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Gastrointestinal symptoms are still common in a general Western population

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ABSTRACT

Background: Results from studies conducted in the late 1980s and early 1990s showed that gastrointestinal symptoms were common among the general population. Meanwhile, lifestyle habits have changed and important treatment options have been introduced. This might have influenced symptom prevalence.

Methods: This study aimed to describe the current prevalence of upper and lower gastrointestinal symptoms within the general population. For this purpose, a demographically representative sample of the Dutch population within the city of Nijmegen and surrounding areas was selected after careful comparison with demographic figures from a government demographic database. Participants were invited to fill in a valid self-report questionnaire about gastrointestinal symptoms and prevalence figures were calculated.

Results: A total of 5000 questionnaires was sent and 1616 (32%) were returned. Of these, 839 (52%) subjects reported having had upper (43%) or lower (38%) gastrointestinal symptoms in the past four weeks. The most prevalent individual symptoms reported were flatulence (47%), abdominal rumbling (40%), bloating (37%), alternating solid and loose stools (31%), belching (25%) and postprandial fullness (25%). People who smoked or used a proton pump inhibitor had an increased risk for reporting upper as well as lower gastrointestinal symptoms (OR 1.99; 95% CI 1.56 to 2.55, and OR 1.37; 95% CI 1.01 to 1.75, respectively for smoking; and OR 3.17; 95% CI 2.17 to 4.72, and OR 2.14; 95% CI 1.49 to 3.08, respectively for PPIs).

Conclusion: Both upper and lower gastrointestinal symptoms are very common in a representative sample of a general Western population.

KEYWORDS

Dyspepsia, epidemiology, gastrointestinal diseases, gastrointestinal symptoms

INTRODUCTION

Gastrointestinal symptoms are very common in the general population and a frequent reason for consulting a healthcare professional.¹ In 1989, it was shown that 38% of an English population reported dyspeptic symptoms.² When this study was expanded over five other regions in England and Scotland, prevalence of dyspepsia over a six-month period was 41%.³ In another random sample of older (aged 65-93 years) Minnesota inhabitants, studied in 1992, similar results were obtained.⁴ In addition, a prevalence ranging from 10 to 25% was observed for lower abdominal symptoms, such as constipation and diarrhoea.

No recent data on the prevalence of gastrointestinal symptoms in a general population are available. Since these studies were conducted, there have been significant changes in lifestyle habits, treatment options, and socioeconomic and cultural factors, influencing upper as well as lower gastrointestinal symptoms. The most prominent changes were probably the introduction of proton pump inhibitors (PPIs) and strategies to eradicate *Helicobacter pylori* in national and international guidelines for the treatment of patients with upper gastrointestinal symptoms. Subsequently, infection rates of *H. pylori* have decreased, whereas the number of prescriptions for PPIs has increased dramatically.^{5,6} Secondly, the use of gastro-toxic drugs, such as NSAIDs, has risen and gastrointestinal symptoms induced by these drugs are increasing.⁷ Thirdly, the prevalence of overweight and obesity is increasing. A high body mass index, and the lifestyle habits that precede that, are associated with the development of both upper and lower gastrointestinal symptoms, such as regurgitation, gastro-oesophageal reflux and altered bowel movements.⁸

These developments strengthened the need for data on the current prevalence of gastrointestinal symptoms in the general population. Indeed, a more recent study has shown

that, although there is great inter-country variability (46% in Mexico, 10% in Japan), abdominal cramping and pain are still common in a general population.⁹ Similar results were obtained in the Kalixanda study from Northern Sweden, in which the prevalence of predominantly reflux symptoms over a three-month period was found to be about 40%.^{10,11}

Although both studies indicate that upper gastrointestinal symptoms are still a frequent phenomenon among the general population, they were conducted in specific populations and investigated specific symptom complexes. This study aims to investigate the prevalence of a broad range of both upper and lower gastrointestinal symptoms in a representative sample of the general population.

PATIENTS AND METHODS

Subjects

Questionnaires were spread door-to-door in the city of Nijmegen and the Nijmegen area. Data from Statistics Netherlands (CBS) were used to select neighbourhoods that matched the general Dutch population for social economic status, age, property value, racial configuration and household configuration. One person over the age of 18 per household was asked to fill in the questionnaire and return it by mail. It was specifically mentioned that the questionnaire should also be completed if gastrointestinal symptoms were absent.

Questionnaire

The questionnaire contained items on demographics, lifestyle habits and current medication use. Severity of gastrointestinal symptoms in the past four weeks was assessed using a valid self-report questionnaire. This questionnaire has been extensively used before¹²⁻¹⁵ and symptoms include upper abdominal pain, epigastric pain, heartburn, regurgitation, abdominal rumbling, bloating, nausea, empty feeling in the stomach, early satiety, postprandial fullness, belching, flatulence, haematemesis, dysphagia, questions on defecation and foetor ex ore. Subjects were asked to rate the severity of gastrointestinal symptoms on a seven-point Likert scale (0 = absent; 1 = hardly any; 2 = mild; 3 = moderate; 4 = moderately severe; 5 = severe and 6 = very severe). In analysis a score of 2 or higher was defined as symptom presence. Questionnaires returned without any of the questions answered were not taken into further analysis.

Statistical analysis

Statistical analysis was performed using SAS statistical software (version 8.2). Data on symptom frequencies were summarised using descriptive statistics. Participants reporting three or more of the following symptoms:

epigastric pain, heartburn, regurgitation, abdominal rumbling, bloating, empty feeling, nausea, vomiting, early satiety, postprandial fullness, belching, haematemesis, dysphagia and foetor ex ore, were defined as having upper gastrointestinal symptoms. Having three or more of these symptoms was defined as having lower gastrointestinal symptoms. Alcohol abuse was defined as drinking ≥ 14 units/week for women and ≥ 21 units/week for men (National Drug Monitor Netherlands/Trimbos Institute), and coffee abuse was defined as the consumption of ≥ 6 units/day.¹⁶ Any consumption of cigarettes or cigars was defined as current smoking. Body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in metres (kg/m^2), classifications were made according to WHO standards: a BMI ≤ 18.5 = underweight, a BMI 18.5 to 25 = normal and a BMI ≥ 25 = overweight.¹⁷ Comparison of symptom frequencies between genders was done using Pearson's χ^2 analysis, and Pearson's correlation coefficient was calculated to assess the correlation between age and number of symptoms. To adjust for multiple testing, a p value < 0.01 was considered statistically significant. Logistic regression analysis was used to assess adjusted odds ratios in order to identify risk factors for upper or lower gastrointestinal symptoms.

RESULTS

A total of 5000 questionnaires were distributed and 1616 were returned (32%). Mean age of the responders was 52.3 years (± 17.2) and 34% of the responders were male (table 1). Eighty percent of all subjects reported having had at least one gastrointestinal symptom in the past four weeks. The most frequently reported upper gastrointestinal symptoms were bloating (37%), belching (25%), postprandial fullness (25%) and heartburn (21%). Lower gastrointestinal symptoms most frequently reported were flatulence (47%),

Table 1. Population demographics (n=1616)

Mean age \pm SD	52.3 \pm 17.2
Male gender, n (%)	549 (34%)
Non-Western European origin, n (%)	104 (6.4)
BMI, n (%):	
• < 18.5	33 (2.0)
• (18.5-25)	814 (50.4)
• ≥ 25	704 (43.6)
Smoking, n (%)	385 (24.0)
Alcohol abuse, n (%)	102 (6.3)
Excessive coffee consumption, n (%)	383 (23.7)
Current medication, n (%):	
• Proton pump inhibitor	134 (8)
• Aspirin	165 (10)
• H2-receptor antagonist	17 (1)
• NSAID	66 (4)

abdominal rumbling (40%), alternating solid and loose faeces (31%) and strong urgency (24%) (figures 1 and 2). Women statistically significantly more often reported abdominal pain in general (27 vs 16%), abdominal

rumbling (42 vs 35%), bloating (41 vs 30%), nausea (20 vs 9%), early satiety (15 vs 9%), postprandial fullness (27 vs 20%), constipation (7 vs 18%) and defecation frequently with pain (13 vs 7%) than men (all p values <0.01).

In general, 43% of participants reported having had at least three upper gastrointestinal symptoms in the past four weeks and 38% reported having had at least three lower gastrointestinal symptoms. Although proportions of subjects with upper and lower gastrointestinal symptoms seemed to decrease with increasing age in both men and women (figure 3), no correlation could be shown ($r = -0.22$ in men, and $r = -0.21$ in women for age and upper abdominal symptoms; $r = -0.19$ in men, and $r = -0.24$ in women for age and lower abdominal symptoms; all p values <0.01).

Of all subjects taking either a PPI or an H₂-receptor antagonist, 68% reported upper gastrointestinal symptoms and 55% reported lower gastrointestinal symptoms. Smoking and PPI use were associated with an increased risk for both upper and lower gastrointestinal symptoms (OR 1.99; 95% CI 1.56 to 2.55, and OR 1.37; 95% CI 1.01 to 1.75, respectively for smoking; and OR 3.17; 95% CI 2.17 to 4.72, and OR 2.14; 95% CI 1.49 to 3.08, respectively for PPIs). Excessive coffee consumption was associated with a decreased risk for upper and lower gastrointestinal symptoms (OR 0.75; 95% CI 0.59 to 0.96, and OR 0.72; 95% CI 0.56 to 0.93, respectively).

Figure 1. Prevalence of upper gastrointestinal symptoms

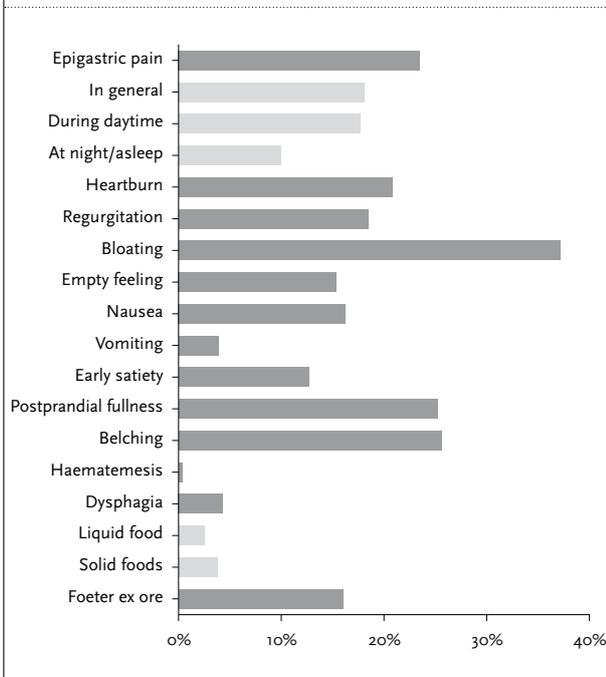


Figure 2. Prevalence of lower gastrointestinal symptoms

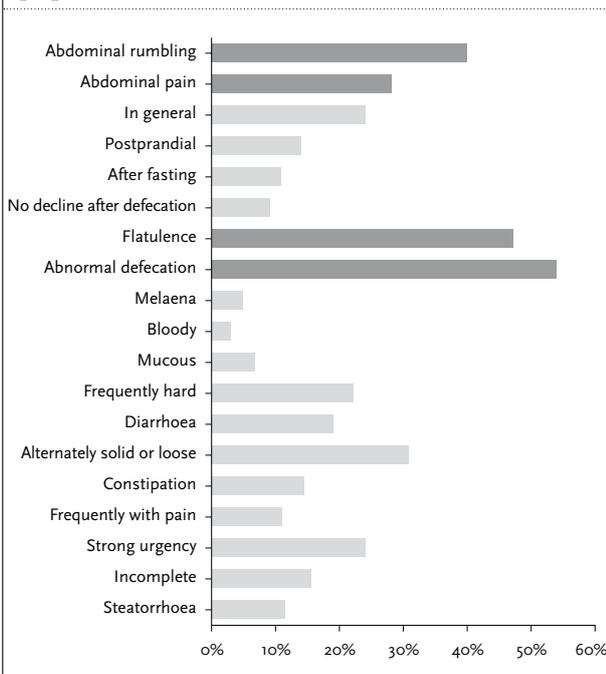


Figure 3. Prevalence of upper and lower gastrointestinal symptoms in men and women with increasing age

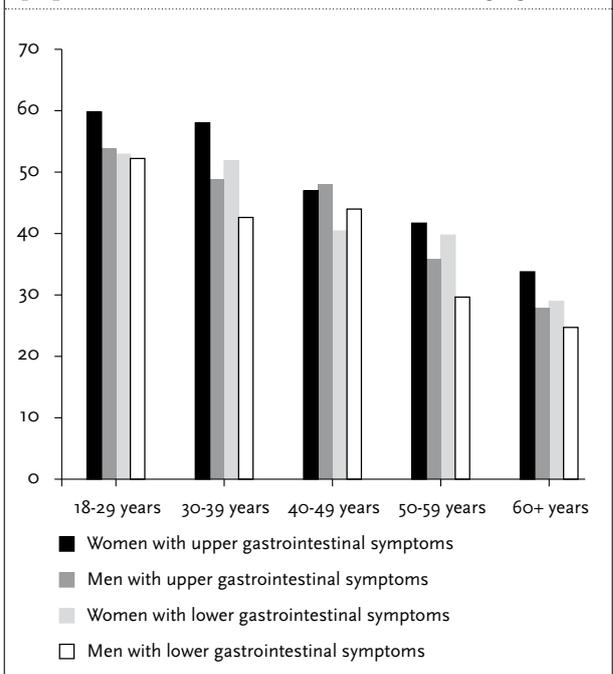


Table 2. Prevalence of specific characteristics among subjects with and without upper and lower gastrointestinal symptoms

	Upper gastrointestinal symptoms			Lower gastrointestinal symptoms		
	Present n=690 (43%)	Not present n (%)	Adjusted* OR (95% CI)	Present n=616 (38%)	Not present n (%)	Adjusted* OR (95% CI)
Alcohol abuse	37 (5.4)	65 (7.0)	0.66 (0.43-1.02)	36 (5.8)	66 (6.6)	0.85 (0.55-1.30)
Excessive coffee consumption	156 (22.6)	227 (24.5)	0.75 (0.59-0.96)	130 (21.1)	253 (25.3)	0.72 (0.56-0.93)
Smoking	207 (30.0)	178 (19.4)	1.99 (1.56-2.55)	164 (26.6)	221 (22.3)	1.37 (1.01-1.75)
Medication						
Aspirin	65 (9.4)	100 (10.8)	0.85 (0.60-1.19)	57 (9.3)	108 (10.8)	0.84 (0.59-1.18)
NSAID	36 (5.2)	30 (3.2)	1.37 (0.82-2.30)	28 (4.6)	38 (3.8)	1.05 (0.62-1.74)
Proton pump inhibitor	92 (13.3)	42 (4.5)	3.17 (2.17-4.72)	74 (12.0)	60 (6.0)	2.14 (1.49-3.08)
H2-receptor antagonist	11 (1.6)	6 (0.7)	2.63 (0.97-7.84)	10 (1.6)	7 (0.7)	2.52 (0.95-7.06)
BMI (kg/m ²):						
• <18.5	20 (2.9)	13 (1.4)	1.54 (0.64-3.80)	19 (3.1)	14 (1.4)	1.97 (0.83-4.78)
• 18.5-25	326 (47.3)	488 (52.7)	0.65 (0.38-1.09)	297 (48.2)	517 (51.7)	0.81 (0.48-1.36)
• >25	310 (44.9)	394 (42.6)	0.74 (0.44-1.26)	272 (44.2)	432 (43.2)	0.87 (0.52-1.48)

*Adjusted for all other variables. Alcohol abuse: ≥ 14 units/week for women and ≥ 21 units/week for men. Excessive coffee consumption: ≥ 6 units/day. Smoking: any consumption of cigarettes or cigars. NSAID = non-steroid anti-inflammatory drug.

DISCUSSION

The results of this large-sample study show that upper and lower gastrointestinal symptoms are very common in a general Western population. The vast majority of subjects experienced at least one gastrointestinal symptom in the past four weeks. Women reported more symptoms than men, and the number of symptoms seems to decrease with increasing age, regardless of gender. Smoking and use of PPIs were associated with the presence of gastrointestinal symptoms, and there was a negative association with excessive coffee consumption.

Other studies have investigated the prevalence of dyspeptic and irritable bowel syndrome-related symptoms before. These studies, performed since 1951, reported a prevalence ranging from 25 up to 40%, depending on the study population and symptom definition.^{2,4,18-20} Since these first data, several changes in factors associated with the treatment and development of gastrointestinal symptoms have taken place, such as altered treatment options, increasing bodyweight and altered lifestyle habits. It might be expected that this has influenced gastrointestinal symptom aetiology and, with that, prevalence. Indeed, in a recent study we showed that the prevalence of upper gastrointestinal disorders found at endoscopy had changed significantly over time compared with 15 years previously.²¹ Unfortunately, the current data do not allow us to draw any conclusions on diagnoses, and there is no data available on these symptoms in a comparable population. Nevertheless, proportions of patients with symptoms are in concordance with proportions described in the earlier studies, and although aetiology and the prevalence of certain disorders may have changed, gastrointestinal symptoms are still a common phenomenon in the general population.

PPIs and smoking were associated with an increased risk for both upper and lower gastrointestinal symptoms. Smoking has previously been associated with the development of gastrointestinal disorders,^{22,23} and our results show once again how important it is for healthcare workers to emphasise the importance of quitting for the prevention and control of symptoms. PPIs are currently among the most frequently prescribed drugs in the Netherlands and numbers are still increasing (source: GIP databank; 01-05-2007). Currently, a common approach in Western countries is to prescribe acid-suppressive drugs for upper gastrointestinal tract symptoms without suspicion of a malignancy.²⁴ A large proportion of patients with upper gastrointestinal symptoms have no acid-related disorder underlying symptoms and it is therefore likely that a group of patients are taking acid-inhibiting medication without the expected effect on gastrointestinal symptoms.²⁵ It is very probable that the observed increased risk is a reflection of the large number of people using this medication without obtaining the desired effect, rather than a true association between the use of PPIs and symptom development. The association with lower gastrointestinal symptoms might be the result of common side effects of PPIs on the lower gastrointestinal tract, such as diarrhoea, constipation and flatulence.²⁶ On the other hand, it is known that gastrointestinal symptoms are often hard to locate, and that upper and lower gastrointestinal symptoms often coexist.²⁷ It is quite possible that many patients received a PPI for their upper gastrointestinal symptoms, while their lower gastrointestinal symptoms persisted. Regarding the inversed association with excessive coffee consumption, it is imaginable that subjects with gastrointestinal symptoms consume less coffee in order

to avoid symptoms, rather than that coffee itself has a protective effect for symptom development.

The response rate to the self-report questionnaire was rather low, compared with the previously mentioned studies investigating symptom prevalence. The low response rate is most probably due to the voluntary, anonymous nature of this study: questionnaires were spread door-to-door, whereas other studies often used a clinical or outpatient setting to approach potential participants. This last method leads to higher response rates since people are more likely to fill in a questionnaire if asked to by a healthcare worker. Our purpose was to obtain insight into a general population, regardless of medical background or healthcare seeking behaviour. Therefore, response was dependent on individual willingness to complete the questionnaire, and response bias might have influenced our results. The investigated sample matched the general Dutch population for several demographic and socioeconomic factors (data from Statistics Netherlands (CBS)). However, the mean age of the responders was slightly higher, and there were more women than men. This would mean that our results could in fact represent an underestimation of prevalence because younger people report more symptoms, or that the higher proportion of women has caused an overestimation because women tend to report more symptoms. The truth probably lies somewhere in the middle; considering these contradicting influences on symptoms, the large sample size and the resemblance of our sample to the general Dutch population for other factors, it might be assumed that data about the prevalence of symptoms are representative for the general population as well.

In summary, over the past decades, several changes in factors associated with the development and treatment of gastrointestinal disorders have taken place. The results of this study show that although these changes might have altered the aetiology and prevalence of underlying disorders, gastrointestinal symptoms are still very common in the general population.

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