Keywords:

***Corresponding author:** Elie Nkwabong, Department of Obstetrics & Gynecology, University Teaching Hospital/Faculty of Medicine and Biomedical Sciences, Yaounde, Cameroon, Tel: 237 99663843, Fax: 237 22312567; E-mail: enkwabong@yahoo.fr

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and 1 mg of folic acid daily, while non anemic women were prescribed 50 mg of iron supplementation and 0.5 mg of folic acid daily. Women with severe anemia were not excluded because we wanted to observe the severity of anemia on pregnancy outcomes. Two women received parenteral iron because of intolerance to oral iron therapy. Hb concentration was controlled again at 36 weeks gestation.

Variables recorded included maternal age at delivery, parity (deliveries at 28 completed weeks gestation), gestational age at booking (con rmed by an ultrasound scan performed before 20 weeks gestation), Hb concentration at booking and at 36 weeks gestation, complications observed during pregnancy, gestational age at delivery, mode of delivery, birth weight, fetal sex and placental weight. Hb concentration was checked during labor at 35 weeks in four women who had preterm deliveries. Five ml of venous blood was collected and Hb concentration was measured on automated cell counter (Huma Count 30TS). Before measuring placental weight, membranes were removed, the cord sectioned at the placental insertion site and fetal blood evacuated from the placenta.

Sample size was calculated using the following formula: $N = 2 \times(1/1-f)\times(Z + Z / P_0-P_1)^2 \times P\times(1-P)$ where f was the assumed percentage of women that might be lost during follow-up (10%), $Z = 1.65$, $Z = 1.28$, P_0 the assumed prevalence of low birth weight (LBW) (<2500 g at birth) in anemic women (10%), P_1 the assumed prevalence of LBW among non anemic women (2%) and $P = (P_0 + P_1)/2$. According to this formula, at least 169 women were needed in each group. is study received approval from the institutional ethics committee. An informed consent form was obtained from each woman. Data were analyzed using SPSS 18.0. Data of anemic pregnant women were compared to those of non anemic pregnant women. Fisher's exact test was used to compare categorical variables and t-test to compare continuous variables. We used relative risks with their 95% con dence intervals (CIs) to present the comparison between the two groups. P<0.05 was considered statistically signi cant.

Results

During the study period, we received 235 anemic women (Hb concentration <10 g/dl) with singleton pregnancies out of 4150 women, giving an incidence of 5.66%. Seven women with gestational diabetes were excluded and 16 women were lost during follow-up. e remaining 212 women were followed up till delivery. e same numbers of non anemic pregnant women (Hb concentration 11 g/dl) were also followed up. Each non anemic pregnant woman recruited was received at booking immediately a er the anemic pregnant woman. Data are shown in Table 1.

At booking, eight women had severe anemia (Hb concentration < 6 g/dl), 11 had moderate anemia (Hb concentration: 6 to < 8 g/dl), and 193 mild anemia (Hb concentration: 8 to < 10 g/dl). ree women with Hb at booking between 3.4 and 6 g/dl whose Hb concentration <8 g/dl at 36 weeks received blood transfusions until new Hb value was 10 g/dl.

Complications observed during pregnancy were LBW (<2500 g at delivery), premature delivery (<37 weeks) and pre-eclampsia (blood pressure 140/90 mm Hg associated with proteinuria 300 mg/24h) (Table 2).

Fourteen cases of LBW (6.4%) were also observed in the anemic group (mean Hb concentration 8.9 ± 1.9) as against two (0.9%) among the non anemic group (mean Hb concentration 11.7 ± 0.6) (RR 7, 95%CI 1.6-30.4, P=0.003).

Ten cases of pre eclampsia (4.7%) were observed in the anemic group (mean Hb concentration 8.5 ± 0.8) and three (1.4%) in the non-anemic group (mean Hb concentration 11.7 ± 0.6) (RR 3.3, 95%CI 0.9-11.9).

Premature deliveries were observed amongst six (2.8%) anemic pregnant women (mean Hb concentration 8.7 ± 0.9), and only two (0.9%) among the non anemic group (mean Hb concentration 11.7 ± 0.6) (RR 3, 95%CI 0.6-14.6, P=0.28).

Among women who were anemic at booking, mean Hb concentration at 36 weeks gestation was 8.7 ± 0.9 for those who delivered before 37 complete weeks, as against 10.8 ± 1.2 for those wh delivered at 37 weeks gestation or above (P<0.0001).

Variables	Anemic pregnant women (range)	Non anemic pregnant women (range)	RR	& R Q ¿ G H Q F H Interval	P value
Baseline characteristics					
Number of women	212	212			
Gestational age at booking (weeks)	19.5 ± 7.3 (6-34)	17.8 ± 4.9 (6-29)			

Vaginal deliveries occurred in 198 anemic women (93.4%) as against 186 (87.7%) in non-anemic women. The indications for emergency cesarean section in the anemic group were cephalopelvic disproportion (CPD) (6 cases), acute fetal distress (AFD) (4 cases), severe pre-eclampsia and placenta praevia (one case each). The indications for emergency CS in the non-anemic group were CPD (7 cases), AFD (5 cases), placenta praevia (3 cases) and placenta abruptio (one case). The indications for elective CS were scarred uterus in the anemic group (2 cases), while in the non-anemic group, the indications were scarred uterus (7 cases) and praevia myoma (2 cases).

Main indications for episiotomy were imminent perineal tears and instrumental delivery while those for instrumental deliveries were mainly prolonged second stage of labor and poor maternal compliance when pushing.

Birth weight distribution among both groups is shown in Table 3. In relation to fetal sex, mean birth weight for boys was 3427.6 ± 533.1 g among initially anemic pregnant women (n=101) as against 3304.6 ± 359 g among non-anemic pregnant women (n=99) (P=0.006), while mean birth weight for girls was 3237.1 ± 444.2 g among initially anemic pregnant women (n=111) as compared to 3189.6 ± 289.5 g among non-anemic pregnant women (n=113) (P=0.013).

Among women who were anemic at booking, mean birth weight of babies delivered by women (n=18) whose 36 weeks Hb <9 g/dl was 2742.1 ± 585 g as against 3439.6 ± 439.9 g for babies delivered by women (n=170) whose 36 weeks Hb ≥ 10 g/dl (P<0.0001). Mean birth weight of babies delivered by women (n=18) whose 36 weeks Hb <9 g/dl was lower than that of babies delivered by women of the non-anemic group (Hb ≥ 11 g/dl) (2742.1 ± 585.1 g vs 3243.5 ± 328.2 g, P=0.002).

Mean birth weight of babies delivered by initially anemic women (n=170) whose 36 weeks Hb ≥ 10 g/dl was higher (3439.6 ± 439.9 g) than that of babies delivered by women of the non-anemic group (3243.5 ± 328.2 g) (P<0.0001).

Placental weights varied between 225 and 820 g with a mean of 499.7 ± 101.4 g among anemic pregnant women as against a range of 301 to 520 g with a mean of 408.5 ± 45.2 g among non-anemic pregnant women (P<0.0001). No maternal death was observed during the study period.

Discussion

Hb concentration <10 g/dl was observed in 5.66% of our anemic pregnant women. This rate is a bit lower than that of 8.6% reported by some authors [7].

Mean gestational age at delivery was similar amongst anemic and non-anemic pregnant women (P=0.07), but anemic pregnant women were more at risk for premature deliveries (RR 3, 95%CI 0.6-14.6), though the difference was not statistically significant. This might be explained by the fact that anemia with resulting hypoxia can induce maternal and fetal stress. This stress stimulates the synthesis

episiotomies and instrumental deliveries have already been noticed by some authors especially when booking Hb was <7.5 g/dl [6].

Mean birth weight was signi cantly increased among the initially anemic pregnant women (P=0.039), with a di erence in mean of 85 g. is was observed among both male fetuses (P=0.006), and female fetuses (P=0.013). is increase in birth weight can be explained by the increased placental weight observed among initially anemic women. e placenta is the organ through which there is transfer of nutrients and oxygen to the fetus [18,19]. is transfer is maximized when the placenta is well developed. is transfer of nutrients is associated with an increased transfer of oxygen, when anemia has been corrected. A maximum transfer of nutrients is associated with an increased fetal growth, hence, with an increased birth weight, as observed in pregnancies complicated by gestational diabetes [19]. Moreover, higher doses of iron and folic acid in our study, as observed in the anemic group, might have led to rapid correction of anemia in some cases and, therefore, increased birth weight. e increase in mean birth weight among the anemic pregnant women who received iron during pregnancy has been documented by others [20-22].

Nevertheless, there was an increased risk of LBW (RR 7, 95%CI 1.6-30.4, P=0.003) among anemic pregnant women, especially when Hb was <9g/dl at 36 weeks gestation, as observed elsewhere [4,9,10]. is might be explained by the fact that, despite the increased placental weight, anemia was so severe that the oxygen transfer to the fetus was limited. Indeed, some researchers think that low birth weight observed among anemic women might be due to decreased oxygen supplementation to the fetus [23]. Women with Hb <9g/dl should either be transfused or receive parenteral iron for a rapid correction of the Hb concentration [24], before 32 weeks for instance, to improve fetal growth. More studies should be carried out to con rm this.

Conclusion

Anemia corrected before term with iron and folic acid was associated with a signi cant increase in birth weight. Hb still <9g/dl at 36 weeks gestation was associated with an increased risk of LBW. At Hb 9g/dl there were few fetal and maternal complications observed. Nevertheless, we should not allow women to have Hb <10 g/dl at term, since studies have shown that anemic women are at a higher risk of dying from post partum hemorrhage [10].

References

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