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Positive screening for major depressive disorder in high-risk pregnant women

Triagem positiva para transtorno depressivo maior em gestantes de alto risco

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ABSTRACT

Objective: To estimate the frequency of positive screening for major depressive disorder and associated factors in high-risk pregnant women at a reference hospital of the Brazilian Public Health System. **Methods:** Cross-sectional study with 184 high-risk pregnant women at the Maternity at the *Hospital Regional de São José, SC, Brazil*. Positive screening for major depressive disorder using the Edinburgh Postpartum Depression Scale was selected as the dependent variable. Socio-demographic and pregnancy-related variables were also collected. Data were analyzed using Poisson regression with a robust estimator, including all variables that presented a p-value < 0.20 in the bivariate analysis. Statistically significant differences were considered when $p \leq 0.05$. **Results:** The frequency of positive screening for major depressive disorder was 37.5%. Non-white skin color, income of less than USD 572,56 per month and maternal age of less than 18 years or greater than or equal to 35 years were statistically and independently associated with positive screening for major depressive disorder in high-risk pregnant women. **Conclusion:** The frequency of positive screening for major depressive disorder in the high-risk pregnant women studied was 37.5%. The frequency was statistically associated with skin color, family income and extremes in the maternal age.

KEYWORDS

Major depressive disorder, high-risk pregnancy, prenatal care.

RESUMO

Objetivo: Estimar a frequência de rastreamento positivo de transtorno depressivo maior e fatores associados em gestantes de alto risco em uma maternidade de referência do Sistema Único de Saúde. **Métodos:** Estudo transversal envolvendo 184 gestantes de alto risco da Maternidade do Hospital Regional de São José, SC, Brasil. A variável dependente foi o rastreamento de transtorno depressivo maior por meio da aplicação da Escala de Depressão Pós-parto de Edimburgo. Foram coletadas ainda variáveis socio-demográficas e relacionadas à gestação. Os dados foram analisados por meio da regressão de Poisson com estimador robusto, incluindo todas as variáveis que apresentaram valor de $p < 0,20$ na análise bivariada. Consideraram-se diferenças estatisticamente significativas quando $p \leq 0,05$. **Resultados:** A frequência de rastreamento positivo para transtorno depressivo foi de 37,5%. Cor da pele não branca, renda mensal inferior a USD 572,56 e idade materna inferior a 18 anos ou superior ou igual a 35 anos foram estatística e independentemente associadas ao rastreamento positivo para transtorno depressivo maior em gestantes de alto risco. **Conclusão:** A frequência de rastreamento positivo de transtorno depressivo maior em gestantes de alto risco estudadas foi de 37,5%. A frequência mostrou-se estatisticamente associada com cor de pele, renda familiar e extremos de idade materna.

PALAVRAS-CHAVE

Transtorno depressivo maior, gravidez de alto risco, cuidado pré-natal.

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INTRODUCTION

Antenatal depression affects about 16% of pregnant women, while epidemiological studies suggest even higher rates in pregnant women with comorbidities¹. An extensive group of obstetric diseases can cause high-risk pregnancies. A high-risk pregnancy has been defined as a pregnancy with an unexpected medical or obstetric condition that poses a potential hazard to the health of fetus or mother². Although this group of pregnant women is more prone to mood disorders, there are still few studies in the literature. Powers *et al.*³ were the first to investigate psychiatric illnesses in high-risk pregnancy and concluded that depressive mood disorders are greater in this population. The prevalence of this disease in high-risk pregnant women can vary from 27% to 44% and is also related to adverse perinatal outcomes, such as premature labor⁴.

The exact mechanism of MDD and perinatal adverse events is not yet fully understood, but research suggests that an increase in stress hormones such as norepinephrine and an increase in the release of corticotrophic hormones could trigger preterm labor⁴. The use of alcohol, drugs and smoking has already been associated with the relationship between MDD and adverse perinatal effects. However, even after control of these variables, the association between MDD and perinatal adverse events still remains, which suggests a relationship between MDD and the immune system activation affecting the mother, fetus, placenta, decidua and myometrium resulting in adverse effects⁵. Another possible explanation is the reduction of natural killer cells, leaving the body susceptible to inflammation that can lead to placental and fetal damage^{4,6}.

Taking into account the period in which this study was carried out, mental health is one of the areas that have been greatly affected by the COVID-19 pandemic. Pregnant women were also affected psychologically by the numerous restrictive measures, uncertain future and fear of infection and its unknown consequences on fetuses. Scientific evidence has shown an increase in the prevalence of anxious and depressive symptoms in high-risk pregnant women during the COVID-19 pandemic compared to usual-risk pregnant women². In this connection, health professionals should be aware of the high prevalence of MDD in high-risk pregnancies, as well as be qualified for early identification of depressive symptoms using validated screening instruments in the obstetric population⁷.

Considering the relevance of the subject, the scarcity of research on MDD in high-risk pregnant women in Brazil, this investigation sought to identify the frequency of this psychiatric condition and its associated factors during the pregnancy cycle. Thus, the objective of the present study was to estimate the frequency of positive screening for MDD and associated factors in high-risk pregnant women

at a referral maternity hospital in Metropolitan area of Greater Florianópolis, in the southern Brazilian State of Santa Catarina.

METHODS

This is an epidemiological cross-sectional design study involving patients who underwent prenatal care at the high-risk outpatient clinic at the Maternity at the *Hospital Regional Dr. Homero de Miranda Gomes* in São José, a municipality in the metropolitan region of Greater Florianópolis, from August 2020 to January 2021. The maternity attends to the medical needs of around 100 prenatal high-risk pregnant women monthly who are exclusively followed by the *Sistema Único de Saúde* (SUS, Brazilian Unified Health System).

The minimum sample size was calculated in the OpenEpi 3.03^a program using the following parameters: estimated population in the period, 600 patients; expected MDD frequency 28.8%⁸, relative error 5% and accuracy level 95%. A minimum sample of 207 high-risk pregnant women was obtained. Considering 10% of possible refusals or losses, the final sample included 227 patients. The patients were selected continuously on the days of care at the high-risk prenatal clinic.

High-risk pregnant women in pre-natal care who were literate and who had proper conditions to answer the questionnaire such as a good understanding of the Portuguese language and literacy that would allow them to answer the self-administered questionnaire were included. Psychiatric background was not evaluate. Women with conditions that made difficult their understanding of the survey instrument, such as patients who do not understand and do not speak Portuguese, and those with a confirmed diagnosis of fetal death were excluded. High-risk pregnant women were invited to participate in the investigation regardless of gestational age. The participants signed a Free and Informed Consent Form after receiving due information on the purpose of the investigation. After agreeing to participate in the study, the pregnant women answered the Edinburgh Postpartum Depression Scale (EPDS)⁹, validated for use in Brazil, specifically with pregnant women¹⁰. The cut-off points for positive screening were 11 points on the EPDS in the first quarter and 10 points on the EPDS in the second and third quarters¹⁰ and constituted the dependent variable of this study (positive screening; negative screening). All pregnant women with positive screening for MDD in the EPDS were referred to a specialized mental health service.

Sociodemographic, clinical-obstetric variables and issues of abortion thoughts, planned pregnancy, unintended pregnancy and mistimed pregnancy were collected by direct interview. All information collected was inserted into a survey instrument *ad hoc*. The independent variables were

age in completed years (later classified into two groups: under 18 years of age/equal to or greater than 35 years of age; between 18 and 34 years of age), self-declared skin color (white; not white), if living with a partner (yes; no), if working (yes; no), education in completed years (later classified into up to 8 years; more than 8 years), family monthly income (classified in the median of distribution), gestational age in completed weeks (classified in up to 13 weeks; from 14 to 27 weeks; more than 27 weeks), number of previous vaginal deliveries, number of previous cesarean sections and number of previous abortions (all classified later in none; one or more), smoking, alcohol or drug use (all classified as yes; no), body mass index (BMI) before pregnancy (classified as eutrophic; overweight), abortion thoughts, planned pregnancy, unintended pregnancy and mistimed pregnancy (all yes; no).

The data were inserted into an Excel spreadsheet and later exported to the SPSS 18.0 where they were analyzed. The frequency of positive screening for MDD was estimated in the population studied. The socio-demographic and clinical-obstetric characteristics were written in the form of absolute and relative frequencies. The chi-square test (χ^2) was used to test the homogeneity of proportions between the independent variables and the positive MDD screening. Multivariate analysis was performed to observe any confounding variables, using Poisson regression with a robust estimator, including all variables that presented a p-value < 0.20 in the bivariate analysis. Prevalence ratios (PR) were calculated with their relevant 95% confidence intervals (95% CI). The level of significance established was $p < 0.05$.

RESULTS

A total of 184 women were interviewed, which corresponds to an 81.0% response rate. The causes of the high-risk pregnancy are described in Table 1, gestational diabetes (11.2%) followed by pre-eclampsia (7.3%) were the main causes.

The frequency of positive MDD screening was 37.5% (95% CI 30.8; 44.7). Regarding socio-demographic characteristics, a higher frequency was observed in the group of women under 18 years of age and above or equal to 35 years old when compared to the age group 18 to 34 years old ($p = 0.013$) (Table 2).

Regarding current pregnancy, a statistically significant association was observed between MDD positive screening and abortion thoughts throughout the prenatal period ($p = 0.024$), unplanned pregnancy ($p = 0.036$) and mistimed pregnancy ($p = 0.009$) (Table 3).

The results of the multivariate analysis showed a 16% higher and independent frequency [PR 1.16 (95% CI: 1.03; 1.30) $p = 0.014$] of positive screening for MDD in pregnant women under 18 years of age or greater or equal to 35 years of age, compared to pregnant women aged 18 to 34 years. Non-white skin color pregnant women had a 12% higher and independent frequency [PR 1.12 (95% CI 1.01; 1.24) $p = 0.027$], compared with white skin color pregnant women, as well as pregnant women with family income up to USD 572,56 /month; had also a 12% higher and independent frequency [PR 1.12 (95% CI 1.02; 1.22) $p = 0.016$] for MDD positive screening when compared with pregnant women with an income greater than the aforementioned value (Table 4).

Table 1. Reasons for high-risk pregnancy categorization – Maternity at the Hospital Regional Dr. Homero de Miranda Gomes, São José, SC, Brazil

Reason	n	%
Gestational diabetes	20	11.2
Pre-eclampsia	13	7.3
Maternal age	11	6.1
Hypothyroidism	7	3.9
Pyelonephritis	6	3.3
Systemic arterial hypertension	5	2.8
Smoking	3	1.6
Current preterm labor	2	1.1
Previous preterm labor	2	1.1
Deep vein thrombosis	2	1.1
Subchorionic hematoma	3	1.6
Hyperemesis	3	1.6
Heart disease	2	1.1
Obesity	2	1.1
Previous diabetes mellitus	1	0.5
Alterations in neonatal transmission	1	0.5
Rheumatoid arthritis	1	0.5
Cholestasis	1	0.5
Pregnancy-specific hypertensive disease	1	0.5
Cervical incompetence	1	0.5
Marginal cord insertion	1	0.5
Molluscum contagiosum	1	0.5
Intracervical neoplasia	1	0.5
Placenta praevia	1	0.5
Polyhydramium	1	0.5
Previous bariatric surgery	1	0.5
Syphilis	1	0.5
Polycystic ovary syndrome	1	0.5
Toxoplasmosis	1	0.5
Multiple conditions	17	9.5
Other disorders without description	55	30.0
Does not know	9	5.0

Table 2. Socio-demographic aspects and screening for major depressive disorder in high-risk pregnant women – Maternity at the *Hospital Regional Dr. Homero de Miranda Gomes*, São José, SC, Brazil

Variables	Positive screening		Negative screening		p
	n	%	n	%	
Age – completed years					0.013
Below 18 and above and 35	20	55.6	16	44.4	
18 to 34	49	33.1	99	66.9	
Skin color					0.084
White	57	41.0	82	59.0	
Not white	12	26.7	33	73.3	
Living with partner					0.135
Yes	58	35.6	105	64.4	
No	11	52.4	10	47.6	
Education time in completed years					0.664
Up to 8	14	41.2	20	58.8	
More than 8	55	37.2	93	62.8	
Family monthly income*					0.137
Up to USD 572,56/month	34	44.7	42	55.3	
More than USD 572,56/month	34	33.7	67	66.3	
Work activity					0.458
Yes	40	35.4	73	64.6	
No	29	40.8	42	59.2	

*Conversion from Real to Dollar according to the quotation of the Central Bank of Brazil on December 8th 2022.

Table 3. Aspects related to current pregnancy and screening for major depressive disorder in high-risk pregnant women – Maternity at the *Hospital Regional Dr. Homero de Miranda Gomes*, São José, SC, Brazil

Variables	Positive screening		Negative screening		p
	n	%	n	%	
BMI					0.515
Thinness	34	34.7	64	65.3	
Eutrophic	3	60.0	2	40.0	
Overweight	25	35.7	45	64.3	
Gestational age in complete weeks					0.744
Up to 13	7	33.3	14	66.7	
14 to 27	48	39.7	73	60.3	
More than 27	14	34.1	27	65.9	
Smoking					0.758
Yes	5	41.7	7	58.3	
No	64	37.2	108	62.8	
Use of alcohol or drugs					0.526
Yes	3	42.9	4	57.1	
No	66	37.3	111	62.7	
Number of previous vaginal deliveries					0.729
1 or more	19	39.6	29	60.4	
None	50	36.8	86	63.2	
Number of previous cesarean sections					0.576
1 or more	20	40.8	29	59.2	
None	49	36.3	86	63.7	
Number of previous abortions					0.525
1 or more	14	33.3	28	66.7	
None	55	38.7	87	61.3	
Abortion thoughts					0.024
Yes	14	58.3	10	41.7	
No	55	34.4	105	65.5	
Planned pregnancy					0.013
Yes	23	27.7	60	72.3	
No	46	45.5	55	54.5	
Unintended pregnancy					0.036
Yes	15	55.6	12	44.4	
No	54	34.4	103	65.8	
Mistimed pregnancy					0.009
Yes	18	58.1	13	41.9	
No	51	33.3	102	66.7	

Table 4. Results of the multivariate analysis of positive screening for major depressive disorder in high-risk pregnant women – Maternity at the *Hospital Regional Dr. Homero de Miranda Gomes*, São José, SC, 2020

Variables	Positive screening					
	PR _c	95% CI	p	PR _a	95% CI	p
Age in completed years			0.013			0.014
Below 18 and above 35	1.16	1.02; 1.30		1.16	1.03; 1.30	
18 to 34	1.00			1.00		
Skin color			0.084			0.027
White	1.00			1.00		
Not white	1.09	0.99; 1.19		1.12	1.01; 1.24	
Living with partner			0.135	#		
Yes	1.00					
No	1.11	0.96; 1.30				
Family monthly income*			0.137			0.016
Up to USD 572,56/month	1.07	0.98; 1.17		1.12	1.02; 1.22	
More than USD 572,56/month	1.00			1.00		
Abortion thoughts			0.024	#		
Yes	1.16	1.01; 1.35				
No	1.00					
Planned pregnancy			0.013	#		
Yes	0.90	0.82; 0.97				
No	1.00					
Unintended pregnancy			0.036	#		
Yes	1.15	1.01; 1.31				
No	1.00					
Mistimed pregnancy				#		
Yes	1.17	1.03; 1.34	0.009			
No	1.00					

*Conversion from Real to Dollar according to the quotation of the Central Bank of Brazil on December 8th 2022.

PR_c: crude prevalence ratio; PR_a: adjusted prevalence ratio; 95% CI: 95% confidence interval.

Removed from the model due to loss of statistical significance.

Omnibus test p = 0.886; degrees of freedom: 8.

DISCUSSION

The frequency of positive screening for antenatal major depressive disorder was 37.5% in this study. A systematic review conducted in 2020 found a prevalence of antenatal MDD ranging from 15.0% to 65.0%¹¹. Chen *et al.* using EPDS found a prevalence of 29.6% of women with the possibility of MDD during pregnancy¹², while a retrospective cohort study conducted in Australia in 2018 identified 6.2% positive MDD screening¹³. The prevalence of positive MDD screening in high-risk pregnant women in another recent systematic review showed prevalence ranging between 12.5% and 44.2%, while a recent study carried out in high-risk pregnant women in Greece also using EPDS found a prevalence of 28.0%⁷.

The high frequency we found in this study can be attributed to the social profile of the studied population, since in the literature the highest prevalence of MDD in low- and middle-income countries has been well documented^{8,14,15}. Classifying pregnancy as being high risk implies a higher prevalence of depressive symptoms and, consequently, a greater number of major depressive disorder diagnoses¹⁶. These women with MDD, experience a greater number of hospitalization events and have concerns about the fetus,

her health with their body and mind and the anxieties and pressures are greater when compared to pregnancies not classified as high risk¹⁷. A study conducted in Shanghai, China, found a prevalence of depressive symptoms between 5.0% and 7.6% in pregnant women without high risk, while this value in usual-risk pregnancy was 15.7%¹⁸.

In addition to the fact that high-risk pregnancies alone imply higher rates of anxiety and depression¹⁹, another marked factor in the present study was the fact that data collection was performed during the COVID-19 pandemic, which may have caused even more mood changes and concerns in the sample. Similar findings have been described in recent studies that assessed the level of anxious and depressive symptoms during the COVID-19 pandemic in high-risk pregnant women². Dagklis *et al.*¹⁹ identified a 14.9% prevalence of positive MDD screening in pregnant women during the pandemic, while a cross-sectional study carried out with high-risk pregnant women found a prevalence of 25%.

This study showed a statistically significant association between age under 18 years and above or equal to 35 years and MDD positive screening. A descriptive study conducted in 2016 with high-risk pregnant women found a significant association between depressive symptoms and young

pregnant women under 35¹⁶. Corroborating the findings of the present study, a systematic review of 97 articles identified the youngest age group and the advanced age group as risk factors for antenatal depression¹⁴.

According to Coll *et al.*²⁰ in a cohort study conducted in 2017, high EPDS scores were associated with pregnant women under 20 years of age; however, after adjustment it was found that pregnant women aged 35 years or older were 36% more likely to develop depressive symptoms during pregnancy when compared with pregnant women under 20 years of age. Ayelle *et al.*²¹ in a cross-sectional study found that pregnant women aged between 20 and 29 years had a reduced risk of developing MDD when compared to pregnant women under 20 years of age. The risk of MDD in pregnant women between 20 and 29 years of age was 82% lower when compared to pregnant women aged between 14 and 19 years.

The predominance of positive screening for MDD in pregnant women with extreme age¹⁹, in contrast to the age group between 18-34 years suggests that extreme age range may be a risk factor for MDD since it is associated with unplanned pregnancies as is the frequent case in adolescence. On the other hand, older pregnant women are already classified as being at high risk for their age, adding concerns and depressive symptoms due to their categorization as being a risk group. However, it is noteworthy that the variable "unplanned pregnancy" included in the present study, lost statistical significance when the multivariate analysis was performed.

The self-declared white skin color predominated in the study, probably reflecting the demographic profile of the location where the investigation was being conducted. In fact, according to the census by the *Instituto Brasileiro de Geografia e Estatística* (IBGE, Brazilian Institute of Geography and Statistics), in the southern part of the country 76.8% of the population self-declared to be white²². Despite the higher prevalence of white skin color, the study found 12% higher frequency of positive MDD screening in the population that self-declared non-white. A recent systematic review has shown conflicting findings, with studies suggesting a higher prevalence in black, Latin and Asian women when compared with white women^{14,23}. To be part of a minority ethnic group is a risk factor already known and highlighted in other studies^{14,23,24}. This aspect can be a risk factor caused by increased stress due to marginalization and discrimination. Current findings corroborate previous research^{23,24}. These outcomes can be attributed to the risk factors associated with minority groups such as poor access to health services in general, including prenatal care²³.

Another independent factor associated with positive screening for antenatal MDD was lower income, in which data were categorized in the median, which is consistent with much of the literature^{12,24}. It is already known that low socioeconomic status has an adverse effect on antenatal depression¹⁵. Low family income was a variable significantly

associated with depressive symptoms in a study conducted in 2018⁸. It is worth mentioning that income is part of the family's socioeconomic assessment. Low-income people have less access to health services and less clinical follow up¹⁵, which can contribute to an increase in the number of pregnancies without adequate monitoring, increased stress levels and a lack of adequate screening for depressive symptoms. In addition, low family income is usually associated with unemployment and all its consequences, such as difficulty in accessing different aspects of the health-disease process. However, having a job or not was not shown to be associated with MDD screening in the present study.

The present study did not identify an association between thinking about abortion, unplanned, unintended or mistimed pregnancy and positive screening for MDD when a multivariate analysis was performed. Research carried out in Greece with pregnant women admitted to a high-risk health unit, also found no statistical association between MDD and BMI, gestational age, living with a partner, maternal education level, maternal work, and planned pregnancy⁷. Study by Ayelle *et al.*²¹ also found no statistical association between depressive mood symptoms and relationship with a partner. It is worth mentioning that the differences between the results of several studies can be related to different populations, screening tools and cut off points.

It is known that psychiatric illness stigma exists among lay people and in the health setting. The results of this investigation point to the need to warn patients, basic health care doctors, obstetricians and all the professionals involved in providing health care to pregnant women, on how much a high prevalent disease can be approached with so little attention. Taking into account MDD associated factors such as income, skin color and extremes of age, one can think and plan public policies that expand mental health care services for high-risk pregnant women, especially those non-white, low-income and at extreme of age.

As a limitation, the present study was carried out during the period of the COVID-19 pandemic, which reduced the expected response rate due to the reduction in elective visits during periods of isolation. Another limitation of this study is the fact that different causes of high-risk pregnancies have different risks and may have distinct impact on the association with major depressive disorder. The sample used was restricted to the population of high-risk pregnant women; therefore, the results presented here should not be extrapolated to other populations, such as, for example, pregnant women of usual-risk.

CONCLUSION

It can be concluded that the high frequency of positive MDD screening in the studied population is independently associated with skin color, family income and extremes of age.

INDIVIDUAL CONTRIBUTIONS

Laura Britz Soares – Conception of the research project, analysis and interpretation of data, writing and critical review of the manuscript.

Alexandre Ferreira Bello – Writing and critical review of the manuscript.

Jefferson Traebert – Conception of the research project, analysis and interpretation of data, writing and critical review of the manuscript.

CONFLICT OF INTERESTS

Nothing to declare.

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