Perinatal characteristics and obstetric complications in mothers with multiple sclerosis: Record-linkage study

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ABSTRACT  

Background: Multiple sclerosis (MS) predominantly onsets in women of reproductive age. The possibility of adverse obstetric and perinatal outcomes is a likely source of concern to pregnant women with MS and their clinicians. We aimed to compare the characteristics of the pregnancies of mothers with or without MS.  

Methods: The historical Oxford Record Linkage Study specialised maternity dataset (850,000 people, 1970–1989), with record-linkage between mother and baby, was analysed. The dataset was linked to any prior recorded day-case or inpatient hospital admission episodes back to 1963. The file of mothers’ records was searched for a record of MS in either the maternity admission or in a previous admission. The pregnancies and babies of mothers with MS were compared with those of mothers without MS.  

Results: There were 181 pregnancies and babies born to 98 mothers with MS. These were compared with 244,573 pregnancies and babies of 124,830 mothers without MS. There was a significant social class gradient with a higher than expected number of cases of MS in the least deprived social classes. Mothers with MS tended to be lighter than other mothers. There were no significant associations between MS and mothers’ marital status, history of smoking during the pregnancy, parity, pre-eclampsia, ABO blood group or rhesus group. There were no significant associations with babies’ birth weight, and no significant associations with gestational age, being small for gestational age, Caesarian delivery, or forceps delivery. There were no stillbirths, no neonatal deaths, and no postneonatal deaths in the babies born to mothers with MS.  

Conclusions: We hope that our findings will add to the available literature in addressing the understandable anxieties of young women with MS, and reassure them that the characteristics of their pregnancies are generally normal.

1. Introduction

Multiple sclerosis (MS) is a complex neurological disease which predominantly onsets in women (sex ratio 3:1) aged 20–40 years, i.e. of reproductive age (Koch-Henriksen and Sorensen, 2010). The possibility of adverse obstetric and perinatal outcomes is a likely concern both to clinicians caring for pregnant women with MS and to the women themselves. Information available to reassure patients has been limited by relatively small studies where findings are inconclusive, and from studies where the reporting of obstetric complications has been a secondary outcome to the study of any influence of pregnancy on the clinical course of MS (Orvieto et al., 1999; Worthington et al., 1994). Where larger studies have now been done, findings have been inconsistent. For example, reports have been conflicting in whether offspring of mothers with MS are more likely to be pre-term, small for gestational age, and whether operative or instrumental interventions during delivery are more frequently used than in other mothers (Dahl et al., 2005; Mueller et al., 2002; Jalkanen et al., 2010; Chen et al., 2009; Kelly et al., 2009). We analysed a historical dataset of routinely collected maternity data, enhanced by record linkage between the mother and baby records, with the objective of comparing the characteristics of the pregnancies of mothers with or without MS. Some of the characteristics will reflect those of women with MS irrespective of pregnancy (e.g. social class); others relate to the pregnancy itself (e.g. baby’s birth weight and gestational age).

2. Methods

2.1. Data and population

The Oxford Record Linkage Study (ORLS), founded in 1963, was a project run jointly by the National Health Service (NHS) and the...
University of Oxford in the (former) Oxford NHS Region. It comprised routinely collected data on all hospital admissions and deaths in the area covered by it. The data collection systems were generally similar to those collected routinely on hospital care throughout all the NHS in England as Hospital Activity Analysis (HAA) in the 1960s–1980s (HAA is now superseded by the Hospital Episode Statistics system, HES). To avoid duplication, the core HAA and ORLS systems in Oxford were the same data. However, of relevance to this paper, the ORLS was enhanced by additional data fields in its maternity dataset from 1970 to 1989. The enhanced specialist maternity data collection system included information on maternal smoking, individual-level occupational social class of the head of the mother’s household, mother’s marital status, mother’s weight (but not height), breastfeeding, presence or absence of pre-eclampsia, and the baby’s identity. The mother’s identity was generally unique ORLS identifier. A unique ORLS identifier was allocated to the mother, and a separate one to the baby. The mother’s identifier was also coded on the baby record; and the baby’s identifier was coded on the mother’s record. There are some missing data: for example, data on social class and mothers’ weight were not collected in every year. The table will show totals for each variable and the reader can see the extent of missing data (which was generally small).

2.2. Analysis: mothers with MS

The file of mothers’ records was searched for a record of MS in either the maternity admission or in a previous admission. MS was identified as the International Classification of Diseases (ICD) code 345 in the 7th edition of the ICD, 340 in the 8th and 9th, and G35 in the 10th. The pregnancies and babies of mothers with MS were compared with those of mothers without MS. As indicated below, in most analyses the unit of analysis was the individual pregnancy and baby (counting each baby born to each mother); in a few analyses, notably social class, mother’s weight, and blood group, we counted only the first baby of each mother in order to avoid multiple-counting of the mothers’ characteristic. Where there is an ‘ordered’ characteristic with more than two values, such as social class (five values, ordered from high to low socio-economic status), we calculated chi-squared statistics for both heterogeneity (shown first in the table) and for trend (shown second).

3. Results

3.1. Mothers with MS

There were 181 pregnancies and babies born to 98 mothers with MS. These were compared with 244,573 pregnancies and babies of 154,830 mothers without MS. Comparisons are shown in Table 1. At the time of the 181 MS deliveries, 26 babies were born to mothers aged under 25, 134 to mothers aged 25–34, and 21 to mothers aged 35 and over (Table). There was a significant social class gradient with a higher than expected number of cases of MS in social classes 1 and 2 (the least deprived) and a lower than expected number of cases in social classes 4 and 5 (the most deprived; x^2(1) for trend of decreasing MS with increasing deprivation = 12.6, p < 0.01). Mothers with MS tended to be lighter than other mothers: 71% of mothers with MS weighed nine stone or less compared with 57% of mothers without MS (p = 0.04, Table 1). There were no significant associations between MS and mothers’ marital status, history of smoking during the pregnancy, parity, pre-eclampsia, ABO blood group or rhesus group. There were no significant associations with babies’ birth weight (a slightly higher percentage of babies of mothers with MS than other babies weighed less than 2000 g but the percentages of these in the MS and non-MS group were both very low at, respectively, 2.8% and 1.4%), and no significant associations with gestational age, being small for gestational age, Caesarian delivery, or forceps delivery. There was a borderline significant difference in presentation at birth between the babies of MS mothers and other babies (respectively, 92.3% and 95.5% were vertex, p = 0.06). There was also a borderline significant difference in Apgar scores at one minute: 6.4% of babies of MS mothers were scored 10, compared with 12.8% of other babies. However, the numerically important differences were between the categories of Apgar 9 and Apgar 10: both are comfortably within the normal range and the finding is unlikely to have any clinical importance. There were no differences between the scores of babies of mothers with or without MS at 5 min. The baby was male in 51.4% of births to MS mothers and 51.4% of other births. Mothers with MS were fractionally more likely than other mothers to breastfeed (Table 1), but the difference was not statistically significant. There were no stillbirths, no neonatal deaths, and no postneonatal deaths in the babies born to mothers with MS. In babies of mothers without MS, the stillbirth, neonatal and postneonatal mortality rates were, respectively, 5.22 per 1000 births (based on 1278 stillbirths), 4.14 (based on 1015 deaths) and 3.33 (based on 806 deaths). Applying these rates to the number of babies born of mothers with MS, the ‘expected’ number of stillbirths, neonatal and postneonatal deaths in the MS group would have been, respectively, 0.94, 0.75 and 0.60.

4. Discussion

Our findings are reassuring to women with MS that their pregnancies generally seem to follow a normal course. Specifically, the babies born to mothers with MS were similar to other babies in respect of birth weight, gestational age, lack of intrauterine growth retardation (as measured by light birth weight for gestational age), mode of delivery (notably, Caesarian section rates were no higher than in the pregnancies of mothers without MS); and there were no recorded stillbirths or deaths in infancy in the babies of mothers with MS. These findings are in line with some previous work and, importantly with the results from a large study utilising a British Columbian cohort, which incorporated clinical factors including disease duration of MS, age of MS onset and disease-associated disability, in which maternal MS did not appear to increase risk of adverse perinatal outcomes (van der Kop et al., 2011). Further, in a systematic review and meta-analysis of women with MS and their pregnancies it was concluded that women with MS do not appear to have a significantly increased risk of obstetric or neonatal complications (Finkelsztajn et al., 2011). Of interest, our finding of a higher occurrence of MS in higher social classes contributes to a very inconsistent evidence base with different studies reporting a positive, nil or negative association (Goulden et al., 2015).

The strengths of this study include that it contributes to an increasing literature on pregnancy outcomes in women with MS; and
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