Original Research Article

Analysis of Hematological Indices of Pregnant Women Attended Antenatal Care in General Hospital Dutsin-Ma, Katsina State.

ABSTRACT

Aim: To investigate hematological indices of pregnant women attending antenatal care (ANC) in Dutsin-Ma General Hospital Katsina State.

Place and duration of the study: Hematology Unit of Laboratory Department, General hospital Dutsin-Ma (GHDTM), between June, 2019 to November 2019.

Methodology: Structured questionnaire with consent form were administered to 552 participants and data collected contain sociodemographic information, blood pressure measurement, Packed cell volume (PCV), White Blood Cell (WBC) for period of (6 month). Data was analyzed using Graphpad instat version 3.0 and Microsoft office excel 2010.

Results: From the result, the mean age of the participants is (34.5 ± 11.6) years. The frequency of the participants according to trimester grouping were 246 (44.5%) in 1st trimester, 173 (31.3%) in 2nd trimester while 133 (24.0%) were in the 3rd trimester. Also the means PCV (%) were T1 (36.2 ± 0.19), T2 (36.1 ± 0.20), T3 (34.7 ± 0.23); Hb (g/dL) T1 (12.0 ± 0.06), T2 (12.0 ± 0.06), T3 (11.5 ± 0.08) and WBC (X 10^9l) T1 (7.2 ± 0.04), T2 (7.3 ± 0.05), T3 (7.4 ± 0.05), respectively. No significant difference in Post hoc test for WBC and Hb but PCV shows significant associations among the trimesters. Conclusively, the emphasis on PCV as baseline routine practice for pregnant women during ANC should be encouraged and highly supported as early detection of hematological complications in pregnancy can be overcome.

Keyword: Endrocrine, Graphpad, Packed cell volume, Hematological indices.

1. INTRODUCTION

Worldwide a large proportion of women are expected to die each year as a result of pregnancy complication related to hematological profile alterations [1]. According to new guidelines, World Health Organization recommends eight antenatal visits throughout pregnancy. Out of these thirty nine recommendations, full blood count (FBC) and fasting blood sugar (FBS) are already being practiced in routine. FBC include quantitative measures for red cells, white cells including differential, platelets, and these are good indicators of anemia [2].

Anemia is one of the commonest complication of pregnancy and birth challenge amongst pregnant across the world with an epidemiology of over 2 billion cases. According to WHO anemia in pregnancy is a disease condition that is established when the packed cell value is less than 33%. It is measured in a ratio of red blood cell percentage of a blood sample. Red cell mass as an index of PCV is

driven by an increase in maternal erythropoietin production, the net result being a dip in hemoglobin concentration thus, there is dilution anemia. The drop in hemoglobin is typically by 1–2 g/dL by the late second trimester and stabilizes thereafter in the third trimester. Pregnant women who take iron supplements have less pronounced changes in hemoglobin, as they increase their red cell mass in a more proportionate manner than those not on hematinic supplements. The WHO recommends oral iron supplementation every day as much as 30–60 mg to be able to meet iron requirements, especially in the third trimester of pregnancy [3].

Several studies have reported that pregnant women of African origin are more at highest risk of adverse birth challenges [4]. Although the exact causes of challenged outcomes have not been clearly established, it could be due to poor nutritional status, high parity, closely-spaced pregnancies, pre-existing diseases, lower socioeconomic status and hematological complication. The major hematological changes during pregnancy are physiologic anaemia, neutrophilia, mild thrombocytopenia, increased procoagulant factors, and diminished fibrinolysis [4]. In view to the aforementioned hematological importance, the study was carried out to investigate hematological indices of pregnant women attending ANC in Dutsin-Ma General Hospital Katsina State.

2. MATERIALS AND METHODS

Material: EDTA tubes, 2ml needle and syringe, Digital weighing scale, measuring tape, hematocrit tubes, Microhematocrit machine, centrifuge, structured questionnaire.

Study setting and design: A facility based cross sectional study was conducted from June, 2019 to November 2019 at General Hospital Dutsin-ma, Katsina State (GH DTM). This health facility is located in the north geographic region of the local government area and is a source of medical care for the underserved population. It currently has about 200 beds with an annual average of 50,000 outpatients.

Study population: All pregnant women attending antenatal cares in GHDTM that fulfills the inclusion criteria during the study period were considered as study participants.

Exclusion and Inclusion Criteria: All pregnant women who came to GHDTM for ANC in maternal and child health department were screened for eligibility in the study. Pregnant women who were sick during data collection, with hepatitis B virus infection, human immunodeficiency virus, those having bleeding in the pregnancy, recently transfused, having known chronic diseases and diagnosed with hemoglobinopathies were excluded. Based on the previous 3 months record, the target pregnant mothers were selected by systematic sampling technique at a sampling interval of three. The first interviewed participant was randomly selected by a lottery system.

Sampling procedure: According to [5], the sample size was calculated using a single population formula with 95% confidence interval, 5% margin of error with the assumption that 21.3% of pregnant women are anemic. By summary a total of 552 pregnant women were enrolled at the antenatal care (ANC) unit of GH Dutsin-ma. Systematic random sampling technique was used to recruit the study participants from their sequence of ANC visit during the study period.

Measurement and data Collection: Interviewer administered structured pretested questionnaire to obtain the sociodemographic information of participants. The process were conducted by the three trained ANC service provider nurses at ANC clinic of GHDTM during ANC follow-up of the study participants. Maternal anthropometry was measured using a standard protocol. Weight was recorded to the nearest 0.1 kg using a weighing scale (Salter, England; 145 BKDR) and height was measured to the

nearest 1 cm using a Stadiometer (Seca, UK; 225). Every participant was requested to see the researcher after getting routine laboratory investigation report. About 2ml venous blood specimens were taken from each participant in EDA tubes for the hematological examination. All laboratory measurements were done by experienced laboratory technologist.
Results of PCV, Hb, BP and WBC were noted on questionnaire. The reference ranges for PCV as 35-42%, Hb concentration of 11.5 g/dL was selected as an optimal cut-off for the detection of iron deficiency in early pregnancy. This value is slightly higher than the WHO recommended cut-off (Hb = 11 g/dL) for anemia in women during early pregnancy [6].

Data Analysis: Data from the questionnaire and laboratory was checked for completeness and consistency over the period of the research. Data were then analyzed using Graphpad instat version 3.0 statistical software and Microsoft office. Excel 2010 were used for data analysis and plotting graphs. Descriptive statistics such as frequency, percentage, mean and standard deviation were used to describe dependent and independent variables. Regression analysis had been used to check for association between dependent and independent variables. In all cases *P value* less than 0.05 was considered statistically significant.

Ethical issues: Ethical clearance was obtained from both Department of Public health, Dutsin-ma Local Government Secretariat, Katsina State. Written informed consent was obtained from each study participant after the purpose and importance of the study were explained. To ensure confidentiality participant data was linked to a code number. Abnormal test results were communicated to their attending physician.

3. RESULTS

Out of 552 study participants, 246 (44.5%) were in 1st trimester, 173 (31.3%) in 2nd trimester while 133 (24.0%) were in the 3rd trimester. Mean age (±SD) of the study participants was 34.5 ± 11.6 years. We analyzed data from participant by grouping them into trimesters as an unpaired groups. Group T1 included women in their 1st trimester, T2 represent 2nd trimester and T3 were those in 3rd trimester; 1st, 2nd and 3rd trimesters were defined as completion of 14th weeks, beginning of 15th week through completion of 28th week and beginning of 29th week through completion of 42nd week of gestation out of all study participants, 475 (86.0%) were non diabetic, while 77 (13.9%) were detected to be diabetic, out of which 9 (1.6%) was known diabetic and 68 (12.3%) were detected for the first time. In group a there is no participant that is diabetic, but for group b and c, 19 (24.6%) and 58 (75.3%) were diabetic.

Significant association was found for mean PCV and mean Hb among the three groups T1, T2 and T3. There was no significant relation found for mean WBC and Hb among the three groups (Table 1)

Table 1: *P*-value from post-hoc test

Variables	1st VS 2nd Trimester	1st VS 3rd Trimester	2nd VS 3rd Trimester
PCV %	>0.05*	< 0.0001**	< 0.0001**
Hb g/dL	0.88	1.42	1.41
WBC X 10^9/l	0.71	0.70	0.86

Where * denotes significant and ** denotes extremely significant

Table 2: Age distribution

Variables	Descriptions	
	Users	Non-users
Iron supplements	491 (88.9%) Non diabetic	61 (11.0%) Diabetic
RBS	475 (86.0%)	77 (13.9)

Table 3: Blood parameter frequency

Age	**15-24**	**25-34**	**35-44**	**42-54**
Freq	**290(52.2%)**	**163(29.5%)**	**70(12.6%)**	**29(5.2%)**

Table 4: Sociodemographic distribution Frequency

Income	**Zero**	**100-5000**	**6000 -10000**	**11, 000 -20,000**	**20,000 above**
Freq.	364 (65.9%)	137 (24.8%)	16 (2.8)	22 (3.9%)	13 (2.5%)

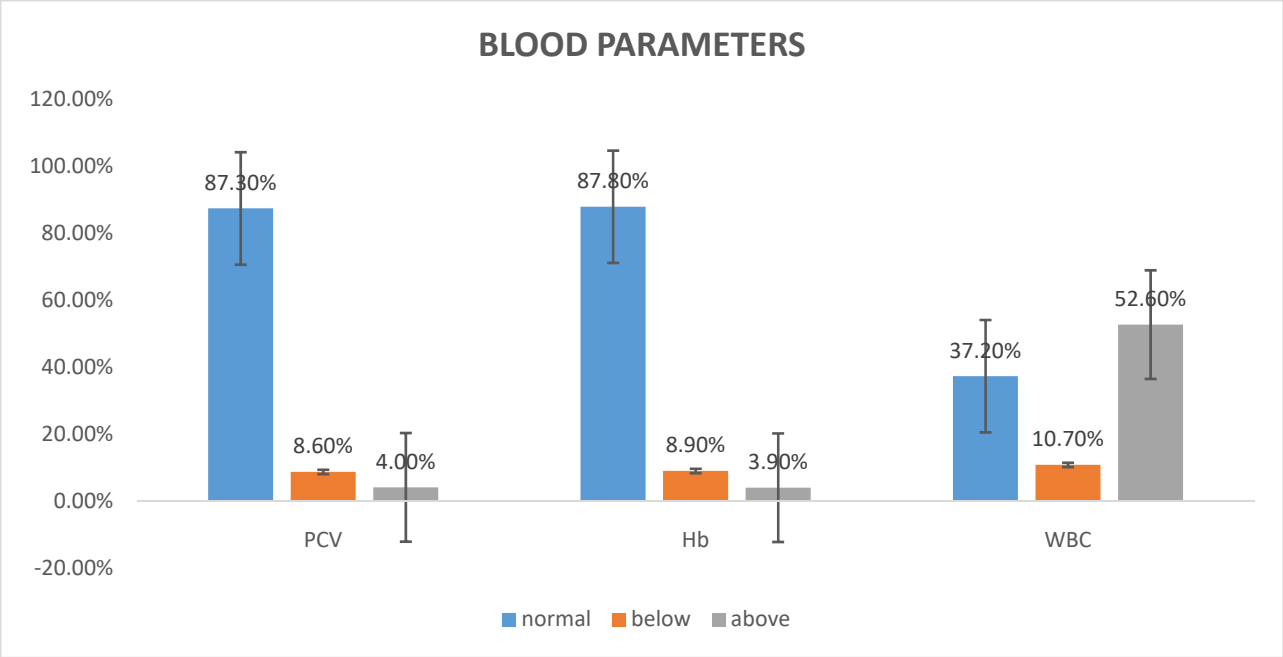

Figure 1: Blood Parameters

Table 5: Frequency and percentage distribution

Variables	Frequency and percentage		
Gravidity	Primigravida 203(36.7%)	Secundgravida 252(45.6%)	Multigravida 97(17.5%)
Employment Status	Self Employed 153(27.7%)	Government 35(6.3%)	Unemployed 364(65.9%)
Blood Pressure	High 198(35.8%)	Normal 352(63.7%)	Low 2(0.3%)

Table 6: Frequency and percentage distribution

Outcome Variables	**Group X (T1)**	**Group Y (T2)**	**Group Z(T3)**	**Total**	**P-value**
PCV					
Mean	36.2	36.1	34.7	35.8	< **0.0001**
SEM	0.19	0.20	0.23	0.12	
Media	**37.0**	**36.0**	**34.0**	**36.0**	
Hb					
Mean	12.0	12.0	11.5	11.9	< **0.0001**
SEM	0.06	0.06	0.08	0.04	

Media	12.3	12.0	11.3	12.0	
WBC					
Mean	7.2	7.3	7.4	7.3	< **0.0001**
SEM	0.04	0.05	0.05	0.02	
Media	7.3	7.3	7.4	7.3	

4. DISCUSSION

Assessing hematological profiles is essential routine for pregnant woman. Pregnant women and their unborn children are the most susceptible to parasitic infection like malaria, pox and the likes of STD, thereby resultant alteration in some the hematological indices [1]. According to the present study, pregnant woman with age group 15-24 had the highest frequency while age group 45-54 had the least frequency. In this study some participants were detected to have diabetes and Long-term complications DM may affect the organs such as kidneys, eyes, nerves, heart and blood vessels, and in absence of effective treatment result into death [7]. This finding is consistent with studies carried out in Nigeria where low age has the highest frequency percentage [8]. The study has highlighted PCV as an important parameter in pregnant women attending ANC routine services, so the inference drawn is to symbolize PCV as a variable to define anemia. Although the PCV value across the trimesters showed a significant difference, where the mean values were within the WHO reference range for pregnancy. There is a slight increase in the total PCV for the 552 participants. This agrees with the study by [9]. This could be the influence of evenly distributed socioeconomic status and elevated level of awareness. The WBC level was generally high throughout the trimester and across every groups, it further helps to buttress the importance of personal hygiene and improve health education orientation that expected from This results could serve as baseline for the study area, where further studies with several other related parameters of PCV can be studied.

On individual observations, above 50 % of the total participants had their Hb above normal range and it agrees with study of Akinbam et al., [10] who reported that increase in plasma volume is relatively greater than the increase in red cell mass, which results in a fall in maternal Hb, hence the physiological anemia that occurs in pregnancy, but contradict with the study of Chandra et al., [11] who reported that, the drop in hemoglobin is typically by 1–2 g/dL by the late second trimester and stabilizes thereafter in the third trimester, when there is a reduction in maternal plasma volume owing to an increase in levels of atrial natriuretic peptide. Also the significance level of the PCV could denote the compliance of pregnant women to routine check-up of their PCV since it was significant across the trimesters under random sampling technique for participants. The increased WBC within individual trimester could be as a result of increased inflammation or defensive immune response to infection. The study shows a non-significant increased levels of total WBC among the pregnant women in a specific trimester [12]. The mean total WBCs count shows no progressive increase from first to third trimester. This might be due to less

physiologic stress as the employment status show the highest frequency of unemployed participants 364 (65.9), this is not in agreement with [13] who reported increased mean WBC count with the progress in gestation. This discrepancy might also be due to difference in socioeconomic and educational status, multi-factorial causes of anemia, prevalence of malaria, access to health care services, access to iron supplementation. The main strength of this study is the fact that despite working from a less resourced setting, we have been able to combine the measurement of hematological parameters, unlike many other studies, where the two types of tests had been done independently. These measurements were done concurrently on same subjects, whereas in other studies, different subjects were used.

5. CONCLUSION

Conclusively, packed cell volume is an important indicator in hematological indices of pregnant women and from the present study it is significant across the trimesters of the pregnant women within the study. Part of the other variables that affect the frequency and significant level of the PCV is the socioeconomic status and gravidities. Possibilities towards monitoring the PCV of pregnant women attending ANC in order to reduce birth challenge and delivery causality is by improving sensitivity course for the patient, also provision of easily assessable means of measuring PCV or its related variable in every ANC routine.

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