Risk factors for ischaemic stroke in young Greenlanders

Kjærgaard J-J, Gelvan A

Queen Ingrid Hospital, Nuuk, Greenland.

ABSTRACT

Introduction. Contrary to a widely held belief, ischaemic cerebral infarction is not a rare disease in Greenland, as shown recently by our institution. We report data on some of the known risk factors in patients below 60 years of age with ischaemic stroke. Method. Retrospective data collection and review of charts from Greenlandic patients from all of Greenland admitted to the central hospital, Dronning Ingrid Hospital in Nuuk, in the years 2001 and 2002. Results. A total of 37 patients below 60 years of age were discharged with a diagnosis of cerebral infarction. All had a CT, which showed infarction in 32. Five were reported normal, and the diagnosis of infarction rested on the absence of haemorrhage combined with long-standing, major neurological defect. Median age of the group was 54 years. Fifteen (40%) were women, thirty (81%) were smokers. Nine (24%) had hypertension. Two had diabetes, one had atrial fibrillation, and one had dilated cardiomyopathy. Two had significant carotid atherosclerosis diagnosed by duplex ultrasound. Of the rest, fifteen had transoesophageal echocardiography done, thirteen of which showed atherosclerotic changes. The cholesterol levels showed relatively high HDL levels. Conclusion. Ischaemic stroke is a common disease in young Greenlanders and seems to be associated with atherosclerosis with smoking as the only outstanding risk factor - though not more common than in the general population.

INTRODUCTION

For many years, it has been stated that myocardial infarction is a rare disease among the Inuit. This has indeed been confirmed by recent data from our institution (1). Cerebrovascular mortality is probably higher than cardiovascular mortality in this population (2,3), and we have recently shown this relation to be true for cerebrovascular morbidity vs. cardiovascular morbidity as well (1).

It has been a commonly held belief that the excess mortality and morbidity due to cerebrovascular disease was related to an increased incidence of intracranial haemorrhage in the Inuit population. We recently disproved this belief, finding intracerebral haemorrhage (subarachnoid haemorrhage and traumatic haematoma excluded) a rare cause of cerebrovascular accidents, the majority being of ischaemic aetiology.

Atherosclerosis is nearly always present in myocardial infarction, as the large majority of infarcts are caused by in-situ thrombosis. The pathophysiology of ischaemic cerebral infarction has not been studied to the same extent.

Atherosclerosis of the large arteries may be as common in Greenlanders as in Europeans (4,5), but Greenlanders may have less atherosclerosis of medium-sized arteries of the coronary circulation (6).

In order to try to shed light on the seeming paradox of more cerebral than myocardial infarction in Greenlanders, we set out to investigate some of the known risk factors of a group of young Greenlanders admitted to our institution with stroke.
PATIENTS AND METHODS
Queen Ingrid’s Hospital is the main hospital in Greenland, serving 15 small district hospitals all over Greenland as a referral centre (pop. 56,124 in 2001) as well as serving the local population in Nuuk, the capital of Greenland (pop. 13,445).

The study period was two years, from 1 January 2001 until 31 December 2002. Charts with a discharge diagnosis (alive or dead) of cerebral infarction, cerebral haemorrhage, stroke or transient ischaemic attack were selected for review.

From these, cases were selected as follows:
- Stroke - as defined by focal neurological deficit lasting more than 24 hours, confirmed by two observers.
- Subarachnoid haemorrhage was excluded, as the pathophysiology is completely different from ischaemic or haemorrhagic stroke.
- Patients furthermore had to be Greenlanders - i.e. born in Greenland and below 60 years of age on admission.

RESULTS
In the two-year study period, a total of 37 patients below 60 years of age were discharged with a diagnosis of cerebral infarction. All underwent CT scanning. Infarction was seen in 32. Five were reported as being normal, and the diagnosis of infarction was based on the absence of haemorrhage combined with sustained, major neurological deficit.

Patients with subarachnoid haemorrhage were excluded - there were 10 with this condition.

Median age of the group was 54 years. Fifteen (40 %) were women, thirty (81 %) were smokers. Nine (24 %) had hypertension. Two had diabetes mellitus, one had atrial fibrillation, and one had dilated cardiomyopathy. Two had significant carotid atherosclerosis diagnosed by duplex ultrasound. Of the rest, fifteen had transoesophageal echocardiography done, thirteen of which showed atherosclerotic changes of the aortic arch. Cholesterol values are shown in Table 1.

DISCUSSION
In this study of Greenlanders, living in Nuuk, the capital, as well as outside of Nuuk, we found that nearly all strokes are ischaemic and not haemorrhagic. The profile of risk factors seemed not to differ from that of the general population, and was characterized by relatively high HDL levels and a high prevalence of smoking. Hypertension was not a frequent risk factor, and the blood pressure distribution in Greenlanders seems no higher than that found in a Danish population (7). We did not systematically test for impaired glucose tolerance, which may be a major problem in Greenland (8), and we did not investigate composition of fatty acids, a more sophisticated possible pathophysiologic factor (9).

Our study does not permit a conclusion as to the cause of the occurrence of ischaemic stroke in young Greenlanders, but the frequent finding of major atherosclerosis of the aortic arch leads us to speculate that embolization of atherosclerotic debris from the major arteries may be a possible mechanism. This could explain the discrepancy between the frequency of infarction in the vascular territories of the brain and heart, as emboli from the aortic arch and major arteries would go to the brain for obvious haemodynamic reasons.

| Table 1. Plasma cholesterol concentrations (mmol/l) in patients suffering from stroke. |
|---------------------------------|----------|-----------|
| Total cholesterol               | 6.9 (6.3 to 7.7) | 3.5-11.3  |
| HDL cholesterol                 | 1.5 (1.0 to 1.7)  | 0.7-2.4   |
REFERENCES

1. Kjærgaard JJ, Bjerregaard P. Incidence of myocardial and cerebral infarction in Nuuk, Greenland (these proceedings)

2. Bjerregaard P, Dyerberg J. Mortality from ischaemic heart disease and cerebrovascular disease in Greenland. Int J Epidemiol 1988;17:514-9.

3. Bjerregaard P. Causes of death in Greenland 1968-85. Arctic Med Res 1988;47:105-23.

4. Hansen JP, Hancke S, Møller-Petersen J. Atherosclerosis in native Greenlanders. An ultrasonographic investigation. Arctic Med Res 1990;49:151-56.

5. Ingeman-Nielsen MW. Arteriosklerose hos grønlandere. [Arteriosclerosis among Greenlanders]. Ugeskr Læger 1990;152:2641-43.

6. Pedersen HS, Mulvad G, Newman P, Boudreau DA. Atherosclerosis in coronary arteries and aorta among Greenlanders: an autopsy study. Atherosclerosis 2003; 170:93-103.

7. Jørgensen ME, Pedersen MB, Siggaard C, Sørensen TB, Mulvad G, Skjoldborg H, Pedersen EB. Twenty-four-hour blood pressure among Greenlanders and Danes. Scand J Clin Lab Invest 2002; 62:413-22.

8. Jørgensen ME, Bjerregaard P, Borch-Johnsen K. Diabetes and impaired glucose tolerance among the inuit population of Greenland. Diabetes Care 2002; 25:1766-71.

9. Jul E, Mulvad G, Pedersen HS, Malcom G, Hansen JC, Misfeldt J. The relationship between a low rate of ischaemic heart disease and the traditional Greenlandic diet with high amounts of monounsaturated and n-3 polyunsaturated fatty acids. Arctic Med Res 1994; 53: suppl 2: 282-84.

Jens-Jørgen Kjærgaard
Queen Ingrid’s Hospital
3900 Nuuk
Greenland

Email: jensjk@dadlnet.dk