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Original contribution

Depression during pregnancy and the postpartum period in adolescent and adult Portuguese mothers

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Summary

Objective: To study prevalence as well as risk factors for pregnancy and postpartum depression in a sample of adolescent and adult Portuguese mothers.

Methods: The Edinburgh Postnatal Depression Scale (EPDS) was administered to 108 (54 adult and 54 adolescent) Portuguese women at 24–36 weeks of pregnancy and at 2–3 months postpartum.

Results: Rates for EPDS > 12 are high during the 3rd trimester of pregnancy (18.5%) and at 2–3 months postpartum (17.6%), and not significantly different between these two periods; more than 1/4 of the sample (27.8%) had an EPDS > 12 before or after delivery. Adolescent mothers presented more depressive symptoms as well as more EPDS > 12 than adult mothers, both in pregnancy (25.9% versus 11.1%) and at 2–3 months postpartum (25.9% versus 9.3%); moreover, when considering other socio-demographics, adolescent mothers were still at risk for depressive symptoms during pregnancy as well as for postpartum depression. Women depressed in pregnancy, and ones who are under 18 years old and who live with the partner, were at risk for postpartum EPDS > 12.

Conclusion: Adolescent mothers seem particularly at risk for depression during pregnancy and the postpartum period, therefore, just like the women who are depressed during pregnancy, they should be better targeted in preventive and intervention measures.

Keywords: Adolescent mothers; EPDS; Portuguese women; postpartum depression; pregnancy depression.

Introduction

The incidence of depression during pregnancy is quite high (10–20%), as reported in several studies carried out in different parts of the world (e.g., Andersson et al, 2003; Chung et al, 2001; Gorman et al, 2004; Josefsson et al, 2001; Limlomwongse & Liabsuetrakul, 2006; Marcus et al, 2003). Predictors for women's depres-

sion during pregnancy have received large agreement in literature, namely: less favorable socio-demographics (for example, being unemployed and single) (e.g., Limlomwongse & Liabsuetrakul, 2006); previous history of depression (e.g., Marcus et al, 2003; Rich-Edwards et al, 2006); adverse life events, low levels of social support and problems in close relationships (e.g., Figueiredo et al, 2006; McKee et al, 2001; Pajulo et al, 2001; Seguin et al, 1995; Zuckerman et al, 1989).

The incidence of postpartum depression is high as well (13%, as it appears in O'Hara and Swain's (1996) meta-analysis of 59 studies), and data collected more recently confirm this in several different countries (e.g., Adouard et al, 2005; Agoub et al, 2005; Boyce et al, 2000; Felice et al, 2006; Seimyr et al, 2004; Thome, 2000; Verkek et al, 2003). Predictors for postpartum depression have also received consistent agreement in literature. For example, factors of increased risk for postpartum depression were studied in a sample of over 6000 pregnant women and grouped according to the 3 following aspects: negative physical or emotional pregnancy experience, previous history of mood disorder, and lack of or difficulties in close relationships (Cooper et al, 1996). In addition to antenatal factors, infant irritability and poor motor development as well as maternal mood after delivery increase the risk for postpartum depression (Murray et al, 1996). Other studies present the same associated factors (e.g., Agoub et al, 2005), but more recently pregnancy depression has been pointed out as the main risk factor for postpartum depression

(e.g., Hobfoll et al, 2005; Kitamura et al, 2006; Rich-Edwards et al, 2006).

Rates for depression in Portugal seem to be quite similar to the ones of other countries, either in pregnancy or the postpartum period: 9.5% of the Portuguese women were depressed (EPDS > 12) before delivery and 9.4% after delivery in a recent European comparative study (Gorman et al, 2004). In other studies, 16.7% (Areias et al, 1996b), 13.1% (Augusto et al, 1996) and 13.7% (Costa et al, 2007) of the women scored above the cut-off value at 2–3 months postpartum. Also, similar risk factors for postpartum depression have appeared in Portuguese samples, namely: history of depression or depression during pregnancy, socio-economic stressors, parity, negative delivery experience and lack of support or difficulties in close relationships (Areias et al, 1996b; Augusto et al, 1996; Costa et al, 2007).

Even so, when women living in underprivileged circumstances are targeted, rates for depression during pregnancy and the postpartum period are significantly higher, seeing that about 25–50% of them show depressive symptoms at a clinical level before and/or after delivery (e.g., Hobfoll et al, 2005; McKee et al, 2001; Onozawa et al, 2003; Rich-Edwards et al, 2006; Schmidt et al, 2006; Seguin et al, 1995). Adolescent mothers are reported as being at high risk for pregnancy and postpartum depression (Barnet et al, 1996; Colleta, 1983; Deal & Holtz, 1998; Hudson et al, 2000; Leadbeater & Linares, 1992; Prodromidis et al, 1994; Rich-Edwards et al, 2006; Schmidt et al, 2006; Troutman & Cutrona, 1990), taking into consideration that the younger the mother the greater the risk for depression (McGee et al, 1983). Some studies have pointed out that one in two pregnant adolescents is going to be depressed after delivery (e.g., Leadbeater & Linares, 1992; Schmidt et al, 2006). Moderate to severe depressive symptoms were found in 36.7% of the sample 3 months after delivery in a recent study of 623 adolescent mothers, 18-year old or younger (Schmidt et al, 2006). However, socio-demographics were usually not taken into consideration when comparing adolescent with adult mothers and the incidence for depression during pregnancy is relatively unknown in this specific population. Some findings suggest that pregnant adolescents are less distressed than they seem to be; the reason why they get depressed derives from aspects other than age, but highly associated with adolescent pregnancy (e.g., Figueiredo et al, 2006). Also, parenting status does not predict the adolescent's psychological well-being when comparing pregnant and non pregnant teenagers (e.g., Barth et al, 1983; Millan

et al, 2004; Troutman & Cutrona, 1990). Young maternal age has been associated with greater risk of antenatal and postpartum symptoms, but, in a recent study, that was largely attributable to the prevalence of financial problems, unwanted pregnancy and lack of a partner (Rich-Edwards et al, 2006).

Prospective studies focusing the prevalence of depression during pregnancy and the first postpartum months have noticed in addition: (1) more depressed women or stronger depressive symptoms in women before than after delivery (e.g., Limlomwongse & Liabsuetrakul, 2006); (2) half of the depressed women during pregnancy remained depressed during the postpartum period (e.g., Gorman et al, 2004; Josefsson et al, 2001; Marcus et al, 2003); and (3) usually postpartum depressed women were already depressed during pregnancy (Da Costa et al, 2000; Evans et al, 2001; Johanson et al, 2000; Josefsson et al, 2001). These empirical results are contradictory with some previous ones (e.g., Kumar & Robson, 1984; Ritter et al, 2000), and have even further stressed the need for screening for depression in women during pregnancy.

Recent empirical findings are somewhat contradictory regarding previous reports covering the following aspects, which the present study would like to help clarify: Is depression more prevalent in women during pregnancy or the postpartum period? Can postpartum depression be predicted by depression during pregnancy? Are adolescents at higher risk for depression than adult women before and after delivery when socio-demographics are taken into consideration?

The main objective is to study pregnancy and postpartum depression in adolescent and adult Portuguese women, with emphasis on (1) prevalence of depressive symptoms and EPDS > 12 in pregnancy and the postpartum period, namely differences in rates of depression between pregnancy and the postpartum period and differences in rates of depression between adolescent and adult women; (2) socio-demographic risk factors for depressive symptoms and EPDS > 12 during the 3rd trimester of pregnancy and at 2–3 months postpartum.

Participants and method

Participants

The sample was composed of 108 (54 adult and 54 adolescent) pregnant women, aged between 14 and 40 years old (mean = 22.83, SD = 7.26); most of them Portuguese (94.6%), Caucasian (98.1%) and primiparous (72.2%). As you can see in Table 1, participants were equally employed and unemployed, but generally had less than 9 years of education, were married or coha-

Table 1. Socio-demographics

Socio-demographics	Total n = 108 %	Adolescent n = 54 %	Adult n = 54 %	χ^2
<i>Education</i>				
<grade 9	73.1	87.0	59.3	10.607**
≥grade 9	26.9	13.0	40.7	
<i>Marital status</i>				
Married or cohabiting	72.2	48.1	96.3	31.200***
Single	27.8	51.9	3.7	
<i>Employment status</i>				
Employed	50.0	17.3	81.5	43.638***
Unemployed	50.0	82.7	18.5	
<i>Family unit</i>				
With family of origin	73.1	83.3	63.0	5.704*
Without family of origin	26.9	16.7	37.0	
<i>Partner employment status</i>				
Employed	85.9	72.9	98.0	12.854***
Unemployed	14.1	27.1	2.0	
<i>Parity</i>				
Primiparous	72.2	97.2	75.0	26.585***
Multiparous	27.8	2.8	25.0	

* $p < 0.05$; ** $p \leq 0.01$; *** $p \leq 0.000$.

biting, and living with their family of origin; the partner usually belonged to the family aggregate (72.2%) and was employed.

Adolescent mothers (≤ 18 -year old) presented with more unfavourable socio-demographics than adult mothers, as they usually did not have grade 9, were unemployed, were neither married nor cohabiting with the partner, but living with the family of origin, and their partners were also more frequently unemployed. Almost all the adolescent mothers were primiparous compared to adult mothers who were both primiparous and multiparous.

Measures

A socio-demographic questionnaire was used to collect data concerning the pregnant women and their partners: age, place of birth, parity, education, occupation, marital status, family aggregate, etc.

The Portuguese version (Augusto et al, 1996) of the *Edinburgh Postnatal Depression Scale* (EPDS, Cox et al, 1987), a self-report questionnaire composed of 10 items scored in a 4-point likert scale (0–3), was administered to assess pregnancy and postpartum depression. This questionnaire addresses the intensity of depressive symptoms within the previous seven days, and has been used in several studies both with pregnant (Da Costa et al, 2000; Rich-Edwards et al, 2006; Ross et al, 2003) and postpartum women (e.g., Adouard et al, 2005, Agoub et al, 2005; Limlomwongse & Liabsuetrakul, 2006), including Portugal (Areias et al, 1996a, b; Augusto et al, 1996; Costa et al, 2007; Figueiredo et al, 2006). EPDS Portuguese version showed good internal consistency (Cronbach Alpha = 0.85), test-retest reliability ($r = 0.75$), and external validity having the SADS psychiatric interview as a criterion ($r = 0.86$) (Figueiredo, 1997). A score higher than 12 indicates the probable presence of a major depressive episode (Areias et al, 1996b; Augusto et al, 1996).

Procedures

All participants were randomly selected before their routine medical appointment at the Júlio Dinis Maternity Hospital (MJD, Porto, Portugal), attending with their gestational age (24–36 weeks). The pregnant women were informed about the study's aims, and signed an informed consent when they agreed to participate (81.8% of the approached women agreed to participate). Socio-demographics were collected and the mothers had filled in the EPDS after the medical appointment. All mothers completed the scale again at the 2–3 months postpartum medical appointment. Ethical permission was obtained from the MJD Hospital Ethical Commission.

Statistical analyses

To evaluate differences between pregnancy and postpartum EPDS > 12 a Wilcoxon paired samples *t*-test was used. To examine means differences in EPDS results between pregnancy versus postpartum and between adolescent versus adult mothers, paired and independent samples *t*-tests were respectively performed. Chi-squares were performed to examine differences in EPDS > 12 and socio-demographics between adolescent versus adult mothers.

Multiple linear regression analyses were used to identify predictors of a mother's depressive symptoms in the 3rd trimester of pregnancy and at 2–3 months postpartum, using as independent variables: age, educational level ($< / \geq$ grade 9), employment status (employed/unemployed), living or not with the partner, living or not with the family of origin, parity (primiparous/multiparous), and depression in pregnancy (EPDS $\leq / >$ 12) (only for postpartum prediction). The same set of variables was applied in multiple logistic regression analyses to identify risk factors for pregnancy and postpartum EPDS > 12 .

Results

Rates for depressive symptoms and EPDS > 12 during pregnancy and the postpartum period in adolescent and adult mothers

As can be seen in Table 2:

Rates for EPDS > 12 are high both during the 3rd pregnancy trimester (18.5%) and the 2nd–3rd postpartum month (17.6%), with no significant differences in EPDS > 12 between these two periods ($Z(2) = 0.218$, $p = 0.827$). Mean differences for depressive symptoms in pregnancy and the postpartum period were also not significant: women report similar levels of depressive symptoms during these two periods ($t = 1.173$, $p = 0.243$).

More than one in four women (27.8%) are depressed at least at one point, before or after delivery, and some of them (8.3%) are depressed at both times, before and after delivery. Almost half of the depressed women during the last trimester of pregnancy (45.0%) remained depressed at 2–3 months postpartum, and al-

Table 2. Rates for depressive symptoms and for EPDS > 12 during pregnancy and the postpartum period in adolescent and adult mothers

	Pregnancy (n = 108) (adolescent = 54, adult = 54)		Postpartum (n = 108) (adolescent = 54, adult = 54)		Pregnancy and postpartum (n = 108) (adolescent = 54, adult = 54) EPDS > 12 (%)	Pregnancy or postpartum (n = 108) (adolescent = 54, adult = 54) EPDS > 12 (%)
	EPDS > 12 (%)	Mean (SD)	EPDS > 12 (%)	Mean (SD)		
Adolescent	25.9	9.44 (5.69)	25.9	8.54 (5.98)	16.7	35.2
Adult	11.1	6.46 (3.97)	9.3	6.30 (4.65)	0	20.4
Total	18.5	7.95 (5.11)	17.6	7.42 (5.45)	8.3	27.8

most half of the postpartum depressed women (47.4%) were already depressed during the 3rd trimester of pregnancy.

When adolescent and adult mothers were compared, significant differences were obtained, with more cases of EPDS > 12 in the adolescent group, both in pregnancy ($\chi^2(1) = 3.927$, $p = 0.041$) and the postpartum period ($\chi^2(1) = 5.173$, $p = 0.021$). Moreover, adolescent women have significantly more depressive symptoms than adults both before ($t = 4.461$, $p = 0.002$) and after delivery ($t = 5.766$, $p = 0.032$). Also, all cases of EPDS > 12 in pregnancy and the postpartum period belonged to the adolescent mother group ($\chi^2(1) = 9.818$, $p = 0.001$), and a marginally significant difference was obtained between adolescent and adult women for EPDS > 12 in pregnancy or in the postpartum period ($\chi^2(1) = 2.954$, $p = 0.066$).

Risk factors for depressive symptoms and for EPDS > 12 during pregnancy and the postpartum period

Pregnancy

When all the studied socio-demographics were considered as risk factors for depressive symptoms during

the 3rd pregnancy trimester (stepwise method), age was the best and only predictor; results show that the younger the mother the higher her EPDS pregnancy result ($R^2 = 0.082$, $B = -0.286$, $F [1,104] = 9.272$, $p = 0.003$). When all the socio-demographic variables but not age were considered for the equation (stepwise method model 1), cohabitation status was the best and only predictor, explaining 5.2% of the variance in pregnancy EPDS results, with women living without the partner having higher EPDS results ($R^2 = 0.052$, $B = 0.228$, $F [1,104] = 5.679$, $p = 0.019$); but age (model 2) ($\Delta R^2 = 0.042$, $p = 0.32$) significantly explained some of the remaining variance ($R^2 = 0.093$, $B = -0.230$, $F [2,103] = 5.298$, $p = 0.006$).

However, neither age nor the other socio-demographic variables considered could explain significantly an EPDS > 12 in pregnancy, as can be seen in Table 3.

Postpartum

When all the studied socio-demographics were considered as risk factors for depressive symptoms at 2–3 months postpartum (stepwise method), pregnancy EPDS > 12 was the best predictor accounting for 24.9% of the vari-

Table 3. Risk factors for EPDS > 12 during pregnancy and the postpartum period (logistic regression analysis)

Model	Variables	B	OR	95% IC	P
Pregnancy ($\chi^2(6) = 5.131$, $p = 0.527$)	age ≥ 18	-1.287	0.276	0.049–1.547	0.143
	>grade 9	-0.397	0.672	0.161–2.798	0.585
	employed	0.290	1.336	0.341–5.243	0.678
	living with partner	-0.336	0.715	0.167–3.057	0.650
	not living with family of origin	0.153	1.165	0.241–5.627	0.849
	primiparous	-0.697	0.498	0.090–2.761	0.425
Goodness of fit = 82.1%					
Postpartum ($\chi^2(7) = 26.513$, $p = 0.000$)	age ≥ 18	-3.287	0.037	0.003–0.417	0.008
	>grade 9	1.560	4.759	0.954–23.734	0.057
	employed	0.548	1.730	0.381–7.858	0.478
	living with partner	1.658	5.251	0.993–27.769	0.051
	not living with family of origin	-1.715	0.180	0.024–1.343	0.094
	primiparous	-1.252	0.286	0.035–2.322	0.241
	no pregnancy depression	-2.257	0.105	0.026–0.423	0.002
Goodness of fit = 85.8%					

ance in postpartum EPDS results ($R^2 = 0.249$, $B = 0.499$, $F [1,104] = 34.502$, $p = 0.000$); living with the family of origin was also associated with an increase in EPDS results ($B = 0.252$), and these two variables explain 31.2% ($R^2 = 0.312$, $F [2,103] = 23.386$, $p = 0.000$) of the variance in postpartum EPDS results. But not age, which was not included in the predictive equation after the entry of all the other considered variables (model 2) ($R^2 = 0.312$, $F [3,102] = 15.450$, $p = 0.000$), and didn't explain significantly any supplementary variance ($\Delta R^2 = 0.000$, $p = 0.883$).

Moreover, as can be seen in Table 3, the risk for having a postpartum EPDS > 12 is significantly higher when the mother is living with the partner, is less than 18 years old and was already depressed during pregnancy.

Discussion and conclusion

Levels of depressive symptoms as well as rates for EPDS > 12 were high in this Portuguese sample, both during the 3rd trimester of pregnancy (17.6%) and the 2nd–3rd postpartum month (18.5%). It's particularly relevant that more than 1/4 of the participants (27.8%) were depressed at least within one of the two target points. Levels of depressive symptoms as well as rates for EPDS > 12 were similarly high in pregnancy and the postpartum period. These results suggest, in accordance with recent literature, that women are at high risk for depression before, in addition to after delivery (Andersson et al, 2003; Marcus et al, 2003), and that pregnancy depression is as common as postpartum depression (e.g., Gorman et al, 2004).

Adolescent mothers presented more depressive symptoms as well as more EPDS > 12 than adult mothers, both in pregnancy (25.9% versus 11.1%) and in the postpartum period (25.9% versus 9.3%); also, all cases of EPDS > 12 in pregnancy and the postpartum period were due to the adolescent mother group. These results suggest that adolescent mothers are particularly at risk for pregnancy and postpartum depression, in similar rates (25–50%) as it had been pointed out in other samples of adolescent mothers (Barnet et al, 1996; Colleta, 1983; Deal & Holtz, 1998; Hobfoll et al, 2005; Hudson et al, 2000; Leadbeater & Linares, 1992; Prodromidis et al, 1994; Rich-Edwards et al, 2006; Schmidt et al, 2006; Troutman & Cutrona, 1990). Presented results also suggest that adolescent mothers can be at risk for depressive symptoms during pregnancy as well as for having an EPDS > 12 in the postpartum period, and that seems not only due to worse socio-demo-

graphic conditions, contrary to what has appeared in some recent studies (e.g., Rich-Edwards et al, 2006).

Younger women as well as women living without the partner seem to be at risk for depressive symptoms during pregnancy. Women depressed during pregnancy and women who live with the family of origin seem to be at risk for depressive symptoms at 2–3 months postpartum. Furthermore, depression during pregnancy is not only the best predictor for postpartum depression symptoms but also a predictor for postpartum EPDS > 12, as other authors have pointed out (e.g., Atkinson & Rickel, 1984; Cooper et al, 1996; Hobfoll et al, 2005; Kitamura et al, 2006; Rich-Edwards et al, 2006). The proportion of the variance of EPDS scores at postpartum accounted for by EPDS scores in late pregnancy was 24.9%, similar to what has been presented in recent studies (Limlomwongse & Liabsuetrakul, 2006). But, contrary to what has been proposed in the literature, women who are living with the partner are at risk for an EPDS > 12 during the postpartum, a result that needs further exploration, and may be specific of this sample. However, as presented by O'Hara (1986), the results of this study suggest that different causes may be responsible for prepartum and postpartum depression: the circumstance of living with the partner seems to be protective for depression during pregnancy but a risk factor for depression after delivery. A surprising result that could be explain by the reported difficulties in couples during the transition to parenthood – decrease in proximity and communication and the increase in conflicts and ambivalence, resulting in less marital satisfaction and adjustment after when compared to before delivery (Cox et al, 1999; Florsheim et al, 2003; Gloger-Tippelt & Huerkamp, 1998) – which may be larger and causing a worse impact than partner absence, in this particular sample.

Several epidemiological studies have shown that depression is very common in women during the transition to parenthood, namely when compared to other life phases (e.g., Augusto et al, 1996; Eberhardt-Gran et al, 2003). Following decades of almost exclusive attention to postpartum depression, some recent studies have pointed out that (1) depression may be even more prevalent during pregnancy than in the postpartum period (e.g., Evans et al, 2001; Josefsson et al, 2001; Seimyr et al, 2004), and that (2) pregnancy depression can be the strongest risk factor for postpartum depression (e.g., Kitamura et al, 2006; Rich-Edwards et al, 2006), and have as an adverse impact as postpartum depression on both the mother's (e.g., Marcus et al, 2003; Orr et al, 2002; Pajulo et al, 2001; Zhu & Valbo, 2002; Zuckerman et al,

1990) and the infant's well-being (Diego et al, 2004; Field et al, 2002; Jones et al, 1998; Lundy et al, 1999; Orr et al, 2002, Zuckerman et al, 1989).

Considering that depression was as prevalent before than after delivery, that almost half of the postpartum depressed women had been depressed since pregnancy, that almost half of the depressed pregnant women will remain depressed during the postpartum period, and that depression during pregnancy is the strongest risk factor for postpartum depression, as others have also pointed out recently (e.g., Da Costa et al., 2000; Evans et al, 2001; Josefsson et al, 2001; Kitamura et al, 2006; Rich-Edwards et al, 2006), screening for depression in pregnancy may be the most adequate measure to identify women at risk and to prevent the adverse effects of depression both before and after childbirth, which are important clinical implications after shown results.

This study was particularly designed to study the impact of socio-demographic variables (particularly age at pregnancy) on the onset of depression during pregnancy and the postpartum period, as well as the impact of pregnancy depression on the onset of postpartum depression. However, other important dimensions have not been considered, which naturally limits the study.

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