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Gestational diabetes in urban Guinea: Results of a systematic screening

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Abstract
The prevalence of type 2 diabetes and moderate fasting hyperglycemia is high in Guinea, while data on gestational diabetes are scarce.
Objective: To determine the prevalence of Gestational Diabetes among women admitted for prenatal consultation, identify their socio-epidemiological characteristics and any associated risk factors.
Patients and Methods: Prospective study conducted in pregnant women who came for prenatal follow-up in two urban health centers in the prefecture of Kindia, Guinea during the period from January 1 to June 30, 2018, screened according to the recommendations of International Association of Diabetes and Pregnancy Study Group (IADPSG). A single abnormal value is sufficient to make the diagnosis of GDM.
All pregnant women between 24 and 28 SA were included. Women with multiple pregnancies and/or pre-existing diabetes or refusal to participate in the study were excluded.
The variables analyzed: maternal age, gestational age, parity and exposure or not to risk factors. The data were analyzed by specific statistical tests with a probability $p<0.05$.
Results: Seven hundred and forty-two (742) pregnant women were screened with 103 cases of GDM diagnosed, representing a prevalence of 13.8%. The epidemiological profile of women with GDM was dominated by the average maternal age which was 28.7 ± 6.5 years, housewives 57.28% (59/103), no level of education 53.39% (55/ 103), married 67.96% (70/103) with an average parity of 2.11± 1.9. The average gestational age was 27.1 ± 5.6 SA. The risk factors were dominated by advanced maternal age, with a proportion of 70.27% and 13.41% of patients without risk factors, screening for GDM was positive ($P < 0.000001$).
Conclusion: The GDM is frequent among the women followed at the prenatal consultation in Kindia. Systematic screening integrated with prenatal care remains the best means of prevention.

Keywords: Gestational diabetes, prevalence, screening, IADPSG criteria

Introduction
Gestational diabetes mellitus (GDM) is a disorder of carbohydrate tolerance leading to hyperglycemia of variable severity, which is initiated or first diagnosed during pregnancy, regardless of the necessary treatment and the evolution in the postpartum period [1].
It may be a disorder of carbohydrate tolerance prior to pregnancy but unrecognized (most often type 2 diabetes) whose maternal-fetal prognosis appears to be much more guarded than that of transient hyperglycemia appearing during the second half of pregnancy and disappearing after delivery [2].
However, these two situations share the same pathophysiology (insulin resistance and inadequate insulin production) and common risk factors [3]. There is a positive, linear correlation with no real threshold between the risk of pregnancy complications and maternal blood glucose, raising the problem of diagnostic criteria for GDM [3].
Regardless of the type of GDM, it is a metabolic and obstetrical emergency [4].
GDM results in hyperglycemia of varying severity and can be the cause of maternal and/or fetal complications (pre-eclampsia, cesarean section, macrosomia) warranting optimal multidisciplinary management [2, 4, 5].
It is recognized that GDM increases the risk of preeclampsia and cesarean section in the absence of treatment [3]. Similarly, on the fetal side, there is a significant increase in macrosomia in the absence of appropriate management. All these short, medium and long term complications require a better understanding of this pathology and its risk factors, all types combined, in order

to prevent gestational diabetes effectively [6, 7].

Systematic or targeted screening for GDM is controversial and is reflected in the heterogeneity of international recommendations and professional practices [2, 5, 7].

The prevalence of GDM and its risk factors depend on the population studied and the screening criteria used [8-10]. Thus, the prevalence of GDM is difficult to estimate because of the difficulties of systematic screening and the diversity of diagnostic criteria [4, 8, 9].

In European populations, the prevalence, most often estimated at 2-6%, can reach values of 10-20% in some high-risk populations, with a current trend of increasing prevalence in most ethnic groups studied [10, 11].

In Africa, the prevalence of GDM is variously reported and varies among study populations [4, 9, 12, 13].

In Guinea, the first available data indicate a high prevalence of GDM [14]. This high prevalence of GDM may partly reflect the large and unrecognized proportion of type 2 diabetes in Guinea; indeed, 59% of cases were previously undiagnosed in the 2003 survey that reported a prevalence of 6.7% in urban areas [15]. Indeed, depending on the population studied and its level of care, the prevalence of GDM appears to be higher the higher the prevalence of type 2 diabetes [1]. This may explain why GDM appears to be more prevalent in certain ethnic groups at higher risk, including blacks [12, 14].

The objectives of this study were to determine the prevalence of Gestational Diabetes among pregnant women admitted for prenatal consultation, identify their socio-epidemiological characteristics and any associated risk factors.

Patients and Methods

This is a cross-sectional, descriptive study conducted in two urban health centers (CS) in the prefecture of Kindia. In Guinea, the health center constitutes, according to the health pyramid, the first recourse for pregnant women to benefit from prenatal consultations in the public sector.

The study was conducted between January 1 and June 30, 2018, and included a consecutive series of 742 women followed in ANC with a gestational age between 24 and 28 weeks of amenorrhea (SA). Women with multiple pregnancies and/or pre-existing diabetes or refusal to participate in the study were excluded.

These women, who were not to be known to have diabetes, were screened without prior modification of their diet according to the criteria adopted by the International Association of Diabetes and Pregnancy Study Group (IADPSG) (2): oral load of 75 g of glucose judged on fasting blood glucose (≥5.1 mmol/L) or post load blood glucose at 1 h (10.0 mmol/L) and/or at 2 h (≥8.5 mmol/L). A single abnormal value is sufficient to make the diagnosis. For patients at high risk of GDM, screening is performed during the first consultation.

Participation in the study was voluntary and subject to free informed consent. All women with GDM were referred to the endocrinology department at the referral hospital where their care was organized.

In Guinea, antenatal consultations include the performance of standard biological assessments for pregnancies progressing normally and the screening of certain risk factors, including those of diabetes, as well as the performance of additional analyzes for pregnancies at risk [16].

Statistical analysis

The data were collected on a survey form designed for this purpose, and were entered and processed using Epi-Info version 6 software. This allowed us to calculate the sensitivity, specificity and predictive values of the screening test. Statistical comparisons were made using the Chi2 test. Statistical significance was considered when the p value was less than 0.05.

Results

The systematic screening of 742 pregnant women resulted in the diagnosis of 103 DGs, a prevalence of 13.8%.

Table 1: Socio-epidemiological characteristics of GDM women

Age range N=103	Effective	Percentage
15-19	10	9,70
20-24	18	17,47
25-29	22	21,35
30-34	29	28,15
35 and more	24	23,30
The most represented age group is that of 30-34 years with extremes of 15-38 years and the mean maternal age was 28, 7± 6, 5 years.		
Professional Occupation		
Housewives	59	57,28
Pupils/Students	13	12,62
Employees	17	16,50
Liberal profession	14	13,59
Housewives are more numerous with 57, 28%.		
Marital status		
Married	70	67,96
Célibataires	20	19,41
Veuves	13	12,62
67,96% of women DG are married		
Instruction level		
No education	55	53,39
Primary	31	30,09
Secondary/university	17	16,50
53,39% of women are out of school		
Gestationnel Age		
16-19	13	12,62
20 – 23	19	18,44
24- 27	28	27,18
28- 31	20	19,41
32 Weeks of amenorrhea (WA) and more	22	21,35
The mean gestational age was 27.1 (WA) ± 5.6.		
According to Parity Nulliparous	19	18,44
First seems	29	28,15
Fears it seems	39	37,86
Multipare	18	17,47
The paucipares are more numerous with 37,86%		

Table 2: Distribution of women according to the observed number of risk factors

Analysis of risk factors n= 37	Effective	Percentage
Age >35	26	70,27
IMC>25	4	10,81
HTA	4	10,81
Antecedent of delivery of a child of weight ≥ 4000g	2	5,40
Antecedent of delivery of a malformed child	1	2,70

Table 3: Analysis of risk factors

	Risk		
	Exhibited	**No exhibited**	**Total**
Positive test	37(14,8%)	66 (13,41%)	103 (13,88%)
Negative test	213 (85,2%)	426 (86,58%)	639 (63,51%)
Total	250 (100%)	492 (100%)	742 (100%)

3. Discussion

3.1. Prevalence of gestational diabetes in ANC

The high prevalence of GDM in our study (13.8%), 2.3 times that obtained according to the 1999 WHO criteria, is in agreement with data published since the adoption of the IADPSG recommendations in 2010 [2]. Indeed, the use of these diagnostic criteria has been accompanied by a significant increase in the prevalence of GDM compared with previous screening methods [2]. In South Africa, a recent study using the IADPSG diagnostic thresholds found a higher prevalence of GDM (25.8%) than that found in other countries (13). The significant increase in the prevalence of GDM reported in this study compared to previous studies on SA may be attributed to the lower diagnostic threshold and the use of universal screening [4].

The prevalence in our series was similar to that found previously by S. Bensalem [19] and lower than that reported by N. Balde [14, 15]. However, it was higher than those found in the main African series [4, 17, 18]. The prevalence observed in our study clearly indicates that this is a problem of concern. This increase in prevalence could be explained by the fact that this one-stage IADPSG diagnostic strategy is likely to generate more "false positives" than a two-stage strategy [10].

This variability could also be explained by the lack of homogeneity of diagnostic criteria, the diversity of screening methods, the characteristics of the study population, and the term of pregnancy at which the screening took place.

This high prevalence results in an increase in the cost of care, which has a deleterious impact on our populations.

3.2-Social-epidemiological characteristics

Our high frequency of GDM could be explained by the fact that our population of women with GDM is old (on average, 28.7±6.5 years).

For maternal age, there was no consensus, we reported a high frequency in the age range 30-34 years. This is the period of maximum genital activity of the woman and they came in large numbers (29 patients). Several study series reported a similar mean age as ours [6, 19].

E. Werya *et al*. [20] argue that the existence of GDM is not related to the high age of the pregnant women but rather to the disorder of carbohydrate metabolism. Similarly, increasing the average maternal age of pregnant women increases the risk of GDM. More importantly, maternal age increases the risk by a factor of 3 in the 25 to 29 age group and by a factor of 4 in the 30 to 34 age group [5].

In relation to gestational age, Saadi *et al*. [21] reported a frequency of 56.45% of GDM in the gestational age group 26-28 years, which was higher than that found in our study. The gestational age range between 24 and 28 days of age was the preferred age for screening.

As for Parity, several studies [19, 21, 22] have reported a frequency significantly higher than that found in our series.

Women with no education had the highest rate (53.39%) in our series. This lack of level could be explained by the lack of knowledge of the harmful effects related to the determinants of the occurrence of GDM.

Amazian K *et al*. [6] found that 29.4% of patients were illiterate, 23.6% and 29.4% had primary and secondary level respectively and only 17.6% had higher level

Married women were more numerous than unmarried women. This can be explained by the tradition that births should take place within marriage.

3.3 Socio-professional categories and analysis of risk factors

All socio-professional strata were affected in our series. As for exposure to risk factors, in our series the risks were present in 37 pregnant women, i.e. 14.80%, with a positive predictive value of 32.6%. These risks were dominated by high maternal age, i.e. a frequency of 70.27%.

Out of 103 positive tests, 66 were found in pregnant women with no risk of gestational diabetes.

Saadi *et al*. [21] reported that 46.7% of screened women had risk factors in a sample of 2077 women. Thus, screening for risk factors would miss 50% of DG [1]. In addition, S. Bensalem *et al*. (19) found that all women with GDM screened had risk factors in a series of 432 women screened.

Concerning maternal age, most learned societies propose a limit of 35 years and the correlation was positive and significant from a maternal age greater than or equal to 35 years (2, 20, 23).

Conclusion

The GDM is frequent among the women followed at the prenatal consultation in Kindia. Systematic screening integrated with prenatal care remains the best means of prevention.

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Author's Contribution

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Conflict of interest

None declared

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