflux symptoms in an Australian community have not been reported, although Westbrook and Talley [19] reported that 1 in 6 Australians consulted a medical practitioner in 2003 for "dyspepsia" symptoms, and it is likely that gastroesophageal reflux disease accounts for a significant number of these presentations.

There is also indirect evidence that reflux is becoming more common in Western countries. This is based on increasing consumption of PPI medication [4], an increased prevalence of Barrett's esophagus [20], and a rising incidence of adenocarcinoma of the esophagus throughout the Western world [21], the latter being a reflux-related disease.

Our study surveyed the population of South Australia. We are confident that the sample group reflects the broader South Australian community. The State of South Australia

Table 6 Frequency of bloating versus heartburn score

	Frequency of bloating			
	Regularly (n = 217)	Several times/week (n = 163)	<once/week (n = 1051)	None (n = 1542)
Heartburn score	3.2 (2.8, 3.7)	2.9 (2.4, 3.3)	2.3 (2.1, 2.5)	2.4 (2.2, 2.6)

Figures are means (95% confidence intervals); $p = 0.0028$ (Kruskall–Wallis test)

Table 7 Heartburn and dysphagia versus medication use

	Medications used					<i>p</i> Value
	PPIs (n = 300)	H ₂ -blocker (n = 36)	Antacids (n = 63)	Other medication (n = 102)	No medications used (n = 2466)	
Heartburn score	3.9 (3.6, 4.3)	4.6 (3.8, 5.3)	4.5 (3.8, 5.3)	4.0 (3.4, 4.5)	1.5 (1.4, 1.7)	<0.0001
Dysphagia score for liquids	0.5 (0.3, 0.7)	0.7 (0.2, 1.1)	0.1 (−0.04, 0.4)	0.2 (0.03, 0.4)	0.2 (0.1, 0.2)	<0.0001
Heartburn score for solids	0.9 (0.7, 1.2)	0.9 (0.3, 1.5)	0.4 (0.02, 0.8)	0.5 (0.2, 0.8)	0.3 (0.2, 0.3)	<0.0001

Data are means (95% confidence intervals); statistical testing for significance with Kruskal–Wallis test

PPI proton-pump inhibitor

comprises 7.6% of the total national population, and in general outcomes for South Australia can be extrapolated to the general population of the nation [22], although the median age of the South Australian community is slightly older than the overall Australian population (38.7 versus 36.6 years). Our study has revealed outcomes that are consistent with previous reports from Western countries, with 50% of South Australians describing heartburn symptoms, 21.2% at least once every month, and 5% at least daily. Some 17% of the participants in this study were also consuming medication of some sort for reflux symptoms.

Whereas our study has confirmed that the symptom of heartburn is common in the community, the survey methodology did not allow us to confirm with certainty that this symptom was actually due to gastroesophageal reflux. To confirm an association would require objective investigation with esophageal function tests such as ambulatory pH monitoring. This was not feasible in a large community study. However, in previous studies we have used the questions used in the present study for follow-up after antireflux surgery, and the responses to these questions have been indicative of the clinical outcomes of reflux control and post-fundoplication side effects [12, 13, 15, 17]. Nevertheless, our study does support the contention that reflux symptoms are common in Australia, and those symptoms could account for the high rate of consumption of such medications as PPIs. The situation in other Western countries is likely to be similar.

It should be recognized, however, that not all people consume anti-secretory medications for the relief of reflux symptoms, although it seems likely that this is the

commonest indication for the prescription of medications such as PPIs, whereas other indications such as peptic ulcer treatment or prophylaxis are likely to account for only a minority of instances. Furthermore, our study only sought information about medications that were taken for reflux symptoms, and for this reason other indications are unlikely to account for a significant amount of the medication use. Interestingly, our study has also shown that a significant number of people in our community consume nonprescription medication for reflux type symptoms, highlighting the role of such substances in the management of this problem in the community.

In addition to the direct cost of more than A\$5 million per year for dispensing medication in Australia [4], medical therapy generates additional indirect costs from the requirement for regular review by medical practitioners for the prescription of medications, and in some people, new or persistent symptoms require further investigation with upper gastrointestinal endoscopy. Hence, the actual cost associated with the treatment of gastroesophageal reflux in Australia now almost certainly exceeds A\$1 billion per annum. Furthermore, the heartburn scores were significantly higher in people who were consuming medication for reflux, and this suggests that the level of symptom control achieved by medication in many of these individuals is inadequate.

The main alternative therapy for reflux is surgery. This fashions a new valve to prevent gastric content from entering the esophagus. All types of fundoplication are effective in stopping gastroesophageal reflux, and such treatment is curative for 80–90% of patients at more than 10 years follow-up [15]. However, it would not make sense to propose

antireflux surgery for all patients with gastroesophageal reflux, as the cost of anti-reflux surgery in more than 10% of the Australian, or similar Western populations would be considerable. At present, fewer than 1 in 500 Australians will undergo an antireflux procedure during his or her lifetime [4]. Nevertheless, the cost of all therapies for the treatment of reflux indicates that reflux is associated with a substantial health care cost in Australia, and probably other Western countries. More recently, endoscopic alternatives such as the EsoPHYX procedure, have been described, and the early outcomes from this procedure suggest that in appropriately selected patients effective control of reflux symptoms can be achieved via the trans-oral route [23]. However, it is unlikely that such therapies will dramatically change the proportion of patients with gastroesophageal reflux who undergo an antireflux procedure.

It is interesting to compare the community prevalence of the symptoms investigated in this study with the outcomes obtained using similar questions during follow-up of laparoscopic antireflux surgery. In a previous study we reported that 10 years after a laparoscopic Nissen fundoplication, 14% of patients answered affirmatively to the heartburn question that was used in the current study, and the mean analog score was 1.4 [17]. These outcomes suggest a lower level of reflux symptoms at long-term follow-up after this surgery, compared to the general community. Furthermore 65% of post-Nissen fundoplication patients reported bloating at 10 years follow-up, compared to 48% of the general community in the present study. Hence, it is likely that at least some of the bloating symptoms previously attributed to antireflux surgery actually predate the surgery.

We were also interested to determine the prevalence of dysphagia in our community. We were surprised to find (1) that 11% of the South Australians surveyed experienced dysphagia, (2) that 3.5% experienced this symptom at least once a month, and (3) that 2.1% experienced it at least 2 to 3 times per week. The significance of this symptom in the general community is uncertain, although it can be associated with untreated gastroesophageal reflux or other pathology. Our data show that this problem is more common in individuals who have heartburn, and for this reason, it is important to realize that at least some dysphagia following antireflux surgery is actually present before the operation is performed.

A weakness of the present study is that it was a community-based questionnaire, and objective investigations were not used to confirm that symptoms of heartburn were actually due to reflux. Adding investigations such as pH monitoring or endoscopy was not feasible in a large population-based study. In addition, data that indicated that 1.6% of patients thought that they had undergone a previous surgical procedure for reflux indicate that this question was not specific enough, as the answer almost

certainly greatly overestimated the number of patients who had undergone a fundoplication. We suspect that some respondents interpreted endoscopy for the investigation of reflux as being a surgical procedure for reflux, and this could have inflated the number of positive responses to this question. A further problem was that the response rate to the survey was only 55%. However, this level of response is similar to the response rates for other community-based surveys that have applied similar methodology [24].

Our study has shown that symptoms of gastroesophageal reflux and the use of medications to treat such symptoms are very common in our community. Furthermore, the healthcare burden associated with the treatment of gastroesophageal reflux is now huge. Nearly 1 in 7 Australians over the age of 15 now consume medication for the treatment of reflux symptoms, and the percentage of the population requiring treatment for reflux could well increase further.

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