

ORIGINAL RESEARCH ARTICLE

The Prevalence of Obsessive-Compulsive Disorder Symptoms and their Psychological Correlates amongst Pregnant Clinic Attendees in the Capricorn District, South Africa

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Abstract

This study investigated the prevalence of Obsessive-Compulsive Disorder (OCD) symptoms and their relationship with pregnancy-related anxiety, perinatal depression and clinical anger among pregnant black African women in South Africa. The sample consisted of 206 women attending their antenatal check-ups at the Mankweng, Nobody, and Rethabile Clinics, and the Mankweng hospital in the Capricorn District, Limpopo Province. Quantitative data was collected from a convenience sample, within a cross-sectional survey design. First, the prevalence of OCD among the women was established. Then Pearson's correlation analysis was used to establish if there was a linear relationship between the variables of the study. Variables that were related were then subjected to regression analysis, seeking to establish if the independent variables, pregnancy-related anxiety, perinatal depression and clinical anger, together with other pregnancy-related variables, would predict OCD symptoms. When correlational analysis was conducted, the patient characteristics of having undergone a medical check-up, and having previously delivered a live baby generally did not correlate with any of the main scales measuring OCD symptoms, perinatal depression, pregnancy-related anxiety and clinical anger ($p > 0.05$). Almost 39.5% of the pregnant women could be classified as obsessive-compulsive disordered, when using the cut-off score of 36. Furthermore, findings from regression analyses indicated that higher age, the number of gestation weeks, having previously experienced pregnancy-related complications, perinatal depression, pregnancy-related anxiety and clinical anger were variably positive predictors of the Revised version of the Obsessive-Compulsive Inventory (OCI-R) measured OCD symptoms. The predictors were specific to each of the symptoms. It can be concluded from the study that there is a relationship between OCD symptoms and all the independent variables used. (*Afr J Reprod Health 2019; 23[2]: 44-55*).

Keywords: Obsessive-Compulsive Disorder, pregnancy-related anxiety, perinatal depression, clinical anger

Résumé

Cette étude a examiné la prévalence des symptômes du trouble obsessionnel-compulsif (TOC) et leur relation avec l'anxiété liée à la grossesse, la dépression périnatale et la colère clinique chez les femmes africaines noires enceintes en Afrique du Sud. L'échantillon comprenait 206 femmes ayant participé aux visites prénatales dans les cliniques Mankweng, Nobody et Rethabile, ainsi qu'à l'hôpital de Mankweng dans le district de Capricorne, dans la province de Limpopo. Les données quantitatives ont été recueillies à partir d'un échantillon de commodité, dans le cadre d'un plan d'une enquête transversale. Premièrement, la prévalence du TOC chez les femmes a été établie. Ensuite, l'analyse de corrélation de Pearson a été utilisée pour déterminer s'il existait une relation linéaire entre les variables de l'étude. Les variables associées ont été alors soumises à une analyse de régression visant à établir si les variables indépendantes, l'anxiété liée à la grossesse, la dépression périnatale et la colère clinique, associées à d'autres variables liées à la grossesse, permettaient de prédire les symptômes du TOC. Lors de l'analyse par corrélation, les caractéristiques de la patiente consistant en un bilan de santé et ayant déjà accouché un bébé vivant ne correspondaient en général à aucune des échelles principales mesurant les symptômes du TOC, la dépression périnatale, l'anxiété liée à la grossesse et la colère clinique ($p > 0,05$). Près de 39,5% des femmes enceintes pourraient être classées dans la catégorie des troubles obsessionnels compulsifs en utilisant le seuil de 36. De plus, les résultats des analyses de régression indiquaient qu'un âge plus élevé, le nombre de semaines de gestation, ayant déjà eu des complications liées à la grossesse, la dépression périnatale, l'anxiété liée à la grossesse et la colère clinique étaient des facteurs prédictifs positifs de la version révisée de l'Inventaire obsessionnel-compulsif (IOC-R) mesuré des symptômes du TOC. Les indices étaient spécifiques à chacun des symptômes. L'étude permet de conclure qu'il existe une relation entre les symptômes du TOC et toutes les variables indépendantes utilisées. (*Afr J Reprod Health 2019; 23[2]: 44-55*).

Mots-clés: Trouble obsessionnel-compulsif, anxiété liée à la grossesse, dépression périnatale, colère clinique

Introduction

Pregnancy is known to influence the onset and course of psychiatric conditions such as mood, psychotic, and anxiety disorders¹. Obsessive-Compulsive Disorder (OCD) is one of the Obsessive-Compulsive and Related Disorders (OCRD) that is observed relatively frequently and appears to be among the conditions related to pregnancy^{2,3}. Many women suffer from either new onset or worsening of existing OCD symptoms during pregnancy⁴.

OCD is recognized in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a disorder distinct from anxiety and it is characterized by the presence of obsessions and/or compulsions. The DSM-5 defines obsessions as ego-dystonic recurrent and incessant urges, thoughts, and images. Compulsions are behaviours or mental acts that an individual feel driven to perform repeatedly, being prompted by a rigidly applied rule or an obsession. They are uncontrollable and in the long-run cause distress to the individual. Although the results are mixed, research links reproduction-related factors such as age, gravidity and parity, gestational stage, unplanned pregnancy, existence of pregnancy complications, and many others, to OCD aetiology^{3,5,6}. Pregnancy itself, including childbirth, seems to trigger OCD onset⁷.

Lifetime prevalence of OCD in the general population is approximately 2–3%, making it one of the most common psychiatric disorders². Interestingly, estimates of the prevalence rates of OCD in pregnant women have been found to be greater than the estimated prevalence in the general population³. van Heyningen *et al*⁸ found a 4% OCD prevalence rate amongst pregnant women recruited from an obstetric unit serving a low-income community in Cape Town, South Africa. Empirical evidence suggests that the perinatal period is the time of high risk for the onset of OCD⁶, and up to 50% of women suffering from OCD recall the onset or worsening of their symptoms during this time⁷.

Amongst the pregnant women with OCD, the most common obsessions are germ contamination, and symmetry or exactness, while the most common compulsions are cleaning and checking^{6,9}. Perinatal obsessions and compulsions are very specific in content and are frequently directed towards the baby's health and well-being, and the environment. The symptoms thus create immense distress and impair not only the mother's social, occupational and

personal life, but may also affect the ability of the mother to care for her baby, leading to negative fetal outcomes, long-term behavioural challenges, and disruptions in the mother-infant bonding process^{9,10}.

OCD tends to overlap with several other psychiatric disorders, with the most frequent comorbidity being with anxiety and depressive disorders¹¹. In fact, OCD patients show symptoms of both anxiety and depression. This is especially the case in pregnant women¹². Symptoms of anxiety co-occur with depressive symptoms in 32% of pregnant women, implicating depressive experiences in OCD⁹. Aside from anxiety and depression, elevated anger levels are common in OCD^{13,14}. Typically, OCD patients tend to suppress anger inwardly and express it outwardly¹⁵. They also report more difficulty in controlling their anger, with anger correlating with the presence of comorbid depression.

Although the association between pregnancy and OCD has been extensively explored amongst Western women, the prevalence and factors related to OCD during pregnancy amongst African women have not received the same attention. A past paper suggests that the incidence of OCD symptoms in blacks is low¹⁶. This is surprising since reports state that OCD and depression are the most common disorders in pregnant women⁹⁻¹¹. van Heyningen *et al*⁸ bears this out in one South African community. The DSM-5 itself recognizes that OCD is common globally and its prevalence patterns, with respect to onset age, comorbidity and distribution by gender, are the same cross-culturally². Thus, it is necessary to conduct a study of the incidence of OCD, and factors related to it among black African women in the Capricorn district, South Africa. No comparative OCD reports are available in this area of the country.

Study aims

The study set out to establish rates of OCD amongst pregnant black African women attending community clinics in the Capricorn district, Limpopo Province, South Africa and to determine the relationship between OCD and prenatal depression, pregnancy-related anxiety and anger during pregnancy.

Methods

Research design

The study was quantitative in nature and used a cross-sectional survey design.

Sampling

Convenience sampling was used to select participants for this study. This sampling type may be legitimate for a few exploratory preliminary studies and some qualitative research studies when the purpose is something other than creating a representative sample for purposes of generalizing the findings. Despite that, it is possible to obtain valuable, usable information using the method of sampling. The final sample of the present study consisted of 206 pregnant women presenting for their perinatal check-ups at Mankweng Hospital, and Mankweng, Nobody, and Rethabile Clinics in the Capricorn District, South Africa. The number is considered sufficient to conduct any type of statistical analysis desired.

Measures

Demographic information

Participants completed the demographic questionnaire, which was designed to collect information on their personal details. Demographic information collected included the participant's marital status, age, domicile, socio-economic status, and obstetric history.

Revised version of the OCI-R

The current study used the OCI-R to assess OCD symptoms. The OCI-R is an 18-item self-report questionnaire in which participants rate the degree to which they are bothered or distressed by OCD symptoms in the past month¹⁷. Its response scale is keyed on a 5-point Likert-type scale ranging from 0 (Not at all) to 4 (Extremely). The OCI-R assesses OCD symptoms across six factors, which are Washing, Checking, Obsessions, Neutralizing, Ordering and Hoarding¹⁷. The scale includes items such as "I find it difficult to touch an object when I know it has been touched by strangers or certain people". OCI-R scores are generated by summing up the item scores. In the present study the overall reliability of the 18 items of the scale was $\alpha = 0.87$. The reliability levels of the subscales were as follows: Washing's $\alpha = 0.56$, Obsessing's $\alpha = 0.52$, Hoarding's $\alpha = 0.42$, Ordering's $\alpha = 0.58$, Checking's $\alpha = 0.59$ and Neutralising's $\alpha = 0.62$. The relatively lower reliabilities seem to confirm Whiteside and Abramowitz's¹⁵ observation that subscales of the

OCI-R tend to have poor reliability levels among non-clinical (meaning, non-diagnosed OCD) samples.

The Contamination Obsessions and Washing Compulsions subscale of the Padua Inventory-Washington State University Revision Scale (PI-WSUR)¹⁸ was administered for the purpose of establishing convergent validity. Although there are indications that the validity of the PI-WSUR itself is doubtful among blacks¹⁹, it remains one of the most reliable measures of OC symptoms²⁰. With the most common obsessions and compulsions being germ contamination, and cleaning and checking^{6,9}, respectively, the PI-WSUR Contamination Obsessions and Washing Compulsions in particular, is suitable for evaluating OCI-R convergent validity in this study. The OCI-R and its subscales correlated with the 10-item PI-WSUR Contamination Obsessions and Washing Compulsions¹⁸ subscale (r ranged between .37 to .55, $p < .001$; see Table 3). It is for that reason that although the OCI-R is primarily a measure of the severity of OCD symptoms, it is used in this study as a proxy OCD symptom measure.

Edinburgh postnatal depression scale (EPDS)

The EPDS was used to measure perinatal depression^{21,22}. It is a 10 item self-report scale which was developed by Cox *et al*²¹ as a tool for detecting depression in the pre- and postnatal periods. The scale includes items such as "I have been so unhappy that I have had difficulty sleeping". Each item on the scale is given any value from 0 to 3, with higher scores being consistent with greater depressive symptoms. Although the scale can be interpreted for both anxiety and depression²³, its single factor structure for depression is the one that has received wider usage. The EPDS is a reliable and valid measure of perinatal depression symptom severity in the African context²². The overall reliability of the scale was estimated at $\alpha = 0.67$ for the current study.

Clinical anger scale (CAS)

The CAS, a 21-item self-report instrument²⁴, was used to assess the syndrome of clinical anger. Each item consists of 4 statements. The respondent is directed to select one which best describes how he/she feels. An example of a cluster of statements for an item is as follows: "A = I do not feel angry, B = I feel angry, C = I am angry most of the time now, and D = I am so angry all the time that I can't stand it." The four statements in each cluster vary in

symptom intensity, with more intense clinical anger being associated with statement D. Thus, each cluster of statements is scored on a 4-point Likert scale, with A = 0, B = 1, C = 2, and D = 3. The total score ranges from 0 to 63. The overall reliability of the scale in the current study was $\alpha = 0.89$ for the whole sample.

Pregnancy-related anxiety scale (PRAS)

The PRAS is a 10-item questionnaire that asks women to report the frequency or extent to which they have worried or felt concerned about their health, labour and delivery, the baby's health, and caring for the baby²⁵. Items are rated on 4-point Likert scales, with higher values denoting higher anxiety levels. Item examples include: "I am worried that the baby could be abnormal". The overall reliability of the scale was $\alpha = 0.69$ in this study.

Data collection procedure

Applicable questionnaires were compiled into a composite data collection instrument. All pregnant women present for regular antenatal check-ups at the Mankweng Hospital, and the Mankweng, Nobody, and Rethabile Clinics for the period of May to July 2016, were approached for participation in the study. Following the ethical clearance of the study from the University of Limpopo, the researcher requested permission from the Limpopo Department of Health and Social Development to access patients in the Capricorn district institutions within their jurisdiction. Once the department inspected the study protocol and granted approval to access the patients, the researcher obtained another approval from Mankweng Hospital to access the patients attending perinatal check-ups at the hospital and its subsidiary clinics. The approval at Mankweng Hospital had conditions that the data collection must be completed within a limited time-frame. To access Rethabile Clinic, a district clinic, another approval from the Capricorn District Department of Health was obtained.

All the necessary ethical considerations such as informed consent, confidentiality and voluntary participation pertaining to the research, were observed during data collection. For instance, before commencing with data collection, the researcher provided an information leaflet and explained the nature and purpose of the study to prospective participants. Copies of the instrument were administered by the researcher by hand and were

completed by the participants in their respective clinics while waiting for their appointments.

Data Analysis

The data were analyzed using version 23 of the Statistical Package for the Social Sciences (SPSS 23). Before analysis could proceed, data was checked and "cleaned", and the Kolmogorov was used to detect outliers. The data were considered to have been extracted from a normal distribution ($p < .05$), based on the failure of the Shapiro-Wilk test to reach statistical significance. Subsequently, data analysis proceeded with parametric statistics. Firstly, a descriptive analysis of the background information was performed. Thereafter, correlation and regression analyses were conducted to determine the association between the main variables of the study and the predictive capacity of independent variables to predict OCD symptoms.

Description of the sample

The study comprised of pregnant women who attended their antenatal check-ups at the Mankweng Hospital and the Mankweng, Nobody, and Rethabile Clinics, which are situated in the Capricorn District, Limpopo Province, South Africa. Limpopo Province is one of the poorest, and predominantly black (97% black) provinces of South Africa. Polokwane, the city where the study was conducted, is the capital of the province. The study used those participants that were available on the day of data collection. To control for language problems, since the scales were not translated from English to any of the local languages (e.g., Afrikaans, Tshivenda, Xitsonga, and so on) participants who declared that they were not conversant and could not read in English were excluded from the study.

Results

The final sample was drawn from pregnant women attending the selected clinics and hospital, for a sample size of $N = 206$ (a total 28 pregnant women were excluded due to the language barrier). All participants were black Africans. Table 1 shows the rest of the demographic characteristics of the participants. Most of them (85.4%) belonged to either the working class or the lower-middle class status, and nearly 64% listed their domicile as a rural area. The average age of the sample was 27.72 (SD =

Table 1: Characteristics of pregnant women in Capricorn District, South Africa (N = 206)

Marital status			
Married	Live-in partner	Widowed/Divorced/ Separated	Single
54 (26.2%)	51 (24.8%)	8 (3.9%)	93 (45.1%)
Age			
<19 yrs. Old	19-24 yrs. Old	>24-35 yrs. Old	>35 yrs. Old
9 (4.4%)	57 (27.7%)	118 (57.3%)	22 (10.7%)
Domicile			
Urban/Township	Rural/Village		
75 (36.4%)	131 (63.6%)		
Social class			
Working class	Lower-middle class	Upper-middle class	Upper class
69 (33.5%)	107 (51.9%)	26 (12.6%)	4 (1.9%)
Planned pregnancy			
Yes	No		
115 (55.8%)	91 (44.2%)		
Weeks pregnant			
4-12	13-26	27-40	
22 (10.7%)	88 (42.7%)	96 (46.6%)	
First pregnancy			
Yes	No		
62 (30.1%)	144 (69.9%)		
Live birth			
0-2 children	3-4 children	5-6 children	
121 (82.9%)	21 (14.4%)	4 (.2%)	
Miscarriage history			
Yes	No		
60 (29.1%)	146 (70.9%)		
Current pregnancy-related complications			
High blood pressure	Hyperemesis gravidata	Abdominal & back pains	Bridge position
8 (3.9%)	6 (2.9%)	9 (4.4%)	1 (.5%)
Medical check-up			
Very often	Fairly often	Now and then	Rarely or never
55 (26.8%)	93 (45.4%)	33 (16.1%)	24 (11.7%)

Note: Column total frequencies of variables do not add up to 206 due to missing values.

5.974, range = 14-45). The largest single category in terms of marital status was the participants who reported that they were single (45.1%). Nearly 52% of the participants came from lower middle-class families, with the second largest group (33.5%) coming from a working-class family background. Regarding obstetric history, the average weeks of pregnancy in the sample was 25.39 (SD = 8.434). Sixty-two (30.1%) women reported that they were going to be first time mothers. Additionally, most participants (56.0%) reported that they had planned their pregnancies. Half (50.0%) of the sample reported that they had experienced complications in their previous pregnancies. There were more women reporting a history of miscarriage (24.3%) than was the case with each of the other complications. Moreover, current complications reported were back pains and abdominal pains (4.4%), high blood pressure (3.9%) and hyperemesis gravidata (3.9%).

Prevalence of OCD among the pregnant women

The present study followed Frías *et al*'s²⁶ method of determining prevalence by doing a head count of pregnant women who had OCD whether they exhibited the disorder before getting pregnant. The presence of OCD was established based on the cut-off score of 36 as recommended by Williams *et al*²⁷ for differentiating OC from non-OC blacks on the OCI-R. Important to note is that the cut-off score of 21 recommended by Foa *et al*²⁸ and commonly applied in many cultures²⁹, was found to be inappropriate for blacks²⁷. Patterns and frequencies of symptoms reports by blacks are unique and high, respectively^{27,30}. The Williams *et al*²⁷ cut-off score saw 39.3% (81) of the women considered to have OCD. The mean score obtained by the pregnant women on the OCI-R was 32.6 (SD = 12.40; median = 32 and 5 or 6 for each of the subscales).

Comparisons between OCD and non-OCD classified pregnant women on the EPDS, CAS, PRAS and PI-WSUR (Contamination and Washing Compulsions)

A follow-up analysis was conducted between pregnant women scoring on or above the OCI-R cut-off score of 36 and those scoring below it²⁷. All comparisons were statistically significant ($p < .001$), and the effect sizes ranged from small to large (Cohen's $d = 0.27$ — 1.19) (see Table 2).

Associations between the main study variables

All the main variables of the study were subjected to a correlation analysis between themselves (Table of results available from the corresponding author). The patient characteristics of age, having undergone a medical check-up, and having previously delivered a live baby generally did not correlate with any of the main scales measuring OCD symptoms, depression, pregnancy-related anxiety and clinical anger ($p > .05$). There was an exception though. The experience of complications in the past pregnancy was associated with almost all the OCI-R sub-scales ($r = 0.20$ — 0.25 , $p < .01$ — $.05$), except OCI-R Ordering ($p > .05$). It was also associated with EPDS ($r = 0.245$, $p < .01$).

EPDS was positively associated with all the OCI-R scales ($r = 0.18$ — 0.37 , $p = .001$ — $.01$). PRAS was also positively related to all the OCI-R scales ($r = 0.23$ — 0.34 , $p = .001$), but correlated marginally ($p < .10$) with EPDS and the correlation with CAS failing to reach statistical significance ($p > .05$). The CAS was associated with all but two of the OCI-R scales. It correlated with the OCI-R total scale and its subscales of Obsessing, Hoarding, Checking and Neutralizing ($r = .16$ — $.23$, $p < .001$ — $.01$), and did not correlate with the OCI-R Washing and OCI-R Ordering ($p > .05$). CAS also correlated with EPDS ($r = 0.29$, $p < .001$).

The prediction of OCD symptoms from pregnancy-related anxiety, perinatal depression and clinical anger

The main analysis of the study sought to determine if pregnancy-related anxiety, perinatal depression and clinical anger could, in conjunction with some descriptive factors, significantly predict rates of OCD symptoms among pregnant women. A series of multiple regression analyses was conducted. The total and scale scores of OCD symptoms were entered in

turn as dependent variables. Several variables served as predictors. Age, gestation weeks and past pregnancy complications were entered first. They were followed by PRAS, EPDS and CAS. The results of regression analysis where the total OCI-R score was the dependent variable indicated that the predictors explained 31% of the variance (adjusted $R^2 = 0.275$, $F(6,143) = 10.034$, $p < .001$). Table 3 shows that almost all the predictor variables significantly predicted the total scale scores of OCI-R. Higher age ($\beta = .20$, $t = 2.812$, $p < .01$), the number of gestation weeks ($\beta = 0.17$, $t = 2.316$, $p < .05$), having previously experienced pregnancy-related complications ($\beta = .17$, $t = 2.286$, $p < .05$), EPDS ($\beta = 0.17$, $t = 3.536$, $p < .001$) and PRAS ($\beta = .17$, $t = 3.290$, $p < .001$) were positive predictors, whilst the significance level of CAS's probability value was marginal ($\beta = .14$, $t = 1.787$, $p < .10$).

The results of regression analysis to predict the OCI-R Washing dimension indicated that the predictor variables explained 19.2% of the variance (adjusted $R^2 = 0.157$, $F(6,143) = 5.440$, $p < .001$) (see Table 3). The number of gestation weeks ($\beta = 0.24$, $t = 3.238$, $p < .01$), past pregnancy-related complications ($\beta = .16$, $t = 2.034$, $p < .05$), EPDS ($\beta = 0.21$, $t = 2.398$, $p < .05$) and PRAS ($\beta = 0.18$, $t = 2.344$, $p < .05$) were the significant predictors. The direction of their influence was positive, meaning that higher values of the variables predicted higher values of OCI-R Washing, the dependent variable. On the other hand, the predictor variables explained 30.0% of the variance (adjusted $R^2 = 0.270$, $F(6,143) = 9.793$, $p < .001$) when the OCI-R Obsessing dimension was the dependent variable (Table 3). Higher age ($\beta = .19$, $t = 2.601$, $p < .01$), the number of gestation weeks ($\beta = 0.15$, $t = 2.064$, $p < .05$), having previously experienced pregnancy-related health complications ($\beta = .20$, $t = 2.628$, $p < .01$), EPDS ($\beta = 0.34$, $t = 4.244$, $p < .001$) and PRAS ($\beta = .21$, $t = 2.831$, $p < .05$) were positive predictors.

The results of regression analysis to predict the OCI-R Hoarding dimension indicated that the predictor variables explained 15.5% of the variance (adjusted $R^2 = 0.118$, $F(6,143) = 4.181$, $p < .001$). Only gestation week ($\beta = 0.16$, $t = 2.028$, $p < .05$) and the EPDS ($\beta = .34$, $t = 4.244$, $p < .001$) were positive predictors (Table 3). Age ($\beta = 0.15$, $t = 1.931$, $p < 0.010$), past pregnancy-related complications ($\beta = .16$, $t = 1.888$, $p < .010$) and PRAS ($\beta = .15$, $t = 1.814$, $p < .010$) were only marginally significant. With regards to the prediction of the OCI-R Ordering dimension, the results of regression analysis showed that the

Table 2: Comparison of pregnant women with and without OCD symptoms (OCI-R total score) on EPDS, CAS, PRAS and PI-WSUR: Cut-off score of 36

Measure	OCD symptoms	N	Mean	S.D	T	p-value	Cohen's d
EPDS	present	81	14.7531	4.128	2.225	.027	0.32
	absent	124	13.2984	4.847			
CAS	present	80	40.1875	11.728	1.881	.061	0.27
	absent	121	37.0248	11.629			
PRAS	present	80	26.9250	5.813	4.589	.001	0.66
	absent	123	23.3496	5.158			
PI-WSUR	present	80	23.3375	7.218	8.260	.001	1.19
	absent	123	14.8293	7.141			

Note: CAS = Clinical Anger Scale, EPDS = Edinburgh Postnatal Depression Scale, OCD = Obsessive-Compulsive Disorder, PI-WSUR = Padua Inventory Washington State University Revision (Contamination Obsessions & Washing Compulsions), PRAS = Pregnancy-Related Anxiety Scale

Table 3: Prediction of OCI-R total and subscale scores by age, number of weeks pregnant, past pregnancy-related complications, postnatal depression, clinical anger, and pregnancy-related anxiety

Model	Predictor variable	OCI-R	Wash	Obsess	Hoard	Order	Check	Neutral
		B	B	β	B	β	B	β
1	Age	.204**	.127	.189**	.154†	.116	.243**	.105
	Weeks pregnant	.169**	.254**	.151**	.163*	.106	.074	.081
	Past pregnancy-related complications	.170**	.163**	.196**	.155†	.075	.084	.077
	EPDS	.280***	.205**	.337***	.187*	.183**	.086	.199**
	CAS	.137†	.014	.207**	.074	.038	.220**	.166**
	PRAS	.239***	.184**	.060	.146†	.191**	.183**	.181*

Note: † = .10, * = .05, ** = .01, *** = .001.

CAS = clinical anger scale; Check = OCI-R Checking, EPDS = Edinburgh Postnatal Depression Scale, Hoard = OCI-R Hoarding, Neutral = OCI-R Neutral, Obsess = OCI-R Obsessing, OCI-R = Revised Obsessive-Compulsive Disorder scale total score, Order = OCI-R Ordering, PRAS = pregnancy-related anxiety, Wash = OCI-R Washing.

predictor variables explained 11.6% of the variance (adjusted R² = 0.077, F (6,143) = 2.990, p < .01). Only PRAS (β = .19, t = 2.328, p < .05) and EPDS (β = .18, t = 2.052, p < 0.05) were positive predictors (Table 3).

The results of regression analysis to predict the OCI-R Checking dimension indicated that the predictor variables explained 17.2% of the variance (adjusted R² = 0.138, F (6,143) = 4.754, p < 0.001). The OCI-R Checking dimension was predicted by age (β = .24, t = 3.069, p < .01), PRAS (β = .18, t = 2.304, p < 0.05) and CAS (β = .22, t = 2.624, p < .01) (Table 3). Finally, the results of regression analysis to predict the OCI-R Neutralizing dimension showed that the predictor variables explained 16.5% of the variance (adjusted R² = 0.128, F (6,143) = 4.499, p < .001). The OCI-R Neutralizing dimension was predicted by PRAS (β = .18, t = 2.304, p < 0.05), EPDS (β = .20, t = 2.295, p < 0.05) and CAS (β = .17, t = 1.974, p < 0.05) (Table 3).

Discussion

The prevalence of OCD during pregnancy

This current study set out to establish the prevalence rate of OCD among clinic attending pregnant women in the Capricorn district, South Africa. The participating women obtained a median OCI-R score of 32 and further obtained median scores of 5 and 6 on each of the subscales of the same measure. This meant that 39.5% of them could be classified as OC disordered, when using the Williams *et al*²⁷ cut-off score of 36. The score was obtained among individuals self-identifying as African American, a group likely to share some cultural characteristics, and by extension test behaviour, with black Africans in the sub-Saharan region. In the existing literature, mostly conducted from non-African settings, prevalence of OCD during pregnancy varies between studies, with rates typically ranging from 0.2% to

5.2%^{26,31}. Even so, Neziroglu *et al*³² reported as early as 1992 that OCD symptoms appeared in 39% of their female study participants of child-bearing age. Thus, even though the prevalence rate obtained in the current study (39.3%) is in the high end of estimates, it is comparable.

There may be various reasons why prevalence rates differ across studies¹⁹. Two of them are the scale used and the pregnancy period covered²⁶. Borri *et al*³³ interviewed women using the Structured Clinical Interview for DSM disorders³⁴ and Uguz *et al*³⁵ used the Turkish adaptation of the same schedule among women at different gestational stages. The women in Chaudron and Nirodi's⁹ study completed a combination of the OCI-R, the Yale–Brown Obsessive–Compulsive Scale and the Structured Clinical Interview for DSM-IV. Chaudron and Nirodi⁹ studied women in the first trimester of pregnancy, while Borri *et al*³³ focused on 12–15 weeks gestation. In this study the OCI-R was used to measure OCD, and pregnant women were included without regard to the gestational stage that they were in. This may partly explain the reason why the rate of prevalence was so high. Add to that the fact that all participants came from clinical settings, even if the settings were not specialist with regards to psychiatric services.

The relationship between OCD and both depression and anxiety

The most common comorbid disorders to perinatal OCD are depression and anxiety¹². Additionally, depression and anxiety are comorbid during pregnancy, and perinatal anxiety has been found to predict the experience of depression during pregnancy³⁶. Regardless, pregnant women tend to score higher on depression and anxiety measures⁴. This has also been the case in South Africa⁸. Two South African studies using EPDS estimated perinatal depression at 39%^{22,37}. Manikkam and Burns³⁷ also found that having had thoughts of deliberate self-harm was the strongest risk factor for depression among the pregnant women. However, at least in one study, major depression was common in non-gravid women when compared with pregnant women⁶. It is likely that reports of depression during pregnancy in the current study are related to some pre-existing depressive condition. The inverse is also true, that pregnancy, especially in instances of complicated pregnancy, may have led to negative affect, including depression⁵. It is possible too that some depressive

condition may have co-occurred with OCD, with pregnancy being the trigger⁴.

The present study also sought to investigate whether prenatal depression will predict OCD. Like other previous studies, the study found a relationship between prenatal depression measured with the EPDS and OCD symptoms assessed with the OCI-R. Depression predicted higher values of OCD symptoms on the total OCI-R scale. At a lower (subscale) level, the prenatal depression assessed in this study could positively predict the Washing, Obsessing, Hoarding and Neutralizing dimensions of the OCI-R. But it had no role in predicting the Checking dimension of the OCI-R. Interestingly, depression could predict the OCI-R Hoarding dimension, the subscale whose reliability estimate in this study was low.

Pregnant women who report high levels of depression report high levels of anxiety as well⁹. Although anxiety and depression are frequently comorbid with OCD during pregnancy, anxiety disorders were the most frequent comorbid conditions to OCD than was the case with mood disorders⁶. Since anxiety-related disorders and symptoms are generally common during pregnancy^{30,31}, it is worthwhile to investigate their relationship and prediction of OCD.

In this study, pregnancy-related anxiety was positively associated with the OCI-R total scale and all its subscales. This was not unexpected since OCD is primarily an anxiety-based disorder, although it is no longer classified as such in the DSM-5². It also predicted the overall OCI-R and all but one of its subscales. Pregnancy-related anxiety was only marginal in its prediction of the OCI-R hoarding subscale. Hoarding is considered a distinct psychopathology deserving a separate classification from OCD in the WHO ICD-11⁴⁰. In fact, it is classified separate from OCD as Hoarding Disorder (HD), a subcategory of OCD in the DSM-5. In an earlier study, Foa *et al*⁴¹ observed that hoarding affects only a few individuals with OCD, and HD affects older persons (55 years of age and above; DSM-5)². Importantly, hoarding itself does not provoke anxiety in hoarders; it is the clutter that does⁴². Aside from the evidence of the distinctiveness of hoarding, the OCI-R Hoarding subscale's reliability level was quite low in this study. Therefore, it is not surprising that in the current study pregnancy-related anxiety was not a strong predictor of the Hoarding subscale of the OCI-R.

The relationship between anger and OCD

Anger is a feature of many psychiatric conditions⁴³, including premenstrual dysphoric disorder, separation anxiety disorder, disruptive, impulse-control, conduct disorders, and trauma and stressor-related disorders such as acute stress disorder and posttraumatic stress disorder². The present study investigated the element of anger in OCD among pregnant women. Elevated levels of anger may co-occur with OCD or be associated with certain presentations or dimensions of it^{13,15}. This study found the CAS measured anger to be associated with OCD; pregnant women who scored high on the OCI-R reported higher CAS rates when compared to women who scored low on the measure.

Clinical anger also significantly predicted OCD symptoms when included in regression models to predict all aspects of OCD measured by the OCI-R. However, the effect was limited to the Checking and Neutralising dimensions. Clinical anger could not predict the OCI-R dimensions of Washing, Obsessing, Hoarding and Ordering, while its prediction of the total OCI-R score was only marginal. The results of this study are close to those of Whiteside and Abramowitz¹³, who found anger to be more strongly related to the Checking dimension than any other type of OCD symptoms. However, the difference between the current study findings and Whiteside and Abramowitz's¹³ is that the current study also found anger to be strongly related to the Neutralizing dimension which was not found in Whiteside and Abramowitz¹³. It is possible that anger is related to the Neutralizing dimension in so far as the pregnant women may seek to deal with ego dystonic feelings of aggression by minimizing (neutralizing) their impact.

Reproduction-related descriptive factors and OCD

This study focused on the role of only three personal and reproduction-related factors, namely, age, gestational period and past pregnancy-related complications. Contrary to researchers such as Leach *et al*⁴⁴, Kaya *et al*⁶, and Uguz *et al*³¹ the present study found that age predicted the OCI-R total score and the Obsessing and Checking dimensions of the OCI-R. Additionally, the relationship between past pregnancy complications and the OCD symptoms was positive and statistically significant for the Washing and Obsessing dimensions of the OCI-R.

Primi and multiparous women were asked to state if they had experienced any complications and what those complications were. The affected women listed the following as their past complications: back and abdominal pain, hypoxia, hyperemesis gravida, fetal distress, caesarean section birth, stillbirth, miscarriage, and so on. Some included abortion. All the pregnancy-related complications acted as predictors of the experience of OCD symptoms.

Uguz and colleagues^{3,31} found perinatal complications to be one of the risk factors associated with OCD during pregnancy. Interestingly, Uguz *et al*³¹ found that a history of abortion played no part in predicting OCD, or the worsening of its symptoms, among pregnant women. In the present study the most reported pregnancy-related complication was a history of miscarriage and abortion. It thus goes without saying that, had each of the complications been analyzed separately, it is likely that abortion would be among those that would produce a high predictive value.

The current study further analyzed whether gestation stage could predict OCD. Gestation stage, stated in weeks, was found to be a predictor of OCD in the Washing, Obsessing and Hoarding dimensions of the OCI-R. Later weeks of pregnancy predicted increased levels of washing, obsessing and hoarding symptoms. This finding is in line with Uguz and Ayhan⁴⁵ and Uguz *et al*³¹ who stated that there is an increase in the prevalence rate of OCD in pregnant women in the latter gestational periods.

Ethical Clearance

Ethical clearance for the study was provided by the research and ethics committee of the University of Limpopo.

Conclusion

The current study indicates that African pregnant women also experience OCD symptoms. Based on the results of the OCI-R, it can also be stated that rates of OCD are much higher than expected. The study further indicates that there is an association between prenatal depression, pregnancy related anxiety, anger and OCD. The predictive part of the study further suggests that the relationships are not straight forward. For instance, clinical anger associates with some dimensions of OCD symptoms and not others. The same applies to factors related to reproduction, such as age at pregnancy and

complications experienced in past pregnancies. The factors do not apply equally to all dimensions of OCD symptoms.

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Limitations of the Study

There are several limitations in the study. The first limitation is that the study used a cross sectional design, which limited the capacity to determine cause and effect between variables. Additionally, the study sample was drawn from three health facilities situated in the rural areas (Mankweng Hospital, Mankweng Clinic and Nobody Clinic) and one from the urban areas (Rethabile Clinic). Thus, the sample was dominated by participants from the rural areas, something which might have impacted the types of responses to the measures used. Another limitation is the sampling method used. It is possible that the sample may not be representative of all the pregnant women in the Capricorn district. Therefore, findings cannot be generalized to all pregnant women in the Capricorn District, let alone the Limpopo Province.

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Contribution of Authors

The study was conceived and designed by RD Malemela and S Mashegoane, data were collected by RD Malemela, and was analyzed by RD Malemela and S Mashegoane. Both authors, also prepared and approved the manuscript.

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