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Achalasia in Iceland, 1952–2002: An Epidemiologic Study

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Abstract Limited epidemiologic information is available on achalasia in Northern European countries and worldwide. Achalasia has never been studied in Iceland. This study aimed to evaluate the epidemiology of achalasia in Iceland and compare the findings to other studies. All patients diagnosed with achalasia in Iceland from 1952 to 2002 were identified and patients demographic and clinical history was reviewed. The incidence and prevalence of achalasia were obtained. Sixty-two achalasia patients were diagnosed during the 51-year study period, 33 males and 29 females. The mean age at diagnosis was 45.2 years (range, 13.2–85.4 years). The median duration of symptoms before diagnosis was 2.0 years. The mean prevalence was 8.7 cases/100,000 and the overall incidence was 0.55 case/100,000/year. This is the first national epidemiological study of achalasia in a genetically homogeneous population, spanning over half a century. The epidemiology of achalasia in Iceland is similar to that in most other reported studies.

Keywords Achalasia · Epidemiology · Incidence · Prevalence · Demography

Introduction

Achalasia is an esophageal motility disorder of unknown etiology [2, 16]. Despite its being recognized more than three centuries ago, limited information is available regarding the epidemiology of achalasia worldwide [9, 20]. Due to the rarity of the disease, prospective epidemiologic studies are difficult to conduct. The available epidemiologic studies are mostly retrospective and based on hospital records from local areas in a few countries [14]. In many of the studies achalasia was not defined or individual cases reviewed. The true incidence of achalasia might therefore be either over- or underestimated.

Iceland is an island in the North Atlantic ocean, just south of the Artic Circle. The Icelandic population is descended from a relatively small group of settlers who arrived from Norway and the British Isles beginning in the ninth century, and immigration has been very limited since that time. Iceland is well suited for nationwide epidemiologic studies due to the genetically homogeneous population and national health-care system, with an excellent medical record system maintained for many decades and easy accessibility of health information [6]. No information is available regarding the epidemiology of achalasia in Iceland. The purpose of this study was to investigate the epidemiology of achalasia in Iceland and to compare the findings to published data.

Methods

Patients

All cases in Iceland with the ICD discharge codes for achalasia (ICD 530.0 and ICD K22.0) were identified through either computerized database or manual searching (by the author) of discharge diagnosis lists for the 51-year period 1952–2002. In addition, gastroenterologists and surgeons known to manage achalasia patients were contacted

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regarding all their personal patients with achalasia. The author traveled throughout the country and personally reviewed all ICD codes and medical records of patients with the diagnosis of achalasia. During the study period, the population of Iceland increased from 148,080 in 1952 to 287,559 in 2002.

Inclusion criteria

The criteria used for the diagnosis of achalasia are listed below. Criteria 1 and 2 had to be present in addition to 3 or 4.

1. Symptoms. Dysphagia. Additional symptoms included food regurgitation, weight loss, chest pain, recurrent aspiration pneumonia, and cough.
2. Exclusion of other esophageal diseases accounting for the symptoms, such as gastroesophageal reflux disease, nonachalasia esophageal dysmotility disorders, and benign or malignant stictures.
3. Barium esophagogram showing a benign-appearing narrowing at the gastroesophageal junction with or without esophageal body dilation and delayed esophageal barium emptying to the stomach.
4. Esophageal manometry showing incomplete relaxation of the lower esophageal sphincter (LES), with or without elevated basal LES pressure, and aperistalsis of the esophageal body.

Data collection

The time of diagnosis of achalasia was considered to be the date of the confirming diagnostic test, either barium esophagogram or esophageal manometry. Due to the inaccuracy of retrospective data, the beginning of the patient symptoms was not used as the date of diagnosis.

The following information was extracted from the patients medical records: age at the time of diagnosis, gender, weight and height, occupation, smoking and alcohol use; duration and type of symptoms, amount of weight loss, results of diagnostic tests, treatment and family history.

Statistical methods

Calculation of the mean annual incidence and prevalence for each period is based on the mean population in respective time period (Statistics Iceland, National Statistical Institute of Iceland). The number of cases at each time is assumed to follow approximately a Poisson distribution and the 95% confidence limits for the number of cases per 100,000 are calculated accordingly. The mean annual incidence is compared between periods by chi-square test. The level of significance was set at 0.05.

Results

Study population

Between 1952 and 2002, 151 patients were identified with an ICD code for achalasia. All medical records were available for review. Of this group, only 62 (41%) met the true criterion and were considered to have a definite diagnosis of achalasia. Eighty-nine patients who had an ICD code diagnosis of achalasia were excluded. None of the excluded patients were considered to have a probable or possible diagnosis of achalasia. Most patients had an incorrect ICD coding. In many instances, medical records obtained several years after the initial achalasia ICD coding did not suggest the diagnosis of achalasia in the excluded patients. Of the excluded patients, 30 patients had gastroesophageal reflux disease, with or without peptic esophageal stricture, six patients had pseudoachalasia due to retroperitoneal lymphoma (1), gastric lymphoma (1), lung cancer (1), breast cancer (1), and adenocarcinoma at the gastroesophageal junction (2), 6 patients had nonspecific esophageal motility disorder, 2 patients had diffuse esophageal spasm, 3 patients had esophageal meat bolus impaction, 2 patients had caustic esophageal stricture, 2 patients had esophageal diverticulum, 2 patients had pyloric stenosis, and 1 patient had cricopharyngeal achalasia. Thirty-five patients had other miscellaneous causes such as dental caries, transient dysphagia, epigastric or chest pain, peptic ulcer disease, and esophageal cancer without documented pseudoachalasia.

Demographic and clinical characteristics

Of the 62 patients with achalasia, there were 33 males and 29 females, for a male-female ratio of 1:1.1 (Table 1). All patients were of Icelandic descendants.

The mean age at diagnosis was 45.2 years (range, 13.2–85.4 years) (Fig. 1). The median duration of symptoms before diagnosis was 2.0 years (range, 0.7 month to 30 years). The mean age at symptom onset was 41 years (range, 12.2–80.5 years). In four patients the symptom duration could not be obtained.

The patients' symptom profile is reported in Table 1. All patients had dysphagia, 69% had both solid and liquid food dysphagia, and 31% had solid food dysphagia only.

No weight data were obtainable for 10 patients. Thirty-two patients (62%) had no weight loss, whereas 20 patient (38%) reported a median 12-kg weight loss (range, 3–44 kg). One patient was diagnosed with squamous cell cancer of the esophagus, 40 years after the diagnosis of achalasia. There was a trend for the diagnosis of achalasia to be delayed in the first period compared to the later one ($P = 0.07$).

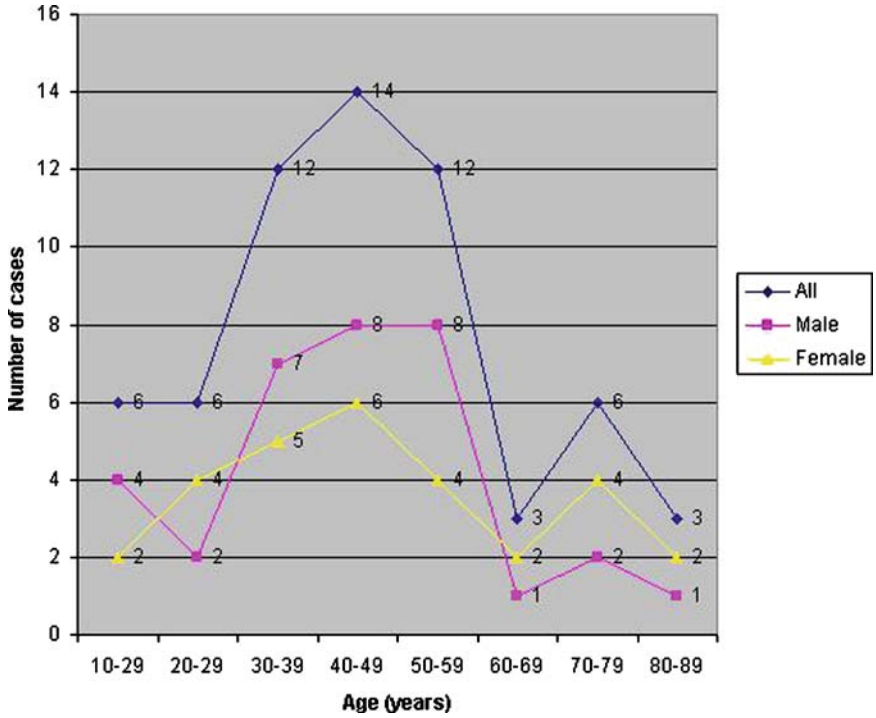

Fig. 1 Age of achalasia patients at time of diagnosis ($n = 62$)

Patient investigations

All patients had either a barium esophagogram and/or esophageal manometry, 97% had a barium esophagogram, and 34% had esophageal manometry. The barium esophagogram typically revealed a benign-appearing stenosis at the gastroesophageal junction area. In most cases the width of the esophagus was not measured. Seven patients (11%) could be classified as having end-stage achalasia or megaesophagus, according to the radiology description ("enormous dilation of the esophagus"). In addition to the barium esophagogram, most patients (87%) had esophagoscopy performed, further excluding a malignant or benign peptic stricture.

Esophageal manometry has been available in Iceland since 1989. The esophageal manometry performed in 21 patients revealed a mean resting LES pressure of 46.4 mm Hg (range, 20–80 mm Hg). There was absent or incomplete LES relaxation in all patients. All patients had aperistalsis of the esophageal body, with low-amplidude contractions or isobaric waves. Only one patient could be classified as having vigorous achalasia (contraction amplitude, >40 mm Hg). For nine patients, surgical specimens from the cardiomyotomy site were available, all with histopathology changes suggestive of achalasia [5].

Table 1 Demographics and clinical history of achalasia patients in Iceland, 1952–2002

	Male ($n = 33$)	Female ($n = 29$)	All ($n = 62$)
Demographics			
Mean age at diagnosis	43.7 yr	46.8 yr	45.2 yr
Range	14–85.4 yr	13.2–82.1 yr	13.2–85.4 yr
Smoking	11/21 (52%)	10/18 (56%)	21/39 (54%)
Alcohol use	10/21 (48%)	2/9 (22%)	12/30 (40%)
Symptoms			
Duration (median)	1.5 yr	2.0 yr	2.0 yr
Range	2 mo–30 yr	0.7 mo–28 yr	0.7 mo–30 yr
Dysphagia	100	100	100
Solids and liquids	24 (73%)	19 (66%)	43 (69%)
Solids	9 (27%)	10 (34%)	19 (31%)
Regurgitation	16 (48%)	14 (48%)	30 (48%)
Chest pain	17 (52%)	15 (52%)	32 (51%)
Heartburn	6 (18%)	1 (3%)	7 (11%)
Cough	4 (12%)	1 (3%)	5 (8%)
Weight loss	9/28 (32%)	11/24 (46%)	20/52 (38%)
Median weight loss	10 kg	7 kg	12 kg
Weight loss range	4–20 kg	3–44 kg	3–44 kg

Patient treatment

All patients received either surgical or dilation treatment or both. Thirty-nine (63%) patients received various types of esophageal dilation treatment. The average number of dilations per patient was 2.0 (range, 1–6). Pneumatic (achalasia Rigiflex dilator) dilation was used in 16 (41%) patients. Other dilation methods included bouginage and through-the-scope balloon dilators.

Forty-one (66%) patients had esophageal cardiomyotomy. Open Heller cardiomyotomy was the surgical approach in 31 (76%) patients, of which a thoracotomy approach was used in 24 (73%) cases and a transabdominal approach in 7. Laparoscopic cardiomyotomy was performed in 10 patients (24%). Since 1993, all surgically treated patients had laparoscopic cardiomyotomy surgery. The median time from diagnosis until surgery was 8 months (range, 1 month to 17 years). Eighteen (44%) of the surgically treated patients had received one or more dilation treatments prior to surgery, however, only four of these had reveived pneumatic dilation.

Medication was tried in 15 (24%) patients with limited success. Calcium channel blockers, nitrates, β blockers, and antispasmotics were the medications most commonly prescribed. Only one patient was treated with intersphincteric botulinum toxin injection; he subsequently had laparoscopic cardiomyotomy.

Prevalence

The mean prevalence was 8.7 cases/100,000 (95% confidence interval [CI]: 8.1–9.2). The 10-year-period prevalence and 95% CIs are shown in Fig. 2. The mean age of the 22 patients who died during the study period was 71.2 years (range, 49.2–96.2 years).

Incidence

The overall incidence of achalasia was 0.55 case/100,000/year (95% CI: 0.42–0.71) during the 51-year period. The yearly incidence was quite variable. During some years no cases were identified, for instance, from 1966 to 1969 no cases were diagnosed, whereas in 2002 four cases were diagnosed. The mean annual incidence for each 10-year period did not vary greatly, being 0.50 case/100,000/year for 1952–1962 and 0.73 case/100,000/year for 1993–2002 (Fig. 3). There was no significant difference in incidence between the 10-year periods ($P = 0.27$)

Discussion

This is the first epidemiologic study of achalasia in one country over a long time period. Achalasia is a rare condition, with an incidence of 0.55 case/100,000 population per year in Iceland. No epidemiologic studies on achalasia are available for comparison from other northern European countries. The incidence of achalasia in Iceland is remarkably similar to that reported in studies from the United States, the United Kingdom, and Israel (Table 2) [1, 3, 4, 7, 8, 10, 12, 15, 19].

Two of the previously reported studies are prospective and the others are retrospective, like ours. Because of the scant population, it would take decades to perform a prospective study on achalasia in Iceland.

The main strengths of this retrospective study are that all achalasia patients are diagnosed and managed at only a few hospitals in Iceland. Hospital diagnostic codes are available from all these hospitals since 1952 and all medical records could be retrieved for review. The main limitation is that cases could be missed due to incorrect coding. The fact that all diagnostic discharge codes are done by physicians in Iceland, rather than clerical personal, minimizes the chance that a wrong code would be reported for a rare disease like achalasia. In only three retrospective studies have all medical records of diagnosed achalasia patients been reviewed if available. In two of them, some but not all charts were reviewed. In our experience all medical charts from patients with the achalasia ICD code need to be reviewed to establish the correct diagnosis. About two-thirds of the patients in this study with the ICD coding of achalasia did not have the disease. In addition, a clear statment of case definition needs to be established. In our study clear criteria were made ad hoc for the diagnosis of achalasia.

No significant change in the incidence of achalasia was observed between the 10-year periods in Iceland during the 51-year study period. Three other long-term studies, ranging from 18 to 50 years, have reported an unchanged or a slightly increased incidence over time [3, 10, 15].

The slightly higher incidence in the last decade is probably related to the increased awareness of the disease, the higher number of gastroenterologists available, and the increased number of procedures, such as esophageal manometry and endoscopy. However, no statistical difference was found in incidence between the 10-year time periods. On the other hand, the lower incidence in the first decade might be related to missed cases related to incomplete medical charting or patients' not seeking medical attention. The great variation in new achalasia cases from year to year may also explain the variation in the incidence rates between the decades.

The mean prevalence of 8.7 cases/100,000 is similar to the reported prevalence figures from the United Kingdom and Israel and for European patients in New Zealand [1, 12, 13]. The increase in prevalence from 1952 reflects the low mortality from achalasia, resulting in more patients being added to the existing patient pool in later periods and therefore an increased prevalence of achlasia with age. The last two decades of the study period are therefore more likely to reflect the true prevalence of the disease.

Similarly to most other reports, no gender difference was noted and the mean age at diagnosis was also similar [1, 3, 7, 8, 15]. The median duration of symptoms at diagnosis of 2 years is similar to that in two prospective studies [7, 8]. Most studies report a longer duration of symptoms. The mean duration of symptoms in 12 studies, involving over 1200 patients, was 4.6 years [2]. However, as frequently reported, there is

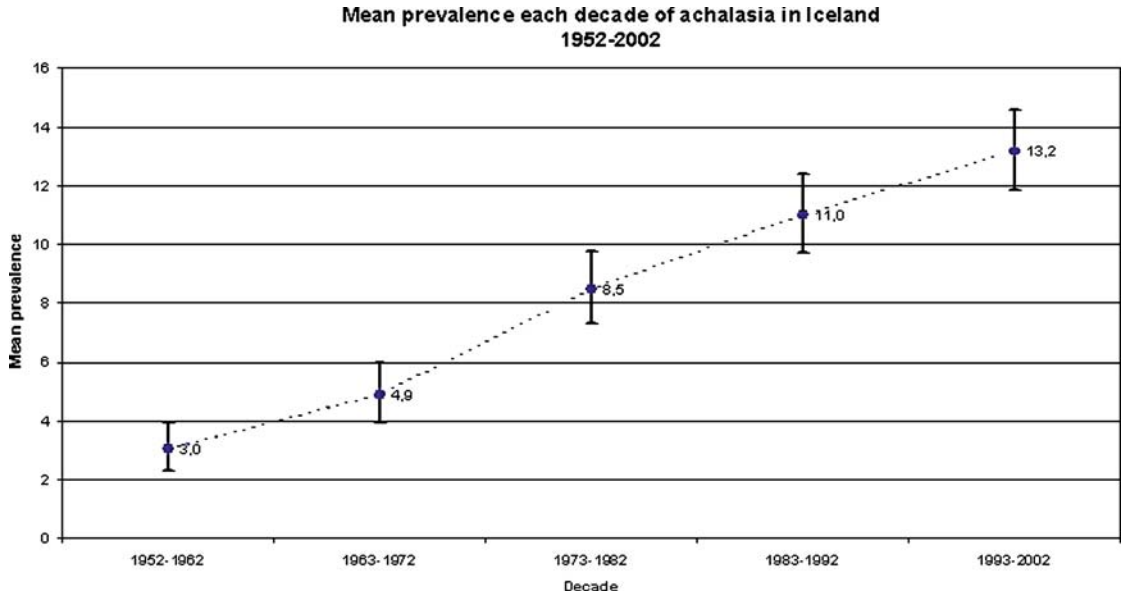

Fig. 2 Mean prevalence of achalasia in Iceland for each decade, 1952–2002

a wide range of symptom duration in achalasia as demonstrated in this study, where one patient reported a 30-year history of dysphagia before diagnosis. This wide range of symptom duration is due to many factors including patients' threshold for seeking medical attention, the availability and cost of medical care, and the rapidity with which the disease progresses (e.g., food bolus impaction). The relatively short duration of symptoms at diagnosis in Iceland may be related to the national health-care system and easy accessibility of medical care. There was no significant difference in the age or duration of symptoms at diagnosis between patients diagnosed before 1972 and those diagnosed after the first two decades. A delay in diagnosis and treatment might have perhaps been expected 50 years ago, which was not the case in our study.

As expected, the clinical presentation of solid and liquid food dysphagia, regurgitation, and weight loss in our patient group is similar to that in other reports [8, 17, 18]. A retrospective review of clinical history is not as accurate as a prospective evaluation.

No familial cases were identified. Although familial cases have been reported, they represent less than 1% of all

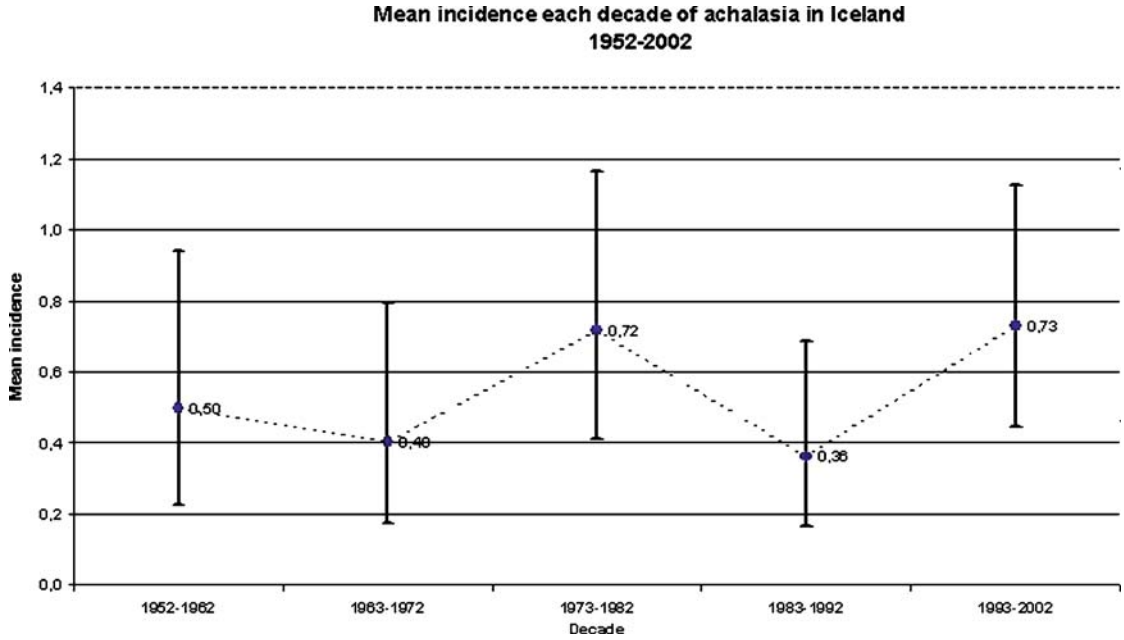

Fig. 3 Mean incidence of achalasie in Iceland for each decade, 1952–2002

Table 2 Published studies of incidence and prevalence of achalasia

Study population [ref. no.]	No. of cases	Period	Incidence (cases/100,000/yr)	Prevalence (cases/100,000/yr)
USA				
Rochester [3]	11	1935–1964	0.6	
Virginia [4]	31	1975–1978	0.6	
United Kingdom				
Scotland [12]	699	1974–1983	1.1/1.2[a]	11.2
Oxford [12]	216	1974–1983	0.9/0.9[a]	9.99
Cardiff [15]	48	1926–1977	0.4	
Nottingham [10]	53	1966–1983	0.5	8
Edinburgh [8]	25	1986–1991	0.8	
Israel [1]	162	1973–1978	0.8	7.9–12.6
New Zealand [13]	152	1980–1984	1.0	
Zimbabwe [19]				
Bulawayo and Harare	25	1974–1983	0.03	
Singapore [7]	49	1989–1996	0.3	1.8
Iceland	62	1952–2002	0.55	8.7

[a]Male/female.

achalasia cases [21]. Most studies have failed to demonstrate a familial occurence [1, 8, 11]. This suggests that the disease is usually acquired rather than inherited.

The majority (66%) of our patients received surgical treatment, and more than half of them had not received dilation treatment prior to surgery. This is probably due to the fact that until 1988 the majority of Icelandic patients were treated by surgeons, and since 1993 the referral of achalasia patients from gastroenterologists to experienced laparoscopic surgeons has become more common.

In summary, this is the first and only study of achalasia in Iceland. The epidemiology and demographics of Icelandic achalasia patients are quite similar to those in other reports. No clue to the etiology of achalasia was found in the present study. Further epidemiologic studies are needed, paricularly from other Northern Euoropean contries.

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