Journal of Gastroenterology (2010) 45(2):187-194.

Prevalence of functional dyspepsia in an outpatient clinic with primary care physicians in Japan

Okumura, Toshikatsu ; Tanno, Sachie ; Ohhira, Masumi ; Tanno, Satoshi

Prevalence of functional dyspepsia in an outpatient clinic where primary care physicians are working in Japan

Toshikatsu Okumura, Sachie Tanno, Masumi Ohhira, Satoshi Tanno

Department of General Medicine, Asahikawa Medical College, Asahikawa, Japan

Short title: Prevalence of FD in Japan

All correspondence should be:

Toshikatsu Okumura, M.D.
Department of General Medicine
Asahikawa Medical College
2-1-1 Midorigaoka-Higashi
Asahikawa 078-8510
Japan
E-mail: okumurat@asahikawa-med.ac.jp

Abstract

Background Since little is known about the prevalence of patients with functional gastrointestinal disorders (FGID), this study was performed to clarify the prevalence of FGID, especially functional dyspepsia (FD), in new patients of an outpatient clinic where primary care physicians are working in Japan.

Methods We analyzed consecutive outpatients (n=5183) who newly visited the Department of General Medicine, Asahikawa Medical College Hospital between April 2004 and March 2009.

Results Out of 5813 patients, 818 (14.1%) patients visited because of their abdominal symptoms. Final diagnosis of the 818 patients were FGID (n=320, 39.1%), organic gastrointestinal diseases (n=237, 28.9%), organic non-GI disease (n=135, 16.5%), and others (n=126, 15.4%). 320 patients with FGID include FD (n=170), irritable bowel syndrome (IBS) (n=68) and other FGID (n=88). The rate of FGID or FD in all patients was 5.5 % or 2.9 %, respectively. Among outpatients (n=381) who complained of upper abdominal symptoms, approximately 45% were FD. There was no gender difference in the frequency of FGID, FD or IBS in all aged patients. It was also shown the lower incidence of FD in female patients aged over 70-year old and the higher incidence of IBS in male patients aged under 29-year old.

Discussion All these results suggest that the prevalence of FGID, especially FD, is very high in an outpatient clinic where primary care physicians are working in Japan.

Key words; functional dyspepsia, outpatient, Japan

Introduction

Functional gastrointestinal disorders (FGID) are a variable combination of chronic or recurrent gastrointestinal symptoms not explained by structural or biochemical abnormalities [1]. FGID are one of the most important diseases for gastroenterologists because up to a half of a gastroenterologist's time may be spent caring for patients with FGID [2, 3]. Among FGID, functional dyspepsia (FD) is a numerically important group of patients with FGID who have chronic symptoms, such as upper abdominal pain and discomfort, that can be attributed to the gastroduodenal region [4]. Although FD is generally a non-life-threatening disorder that is not associated with a need for surgery or a reduction in survival, primary care physicians as well as gastroenterologists have to pay attention to FD patients because of its high prevalence and impaired quality of life [1, 5].

Although it has been reported the prevalence of FD in the general population in many countries, uninvestigated people who have dyspepsia symptoms do not necessarily visit to a clinic. Although the majority of patients with unexplained dyspeptic syndrome continue to be symptomatic over the long-term despite periods of remission [6], approximately 1 in 2 subjects is estimated to seek health care for their dyspeptic symptoms at some time in their life [7]. Pain severity and fear of serious diseases appear to be factors associated with consulting behavior [7, 8]. Thus, FD in the general population consists of not only true FD patients but also non-patient FD. Since little is known about the prevalence of patient-FD, this study was performed to clarify the prevalence of FGID, especially FD, in new patients of the outpatient clinic where primary care physicians are working in Japan to better understand the clinical features of FD.

Methods

We analyzed consecutive outpatients who newly visited at Department of General Medicine, Asahikawa Medical College Hospital between April

2004 and March 2009. Asahikawa Medical College Hospital is located in Asahikawa City which has a population of approximately 350,000 in the middle of the Hokkaido Island, the most northern part of Japan. The hospital consists of 602 beds in which approximately 250 doctors are working to cover almost all of medical problems. Among them, 5 or 6 primary care physicians are working at the Department of General Medicine. New patients who come to the hospital by an ambulance are always admitted to the emergency unit in this hospital. Therefore, such patients are not admitted in the department of general medicine. Out of new walk-in patients who visited to outpatient departments in our hospital, the patients who have a letter to a specific department such as the department of Dermatology go to directly to the department. On the other hand, patients who have no letter from other doctors and do not know "I should visit to what department" come first to the Department of General Medicine. Approximately 10 % of all new patients who visited to our department had a letter of introduction from other doctors. Table 1 shows the major ICD-10 [9] diagnosis of all outpatients (n =5813) evaluated in this study. All data were drawn from medical records and Computerized Physician Order Entry System in the hospital. Each parameter such as age, sex and diagnosis was investigated from the source.

FGID was diagnosed when organic diseases had been excluded by a structural or biochemical abnormality in patients who complained of abdominal symptoms. FD was diagnosed when organic diseases had been excluded in patients who complained of upper abdominal symptoms. In the present study, upper abdominal symptoms included upper abdominal pain, abdominal discomfort in the area including the epigastrium, early satiety, fullness and nausea, but not heartburn. IBS was defined as a combination of frequent abdominal pain and altered bowel habit. The abdominal pain had to have 2 of the following 3 characteristics; (1) relieved by defecation, (2) associated with a change in stool frequency; or (3) associated with a change in stool form.

Diagnosis of acute gastritis/duodenitis, so-called acute

gastroduodenal gastric lesions (AGDML) was made by endoscopy with findings of multiple gastric or duodenal erosions or hemorrhagic mucosal lesions according to previous reports [10, 11].

Statistical analysis was made using χ square test. A level of $p < 0.05$ was considered to be statistically significant.

Results

We analyzed consecutive outpatients who newly visited the Department of General Medicine, Asahikawa Medical College Hospital between April 2004 and March 2009. The total number of patients who newly visited the Department of General Medicine, Asahikawa Medical College Hospital during the 5 years was 5813. During the 5 years, time-sequential changes of total numbers of patients, men/women ratio, numbers of patients who chiefly complained with abdominal symptoms were almost constant as shown in Table 2, demonstrating that we do not have to consider a time-dependent changes of patient`s profile under the present study. Out of 5813 patients, 818 (14.1%) patients visited to our department because of their abdominal symptoms. As shown in Figure 1 and Table 3, final diagnosis of 818 patients were FGID (n=320, 39.1%), organic gastrointestinal diseases (n=237, 28.9%), organic non-GI disease (n=135, 16.5%), and others (n=126, 15.4%). Table 2 reveals that the point prevalence of FGID was stable over 5-years (66/1120=5.9 %, 82/1138= 7.2 %, 51/1137= 4.5 %, 61/1275= 4.8 % or 60/1143= 5.2 %, respectively). Among organic GI diseases, the rate of acute enterocolitis was the highest (19.3 %). The rate of each acute gastritis/duodenitis and gastroduodenal ulcers, diverticulitis of the large intestine or gastro-esophageal reflux disease with esophagitis was more than 1 % in patients who had complained of abdominal symptoms. Among non-GI organic diseases, the rate of diseases of the musculoskeletal system was highest (8.3 %). The rate of each disease of urinary tract, mental and behavioral disorders or female pelvic inflammatory diseases was more than 1 % (Table 3).

We next focused into the prevalence of FD. FD was defined as patients who have upper abdominal symptoms without organic diseases. Out of all 5813 patients, 381 (166 males and 214 females)(6.6 %) visited to our department because of their upper abdominal symptoms. Upper abdominal symptoms include upper abdominal pain, upper abdominal discomfort, fullness, early satiety and nausea with or without vomiting. If any organic diseases were excluded, patients who chiefly complained with the symptoms related to upper abdominal symptoms were diagnosed as FD. The rate of final diagnosis in patients who complained with upper abdominal symptoms is shown in Table 4. 170 (44.6 %), 28 (7.3 %) and 6 (1.6 %) patients were diagnosed as FD, IBS and other FGID, respectively. 6 patients had both FD and IBS. In other words, over 50 % of patients who complained of upper abdominal symptoms were diagnosed as FGID including FD and IBS. Organic diseases such as gastric ulcer were identified in 126 patients (33.2%).

Table 5 summarized the data on the gender and age distribution of symptoms, and FGID, FD or IBS in the present study. Basd on the Table 5, the incidence of FD in all patients was 2.9 %. In addition, 320 patients with FGID as described above include FD (n=170) and IBS (n=68). As illustrated in Table 5, with regard to the relationship between sex or age, and the number of patients with FGID, FD or IBS, there was no gender difference in the frequency of FGID in all aged patients (male vs. female, 5.2 % vs 5.7 %), FD (2.9 % vs 3.0 %) or IBS (1.2 % vs 1.1 %). It was also shown the incidence of FD in female patients aged over 70-year old was statistically significant lower ($p = 0.005$) and odds ratio was 2.71 (95% CI; 1.31-5.63). In addition, the prevalence of IBS was higher among males aged under 29-year old. The higher incidence in male patients aged under 29-year old was statistically significant ($p = 0.014$) and odds ratio was 2.41 (95% CI; 1.16-4.99).

Table 6 demonstrates the number of patients who received endoscopy. Out of 170 patients who had been diagnosed as FD, 124 (73 %) received gastroduodenoscopy to exclude organic upper GI diseases

such as gastric ulcer. A third of patients with FD and IBS underwent colon fiberscopy in this study.

Discussion

Definition for dyspepsia remains controversy, particularly about the overlap between heartburn and upper abdominal pain or discomfort [12-15]. There is also a fact that dyspepsia is not a term usually understood by patients [16], and is not measurable as a self-reported item. In particular, the periodicity of symptoms and the rates of persistence of symptoms have not been relatively inconsistence in the literature. For example, investigation was performed during the lifetime [17-19] or short term period (a couple of months) [20, 21]. Thus, the term "functional dyspepsia" used in a number of reports that have been published dose not necessarily mean the same clinical entity. The Rome definition of FD was changed from Rome II to Rome III during the 5-years (2004-2009). Definition of FD depends on studies. For example, Hadler et al. have demonstrated their original definition that FD was defined as 2 or more of the following are present (1) frequent upper pain (> 6 times per year), (2) nausea (at least weekly> 3), (3) vomiting (at least weekly >3), (4) early satiety; and (5) loss of appetite [22]. Thus, their definition was not equal to Roma II or III criteria. Similarly, the definition of FD in this study was not equal to the definition of Rome II or Rome III criteria. We have defined in this study that FD was diagnosed when organic diseases had been excluded in patients who complained of upper abdominal symptoms. In the present study, upper abdominal symptoms included upper abdominal pain, abdominal discomfort in the area including the epigastrium, early satiety, fullness and nausea, but not heartburn. Based upon our definition of FD as described above, the present study was performed.

In the present study, we did not include the duration of symptoms which should be required for diagnosing FD by Rome criteria because the definition of FD in this study was not equal to Rome criteria as described above. We thought that FD is a disease in patients who complained of

upper abdominal symptoms without any organic diseases which can explain the symptoms. In that case, duration of symptoms should not necessarily be included. In fact, although a number of studies have examined the prevalence of FD so far, the duration of symptoms analyzed distributed widely as described above [17-21]. We did therefore not include duration of symptoms in this study.

As described above, we did not use international criteria such as Rome III. FD defined in this study should be described as the investigated patients with dyspepsia. Therefore, one may raise a possibility that the comparisons between this study and other literature regarding the prevalence of FD patients make no sense, suggesting that we have to pay attention to the point especially when the prevalence of FD would be compared between this and other studies.

Although there is an above limitation of interpretation, according to a systematic review by El-Serag et al. [23] studies up to 2002 indicated that in the general population, the prevalence of uninvestigated dyspepsia was in the range 10-40 %. Two studies provided information sufficient to calculate the prevalence of FD and reported that the prevalence of FD was 11.5-14.7 %. One was population-based study in Norway [18, 24]. The lifetime prevalence of uninvestigated dyspepsia in the study was 12.1 per 100. The majority of participants with dyspepsia (88%) agreed to undergo endoscopy. The overall prevalence of FD was calculated to be 14.7 %, which was equivalent to 54 % of dyspepsia who underwent upper endoscopy. In the second study [25] that examined the prevalence of FD, only 20 % of participants with dyspepsia had an upper endoscopy preformed. 93 % of these were reported as having non-ulcer dyspepsia, giving a population-based prevalence of 11.5 %. In the present study, the prevalence of FD was 2.9 % in an outpatient clinic, being too small when compared with the prevalence of FD reported by previous investigators [23]. The difference may come from the difference in the study design. The present results were obtained from a patient-based investigation while previous findings were found by general population-based studies. In

other words, we treated patients but not non-patients who visited to our department and needed medical services. Uninvesigated dyspepsia do not necessarily need to visit to clinics as reported that only one fourth of individuals with dyspepsia seek medical consultation [7, 26, 27]. It is therefore suggested that the finding that the lower prevalence of FD in this study than in the general population may be reasonable.

In addition to the prevalence of FD in general population, a nationwide cross-sectional survey performed in 1997 of 900 American Gastroenterological Association members selected randomly, demonstrated that FGID were the most common disorders (35%) [28]. In other words, approximately one-third of all patients who visit to gastroenterologists were FGID including FD. In the present study, out of 5813 patients who visited to an outpatient clinic where primary care physicians are working, 320 (5.5 %) patients were FGID. If we mention only patients who complained of GI symptoms, 320 (39.1 %) out of 818 patients were FGID, being in good agreement with the rate of FGID among patients who should be treated by gastroenterologists. It is therefore suggested that the prevalence of FGID patients in Japan as evaluated by this present study would not be far from in USA.

It has been reported that a large majority of uninvestigated dyspepsia in the general population do not have organic diseases [29-31]. In the present study, out of 381 patients with upper abdominal symptoms, 126 (33.2 %) patients had organic diseases that could explain their symptoms. In other words, we could not detect any organic diseases in two third of patients who complained of upper abdominal symptoms, supporting the above evidence.

According to a prospective cohort study used data from surveys of random samples of Olmsted County, MN, residents over a means of a 12-year period, the prevalence of FGID was stable over time [30]. The present study in Japan demonstrated that among 5 years, the point prevalence was stable for FGID (5.9, 7.2, 4.5, 4.8 or 5.2 %, respectively), being in agreement with the findings obtained from a prospective cohort

study in the USA, although the study design was quite different between the both reports.

Usage of NSAIDs could possibly contribute to the symptoms [32]. Hollenz et al. have demonstrated that primary care patients with an average risk profile frequently develop dyspeptic symptoms requiring treatment [33]. According to our investigation of medical records, when chronic usage of NSAIDs was recognized, gastroduodenoscopy was usally perforned. However, the present study failed to cover precisely in all cases which he/she takes NSAIDs or not. Out of FD diagnosed in this study, 73 % patients received upper GI endoscopy and revealed no gastroduodenal damage which could explain the abdominal symptoms. Although all patients did not receive endoscopy, a majority of patients who had been diagnosed as FD in the present study indeed received an examination by endoscopy, suggesting that NSAIDs-induced gastroduodenal mucosal lesions were rarely included into the group of patients who had been diagnosed as FD. However, further studies should be needed to clarify whether NSAIDs usage may contribute to the abdominal symptoms even when gastrointestinal mucosal lesions are excluded by endoscopy.

One may speculate that symptoms are overlapped among FD, gastroesophageal reflux disease and IBS and that it is quite difficult to distinguish these diseases by chief complaint. In fact, 6 out of 381 patients who complained of upper abdominal symptoms had both FD and IBS. Thus we believe the data obtained in this study were carefully analyzed from a point of view that there might exist overlapping among FD and IBS. Symptoms are overlapped among FD, gastroesophageal reflux disease and IBS [34]. In this study, heartburn was not included as a symptom of upper abdominal symptoms. Therefore, we could exclude the possibility that gastroesophageal reflux disease was not diagnosed in patients who complained of upper abdominal symptoms. However, it is quite difficult to distinguish these diseases (FD, gastroesophageal reflux disease and IBS) by only symptoms when the patients visited first. In the

present study, we focused into outpatients who needed to visit to clear their medical problems. Therefore, we sometimes could not pick up symptoms other than the chief complaints. For example, we might fail to get information “He/ She felt heartburn recently” when his/her chief complaint was lower abdominal pain. Thus such cases may fail to detect his/her diagnosis may contain both IBS and gastroesophageal reflux disease. Such missing could not be included in the study by questionnaire for non-patients, ie, general population. Again, our clinical study possibly reduces the accuracy of overlapping. Thus clinical limitation should be improved in the future.

Epidemiologic data of IBS from western countries show that IBS is dominant in females [35, 36]. However there was no gender difference in the rate of IBS in this study. According to a recent report from Japan, the prevalence of IBS in females was not significantly but tended to be more ($p < 0.1$) than in males. In addition, an epidemiologic survey in Japan demonstrated that males had a higher prevalence of IBS [37]. These results suggest that there might not be significant gender difference especially in Japan, which could support the present finding that there was no gender difference in the prevalence of IBS in an outpatient clinic. It has been also demonstrated that the prevalence of IBS was relatively high among the 10 to 29-year old in males, being in agreement with a recent publication on Japanese subjects [38].

In contrast, a couple of reports have demonstrated that there is no gender difference in the prevalence of FD [39]. The present study also provided the data that there was no gender difference in the prevalence of FD. With regard to the relationship between age and the prevalence of FD, a couple of studies on the general population have suggested that the prevalence of dyspepsia decreases with age [40-42]. The present study demonstrated that there was no age-dependent difference of prevalence of FD in males. On the other hands, the lower prevalence of FD was observed in females aged over 70 year-old. In females aged over 70 year-old, the prevalence of FD was much lower than that in younger age,

suggesting that there might be an age-dependent change that is associated with the pathophysiology of FD especially in females. Further studies should be needed to elucidate the reason.

The present study demonstrated that among outpatients who complained of abdominal symptoms, approximately 40 % were FGID. In addition, among outpatients who complained of upper GI symptoms, approximately 45% were FD. Thus the present study clearly revealed that the prevalence of FGID, especially FD, is very high in an outpatient clinic where primary care physicians are working in Japan. The epidemiological findings on FGID in outpatients in Japan obtained in this study may help our daily clinical practice.

Acknowledgements

We would like to thank Dr. Y. Saijo (Department of Health Science, Asahikawa Medical College, Japan) for assistance in the statistical analysis.

References

1. Drossman DA. The functional gastrointestinal disorders and the Rome III. Gastroenterology 2006; 130:1377-90.

2. Switz DM. What the gastroenterologist does all day. A survey of a state society's practice. Gastroenterology. 1976;70:1048-50.

3. Mitchell CM, Drossman DA. Survey of the AGA membership relating to patients with functional gastrointestinal disorders. Gastroenterology. 1987;92:1282-4.

4. Tack J, Talley NJ, Camilleri M, Holtmann G, Hu P, Malagelada JR, et al. Functional gastroduodenal disorders. Gastroenterology. 2006; 130:1466-79.

5. Koloski NA, Talley NJ, Boyce PM. The impact of functional gastrointestinal disorders on quality of life. Am J Gastroenterol. 2000;95:67-71.

6. Talley NJ, McNeil D, Hayden A, Colreavy C, Piper DW. Prognosis of chronic unexplained dyspepsia. A prospective study of potential predictor variables in patients with endoscopically diagnosed nonulcer dyspepsia. Gastroenterology. 1987;92:1060-6

7. Koloski NA, Talley NJ, Boyce PM. Predictors of health care seeking for irritable bowel syndrome and nonulcer dyspepsia: a critical review of the literature on symptom and psychosocial factors. Am J Gastroenterol. 2001;96:1340-9.

8. Talley NJ, Boyce P, Jones M. Dyspepsia and health care seeking in a community: How important are psychological factors? Dig Dis Sci. 1998; 43: 1016-22.

9. International Classification of Diseases 10th edition (ICD-10) codes International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Version for 2007. http://www.who.int/classifications/apps/icd/icd10online/

10. Namiki M. Acute ulceration, acute gastric mucosal lesions (AGML) and acute duodenal mucosal lesions (ADML). Nippon Rinsho. 1984; 42: 40-2.

11. Yakabi K, Nakamura T. Acute gastroduodenal mucosal lesion. Nippon Rinsho. 1998; 56: 2336-42.

12. Colin-Jones DG, Bloom B, Bodemar G, Crean G, Freston J, Gugier R, et al. Management of dyspepsia: report of a Working Party. Lancet. 1988; 1: 576–9.

13. Barbara L, Camilleri M, Corinaldesi R, Crean GP, Heading RC, Johnson AG, et al. Definition and investigation of dyspepsia. Consensus of an international ad hoc Working Party. Dig Dis Sci 1989; 34: 1272–6.

14. Talley NJ, Colin-Jones D, Koch KL, Koch M, Nyren O, Stanghellini V. Functional dyspepsia: a classification with guidelines for diagnosis and management. Gastroenterol Int. 1991; 4: 145–60.

15. Talley NJ, Stanghellini V, Heading RC, Koch KL, Malagelada JR, Tytgat GN. Functional gastroduodenal disorders. Gut. 1999; 45(Suppl. 2): II37–42.

16. Bytzer P, Talley NJ. Dyspepsia. Ann Intern Med. 2001; 134: 815–22

17. Bernersen B, Johnsen R, Straume B, Burhol PG, Jenssen TG, Stakkevold PA. Towards a true prevalence of peptic ulcer: the Sorreisa gastrointestinal disorder study. Gut. 1990; 31: 989–92.

18. Bernersen B, Johnsen R, Straume B. Non-ulcer dyspepsia and peptic ulcer: the distribution in a population and their relation to risk factors. Gut. 1996; 38: 822–5.

19. Johnsen R, Straume B, Forde OH. Peptic ulcer and non-ulcer dyspepsia — a disease and a disorder. Scand J Prim Health Care. 1988; 6: 239–43.

20. Westbrook JI, Talley NJ. Empiric clustering of dyspepsia into symptom subgroups: a population-based study. Scand J Gastroenterol. 2002; 37: 917–23.

21. Moayyedi P, Forman D, Braunholtz D, Feltbower R, Crocombe W, Liptrott M, et al. The proportion of upper gastrointestinal symptoms in the community associated with Helicobacter pylori, lifestyle factors, and nonsteroidal anti-inflammatory drugs. Leeds HELP Study Group. Am J Gastroenterol. 2000; 95: 1448–55.

22. Halder SL, Locke GR 3rd, Schleck CD, Zinsmeister AR, Melton LJ 3rd, Talley NJ. Natural history of functional gastrointestinal disorders: a 12-year longitudinal population-based study. Gastroenterology. 2007; 133:.799-807.

23. El-Serag HB, Talley NJ. Systematic review: the prevalence and clinical course of functional dyspepsia. Aliment Pharmacol Ther. 2004; 19: 643-54.

24. Bernersen B, Johnsen R, Straume B, Burhol PG, Jenssen TG, Stakkevold PA. Towards a true prevalence of peptic ulcer: the Sørreisa gastrointestinal disorder study. Gut. 1990; 31: 989-92.

25. Jones R, Lydeard S. Prevalence of symptoms of dyspepsia in the community. BMJ. 1989;298:30-2.

26. Talley NJ, Zinsmeister AR, Schleck CD, Melton LJ 3rd. Dyspepsia and dyspepsia subgroups: a population-based study. Gastroenterology. 1992;102:1259-68.

27. Koloski NA, Talley NJ, Boyce PM. Epidemiology and health care seeking in the functional GI disorders: a population-based study. Am J Gastroenterol. 2002; 97: 2290-9.

28. Russo MW, Gaynes BN, Drossman DA. A national survey of practice patterns of gastroenterologists with comparison to the past two decades. J Clin Gastroenterol. 1999;29:339-43.

29. Klauser AG, Voderholzer WA, Knesewitsch PA, Schindlbeck NE, Müller-Lissner SA. What is behind dyspepsia? Dig Dis Sci. 1993; 38:147-54.

30. Johnsen R, Bernersen B, Straume B, Førde OH, Bostad L, Burhol PG. Prevalences of endoscopic and histological findings in subjects with and without dyspepsia. BMJ. 1991;302:749-52.

31. Talley NJ, Silverstein MD, Agréus L, Nyrén O, Sonnenberg A, Holtmann G. AGA technical review: evaluation of dyspepsia. American Gastroenterological Association. Gastroenterology. 1998;114:582-95.

32. Allison MC, Howatson AG, Torrance CJ, Lee FD, Rusell RI. Gastrointestinal damage associated with the use of nonsteroidal anti-inflammatory drugs. N Engl J Med. 1992; 327: 749-54.

33. Hollenz M, Stolte M, Leodolter A, Labenz J. NSAID-associated dyspepsia and ulcers: a prospective cohort study in primary care. Dig Dis. 2006; 24: 189-94.

34. Geeraerts B, Tack J. Functional dyspepsia: past, present, and future. J Gastroenterol. 2008; 43: 251-5.

35. Drossman DA, Whitehead WE, Camilleri M. Irritable bowel syndrome: a technical review for practice guideline development. Gastroenterology. 1997;112:2120-37.

36. Thompson WG, Heaton KW, Smyth GT, Smyth C. Irritable bowel syndrome in general practice: prevalence, characteristics, and referral. Gut. 2000; 46: 78-82.

37. Itasaka T, Takahashi T. The epidemiological investigation for irritable bowel syndrome using a group examination. Ther Res. 1996; 17: 4059-64.

38. Shinozaki M, Fukudo S, Hongo M, Shimosegawa T, Sasaki D, Matsueda K, et al. IBS Club. High prevalence of irritable bowel syndrome in medical outpatients in Japan. J Clin Gastroenterol. 2008;42:1010-6.

39. Drossman DA, Li Z, Andruzzi E, Temple RD, Talley NJ, Thompson WG, et al. U.S. householder survey of functional gastrointestinal disorders. Prevalence, sociodemography, and health impact. Dig Dis Sci. 1993;38:1569-80.

40. Agréus L, Svärdsudd K, Nyrén O, Tibblin G. The epidemiology of abdominal symptoms: prevalence and demographic characteristics in a Swedish adult population. A report from the Abdominal Symptom Study. Scand J Gastroenterol. 1994; 29: 102-9.

41. Kay L, Jørgensen T. Epidemiology of upper dyspepsia in a random population. Prevalence, incidence, natural history, and risk factors. Scand J Gastroenterol. 1994; 29: 2-6

42. Chang L, Toner BB, Fukudo S, Guthrie E, Locke GR, Norton NJ, et al. Gender, age, society, culture, and the patient's perspective in the functional gastrointestinal disorders. Gastroenterology. 2006 ; 130: 1435-46.

Figure legend

Figure 1

Schematic representation of diagnostic flow.

Table 1 International Classification of Diseases (ICD)-10 diagnosis in 5813 patients

Chapter	Blocks	Rate (%)	Title
I	A00-B99	14.5	Certain infectious and parasitic diseases
II	C00-D48	6.7	Neoplasms
III	D50-D89	1.1	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
IV	E00-E90	4.2	Endocrine, nutritional and metabolic diseases
V	F00-F99	10.7	Mental and behavioural disorders
VI	G00-G99	7.4	Diseases of the nervous system
VII	H00-H59	0.2	Diseases of the eye and adnexa
VIII	H60-H95	5.2	Diseases of the ear and mastoid process
IX	I00-I99	7.1	Diseases of the circulatory system
X	J00-J99	9.9	Diseases of the respiratory system
XI	K00-K93	10.1	Diseases of the digestive system
XII	L00-L99	6.9	Diseases of the skin and subcutaneous tissue
XIII	M00-M99	9.3	Diseases of the musculoskeletal system and connective tissue
XIV	N00-N99	2.8	Diseases of the genitourinary system
XV	O00-O99	0.5	Pregnancy, childbirth and the puerperium
XVI	P00-P96	0.1	Certain conditions originating in the perinatal period
XVII	Q00-Q99	0	Congenital malformations, deformations and chromosomal abnormalities
XVIII	R00-R99	3.1	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified
XIX	S00-T98	0.2	Injury, poisoning and certain other consequences of external causes
XX	V01-Y98	0	External causes of morbidity and mortality
XXI	Z00-Z99	0	Factors influencing health status and contact with health services
XXII	U00-U99	0	Codes for special purposes

Table 2 Number of patients with abdominal symptoms and diagnosed as FGID from 2004 to 2009

		04-05	05-06	06-07	07-08	08-09	Total (04-09)		
(A) Patients		**1120**	**1138**	**1137**	**1275**	**1143**	**5813**		
	Male	**484**	**483**	**470**	**519**	**458**	**2414**		
	Female	**636**	**655**	**667**	**756**	**685**	**3399**		
								(B/A) **%**	
(B) abdominal symptoms		**170**	**162**	**152**	**176**	**158**	**818**	**14.1**	
	Male	**85**	**74**	**69**	**72**	**60**	**360**	**14.9**	
	Female	**85**	**88**	**83**	**104**	**98**	**458**	**13.5**	
								(C/A) **%**	(C/B) **%**
(C) FGID		**66**	**82**	**51**	**61**	**60**	**320**	**5.5**	**39.1**
	Male	**25**	**28**	**36**	**18**	**18**	**125**	**5.2**	**34.7**
	Female	**41**	**54**	**15**	**43**	**42**	**195**	**5.7**	**42.6**

Table 3 Diagnosis of 818 patients who had GI symptoms

Diagnosis	Number	(%)
Functional gastrointestinal disorders (FGID)	**320**	**39.1**
organic GI diseases	**237**	**28.9**
Acute enterocolitis	155	19.3
Acute gastritis/ Duodenitis Gastric/duodenal ulcer	27	3.4
Diverticulitis of large intestine	10	1.2
Gastro-oesophageal reflux disease with oesophagitis	9	1.1
Ischaemic colitis	7	0.9
Inguinal hernia	7	0.9
Acute pancreatitis	5	0.6
Pancreatic cancer	5	0.6
Ileus	3	0.4
Acute appendicitis	3	0.4
Acute cholecystitis	3	0.4
Esophageal/gastric cancer	3	0.4
organic non-GI diseases	**135**	**16.5**
Diseases of the musculoskeletal system	67	8.3
Calculus or infection of urinary tract	27	3.4
Mental and behavioural disorders	17	2.1
Female pelvic inflammatory diseases	12	1.5
Preganancy	3	0.4
Dissection of aorta	3	0.4
Herpes zoster	3	0.4
Hyper/hypo-thyroidism	3	0.4
others	**126**	**15.4**

Table 4 Final diagnosis in patients who complained with upper abdominal symptoms

Number of patients (04-09) with upper GI symptoms	Diganosis		
381	FD	170	(44.6%)
	IBS	28	(7.3%)
	Other FGID	6	(1.6%)
	Organic diseases	126	(33.2%)
	unclassified	57	(15.0%)

* Patients with both FD and IBS (n= 6) were included.

Table 5 Gender and age distribution of abdominal symptoms, FGID, upper abdominal symptoms, FD and IBS

age	(A) patients	(B) abdominal symptoms (B/A %)	(C) FGID	C/A %	C/B %	(D) Upper abdominal symptoms (D/A %)	(E) FD	E/A %	E/D %	(F) IBS	F/A %
Male											
-9	38	0	0	0	0	0	0	0	0	0	
10-19	140	15 (10.7%)	8	5.7%	53.3%	11 (7.6%)	4	2.9%	36.4%	2	1.4%
20-29	409	74 (18.1%)	18	4.4%	24.3%	35 (8.6%)	8	2.0%	22.9%	11	2.7% **
30-39	410	57 (13.9%)	21	5.1%	36.8%	24 (5.9%)	13	3.2%	52.0%	5	1.2%
40-49	249	40 (16.1%)	17	6.8%	42.5%	20 (8.0%)	12	4.0%	60.0%	2	0.8%
50-59	342	46 (13.5%)	18	5.3%	39.1%	24 (7.0%)	9	2.6%	37.5%	3	0.9%
60-69	387	54 (14.0%)	19	4.9%	35.2%	24 (6.2%)	12	2.6%	50.0%	4	1.0%
70-79	320	45 (14.1%)	18	5.6%	40.0%	20 (6.3%)	8	2.5%	40.0%	2	0.6%
80-	119	19 (16.0%)	6	5.0%	31.6%	8 (6.7%)	3	2.5%	37.5%	1	0.8%
all	2414	360 (14.9%)	125	5.2%	34.7%	166 (6.9%)	69	2.9%	41.6%	30	1.2%
Female											
-9	19	1 (5.2%)	0	0	0	0	0	0	0	0	
10-19	203	32 (15.8%)	14	6.9%	43.8%	21 (9.3%)	9	4.4%	42.9%	4	2.0%
20-29	580	100 (17.2%)	33	5.7%	33.0%	43 (7.4%)	16	2.8%	37.2%	8	1.4%
30-39	575	82 (14.3%)	27	4.7%	32.9%	34 (5.9%)	15	2.6%	44.1%	4	0.7%
40-49	357	57 (16.0%)	29	8.1%	50.9%	24 (6.7%)	12	3.4%	50.0%	7	2,0%
50-59	523	62 (11.9%)	32	6.1%	51.6%	34 (6.5%)	23	4.4%	67.6%	2	0.4%
60-69	509	57 (11.2%)	33	6.5%	57.9%	30 (5.9%)	18	3.5%	60.0%	6	1.2%
70-79	464	47 (10.1%)	20	4.3%	42.6%	20 (4.3%)	5	1.1% *	25.0%	6	1.3%
80-	169	20 (11.8%)	7	4.1%	35.0%	9 (5.3%)	3	1.8%	33.3%	1	0.6%
all	3399	458 (13.5%)	195	5.7%	42.6%	214 (6.3%)	101	3.0%	47.2%	38	1.1%
Total	5813	818 (14.1%)	320	5.5%	39.1%	380 (6.5%)	170	2.9%	44.6%	68	(1.2%)

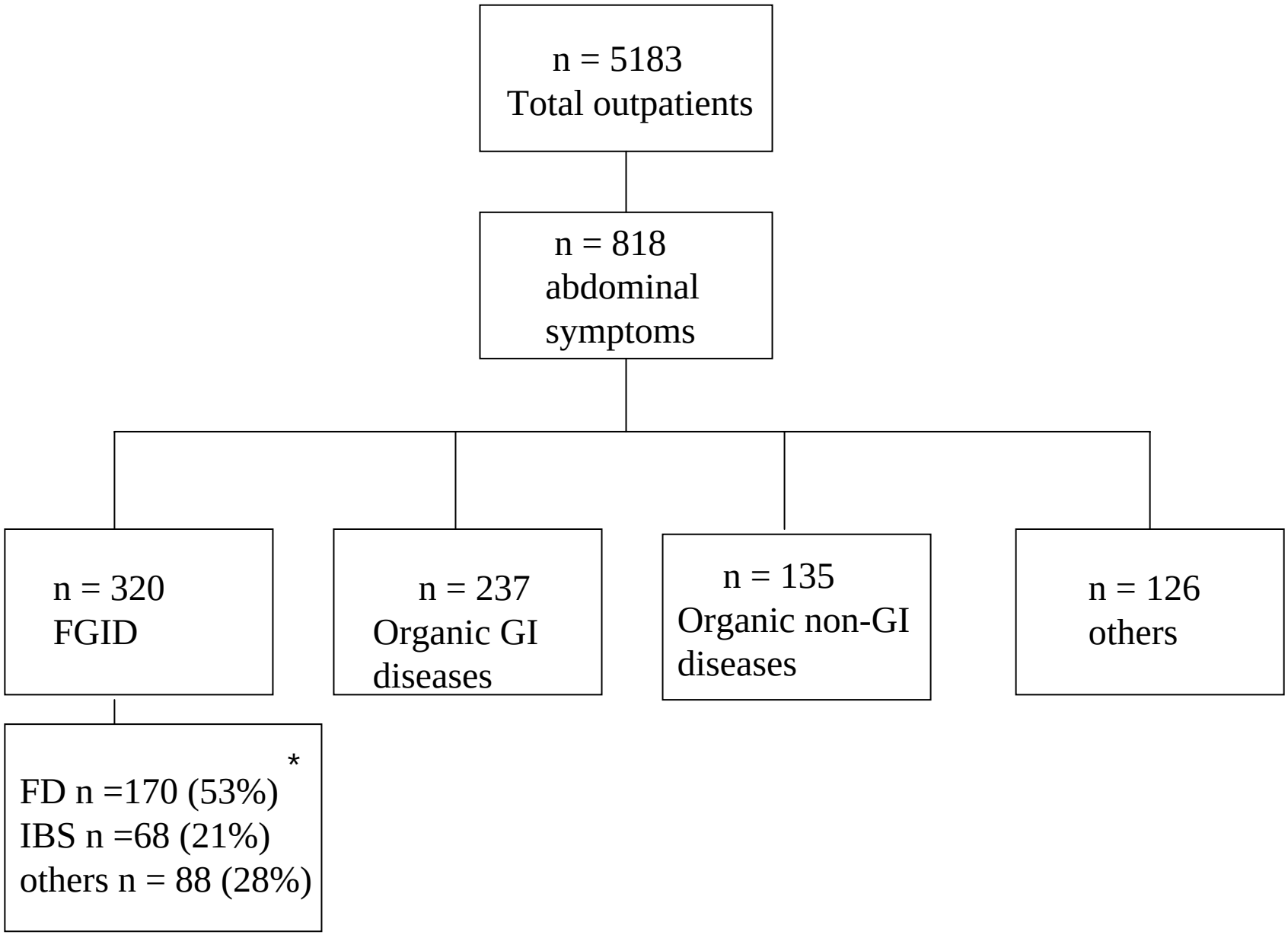
* $p < 0.01$ by χ square test between females aged over 70 and under 69-year old.
** $p < 0.01$ by χ square test between males aged under 29 and over 30-year old.

Table 6 Number of patients who received examination by endoscopy

	N	GF	CF	both GF+CF
FD	170	124 (73.0%)	56 (33.0%)	48 (28.2%)
IBS	68	17 (25.0%)	25 (36.8%)	12 (17.6%)

GF; gastroduodenofiberscopy CF; colon fiberscopy

Figure 1



* 6 patients have both FD and IBS