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Seroprevalence Of Syphilis Among Pregnant Women At The Omar Bongo Ondimba Regional Hospital In Makokou, North-East Of Gabon

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Abstract

Syphilis is a major public health problem worldwide. Therefore, the present study was conducted to determine the seroprevalence and risk factors associated with this infection among pregnant women. These women were received for a prenatal consultation in 2022 at the laboratory of the Omar Bongo Ondimba Regional Hospital of Makokou (OBORHM), Northeast of Gabon.

Patients and Methods: Conducted from April 11 to June 11, 2022, this retrospective, cross-sectional study was based on registers containing sociodemographic information, obstetrical data, and results of examinations for the detection of *Treponema pallidum* in the pregnant women in the study. Data were analyzed using R software and results were considered significant at a p value ≤ 0.05.

Results: A total of 215 records were collected. Of these, 5 were positive for syphilis, indicating an overall prevalence of 2.33% (95% CI: [0.01- 0.53]). Univariate analysis of syphilis prevalence by sociodemographic and obstetric characteristics showed that being between 31 and 40 years of age (Odds Ratio = 7.01; 95% CI [1.13;43.44], p=0.000), and being single (Odds Ratio = 10.0; 95% CI [1.1;91.31] p=0.013), were significantly associated with syphilis prevalence.

Conclusion: The results of the present study indicated the existence of syphilis among pregnant women, which can be transmitted to the child in Makokou. They may raise awareness among the population. Emphasis should be placed on systematic screening during prenatal visits of pregnant women.in Gabon.

Keywords – Prevalence; Syphilis; Pregnant women; Makokou; Gabon

I. Introduction

The woman pregnancy period is delicate. During this one, the mother-to-be may be exposed to numerous infections, in particular syphilis, for which the bacterium *Treponema pallidium* is responsible. Indeed, despite the advent of antibiotics, this disease remains a real public health problem in the world [1]. In fact, the number of new syphilis infections worldwide is estimated to be 7 million by 2020. Although the majority of syphilis cases occur through sexual contact (vaginal, anogenital and orogenital) [3], the disease is also transmitted from mother to newborn (vertical transmission) [4], [5]. There are also rare cases of transmission through blood products and organ donation (horizontal transmission) [6], [7]. Syphilis transmission from mother to child remains the most serious route [8], [1]. Therefore, it has been revealed that newborns of mothers infected with syphilis, can develop congenital syphilis, if they do not receive immunoglobulin against this infection, at the time of birth. [9]. In addition, it has been reported that, pregnant women infected with syphilis are a potential source of infection for their sexual partners, as well as for health care providers, during labor and delivery [10]. During pregnancy, *Treponema pallidium* infection can lead to serious obstetric complications such as miscarriage, premature labor, and low birth weight of the newborn [11]. In sub-Saharan Africa, the prevalence of syphilis in pregnant women has been estimated to range from 0.6% in Senegal to 14% in Equatorial Guinea [12]. In Gabon, the seroprevalence of syphilis was studied in an urban and semi-rural community. It was estimated at 13.3 +/- 5.0% at the semi-rural level and in the urban population at 19.4 +/- 4.6% [13]. According to the World Bank Development Indicators collection, the prevalence of syphilis of women receiving antenatal care in Gabon, was reported to be 6.5% in 2019 [14]. However, the epidemiological literature does not indicate to date, any information on data of this infection at the site of the present study. Therefore, this study was undertaken to provide a concise and accurate analysis of the evolution of *Treponema pallidium* infection among pregnant women at the Omar Bongo Ondimba Regional Hospital in Makokou, Northeast of Gabon.

II. Patients And Methods

II .1. Description of the host facility.

This study was carried out at the medical analysis laboratory of the Omar Bongo Ondimba Regional Hospital of the Makokou town (OBORHM), regional capital of the Ogooue-Ivindo, in Gabon. The hospital is located to the east of the Notre-Dame-des-Victoires church and to the North-east of the Alexandre Sambat municipal stadium. This public health facility receives patients from all over the province and beyond. It has an adequate technical platform for routine hospital examinations.

II .2. Type, period and study population

This retrospective, cross-sectional study was conducted from April 03 to June 02, 2023. It was based on the results of examinations for the detection of *Treponema pallidum*, in pregnant women in 2022, randomly selected and entered into a database of the health information management system of this hospital center. The basis of the study was therefore to determine the prevalence of syphilis recorded during the study period**.**

II .3. Inclusion and exclusion criteria

Only results obtained from the Rapid Plasma Reagin Test (RPR) and confirmed by an ELISA test using the Biorad Syphilis Total Antibody EIA II or BioMerieux Trepanostika TP recombinant kit, for the detection of anti-*Treponema pallidum* antibodies, from the blood serum of pregnant women attending antenatal clinics in 2022, at the Omar Bongo Ondimba Regional Hospital in Makokou, North-east of Gabon, were taken into account in the present study. Incomplete records and unexploitable or doubtful results were excluded from the study.

II .4. Sampling method

Purposive sampling was used to target and focus on syphilis diagnostic results only, at the medical analysis laboratory of the Omar Bongo Ondimba Regional Hospital in Makokou, North-east of Gabon, during the study period. To ensure that the study was representative, the sample size depended on the number of cases recorded in the laboratory's database.

II .5. Data acquisition procedure

The data used for the present study came from the database containing the results of analyses of blood serum samples from pregnant women obtained at the laboratory of the Omar Bongo Ondimba Regional Hospital in Makokou, North-east of Gabon. Access to these data was facilitated by an existing collaboration between the General Management of this hospital and the

Masuku University of Science and Technology. The extracted data were made available to us in digital form. All the results of examinations for *Treponema pallidum*, from the blood serum of pregnant women in 2022, were extracted and used for the present study.

II .6. Variables measured :

In the course of this study, variables such as sociodemographic characteristics (age, place of residence, level of education, marital status, occupational status, number of months pregnant, number of pregnancies) and the outcome of syphilis diagnosis were evaluated.

II .7. Ethical considerations:

The data received included neither the identity of the pregnant women nor any personal information about them**.**

II .8. Statistical analysis of data:

Entered in a Microsoft Excel 2016 format, the data were then analyzed with R software version 3.6.1, including the measurement of rates and associations. Univariate sample analysis was used to determine factors associated with syphilis prevalence A 95% confidence interval was estimated and a p≤0.05 value was considered statistically significant

III. RESULTS

III-1 Prevalence of syphilis in pregnant women in the study (N= 215)

A total of 215 test results for *Treponema pallidum* among pregnant women attending antenatal clinics in 2022 were collected from the Omar Bongo Ondimba Regional Hospital in Makokou, North-east of Gabon registers. Of these, 5 were positive for syphilis, indicating an overall prevalence of 2.33% (95% CI: [0.01- 0.53]), compared to 97.67% or 210 negative results.

III-2 Prevalence of syphilis according to sociodemographic and obstetric characteristics of pregnant women in the study (N= 215)

A univariate analysis of the prevalence of syphilis according to the sociodemographic and obstetrical characteristics of the pregnant women in the study showed that being between 31 and 40 years of age (Odds Ratio = 7.01; 95% CI [1.13;43.44], p=0.000), and being single (Odds Ratio = 10.0; 95% CI [1.1;91.31] p=0.013), were significantly associated with the prevalence of syphilis (. Table 1).

Table 1 Univariate analysis of syphilis prevalence, according to sociodemographic and obstetric characteristics of pregnant women in the study, (n=215).

Variables	**Number of Pregnant Women in Study N (%)**	**Prevalence of Syphilis**		**Univariate Analysis**	
		Positive N (%)	**Négative N (%)**	**Crude OR CI 95%**	**p-value**
Age groups (years)					
≤20	8 (3.72)	0(0)	8 (100)	Reference	
21 - 25	63 (29.30)	1 (1,59)	62 (98.41)	0.6. [0.07 ; 5.5]	0.64
26- 30	101 (46.98)	1 (0.99)	100 (99.01)	0,28. [0.03 ; 2.6]	0.22

31- 40	40(18.06)	3(7.5)	37(92.5)	7.01 [1.13;43.44]	**0.000***
41- 43	3(1.4)	0(0)	3(100)	-	0.79
Marital status					
Married	85(39.53)	0(0)	85 (100)	Reference	-
Single	64(29.77)	4(6.25)	60(93.5)	10.0 [1,1 ; 91.31]	**0.013***
Cohabiting	66(30.70)	1(1.52)	65 (98.48)	0.56. [0.06; 5.11]	0.60
Educational level					
Secondary	122 (56.74)	3 (2.46)	119 (97.54)	Reference	
Primary	89 (41.36)	2(2.25)	87 (97.75)	0.98 [0.16-5.99]	0.98
Higher	4 (1.9)	0 (0)	4(100)	-	0.75
Employment status					
Student	102(47.44)	3(2.94)	99(97.06)	0.98 [0.16 ; 6]	0.57
Without	46(21.40)	1(2.17)	45 (97.83)	Reference	-
Active	67 (31.16)	1(1.49))	66 (98.51)	0.55 [0.06 ; 5.02]	0.56
Residence					
Urban	125 (58.14)	3(2.4)	122(97.6)	Référence	-
Rural	90(41.86)	2 (2.22)	98 (97.78)	0.83 [0,14 ;5.07]	0.84
Number of Pregnancies					
0 - 1	98 (45.58)	1 (1.02)	97 (98.98)	Référence	-
2 - 3	65(32.23)	2 (3.08)	63 (96.92)	1,56 [0.25;9.56]	0.63

≤ 4	52(22.19)	2 (3.85)	50(96.15)	2.13 [0.35;13.1]	0.40
Number of months of pregnancy					
1st Quarter	111(23.18)	2 (1.8)	109 (98.2)	Référence	-
2nd Quarter	93 (31.13)	2 (14.89)	91 (85.11)	0.62 [0.1 : 3.8]	0.88
3rdQuarter	11(45.69)	1 (5.80)	10 (94.20)	5 [0.51 ; 49]	0.13

OR= Odds ratio; **CI**= Confidence interval; ***** = Significant test

IV. Discussion

In spite of many efforts made by the public authorities in the world, a good number of pregnant women are still victims of syphilis. This infection is responsible for serious health problems in these women, and can lead to the death of their newborns. However, a permanent health watch through testing and early treatment could prevent this disease in this type of population. According to a previous study, the rates of syphilis infection among pregnant women in Africa vary from 3% to 15% [15]. In a systematic review [16], the prevalence of syphilis was reported to range from 2.5% to 18% in pregnant women. In contrast to two studies conducted in Ethiopia, which reported syphilis prevalences of 1.4% [17].and 1.1% [18]., the present study, reported a prevalence of 2.33% (95% CI: [0.01- 0.53]). This result is also consistent with studies [19], [20] that reported prevalences of 2.6% .and 2.5% (95% CI: 2.3, 3.6%). However, the prevalence of syphilis obtained in the present study was lower than those obtained in South Sudan (22.1%) [21], and the Democratic Republic of Congo (10.9%) [22]. The variability of the results recorded in the prevalence of syphilis, could be justified by the socio-demographic difference, sample size, differential access to diagnosis and treatment of syphilis, level of knowledge and income level of the study population [23]. Irresponsible use of antibiotics for the treatment of a wide variety of systemic infections can lead to the development of drug resistance. Ineffective treatment of syphilis could also contribute to this variation [24]. In addition, in the city of Makokou and the surrounding departments, the habitual frequentation of drinking establishments by the population, the consumption of cheap alcoholic beverages and the high number of sex workers, the transit of long-distance drivers in the province of Ogooué-Ivindo, could increase exposure to syphilis. In contrast to the study by Hussein and Tadesse [16], which found that the prevalence of syphilis among pregnant women was higher in the 35-49 age group, the present study, using a univariate analysis, found that being between 31-40 years of age (Odds Ratio = 7.01; 95% CI [1.13;43.44], p=0.000) had a seven-fold increased risk of being infected with syphilis. This result can be justified not only by the youth of the Gabonese population [25], but also by the early onset of sexual activity, which remains a risk factor associated with syphilis [26]. Moreover, the present study indicated that being single (Odds Ratio = 10.0; 95% CI [1.1; 91.31] p=0.013) was significantly associated with the prevalence of syphilis. This is in line with the findings of a study conducted in Kisangani, DRC [22]. This result can also be explained by the low socioeconomic level of some single women. Even when pregnant, this category of women has sexual freedom, which allows them to undertake sexual adventures with a multitude of partners, in order to guarantee their basic needs [27].

Strengths and limitations of the study.

Despite the contributions made, the present study nevertheless has some limitations that deserve to be highlighted, in order to take them into account in future studies. Within the conceptual framework of the study, we identified a number of upstream factors (life context of pregnant women and sociodemographic characteristics) that may influence syphilis infection. First, the data collected for this study were laboratory test results, limited only to the use of immunological techniques that are reliable only one month after infection. The use of nucleic acid-based detection techniques, such as real-time polymerase chain reaction (qPCR), would have been appropriate to prevent syphilis in the pregnant women in the present study. Finally, no clinical characteristics of syphilis-positive pregnant women were evaluated.

V. Conclusion

In providing key information, the results of the present study showed a significant association between syphilis prevalence and sociodemographic variables of pregnant women (age range 31-40 years, and being single). These results call for further strengthening of current intervention measures, including intensification of prevention in maternal and child health care services in Gabon.

VI. Competing Interests

The authors declare no competing interests.

VII. Acknowledgments

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VIII. Contributions of the Authors

The authors contributed equally to the design of the study and the writing of the manuscript. All authors read and approved the final version of the manuscript.

References

[1]. PEELING, R., MABEY, D, KAMB, M.et al. (2017).. Syphilis. *Nat Rev Dis Primers* 3, 17073.

[2]. OMS 9 July 2021 New study finds unacceptably high global prevalence of syphilis among men who have sex with men

[3]. DE SANTIS M., DE LUCA C, MAPPA I, SPAGNUOLO T, LICAMELI A, STRAFACE G, et al. 2018. Syphilis infection during pregnancy fetal risks and clinical management.Infect dis obset gynecol. 2012, 2012:430585. doi: 10.1155/2012/430585

[4]. MEGLI C., COYNE C E, S. E., M., Infections Infections at the mother-fetal interface: an overview of pathogenesis and defense. *Nat Rev Microbiol* 20, 67–82 (2022). https://doi.org/10.1038/s41579-021-00610-y

[5]. DORFMAN DH, GLASER JH, Congenital syphilis occurs in infants after the neonatal period. *N Engl J Med.* 1990; 323:1299-302..doi: 10.1056/NEJM199011083231902

[6]. CHAMBERS RW ., FOLEY HT, SCHMIDT PJ, C. Transmission of syphilis by fresh blood components. *Transfusion.* 1969; 9:32-4. doi: 10.1111/j.1537-2995.1969.tb04909.x

[7]. PERKINS,H A., BUSCH, M P., Transfusion Transmitted Infections: 50 Years of Relentless Challenge and Remarkable Progress. Transfusion. 2010; 50:2080-99 doi : 10.1111/j.1537-2995.2010.02851.x.

[8]. MARHINO DE SOUZA, J., GIUFFRIDA, R., RAMOS, A. P. M., MORCELLI, G., COELHO, C. H., & PIMENTA RODRIGUES, M. V. (2019). Mother-to-child transmission and gestational syphilis: spatio-temporal epidemiology and demography in a Brazilian region. *PLoS neglected tropical diseases*, *13*(2), e0007122

[9]. GENC M. & LEDGER, W. J. (2000). Syphilis in pregnancy. *Sexually transmitted infections*, *76*(2), 73-79

[10]. SIFFILIZLI. M. D. O. E. K. (2017). Management of Early Congenital Syphilis in a Newborn Case with Maculopapular Rash

[11]. WALDORF, K. M. A. et McAdams, R. M. (2013). Influence of infection during pregnancy on fetal development. *Reproduction (Cambridge, Angleterre*), *146*(5), R151

[12]. KENGNE-NDE, C, DE DIEU ANOUBISSI J, LONI-EKALI G, NGUEFEU-NKENFOU C, MOUSSA Y, MESSEH A,.et al., Highlighting a population-based re-emergence of syphilis infection and assessing associated risk factors among pregnant women in Cameroon: Evidence from the 2009, 2012 and 2017 national sentinel surveillance surveys of HIV and syphilis. *PLoS One.* 2020 Nov 13;15(11):e0241999. DOI : 10.1371/journal.pone.0241999..

[13]. DUPONT A. SCHRIJVER D, DELAPORTE E, MERLIN M, JOSSE R, CHERINGOUh H, et al.,. Seroprevalence of syphilis in urban and semi-rural populations of Gabon. Bull Soc Pathol Exot Filiales. 1988;81(4):699-704. Français. PMID : 3064939

[14]. GABON - Syphilis Prevalence, (% of Women Receiving Antenatal Care) - Data 2023 Forecast 2024, 2008-2019Historique (tradingeconomics.com

[15]. SCHULZ, KF, CATES, et o'MARA, PR (1987) Pregnancy loss, infant death and suffering: the legacy of syphilis and gonorrhea in Africa. *Infections sexuellement transmissibles*, *63* (5), 320-325

[16]. HUSSEIN S, TADESSE BT. Prevalence of syphilis among pregnant women in sub-Saharan Africa systematic reviews and meta-analysis *BiomedResInt* 2019 ; 2019 :4562385. 10.1155/2019/4562385

[17]. BEFEKADU B, SHUREMU M, ZEWDIE A. Seroprevalence of syphilis and its predictors among pregnant women in Buno Bedele zone, south-west Ethiopia: a community-based cross-sectional study. BMJ Open. 2022 Aug 8;12(8):e063745. doi: 10.1136/bmjopen-2022-063745. PMID: 35940833; PMCID: PMC9364416

[18]. FIKADU B, GEBRISH S, ASFAW T. Seroprevalence of syphilis among pregnant women attending an antenatal care clinic at Jimma University Specialist Hospital, Ethiopia . *J Med Med Sci* 2019 ; 10 : 1–5

[19]. AREKE F, MUNSHEA A, NIBRET E, Seroprevalence of syphilis and its risk factors among pregnant women attending antenatal care at Felege Hiwot Referral Hospital, Bahir Dar, northwest Ethiopia: une étude transversale. *Notes de résolution BMC* 2019 ; 12 : 1–7

[20]. MANYAHI, , J., JULLU, BS, ABUYA, MI *et al.* Prevalence of HIV and syphilis infections among pregnant women attending antenatal clinics in Tanzania, 2011. *BMC Public Health* 15 , 501 (2015). https://doi.org/10.1186/s12889-015-1848-5

[21]. EMMANUEL SK, LADO M, AMWAYI S, et al.. Syphilis among pregnant women in Juba, southern Sudan . *East Afr Med J* 2010; 87 :192–8. 10.4314/eamj.v87i5.63073

[22]. KATENGA B G et MAINDO A. M-A *Syphilis during pregnancy in the city of Kisangani: Prevalence, risk factors and prognosis*, KisMéd Aout 2014, Vol 5(1) : 22-30

[23]. AMSALU A, FEREDE G, ASSEGU D. High seroprevalence of syphilis among pregnant women in Yiregalem Hospital, southern Ethiopia. *BMC Infect Dis* 2018 ; 18 : 1–6. 10.1186/s12879-018-2998-8

[24]. MWAPASSA V, ROGERSON SJ, KWIEK JJ, et al. Maternal syphilis infection is associated with increased risk of mother-to-child transmission of HIV in Malawi. *SIDA* 2006; 20:1869–77. 10.1097/01.aids.0000244206.41500.27

[25]. UNDP in Gabon, Economic and social development context. Available on line at, https://www1.undp.org › COVID-19-COResponse

[26]. CASAL C, ARAUJO ED, CORVELO TC, Risk factors and pregnancy outcomes in women with syphilis diagnosed using a molecular approach.. Sex Transm Infect. 2013 May;89(3):257-261. Epub 2012 Oct 4

[27]. FABER, N. (2009). Teenage pregnancy: policy and prevention services . Société d'édition Springer.