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Oral Health Status Assessment of Pregnant Women Attending Antenatal Consultations in Abidjan – Cote d'Ivoire

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Abstract: Introduction: Although there are evidence-based associations between oral health status and adverse pregnancy outcomes, oral health screening is not systematically included in antenatal consultations in Côte d'Ivoire. Furthermore, there are no oral health promotion activities specifically targeting pregnant women. Objective: Assessing the oral status of pregnant women in Côte d'Ivoire. Methods: A cross-sectional survey was conducted at the maternal and child health service of the National Institute of Public Health in Abidjan. Data collected were: demographic information, education level, income category, stage of pregnancy, oral hygiene and dietary habits and oral health information received. Clinical examination was performed to assess: oral hygiene practices (OHI-S index), periodontal status (CPI Index), recording dental status by DMFT index (Decayed, Missing and Filled Teeth), and the frequencies of epulis, dental erosion or tooth mobility. Absolute and relative frequencies were calculated for the different variables of the study. Results: Overall, 207 pregnant women were included in the study and assessed for their overall oral health status. The age range was 15 – 44 years and 14.0% of the women were under 19 years. Most of them were: in a couple (76.8%); multi-gestational (77.3%); and more than half had no school education (52.2%), and had very low income status (56.0%); 50.7% were snacking between meals and 33.3% had emesis during pregnancy. They were cleaning their teeth at least twice a day (70.0%) and had not modified their oral hygiene practices (77.3%). Only 3.4% had received knowledge about oral health during pregnancy. The estimated prevalence of the oral diseases was: dental caries 75.4%; dental erosions 13.0%; gingivitis 57.0%; periodontitis 6.8%; and epulis 3.4%. Conclusion: The results suggest the relevance of integrating a systematic oral examination into antenatal consultations, to raise awareness among pregnant women and to screen and manage their oral health conditions.

Keywords: Pregnancy, Dental Caries, Periodontal Diseases, West Africa, Cote d'Ivoire

1. Introduction

Pregnancy is characterised by physical, metabolic, behavioral and hormonal changes that can alter the global health state [1] and can affect the oral health of pregnant woman [2, 3].

In the oral cavity the effects of these changes are seen on teeth and periodontal tissues [4-6]. Acid exposure caused by gastroesophageal reflux disease (GERD), nausea and vomiting increase the risk of dental caries and erosions [7].

The behavioural changes in pregnant woman, particularly snacking habits and the fragmentation of meals on the one hand, and poor oral hygiene due to the tiredness she may feel on the other, will also favour the occurrence of dental caries. At the periodontal level, hormonal changes increase vascular

permeability with tissue congestive, leading to periodontitis, gingivitis and gravidic epulis [8].

The increased risk of oral diseases associated with pregnancy has been reported by numerous epidemiological studies in the recent decades. However, there is limited data on this issue in sub-Saharan Africa and specifically in Côte d'Ivoire.

The number of females in reproductive age, was estimated at 5,891,489, represents nearly 20% of the Ivorian population. Therefore, the health state of this group of population should be monitored [9], particularly pregnant women, and the issue of their oral health should be a concern because of the impact that the different changes in the body during pregnancy can have on their oral status.

However, the lack of local evidence-based data on its impact constitutes an obstacle to the implementation of an effective oral health management strategy for pregnant women. A few recent studies in Côte d'Ivoire have addressed this issue [10, 11]. Thus, this study aims to contributing for the production of epidemiological data regarding oral health of pregnant women. The objective is to describe the oral status of pregnant women attending the National Institute of Public Health (NIPH) for antenatal consultations (ANC), as well as the factors that may influence it.

2. Methodology

2.1. Study Framework

Located within the NIPH, in the municipality of Adjamé, one of the most populous municipality of the city Abidjan, the Maternal and Child Health Service (MCHS) ensures the follow-up of pregnant women and newborns. It has four care units: a "Child Health Unit" in charge of immunization, paediatric consultations and weight measurement; a "Maternal Health Unit" in charge of ANC, family planning and gynecological care; a "Unit of care for people (mothers and children) living with HIV" unit; and a "Social Unit" in charge of social concerns. The MCHS does not have a delivery unit. The survey covered a two-month period, from 4 September to 31 October 2017.

2.2. Type of Survey

This is a cross-sectional descriptive study conducted at the Maternal and Child Health Service (MCHS) of the National Institute of Public Health (NIPH) in Abidjan, Côte d'Ivoire.

2.3. Population and Recruitment of Participants

The study population consisted of pregnant women attending the INSP for ANC, regardless of the number of weeks of amenorrhoea. The women were approached after their registration at the "reception station". The interviewer presented the objectives of the study and asked for their participation. If they accepted, a consent form was filled in and attached to the data collection form in the woman's health record and in the pregnancy, follow-up register of the Maternal Health Unit. Women were offered to attend the oral health education session in a small group (4-6 people maximum) after their consultation in the service.

The eligibility criteria for the study were confirmation of pregnancy by ultrasound and informed consent from the woman to participate in the survey. The time required for clinical examination and data collection estimated in a pre-survey allowed for 7-8 women to be seen per day. Thus, each day, from the pregnant women's consultation books, ten women were randomly selected. Then, the survey was offered to them, according to the order of selection, until the required sample size was reached.

2.4. Data Collection and Analysis

The data were collected in a standardized format, by a single investigator, using a data collection form consisting of a questionnaire and a clinical examination form. Some data were extracted from individual health booklets and consultation registers. The questionnaire was used to collect socio-demographic information's (age, level of education, marital status) and data on the pregnancy (trimester, gestation, emesis). The clinical examination was used to assess oral hygiene with the OHI-S index [12], dental status with the DMFT index (Decayed, Missing, and Filled Teeth) [13], and periodontal status with the CPITN index [14]. Other disorders such as epulis and dental erosions were also screened. After the clinical examination, an oral hygiene education session was carried out and an oral health leaflet was given to each pregnant woman. Data were collected first on paper form, before entering into EPI-data 3.1 and analysed with EPI Info 3.2. software's. Quantitative variables (age, DMFT index) were described as range and means with standard deviation. For qualitative variables, percentages were calculated.

3. Results

A total of 207 women aged between 15 and 44 years were surveyed with mean: 26.7±6.3 years. More than half of the women in the sample had not attended school (52.2%); 44.0% had an income-generating activity (Table 1). The majority of them were multi-gestational (77.3%) (Table 2; Figure 2).

Table 1. Socio-demographic characteristic distribution in pregnant women.

Variables		n	%
Age classes			
	15-24	80	38,6
	25-34	96	46,4
	35-44	31	15,0
Marital status			
	Single	48	23,2
	In couple	159	76,8
Educational levels			
	None	108	52,2
	Primary	45	21,7
	Secondary	35	16,9
	Higher	19	9,2
Generating activities incomes			
	Yes	91	44,0
	No	116	56,0
Total		207	100,0

Table 2. Gestational Status and Age description in pregnant women.

Variables		n	%
Gestational Age			
	First trimester	70	33,8
	Second trimester	87	42,0
	Third trimester	50	24,2
Gestational Status			
	Primiparous	47	22,7
	Multiparous	160	77,3
Total		207	100,0
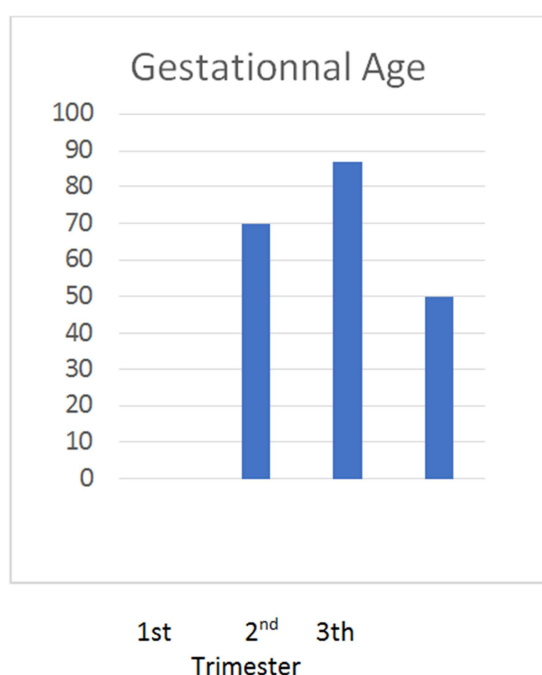
Figure 1. Gestational Age.
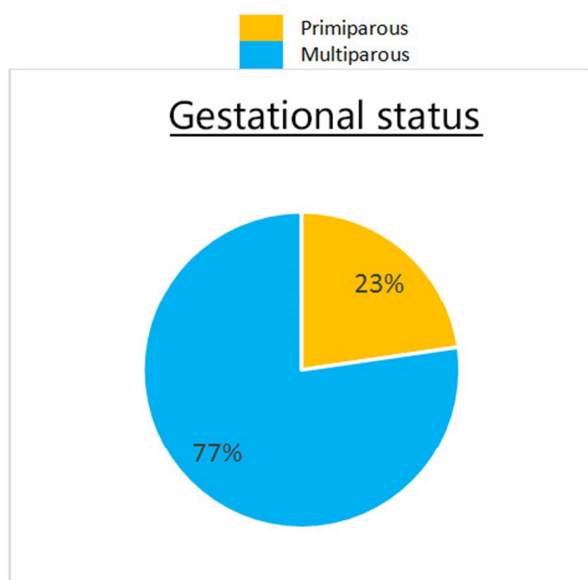
Figure 2. Gestational Status.

More than half (50.7%) reported snacking between meals, and 69 (33.3%) reported emesis episode during pregnancy. Of these, 71.0% brushed their teeth after each emesis incident (Table 3).

Table 3. Changes in oral hygiene and dietary habits distribution in pregnant women.

Variables		n	%
Snacking			
	Yes	105	50,7
	No	102	49,3
Emesis			
	Yes	69	33,3
	No	138	66,7
Brushing after emesis (n=69)			
	Yes	20	71,0
	No	49	29,0
Total		207	100,0

Almost a quarter (22.7%) of the women had changed their oral hygiene habits. Some had stopped daily brushing teeth because of the pregnancy (17.0%). Oral hygiene was considered insufficient in 41.1% of the women. The main oral diseases prevalence's estimated were: dental caries (75.4%), dental erosions (13.0%), epulis (3.4%), gingivitis (97.6%) and periodontitis (3.9%) (Table 4). The DMFT index was estimated at 5.0±4.3 (±standard deviation). The D-index is 88% of the DMFT index (4.4 of 5.0) (Table 5).

Table 4. Oral hygiene and oral diseases distribution in pregnant women.

Variables		n	%
Change of Oral Hygiene Habits			
	Yes	47	22,7
	No	160	77,3
Type of habits changing (n=47)			
Stopping brushing		8	17,0
Increase frequencies of brushing		10	21,3
Toothpick associated to brushing		29	61,7
Oral Hygiene (OHIS index)			
	Insufficient (3,1-6,0)	85	41,1
	Moderate (1,3-3,0)	116	56,0
	Good (0,0-1,2)	6	2,9
Dental Caries			
	Yes	156	75,4
	No	51	24,6
Dental erosions			
	Yes	27	13,0
	No	180	87,0
Periodontitis			
	Yes	8	3,9
	No	199	96,1
Gingivitis			
	Yes	202	97,6
	No	5	2,4
Epulis			
	Yes	7	3,4
	No	200	96,6
Total		207	100,0

Table 5. DMFT Index (Decayed, Missed and Filed Teeth).

Variables	Means	Standard deviation	Range (Min-Max)
Decayed Index (D)	4,4	3,9	0-19
Missed Index (M)	0,6	1,2	0-6
Filled Index (F)	0,0	0,1	0-1
DMFT Index	5,0	4,3	0-22

We looked for statistical associations between age and caries indices on the one hand and between gestational status and oral status and eating habits on the other (tables 6 and 7).

Table 6. *Analysis of the Statistical Association between Age and DMFT Index (Standard Deviation).*

DMFT Index	Age Classes (years)			P
	15 – 24	24 - 34	35 - 44	
D Index, *Mean (SD)*	3,12 (4,95)	4,74 (3,55)	7,25 (5,21)	0,000
M Index, *Mean (SD)*	0,19 (0,59)	0,65 (1,23)	1,46 (1,90)	0,000
F Index, *Mean (SD)*	0,02 (0,16)	0,03 (0,17)	0 (0)	---
DMFT Index, *Mean (SD)*	3,3 (3,46)	5,4 (3,95)	8,7 (5,15)	0,000
Prevalence of dental carie, %	64,2	79,6	92,9	0,000

Table 7. *Analysis of Statistical Association between Gestation status and Oral health status, Emesis et Snacking.*

		Gestational status		P
		Multiparous, n (%)	Primiparous, n (%)	
Periodontitis				
	No	152	47	0,2027
	Yes	8	0	
DMFT Index (Mean, SD)		6,1 (8,0)	3,0 (3,2)	0,000
Dental Carie				
	No	33	18	0,0200
	Yes	127	29	
Dental Erosion				
	No	136	44	0,1453
	Yes	24	3	
Snacking				
	No	84	18	0,098
	Yes	76	29	

4. Discussion

The excellent working relationship with the staff of the Maternal and Child Health Service (MCHS) and the full cooperation of the pregnant women attending antenatal consultation facilitated the organization and completion of data collection.

The oral status assessment of the people investigated could therefore be completed. However, the difficulty of interacting with women with low literacy skills (those who did not understand or could not express themselves in French) could be a potential source of bias. But using interpreters helped to reduce this information bias. The selection of women over a period of two months, on a random basis, strictly executed, made it possible to minimise possible selection bias. The sample of women surveyed can be considered representative of all women attending ANC during the study period.

The study also provided an opportunity to implement outreach sessions on the importance of good oral health and best oral hygiene practices during pregnancy for all women who attended the MCHS during the survey period. The main oral disorders diagnosed in pregnant women are well described in the literature: dental caries, dental erosions, epulis, gingivitis and periodontitis in pregnancy [7].

In our study, the frequencies of these diseases were estimated: 75.4% for dental caries and 13.0% for dental erosion; then at for the periodontal status: 97.6% for gingivitis, 3.9% for periodontitis, 3.4% for epulis. More than 2 out of 5 pregnant women (41.1%) had oral hygiene judged insufficient based on OHIS index. Factors that increase the risk of oral disease in pregnant women are vomiting and changes in eating habits, including snacking, frequent intake of acidic and sweet drinks, and difficulties in maintaining good oral hygiene practices [15]. Almost a quarter of the women surveyed reported changing their oral hygiene habits, with 17.0% stopping teeth brushing. A study in Denmark in 2003 showed that pregnant women reported changes in oral hygiene habits during pregnancy, with 27.0% of women reporting increased brushing [16]. This was consistent with the fact that Danish women visit their dentist more often and are therefore advised about the increased risk of developing dental caries during pregnancy. They also had a higher socio-economic status than the women we surveyed.

In our study, more than half of the women snacked between meals. One third of them, 33.3%, reported emesis; and of these 71.0% brushed their teeth after each episode of emesis (Table 3). Brushing after vomiting is counterproductive as the exposure of tooth surfaces to gastric acidity combined with the mechanical action of teeth brushing increases enamel demineralisation leading to caries and dental erosion. The prevalence of dental erosion observed in this study is identical to that reported by Payal and al in India (13.0%) [17]. The WHO defines four grades for classifying the severity of dental caries in adults: very low (DMFT < 5.0), low (5-8.9), moderate (9.0-13.9) and high (DMFT > 13.9) [18]. According to this classification, the DMFT index estimated at 5.0 in our study (Table 5) is low, as was the case in the study by Africa et al, conducted in South Africa, which was 7.18 (standard deviation: 4.22) [4]. In Iran, Deghatipour and al observed a DMFT index of 10.3 (SD 5.1) in pregnant women [19]. The prevalence of caries found in

our survey (75.4%) is similar to that reported in pregnant women in Sudan, estimated at 75.5% [20], but higher than that estimated in the United States using data from the National Health and Nutrition Examination Survey between 1999 and 2004 [21].

More than half of the women in the sample reported having no own income and never having attended school (Table 1). This may explain the high incidence of caries. Indeed, low income and education are known to be determinants of high frequencies of oral diseases [22]. Periodontal disease in pregnant women is partly a consequence of the significant increase in progesterone hormones [2, 6, 23]. The frequencies of gingivitis and periodontitis observed in our study were 97.6% and 3.9% respectively (Table 4). These frequencies are higher than those of Ibrahim and al, in Sudan who found 41.4% gingivitis and 1.9% periodontitis respectively [20]. The frequency of epulis (3.4%) is lower than that reported in Poland by Bilinska and al [24], estimated at 5.0% of the women surveyed. In general, the frequency of epulis is very variable according to the studies. A survey in Mali found a frequency of 1.2% in 2007 [25], while other authors reported 8.5% in 2019 in South Africa [4].

The main oral health results measured in the study were analysed in relation to some pregnancy-related variables in the sampled women. It was found that only multigestation was statistically associated with the prevalence of dental caries and the DMFT index (Table 7). However, the statistically significant differences calculated ($p < 0.02$ and $p < 10^{-3}$, respectively) should be analysed with some caution, as women with multigestation represent 77% of the sample. Furthermore, although the study population is relatively young (85% are under 35 years old), it is clearly recognised that the prevalence of caries and the DMFT index increases with age, as multiparous women are generally older than primiparous ones. The study of Africa and al in South Africa showed a correlation between the caries index and the age of the pregnant women.

The National Program for Oral Health Promotion and Care (NPHPC) had initiated a process with the direction of the Ministry of Health in charge of the management of Health Facilities in 2010 to incorporate the oral health evaluation in the mother's health booklet. The training and sensibilization of maternal health professionals did not evolve. The finding at the time of our survey was that the oral examination is not done by midwives during the antenatal consultation. The results of our study highlighted the need for this dental examination in pregnant women. Indeed, the frequencies of dental caries and periodontal disease are high in this group of the population, with changes in dental hygiene and dietary practices increasing the risk of caries.

5. Conclusion

The study revealed that pregnant women attending antenatal clinics at the NIPH adopt behaviours during their pregnancy that are conducive to poor oral hygiene. The indicators of dental caries and periodontal diseases were relatively higher in the group evaluated than in the general population. These results suggest the usefulness of implementing oral health promotion actions in favour of pregnant women and of raising awareness among mother and child health professionals, so that they relay oral health prevention information. Other studies should be considered to continue the production of epidemiological data on the oral health of pregnant women in Côte d'Ivoire and to further explore the relationship between oral health and pregnancy.

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