Original Article

Schizophrenia in Greenland

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ABSTRACT

INTRODUCTION: The present prevalence of schizophrenia in Greenland is unknown. The aim of this study was to estimate the prevalence of schizophrenia in Nuuk and the rest of Greenland.

METHODS: The study was designed as an observational, cross-sectional study based on statistical extractions and review of medical records for psychiatric patients in Greenland, aiming to determine the prevalence of schizophrenia.

RESULTS: The prevalence of schizophrenia was estimated to 1.0% in Nuuk and 0.7% in the rest of Greenland. More males than females were affected (male/female ratio 2.5). Poor socio-economic conditions were revealed for the majority of patients. Cardiovascular risk factors were monitored suboptimally.

CONCLUSIONS: An increased focus on socio-psychological rehabilitation and monitoring and control of cardiovascular risk factors is warranted.

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The present prevalence of schizophrenia in Greenland is unknown. The aim of this study was to estimate the prevalence of schizophrenia in Nuuk and the rest of Greenland. The study was designed as an observational, cross-sectional study based on statistical extractions and review of medical records for psychiatric patients in Greenland, aiming to determine the prevalence of schizophrenia and to describe demographic data and socioeconomic and physical health factors.

The prevalence of schizophrenia was estimated to 1.0% in Nuuk and 0.7% in the rest of Greenland. More males than females were affected (male/female ratio 2.5). Poor socioeconomic conditions were revealed for the majority of patients. Cardiovascular risk factors were suboptimally monitored. An increased focus on socio-psychological rehabilitation and monitoring and control of cardiovascular risk factors is warranted.

Schizophrenia is a mental disorder characterised by distortions in thinking, perceptions of the self and the surroundings, emotions and behaviour. It is among the costliest mental disorders in terms of human suffering and social expenditure, and it causes approximately 1% of the worldwide disability-adjusted life years [1]. Thus, schizophrenia is associated with psychosocial problems, including unemployment, homelessness, substance abuse and having poor social relationships [2]. Furthermore, a high prevalence of obesity, dyslipidaemia, diabetes, hypertension, tobacco smoking and metabolic adverse effects of antipsychotics is frequent among these patients. Life expectancy is 15-20 years lower among patients with schizophrenia than among the background population [3]. Globally, the prevalence of schizophrenia varies between 0.5 and 0.9% [4, 5]. A study

published in 1995 based on first hospitalisation indicated that the incidence of schizophrenia was comparable in Greenland and Denmark [6]. Several studies performed in Greenland have indicated a high prevalence of psychosocial problems including suicide, anxiety and depression among primary healthcare patients [7, 8]. However, the actual prevalence of schizophrenia in Greenland remains unexplored. The aim of this study was to determine the prevalence of schizophrenia in Greenland and in the capital Nuuk, and to describe demographic data and socioeconomic and physical health factors among the patients.

METHODS

This study was conducted as an observational cross-sectional study based on statistical extractions and review of medical records.

Setting

Greenland is the world's largest island, covering approximately two million km^2. It is sparsely populated. The 56,000 inhabitants live in 16 minor towns and approximately 60 smaller settlements along the coastline. The capital Nuuk, located on the west coast, is by far the largest town with almost a third (17,000) of the national population living there. The majority of the population is of Inuit origin, a genetically, historically and culturally unique indigenous people of the Arctic [6]. Greenland is part of the Danish Realm, and the organisation of Greenlandic healthcare is inspired by and cooperates with the Danish healthcare system. Primary healthcare is provided free of charge by regional healthcare centres, clinics and minor healthcare stations. The Queen Ingrid Hospital (QIH) in Nuuk provides specialised secondary health care. The psychiatric ward at QIH has a capacity of thirteen patients including three places for involuntary patients. A psychiatric consultant visits the towns outside Nuuk once annually. In addition, video consultations with specialists in Nuuk are possible continually. Patients from minor towns and settlements in need of hospitalisation are treated locally in collaboration with a specialist in Nuuk. In more severe cases, the patient is transferred to the psychiatric ward in Nuuk. Patients who have committed serious crimes or are considered dangerous may be transferred to the Department of Forensic Psychiatry in Aarhus, Denmark, which has 18 places reserved for Greenlanders.

Study population

All in- and outpatients with an address in Greenland and a registered diagnosis of schizophrenia (International Classification of Diseases, tenth version (ICD10)-code DF20) in the national electronic record were identified using a statistic extraction module. The electronic medical records (EMR) of all patients were reviewed to obtain information about age, gender, age at time of diagnosis, antipsychotic treatment Anatomical Therapeutic Chemical Classification System code (ATC code) N05A), smoking status, alcohol and substance abuse, most recent registration of Body Mass Index (BMI), blood pressure, total serum cholesterol, glycosylated haemoglobin (HbA_{1c}) and sociodemographic factors including marital and parenting status, domestic situation, education, employment and presence of any criminal sentences.

Variables

Based on information in the EMR, patients were categorised as living in supported housing, with their family, alone or as homeless people. Educational level was defined as "elementary school or less" if no education had been concluded except for elementary school. Employment status was categorised as employed if the patient had a paid work, otherwise as unemployed. Parenting status was categorised as "has children" if mentioned in the EMR, regardless if the patient was living with the child or not. Alcohol or substance abuse was considered present if recorded as abuse in the EMR or treatment with disulfiram was documented. Patients were categorised as criminal if a criminal sentence specifying psychiatric treatment had been registered in the EMR or the central criminal register. Daily smoking, BMI calculated from weight divided by height in metres squared,

blood pressure, HbA$_{1c}$ and total cholesterol were obtained from the lifestyle table or laboratory card in the EMR. The standard procedure for weight and height is measurement in light indoor clothing without shoes, while blood pressure is measured in a sitting position after five minutes of rest. The HbA$_{1c}$ level was measured by analysis of venous blood, and the serum cholesterol level was analysed. All analyses were performed at the central laboratory at QIH. Only values recorded within one year were included (from 1 January 2017 to 31 December 2018). Patients with daily use of tobacco were considered smokers. Patients with a BMI above 30 kg/m^2 were considered obese. Patients with either a systolic blood pressure above 140 mmHg and/or a diastolic pressure above 90 mmHg were categorised as hypertensive. Diabetes was considered present among patients with a blood value of HbA$_{1c}$ after the standard from the International Federation of Clinical Chemistry value at or above 48 mmol/mol. Finally, hypercholesterolaemia was defined as a total blood cholesterol above 5 mmol/l.

Statistics

Age- and gender-specific prevalences of schizophrenia were estimated for the country as a whole and for Nuuk separately, using the population as of 1 January 2019 as background population [9]. Normally distributed parameters were described using mean and standard deviations. Check for normality was done by QQ-plot. Means were compared using two-sided t-test for independent samples. Proportions were compared using the χ^2-test. A p-value below 0.05 was considered significant.

The study was approved by the Ethics Committee for Medical Research in Greenland (reference number: KVUG 2018-17) and by the Agency for Health and Prevention in Greenland.

Trial registration: not relevant.

RESULTS

Data extraction was done on 7 November 2018. A total of 273 (78 women and 195 men) persons with a diagnosis of schizophrenia were identified corresponding to a crude prevalence of 0.8% among people aged 15 years or more (see **Table 1**). Table 1 presents the age- and gender-specific prevalence of schizophrenia in Nuuk and Greenland, respectively. The prevalence was higher among men (1.1%) than among women (0.5%), p < 0.001. In particular, the prevalence among men aged 15 years or more in Nuuk (1.3%) was rather high. Thus, the male/female ratio for schizophrenia in Nuuk was 2.5. The prevalence of schizophrenia in Nuuk was 1.0%, higher than the 0.7% observed in the rest of Greenland, p < 0.001. The highest prevalence, 1.8%, was observed among males aged 15-34 years in Nuuk. Among the 273 patients with schizophrenia, 263 (96.3%) received at least one type of antipsychotic medication; among those, 137 (50.2%) received two antipsychotics or more. Basic characteristics of the patients are presented in **Table 2**.

TABLE 1 Age and gender specific prevalence of schizophrenia in Greenland, November 2018.

Age, yrs	Nuuk			Rest of Greenland			Greenland	
	male n/N % (95% CI)	female n/N % (95% CI)	p-value	male n/N % (95% CI)	female n/N % (95% CI)	p-value	male n/N % (95% CI)	female n/N % (95% CI)
15-34	50/2,861 1.8 (1.3-2.3)	22/2,803 0.8 (0.5-1.2)	0.001	25/4,919 0.5 (0.3-0.8)	19/4,725 0.4 (0.2-0.6)	0.464	75/7,780 1.0 (0.8-1.2)	41/7,528 0.5 (0.3-0.7)
35-64	49/4,161 1.2 (0.9-1.6)	15/3,524 0.4 (0.2-0.7)	< 0.001	64/5,998 1.1 (0.8-1.4)	22/3,899 0.6 (0.4-0.9)	0.010	113/10,159 1.1 (0.9-1.13)	37/7,423 0.5 (0.3-0.8)
≥ 15	101/7,585 1.3 (1.1-1.6)	37/6,762 0.6 (0.4-0.8)	< 0.001	94/10,145 0.9 (0.7-1.0)	41/8,189 0.5 (0.4-0.7)	0.002	195/17,730 1.1 (0.9-1.2)	78/14,951 0.5 (0.4-0.6)

CI = confidence interval; n = number of patients; N = number of individuals in background population.

TABLE 2 Basic characteristics of patients with schizophrenia in Greenland, November 2018.

	Male (n = 195)		Female (n = 78)			Total (N = 273)	
	yrs, mean (± SD)	n (%)	yrs, mean (± SD)	n (%)	p-value	yrs, mean (± SD)	n (%)
Criminal sentence to psychiatric treatment		57 (29.2)		9 (11.5)	< 0.001		66 (24.2)
No education/elementary school		174 (89.2)		62 (79.5)	< 0.001		236 (86.5)
Dependent of state benefit/social transfers[a]		142 (72.8)		55 (70.5)	0.702		197 (72.2)
Living in supported housing		63 (32.2)		21 (26.9)	0.383		84 (30.8)
Has children		18 (9.2)		26 (33.3)	< 0.001		44 (16.1)
Regular cannabis use		111 (56.9)		32 (41.0)	0.018		143 (52.4)
Alcohol abuse or Antabus treatment		42 (21.5)		22 (28.2)	0.239		64 (23.4)
Sexually abused during childhood		13 (6.7)		13 (16.7)	0.011		26 (9.5)
Age							
In November 2018	38.9 (± 13.2)		36.9 (± 13.0)		0.303	38.7 (± 13.0)	
When diagnosed	25.1 (± 6.9)		24.6 (± 8.0)		0.670	24.6 (± 6.78)	

SD = standard deviation.
a) Excluding study support, and old age retirement support.

The mean age at diagnosis was 25.0 years with no difference observed between genders. The majority of the patients had no education (86.5%) and were unemployed (72.2%). Around one third of the patients, 84 (31%), lived in supported housings, whereas 26 (10%) lived with a partner, 50 (18%) with parents or other family members and finally six (2%) were living as homeless (sleeping in apartment complex staircases, hostelries, etc.). In all, 44 of the patients (16%) had children. Among those, 18 (41%) had had their children removed by the authorities. Approximately one quarter of the patients, 64, had some level of alcohol problem, either overuse or as disulfiram treatment due to previous dependency. More than half of the patients, 143 (41.0% of females and 56.9% of males), used cannabis, whereas no use of other illegal drugs was recorded for the rest of the patients. Among males, 57 (29.2%) of the patients had a sentence to psychiatric treatment compared with nine (11.5%) of the females, p ≤ 0.001 Cardiovascular risk factors are shown in **Table 3**. Registration within one year was available among 8.4% (smoking), 17.9% (BMI), 61.9% (blood pressure), 71.1% (HbA$_{1c}$), and 68.1% (total blood cholesterol) of the patients. Among those, 91.3% (21/23) were smokers, 38.8% (19/49) were obese, 26.0% (44/169) had hypertension and 23.1% (43/186) had elevated total blood cholesterol.

TABLE 3 Cardiovascular risk factors of patients with schizophrenia in Greenland, November 2018.

	Male, %; n/N	Female, %; n/N	p-value	Total, %; n/N
The factor has been registered within the past year				
Smoking	8.9; 15/168	9.8; 8/82	0.818	9.2; 23/250
BMI	16.1; 27/168	26.8; 22/82	0.046	19.6; 49/250
Hypertension	68.5; 115/168	65.9; 54/82	0.681	67.6; 169/250
Diabetes	95.8; 161/168	40.2; 33/82	< 0.001	77.6; 194/250
Total cholesterol	78.0; 131/168	67.1; 55/82	0.640	74.4; 186/250
Registered risk factor shows abnormal values				
Daily smoking	93.3; 14/15	87.5; 7/8:	0.644	91.3; 21/23
Obesity: BMI > 30 kg/m²	33.3; 9/27	45.5; 10/22	0.031	38.8; 19/49
Hypertension: blood pressure > 140/90 mmHg	29.6; 34/115:	18.5; 10/54	0.128	26; 44/169
Diabetes: HbA$_{1c}$ concentration > 47 mmol/mol	5.0; 8/161	3.0; 1/33	0.630	4.6; 9/194
Total cholesterol concentration > 5 mmol/l	23.7; 31/131	21.8; 12/55	0.787	23.1; 43/186

HbA$_{1c}$ = glycosylated haemoglobin; n = number of patients; N = number of individuals in background population.

DISCUSSIONS

Limitations

The major strength of this study is that it is the first to estimate the national prevalence of schizophrenia in Greenland. However, the study has some clear limitations. The absolute number of patients is quite small, limiting the statistical power. Yet, the population is small. Furthermore, the EMR used is relatively new (2015), and was only recently implemented in all regions of the country (2018), increasing the risk of incomplete reporting beyond Nuuk. Thus, it cannot be excluded that some patients with schizophrenia have not received an ICD-10 code in the EMR. In particular, this is the case for patients living beyond Nuuk who have not been hospitalised since outpatient contacts in primary healthcare are not coded with an ICD-10 diagnosis. Thus, the prevalence for all of Greenland is clearly underestimated, whereas the prevalence for Nuuk is considered representative. Thus, the true prevalence for all Greenland is probably closer to the Nuuk prevalence than the one recorded for the rest of Greenland. Also, the estimated prevalence of schizophrenia in this study only captures patients who have been in contact with the healthcare system between 2015 and 2018, contributing to an underestimation of the real prevalence. Thus, not all people with schizophrenia come into contact with the healthcare system. The short observation period may also have increased the male/female ratio as females with schizophrenia tend to manage their disease without healthcare contact for a longer period than males do.

Metabolic and cardiovascular risk factors were only reported in 9-77% of the patients. The true prevalence of cardiovascular risk factors and diabetes is unknown and the comparison with the general population in Greenland should be considered with caution.

Other studies

The 1.0% prevalence of schizophrenia in Nuuk among adults aged 15 years or above is comparable to and a bit higher than the prevalence observed internationally, 0.5-0.9% [4, 5]. The high male/female ratio (2.5) documented herein is rather high compared with the schizophrenia male/female ratios usually found in international studies. A systematic review including 1,721 prevalence estimates (154,140 prevalent cases) from 188 studies in 46 countries reported an average male/female ratio of 1.4 [4]. The mean age at diagnosis (25.0 years of age) was comparable to observations in a Danish study. According to a comprehensive nationwide follow-up study of all Danish residents (5.6 million persons, total follow-up 59.5 million person years), median age at diagnosis was 26.8 years for men and 29.1 years for women. The highest incidence for both genders was observed at the age of 22 years [10].

The poor socio-economic states in patients with schizophrenia in Greenland are in line with a global trend supported by multiple studies and reviews [11, 12]. Also, the high proportion of patients receiving social benefits is comparable to what is seen in other Nordic countries with similar welfare systems. A follow-up study with 428 patients in Denmark reported around 95% of the schizophrenia patients being dependent on social welfare [12]. Also, the frequency of patients being institutionalised and living with their family are similar to those observed in other Nordic countries [12].

A quarter of the patients – almost one third of the male patients – had a criminal sentence including psychiatric treatment. In comparison, approximately 2,300 people with schizophrenia in Denmark have a treatment sentence, corresponding to approximately 8% of the patients (13% of the male patients) [13, 14].

We found a very high frequency of cannabis use among the mentally ill; 41% and 56.9% in females and males, respectively, compared with 9.2% and 15% in the female and male background population [15]. Almost a quarter of the schizophrenia patients had alcohol problems, in contrast to what is seen in the general Greenlandic population where consumption is slightly below alcohol consumption in Denmark, whereas alcohol prices are far above Danish prices [16]. The frequency of both alcohol and drug abuse may, in fact, be higher than reported, as it is likely that only some of the patients with drug abuse have reported this. Thus, the information in the EMR may be incomplete.

Sexual abuse during childhood was described in the EMRs for 16.7% of the female patients and 6.7% of the male patients. This is less than in the general Greenlandic population, according to the latest report from the Danish Center for Social Science Research [17], where 22% of women and 5% of men reported having been sexually abused at an age under 15 years. The true proportion of patients with a history of sexual abuse is probably higher, as such information is not necessarily reported in the EMR.

Metabolic and cardiovascular risk factors were available for 9-77% of the patients indicating that there is room for improved cardiovascular preventive care. The proportion of patients who were smokers was very high, 91%, compared to 52% in the general population [15]. Also, the proportion with obesity, 45.5% of the women and 33.3% of the men, was higher than the percentages in the general population, 32% and 24%, respectively [15]. The prevalence of diabetes, 4.6%, was also slightly higher than the reported prevalence among adults in Greenland, 2.5% [18, 19]. The suboptimal monitoring of cardiovascular risk factors documented in this study is in line with a global trend. Patients with severe mental illness are less likely to be tested for metabolic risk factors than the general population. Somatic health problems are therefore widely underdiagnosed and undertreated among people with severe mental illness [19].

CONCLUSIONS

The prevalence of schizophrenia in Nuuk is comparable to what is found internationally, except for a higher occurrence of the illness among younger men. In general, low socioeconomic states were observed to be comparable to the global findings. Monitoring of cardiovascular risk factors was suboptimal. An increased focus on socio-psychological rehabilitation and monitoring and control of cardiovascular risk factors is warranted. Reproduction of this study would be relevant after five years when the relatively new EMR system has been available for a greater amount of time.

LITERATURE

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