Psychological impact of COVID-19 amongst pregnant women in Conakry, Guinea. A cross-sectional study.

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Research Article

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Abstract

Introduction Pregnancy, apart from any external events, is subject to psychological changes. The COVID-19 pandemic in Guinea led to the implementation of restrictive measures followed by the mitigating ones, but few of them have targeted stress and anxiety management in pregnant women. This study aimed to assess the psychological impact and its associated factors in pregnant women.

Methods We conducted a cross-sectional study in three health centres in Conakry capital city. Pregnant women were interviewed during antenatal care visits. We used two tools for stress and anxiety assessment: Impact of Event Scale-Revised (IES-R) and Penn State Worry Questionnaire (PSWQ), and followed three steps to seeking for factors associated with stress and anxiety: univariate analysis, regression tree (CART), and logistic regression.

Results We surveyed a total of 649 pregnant women. Most of them presented a state of stress (97.7%) and anxiety (52.7%). Gestational age was the main factor associated with stress and anxiety. Pregnant women with a gestational age ≤ 34 weeks had an odd of 0.09 times lower of being stressed compared to those with a gestational age greater than 34 weeks. Pregnant women living in Ratoma and Kaloum with a gestational age was ≤ 9 weeks had an odds of 15.1 times [95% CI: 8.76, 27.4] higher of being worried compared to those from Matoto, Matam and Dixinn with a gestational age greater than 9 weeks. Similarly, pregnant women living in Matoto, Matam and Dixinn with a gestational age ≤ 9 weeks had an odds of 4.48 times [95% CI: 2.59, 8.12] higher of being worried compared to other women from the same localities.

Conclusion Most of our participants were at a higher risk of stress and anxiety caused by COVID-19; women in their earlier stage of pregnancy tended to be more vulnerable to these psychological problems. Therefore, it is vital to implement an appropriate management plan which should prioritise those vulnerable pregnant women.

Introduction

The COVID-19 pandemic is a major event that continues to impress and occupy our collective mind during this time, and for the foreseeable future. According to the World Health Organisation's (WHO) August 2020 report, 17,918,582 cases of COVID-19 have been reported worldwide, including 815,996 cases in Africa with 14,062 deaths [1]. The burden of this pandemic is tremendous in terms of deaths toll and socio-demographic and economic consequences[2, 3]. Pregnant women are one of the leading groups that deserve special attention during this pandemic due to their immune vulnerability.

Pregnancy, in the absence of any intercurrent events, is a potential source of stress and anxiety [4, 5]. "Prenatal stress is considered to be a major factor of preterm labour" [6]. Despite investigations as to the link between COVID-19 and pregnancy outcomes, significant gaps remain in the evidence of the severity of COVID-19 for pregnant women and their newborns. However, some studies have reported complications such as maternal death [7], preterm birth, abortion, the necessity of the Cesarean, newborn

respiratory distress, and the possibility of vertical transmission [7–9]. Complications of COVID-19 during pregnancy could be the source of psychological changes amongst pregnant women leading to behaviours, including fear of infection, health care insecurity, job loss, and decreased incomes [10–12].

To minimise the spread of the virus, the Guinean Government has taken some measures, including mandatory wearing of masks, implementation of a curfew, closure of places of worship, ban on gathering of more than 20 people, restriction on interurban travels, and closure of businesses. To mitigate the impact of these measures, the Government has decided to make running water and domestic electricity bills free of charge to assist vulnerable households. However, they did not take any specific actions to contain and manage potential psychological problems raised by these harsh circumstances. As aforementioned, psychological issues constitute a real problem during pregnancy, especially in the context of high maternal and neonatal mortality rates. For the records, maternal and neonatal mortality rates in Guinea are respectively 550 deaths per 100,000 live births and 20 deaths per 1,000 live births [13].

Data on psychological problems in pregnant women during health crises, especially those related to respiratory diseases, remain limited to countries outside Africa [10, 11, 14–16], with little information on countries with limited resources. In addition, most of these studies used the online interview method (internet) due to restrictive measures imposed by COVID-19. Results from these studies are, therefore, based on self-declaration [11, 14] with little information on medical and non-medical histories of pregnant women. Implementation of a survey in antenatal care departments offers the opportunity to collect additional information during a pregnancy follow-up. Finally, given the intense pressure exerted by these restrictive measures in a context of limited resources, and the evidence of psychological problems during pregnancy, we hypothesised that the frequency of psychological issues during this COVID-19 pandemic would be higher than that usually encountered during pregnancy. Therefore, we aimed to assess the magnitude of traumatic events (stress and anxiety) and socio-demographic and antenatal factors associated with them.

Methods

Study sites and population

Study sites: this study took place in three health centres in Conakry capital city (a hotspot of the pandemic in Guinea). The health centre (HC) of Matoto located in the largest municipality of Conakry with 796,291 inhabitants, the medical and surgical centre (MSC) of Ratoma in the municipality of Ratoma with 780,146 inhabitants, and the medical and surgical centre of Matam (MSC) in the municipality of Matam with 153,210 inhabitants [17]. All pregnant women living in Conakry since the beginning of the pandemic and accepting to participate in the study were eligible.

Type of study and period

We conducted a cross-sectional survey from August 3 to September 24, 2020.

Survey procedures

The study began with the interviewers training and harmonisation of study tools. The pretest of the tools was carried out in centres not selected for the survey and allowed us to identify inconsistencies to adapt the questionnaire. Eligible pregnant women were selected during antenatal care visits in compliance with COVID-19 preventive guidelines []. The survey was conducted by a male and two female interviewers, but the latter carried out most of the survey in order to respect women's sensitivity in our country. The questionnaire was directly administered to literate participants without any translation; likewise, it was translated into local languages for non-literate participants. Obstetrical data were collected from consultation registers.

The study variables

We collected three groups of variables: socio-demographic and obstetric variables, variables related to the symptoms of COVID-19 awareness, means of transmission, prevention, and variables related to stress and anxiety. Socio-demographic variables were: age, sex, marital status, residence, level of education, household income, occupation, and the number of people living in the household. Obstetrical variables were as follow pregnancy, parity, number of living children, number of deceased children, number of abortions, presence of diabetes and high blood pressure.

Penn State Worry Questionnaire (PSWQ): It is a self-administered 16-item questionnaire using a Likert-style scale designed to measure worry. The possible range of scores is 16 to 80 with the total scores algorithm: 16 to 39 = low concern, 40–59 = moderate concern and 60–80 = serious concern [18].We used the French version for this study.

Impact of Event Scale-Revised (IES-R): It is a self-assessment questionnaire, "used to evaluate the degree of distress a patient feels in response to trauma" and composed of 22 questions. The score is interpreted as follows: 24–32: Post-traumatic stress disorder (PTSD) as a clinical concern. 33–38: This is considered to be the best threshold for a probable diagnosis of PTSD, and 39 and above as severe PTSD [19]. We used the French version in this study.

Sampling and sample size.

We supposed that COVID-19 psychologically impacts 50% of pregnant women. With the desired accuracy of 5%, the expected minimum sample size was 384; considering the non-response rate, this size was increased by 15%. For the sake of representativeness of other municipalities, we finally increased the sample size to 650 participants. Pregnant women were randomly enrolled (1:2) during antenatal care visits.

Data management and analysis

An XLS Form was designed and validated by all study investigators. Data were entered into Android cellphones and connected to the ONA server (https://ona.io/login), the setting was performed with

integrity constraints to reduce missing data; we regularly monitored it for internal consistency, and all aberrations were corrected as soon as possible.

We performed a descriptive analysis by considering percentages for categorical variables and the mean for numeric variables. All of these values were associated with 95% confidence intervals. For univariate analysis, we used two dependent variables: IES-R and PSWQ. Since these variables are numeric, we considered two thresholds as follows: for IES-R, all pregnant women with a score ≤ 32 were considered as having a low level of stress and subsequently classified as "no stress"; and likewise, all pregnant women with a score ≥ 33 were classified as " stress". For PSWQ, a score ≤ 39 indicates a low level of worry considered as "no-worry" and a score ≥ 40 was considered as "worry". We used Student and Chi-squared tests when conditions met, in which case we chose Wilcoxon and Fisher Exact tests, respectively.

For the multivariate analysis, we first carried out: regression tree with the stress and worry variables as supervisors and the socio-demographic, obstetric and knowledge variables of COVID-19 (average scores) as supervised variables; then, the variable profiles were retrieved and put into a logistic regression model. We used the following tests for the modelling strategy: likelihood test for the significance of the models, Pearson's test for the relevance of the model and the ROC curve for the quality of the models. The significance of the tests was set at a threshold of α = 0.05. We carried out all analyses using R software version 4.0.2 (R Foundation for Statistical Computing, Vienna, Austria).

Results

We surveyed 649 pregnant women; data from two participants were deleted for incompleteness; monthly household income could not be obtained for 24 participants. The mean age was 25.8 [95% CI, 25.3, 26.2]; married women were dominant with 88.9% [95% CI, 86.2%; 91.2%]. Most of our respondents came from the municipality of Ratoma 48.4% [95% CI, 44.5%; 52.3%]. We noticed that 31.4% [95% CI, 27.8%; 35.1%] of participants had no formal education. Most of our respondents were unemployed 53.0% [95% CI, 35.0%; 42.7%]. The average number of household members was 5.50 [5.25; 5.75]; the mean gestational age was 10.8 weeks [95% CI, 5.25, 5.75]. Most of our participants (89.6%) would like to keep their pregnancy. The average monthly income of our participants was 934,101 Guinean francs [95% CI, 851104; 1017098], or $95.75. The average number of pregnancies was 2.67 with 1.56 deliveries which almost corresponded to the mean number of living children 1.42 [95% CI, 1.30; 1.53]. The average number of abortions and deceased children was 0.14% and 0.12% respectively. Women with a history of diabetes and those with a history of high blood pressure accounted for 0.62% and 3.09% respectively. The average score of knowledge of symptoms of COVID19 was 7.33 [95% CI, 7.09; 7.56], that of the mean transmission score at 5.61 [5.48; 5.74] and the mean score of knowledge of preventive means was 5.42 [CI 95%, 5.34; 5.50]. Most of participants were stressed 97.7% [95% CI, 96.2%; 98.7%] and more than half were worried about the COVID-19 pandemic 52.7% [95% CI, 48.8%; 56.6%] (Table 1).

Table 1
Description of the 647 pregnant women received antenatal care visits in the 3 health facilities.

	[ALL]		N
	%	IC à 95%	
Age (years)	25.8	[25.3;26.2]	647
Matrimonial status :			647
Married	88.9%	[86.2%;91.2%]	
Single	11.1%	[8.81%;13.8%]	
Residence :			647
Matoto	34.2%	[30.5%;38.0%]	
Ratoma	48.4%	[44.5%;52.3%]	
Matam	15.6%	[12.9%;18.6%]	
Dixinn	1.70%	[0.85%;3.02%]	
Kaloum	0.15%	[0.00%;0.86%]	
levels of Education:			647
No formal education	31.4%	[27.8%;35.1%]	
Primary school	11.3%	[8.95%;14.0%]	
Secondary school	28.1%	[24.7%;31.8%]	
High_school	5.72%	[4.06%;7.80%]	
College/University	23.5%	[20.3%;27.0%]	
Occupation :			647
Private_sector	3.55%	[2.27%;5.29%]	
Civil_servant	4.64%	[3.15%;6.55%]	
Unemployed	53.0%	[49.1%;56.9%]	
Freelance	38.8%	[35.0%;42.7%]	
Number_Household_members (mean)	5.50	[5.25;5.75]	647
Gestational Age in Weeks	10.8	[10.0;11.5]	647
Desire to keep the pregnancy :			647
Yes	89.6%	[87.0%;91.9%]	

	[ALL]		N
No	10.4%	[8.12%;13.0%]	
Monthly income (mean in Guinean Francs)	934101	[851104;1017098]	623
Gravidity (mean)	2.67	[2.54;2.80]	647
Parity (mean)	1.56	[1.44;1.68]	647
Living children (mean)	1.42	[1.30;1.53]	647
Abortion (mean)	0.14	[0.10;0.18]	647
Deceased children (mean)	0.12	[0.09;0.15]	647
Diabetes:			647
Yes	0.62%	[0.17%;1.58%]	
No	99.4%	[98.4%;99.8%]	
High blood pressure			647
Yes	3.09%	[1.90%;4.73%]	
No	96.9%	[95.3%;98.1%]	
COVID-19 kowdlege (score mean)	7.33	[7.09;7.56]	647
COVID-19 transmission knowdlege (score mean)	5.61	[5.48;5.74]	647
COVID-19 prevention knowdlege (score mean)	5.42	[5.34;5.50]	647
Stress_COVID19 :			647
No stress	2.32%	[1.30%;3.80%]	
Stressed	97.7%	[96.2%;98.7%]	
Worry_COVID19 :			647
No worry	47.3%	[43.4%;51.2%]	
Worried	52.7%	[48.8%;56.6%]	

Figures 1, 2 and 3 describe the aggregation of the elements showing awareness of the symptoms, means of transmission and prevention of COVID-19 by pregnant women. Groups with a number less than 6 are not visible on the charts. 38.48% of pregnant women were aware of the major symptoms (Fig. 1), and

37.71% were aware of the primary means of transmission (Fig. 2) of COVID-19. However, the majority of them (65.37%) knew the means of prevention against COVID-19 (Fig. 3).

The following variables were significantly associated with the onset of stress in pregnant women: residence- those living in Ratoma (p = 0.007), average gestational ages of 10.5 weeks (p = 0.017) and average pregnancies of 2.64 (p = 0.049). (Table 2).

Table 2

Univariate analysis stress and socio-demographic, obstetric and knowledge characteristics of COVID-19.

	No Stress	Stressed	p.value
	N = 15	N = 632	
Caractéristiques sociodémographiques			
Age*(years)	29.4 (6.80)	25.7 (5.65)	0.053
Matrimonial status :			0.679
Married	13 (86.7%)	562 (88.9%)	
Single	2 (13.3%)	70 (11.1%)	
Residence :			0.007
Matoto	4 (26.7%)	217 (34.3%)	
Ratoma	3 (20.0%)	310 (49.1%)	
Matam	7 (46.7%)	94 (14.9%)	
Dixinn	1 (6.67%)	10 (1.58%)	
Kaloum	0 (0.00%)	1 (0.16%)	
Levels of Education :			0.772
No formal education	7 (46.7%)	196 (31.0%)	
Primary_school	1 (6.67%)	72 (11.4%)	
Secondary school	3 (20.0%)	179 (28.3%)	
High_school	1 (6.67%)	36 (5.70%)	
University	3 (20.0%)	149 (23.6%)	
Occupation :			0.071
Private_sector	2 (13.3%)	21 (3.32%)	
Civil_servant	2 (13.3%)	28 (4.43%)	
Housewife	0 (0.00%)	6 (0.95%)	
Freelance	3 (20.0%)	248 (39.2%)	
Unemployed	8 (53.3%)	329 (52.1%)	
Number of Household members*	6.00 (3.51)	5.48 (3.24)	0.581

* Means of the variable calculated with standard deviation.

	No Stress	Stressed	p.value
Gestational_Age_Weeks*	21.1 (15.1)	10.5 (9.60)	0.017
Desire to keep the pregnancy			1.000
Yes	14 (93.3%)	566 (89.6%)	
No	1 (6.67%)	66 (10.4%)	
Monthly income*	726667 (762015)	939219 (1061052)	0.308
Obstetrical characteristics			
Gravidity*	3.73 (1.94)	2.64 (1.64)	0.049
Parity*	2.53 (1.92)	1.53 (1.57)	0.065
Living_children*	2.13 (1.81)	1.40 (1.44)	0.140
Abortion*	0.27 (0.59)	0.14 (0.50)	0.417
Deceased children*	0.33 (0.62)	0.11 (0.39)	0.189
Diabetes :			1.000
Yes	0 (0.00%)	4 (0.63%)	
No	15 (100%)	628 (99.4%)	
High blood pressure :			0.379
Yes	1 (6.67%)	19 (3.01%)	
No	14 (93.3%)	613 (97.0%)	
Connaissances COVID-19			
COVID-19 knowledge*	6.67 (3.64)	7.34 (2.98)	0.487
COVID-19 transmission knowledge*	5.13 (2.33)	5.62 (1.71)	0.434
COVID-19 prevention knowledge*	5.40 (1.59)	5.42 (1.05)	0.963
* Means of the variable calculated with standard deviation.			

Table 3 shows the association between worry and socio-demographic, obstetrical and awareness of symptoms of COVID-19. The following variables were significantly associated with worry amongst pregnant women: women who lived in Ratoma (p = 0.007), an average of gestational age at 5.84 (p = 0.017), monthly income (p = 0.002), number of people in the household, the history of abortion (0.043) and the average of COVID-19 symptoms awareness score.

Table 3
Univariate analysis worry and socio-demographic, obstetrical and awareness of symptoms of COVID-19.

	No worry	Worried	p.value
	N = 306	N = 341	
Socio-demographic variables			
Age*(years)	25.5 (5.80)	26.0 (5.61)	0.218
marital status :			0.106
Married	265 (86.6%)	310 (90.9%)	
Single	41 (13.4%)	31 (9.09%)	
Residence :			< 0.001
Matoto	123 (40.2%)	98 (28.7%)	
Ratoma	92 (30.1%)	221 (64.8%)	
Matam	82 (26.8%)	19 (5.57%)	
Dixinn	9 (2.94%)	2 (0.59%)	
Kaloum	0 (0.00%)	1 (0.29%)	
Levels of Education :			0.967
No formal education	98 (32.0%)	105 (30.8%)	
Primary_school	35 (11.4%)	38 (11.1%)	
Secondary	83 (27.1%)	99 (29.0%)	
High_school	19 (6.21%)	18 (5.28%)	
University/ College	71 (23.2%)	81 (23.8%)	
Occupation :			0.482
Private_sector	11 (3.59%)	12 (3.52%)	
Civil_servant	15 (4.90%)	15 (4.40%)	
Housewife	5 (1.63%)	1 (0.29%)	
Freelance	121 (39.5%)	130 (38.1%)	
Unemployed	154 (50.3%)	183 (53.7%)	
Number of Household members*	5.91 (3.31)	5.12 (3.14)	0.002

*Means of the variable calculated with standard deviation.

	No worry	Worried	p.value
Gestational_Age_Weeks*	14.4 (12.0)	7.59 (5.84)	< 0.001
Desire to keep the pregnancy :			0.214
Yes	269 (87.9%)	311 (91.2%)	
No	37 (12.1%)	30 (8.80%)	
Monthly income*	779158 (1427195)	1064749 (547676)	0.002
Obstetrical variables			
Gravidity*	2.69 (1.65)	2.65 (1.67)	0.768
Parity*	1.57 (1.64)	1.55 (1.54)	0.911
Living children*	1.38 (1.44)	1.45 (1.46)	0.579
Abortion*	0.18 (0.57)	0.10 (0.42)	0.043
Deceased children*	0.13 (0.43)	0.11 (0.37)	0.428
Diabetes :			1.000
Yes	2 (0.65%)	2 (0.59%)	
No	304 (99.3%)	339 (99.4%)	
High blood pressure			0.636
Yes	11 (3.59%)	9 (2.64%)	
No	295 (96.4%)	332 (97.4%)	
Awareness of COVID-19			
Average score*	7.61 (3.11)	7.07 (2.87)	0.024
COVID-19 transmission*	5.57 (1.97)	5.64 (1.49)	0.611
COVID-19 prevention*	5.40 (1.23)	5.43 (0.89)	0.707
*Means of the variable calculated with standard deviation.			

Two groups define stress in pregnant women according to the regression tree: women whose gestational age was equal or less than 34 and those whose gestational age was greater than 34 (Fig. 4). Regarding worry, four groups of women can be distinguished: on the one hand, women who resided in Matam, Matoto and Dixinn with gestational age equal or less than 9 weeks and gestational age greater than 9 weeks; on the other hand, women residing in Ratoma and Kaloum with gestational age equal or less than 9 weeks and gestational age greater than 9 weeks (Fig. 5).

Women whose gestational age was equal or less than 34 weeks had the odds of 0.09 [95% CI, 0.03, 0.31] of being less stressed compared to those whose gestational age was greater than 34 weeks (Table 4).

Table 4
Logistic regression between the dependent variable stress and risk groups in pregnant women.

Characteristic	OR[1]	95% CI[1]	p-value
Clusters			
Women with gestational age ≤ 34 weeks	—	—	
Women with gestational age ≥ 34 weeks	0.09	0.03, 0.31	< 0.001
[1]OR = Odds Ratio, CI = Confidence Interval			

Pregnant women who resided in Ratoma and Kaloum whose gestational age was ≤ 9 weeks had an odd of 15.1 times [95% CI: 8.76, 27.4] more to be worried compared to pregnant women of Matoto, Matam and Dixinn who had gestational age > 9 weeks. Likewise, pregnant women living in Matoto, Matam and Dixinn with gestational age ≤ 9 weeks had an odd of 4.48 times [95% CI: 2.59, 8.12] more to be worried compared to women from the same areas (Table 5).

Table 5
Logistic regression between the dependent variable anxiety and risk groups in pregnant women.

Characteristic	OR[1]	95% CI[1]	p-value
Clusters			
Pregnant women from Matoto, Matam, and Dixinn with gestational age > 9 weeks	—	—	
Pregnant women living in Ratoma and Kaloum with gestational age ≤ 9 weeks	15.1	8.76, 27.4	< 0.001
Pregnant women living in Ratoma and Kaloum with gestational age > 9 weeks	2.17	0.75, 5.86	0.13
Pregnant women living in Matoto, Matam, and Dixinn with gestational age ≤ 9 weeks	4.48	2.59, 8.12	< 0.001
[1]OR = Odds Ratio, CI = Confidence Interval			

Discussion

One of the crucial considerations in times of health crisis is managing stress and anxiety. These elements can be felt differently within a population; thus, pregnant women constitute one of the groups at greatest risk of psychological trauma during crises. The scale of COVID-19 has suddenly plunged the world into an unprecedented scenario of stress and anxiety. Therefore, it remains essential to take care of the mental health of vulnerable people, such as pregnant women because of the double risk involved (mother and fetus).

Results of this study indicate a high level of stress and worry in pregnant women. These findings are similar to those observed in specific contexts [12, 14, 20] and higher than those reported in other contexts [11, 21]; thus confirming our initial hypothesis. The variability of the measurement of stress and anxiety makes our comparison difficult and could only be approximate. Nevertheless, the unpredictable and unprecedented nature of this pandemic largely explains this psychological state in pregnant women in Guinea. The experience of managing the Ebola outbreak has led health authorities to think of the equivalent risk. As a result, we observed a delay in the effective management and the response to stop the spread of the pandemic; the lack of communication on COVID-19, with the effects of instilling doubt, suspicion and fear in the mentality of the population including pregnant women.

We found in this study that residence is associated with stress and worry in pregnant women. These are most affected in the municipality of Ratoma, where we observed more COVID-19 cases [22]. Levels of stress and anxiety depending on the number of cases reported in a given area, as that has been reported in China [23]. Gestational age is another key factor that influences the onset of stress and anxiety, and this influence is much greater when gestational age is equal or less than 9 weeks. Women with a gestational age ≤ 34 weeks appeared to be less prone to stress. Childbirth leads to increased hormones, which is likely to induce stress[24, 25]. The onset of pregnancy is featured by physiological and psychological changes that can influence pregnant women. Studies on pregnant women's life quality indicate that the mental quality of life may increase or maintain from the first term of pregnancy [26], which implies that this period is stressful. Many studies have also shown the essential predictive role of gestational age in prenatal anxiety [27].

Along with gestational age, the number of pregnancies was associated with stress. This number was high among non-stressed women; in fact, primigravidae may have greater psychological effects compared to multigravidae. The average abortion score was lower among anxious pregnant women. We noticed that multigravidae experienced more abortions (additional file1) in this study, and they probably adapted themselves psychologically over time. The average score of COVID-19 symptoms awareness was lower among women with high levels of anxiety. Knowing the symptoms of COVID-19 may lead to better prevention against the disease and therefore reduce fear and anxiety. This knowledge depends on the level of education; in fact, women with higher education had better knowledge of symptoms of COVID-19 (Additional file1).

Interestingly, our results showed that the number of people in households and monthly incomes were associated with anxiety, and this association was indirectly proportional to these factors. Over 91% of

households with five were made up of women in the first trimester of pregnancy (Additional file1). Moreover, even though a pregnant woman lives in an individual comfort with a relatively high income, some factors such as fear of losing her job or getting infected by the virus and concerns about pregnancy outcomes may negatively impact her mental health, [10]. Finally, conditions of monthly incomes data collection might also be subject to social desirability bias.

This study presents some limitations:

1-Psychometric tools for measuring stress and anxiety are not specific to pregnant women, and they have not yet been validated in Guinea. However, these tools show a good internal consistency with respect to Cronbach's α = 0.83 and Cronbach's α = 0.70 for stress and anxiety (Additional file1).

2- Transformation of the variables of interest in binomial variables induces a loss of information, but it still offers the advantage of providing a picture of psychological problems. And we also believe that only a perfect physical examination could distinguish moderate cases of stress and anxiety from severe cases.

3- It is difficult to prove causal associations with the type of study (cross-sectional survey) that we used, for we only interviewed each participant once.

4- Failing to take into account other factors that might lead to psychological problems, such as restrictive measures of COVID-19 and risk of having a long interview, we limited the questionnaire length to a bare minimum.

5- This study is not necessarily representative of all pregnant women in Conakry, for we have selected only a few centres; however, with this sample size, it is not that far from the real situation. For an in-depth exploration of psychology, it would have been interesting to integrate the socio-anthropological dimension.

Despite all its limitations, our study fills up this scarcity of information on COVID-related psychological problems amongst pregnant women in Guinea.

Conclusion

Pregnancy is an overwhelming time that induces particular psychological problems, even without any external interference; and COVID-19 pandemic has worsened that situation. This study showed that most pregnant women carried the burden of stress and anxiety caused by COVID-19. Women in early pregnancy seemed especially concerned by these psychological problems. Therefore, it is vital to implement an appropriate crisis management system which should integrate the management of all critical aspects, including pregnant women coming from areas with a large number of notified cases, pregnant women with low levels of COVID-19 awareness, household income and household size. Beyond these aspects, seeking obstetrical histories of these women is crucial to mitigate the psychological impact of COVID-19.

Abbreviations

COVID-19: Coronavirus disease 2019.

HBP: High blood pressure;

WHO: World Health Organization.

Declarations

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Author's contributions

AAT, AD, ASM, AD, and GC conceptualised the idea. AAT, AD, AC, AHB and IC drafted the manuscript. AAT, ADD, ABA and MSD analysed the data. All authors critically revised and finalised the manuscript. All authors approved the final version for publication.

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Availability of data and materials

The dataset supporting the conclusions of this article is included within the article (and its additional file(s))

Ethics approval and consent to participate

This study was reviewed and approved by the Kofi Annan University Institutional Review Board in Guinea (008 / UKAG / P8 / 2020). The heads of the health centres also gave their consent before the start of the survey. Data were collected anonymously after obtaining informed written consents from all pregnant women participants. All methods for this study were performed in accordance with the Guinea guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

Authors have no competing interests to declare.

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