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Original Research

Cold-related symptoms among the healthy and sick of the general population: National FINRISK Study data, 2002

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SUMMARY

Objective: To determine the prevalence of cold-related symptoms among the general population, especially people with pre-existing diseases.
Study design: Six thousand nine hundred and fifty-one men and women aged 25–74 years, who had participated in the National FINRISK 2002 Study, filled in a questionnaire on cold-related symptoms.
Methods: Age-specific and age-adjusted prevalence figures for cold-related symptoms were calculated. The symptoms were regressed for gender, age, region of residence, industry, self-reported disease and smoking.
Results: Five percent of the subjects reported chest pain or arrhythmia in the cold, and higher prevalence figures were found for respiratory (men 26%/women 31%) and musculoskeletal symptoms (31%/28%). The prevalence of cold-related cardiovascular symptoms was particularly high among subjects with coronary heart disease (33%/46%) or cardiac insufficiency (25%/40%), as was the prevalence of respiratory symptoms among asthmatics (69%/78%) and subjects with chronic bronchitis (66%/77%). The symptoms increased with age, were more common in colder areas than milder areas, and were more common in those engaged in agricultural work than those engaged in industry or services. Cold-related cardiovascular and respiratory symptoms were more common among women than men. The regression-adjusted contributions (percentage points) to various cold-related symptoms were 2–45% for lung disease, 7–9% for cardiovascular disease, 3–15% for joint or back disease and 6–13% for mental disease.
Conclusions: Large proportions of people living in the north, particularly those with pre-existing medical conditions, experience cardiovascular, respiratory or musculoskeletal symptoms in the cold. Since the symptoms may predict future morbidity and mortality, a strategy is needed to reduce the cold-related health risks of the entire population.

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Introduction

Most countries suffer 10–30% higher mortality in winter than summer,[1] mainly due to cardiovascular and lung disease. In Finland, both the incidence and case fatality of myocardial infarction[2,3] and cerebral stroke[4] increase during the cold season. The underlying mechanisms are not fully known,[5] but are mainly understood in terms of the adverse effects of thermoregulatory adjustments. Cooling of the human body leads to cutaneous vasoconstriction, a rise in blood pressure, hemoconcentration and propensity to vascular thrombosis, as well as increased cardiac load, oxygen deficiency and arrhythmia.[5–7] Cold exposure may also cause long-lasting hypertension due to activation of the sympathetic nervous system, renin–angiotension–aldosterone system, nitric oxide or endothelin,[8] thereby increasing the risk of cardiovascular disease and triggering acute events. Respiratory infections in winter not only increase respiratory deaths,[9] but may precipitate cardiovascular events by the extra load imposed on the heart[6] and increased thrombogenesis.[10,11] Old people[12,13] and persons suffering from coronary heart disease[14] or cardiac insufficiency[15] are at high risk of cold-related adverse effects such as angina,[16] myocardial infarction[17] or death.[15,18] Pre-existing lung disease increases cold-related all-cause mortality among the elderly.[19] Vulnerable groups also include people suffering from back or joint disease, since their symptoms increase and worsen in the cold, possibly due to cold-induced vasospasm,[20] which further increases the already heavy public health burden related to musculoskeletal disorders.

The first sign of cold exposure is the sensation of cold, which is perceived by one-half of the working-age population in Finland when ambient temperatures fall to between −5 °C and +5 °C.[21] The sensation of cold is followed by cardiovascular, lung and other symptoms which start to emerge at temperatures of −3 °C to −20 °C.[21] Although not equivalent to actual health effects, such symptoms can identify individuals who are at increased risk.[22] Previous studies have determined the prevalence of cold-related symptoms in the entire population[21] and among people with lung disease,[23] but their occurrence among people suffering from other medical conditions remains unknown. Pre-existing diseases impair thermoregulatory responses in the cold, thus enhancing heat loss from humans to the environment and resulting in aggravated symptoms.[24,25] In patients with coronary heart disease, for example, chest pain is easily provoked by cold exposure, even without exertion,[17] which may indicate a risk of myocardial infarction or death. Exacerbation of symptoms among asthmatics in the cold is well known,[23,26,27] as is exacerbation of musculoskeletal symptoms among patients with low back pain.[28] While cardiorespiratory symptoms such as chest pain, dyspnea and phlegm production predict long-term cardiovascular and all-cause mortality,[22,29–31] no studies have specifically linked cold-related symptoms to future morbidity or mortality.

To provide more information on cold-related symptoms and to identify susceptible population groups, a series of studies on the general population of Finland was undertaken.[21,23,32] The present paper determines the prevalence of cold-related symptoms among individuals suffering from a wide range of medical conditions. The focus is on cold-related cardiovascular, respiratory and musculoskeletal symptoms. The data come from the National FINRISK Study, in conjunction with which the participants filled in a separate cold questionnaire.

Methods

Participants and data

Finland is one of the Nordic countries, situated between 60 and 70°N latitude and 20 and 31°E longitude. The National FINRISK Study, performed at 5-year intervals, was conducted between January and April 2002. In January, average daytime temperatures were from −3 °C (Helsinki in southern Finland) to −12 °C (Lapland in northern Finland); and in April, from +7 °C (Helsinki) to +3 °C (Lapland); the lowest and highest daytime temperatures recorded were −35 °C and +18 °C. Working-aged people in Finland are exposed to cold for an estimated 7 h/week at work and during leisure time.[32]

A random sample, stratified by gender and 10-year age groups, with 250 individuals in each stratum, was drawn from the entire population in six areas of Finland (Fig. 1) using the national population register. The age range was 25–64 years, except in Helsinki-Vantaa, Lapland and North Karelia where people aged 65–74 years were also included. In total, 13,437 people were sampled, but 3181 people selected at random from all areas except Lapland were excluded after a dietary interview, leaving 10,256 people for the cold sub-study. The cold questionnaire was mailed to them together with the

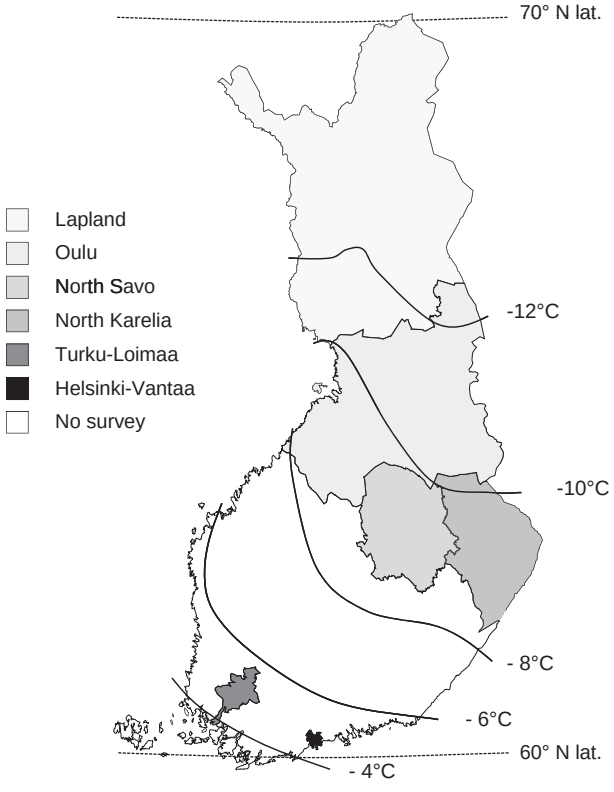

Fig. 1 – The areas of the FINRISK 2002 cold sub-study. Isotherms are mean monthly temperatures in December–February, 1971–2000.