Rate and Place of Death From Asthma Among Different Ethnic Groups in Israel*

National Trends 1980 to 1997

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Study objectives: To compare the trends of asthma mortality and place of death in young patients (ages 5 to 34 years) from different major population groups in Israel.

Design: Retrospective study.

Patients and participants: Patients who died from asthma between the years 1980 and 1997 according to the death record of the National Israeli Health Registry.

Results: During the period studied, 100 asthma mortality cases were reported, which yields a mean mortality rate of 0.226 per 100,000 population. There were no significant changes in the mortality rates over the years. The mean (± SD) age of death was 23 ± 7 years. Of this population, 84.5% were Jews and 15.5% were Arabs, which is proportionate to the general Israeli population. In 52% of the cases, the patients died outside a hospital. There was no significant difference in the place of death between Jews and Arabs. Significantly more men (62.5%) than women (40%) died outside the hospital (p = 0.025).

Conclusions: The asthma mortality rate in Israel during the years 1980 to 1997 was low and stable. Most of the patients still died outside the hospital. There was no difference in the asthma death rate and place of death between Jews and Arabs, suggesting that in our population genetic predisposition is not likely to be a risk factor for mortality. (CHEST 2002; 122:1222–1227)

Key words: asthma; hospital; mortality

Abbreviation: ICD = International Classification of Diseases

Asthma is a common chronic disease that is characterized by an inflammatory process of the large and small airways causing reversible airflow obstruction and airway hyperresponsiveness. In many countries, the prevalence of asthma has increased in recent decades.1,2 An analysis of asthma mortality rates in Western countries such as the United States, Canada, New Zealand, France, Denmark, and Germany has revealed a distinct rise in rates during the 20-year period prior to 1990.3–9 This trend was less apparent in other countries.10,11 An increased prevalence of asthma cannot be a primary contributor to increased mortality rates since the rise in the latter was disproportionately greater than that of the former.12 In the last decade, though, the stabilization of mortality, and even a decrease in mortality, from asthma has been reported.13–16 Asthma mortality is associated with multiple factors, including delay in care, poor compliance, lack of access to health care, theophylline toxicity, and overdose of B-agonist medications.17–19 Speculation about the recent decline in asthma deaths has pointed to the more judicious use of prophylactic treatment, particularly inhaled steroids, as a possible factor.20,21 Studies also have shown that race and socioeconomic status may influence the outcome of an asthma attack.22,23 Efficient treatment for severe asthma attacks exists, requires hospitalization, and may include mechanical ventilation. Hospitalization rates for asthma are high and have increased in the last few decades.3,5,7,24,25 However, some patients die before they can receive medical care.26,27 The true proportion of deaths occurring outside the hospital and its association with genetic, environmental, or sociologic factors is not clear.

The population of Israel consists of two major
population groups, Jews and Arabs. Both of these major populations are composed of different ethnic groups. Sephardim and Ashkenazim comprise the Jewish population, and the Arab population consists of Druses, Christians, Moslems, and Bedouins. Most of the Jewish population in Israel is concentrated in cities, whereas most of the Arab population lives in villages or small townships. Both populations receive free medical care. Therefore, the trends and the main causes of asthma mortality in Israel in general, and in each of these ethnic groups in particular, could be different from those reported in other countries.

The aims of this study were the following: (1) to assess the trend of asthma mortality in Israel between the years 1980 and 1997 and to compare it with those of other countries; (2) to assess the rates of asthma deaths occurring outside medical centers; and (3) to determine whether there exist differences in rates of death and place of death between Jews and Arabs.

**Materials and Methods**

The Israeli Health Registry records an individual’s cause of death according to the diagnoses stated on the death certificate, which is completed by law by the physician who last treated the patient. This death certificate includes diagnoses of the causes of death. The data are collected and coded by the Israeli Central Bureau of Statistics under the supervision of the Ministry of Health. This same bureau annually publishes general demographic data on the Israeli population, thereby enabling the calculation of mortality rates for each disease. Information regarding asthma mortality and the general population between the years 1980 and 1997, including the gender, race, and place of death of patients between the ages of 5 and 34 years, was obtained. This age group was chosen because of the high accuracy of asthma diagnosis during this period of life. It was not possible to retrieve specific details concerning the circumstances of fatal cases of asthma.

Only cases in which the cause of death was reported as asthma (code 493 in the ninth revision of the International Classification of Diseases [ICD]) were included. To avoid the possible overestimation of the incidence of asthma mortality, cases reported under codes 490 to 492 in the ninth revision of the ICD (i.e., bronchitis and emphysema) were omitted. In 1979, the ICD classification system was revised. In order to ensure the standardization of diagnoses, only fatal cases that occurred subsequent to this revision were included. Annual death rates were grouped into 3-year periods in order to prevent potential errors due to small numbers of cases. The data were analyzed for statistical significance using Poisson regression modeling to assess the effect of age group and year on the mortality rate. In order to estimate the possibility of a nonlinear trend, nonparametric regression was performed using a spline model.

**Results**

One hundred individuals aged 5 to 34 years died from asthma in Israel between the years 1980 and 1997. Yearly death rates are presented in Figure 1. The average mortality rate per year during this period was 0.226 per 100,000 population (95% confidence interval, 0.16 to 0.292). The mean (± SD) age of death was 23 ± 7 years. The sporadic in-

![Figure 1. Yearly rate of death from asthma in Israel per 100,000 population among patients who are 5 to 34 years old.](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21983/ on 06/27/2017)
creases and decreases in death rates occurring between 1980 and 1997 do not achieve statistical significance. The analysis of the mortality rate using a Poisson regression model showed no significant influence either for year (p = 0.78) or for age group (p = 0.695). Because of the relatively small number of cases, we grouped them into 3-year periods (Fig 2). Although during the years 1992 to 1994 there was a decline in mortality rates, it did not achieve statistical significance. This decline did not continue during the next 3 years. Grouping the mortality rates into 5-year periods still did not demonstrate any significant trends during the study period. The analysis of the nonparametric regression did not show significance in trends of mortality during the study period.

Among the patients in the 100 fatal cases, 52 patients (53.6%) were men and 45 patients (46.4%) were women. In three cases, the gender of the patient was not available. This distribution is not statistically different from the general Israeli population (men, 51%; women, 49%). Eighty-two patients (84.5%) were Jewish, 15 patients (15.5%) were Arab, and in three patients the ethnicity was not available. These values too are comparable to the demographics in the Israeli population (Jews, 78%; Arabs, 22%).

In 95 cases, the place of death was documented. Forty-nine patients (52%) died outside the hospital, while 46 patients (48%) died in a hospital. Among the former group, 36 patients (73.5%) died in the street, 10 patients (20.4%) died at home, and 3 patients (6.1%) died on the way to the hospital. There was no significant difference in the places of death between Jews and Arabs (Fig 3). Interestingly, significantly more men (n = 30; 62.5%) than women (n = 18; 40%) died outside the hospital (p = 0.025) [Fig 3].

**Discussion**

This retrospective study on asthma mortality in Israel between 1980 and 1997 among patients aged 5 to 34 years demonstrates that the rate of death during that period remained stable. Several studies have demonstrated different trends in asthma mortality in Israel, and both increasing trends and decreasing trends have been reported. Our results demonstrate that although annual increments and decrements in mortality rates indeed may occur, over a longer period of time the overall trend is unchanged. Although the prevalence of asthma in
Israel is estimated to be approximately 9.6%, which is close to the prevalence generally reported in Western countries, the asthma mortality rate in Israel is relatively low. Of interest is that Israel, unlike other Western countries, did not experience an increase in asthma mortality in the early 1980s. More recently, a drop in asthma mortality rates has been reported in several countries. This phenomenon, however, did not occur in Israel. It is possible that the previously low asthma death rate in Israel makes a further decline in mortality rates a more difficult goal to achieve (Fig 1). Indeed, the mean rate of asthma mortality during the years 1982 to 1984 in our study was 0.24 per 100,000 population, which is somewhat lower than that reported for the same age group and time period in France (0.29) and the United States (0.34), and is far lower than that noted in West Germany (0.83), England (0.86), Australia (1.09), and New Zealand (2.67), all countries with similar prevalences of the disease. Furthermore, studies have demonstrated an increase in the prevalence of asthma in Israel over the last 20 years. Consequently, the lack of a concomitant rise in asthma deaths may be viewed as a relative decline.

The reasons for the stable low asthma mortality rates in Israel are probably multiple. Israeli law grants national medical insurance to every citizen. Medical care as well medications are virtually free of cost. Moreover, the country is relatively small with an abundance of hospitals so that urgent medical care is generally readily accessible. Israel is also among the countries with the highest per capita ratio of physicians to inhabitants. We speculate that these conditions may improve the quality of health care and urgent medical treatment, which may reduce mortality.

Our study did not reveal a difference in asthma mortality rates between Jews and Arabs. The low number of fatal cases did not allow us to assess other variables between these two major population groups. Although the Arab population resides mostly in villages, which are farther from emergency medical care, this did not influence its asthma mortality rate. Several studies have demonstrated disparate mortality rates among different ethnic groups. In Chicago, mortality from asthma was found to be higher among black patients compared to Hispanic and non-Hispanic white patients. In addition, among Hispanics of Puerto Rican origin asthma mortality was found to be higher than among other Hispanics and non-Hispanic whites. It is most

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**Figure 3.** Place of death according to sex and ethnic origin.
likely that the risk for asthma mortality for different ethnic populations is not only due to genetic factors but is a function of health-care accessibility and quality. Unfortunately, we have no data regarding the respective prevalence of asthma among Israeli Arabs and Jews, and it may be argued that if there is indeed a significant difference, the mortality rates could diverge.

In our study, 52% of the patients died outside the hospital, 73.5% of them in the street. Our findings are similar to those of other studies, which found that > 50% of asthma deaths occurred outside of hospitals. Asthma fatalities outside the hospital may occur more than is reported since some patients arrive at the emergency department having already sustained severe irreversible hypoxic damage and are pronounced dead in the hospital. The absence of a difference in the mortality rates outside of hospitals between Jews and Arabs suggests similar quality and accessibility of health care and no genetic predisposition for death from asthma.

The failure to seek emergency care is a known risk factor for asthma death. Israel is a relatively small country, with the majority of the population residing in close proximity to medical centers. Difficulty in reaching medical care would therefore not likely be a factor in asthma deaths in Israel that occurred outside the hospital. One report found that patients who are at a higher risk for asthma death were generally more likely to have severe disease, to have had more previous hospitalizations, and to be more likely to have been intubated or to have undergone cardiopulmonary resuscitation in the past. Since such patients previously had experienced severe asthma attacks, it would be expected that they would seek medical help at the onset of another attack. We hypothesize that the patients’ underestimation of their conditions, resulting in a failure to seek or a delay in seeking emergency medical treatment, played an important role in many of these cases. This underestimation may have been due either to negligence or to a subpopulation of patients with sudden and unexpected attacks, as reported by Hannaway. The fact that significantly more men died outside the hospital may be attributed to men being less inclined to seek emergency care and to an exaggerated self-confidence in their ability to control their asthma attack. Concerted efforts to educate asthma patients, especially those who are considered to be at high risk, in the accurate monitoring of their condition and in recognizing the clinical warning signs would likely have a beneficial impact on asthma mortality.

We conclude that the relatively low asthma mortality rate in Israel has not changed significantly in recent years. Although this may seem encouraging, the proportion of deaths that have occurred outside the hospital is high. A national asthma education campaign focusing on patient self-assessment, promoting wider use of a peak flowmeter, and establishing individual crisis management plans may reduce the potentially preventable mortality of patients with this treatable disease.

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