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The incidence of ectopic pregnancy in the City and Hackney Health District of London, 1990–1991

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Summary
In a retrospective study in the City and Hackney Health District, between 1 September 1990 and 31 August 1991, there were 106 ectopic pregnancies, 474 histologically confirmed spontaneous pregnancy failures, 2244 legal abortions and 4047 deliveries. The incidence of ectopic gestation was 1·54 per cent of all known pregnancies, 2·62 per cent of all deliveries, and 2·13/1000 per year of all women of childbearing age. These rates are among the highest reported in the world literature.

There was a greater percentage of Afro-Caribbeans in the ectopic pregnancy patients (56·8 per cent, compared with 34·5 per cent in a control group, $P < 0{\cdot}001$), and the patients with ectopic pregnancies were more likely to have had suction terminations of pregnancy — 30·8 per cent, compared with 12·5 per cent of the controls ($P < 0{\cdot}001$). Previous ectopic pregnancy was more common in the ectopic pregnancy group, 9·9 per cent *versus* 2·0 per cent in controls ($P < 0{\cdot}05$).

INTRODUCTION

ECTOPIC pregnancy is a major cause of maternal death in the United Kingdom, resulting in 17 deaths between 1985 and 1987, of which seven cases are said to have received substandard care through missed or late diagnosis, according to the Report on Confidential Enquiries into Maternal Deaths in the United Kingdom, 1985–87 (Department of Health, 1991).

A clinical suspicion that the number of ectopic pregnancies seen in this health district is high led us to investigate whether the incidence of this condition was in reality much higher than that normally quoted for England and Wales. We performed a retrospective study of all cases of histologically proved ectopic pregnancy treated in the district during one year.

Having calculated the rates of ectopic pregnancy, we performed a case–control study on the 90 patients with ectopic pregnancies for whom notes were available.

PATIENTS AND METHODS

The study was retrospective, over one year from 1 September 1990 to 31 August 1991 inclusive. To determine the number of ectopic pregnancies in the district, we retrieved admissions to the gynaecological wards with a diagnosis of possible ectopic pregnancy, consulted the operating theatre record books and the hospital activity analysis records. We also obtained from the histopathology laboratory a list of all the patient with a histologically proved ectopic pregnancy. It is the policy of the district to send all specimens at laparotomy to histopathology to confirm the ectopic pregnancy. A similar list was obtained for cases having an evacuation of retained products of conception, in order to determine the number of spontaneous abortions treated. Both lists were checked for multiple specimens, and all diagnosed ectopic pregnancies were, where possible, confirmed with the patients' notes. A problem experienced in all studies of this kind is in determining the total number of pregnancies; an unknown number of women will inevitably have a spontaneous pregnancy failure and not be seen in hospital. Estimates of numbers of undiagnosed pregnancy failures are entirely speculative, and therefore no attempt was made to include these in the calculation.

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To find the number of legal abortions, both under the National Health Service and under the private sector, we used district statistics for the year 1990 (Office of Population Censuses and Surveys, London), on the basis that there will not have been substantial changes in the rates during the subsequent 9 months.

The Homerton Hospital is the only maternity hospital in the District. We calculated the number of hospital deliveries, including stillbirths, from the birth register on the labour ward, and the number of home deliveries from the community midwives' register. As the number of patients booked at the Homerton Hospital was very close to the number actually delivered there, we assumed that the number of women from outside the district that were delivered at the hospital was the same as the number of local women delivered outside the District.

Of the 106 cases of ectopic pregnancy, 90 (84·9 per cent) had case notes available for review. The notes were reviewed to record details such as patients' age, racial group, number of pregnancies and parity and previous history of abdominal or pelvic surgery.

Ectopic pregnancy rates are commonly expressed as a rate per 100 births; this is because the number of births is easier to derive than the total number of pregnancies. For this reason we chose as a control group 200 women with ongoing pregnancies, who were between 38 and 42 weeks pregnant by the date of the last menstrual period, confirmed by ultrasound scan at 16 weeks and booked at the Homerton Hospital during the study period. The notes of all patients between 38 and 42 weeks are kept on the labour ward of the Homerton Hospital and filed in alphabetical order. We selected the 200 control notes in a totally random manner to avoid possible over-representation of certain ethnic groups. The control group were thus of proved fertility, of comparable age to the ectopic pregnancy group, and representative of our obstetric population.

RESULTS

The total population in the City and Hackney District in 1990 was 195 798 and the number of women aged 15–44 years was 49 350. The total number of legal abortions was 2244 in 1990. These figures were obtained from the Office of Population Censuses and Surveys.

The total number of deliveries during the study was 3950 at the Homerton Hospital and 97 at home, giving a total of 4047 deliveries. The number of evacuations of retained products of conception for pregnancy failure was 474 histologically confirmed from both St Bartholomew's and the Homerton Hospital during the period of the study. The number of histologically confirmed ectopic pregnancies was 106, and from retrieving the operation records there were no 'tubal abortions'.

The ectopic pregnancy rate can be calculated and expressed in several ways. In terms of total number of known pregnancies the rate was 1·54 per cent. This was 2·62 per cent of total births. Per 1000 women years of childbearing age (15–44 years) the rate was 2·13; one of the patients in the ectopic groups was aged 14 and thus excluded from the calculation.

The mean ages of the two groups were similar — 28·1 years (range 14–38 years) in the ectopic pregnancy group, and 27·0 (range 14–45 years) in the control group. This is consistent with the national birth statistics, which show that in 1991 the highest number of maternities occurred in women aged between 25 and 29 years of age. When race was considered, we found a higher ($P < 0·001$) prevalence of Afro-Caribbeans in the ectopic patients, compared with the controls; 47 (52·4 per cent) *versus* 32 (35·1 per cent). (Figure 1).

On comparing cigarette smoking and consumption of alcohol, no differences were found between the two groups.

Comparison of previous pregnancies between the two groups showed similar previous live birth rates, and similar rates of previous spontaneous abortion between the cases and controls, with 17·3 per cent of the ectopic pregnancy patients and 19·1 per cent of the controls having had one or more spontaneous pregnancy loss. In contrast, when previous legal abortions were considered, more abortions were found in the ectopic pregnancy group ($P < 0·001$); 38·3 per cent, compared with only 16 per cent in the controls (Figure 2).

Previous appendicectomy was rather more common in the ectopic pregnancy patients, 7·4 per cent *versus* 2·0 per cent in the controls but a difference was not demonstrated statistically. Previous ectopic pregnancy was more common ($P < 0·05$), 8 (9·9 per cent) *versus* 4 (2·0 per cent) in the controls.

DISCUSSION

Our results showed one of the highest rates of ectopic pregnancy in the world when compared with recent published data (Table). The incidence of ectopic pregnancy has been reported to be increasing, in the United States of America (Cen-

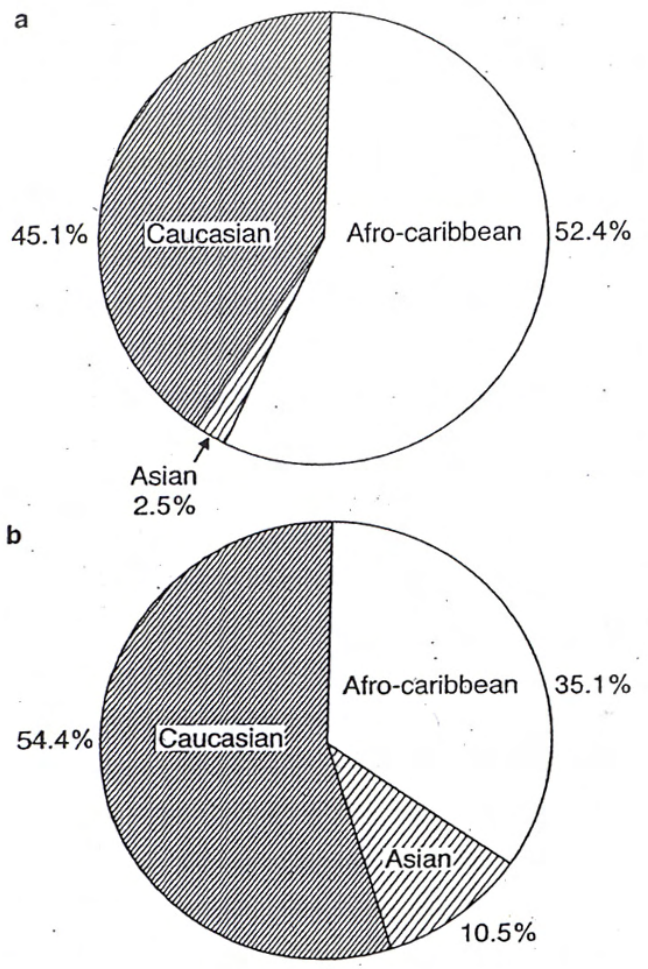

Figure 1. Race expressed in percentages: (a) ectopic pregnancy patients; (b) controls.

ters for Disease Control, 1990) and also in the United Kingdom (Kok *et al.*, 1989; Dimitry and Morcos, 1990). In a retrospective study by Dimitry and Morcos (1990), they identified 193 cases of ectopic pregnancy over a 10-year period (1977–1986) in the Medway Health District. To calculate the ectopic pregnancy rate they obtained the number of deliveries, live births, stillbirths, the number of therapeutic terminations of pregnancy and spontaneous pregnancy failures. The overall rate was 1 per 233 deliveries, 0·43 per cent. They also gave the rate as ectopic pregnancies per 1000 reported pregnancies (delivered, stillbirths, spontaneous and legal abortions). There was an increase during the study period from 2·5 to 4·7 per thousand reported pregnancies. It is said to be higher in the developing countries (Akingba and Eneli, 1975; Kitchin *et al.*, 1979). The true incidence of ectopic pregnancies may be even higher in developing countries as some cases may end in tubal abortion, fatal cases may not have a conclusive diagnosis, and general under-recording is likely. The reasons for the increase in ectopic pregnancy rates have been suggested to be the use of the intra-uterine contraceptive device (Beral, 1975), pelvic inflammatory disease (Westrom, 1985) and sexually transmitted diseases (Sweet and Gibbs, 1985). Another factor contributing to the increase could be improved diagnosis as a result of increasing use of pelvic ultrasonic scanning and sensitive β-HCG assays (Irvine *et al.*, 1990).

Although the literature is far from being conclusive previous legal abortion has been claimed to be an aetiological factor. Orhue *et al.* (1989) found that in a group of 31 women with proved ectopic pregnancy, when compared with 93 matched controls, a greater number had had previous legal abortions. In their study, some abortions

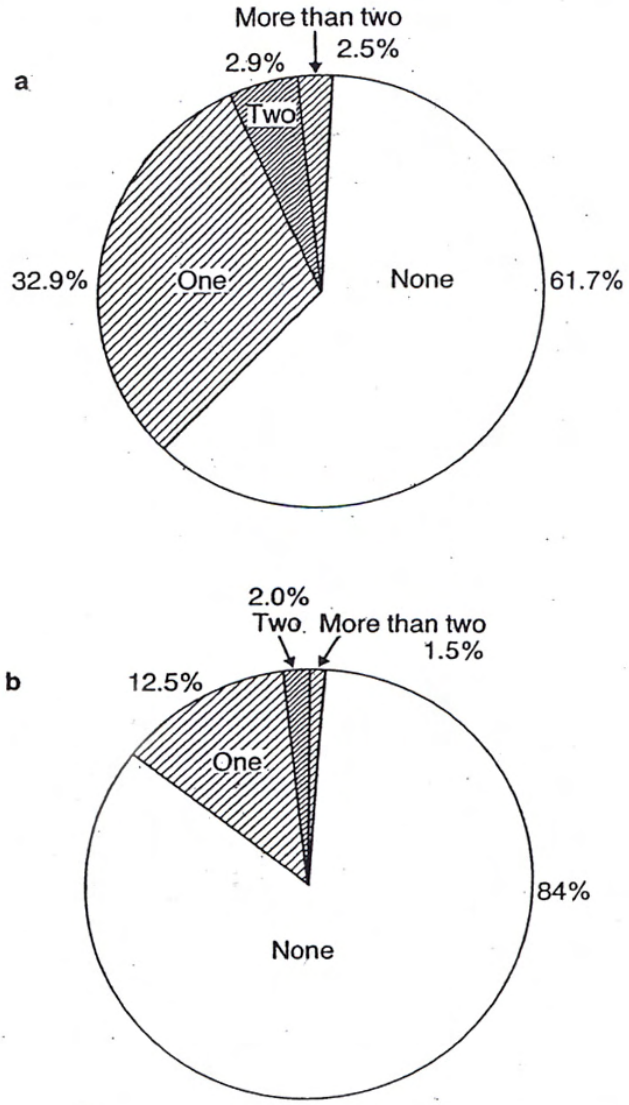

Figure 2. Number of legal abortions expressed in percentages: (a) ectopic pregnancy patients; (b) controls.

Table. Survey of published data on ectopic pregnancy rates

Authors	*Rates (converted to percentages where appropriate)*	*Numbers of cases*
Dimitry (1990)	0·43% deliveries, 4·6 per 1000 reported deliveries in the Medway Towns, England	193 ectopic pregnancies 1977–86
Yoseph (1990)	0·8% deliveries in the Tikur Aubessa teaching Hospital, Addis Ababa, Ethiopia, 1981–87	242/28 600 deliveries
World Health Organization (1990)	1·43% reported pregnancies in U.S.A., 1986. 1·97% live births	73 700 reported cases of ectopic pregnancy
Flett *et al.* (1988)	0·64% of all pregnancies in Aberdeen, 1985 0.87% of all deliveries	108/16 866 108/12 415 deliveries
Parazzini *et al.* (1988)	0·49% of all pregnancies in Lombardy, 1982	644/131 429 pregnancies
Daisley (1989)	0·9% of all births in Trinidad, 1985–86	154/17 073 known pregnancies
Ruminjo and Nuwagaba (1990)	0·66% of all deliveries in Thika, Kenya 1985–88	165/24 912 deliveries
Makinde and Ogunniyi (1990)	0·48% of all births in Nigeria, 1977–87	
Franks *et al.* (1990)	2·6/1000 woman-years (no contraception) in Atlanta, Georgia	(Theoretical calculations)
Makinen (1989)	1·8% of pregnancies. 2·6% of deliveries 1·53/1000 fertile age women-years in the Turku region of Finland in the mid-1980s	Numbers not available
Johnsen and Becker-Christiansen (1990)	2.34% of known pregnancies in Greenland	105/4481 pregnancies (see text)
Department of Health (1991)	0·57% pregnancies in United Kingdom, 1982–84	14 400/2 507 000 pregnancies
Irvine *et al.* (1993) (this study)	1·54% of all pregnancies 2·62% of all deliveries 2·13/1000 women of reproductive age in the City and Hackney Health District of London	

were carried out by unqualified individuals, which may have resulted in a higher incidence of postoperative complications including pelvic inflammatory disease. In our study, we found that in the ectopic pregnancy group, 38·3 per cent had had one or more previous suction abortions, compared with 16·0 per cent of women in the control group.

In our ectopic pregnancy group, 53·4 per cent were Afro-Caribbeans, compared with 35·1 per cent in our control group. Racial differences have been reported by Lawson *et al.*, (1989), and ectopic pregnancies have been reported to be 40 per cent higher in black and other racial groups compared with white Americans. In a study by Lawson *et al.* (1988) they reported that mortality rates for ectopic pregnancy were four times higher in blacks and other minority groups when compared to whites.

Another aetiological factor has been said to be appendicectomy (Dimitry 1987; Johnsen and Becker-Christiansen, 1990). In a retrospective study of 80 cases of ectopic pregnancy and 80 matched controls Dimitry (1987) found previous appendicectomy in 29 per cent of cases and only 4 per cent of the controls. He also found that the cases of previous appendicectomy, the ectopic pregnancy was more common on the right side, 14 compared with 9. Although our numbers are small, 7 out of 90 (7·7 per cent) in the ectopic pregnancy patients and 6 out of 200 (3 per cent) in the controls had had appendicectomies. The reason for this is postulated to be adhesion formation as a result of appendicitis, or as a consequence of appendicectomy.

Previous ectopic pregnancy is another risk factor and our study, although involving small numbers, supports this, with 9 women (10 per

cent) in the ectopic patients and 4 women (2 per cent) in the controls having had a previous ectopic pregnancy.

Ectopic pregnancy rates can be expressed in various different ways: in terms of total number of pregnancies, in terms of number of deliveries, and in numbers per thousand fertile women per year. The problem in expressing ectopic pregnancies in terms of total number of pregnancies is that some patients may have had a spontaneous abortion at home and never been seen in hospital. This methodological fault will be present in all studies.

Expressing the ectopic pregnancy rate as the number of cases per 100 deliveries can be misleading. If the number of legal abortions is high, this will give a relatively high rate, although the rate per 100 known pregnancies would be low. We report our ectopic pregnancy rates in three different ways for comparison with other published results. We have found one of the highest rates for ectopic pregnancy anywhere in the world. A higher rate has been reported in Greenland by Johnsen and Becker-Christiansen (1990); a rate of 2·34 per cent of all known pregnancies. This study has several shortcomings. Of the 16 medical centres in Greenland to which inquiries were sent, only 7 (44 per cent) replied. It is possible that medical centres who did not reply had seen no ectopic pregnancies. The numbers were small, and in the four years 1980–1984 they reported only 105 cases, with no mention as to histological confirmation of the diagnosis. The actual ectopic pregnancy rate, in terms of the total number of known pregnancies, may be lower than they report. The reasons suggested for the reported high rates were partly the popularity of intra-uterine contraceptive devices, and the high incidence of infection with *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. Ectopic pregnancy rates in terms of numbers of deliveries were not given, so the comparison with our data is incomplete.

Our finding that the incidence of ectopic pregnancy, an important cause of maternal mortality, is so high in this inner London District confirms a long held clinical impression. Health education and contraceptive advice are important in attempting to reduce the incidence, and encouraging the use of condoms and diaphragms may reduce the incidence of pelvic inflammatory disease, and of unwanted and ectopic pregnancies. Staff working in such areas should maintain a high index of clinical suspicion, which should reduce the morbidity and mortality of ectopic pregnancy. Earlier diagnosis may allow less invasive treatment methods to be used. Seventeen cases of deaths from ectopic pregnancy were recorded in the United Kingdom between 1985 and 1987, from the Department of Health (1991) Report on Confidential Enquiries into Maternal Deaths, 1985–87. Of these, seven cases were considered to have received substandard care, mainly from missed or late diagnoses. One of the main conclusions drawn by the report was that 'probably the most important contribution to reducing the risk of death from ectopic pregnancy is an awareness by medical attendants that in any woman of reproductive age, an ectopic pregnancy may be the cause of a lower abdominal pain particularly when of sudden onset'.

Conclusion. We report an ectopic pregnancy rate of approximately 1 in 60 reported pregnancies in the City and Hackney Health District, which is one of the highest rates reported worldwide. Significant risk factors identified in our study include previous termination of pregnancy and Afro-Caribbean race. Doctors working in areas with similar patient populations should consider the diagnosis of ectopic pregnancy in all women of reproductive age presenting with pain and vaginal bleeding. With heightened awareness, it is hoped that ectopic pregnancy will be responsible for less morbidity and mortality in the future.

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