Parity and breast cancer

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Abstract

Data from the 1961 and 1971 Censuses in England and Wales were used to estimate the age distribution of women of various parities in 1976. Applying the age-specific incidences of breast cancer for women in England and Wales in 1975 gave the expected number of cases of that disease in 1976 and permitted an estimate of the mean age at diagnosis of breast cancer at each parity. This showed that the highest average age for breast cancer occurred in nulliparous women (65.9 years) and that the lowest age for the disease occurred in women who had borne two children (60.4 years).

The figures obtained were similar to those reported in a separate study of women treated in Birmingham. The results of that study, however, may have been due to the age distribution in the population of women by parity, rather than any direct influence of parity on the speed of growth of breast cancer.

Introduction

Woods *et al*¹ examined the distribution of age and parity of 341 patients with breast cancer attending a single clinic. They found that the mean age at presentation was lower in parous than nulliparous women and fell with increasing parity until it levelled off in those having had three or more children. There are difficulties, however, in examining the mean age at which events occur in different groups of a population. Over a 100 years ago Farr,² when discussing this, pointed out that the mean age at death of curates was considerably lower than the mean age at death of bishops: but this reflected the different age distribution of the two subgroups of the population rather than the differences in the risk of disease in the two groups.

I have examined the vital statistics for England and Wales, firstly, to discover the difference in age distribution of women by parity and, secondly, to estimate from this the expected mean age at diagnosis of breast cancer.

Methods

The 1971 Census tabulated parity by marital state only for women under 60.³ Hence to include the whole of the female population I also had to use data from the 1961 Census,⁴ which tabulated the numbers of women by marital state and parity in five-year age groups. Using the known probability of survival for women in different age groups, I took the estimated numbers of the population in 1961 in five-year age groups from 40-44 and above and extrapolated these to 1976. Aligning these data with the figures for the younger women derived from the 1971 Census provided an estimated distribution of women by five-year age groups and parity for 1976. The question on fertility differed between the two censuses, however, with that in the 1971 Census being restricted to live births. Also the data suffered from a degree of non-response, as some women failed to record either marital state or parity in the schedule. There was no way of correcting for

this, but probably the slight underreporting did not seriously bias the distribution by age or parity.

The age-specific incidence of breast cancer for women in England and Wales in 1975⁵ was applied to the age distributions derived above to obtain expected numbers of cases. It was then a simple matter to calculate the estimated mean age at development of breast cancer within each parity. Though there was evidence for a variation in risk of breast cancer by parity, the use of the incidence figures for all women created no problem in estimating the mean age at diagnosis, provided that the relative risk in different parity groups was constant over age. This may be shown as follows: average age of breast cancer in parity subgroup = $(\sum (P_i (B_i RR) A_i)) / (\sum (P_i (B_i RR)))$, where P_i = number of women in parity and age group, B_i = incidence of breast cancer in age group, A_i = age groups from 20-24 to ≥ 85 , and RR = relative risk for specific parity. If the relative risk was constant at all age groups for any given parity it had no influence on the average age, as it could be cancelled from both the numerator and the denominator.

Results

The table shows the estimated age distribution of women in England and Wales by parity in 1976. For ease of analysis age is presented in decades and the table restricted to parity groups up to three and over. The age distribution of these women was quite

Estimated percentage distribution of women by age and parity in England and Wales (1976)

Age (years)	Parity			
	0	1	2	≥ 3
20-	42.8	11.9	5.2	1.4
30-	10.9	16.3	22.8	16.2
40-	7.2	13.2	20.5	23.2
50-	9.6	19.3	20.2	20.3
60-	12.5	20.2	16.9	17.8
70-	11.4	13.6	9.9	12.9
≥ 80	5.6	5.5	4.5	8.2

different in the different parity groups, which had a direct bearing on the estimated average age of development of breast cancer in each group. Analysis of the estimated mean ages at diagnosis in the four parity groups studied showed the highest mean age in the nulliparous women (65.9 years). Of the remainder, women of parity 1 had an estimated mean age of 63.5 years at diagnosis, those of parity 2 an estimated mean age of 60.4 years at diagnosis, and those of parity 3 and over an estimated mean age of 62.8 years at diagnosis.

Discussion

It was unfortunate that the 1971 Census restricted the questions to women under the age of 60 when inquiring about fertility, as this meant that the 1961 and 1971 Censuses had to be combined. The non-response also introduced an element of error, in addition to doubt about the validity of the responses of those women who actually recorded parity. There was no indication, however, that these caused a serious age bias in the subsets by parity. The different age distributions found in the different parity groups reflect the quite different trends in marriage and family building that have occurred during this century. The proportion of women who have married has increased in recent years; the proportion who are nulliparous has dropped. My figures show a high proportion of nulliparous

women at young ages, as one would expect; there was also a somewhat higher proportion aged over 70 compared with 30-69 years. There has been a tendency for the proportion of women having very large families to decrease, and this was again reflected by an increased proportion of women in the high parous group at older ages. The data were originally examined for those having three, four, or five or more children; it was particularly in those having five or more children that the proportion at the older age groups was higher.

One crucial point about this study is whether it was appropriate to assume that the relative risk of breast cancer is constant within parity subgroups over a wide age range; unfortunately this issue has not been adequately quantified. The nearest set of data most relevant to this was a study by Miller *et al*,⁶ who examined the parity for women in three provinces in Canada registered with all forms of malignant disease in 1969-71. By special inquiry parity for these women was obtained and compared with the census data. The relative risk of breast cancer in women having four or more children compared with nulliparae was similar in the age ranges 20-44, 45-54, and 55 years and over.

Applying England and Wales incidence rates to the age distribution of women by parity enabled the average age at diagnosis to be estimated; the results approximate to the

findings of Woods *et al*.¹ It was suggested that their result was a reflection of variation in the age distribution of women by parity, rather than any particular influence of parity on accelerating or slowing the date of presentation of breast cancer.

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Interrelations of calcium-regulating hormones during normal pregnancy

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Abstract

Profound changes in calcium metabolism occur during pregnancy. The mother has to make available extra calcium for fetal requirements while ensuring that her plasma and bone calcium concentrations are satisfactorily maintained. In a cross-sectional study plasma concentrations of the major calcium-regulating hormones—namely, calcitonin, parathyroid hormone, 25-hydroxyvitamin D (25-OHD), and 1,25-dihydroxyvitamin D (1,25-(OH)₂D)—were measured to establish their interrelations during normal pregnancy. The major changes observed were increases in the circulating concentrations of 1,25-(OH)₂D and calcitonin. Concentrations of parathyroid hormone and 25-OHD remained within the normal range.

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The increased concentrations of 1,25-(OH)₂D enable the increased physiological need for calcium to be met by enhancing intestinal absorption of this element. The simultaneous rise in calcitonin opposes the bone-resorbing activities of 1,25-(OH)₂D, thereby protecting the integrity of the maternal skeleton. Maternal calcium homeostasis is thus maintained yet the requirements of the fetus are fulfilled.

Introduction

The increased physiological requirement for calcium during pregnancy presents a major challenge to maternal calcium homeostasis. The needs of the growing fetus have to be supplied but at the same time maternal bone and plasma calcium concentrations have to be maintained. If both these conditions are to be fulfilled changes in the secretion of calcium-regulating hormones must occur.

To determine the gestational changes in the secretion of calcium-regulating hormones we measured the plasma concentrations of calcitonin, parathyroid hormone, and the vitamin D metabolites 25-hydroxyvitamin D (25-OHD) and 1,25-dihydroxyvitamin D (1,25-(OH)₂D) on four occasions during entirely normal pregnancies in a cross-sectional study. Previous studies either have been conducted only at the end of pregnancy or have been incomplete as important hormones have not been measured and details of the obstetric outcome have invariably been lacking. Thus the full interrelations of the calcium-regulating hormones in normal pregnancy have not been shown.