



PAPER

Decreasing overweight and central fat patterning with Westernization among the Inuit in Greenland and Inuit migrants

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OBJECTIVE: To analyse overweight, obesity and central fat patterning among the Inuit of Greenland and Inuit migrants in Denmark and their relation to Westernization.

DESIGN: Cross-sectional, population-based epidemiological study.

SUBJECTS: A total of 2046 adult Greenlanders (Inuit), 61% of those invited to participate, living in three areas of Greenland and in Denmark.

MEASUREMENTS: Height, weight, waist and hip circumferences were measured and body mass index (BMI in kg/m²) and waist–hip ratio calculated. Sociocultural information was obtained by questionnaire and interview. Westernization was estimated by language and place of residence.

RESULTS: The prevalence of obesity (≥ 30 kg/m²) was 16 and 22% among men and women in Greenland ($P=0.004$), and 12 and 11%, respectively, in Denmark (NS). Westernization was accompanied by a decrease in the proportion of obese people, in particular among women. Adjusted for BMI, age and Inuit heritage waist circumference decreased with Westernization (among women), while hip circumference did not change. The differences were particularly pronounced for migrants compared with residents of Greenland.

CONCLUSION: BMI and central fat patterning decrease with Westernization among Greenland Inuit women contrary to most studies of migrants. The changes were less prominent among men. This suggests a reduced cardiovascular risk profile with Westernization among Greenland Inuit.

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Keywords: Inuit; Greenland; migrants; Westernization; obesity; central fat patterning

Introduction

Overweight and central fat patterning are associated with increased risk of type 2 diabetes, hypertension, coronary atherosclerosis, stroke, gallbladder disease, certain cancers and premature death in most populations studied.¹ Among

the Inuit, obesity was associated with hypertension,^{2–4} diabetes, impaired glucose tolerance, and insulin resistance.^{5–7} Among the Canadian Inuit, obesity was correlated with serum lipids while the correlation with fasting or 2 h glucose or insulin levels was ambiguous.⁸ Environmental factors are important for the development of overweight and obesity and in many populations studied, obesity rates increased among migrants from developing countries to the industrialized world or from rural to urban environments.^{9–15}

Among the Inuit, overweight was not prevalent until the 1960s when studies from Canada and Alaska demonstrated an increasing prevalence of overweight and obesity.^{5,8,16,17} Inuit women, especially older women, had significantly higher body mass index (BMI), waist circumference and

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waist–hip ratio than white women while the ethnic differences for men were less pronounced.^{2,8,18–21} Among the Inuit, some obesity indices were associated with indicators of modernization such as high income, mixed ethnicity, fluency in the Inuit language, and less time spent on the land.² Longitudinal data from Igloolik, Canada, showed that BMI increased with acculturation among older adults of both sexes.²² In Alaska, obesity was associated with certain food items (butter, fried foods, Eskimo potatoes, cereal).⁵ In Greenland, the consumption of seal meat was found to be weakly associated with a high waist–hip ratio,²³ but there was no difference in BMI between a traditional and a Westernized group.¹⁸ Recently, genetic markers have been associated with obesity among the Canadian Inuit.^{24,25}

The purpose of the study was to analyse overweight and central fat patterning among the Inuit of Greenland and Inuit migrants in Denmark and their relation to Westernization. Age, gender, Inuit heritage, job, smoking, physical activity and diet were studied as determinants for obesity. Based on the literature, our hypothesis was that overweight and central fat patterning increased with Westernization.

Methods

Study population and sample

The population of Greenland is 56 000 of which an estimated 90% are ethnic Greenlanders (Inuit). Further, an estimated 8000 ethnic Greenlanders live in Denmark permanently or for shorter periods for educational purposes. The Greenlandic language is closely related to Inuktitut and Inupiaq spoken in Canada and Alaska, respectively. It is spoken as first language by almost all Greenlanders living in Greenland. Living conditions are considerably different in Greenland and Denmark. The towns and villages in Greenland are small, hunting and fishing are important leisure time activities, and traditional Greenlandic food makes up a significant proportion of the diet. In Denmark, the Inuit migrants are well integrated into the Danish society and their lifestyle is similar to that of the general population in a western industrialized country.

Data were collected from 1998 to 2001 among adult Greenlanders living in Denmark, Nuuk, Qasigiannuit, and four villages in the district of Uummannaq. The study areas in Greenland are shown in Figure 1. In Nuuk, a random sample of the population was invited to participate while in Qasigiannuit and Uummannaq everyone was invited. In Denmark, a two-stage procedure was used to identify the Inuit. First, persons born in Greenland were identified from the Central Population Register. In order to approximate the age composition in Greenland, a weighted sample of these was drawn consisting of a random sample of those aged 18–44 y and everyone aged 45 and above. A questionnaire was mailed to the sample and information on ethnicity was obtained from 77%. Only Greenlanders defined as persons with at least one Greenlandic parent or Greenlandic self-identification were included in the study. A random sample

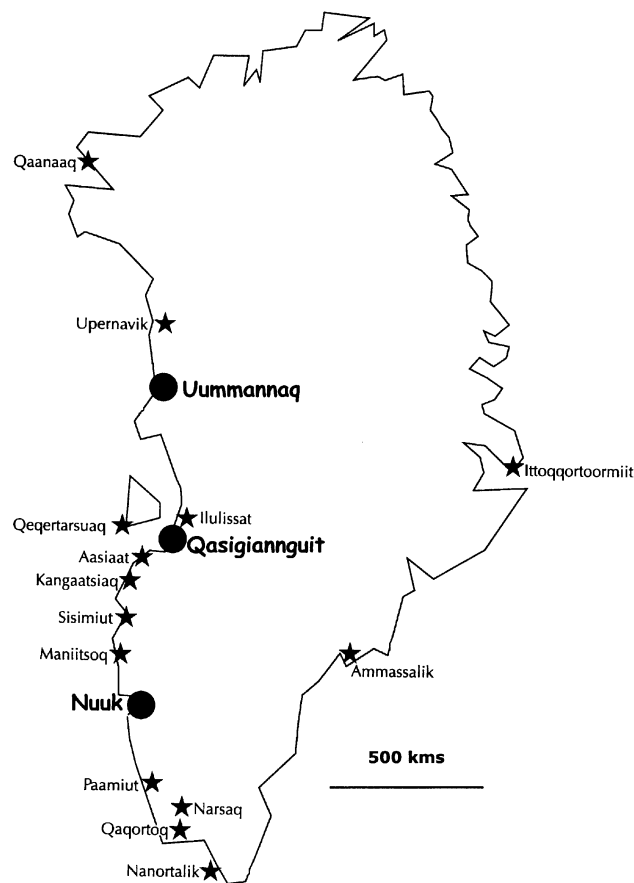


Figure 1 Map of Greenland with towns and study areas.

of those classified as Greenlanders was invited to participate in the study. From Greenland and Denmark, a total of 3327 Greenlanders aged 18 and above was invited to participate in the study. Information was obtained from 2046 (61%). The participation rate was 54% in Denmark and 66% in Greenland ($P < 0.001$).

The study was approved by the relevant ethical review committees. All subjects had been informed about the study in writing and orally, and had given their informed consent in writing prior to enrolment.

Interviews and questionnaires

Data was collected by structured interviews and self-administered questionnaires. The survey questionnaires were developed in Danish and subsequently translated into Greenlandic. The translation procedure included translation by two or more interpreters followed by an independent back translation into Danish and revision of the translation as needed. In Denmark almost all the information was obtained using the survey instruments in the Danish language, while in Greenland almost all information was obtained in the Greenlandic language. In Denmark, the

sociodemographic background information was obtained by mailed questionnaires while in Greenland both mailed questionnaires and interviews were used.

Genetic Inuit heritage was estimated from questions on the ethnicity of the four grandparents and if this information was missing of the parents. It was subsequently recoded as full (all grandparents were Greenlanders) or part Inuit heritage. Participants were asked about their job and were subsequently categorized into white collar employees, manual workers and other, including those not working or with missing information. Smoking behaviour was categorized into current smokers and non-smokers, comprising never smokers and previous smokers. Participants rated their physical activity level during leisure time summer and winter on a five-point scale ranging from sedentary (read, watch TV) to very active (heavy exercise several times a week). This was subsequently recoded into sedentary, light, and heavy activity. Diet was recorded in a food frequency questionnaire comprising 14 different traditional and imported food types, among which seal meat and fish combined and fresh fruit were used in the analyses. The frequency categories were 'daily', '4–6 times a week', '1–3 times a week', '2–3 times a month', 'once a month or less often', and 'never' recoded into weekly or not for seal and fish, and into daily or not for fresh fruit. Language was recoded into four categories based on questions about fluency in spoken Greenlandic and Danish: fluent in Greenlandic and no knowledge of Danish, fluent in Greenlandic and some knowledge of Danish, fluent in both languages (bilingual), and fluent in Danish but with little or no knowledge of Greenlandic.

The participants were categorized according to degree of Westernization based on proficiency in the Danish language and current place of residence. The migrants formed one group irrespective of language ($n=717$); 96% had lived in Denmark for 3 y or more (average 23.3 y). In Greenland, the most Westernized were those who spoke Danish well and who lived in Nuuk ($n=226$). The least Westernized were those who spoke only Greenlandic and who lived in a village or a small town in Greenland ($n=498$). An intermediate group consisted of the remaining participants from Greenland; most of these lived in Nuuk or Qasigiannuguit and spoke some Danish ($n=515$). Because of lack of information about their language, 57 of the participants (2.8%) could not be classified.

Physical measurements

Clinical data were collected by interviews, physical examinations, and blood sampling. The clinical examinations took place at the local hospital or, in the villages, at the health clinic or school. In Greenland, participants had fasted overnight and examinations took place between 8 am and 2 pm. In Denmark, participants were non-fasting and examinations took place between 8 am and 8 pm. Height and weight were measured with the participants stripped to

their underwear and socks. On the standing participant, waist circumference was measured midway between the iliac crest and the costal margin, hip circumference at its maximum. BMI was calculated as weight in kg divided by height in metres squared. BMI categories were defined according to WHO's guidelines:¹ normal 18.5–24.9 kg/m²; overweight 25.0–29.9 kg/m²; obese ≥ 30.0 kg/m². The cut-off points for large waist and hip circumferences were set at the 90% percentiles for slim persons, ie persons with a BMI below 23 kg/m². The cut-off points for waist circumference in this population were accordingly ≥ 86 cm (men) and ≥ 80 cm (women); for hip circumference ≥ 97 cm (men) and ≥ 96 cm (women). Large waist–hip ratio was defined as > 0.90 (men) and > 0.85 (women).

Statistical methods

The questionnaires were coded and double entered on the computer. Values outside the permitted range were corrected against the questionnaires. Data processing and statistical analysis were performed using standard statistical software (SAS and SPSS). Statistical procedures included the chi-square test, logistic regression, and general linear models (the UNIANOVA procedure of SPSS).

Results

The study population included 2046 adult Greenlanders, 575 men and 735 women living in Greenland and 198 men and 538 women living in Denmark. This corresponds to 5% of all Greenland Inuit in the age group. Measurements of height, weight, and waist circumference were available for 2013 (98%). The mean age of the participants in Greenland was 43.4 y compared with 45.4 y of the non-participants ($P < 0.001$); in Denmark the mean age of the participants was 41.7 y and of the non-participants 41.5 y (NS). Men were

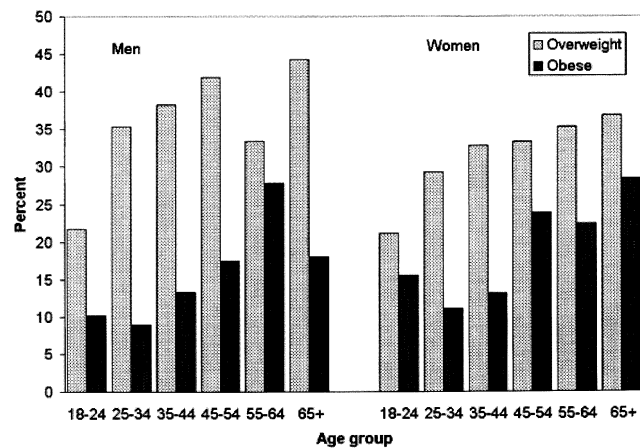


Figure 2 Overweight and obesity among Greenlanders according to age and gender.

Table 1 Distribution of basic variables among population subgroups of Inuit in Greenland and Inuit migrants in Denmark

Variable		Least Westernized (n = 498) Mean	Intermediate group (n = 515) Mean	Most Westernized (n = 226) Mean	Migrants (n = 717) Mean	P ^a	P ^b
Age (y)		46.1	41.1	41.7	42.9	0.44	< 0.001
BMI (kg/m ²)		26.2	26.4	25.5	25.1	< 0.001	0.09
Waist circumference (cm)		88.8	88.9	86.1	83.1	< 0.001	0.02
Hip circumference (cm)		97.2	98.5	97.5	97.2	0.06	0.08
Waist-hip ratio		0.91	0.90	0.88	0.85	< 0.001	< 0.001
Categorical variables		<i>n</i>	%	%	%		
Overweight (BMI 25.0–29.9)	680	31	36	38	33	0.04	0.36
Obesity (BMI ≥ 30.0)	337	21	20	14	11	< 0.001	0.21
Large waist circumference ^c	1216	63	63	63	55	< 0.001	0.99
Large hip circumference ^d	1107	51	56	56	56	0.25	0.19
Large waist-hip ratio ^e	1073	65	57	58	41	< 0.001	0.02
Gender							
Men	764	44	47	41	27	< 0.001	0.20
Women	1249	56	53	59	73		
Inuit heritage (missing 103)							
Full Inuit heritage	1437	96	89	74	52	< 0.001	< 0.001
25–75% Inuit heritage	473	4	11	26	48		
Job (missing 0)							
White collar employees	563	9	31	61	30	0.006	< 0.001
Manual workers	597	35	37	16	25		
Other	853	55	33	23	45		
Smoking (missing 119)							
Non-smokers	662	33	29	34	41	< 0.001	0.19
Smokers	1232	67	71	66	59		
Physical exercise (missing 189)							
Sedentary	232	7	12	23	13	0.15	< 0.001
Light activity	1266	71	71	60	71		
Heavy activity	326	22	18	17	16		
Consumption of seal or fish (missing 105)							
Less than weekly	740	15	36	45	53	< 0.001	< 0.001
Weekly	1168	85	64	55	47		
Consumption of fresh fruit (missing 151)							
Less than daily	1397	94	91	69	55	< 0.001	< 0.001
Daily	465	6	9	31	45		
Language (missing 282)							
Greenlandic only	429	100	15	0	1	< 0.001	< 0.001
Greenlandic, some Danish	321	0	53	0	9		
Bilingual	611	0	32	94	37		
Danish only	370	0	0	6	54		

^aP for difference between Inuit in Greenland and migrants.

^bP for difference within Greenland.

^cWaist circumference ≥ 86 cm for men and ≥ 80 cm for women.

^dHip circumference ≥ 97 cm for men and ≥ 96 cm for women.

^eWaist-hip ratio > 90 for men and > 85 for women.

under-represented in both study populations: 44% among the participants and 54% among the non-participants in Greenland ($P < 0.001$) and 27% among the participants and 32% among the non-participants in Denmark ($P = 0.004$).

The prevalence of overweight and obesity increased with age among both men and women ($P < 0.001$; Figure 2). Among men the 55–64-y-old were most often obese while among women the prevalence of obesity increased throughout the age span. Among both men and women, the 18–24 y-olds were more often obese but less often overweight than the 25–34 y-olds. Overall, the proportion of overweight participants was 35 and 33% among men and women in

Greenland ($P = 0.15$), and 39 and 31%, respectively, in Denmark ($P = 0.02$), while obese participants made up 16 and 22% among men and women in Greenland ($P = 0.004$), and 12 and 11%, respectively, in Denmark (NS).

Table 1 shows the descriptive statistics of the basic variables among the four population groups. The migrants had lower measures of obesity and central fat patterning than the Inuit in Greenland. Among the three groups of Inuit in Greenland waist circumference and waist-hip ratio was lowest among the most Westernized but the variation was less pronounced than the difference between the migrants and the Inuit in Greenland. Genetics, socioeconomic conditions, and lifestyle differed significantly between

Greenlanders in Greenland and the migrants and to a lesser extent within Greenland. Among the migrants, a substantial proportion had mixed heritage. There were fewer manual workers among the migrants and more in the category other, which included those not working. There were fewer smokers among the migrants and the dietary differences were pronounced while the levels of physical exercise were remarkably similar. Finally, among the migrants half spoke only Danish while almost all of the Inuit in Greenland were fluent in Greenlandic. Also within Greenland there were significant differences among the three population groups regarding Inuit heritage, job, physical exercise, diet and language, but the proportion of smokers was similar. Thus the four population groups defined differed significantly with regard to several measures of Westernization.

With age, Inuit heritage, job, smoking, physical exercise and diet as confounders in a logistic regression analysis, women in Greenland were more often obese than men (OR=1.63; 95% CI 1.11, 2.40), while there was no gender difference in Denmark. The same set of variables was included as independent variables in logistic regression models for men and women separately with obesity as the dependent variable (Table 2). Among both men and women, obesity increased with age (OR=1.04 and 1.03, respectively), and smokers were less obese than non-smokers (OR=0.24/0.52). Women with part Inuit heritage were less often obese than those with full Inuit heritage (OR=0.51), while there was no significant difference for men (OR=1.07). Lack of physical activity was associated with obesity for men and women in all four population groups, but although consistent the association was not statistically significant. The only significant finding for diet was a high level of obesity among men who consumed seal meat or fish weekly (OR=2.65). Age was significantly associated with obesity in both Greenland and Denmark, but the other

associations were only present for Greenland. There were socioeconomic differences in Greenland but not among the migrants (not shown in the table). Among men in Greenland, manual workers were less often obese than white collar employees (OR=0.44; 95% CI 0.20, 0.93) while among women more manual workers were obese (OR=2.23; 95% CI 1.30, 4.01). Almost similar results were obtained with various measures of fat patterning as the dependent variable. In addition, part Inuit heritage was associated with a small waist circumference among women and with a large hip circumference among men. Furthermore, men who ate fresh fruit daily had larger waist and hip circumferences than those who did not.

With the variables from Table 1 as confounders, and measures of obesity as the dependent variable, odds ratios in the four population groups were analysed in logistic regression models (Table 3). For men, there were no significant differences among the three population groups in Greenland and only a low waist-hip ratio among the migrants was statistically significant. The differences were much more pronounced for the women. The migrants were less obese and had smaller waist circumference and lower waist-hip ratio than the residents in Greenland. Among the latter, the intermediate group was more often obese (NS) and had larger waist and hip circumferences than the least and the most Westernized group ($P=0.001$).

Adjusted for BMI, age, and Inuit heritage, the waist circumference of men was higher than that of women ($P<0.001$). Among men, waist circumference did not change with Westernization ($P=0.25$), while among women there was a significantly decreasing waist circumference with Westernization ($P<0.001$; Figure 3). Hip circumference adjusted for BMI, age, and Inuit heritage was similar for men and women and did not change with Westernization ($P_{men}=0.21$; $P_{women}=0.06$).

Table 2 Logistic regression models with obesity as the dependent variable. Odds ratio for obese^a compared with non-overweight persons^b

Variable	Category	Men		Women	
		OR	95% CI	OR	95% CI
Age		1.04	(1.02, 1.06)	1.03	(1.02, 1.05)
Inuit heritage	Full Inuit heritage	1.00	reference	1.00	reference
	25–75% Inuit heritage	1.08	(0.54, 2.12)	0.51	(0.31, 0.82)
Job	White collar employees	1.00	reference	1.00	reference
	Manual workers	0.78	(0.40, 1.52)	1.66	(1.05, 2.68)
	Other	0.60	(0.30, 1.22)	1.24	(0.79, 1.95)
Smoking	Non-smokers	1.00	reference	1.00	reference
	Smokers	0.24	(0.14, 0.43)	0.52	(0.35, 0.77)
Physical activity	Sedentary	1.00	reference	1.00	reference
	Light activity	0.60	(0.27, 1.30)	0.76	(0.45, 1.26)
	Heavy activity	0.57	(0.25, 1.33)	0.44	(0.19, 1.04)
Consumption of seal or fish	Less than weekly	1.00	reference	1.00	reference
	Weekly	2.65	(1.41, 5.00)	1.27	(0.86, 1.87)
Consumption of fresh fruit	Less than daily	1.00	reference	1.00	reference
	Daily	1.58	(0.70, 3.56)	0.73	(0.49, 1.10)

^aBody mass index ≥ 30.0 kg/m².

^bBody mass index 18.5–24.9 kg/m².

Table 3 Results of logistic regression models^a for obesity according to Westernization among Greenland Inuit

	Obesity ^d		Waist circumference ^e		Hip circumference ^f		Waist–hip ratio ^g	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
	Men							
Least Westernized	2.06	(0.76, 5.53)	0.73	(0.37, 1.41)	0.61	(0.33, 1.12)	2.09	(1.083, 4.04)
Intermediate group	1.93	(0.78, 4.78)	0.64	(0.36, 1.14)	0.67	(0.40, 1.14)	1.96	(1.11, 3.46)
Most Westernized	1.99	(0.71, 5.62)	0.90	(0.47, 1.75)	0.74	(0.40, 1.35)	1.91	(1.00, 3.64)
Migrants	1.00	reference	1.00	reference	1.00	reference	1.00	reference
<i>p</i> ^b		0.11		0.24		0.12		0.01
<i>p</i> ^c		0.91		0.58		0.99		0.98
	Women							
Least Westernized	2.18	(1.26, 3.79)	1.47	(0.97, 2.21)	0.88	(0.59, 1.30)	2.99	(1.93, 4.62)
Intermediate group	3.31	(1.95, 5.61)	2.96	(2.00, 4.39)	1.75	(1.21, 2.54)	2.68	(1.81, 3.97)
Most Westernized	2.00	(1.04, 3.87)	1.99	(1.27, 3.12)	1.29	(0.83, 1.99)	3.42	(2.17, 5.40)
Migrants	1.00	reference	1.00	reference	1.00	reference	1.00	reference
<i>p</i> ^b		< 0.001		< 0.001		0.10		< 0.001
<i>p</i> ^c		0.16		0.001		0.002		0.36

^aConfounders included age, Inuit heritage, job, smoking, physical activity, and diet (seal, fish, fruit).

^b*P* for difference between Inuit in Greenland and migrants.

^c*P* for difference within Greenland.

^dBMI ≥ 30 compared with BMI 18.5–24.9.

^eWaist circumference ≥ 86 cm for men and ≥ 80 cm for women.

^fHip circumference ≥ 97 cm for men and ≥ 96 cm for women.

^gWaist–hip ratio > 0.90 for men and > 0.85 for women.

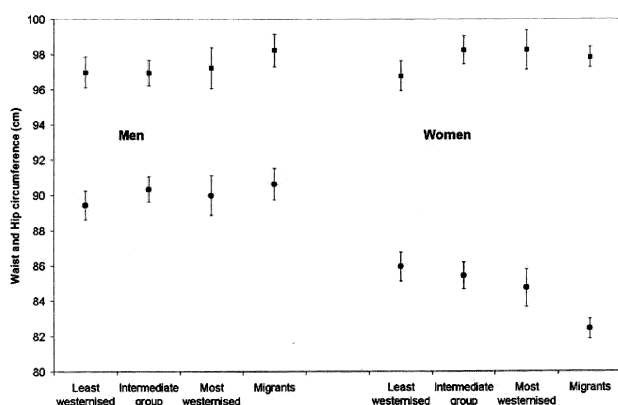


Figure 3 Waist and hip circumference among Greenlanders according to Westernization. Adjusted for age, Inuit heritage, and BMI.

Discussion

Contrary to previous studies of the influence of migration or urbanization on obesity, our results indicate that the modernization process among the Greenland Inuit has not been accompanied by an increase in the proportion of obese people. This was not consistent with our initial hypothesis. Among men, BMI, waist and hip circumferences varied little, while there was significant variation among women both within Greenland and between Inuit in Greenland and the Inuit migrants in Denmark. The intermediately Westernized women had higher BMI and waist and hip circumferences than the least and most Westernized women, and the

migrants had lower BMI and smaller waist circumference than women in Greenland. Adjusted for BMI, age, and Inuit heritage, waist circumference among women decreased significantly with modernization and migration. This indicates that body proportions are subject to environmental influences.

The differences among population groups in BMI and body proportions were not caused by qualitative aspects of the diet (seal, fish, fruit), which were controlled for. Our dietary measure, however, did not estimate the quantity of the diet and it is not unlikely that the Inuit in Denmark have changed their diet quantitatively as well as qualitatively. Participants were asked about the reason for their migration to Denmark and how many years they had spent in Denmark altogether, but neither of these parameters was related to BMI or body proportions.

The present study is a cross-sectional population study of the Greenlanders in Greenland and Denmark. As the first comprehensive population study of the Greenland Inuit, it comprises most Greenland Inuit subpopulations but excludes the Inuit of East Greenland (6.6% of all Greenland Inuit), the Polar Inuit (1.7%), and persons with Inuit ancestry born in Denmark (an unknown but probably small number). Data collection methods differed slightly among the study areas but it is not likely that this had any influence on the anthropometric data or the results of the questionnaires. A certain bias may have been introduced because the study was performed a couple of years earlier in Denmark than in Greenland. Accordingly, a general increasing trend in BMI with time, which has been observed in many countries including Denmark,^{1,26} might have inflated the BMIs in

Greenland relative to those in Denmark, but the difference between migrants and Inuit in Greenland is much larger than would be expected from the time trend alone.

BMI increased by age and the highest proportion (28%) of people with a BMI of ≥ 30 kg/m² was found among men aged 55–64 and women aged 65+. The overall prevalence of obesity was higher than in the general population of Denmark,²⁶ but lower than in Inuit populations of Alaska and Canada.^{20,21} The prevalence of obesity in Greenland had increased in particular for women from 10% in 1994 to 22% in the present study.¹⁸

Alaska Inuit women had larger mean BMI than men²⁰ and, in Canada, young Inuit men had slightly higher BMI than young women, while older women had significantly higher BMI than older men.²¹ A previous study in Greenland showed higher BMI among Inuit men than women. We found significantly higher BMI among women in Greenland but no differences between the genders among the migrants. This could be due to the small size of the previous study or to opposite secular changes in BMI among men and women.¹⁸

The four subpopulations defined according to Westernization and migration differed significantly with regard to a number of biological, socioeconomic and behavioural variables. Obesity was positively associated with full Inuit heritage (among women), job (differently for men and women), non-smoking, and a marine diet (among men). Furthermore, Inuit heritage and consumption of fruit were associated with high waist and hip circumferences among men. The associations with age and smoking have been found in most other studies. Inuit heritage and diet are closely related to the complex concept of Westernization and it is far from certain that they are causally related to obesity.

Within Greenland the socioeconomic differences were opposite for men and women. Men followed the pattern usually observed in developing countries with the highest level of obesity among those with high socioeconomic status, while women followed the pattern of industrialized countries with the highest level of obesity in the low socioeconomic groups. A similar pattern was observed among the Inuit of Kivalliq, Canada.² The effects of migration and Westernization were most pronounced among women. The migrants had lower BMI and smaller circumferences. Within Greenland, the intermediate group of women were more often obese and had larger waist and hip circumferences than both the least and the most Westernized group. We consequently hypothesize that obesity increases during the early stages of Westernization and decreases during later stages.

Waist circumference, adjusted for age and BMI, decreased significantly among women while hip circumference did not change. It is thus not only BMI that is influenced by Westernization but also body proportions. In people of South Asian descent living in Western urban societies, the prevalence of type 2 diabetes is far higher than in the Europeans and in South Asian non-migrants, which has been explained by an increased central fat patterning irrespective of the level of

generalised obesity.^{27,28} The association of insulin resistance, dyslipidaemia, and cardiovascular disease with obesity and central fat patterning among the Inuit remains yet to be shown. If, however, it is similar to that of Western populations, the decreasing BMI and central fat patterning which accompany Westernization among the Greenland Inuit women suggest a reduced risk profile.

Westernization or modernization is a complex transition. Future studies of fat patterning and obesity among the Inuit should concentrate on, in a gender-specific context, examining additional specific risk factors associated with the traditional life and with modernization, and on the associations of obesity with risk factors and disease. Finally, continued monitoring of overweight is important in view of the rapid sociocultural transition in Greenland.

Acknowledgements

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