PREVALENCE AND SURVIVAL OF PATIENTS WITH CYSTIC FIBROSIS IN NORTHERN IRELAND, 1961-1971

by

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CYSTIC fibrosis (CF) is the most common autosomal recessive disorder in Caucasian populations, with a prevalence at birth of approximately 1 in 2,000. The prevalence shows considerable geographical variation, ranging from 1 in 377 to more than 1 in 10,000. Although most of this variation can be attributed to methods of ascertainment and diagnosis of CF, some may be due to true geographical variation. Before 1960, most children with CF died as a result of chronic suppurative lung disease in early childhood. However, in recent years there has been a marked improvement in the survival rates. This paper examines the geographical variation in the prevalence and also the survival of CF patients born in Northern Ireland during 1961-1971.

METHODS

In the mid-1960s the population of Northern Ireland was 1,484,800 with a birth rate of 22.5 per 1000. Multiple sources of ascertainment were employed to identify patients with CF born in the period 1961-1971. These sources included, consultant paediatricians and hospital diagnosis lists, genetic counselling clinic records, autopsy reports, and laboratory results of sweat electrolyte investigations. In addition, all general practitioners were circulated with a questionnaire requesting information relating to any patient under their care who had CF. The Cystic Fibrosis Group was asked to identify any CF patient born in the study period.

For each CF patient, the following information was recorded: date and place of birth, clinical symptoms, age at diagnosis, and confirmatory laboratory investigations. Each family was visited and a family history obtained. Criteria for inclusion in the study was as follows: the patient had to be born in Northern Ireland during the years 1961 and 1971, have a typical clinical history and, in addition, must have either an elevated sweat sodium or chloride, or have shown macro- and microscopic autopsy findings. Patients fulfilling these criteria were considered to be definite CF cases. Some patients who had an affected sib and raised sweat electrolytes but without clinical symptoms were considered to be probable CF cases. All patients reported as having CF but with incomplete information on diagnosis tests were considered as possible CF cases.

153
RESULTS

A total of 200 patients of all categories of CF was born in the period 1961-1971. There were 184 definite cases, 2 probable cases, and 9 possible cases, of CF. Five cases were excluded as two were born outside Northern Ireland, and in 3, the diagnosis of CF could not be confirmed. With a total livebirth population of 362,224 and 184 definite CF cases, the prevalence was 1 in 1969. The prevalence increased to 1 in 1857 when probable and possible cases of CF were also included. The prevalence according to the patient's year of birth ranged from 1 in 1210 (1965) to 1 in 3712 (1967) (Table). Of the 184 definite cases of CF, 19 (10.3 per cent) had meconium ileus. In 1961, the mean age of diagnosis was 12.2 months (range 1 to 36 months), whereas in 1971, the mean age of diagnosis was 14.3 months (range 1 to 61 months).

Table

Total livebirths, number of definite cases of cystic fibrosis by year of birth

| Year | Livebirths | CF Cases | Prevalence |
|------|------------|----------|------------|
| 1961 | 31,915     | 16       | 1/1994     |
| 1962 | 32,565     | 10       | 1/3256     |
| 1963 | 33,414     | 15       | 1/3342     |
| 1964 | 34,345     | 21       | 1/1635     |
| 1965 | 33,890     | 28       | 1/1210     |
| 1966 | 33,228     | 17       | 1/1954     |
| 1967 | 33,415     | 9        | 1/3712     |
| 1968 | 33,173     | 15       | 1/2211     |
| 1969 | 32,428     | 17       | 1/1907     |
| 1970 | 32,086     | 20       | 1/1604     |
| 1971 | 31,765     | 16       | 1/1985     |

362,224 184 1/1969

The geographical distribution of the patients was determined from the family history and hospital records, and compared with the number of livebirths in the same area. Figure 1 shows the prevalence per 100,000 livebirths ranged from 25.6 in County Londonderry to 70.7 in the County Borough of Belfast, compared with the overall prevalence for the Province of 50.8.

During the follow-up period, 95 (51 per cent) of CF patients in the survey had died. Figure 2 shows the cumulative survival for CF patients without meconium ileus, for patients.

Figure 1. Geographical distribution of cystic fibrosis in Northern Ireland, showing the prevalence per 100,000 livebirths by County.
with meconium ileus, and for all CF patients. It will be seen that for all CF patients the highest mortality was in the first year of life, particularly for CF patients with meconium ileus. The survival rates for patients with meconium ileus showed that 26 per cent, 52 per cent, and 84 per cent, had died by the end of the first week, by the second month, and by the end of the first year, respectively. Of the CF patients without meconium ileus, 21 per cent had died within the first year, 10 per cent by their fifth year, and 46 per cent by their tenth year.

**Figure 2**

*Survival curves for cystic fibrosis patients born during 1961-1971:*

(a) patients born without meconium ileus;
(b) all patients with CF; and
(c) patients with meconium ileus.

**DISCUSSION**

The prevalence of CF in Northern Ireland was estimated as 1 in 1969 livebirths when only definite CF cases are considered, but when probable and possible cases also are included the prevalence figure rises to 1 in 1857. The prevalence figure is similar to that for areas of the United Kingdom and for Ireland. The overall prevalence per 100,000 livebirths was 50.8. Interestingly, the prevalence of CF was low in Counties Londonderry (25.6) and Armagh (25.7) being about half that estimated for the whole Province. No clear explanation for this is available. It is unlikely that the lack of paediatric facilities in these areas during the period could explain the low prevalence, as the prevalence rates for Counties Tyrone (55.5) and Fermanagh (44.0) are comparable to the overall population prevalence. Again, the high prevalence rate (70.7) for Belfast has no clear explanation. It has been suggested that large deviations in the frequency of CF are not improbable and they may well be caused by chance alone.

The prognosis for patients with CF has improved dramatically. During the period 1930-1950, more than 80 per cent of children with CF died before the age of one year. From the Hospital for Sick Children, London, for the period 1964-1968, George & Norman reported that 89 per cent of CF children born without meconium ileus were alive five years after diagnosis. In the present survey, only 65 per cent of CF patients born without meconium ileus were alive five years after the diagnosis. However, examination of survival rates for 1961 reveals that five years after diagnosis only 4 of 13 (30 per cent) CF patients born without meconium ileus were
alive, whereas for 1971 there was an improvement with 11 of 14 (79 per cent) CF patients born without meconium ileus still alive. In the study period only 16 per cent of patients born with meconium ileus were alive five years after diagnosis.

Although the survival rates for Northern Ireland are below the United Kingdom average, there has been an improvement from 1961-1971. A number of factors has probably contributed to this improved survival. Most important are probably the wide range of antibiotics available and the recognition of the importance of prompt treatment of all respiratory infections in CF children. However, in the present survey earlier diagnosis does not appear to be the determining factor as the mean age at diagnosis, both in 1961 and in 1971 were similar. It will be interesting to examine the survival rate over the period 1972-1982. An increased awareness of CF in the Province, earlier diagnosis, improved treatment, and with more children with CF attending special clinics for management, a much better prognosis for CF patients can be expected.

SUMMARY

For the years 1961-1971, the prevalence of cystic fibrosis in Northern Ireland was estimated as 1 in 1857 (50.8 per 100,000 livebirths). A geographical variation was noted with low prevalence rates in Counties Londonderry (25.6), and Armagh (25.7), and a high prevalence rate (70.7) in the County Borough of Belfast. Survival studies of CF patients born without meconium ileus showed only 65 per cent alive 5 years after diagnosis. For patients with meconium ileus only 16 per cent were alive 5 years after diagnosis. During the period of the survey, life expectancy of CF patients had improved; of those patients born in 1961 without meconium ileus, 30 per cent were alive, whereas for those born in 1971, the figure was 79 per cent.

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