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Assessment of Nutritional Status and Prevalence of Hypertension among Pregnant Women Attending Antenatal Clinic in Adventist Hospital, Accra-Ghana

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Abstract
Background Pregnancy is deemed to be a wonderful experience for the expectant mother. Evidences manifested that adequate intake of nutrition is a key component for individual's health and well-being, particularly during pregnancy. It is well known that inadequate maternal nutrition results in increased risks of short term consequences such as; low birth weight, preterm birth, Intra Uterine Growth Restriction, prenatal and infant mortality and morbidity.

Objective The objective of the study is to assess nutritional status and prevalence of hypertension among pregnant women Attending Antenatal Clinic in Adventist Hospital, Accra-Ghana

Methodology Using a cross-sectional design, 150 consenting participants were selected for the study. Maternal age, gestational age was collected from the antenatal record booklet. Hemoglobin levels, BMI, hypertension were assessed. Data were analyzed using the SPSS programme IBM version 20. Chi-square was used to investigate the association between independent variables and BMI categories. A $p<0.05$ was considered as statistically significance.

Results The findings indicate that 41.3% of the pregnant women were anaemic, 17.3% were obese and 10.0% were hypertensive.

Conclusion The study established that the prevalence of anemia was high and it is associated with parity. Preventive efforts targeting preconception nutrition and promotion of regular antenatal care visit throughout the normal pregnancy is urgently required.
The result show that 8% were overweight and 12% were obese

Keywords Body Mass Index, Blood Pressure, Hemoglobin and Trimester.

Introduction
Pregnancy is deemed to be a wonderful experience for the expectant mother. Evidences manifested that adequate intake of nutrition is a key component for individual's health and well-being, particularly during pregnancy (Daba et al., 2013). It is well known that inadequate maternal nutrition results in increased risks of short term consequences such as; low birth weight, preterm birth, Intra Uterine Growth Restriction, prenatal and infant mortality and morbidity (Akgun et al., 2017). Moreover, excessive intake of nutrients during pregnancy can lead to some pregnancy complications such as, preeclampsia and gestational diabetes, macrosomia, and higher prevalence of cesarean section (Daba et al, 2013).
Physiological changes in pregnancy can be divided into two basic groups: those occurring in the first half of pregnancy and those in the second half. In general, physiological changes in the first half are considered "maternal anabolic" changes because they build the capacity of the mother's body to deliver relatively large quantities of blood, oxygen, and nutrients to the fetus in the second half of pregnancy. The second half is a time of "maternal catabolic" changes in which energy and nutrient stores, and the heightened capacity to deliver stored energy and nutrients to the fetus, predominate (Brown et al., 2011).
Approximately 10% of fetal growth is accomplished in the first half of pregnancy, and the

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remaining 90% occurs in the second half. The list of physiological changes that normally occur during pregnancy is extensive and such changes affect every maternal organ and system.

During pregnancy woman's normal nutritional requirement increases to meet the needs of the growing fetus (Marangoni, Cetin, Verduci, et al., 2016) and the maternal tissues associated with pregnancy (Adikari et al., 2016). For the period of pregnancy, women require additional food, an assorted diet, and micronutrient supplements. When energy and other nutrient intake does not increase, the body's own reserves are used, leaving a pregnant woman weakened (Riang'a, Broerse, Nangulu, 2017).

Energy requirements augment in the second and mostly the third trimester of pregnancy. Insufficient weight gain during pregnancy often results in low birth weight, which increases an infant's risk of dying. Pregnant women also need additional iron, iodine, vitamin A, folate, protein, and other nutrients. Lacks of certain nutrients are connected with maternal complications and death, fetal and newborn death, birth defects (Wehby et al., 2011) and decreased physical and mental potential of the child.

Anthropometry deals with measurements of body sizes and proportions). Unlike nutritional evaluation during other period of life which is concerned only with individual(s) in whom the measurements are made, measurements during pregnancy and lactation are expected to reflect both the nutritional status of the women and indirectly growth of fetus and later the quality and quantity of the breast milk (act/scn, 1992).

Anemia is defined as decrease in the total amount of red blood cells (Acheampong, Appiah, Baffour-Awuah et al., 2018); Olatunbosun et al., 2014), or when RBC don't contain enough hemoglobin that may results in oxygen shortage of the blood, which increase heart's rate that may eventually raise the risk for coronary heart diseases. The objective of the study is to assess nutritional status and prevalence of hypertension among pregnant women Attending Antenatal Clinic in Adventist Hospital, Accra-Ghana

Methodology

A cross sectional study was conducted between August and December, 2017 at Adventist Hospital, Accra among pregnant women attending antenatal care to assess nutritional status and prevalence of hypertension. A total of 150 apparently healthy pregnant women (age range; 15-44 years) were recruited. Subjects were informed and their consent was sought. Information was collected on general information, educational level, term pregnancy, weight and dietary habits.

Body weight was measured with shoes off to the nearest 0.1kg using bathroom scale; it was validated with standard weight and corrected for zero inaccuracy. Height was measured without shoes to the nearest 0.5cm using stadiometer. The body mass index (BMI) was calculated as weight in kilograms divided by the square (Helal, Fick-Brosnahan, Reed-Gitomer & Schrier, 2012) of the height in meters. BMI of participants were categorized as underweight (BMI<18.5), normal weight (BMI <25kg/m^2), overweight ($\geq$25 to 29.9kg/m^2), and obese (BMI $\geq$30kg/m^2).

The blood pressure of the participants was measured using sphygmomanometer and stethoscope. Average of two systolic and diastolic blood pressure measurements was calculated and was used as variables in the analysis

Hemoglobin, Serum was estimated using Urit -3000 plus haematology analyser. Dietary habits were measured and the frequencies of consumption were collected by a direct answer to the candidate to multiple choice questions.

Data was analyzed using the SPSS version 20.0 programme. Tables, frequency and distribution, were constructed. Chi-square was used to investigate the association between independent variables and body mass index (BMI) categories.

Result

Table1: Socio-demographic characteristics among the pregnant women

Age (yrs)	Freq(n = 150)	%
15-20	1	0.7
21-24	15	10.0
25-29	38	25.3
30-34	50	33.3
35-39	37	24.7
40-44	9	6.0
Level of education		
Primary and Below	43	28.7
Junior Secondary	68	45.3
Senior Secondary	23	15.3
Tertiary	16	10.7

Anthropometric characteristics of the study population

The mean values of physical measurements are shown in Table 2. The results indicate that the average age 31.69years, weight 66.10kg, height was 162.44cm, BMI was 25.18Kg/m^2 systolic blood pressure (SBP) was 113.43mmHg and diastolic pressure (DBP) was 73.82mmHg.

Table 2: Anthropometric characteristics of the study population

Variables	Minimum	Maximum	Mean	Std. Deviation
Age(Years)	20.00	42.00	31.69	5.05
Weight(Kg)	41.00	116.00	66.10	12.48
Height(m)	142.00	179.00	162.44	7.26
SBP(mmHg)	90.00	180.00	113.43	13.77
DBP(mmHg)	45.00	110.00	73.82	9.85
BMI(Kg/m^2)	16.80	46.22	25.13	5.32

The Table 3 presents results on the baseline characteristics of participants and comparison among different BMI groups. Results indicated that, 56.0% had normal BMI, 26.0% were overweight and 17.3% were obese. Underweight women were only 1 (0.7%). The overweight and obese women were particularly 25years or older, multiparous, and had hypertension.

Table 3: Baseline characteristics of participants and comparison among different BMI groups

Variables	Underweight	Normal	Overweight	Obesity	Total
Age Chi-Square= 9.569, P=0.846					
15-20	0(0.0)	1(100.0)	0(0.0)	0(0.0)	1(0.7)
21-24	0(0.0)	10(66.7)	3(20.0)	2(13.3)	15(10.0)
25-29	1(2.6)	17(44.7)	11(28.9)	9(23.7)	38(25.3)
30-34	0(0.0)	32(64.0)	10(20.0)	8(16.0)	37(33.3)
35-39	0(0.0)	18(48.6)	13(35.1)	6(16.2)	37(24.7)
40-44	0(0.0)	6(66.7)	2(22.2)	1(11.1)	9(6.0)
Gestational Age Chi-Square= 6.367, P=0.383					
0-12	0(0.0)	10(76.9)	0(0.0%)	3(23.1)	13(8.7)
13-27	0(0.0)	35(53.0)	19(28.8)	12(18.2)	66(44.0)
28-40	1(1.4%)	39(54.9)	20(28.2%)	11(15.5)	71(47.3)
Parity Chi-Square= 11.446, P=0.491					
No Child	0(0.0)	27(60.0)	14(31.1)	4(8.9)	45(30.0)
1 Child	1(2.6)	24(61.5)	8(20.5)	6(15.4)	39(26.0)
2 Children	0(0.0)	17(42.5)	11(27.5)	12(30.0)	40(26.7)
3 Children	0(0.0)	9(64.3)	3(21.4)	2(14.3)	14(9.3)
4 Children	0(0.0)	7(58.3)	3(25.0)	2(16.7)	12(8.0)
Hemoglobin Estimation Chi-Square= 4.565,p= 0.207					
Normal	1(1.1)	51(58.0)	18(20.5)	18(20.5)	88(58.7)
Anemia	0(0.0)	33(53.2)	21(33.9)	8(12.9)	62(41.3)
Hypertension Chi-Square= 3.734, P=0.292					
Normal	1(0.7)	79(58.5)	33(24.4)	22(16.3)	135(90.0)
HTN	0(0.0)	5(33.3)	6(40.0)	4(26.7)	15(10.0)
Total	1(0.7)	84(56.0)	39(26.0)	26(17.3)	150(100.0)

Table 4 shows the distribution of BMI, hemoglobin and blood pressure among the subjects under study. The results indicate that pregnant women in the 3rd trimester group have higher value of mean BMI. Lowest mean value of hemoglobin was obtained in the 3rd trimester group, on the other hand the values declined from the 1st trimester through the 3rd trimester. The mean blood pressure value was found to be highest in the 3rd trimester and declined through the 2nd trimester, 1st trimester.

Table 4: Mean Blood Pressure, BMI, and Hemoglobin estimation among Pregnant Women

PW	MeanSBP± SD	MeanDBP± SD	MeanBMI±SD	Mean Hb± SD
1st Trimester	108.08±11.46	69.00±8.92	24.66±6.00	10.63±1.28
2nd Trimester	113.50±11.04	75.27±9.28	25.22±5.77	10.96±1.31
3rd Trimester	114.34±16.18	73.35±10.32	25.41±5.32	10.73=±1.28

The result indicates that 41.3% of the pregnant women were anaemic, 17.3% and 10.0% were obese and hypertensive.

Table 5: Distribution of pregnant women by presence hypertension, anemia and obesity

Diseases	Number	Percentage
Anemia	62	41.3
Obesity	26	17.3
Hypertension	15	10.0
No Disease	47	31.4

Dietary Pattern and Food Frequency of the Participants.
Participants that answered to the question on the number of times they eat in a day, 93(62%) eat thrice daily, 39(26%) eat twice daily, while 6(4%) eat more than three times in a day. The meal most consumed daily is lunch 99(66%) followed by breakfast 34(22.7%) and dinner 17(11.3%).

Discussion
During pregnancy, an expectant mother body produces more blood to support the growth of her baby. Therefore the changes that take place demand enough iron or certain other nutrients to be able to produce the amount of red blood cells it needs to make this additional blood. Iron deficiency is a major cause of anemia and the most prevalent nutrients deficiency among pregnant women in developing countries (Kabiru et al., 2012; Acheampong, Appiah, Baffour-Awuah et al., 2018).

Obese women have an increased risk of miscarriage, birth defects and caesarean delivery as compared with women of normal weight. This number of pregnancy complications and, as such, requires adjustment to routine prenatal care. A recent meta-analysis of 9 studies revealed that obese pregnant women have an estimated risk of stillbirth that is twice that of normal weight pregnant women (Leddy, Power, Schulkin, 2008). Maternal anthropometric status assessment during pregnancy reflects growth status. These indicators may reflect past events predict future events or indicate the current nutritional status. According to World Health Organisation to the extent where the weight is usually highly correlated with the size, it can serve as a general indicator of the quality of growth in the mother. Our findings reveal that 17.3% of pregnant women were obese. Changes in BMI reflect the physiological changes of body size during pregnancy.

Statistical significance association between maternal age and BMI was not found (P=0.846) but BMI was significantly higher between the age range of 25 to 39years as shown in table 3. Maternal Age and body mass index (BMI) are important factors in whether a woman will

develop gestational diabetes mellitus. Those factors are particularly relevant in black African and South Asian women, according to a study published online November 2 in *BJOG*. Early detection is critical to the effective treatment of gestational diabetes mellitus. Health message of healthy eating and weight control, is particularly crucial in during pregnancy

Statistical significance association between parity and BMI was not found (P=0.491) but BMI was significantly higher in multiparas. However, observing of the gestational weight gain through actions that support a healthier lifestyle is needed, regardless of parity and nutritional status, in order to prevent excessive gestational weight gain and postpartum weight retention and consequently inadequate pre-pregnancy nutritional status in future pregnancies (Paulino et al., 2016). According to Abrams and colleagues childbearing is associated with permanent weight gain in some women, but the relationship differs by maternal BMI in young adulthood, number of births, race-ethnicity and length of follow-up. Given that overweight women may be at special risk for accumulation of permanent, long-term weight after childbearing, effective interventions for this group are particularly needed (Abrams, Heggeseth, Rehkopf, Davi, 2013).

Statistical significance association between anemia and BMI was not found (P=0.292) but anemia was significantly higher in normal weight subject. This is consistent with a study which reported that women with overweight/obesity were less likely to be anemic as compared to normal weight women (Qin et al., 2013). Anemias in pregnant women are frequent in general, and depend in part on nutritional status of the population (Taleb et al., 2011). The prevalence of anemia among women pregnant attending Adventist Hospital (41.3%) was higher. Similar results were reported on prevalence of anemia among pregnant women in previous studies (Jagadish et al., 2013; Jufar and Zewde, 2014, Kwabena Acheampong et al., 2018). The higher prevalence may be due to inadequate dietary iron intake and lack of proper nutrition during preconception period (Kwabena Acheampong et al., 2018).

Statistical significance association between hypertension and BMI was not found (P=0.261). The prevalence of the hypertension in pregnancy (10 %) found in this study was similar to 9.45% that had been reported from Accra. However, it was greater than 17% and 19.4 % that had been reported from Usmanu Danfodiyo University Teaching Hospital, Sokoto Nigeria (Singh et al., 2014) and Harare, Zimbabwe (Muti et al., 2015). The factor that may be responsible for the high prevalence of hypertensive disorder in our hospital could be due to the fact that it is a referral centre for the catchment areas (Singh et al., 2014).Hypertensive disorders of pregnancy remains a common and serious disease despite clear advances in knowledge of their pathophysiology. They represent the third cause of maternal mortality and the leading cause of perinatal mortality. The lower prevalence of hypertension this study as compared to other studies may be due to the fact that, majority of the participants (94%) were between the ages of 20-39years. Since biological effect of age increases arterial resistance due to thickening arterial wall that comes with it.

Pregnancy is a molecule-building process and a woman's normal nutritional requirement increases during pregnancy to meet the needs of the growing fetus and the maternal tissues associated with pregnancy (Durrani & Rani,2011;Kwabena Acheampong et al.,2018) If energy and other nutrient intake do not enhance, the body's own reserves are used, leaving a pregnant woman weakened. Energy needs increase in the second and particularly the third trimester of pregnancy, mainly due to increased maternal body mass (Diemert et al., 2016; Kwabena Acheampong et al., 2018). Energy requirements of pregnant women swell during pregnancy because of fetal development, placenta and its annexes, and because the heavier the mother makes her movements more energy pricey. Dinner was marked decrease in the consumption of all food groups at as compared lunch compared and breakfast. This was certainly due to the fact that pregnant women wanted to have a light stomach the night before bed to avoid vomiting and stomach burns.

Conclusion

The study revealed that pregnant women (especially those in the 3rd trimester) have higher BMI. Blood pressure appears to increase when the pregnancy progresses, which suggests the risk of gestational hypertension and hemoglobin appears to decrease with advancing pregnancy, which suggests the risk of anemia in pregnancy. Pregnant women should be educated on adequate healthy dietary intake to maintained normal height, weight, hemoglobin, blood pressure levels. Routine analysis of these parameters should be encouraged for all pregnant women at ante-natal clinics.

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