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Epidemiological evaluation of the Patient Health Questionnaire-2 in a pregnant population

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ABSTRACT

Introduction: The Patient Health Questionnaire-2 (PHQ-2) is a commonly used 2-item screening tool for depressive symptoms among pregnant women in primary care settings. However, its validity has not been assessed for large-scale epidemiological studies. Therefore, the aim of this study was to provide an epidemiological evaluation of the PHQ-2 among pregnant women.

Method: A total of 3033 pregnant women participating in the PRegnancy and Infant DEvelopment Study completed the PHQ-2 as well as the Hospital Anxiety Depression Scale-Depression (HADS-D) or the Edinburgh Depression Scale (EDS) three times throughout pregnancy. The validity of the PHQ-2 was assessed with the HADS-D/EDS as reference standard.

Results: Sensitivity and specificity of the PHQ-2 were 69–84% and 79–84%, respectively. The positive predictive values (range 19–26%) were substantially lower than the negative predictive values (96–99%).

Conclusion: Despite the relatively high number of false-positive screens, initial screening for depression by two questions only may enhance routine evaluation of depressive symptoms among pregnant women.

1. Introduction

Depression is common among women of reproductive age with prevalence estimates ranging between 6.5% and 12.9% [1]. Unfortunately, depression among pregnant women often remains unrecognized by health care providers, resulting in many women suffering from untreated depressive symptoms throughout their pregnancies [2,3]. Studies showed that untreated depression among pregnant women may have adverse effects on the fetus, such as preterm birth and low birth weight, and may result in problems during childhood, including depression and criminal behaviour [4–8]. Therefore, early detection and appropriate treatment of depressive symptoms during pregnancy is important to prevent negative health outcomes for both the mother and her (unborn) child. In addition, depression screening during pregnancy may be used to predict future illness. Self-reported questionnaires, including the Hospital Anxiety and Depression Scale (HADS), the Edinburgh Depression Scale (EDS), and the PHQ-9 have been used as screening tools to detect depression in pregnant women in primary care [9]. However, these extensive questionnaires may often be infeasible to administer and interpret in the primary obstetric setting with its busy nature and competing demands [10].

The Patient Health Questionnaire-2 (PHQ-2) is a screening tool consisting of only two questions, inquiring about the presence of depressed mood and/or anhedonia over the past month [11]. The two questions contain the major criteria for the diagnosis of a depressive disorder. The PHQ-2 offers general practitioners, midwifes and gynaecologists a concise tool used for screening for depressive symptoms in pregnant women [11,12]. However, its validity and predictive value have not been assessed in large-scale epidemiological studies within this population. Therefore, the aim of this study is to provide a thorough epidemiological evaluation of the PHQ-2 used among pregnant women, comparing the PHQ-2 to the HADS depression subscale (HADS-D) and the EDS in terms of sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV), as well as exploring the trajectory of depressive symptoms in pregnancy measured by the PHQ-2. If proven to be of sufficient validity and predictive value, the PHQ-2 might replace the more extensive questionnaires screening for depression, which would substantially reduce the burden for pregnant

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women and healthcare providers.

2. Methods

2.1. General design PRIDE Study

Data were collected within the PRegnancy and Infant DEvelopment (PRIDE) Study, an ongoing prospective cohort study in The Netherlands that aims to identify factors that may influence maternal and infant health during or after pregnancy. More details concerning the PRIDE Study are described elsewhere [13]. In short, pregnant women 18 years of age and above, able to read and understand the Dutch language, and not > 16 weeks pregnant are invited to participate in the PRIDE Study by their midwife or gynaecologist at their first prenatal care visit. After providing informed consent, participants complete three web-based questionnaires during pregnancy, and biannual questionnaires after delivery. The baseline questionnaire is administered around gestational weeks 8–12 (Q1), the second questionnaire around gestational week 17 (Q2), and the third questionnaire around gestational week 34 (Q3). For this study, only these three prenatal questionnaires were used. The PRIDE Study was approved by the Regional Committee on Research involving Human Subjects.

2.2. Inclusion and exclusion criteria

All PRIDE Study participants with an estimated date of delivery from February 2012 through May 2016 were selected for this study. We excluded women with a miscarriage or stillbirth, termination of pregnancy, or birth before gestational week 34 according to maternal self-report, obstetric record review, and data from the Netherlands Perinatal Registry as scores on the PHQ-2, HADS, and EDS were not assessed after the adverse event. In addition, women with missing information on the PHQ-2 at baseline were excluded.

2.3. Measures of depressive symptoms

2.3.1. Patient Health Questionnaire-2 (PHQ-2)

All prenatal questionnaires of the PRIDE Study included the PHQ-2, which consists of the first two items of the full depression scale of the PHQ-9. The PHQ-2 inquires about the presence of depressed mood and anhedonia over the past month and incorporates the two most relevant DSM-IV depression criteria [9,10].

In a pregnant population physical complaints (fatigue, nausea, sleep disturbances, nutrition problems) might occur and persist for a longer period (days or weeks). This might influence the mood (first question of PHQ-2) or the emotional state (second question PHQ-2) of a pregnant woman. For the diagnosis of a depressive episode, DSM-IV requires that one of the two symptoms (depressive mood of anhedonia) is present [14]. The correlation between each of these symptoms with the characteristics of a pregnant population has not have been described in a large epidemiological study. Therefore we examined each of the two core symptoms of depression separately and together in relation to the characteristics of our population of pregnant women.

The two questions asked are: “During the last month, have you often been bothered by feeling down, depressed or hopeless?” and “During the last month, have you often been bothered by having little interest or pleasure in doing things?”. For each item, the response can be “Yes” or “No”, scored as 1 and 0, respectively. Therefore, the scores on the PHQ-2 range between 0 and 2.

2.3.2. Hospital Anxiety Depression Scale-Depression (HADS-D)

The HADS was designed as a screening tool for depression and anxiety in hospital patients [15], but it is also widely used and validated in primary care settings including general and pregnant populations [16,17]. The HADS exists of 14 items, of which seven items pertain to depression. These items are rated on a four point scale (0–3), so the total scores on the HADS-D range between 0 and 21 with a cut-off score of ≥ 8 for presence of depressive symptoms. The sensitivity of the HADS-D ranged from 69% to 90%, and the specificity ranged from 70% to 97% [16]. The HADS-D was included in Q1 and Q3.

2.3.3. Edinburgh Depression Scale (EDS)

The EDS is a 10-item self-reported questionnaire to screen for prenatal and postnatal depression [18]. The questions are related to emotional health and well-being of the women and for each statement one of four possible responses can be chosen. The total scores range between 0 and 30, with a cut-off value of ≥ 13 indicating depressive symptoms. The EDS was validated for pregnant and postpartum women in the Netherlands with a sensitivity and specificity of 59% and 69%, respectively, [19] and was included in Q2.

2.4. Maternal characteristics

All maternal characteristics selected were self-reported and were obtained from the first prenatal PRIDE Study questionnaire. Information was collected on demographic characteristics (maternal age, country of birth, educational level, net household income, and cohabitation), medical history (chronic illnesses, pre-pregnancy BMI, parity, and previous miscarriages), pregnancy-related characteristics (planning of pregnancy, time to pregnancy, use of fertility treatment, and severe nausea, extreme fatigue, or infections during pregnancy), health behaviour in pregnancy (smoking, alcohol consumption, illicit drug use, caffeine consumption, and physical activity) and psychosocial characteristics (history of depression, family history of depression, presence of major life events [rated according to the Social Readjustments Rating Scale [20], and medication use for depression or anxiety).

2.5. Statistical analysis

The course of PHQ-2 scores across pregnancy was visualized in a histogram, showing the prevalence of women scoring positive on the PHQ-2 (≥ 1 and 2 questions positive) in only one of the three time periods during pregnancy, of women who scored positive in more than one time period, and of women who scored positive on the PHQ-2 in all three time periods. We used chi-square tests to examine differences in characteristics of women who scored positive on the PHQ-2 question on depressed mood only, on anhedonia only, or on both PHQ-2 questions at baseline compared to women with a negative score on the PHQ-2 at baseline. We also used chi-square tests to examine differences in characteristics of women for whom the PHQ-2 was valid compared to the reference standard and for whom the PHQ-2 was not valid at baseline. Potential differences in characteristics of women with missing data on the PHQ-2 in Q2 and Q3 and women with complete data were also examined.

We validated the PHQ-2 with the HADS-D (Q1 and Q3) and the EDS (Q2) as reference standards. For the validation analyses, we used two different cut-off scores: ≥ 1 PHQ-2 question positive, and 2 PHQ-2 questions positive. First, sensitivity and specificity with 95% confidence intervals (CI) were calculated. Sensitivity reflects the proportion of women who were detected as having depressive symptoms by the PHQ-2 among those with depressive symptoms according to the reference standard. Likewise, specificity reflects the proportion of women who did not have depressive symptoms according to the PHQ-2 among those who scored negative on the reference standard. Furthermore, the positive and negative predictive values were calculated. The PPV is the proportion of women who truly have depressive symptoms according to the reference standard among those scoring positive on the PHQ-2, whereas the NPV is the proportion of women without depressive symptoms according to the reference standard among those who scored negative on the PHQ-2. Both the PPV and the NPV take the prevalence of the disease into account [20]. Finally, Cohen's kappas were