Mortality among Finnish sea pilots 1956–85: a retrospective cohort study

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The National Board of Navigation in Finland employed 942 sea pilots in 1956–85, during which time 262 of them died (SMR = 77, 95% CI = 68–86). The male population in southwest Finland served as control. The causes of deaths were collected from death certificates. The mortality rate for all cardiovascular diseases and lung cancer was lower among sea pilots than in the comparison population (SMR = 83, 95% CI = 69–97 and SMR = 67, 95% CI = 37–97) while for ischaemic heart diseases, it was similar to that of the population as a whole (SMR = 96, 95% CI = 77–115). Health selection due to ischaemic heart disease was seen in the lower mortality rates among young pilots who started work in 1956–85. Otherwise, the slightly higher rates may indicate a possibility of adverse health effects of sea piloting.

Key words: Finland; ischaemic heart disease; mortality; sea pilots.

INTRODUCTION

Sea pilots, as well as other seafarers, have many risk factors for ischaemic heart diseases.1–7 Seafarers are often heavy smokers, they have elevated blood pressure and overweight is common as are high serum cholesterol values.8

The blood level of stress hormones has been shown to be elevated among pilots during strenuous piloting.2,9 The stress feeling correlated with the secretion of stress hormones even though not statistically significantly.10 Piloting work, especially when embarking and disembarking, has physically high loading periods.4,11,12

In the ergometric bicycle test, 10% of symptom-free sea captains and 11% of symptom-free sea pilots had an abnormal ECG finding, while the corresponding percentage among the Norwegian male population was only 4.6.13

Elevated mortality from ischaemic heart diseases has been reported among 39–45 year old English sea pilots.14 A similar result was obtained in Germany.15 Even though the piloting work cannot be separated from the life style of sea pilots—living at piloting stations, eating and smoking habits, ways of spending free time, etc., these possibly varying from country to country—piloting has been seen as one of the occupations with an elevated risk for ischemic heart disease deaths.16,17

Finnish deck and engine crew members have been reported to have a higher overall mortality than the general population (SMR = 151 and 159, respectively).18 Also the mortality rate for ischaemic heart diseases exceeded the expected figure. Even though the sea pilots play a key role in steering the ship safely through the narrow waterways on the Baltic sea, no information exists about the mortality rate caused by ischaemic heart diseases among this special group or sailors in Finland.

MATERIALS AND METHODS

The National Board of Navigation is the employer of Finnish sea pilots and keeps a personal register on
them. The register contains the sea pilot’s name, date of birth, place of birth, piloting district and working time as a sea pilot. A complete list of Finnish sea pilots working in the years 1956–85 was collected from this register. All the pilots were men. During this period, altogether 942 sea pilots had been employed. Sea pilots, so-called ‘sea line pilots’ working on the Baltic car ferries in regular line traffic on certain regular sea routes were employed by private shipping companies and they were excluded from the study.

The vital status of the study members was traced through the Population Information System of Finland. The causes of deaths were collected from the death certificates from Statistics Finland. The primary cause of death was coded according to the International Statistical Classification of Diseases, Injuries and Causes of Death. The cause of death was available for every dead sea pilot.

The age-specific (ten-year age classes) observed numbers of deaths were calculated for the sea pilots in ten-year periods (1956–65, 1966–75,1976–85). The expected numbers were based on the death rates of the male population in southwest Finland (the province of Turku and Pori and the Åland archipelago) in the mean years 1961, 1970 and 1980 of the respective ten-year periods. The year 1961 was chosen because the corresponding statistics on causes of death from 1960 did not exist.

In addition to the expected numbers for all sea pilots together, the Standardized Mortality Ratios SMR, and 95% confidence intervals for the SMR were calculated, separately, for those already working as a sea pilot in 1956 (the cross-sectional cohort) and for those who started sea piloting in 1956–85 (the entry cohort).

RESULTS

During the 30 year follow-up period from 1956–1985, 262 sea pilots died, whereas the expected number was 340 (SMR = 77, 95% CI = 68–86). The total number of person-years was 18,413. The ten-year periodic death rates were as follows: in 1956–65, 37 deaths were observed and 53.7 were expected (SMR = 69, 95% CI = 47–91); in 1966–75 the corresponding numbers were 79 and 130.5 (SMR = 61, 95% CI = 48–74); and in 1976–85, 146 and 155.5 (SMR = 94, 95% CI = 79–109), respectively.

More than half of the deaths (55%) were due to cardiovascular diseases. Sea pilots’ mortality from cardiovascular diseases was 83% (95% CI = 69–97) of that among the comparison male population of the same age. Ischaemic heart disease had caused 72% of the cardiovascular deaths.

The standardized mortality rate for ischaemic heart diseases was similar among the whole cohort of pilots.
and in the comparison population (SMR = 96, 95% CI = 77–115). However, in the younger age groups (25–64 years) of the entry cohort, mortality from ischaemic heart disease was lower than in the same age groups of the comparison population (SMR = 88, 95% CI = 38–173), whereas in the older age groups it was slightly higher than was expected (SMR = 133, 95% CI = 49–290). In the cross-sectional cohort the results were the reverse; SMR = 138 (95% CI = 71–241) and SMR = 90 (95% CI = 71–113), respectively (Table 1).

Malignant tumours had caused every fifth death and violence, accidents or poisoning every tenth death. Lung cancer had caused most of the cancer deaths. Sixteen gastrointestinal cancers were observed, nine of them stomach cancers. Eight gastrointestinal cancers were found in the period 1966–85 whereas the expected figure was 9.9.

Of the 12 pulmonary deaths, three were due to pneumonia, six to chronic bronchitis and three to bronchial asthma. In 1966–85, seven deaths were caused by chronic bronchitis and bronchial asthma, a figure which was 52% of the expected number.

Both the total and cause-specific mortality rates increased in the ten-year observation periods among all sea pilots. The observed 19 pulmonary cancer cases were clearly fewer than expected (28.5). In the first two follow-up decades (1956–75), there were five lung cancer deaths (expected 14.8) and in the last decade (1976–85) 14 (expected 13.7).

The total mortality as well as the mortality rate for cardiovascular and ischaemic heart diseases among sea pilots starting their piloting service before the year 1956 (the cross-sectional cohort) were lower than expected, while rates among pilots starting their service in 1956–85 (the entry cohort) were as high as expected (Table 1). Cardiovascular mortality of the young pilots (25–44 years) slightly exceeded that of the comparison population.

DISCUSSION

The sea pilots form a very special group of seafarers: they all have a captain’s training with many years at sea before starting as a pilot. During this time they experience the same exposure as other seafarers on board ship (smoking, eating, exposure at work, etc.). Later, as a pilot, they live on shore and are on board ship only when piloting. If there were in earlier years some dissimilarity in eating habits between sea pilots and coastal population, today this kind of differences were no more seen.16 Sea pilots’ smoking habits are today similar to those of the coastal population.13

Because most of the Finnish sea pilots were born in the coastal regions, the male population of southwest Finland (the province of Turku and Pori and the Åland archipelago) was chosen as the control population. The mortality from ischaemic heart diseases among the male population in this region has always been the lowest in the country.14 To avoid the time variation in mortality rates the expected figures were produced separately for the three ten-year periods.

The total mortality rate of Finnish sea pilots was lower than that in the southwest coastal male population (71%). The effect of health selection on mortality rates was seen in all three decades. The lowest mortality rate was observed in the first decade, especially in the oldest age groups.

Deaths due to ischaemic heart disease among the younger age groups in the whole cohort were found to be slightly more common than in the coastal population, whereas in the older groups the situation was the reverse. This age-related finding was similar to the findings in England and Germany.5,10 However, in these studies, the mortality rate of younger sea pilots was significantly higher than in the comparison populations while no difference was seen in older groups. In Sweden, no excess mortality from ischaemic heart diseases could be observed in 1951–84 among sea pilots in comparison with the national male population of the same age.25

The Finnish piloting population consisted of pilots already working as pilots in 1956 and of those starting in 1956–85. The age distribution of the person-years and of the deaths in the whole cohort was more weighted by the subcohort of sea pilots who started piloting before 1956 than by those who entered this work in 1956–85. Therefore, the mortality rates in the whole cohort also reflected the corresponding rates of the cross-sectional sub-cohort.

The proportion of ischaemic heart disease of all cardiovascular deaths was quite high, almost two-thirds. Nevertheless, there were no statistically significant differences in ischaemic heart disease mortality between the sea pilots and the comparison population. The mortality from ischaemic heart disease in the younger age groups of the entry cohort was lower than expected, thus showing a health-based selection into piloting. This was supported by the reverse result obtained from the cross-sectional cohort. The lower rates in the younger age groups in the entry cohort are in accord with the results of other studies on occupations demanding good physical fitness.36

Regardless of the health selection mortality from ischaemic heart disease was slightly higher than expected in the older age groups of the entry cohort and in the age range 25–64 years of the cross-sectional cohort. This does not exclude the possibility of adverse health effects of sea piloting.

The mortality from malignant tumours among sea pilots did not differ from that of the coastal population. There are no known carcinogenic risk factors in piloting work. Since the smoking habits of Finnish sea pilots are similar to those of other populations, no excess in lung cancer mortality was expected.

To summarize, this study on mortality among Finnish sea pilots did not indicate that sea pilots in Finland form a special occupational risk group. However, the mortality rate from cardiovascular diseases as
well as from ischaemic heart diseases among sea pilots slightly exceeded that of the comparison population. Sea pilots have had regular medical examinations every second year. However, the nature of this examination is almost identical for all seafarers irrespective of their work on board ship. In the case of sea pilots, the content of the medical examinations should be developed.7

REFERENCES