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HEALTH SURVEYS

A population survey of bowel habits in urban Swiss men

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The aim of this study was to determine the prevalence of symptoms related to constipation in urban Swiss men and to identify associated sociodemographic factors and health habits. A sample of 773 men aged between 35 and 74 years randomly selected from the Geneva population answered a questionnaire on bowel habits during a personal interview in a mobile epidemiological unit. 'Constipation' was reported by more than 6% of subjects, difficulties in stool evacuation by approximately 5% and less than three stools per week by approximately 2%. These symptoms appeared less prevalent in subjects with post-baccalaureate education (the excess prevalence of self-reported constipation, difficulty in stool evacuation and frequent daily defecation was greater than 5%). Smokers were more likely to have a frequency of 3–7 stools per week and were less affected by frequent daily defecation. Self-reported constipation was more prevalent in subjects with a higher dietary fibre intake. No statistically significant effects of age, nationality, dietary fat or physical activity were observed. These results are consistent with national surveys in US populations. Factors related to socioeconomic status or education may be a cause of constipation in men, but they still need to be elucidated.

Key words: bowel habits, constipation, prevalence, urban population, sociodemographic factors

Among gastrointestinal functional disorders, constipation is sometimes considered to be a minor problem by physicians.[1] Yet, it constitutes one of the most frequent complaints in gastroenterology, being more frequent than all other chronic digestive conditions.[2] The prevalence of constipation has been estimated at between two[3] and >10% of the US population[4] and reaches 20% among the elderly.[5] Part of the observed heterogeneity in the prevalences within comparable populations may stem from the lack of a standard definition of constipation, particularly when 'constipation' is self-reported.[1]

The impact of constipation on health is high. For example, faecal incontinence, a frequent consequence of long-term constipation, can lead to work absenteeism and is a major cause of institutionalization in the elderly.[6] Furthermore, constipation has low disability and hospitalization rates, but generates important medical expenditure.[1] Patients suffering from constipation consult physicians more frequently than other patients.[7] Approximately 1.2% of all consultations in the US[2] and 0.9% in the UK[8] are motivated by this problem. Each year, $330 millions are spent in the US on laxatives.[9] Constipation may also increase the risk of colorectal cancer.[10–12]

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In general, studies focusing on gastrointestinal problems have used data collected in large US population surveys such as the National Disease and Therapeutic Index (NDTI),[2] the National Hospital Discharge Survey (NHDS), the National Health Interview Survey (NHIS), the National Ambulatory Medical Care Survey (NAMCS), the Vital Statistics of the United States (VSUS)[3] and the National Health and Nutrition Examination Survey (NHANES–I).[13] In contrast, the prevalence of constipation in European populations and in particular among urban men is less well known. We therefore performed the present study to examine the prevalence of symptoms related to constipation in the general population of men in Geneva, Switzerland.

METHODS

Subjects

Between January 1993 and December 1994, a random sample of the male adult population of Geneva, including 1,141 men, was selected to represent the 89,000 male non-institutionalized residents of Geneva city and county aged 35–74 years. Subjects were identified from an official list of all residents provided by the Population Office that included name, date of birth, address and nationality. The random sampling in the age-sex-nationality strata was proportional to the corresponding distributions in the Geneva population. Subjects were asked by mail to participate in a population survey about 'men's health', including issues such as cardiovascular risk factors, anthropometry and medical and familial history. In cases of non-response after 15 days, the subjects were called by

telephone up to seven times on different days of the week and at different hours of the day and, if necessary, sent a second and third letter. A systematic check in the following yearly edition of the list showed that over 90% of the subjects that had not been reached no longer resided in Geneva. The participation rate was 67.7%, and the final sample comprised 773 men.

In-person interviews were performed in a mobile epidemiology unit where trained interviewers helped the subjects to complete a detailed questionnaire about education and smoking as well as constipation-related symptoms. Subjects were asked the following questions: 'Do you suffer from constipation?', 'Have you any difficulty in stool evacuation?', 'Have you any difficulty in stool retention?' The frequency of defecation was evaluated as once a week or less, once per three or four days, once per two days, once a day or several times a day. At home, participants completed a self-administered, semi-quantitative food frequency questionnaire. This comprised a list of 80 food items and serving sizes that could be converted into daily energy, nutrients and alcohol intakes.[14,15]

Data analysis

The sample was stratified accordingly into categories of age (<50 years and ≥50 years), education [which was classified into three levels: primary school education (≥6 years of schooling), secondary school education (≥9 years of schooling) and post-baccalaureate education (>13 years of schooling)], nationality (Swiss or non-Swiss) and smoking habits (current smoker or non-current smoker). The fibre and fat intakes, adjusted for energy intake,[16] were categorized as below or above the 67th percentile of regression residuals. High physical activity was defined as at least three times 1 h per week of sport during the whole year before the interview. The symptoms were self-reported constipation, difficulty in stool evacuation and difficulty in stool retention. The frequencies of stool exoneration were grouped in three categories[1]: infrequent defecation (two stools or less per week), intermediate frequency (3–7 stools per week), and frequent daily defecation (more than one stool per day). The crude prevalences were computed for the whole population as well as for subgroups. The differences in the adjusted prevalences of constipation-related symptoms and in the frequencies were estimated by the regression coefficients obtained using multivariate linear regression with sociodemographic and health habit factors as predictors. The adjusted odds ratios and trends of constipation-related symptoms and frequencies according to educational levels were calculated using multivariate logistic regression with sociodemographic and health habit factors as covariates. Statistical analysis was done with SPSS software (SPSS Inc.).

Table 1 Distribution of age, education, nationality, smoking, dietary and physical activity categories in a sample of 773 Swiss men, Geneva, 1993–1994

Variables	Categories	n	%
Age	<50 years	349	45.1
	≥50 years	424	54.9
Education	Primary	194	25.3
	Secondary	337	43.9
	Post-baccalaureate	236	30.8
Nationality	Swiss	521	68.3
	Non-Swiss	242	31.7
Smoking	Current smoker	219	28.7
	Non-current smoker	545	71.3
Dietary fibre	Low (<17.6 g/day)[a]	513	67.1
	High (≥17.6 g/day)[a]	252	32.9
Dietary fat	Low (<826.4 kcal/day)[a]	513	67.1
	High (≥826.4 kcal/day)[a]	252	32.9
Physical activity	<3 h/week	629	81.4
	≥3 h/week	144	18.6

a: 67th percentile

RESULTS

Table 1 presents the distribution of the population according to age, education, nationality, smoking, dietary habits and physical activity.

The prevalences of constipation-related symptoms are shown in *table 2*. Constipation was reported by 6.4% of the subjects. Of the whole sample, 5.1% complained about difficulty in stool evacuation (56.3% of self-reported constipated subjects). Of the whole sample, 1.3% reported difficulty in stool retention (4.1% in self-reported constipated subjects). Concerning defecation frequencies, 2% of the whole sample had two or less stools per week (14.6% of self-reported constipated subjects), 81.2% had daily stools or one per two days (75.0% of self-reported constipated subjects) and 16.8% had two stools or more per day (10.4% of self-reported constipated subjects).

Analysis of the crude prevalences in *table 3* shows that self-reported constipation tended to increase with age, in less well educated subjects, in the non-Swiss, in non-smokers and in subjects consuming higher amounts of fibre and fat and having lower physical activity. Difficulty in stool evacuation had a similar distribution to self-

Table 2 Prevalences of symptoms related to constipation and defecation frequencies in 773 Swiss men, Geneva, 1993–1994

Symptoms and frequencies	n	%	95% CI
Self-reported constipation	49	6.4	4.7–8.1
Difficulty in stool evacuation	39	5.1	3.5–6.7
Difficulty in stool retention	10	1.3	0.5–2.1
Infrequent defecation (≤2 stools per week)	15	2.0	1.1–2.9
1 stool a week or less	3	0.4	0.0–0.8
1 stool per 3 or 4 days	12	1.6	0.7–2.5
Intermediate frequency (3–7 stools per week)	628	81.2	78.5–84.1
1 stool per 2 days	59	7.6	5.7–9.5
1 stool a day	569	73.6	70.5–76.7
Frequent daily defecation (>1 stool per day)	130	16.8	14.2–19.4

CI confidence interval

reported constipation except for dietary fat. Difficulty in stool retention was more prevalent among younger, more highly educated subjects, the Swiss, smokers and in subjects with a higher fibre diet and higher physical activity. Infrequent defecation was more prevalent among older subjects, the non-Swiss, non-smokers and subjects with a low fat diet and low physical activity. Frequent defecation was more prevalent in younger, less well educated subjects, the Swiss, non-smokers and in subjects with higher fibre and lower fat diets and higher physical activity. After adjustment for other sociodemographic and health habit variables, significant differences in prevalences were found between educational categories, except for infrequent defecation. The differences were mainly significant in subjects with a post-baccalaureate education. Smokers were significantly more likely to have a frequency of 3–7 stools per week and were less affected by frequent daily defecation. Self-reported constipation was more prevalent in subjects consuming a higher fibre diet. Age, nationality, dietary fat and physical activity had no significant effects.

Table 4 presents the relationship of symptoms with educational categories. Compared to subjects with a primary school level education, subjects with a baccalaureate education had a significant, up to 2-fold decreased risk of constipation (adjusted OR=0.5, p trend =0.02), of difficulty in stool evacuation (adjusted OR=0.4, p trend =0.008) and of frequent daily defecation (adjusted OR=0.8, p trend =0.06). A significant trend (p trend =0.05) associated higher educational levels with an increased risk of difficulty in stool retention.

DISCUSSION

This study described symptoms related to constipation in a representative sample of men aged 35–74 years from an urban Swiss population. It confirmed the findings on prevalence obtained in US populations studies.[1–3] Over-

Table 3 Prevalences (percentage) of symptoms related to constipation and defecation frequencies and adjusted differences of prevalence[a] according to population categories (n=739)

Variables	Categories	Self-reported constipation	Difficulty in stool evacuation	Difficulty in stool retention	Infrequent defecation (≤2 stools/week)	3–7 stools/week	Frequent daily defecation (>1 stool/day)
Age	<50 years	4.6	3.8	1.7	1.1	81.7	17.2
	≥50 years	7.8	6.2	1.0	2.6	80.8	16.6
	Difference[a]	2.8	2.4	–0.6	1.0	–1.2	–2.2
	95% CI	–0.8–6.4	–0.9–5.6	–2.3–1.1	–1.0–3.0	–6.9–4.6	–7.7–3.3
Education	Primary	7.9	7.8	0.5	3.1	78.8	18.1
	Secondary	8.7	6.0	0.9	1.2	80.4	18.4
	Difference[a,b]	0.3	–0.5	1.4	–0.7	0.3	0.9
	95% CI	–2.0–2.5	–2.5–1.5	0.3–2.4[c]	–2.0–0.5	–3.3–3.8	–2.5–4.4
	Post-baccalaureate	2.1	1.7	2.6	2.1	84.7	13.1
	Difference[a,b]	–6.5	–5.7	1.5	–0.5	6.2	–6.6
	95% CI	–10.5– –2.6[c]	–9.2– –2.1[c]	–0.3–3.4	–2.7–1.7	0.0–12.4[c]	–12.6– –0.6[c]
Nationality	Swiss	6.1	4.6	1.5	1.5	81.3	17.1
	Non-Swiss	7.1	6.2	0.8	2.9	80.6	16.5
	Difference[a]	0.8	1.8	–1.1	1.1	–0.7	–0.4
	95% CI	–3.0–4.7	–1.7–5.3	–2.9–0.7	–1.0–3.3	–6.9–5.4	–6.3–5.5
Smoking	Current smoker	5.9	4.5	1.8	0.9	86.4	12.7
	Non-current smoker	6.6	5.4	1.1	2.4	79.4	18.2
	Difference[a]	0.5	0.8	–1.2	1.2	–8.3	7.1
	95% CI	–3.5–4.5	–2.8–4.5	–3.1–0.6	–1.0–3.5	–14.7– –1.9[c]	1.0–13.3[c]
Dietary fibre	Low (<17.6 g/day)	5.1	4.2	1.0	1.9	82.1	16.0
	High (≥17.6 g/day)	9.2	7.1	2.0	2.0	78.9	19.1
	Difference[a]	4.9	3.0	1.2	0.4	–2.1	2.5
	95% CI	1.0–8.8[c]	–0.6–6.5	–0.6–3.1	–1.7–2.5	–8.3–4.1	–3.5–8.4
Dietary fat	Low (<826.4 kcal/day)	6.1	5.5	1.4	2.1	82.1	18.8
	High (≥826.4 kcal/day)	7.2	4.4	1.2	1.6	78.9	13.5
	Difference[a]	2.1	–0.1	–0.1	–0.8	–5.6	–4.8
	95% CI	–1.7–6.0	–3.6–3.5	–1.9–1.7	–3.0–1.3	–11.8–0.5	–10.7–1.1
Physical activity	<3 h/week	6.9	5.6	0.7	2.8	83.3	13.9
	≥3 h/week	6.3	5.0	1.4	1.8	80.7	17.5
	Difference[a]	–0.4	–0.1	0.7	–1.1	–3.1	4.2
	95% CI	–4.9–4.2	–4.3–4.1	–1.5–2.8	–3.6–1.4	–10.3–4.2	–2.8–11.1

a: Simultaneously adjusted for all other variables in the table
b: Difference with primary school level
c: p<0.05

all, education was the main predictor of constipation-related symptoms.

Self-reported constipation

Self-reported constipation was found in 6.4% of subjects. This prevalence was higher than those reported from the data of some US surveys which were estimated at between 1 and 2%,[2,3] but similar to a prevalence of 7% found by Sandler et al.[13] with the NHANES–I data.

Difficulty in stool evacuation

Difficulty in stool evacuation was reported by 5.1% of the sample. This value was lower than the prevalences of similar symptoms such as strain during defecation or incomplete evacuation which were estimated at around 10% by Thompson and Heaton[4] in a non-random sample of the British population or at around 20% by Talley et al.[17] in a population study from an urban US population.

Difficulty in stool retention

Difficulty in stool retention had a prevalence of 1.3%, which was similar to the prevalence of 1.5% found by Talley et al.[17]

Defecation frequency

For infrequent stool evacuation, a prevalence of 2% was found, which was similar to the prevalence of 1% found by Sandler et al.[13] This prevalence is less than one-third of the prevalence of self-reported constipation. Among self-reported constipated subjects, only 15% reported infrequent defecation. A prevalence of 16.8% was observed in frequent daily defecation, which was somewhat higher than the 7% found by Heaton et al.[18] in a British urban population and the 11% reported by Sandler et al.[13]

Association with sociodemographic categories

Less well educated subjects presented significantly more self-reported constipation and difficulty in stool evacuation compared to subjects with a post-baccalaureate education. These results are in line with previous reports. Constipation may be more prevalent in less well educated and in lower social categories of population.[1,3,13] It might be argued that more highly educated subjects are less inclined to report constipation than the least educated. However, there is to our knowledge very little empirical support for this postulate. In contrast, education is known to be related to several factors which influence constipation. Low socioeducational classes may more often have inadequate dietary habits or less physical activity,[1,3] though our results did not show a confounding effect of diet or physical activity. More frequent exposure to agents such as stimulant laxatives,[19] psychotropic drugs,[20,21] and organochlorinated compounds[22] or viruses such as herpes simplex, herpes zoster or cytomegalovirus[23,24] that affect colonic motility might explain the highest prevalence of constipation in lower socioeducational categories. Personality traits associated with poor educational achievement could predispose to constipation.[25,26] More highly educated subjects might also be more prone to modify their health habits in case of constipation.

The effect of age on constipation remains controversial. Some studies found a significant association between an increase of constipation prevalence and ageing.[27–29] A lack of physical activity, chronic illnesses and drugs have been proposed to explain such a relation.[30,31] However, the effect of age has not been systematically reported.[6,13,18] In our study, self-reported constipation, difficulty in stool evacuation and infrequent defecation were slightly more prevalent in subjects older than 50 years. A stratification by 10 year categories did not provide additional information (data not shown). The non-significance of this trend may be due to the fact that the age effect becomes manifest only in subjects older than 75 years.

The nationality of the subjects had little impact on constipation. Indeed, at a similar educational level, socio-cultural habits do not differ between the Swiss and the majority of non-Swiss, who are mainly of European origin. Smoking decreased the prevalence of frequent daily defecation, but did not modify the prevalence of symptoms related to constipation. This is in line with the results of Levy et al.[32] and those of Talley et al.[17] who found no differences in bowel habits between smokers and non-smokers.

Unexpectedly, dietary habits had little effect on constipation. Constipation seems rare in societies with a high fibre diet[33] and the addition of fibre could improve constipation-related symptoms.[34] Yet, numerous studies have suggested that higher amounts of dietary fibre did not protect against symptoms related to constipation and that

Table 4 Adjusted odds ratios (OR)[a] of constipation related symptoms and defecation frequencies by education level compared to primary education subgroup (n=739)

	Primary n=183	Secondary n=327	Post-baccalaureate n=229	
Variables	Adjusted OR[a] (95% CI)	Adjusted OR[a] (95% CI)	Adjusted OR[a] (95% CI)	p trend
Self-reported constipation	1.0 (Reference)	1.1 (0.8–1.6)	0.5 (0.3–0.8)	0.02
Difficulty in stool evacuation	1.0 (Reference)	0.9 (0.7–1.3)	0.4 (0.2–0.8)	0.008
Difficulty in stool retention	1.0 (Reference)	1.5 (0.5–4.3)	1.7 (0.8–3.3)	0.05
Infrequent defecation	1.0 (Reference)	0.6 (0.3–1.2)	0.8 (0.4–1.5)	0.57
Frequent daily defecation	1.0 (Reference)	1.0 (0.8–1.3)	0.8 (0.6–1.0)	0.06

CI. confidence interval

a: Simultaneously adjusted for other sociodemographic and health habit factors

constipated subjects generally did not differ from others in the absorbed amounts of fibre.[1,31,32,35,36] Our results showed a higher prevalence of self-reported constipation in subjects consuming a higher amount of fibre. The highest fibre intake might not be a cause but a consequences of self-reported constipation.

Dietary fat could stimulate colonic activity,[37] but fat intake was not related to constipation symptoms in our study as in other studies on constipation.[35,38]

Physical activity has been reported to be protective against constipation.[13,32] In our study, no significant effect of physical activity was observed, although a slight trend suggested that subjects with a higher physical activity reported less constipation.

Potential biases and strengths

Studies focusing on symptoms are necessary, because a large part of human morbidity and suffering is due to symptoms.[39] Yet, recording symptoms implies subjectivity in their description.[40] For example, subjects questioned about constipation may be more concerned about incomplete or difficult evacuation than decreased stool frequency.[41] There is no objective confirmation (radiological or pathological, for example) of constipation. Similarly, the absence of information on the pathologies causing constipation (colonic cancer or haemorrhoids, for example) or on the use of laxatives complicates the interpretation of prevalences. As constipation can easily be treated by over-the-counter medication, the symptoms and defecation frequency can be somewhat modified by constipated subjects who treat themselves.[31] Defecation problems are often minimized by patients who use incorrect terms[42] or report them incorrectly.[43] In this study, 39% of the subjects who declared that they were constipated reported neither difficulty in stool evacuation nor infrequent defecation. It is important to assess whether issues in defining and reporting constipation are related to socioeducational classes, but, to our knowledge, this has never been investigated hitherto.

However, these potential biases are unlikely to have severely affected the validity of the results, since overall they were consistent with those previously reported in comparable populations. In addition, the present study had several strong assets. It was based on a representative sample of the population, information was obtained by a standardized questionnaire and the questions on bowel function were mixed with other questions related to general health, so the subjects therefore had no particular reason to under-report nor to over-report their bowel symptoms.

CONCLUSION

This study suggests that symptoms related to constipation are rather frequent in the Swiss male population. Although constipation is not lethal and is only a minor cause of hospitalization,[3] it can alter the quality of life of numerous patients sufficiently and even lead to invalidity, particularly in elderly subjects. It is a clinical and public health problem that must not be neglected. Education appears to be the main predictor of this disorder. As the aetiology of constipation is certainly multifactorial,[1] further studies are needed to explore which factors associated with education are responsible for bowel habit disorders and whether they are amenable to prevention.

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