

INDIGENOUS GREENLANDERS HAVE A HIGHER SERO-PREVALENCE OF IgG ANTIBODIES TO *HELICOBACTER PYLORI* THAN DANES

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ABSTRACT

Objective: To assess the sero-prevalence of IgG antibodies to *Helicobacter pylori* (*H. pylori*) in Greenlanders and compare with the sero-prevalence in Caucasian Danes.

Methods: 71 randomly recruited indigenous Greenlanders (29 men) with a median age of 39 years (range 22-76), living in the capital, Nuuk, and the town of Ilulissat, and participating in a population survey carried out in 1993-1994. The results were compared with those obtained in a 1983-1984 population survey in Copenhagen County, comprising 2794 Caucasian Danes (1425 men) with a median age of 41 years (range 30-60). Serum IgG antibody levels to *H. pylori* were determined by an indirect enzyme-linked immunosorbent assay in 1995 and categorised as negative, borderline (equivocal), or positive.

Results: Greenlanders: 48.3 % of men and 45.2% of women had positive serum IgG antibody levels to *H. pylori*. In the entire series, 46.5% had positive IgG antibody levels, 25.4% displayed borderline antibody levels and 28.2% had negative antibody levels. There were no age, or gender differences concerning the prevalences of the three *H. pylori* IgG antibody subgroups. Danes: 25.6 % of men, and of women, had positive IgG antibody levels against *H. pylori*. In the entire series, 25.6% had positive IgG antibody levels, 19.0% displayed borderline antibody levels and 55.4% had negative antibody levels. There was no gender difference concerning the sero-prevalence of IgG antibodies, but the sero-prevalence increased significantly with age. The prevalence of positive serum IgG antibodies against *H. pylori* was markedly higher in Greenlanders than in Danes ($p < 0.0001$).

Conclusion: Indigenous Greenlanders have a significantly higher infection rate with *H. pylori* than Danes. The results suggest that Greenlanders become infected with *H. pylori* early in life.

Key words: Denmark, Eskimos, ferritin, Greenland, *Helicobacter pylori*, hemoglobins, men, women

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INTRODUCTION

Infection with *Helicobacter pylori* (*H. pylori*) is known to be a major risk factor for the development of chronic gastritis, peptic ulcer disease and gastric cancer (1). There are only a few studies addressing the prevalence of *H. pylori* infection, assessed by gastroscopy (2, 3), or by the analysis of serum IgG antibodies to *H. pylori*, in Inuit populations (4, 5). The aim of the present investigation was to evaluate the frequency of *H. pylori* infection in indigenous Greenlanders living on the West Coast of Greenland, by measuring serum IgG antibodies to *H. pylori*. The results were compared with those obtained in a Danish Caucasian population (6).

MATERIAL AND METHODS

Subjects

The random selection of the participants has been described in details elsewhere (7). 264 adult, indigenous Greenlanders (persons who consider themselves to be Greenlanders, or of mixed Greenlandic/Danish descent), selected from those surveyed during the Health Interview Survey carried out in Greenland in 1993-1994, were randomly recruited from two locations in Western Greenland: 1) The capital, Nuuk, with the most westernised living conditions. 2) The town of Ilulissat with mixed western and native living conditions. Whole blood and serum samples were taken from 230 participants. Most blood and serum samples had been used for other purposes. Random serum samples were available from 71 subjects (29 men, 42 women) with a median age of 39 years (range 22-76); 11 subjects from Nuuk and 60 from Ilulissat (Table 1).

The MONICA1 Population Survey was performed in Copenhagen County, in 1982-1984. Danish Caucasian participants were selected at random from the Census Register, as described elsewhere (6). The MONICA1 *H. pylori* Status Survey comprised 2794 individuals (1425 men, 1369 women) with a median age of 41 years (range 30-60) (6).

Methods

Serum IgG antibody levels to *H. pylori* were analysed by an in-house indirect enzyme-linked immunosorbent assay in 1995 and were catego-

rised as negative, borderline (equivocal), or positive (6, 8). Haemoglobin was measured with a Sysmex K 1000™, and serum ferritin was assessed by a radioimmunoassay (Ferritin RIA Amersham™, Cardiff, U.K.) (7).

Statistics

Non-parametric statistics were employed. The χ^2 -test with the Yates' correction was used to assess the significance of differences between serum *H. pylori* IgG levels. Haemoglobin and serum ferritin in the different groups were compared using the Kruskal-Wallis's test.

RESULTS

Sero-prevalence of *H. pylori* IgG antibodies

Table 1 shows the sero-prevalence of *H. pylori* IgG antibody levels in Greenlanders and Danes. There was no significant gender difference in *H. pylori* IgG antibody levels, either in Greenlanders, or in Danes.

Greenlanders had a significantly higher prevalence of positive serum IgG antibody levels against *H. pylori* than Danes. Accordingly, the prevalence of negative serum IgG antibody levels against *H. pylori* was significantly lower in Greenlanders than in Danes. There was no significant difference in the prevalence of borderline serum IgG antibody levels.

In Greenlanders, there was no significant difference between the age of the participants, haemoglobin, or serum ferritin levels in the three *H. pylori* IgG antibody subgroups (Table II).

Table 1. Sero-prevalence of *Helicobacter pylori* IgG antibodies in indigenous Greenlanders and in Caucasian Danes (6).

	Median age (y)	Mean age (y)	<i>H. pylori</i> serum IgG antibodies		
			negative (%)	borderline (%)	positive (%)
Greenlandic men <i>n</i> = 29	47	46.5	31.0	20.7	48.3
Greenlandic women <i>n</i> = 42	36	41.8	26.2	28.6	45.2
Total <i>n</i> = 71	39	43.7	28.2*	25.4	46.5*
Danish men <i>n</i> = 1425	41	45.7	55.3	19.1	25.6
Danish women <i>n</i> = 1369	41	45.4	55.6	18.8	25.6
Total <i>n</i> = 2794	41	45.5	55.4*	19.0	25.6*

* Difference between Greenlanders and Danes: χ^2 -test: *p* < 0.0001

Table II. Serum ferritin and haemoglobin (Hb) levels (median values) in indigenous Greenlanders according to *Helicobacter pylori* IgG antibody status.

<i>H. pylori</i> serum IgG antibodies	Men				Women			
	<i>n</i>	Age (y)	S-ferritin (µg/l)	Hb (g/l)	<i>n</i>	Age (y)	S-ferritin (µg/l)	Hb (g/l)
Negative	9	54	138	143	11	36	26	135
Borderline	6	45	91	143	11	39	35	131
Positive	14	38	96	150	19	36	38	132
P-value		0.2	0.4	0.2		0.9	0.3	0.8

The different groups were compared using the Kruskal-Wallis test.

DISCUSSION

Within a population, the sero-prevalence of *H. pylori* infection is influenced by age, birth-cohort, socio-economic status and lifestyle factors. It is therefore mandatory that the participants be randomly selected. It is generally agreed that IgG serology is a suitable means for screening for *H. pylori* infection in populations (1). The IgG serum assay used in this study has already been validated using samples from 250 Danish adults with dyspeptic symptoms and known *H. pylori* infection status (8). The specificity of the assay is relatively low, which may cause false positive results. Participants with equivocal, borderline test results constitute the borderline group. Conceivably, both *H. pylori*-infected and non-infected persons were represented in this category.

Both Greenlandic and Danish participants were chosen at random and the great majority of the individuals in both populations were fit and healthy. Although the present Greenlandic series is small, our results demonstrate that the prevalence of positive serum IgG antibody levels to *H. pylori* is significantly higher in Greenlanders (approximately 47%) than in Danes (26%). The sero-prevalence of IgG antibody levels to *H. pylori* was similar in men and women, in both Greenlanders and Danes. In Danes, the sero-prevalence of positive IgG antibody levels to *H. pylori* increases significantly with age, from 12% at 30 years of age, to 37% at 60 years of age (6). In Greenlanders, there was no significant age difference in the prevalences of the three *H. pylori* IgG antibody subgroups, suggesting that Greenlanders become infected with *H. pylori* early in life.

Previous studies have shown that Inuit populations have a high prevalence of *H. pylori* infection (2-5). The prevalence of *H. pylori* infection among Siberian Chukotka natives, assessed by gastroscopy,

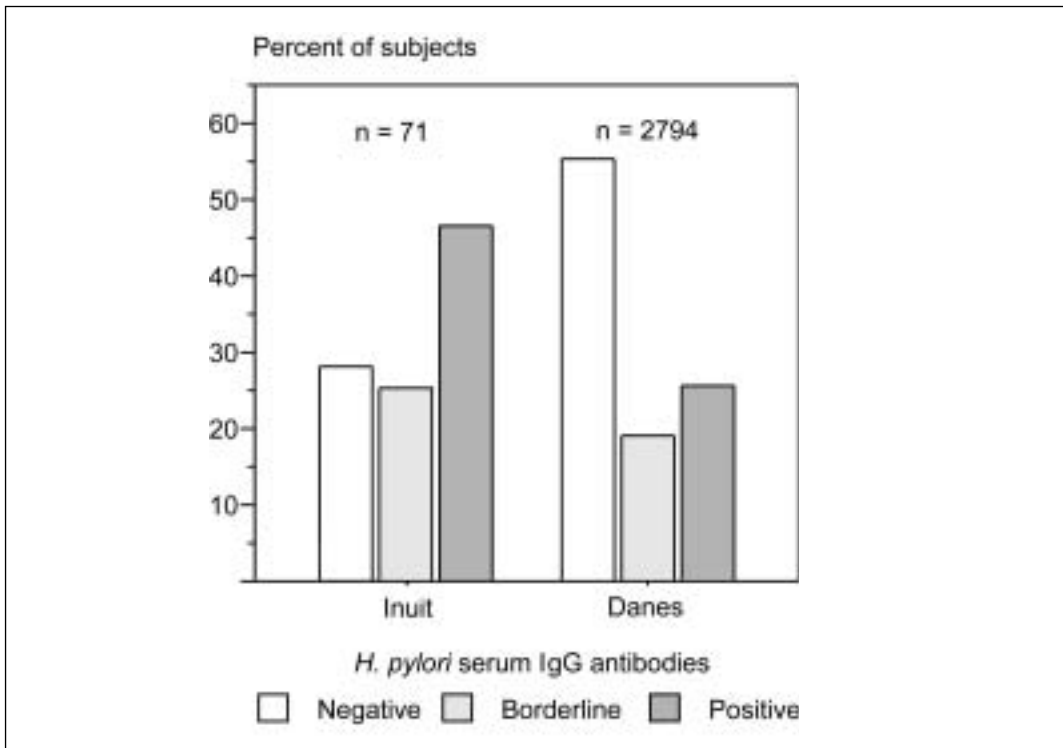


Fig. 1. Prevalence of *H. pylori* serum IgG antibodies in indigenous Greenlandic men and women aged 22-76 years and in Danish Caucasian men and women aged 30-60 years (6).

was 77%. Of the 34 men examined, 29% had superficial gastritis and 55% had chronic atrophic gastritis (2). Among 130 Siberian Yupiks of Alaska, aged 18-86 years, the sero-prevalence of *H. pylori* infection was 92%. Of 70 persons with elevated faecal haemoglobin levels, 99% had *H. pylori* infection and chronic active gastritis, as assessed by gastroscopy (3). The sero-prevalence of *H. pylori* infection in two traditional Inuit communities in the central Canadian Arctic, where 256 persons were examined, was 53.1% in subjects 15-74 years of age (4). Men had a higher frequency of positive values than women. Antibody status did not differ with respect to age, alcohol consumption, cigarette smoking, the number of persons per household, or gastro-intestinal complaints (4). Among 56 Greenlanders from Nuuk with dyspeptic symptoms, the prevalence of positive serum antibodies to *H. pylori* was 60.7% (5).

Our results are consistent with other reports on Inuit populations demonstrating a high prevalence of *H. pylori* infection (2-4). The high prevalence could be explained by the living conditions, i.e. large families in small houses, the level of hygiene, and the quality of the water supply and sanitation systems. *H. pylori* has been found in water supply tanks and in fresh water lakes used for water supply (4).

A large epidemiological survey of Danes showed that subjects with positive IgG antibody levels to *H. pylori* in serum had slightly lower serum ferritin than subjects with negative antibody levels, probably due to occult gastro-intestinal bleeding from gastritis (6). Iron deficiency is prevalent among Canadian Inuits (9, 10). In some Inuit populations this can be explained by a low dietary iron intake (9, 10). Siberian Yupiks of Alaska, despite a high food iron intake (11), have a high prevalence of iron deficiency, possibly due to occult gastro-intestinal bleeding elicited by chronic active gastritis related to *H. pylori* infection (3). In the present series of Greenlanders, there was no relationship between *H. pylori* IgG antibody status and haemoglobin, or serum ferritin levels. However, the subgroups were too small to detect subtle statistical differences and do not allow definite conclusions to be drawn on this aspect.

Among Greenlandic hunters consuming traditional foods with a high iron content, iron deficiency is virtually non-existent (12, 13). In contrast, urbanised Greenlanders from Nuuk, especially young men and fertile women actually have lower serum ferritin levels than Danes (7). This unexpected finding suggests that the dietary iron intake and/or the bio-availability of the dietary iron may be lower in the young Nuuk population than in Danes. However, due to the high prevalence of *H. pylori* infection among indigenous Greenlanders, occult gastro-intestinal bleeding elicited by chronic gastritis may also exert a negative impact on the body iron balance.

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