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# **Risk markers and incidence of atrial fibrillation in northern Sweden**

Cecilia Johansson

## **Akademisk avhandling**

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Fakultetsopponent: Professor emeritus Mårten Rosenqvist,  
Kliniska vetenskaper, Karolinska Institutet, Stockholm, Sverige.

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## Author

Cecilia Johansson

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## Abstract

**Background:** Atrial fibrillation (AF) has a prevalence of approximately 3%. Less is known about the incidence of AF. To reduce the incidence of AF, it is of essence to identify modifiable risk factors for AF.

**Aims:** The aims of this thesis were (1) to estimate the incidence of AF and to assess the prevalence of provoking factors and risk factors for stroke and systemic embolism at the time of AF diagnosis, (2) to study the association between alcohol consumption and risk of AF, (3) to study the association between weight, height, weight change, and risk of AF, and (4) to study the association between normal or high normal blood pressure (BP), compared to optimal BP, and risk of AF.

**Methods:** To determine the incidence of AF and the prevalence of provoking factors and risk factors for stroke and systemic embolism at AF diagnosis, a study was performed between 2011 and 2012 in two municipalities in Västerbotten, Sweden. Diagnosis registries were searched for cases of incident AF. All AF diagnoses were verified by electrocardiogram. Data on provoking factors, type of AF and presence of risk factors for stroke and systemic embolism (assessed by the CHA<sub>2</sub>DS<sub>2</sub>-VASc score) was obtained from medical records. The incidence of AF was calculated. The association between alcohol consumption, weight, height, weight change, normal BP, high normal BP, and risk of AF was investigated in a population-based cohort study of participants of the Västerbotten Intervention Programme (VIP) from January 1, 1988, to September 5, 2014. Individuals diagnosed with AF before participating in the VIP were excluded. Study participants were followed until AF diagnosis, death, migration from the study area, or study end on September 5, 2014. Incident AF cases were identified in the Swedish National Patient Registry. The VIP included measurements of height and weight, BP, fasting glucose, oral glucose tolerance, and cholesterol and a questionnaire addressing e.g., health and lifestyle. BP was categorized as optimal (BP <120/80 mm Hg), normal (BP 120–129/80–84 mm Hg), high normal (BP 130–139/85–89 mm Hg), or hypertensive BP (BP ≥140/90 mm Hg).

**Results:** The incidence of AF was 4.0 AF cases per 1000 person-years. In 21%, a provoking factor was present at the first episode of AF. The CHA<sub>2</sub>DS<sub>2</sub>-VASc score was 2 or higher in 81%. Permanent AF was the most common type of AF. When studying the association between alcohol consumption and risk of AF, 109,230 health examination participants were included in the study cohort and were followed for 1,484,547 person-years. During the study period, 5230 persons developed incident AF. Men with alcohol consumption in the highest quartile (≥ 4.83 standard drinks weekly) had a hazard ratio (HR) of 1.21 (95% confidence interval [CI] 1.09–1.34) for AF in a multivariable model when compared to men with an alcohol consumption in the lowest quartile (< 0.90 standard drinks weekly). In men, problem drinking was also associated with an increased risk of AF. In women, there were no significant associations between alcohol consumption or problem drinking and risk of AF. In a multivariable model, height, weight, body mass index (BMI), and body surface area (BSA) were positively associated with risk of incident AF. Among persons who had two health examinations 10 years apart, 1142 persons developed AF. Mean weight change from baseline was a weight gain of 4.8%. There were no significant associations between either weight gain or weight loss and risk of AF. In the study of the association between normal BP, high normal BP, and risk of AF, 109,697 persons with a total of 162,982 health examinations were included. Incident AF was diagnosed in 5260 persons. There was an increased risk of incident AF in persons with normal BP (HR 1.11, 95% CI 1.01–1.27) and in persons with high normal BP (HR 1.23, 95% CI 1.10–1.38) compared to optimal BP in a multivariable model.

**Conclusions:** AF has an incidence of 4.0 per 1000 person-years. Alcohol consumption and problem drinking were associated with higher risk of AF in men, but not in women. Weight, height, BMI, BSA, and normal BP, and high normal BP, compared to optimal BP, were associated with increased risk of AF.

## Keywords

Atrial fibrillation, atrial flutter, incidence, provoking factors, AF types, stroke risk, alcohol consumption, problem drinking, weight, height, weight change, normal blood pressure, high normal blood pressure

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