

Common symptoms during pregnancy to predict depression and health status 14 years post partum

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ABSTRACT

Objective: To examine the prospective association between symptoms commonly experienced during pregnancy and the mental and general health status of women 14 years post partum.

Methods: Data used were from the Mater-University of Queensland Study of Pregnancy, a community-based prospective birth cohort study begun in Brisbane, Australia, in 1981. Logistic regression analyses were conducted.

Results: Data were available for 5118 women. Women who experienced a higher burden of symptoms during pregnancy were at greater risk of becoming depressed and reporting poorer health status 14 years post partum. Women who experienced major problems during pregnancy were 4 times more likely to be depressed and nearly 8 times more likely to report poorer health status 14 years after the index pregnancy compared with women who experienced few problems.

Conclusions: Findings suggest that pregnant women who experience common symptoms during pregnancy are likely to experience poorer mental and self-reported general health 14 years after the pregnancy.

Keywords: Common symptoms; Depression; General health status; Post partum; Pregnancy

1. Introduction

Women commonly experience a range of symptoms during pregnancy, many of which are considered to be a normal part of pregnancy and a consequence of the body's response to the physiological stresses involved. These symptoms include nausea (with or without vomiting), backache, heartburn, constipation, leg cramps, and fatigue [1], [2] and [3]; they occur frequently and can affect up to 80% of all pregnant women [1], [3], [4], [5] and [6]. While most of these pregnancy-related symptoms resolve quickly at the end of pregnancy [4], [6], [7] and [8], the longer term implications of experiencing multiple symptoms during pregnancy are not known. This is clinically important because it may influence how the treatment of these women is approached. Clinicians conducting prenatal care are familiar with women who have multiple complaints of pregnancy-related symptoms and who are incapacitated by them. However, consideration is rarely given to what happens to these women in the years after the pregnancy.

The aim of the present study was to examine the prospective association between symptoms commonly experienced during pregnancy and the mental and general health status of mothers 14 years after the index pregnancy.

2. Materials and methods

The Mater-University study of pregnancy and its outcomes (MUSP) is a prospective study of 7223 women and their offspring who received prenatal care at a major public hospital in Brisbane between 1981 and 1983 [9]. At enrolment, the participants were at an average of approximately 18 weeks of pregnancy. Women were prospectively interviewed 3–5 days post partum and again when the child was 6 months, 5 years, and 14 years old. At each phase of follow-up, data about maternal socioeconomic status, lifestyle, mental and physical health, and family structure were collected.

The main analyses in the present study were restricted to 5118 women for whom information on both common symptoms experienced during pregnancy and prospective information on mental and self-reported general health status 14 years after the birth was available. Written informed consent was obtained from the participants at all data collection phases. Ethics committees at the Mater Hospital and the University of Queensland approved each phase of the study. Details of the study participants and measurements have been reported previously [9].

At 3–5 days post partum the common symptoms experienced by the participants during pregnancy were assessed with the following question: “Everyone has some problems during their pregnancy. We would like to know if the following happened to you and how much of a problem it was,” for each of the following symptoms: morning sickness; constipation; heartburn; backache; vaginal discharge or infection; leg cramps; and feeling generally unwell. Four response options were available: No, it did not happen = 1; Yes, but it was not a problem = 2; Yes, it was a moderate problem = 3; or Yes, it was a major problem = 4. The analysis combined all 7 symptoms (scored 7 to 28) to generate a composite indicator of problems experienced during pregnancy with 3 categories: few problems (scored 7–10), some problems (scored 10–18), and many problems (scored 19–28).

The primary outcomes of the study were maternal depression and self-reported general health 14 years after the birth. Depression was assessed using the 7-item depression subscale from the Delusions Symptoms-States Inventory: State of Anxiety and Depression (DSSI/SAD) [10]. The measure was developed to detect signs and symptoms of psychopathology that limit a person's capacity to function and to maintain relationships. This measure has high internal validity [10], correlates well, and shares items with other measures of depression and anxiety, such as the Edinburgh Postnatal Depression Scale and the Hospital Anxiety and Depression Scale [11]. In the present study, women who reported experiencing 4 or more out of a possible 7 symptoms were considered to represent a “case” of depression.

At the 14-year follow-up, women were asked about their general health status during the previous year, with the following response options: excellent; good; fair; poor. These groups were combined into 3: excellent; good; and fair/poor.

The following characteristics were considered to be potential confounding or mediating factors on the basis of a priori knowledge [12], or their potential association with symptoms during pregnancy

and maternal mental and self-reported health status at 14 years: age; prepregnancy body mass index; education; marital status; parity; mode of delivery; depression; anxiety; life events; smoking and alcohol during pregnancy; breastfeeding; wanted or unwanted pregnancy; and feelings surrounding caring for the baby.

Maternal age at the child's birth was obtained from obstetric records; maternal education (did not complete secondary school; completed secondary school; completed further/higher education) was recorded at the first clinical visit. Pre-pregnancy body mass index was calculated based on measured height at pregnancy and self-reported prepregnancy weight, recorded at initiation of the study. The 4 BMI categories were based on World Health Organization guidelines [13].

Information on parity was collected at the postdelivery phase. Women were categorized as having no previous children other than the index child, 1 or 2 additional children, or 3 or more children. Mode of delivery was categorized as normal or spontaneous versus cesarean delivery. Marital status at 3–5 days post delivery was recorded as single, living together, married, separated, divorced, or widowed. Anxiety symptoms were assessed using the 7-item depression subscale from the DSSI/SAD [12]. The measure was constructed in the same way as for depression. Life events during pregnancy were assessed using the 9-item scale developed by Holmes and Rahe [14].

Cigarette smoking during pregnancy was based on self-reported number of cigarettes smoked per day (0, 1–9, ≥ 10) during the last trimester of pregnancy. Alcohol consumption during pregnancy was based on self-reported number of drinks commonly consumed on any drinking occasion (0, 1 or 2 glasses, 3 or more glasses). Duration of breastfeeding (categorized as never breast fed, less than 4 months, or 4 months or more) was collected at the 6-month follow-up.

Information about whether the pregnancy was planned or unplanned was obtained at the first clinic visit. This was categorized as: planned/wanted; unsure; or unplanned/unwanted. At the 6-month follow-up the participants were also asked whether they felt positive about caring for the baby, with the response options: always; mostly; or not always.

For the statistical analyses, the percentage distribution of maternal symptoms experienced during pregnancy was calculated. The association between the composite indicator of symptoms during pregnancy with depression and perceived health status 14 years later was obtained using the χ^2 test.

A series of logistic regression models was used to determine the association between symptoms during pregnancy and depression 14 years post delivery, taking into account potential confounding and mediating factors. Model 1 adjusted for maternal age at delivery. Model 2 adjusted for maternal age, parity, education, depression, anxiety, marital status, smoking, and alcohol consumption during pregnancy. Model 3 adjusted for maternal age at birth, breastfeeding, whether the baby was wanted or unwanted, and being positive about caring for the baby. Model 4 adjusted for all factors mentioned above. Similarly, the multivariable association between symptoms during pregnancy and perceived health status 14 years later was examined using a series of logistic regression models adjusting for potential confounders and mediators. Multivariable results are presented as odds ratios (OR) with 95% confidence intervals.

The main study had revealed that participants who were lost to follow-up were more likely to have been teenagers when they delivered, of lower educational status, single or cohabitating, had 3 or more children, used tobacco and alcohol during their pregnancy, and had been anxious and depressed at their first prenatal visit [9]. To determine whether this affected the validity of our findings we undertook a weighted analysis using inverse probability (of having missing outcome data) weights [15]. All analyses were undertaken using Stata version 9.2 (Stata Inc, College Station, TX, USA).

3. Results

Data were available for 5118 women in the study. For each of the 7 symptoms, 3% to 15% of women reported a major problem and between 12% and 34% indicated a moderate problem (Table 1). Using the composite indicators, 14% of women experienced few symptoms, 75% some symptoms, and the remaining 11% many symptoms (Table 2). Symptoms during pregnancy were associated with depression at 14 years post delivery and also with general health status ($P < 0.001$). Of those mothers who experienced many symptoms, one-fifth were depressed at the 14 year follow-up and two-fifths reported fair/poor general health status.

Table 1: Frequency distribution of maternal symptoms during pregnancy

Symptoms	Maternal response (%) (n = 5118)			
	No, it did not happen	Yes, but it was not a problem	Yes, it was a moderate problem	Yes, it was a major problem
Morning sickness	29.8	31.2	28.6	10.5
Constipation	48.6	32.1	15.4	4.0
Heartburn	32.2	26.4	26.4	14.9
Backache	20.0	35.4	33.5	11.1
Vaginal discharge or infection	49.0	32.1	14.4	4.5
Leg cramps	24.3	41.7	26.3	7.7
Feeling generally unwell	51.1	34.3	11.6	3.0

Table 2: Maternal depression and general health status 14 years post partum

Maternal variable at 14-year follow-up	Symptoms during pregnancy (%) (n = 5118)				P value
	No.	Few symptoms (n = 740)	Some symptoms (n = 3820)	Many symptoms (n = 558)	
Depression					
Not depressed	4685	94.9	92.4	81.5	< 0.001
Depressed	433	5.1	7.6	18.5	
General health status					
Excellent	1125	32.4	21.5	11.1	< 0.001
Good	2764	53.2	54.6	50.7	
Fair/poor	1229	14.3	23.8	38.2	

Table 3 shows the adjusted odds ratios of mothers being depressed 14 years post delivery. Using a series of multiple logistic regression models it compares those mothers who experienced many symptoms and those who experienced some symptoms with those who experienced few symptoms during pregnancy, while adjusting for potential confounders and mediators. The results are presented for the 4509 mothers with complete data on all variables included in any of the multivariable models. In the age-adjusted model, women who experienced many symptoms during pregnancy had increased odds of being depressed (OR 4.02; 95% CI: 2.64–6.13) compared with women who experienced few symptoms. Adjustment for social, mental, and lifestyle factors during pregnancy attenuated the association by almost 50% (OR 1.93; 95% CI: 1.22–3.05). Breastfeeding, wanted or unwanted pregnancy, and attitude toward caring for the baby did not attenuate the association. The association remained independent after adjusting for both confounders and mediators.

Table 3: Adjusted odds ratios of maternal depression 14 years post partum

Symptoms during pregnancy (n = 4509)							
		Few symptoms (n = 658)		Some symptoms (n = 3362)		Many symptoms (n = 489)	
Maternal depression	(reference category)	OR	95% CI	OR	95% CI	OR	95% CI
Model 1 ^a	1.00	1.6	1.1–2.3	4.0	2.6–6.1		
Model 2 ^b	1.00	1.2	0.8–1.8	1.9	1.2–3.1		
Model 3 ^c	1.00	1.5	1.0–2.2	3.8	2.5–5.8		
Model 4 ^d	1.00	1.2	0.8–1.7	1.9	1.2–2.3		

^a Model 1 adjusted by maternal age at birth.

^b Model 2 adjusted by maternal age at birth, parity, maternal education, depression, anxiety, marital status, smoking and alcohol consumption during pregnancy.

^c Model 3 adjusted by maternal age at birth, breastfeeding, baby wanted or unwanted, positive about caring for baby, and method of delivery.

^d Model 4 adjusted by all factors mentioned above.

Similar to depression, women who experienced more symptoms during pregnancy were at greater risk of reporting poor health 14 years after giving birth (Table 4). In the age-adjusted model, women who experienced some symptoms throughout pregnancy had increased odds of being in good (OR 1.50; 95% CI: 1.24–1.82) or fair/poor health (OR 2.75; 95% CI: 1.96–3.86) 14 years post partum compared with women who did not experience those symptoms. Similarly, women who experienced many symptoms throughout pregnancy had increased odds of being in good (OR 2.46; 95% CI: 1.88–3.20) or fair/poor health (OR 7.82; 95% CI: 5.30–11.55) 14 years post partum. When the relationship with mental health status was examined, adjustment for maternal social, mental, and lifestyle factors during pregnancy attenuated the association by nearly 33%. The association remained robust in the fully adjusted model.

Table 4: Adjusted odds ratios of maternal general health 14 years post partum

Symptoms during pregnancy (n = 4509)					
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Few symptoms (n = 658) Some symptoms (n = 3362) Many symptoms (n = 489)					
<hr/>					
Maternal general health (reference category)		OR	95% CI	OR	95% CI
<hr/>					
Model 1 ^a					
Good	1.00	1.5	1.2–1.8	2.5	1.9–3.2
Fair/poor	1.00	2.8	2.0–3.9	7.8	5.3–11.6
Model 2 ^b					
Good	1.00	1.4	1.2–1.7	2.1	1.7–2.7
Fair/poor	1.00	2.3	1.6–3.5	5.1	3.4–7.8
Model 3 ^c					
Good	1.00	1.5	1.2–1.8	2.3	1.7–3.0
Fair/poor	1.00	2.6	1.9–3.7	7.0	4.7–10.5
Model 4 ^d					
Good	1.00	1.4	1.1–1.7	1.9	1.5–2.6
Fair/poor	1.00	2.3	1.6–3.2	4.9	3.2–7.5

^a Model 1 adjusted by maternal age at birth.

^b Model 2 adjusted by maternal age at birth, parity, maternal education, depression, anxiety, marital status, smoking and alcohol consumption during pregnancy.

^c Model 3 adjusted by maternal age at birth, breastfeeding, baby wanted or unwanted, positive about caring for baby, and method of delivery.

^d Model 4 adjusted by all factors mentioned above.

When the analyses were repeated with further adjustment for BMI categories, life events, and depression at the 5-year follow-up, the results did not differ from those presented here (these variables were not included in the multivariable model to maximize the sample size). When the analyses were repeated using weights for factors that predicted non-response, the results did not differ from those presented here.

4. Discussion

The results showed that women who experienced the most symptoms during pregnancy were at greater risk of depression 14 years post delivery. They also showed that women who experienced some symptoms or many symptoms during pregnancy were at greater risk of poorer self-rated health status 14 years post partum. In the age-adjusted model, these women were 4 times more likely to be depressed and nearly 8 times more likely to report fair/poor health compared with women who experienced few problems. Although these associations were partly explained by social, mental, and lifestyle factors during pregnancy, they remained robust after adjustment for other factors including breastfeeding and wanted or unwanted pregnancy. The findings suggest that pregnant women who feel generally unwell and experience common pregnancy symptoms are also at greater risk of experiencing poorer mental health and lower self-rated health status many years after the pregnancy.

The results are in broad agreement with those of other studies [1], [2], [3], [16], [17] and [18]. The present study adds to the existing literature by indicating that these common symptoms may have a long-lasting effect on women's mental and general health, but these results need to be interpreted with caution.

One explanation for the findings is that difficulties during pregnancy may cause considerable health damage and therefore there is a causal association between difficulties experienced in pregnancy and poorer physical and mental health experienced later on. That is, women experiencing many physical symptoms during pregnancy genuinely have more organic reasons to complain (ie, real medical problems), and a higher burden of psychosocial disorders, which become manifest sometime after the birth. This would fit with the “pregnancy unmasks chronic illnesses” theory [19]. This interpretation is also supported by existing evidence suggesting that some health problems experienced in pregnancy, for example gestational diabetes, are more likely to be experienced later in life [19].

An alternative explanation could be that the associations reported may not be causal, but may reflect stable personality characteristics or unmeasured confounders. That is, women experiencing many symptoms during pregnancy may tend to readily adopt a sick role and these personality traits may continue throughout their lives, resulting in poorer self-rated health at 14 years. The study did not have the capacity to test this hypothesis because there was little information available on the previous mental and physical health status of this cohort. When maternal social, mental, and lifestyle factors during pregnancy were included in the analysis, these attenuated the strength of the association with depression. This suggests that existing poorer mental health and socioeconomic status may partly explain the relationship between pregnancy symptoms and depression. The association with depression could be explained further with residual confounding, because all possible potential confounders could not be included in this study.

Similarly, BMI was used as a proxy measure for existing poorer health status to assess whether greater BMI attenuated the association of symptoms with general health status. Increasing prepregnancy BMI is associated with increased lower back and pelvic pain during pregnancy [20]. Given that common complaints of pregnancy, such as gastro-oesophageal reflux, hemorrhoids, and varicose veins [21], are all associated with obesity outside of pregnancy, it is likely that obese pregnant women would experience more symptoms related to these problems. Since adjustment for BMI did not alter the results, it is unlikely that the association of pregnancy symptoms with self-reported health status is confounded or mediated via BMI.

The results should be viewed in the context of some limitations. The present study used measures for both depression and self-reported general health status. However, the measure of depression has high internal validity [10]. The subjective health status measurement was not validated; however, there is considerable evidence of the extent to which self-rated health predicts health status and as such it is widely accepted as a valid indicator in middle-aged populations [22].

Loss to follow-up in the cohort was nearly 30%. However, the results would only be biased if the associations assessed were either non-existent or were in the opposite direction in non-participants. Although this possibility cannot be excluded, it is unlikely. To further assess whether loss to follow-up produced bias in the results, inverse probability weighting was attached to subjects included in the analyses to restore the representation of persons lost to follow-up. The

method suggested by Hogan et al. [15] was followed and robust standard error estimates were used in this model. No difference was found between the weighted results and the unweighted results, which suggests that attrition is unlikely to have substantively biased the findings.

The present study found that women who experience more symptoms in pregnancy are also at greater risk of reporting depression and poorer general health status 14 years later. If other large prospective studies confirm the associations found, greater clinical attention should be paid to the role of common symptoms reported during pregnancy.

Given that women with a high burden of pregnancy symptoms have poorer self-rated health and increased depression at 14 years post partum, it is also possible that personality factors and depression during the index pregnancy (which are potentially enduring characteristics) are the reason that these women report so many pregnancy symptoms. This is an area for further study. If this were found to be true, then women who have many complaints should be carefully screened for depression, social dysfunction, and lifestyle problems during or immediately post pregnancy.

Acknowledgments

The core study was funded by the National Health and Medical Research Council (NHMRC) of Australia, but the views expressed in the paper are those of the authors and not necessarily those of any funding body. RA and AAM are funded by NHMRC Career Development Awards in Population Health (ID 519721 and ID 519756, respectively).

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