

Determinants of beta vulgaris l. (Beetroot) for the Treatment of Anaemia among Prenatal Mothers in a Secondary Health Institution in Osun State, Nigeria

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ABSTRACT

Background: Anemia is one of the most prevalent nutritional disorders in pregnant women and its prevalence in Nigeria remains high. Despite the health benefits of beetroot there is a dearth of information regarding the level of awareness, knowledge, and perceptions of pregnant women towards consumption of beetroot during pregnancy in Nigeria. Hence this study aimed at assessing the determinants of beta vulgaris L (beetroot) utilization for the treatment of anaemia among pregnant women attending antenatal clinic at the State Specialist hospital, Asubiaro. **Materials and methods:** The study employed descriptive cross-sectional research design, Taro Yamane formula was used to determine the sample size, and simple random sampling technique was used to select 120 pregnant women. A self-developed structured questionnaire was used to elicit data from the respondents same was coded and analyzed with SPSS version 25.0 and summarized using tables and charts.

Results: it was revealed that only 29(24.3%) of the respondents have awareness beetroot fruits in the management of anaemia in pregnancy while less than average 25 (20.8%) of the respondents had good level of knowledge on beetroot, majority 95(79.2%) had poor level of knowledge. Likewise less than half 50 (41.7%) of the respondents had good perception of beetroot in the treatment of anemia during pregnancy while, majority 71 (59.2%) had negative perception.

Conclusion: it was observed that there is low level of awareness, knowledge and perception of beetroot as a means of prevention and treatment of anemia among pregnant women in Osogbo hence there is need for intervention to promote its utilization.

Keywords: Anemia, Beetroot, Determinants, Management. Pregnancy,

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INTRODUCTION

Pregnancy is a thing of joy for women and their family members and everyone looks forward to the day of joyful delivery. Pregnancy refers to a period between conception and delivery that involves fetal growth and development.¹ During pregnancy the woman can be faced with challenges such as anaemia. The physiological need for iron and other nutrients are of increased, thus the need for adequate nutritional intake during pregnancy.^{2, 3} According to WHO, anaemia refers to a condition characterized by reduced number of haemoglobin concentration in the body.⁴ Iron is important for the formation of haemoglobin by the bone marrow in the body, it is a protein that transports oxygen to the body tissues and gives the blood its red colour.^{2, 5} Several factors such as nutritional deficiencies, parasitic, bacterial diseases, and congenital red blood cell disorders e.g. thalassemias can lead to anaemia in pregnancy however; the main cause is iron deficiency.⁵ Lack of iron in the body will result into a type of anaemia called iron-deficiency anaemia which can impair the growth and development of the fetus during and after pregnancy.⁵ Increased demand for iron in pregnancy, inadequate knowledge of iron-deficiency anaemia and lack of consumption of blood-added tablets during pregnancy are all contributing factors to the high incidence of anaemia in pregnancy. Studies have showed that 37% of pregnant women between the ages of 15–49 years suffered from anaemia in 2019, also, close to 20–80% of females worldwide experience iron deficiency anemia, furthermore about 48% of Asian women, 57% of African women, 24% of American women, and 25% of European women suffered from anaemia in pregnancy in 2020. While in low income countries, anaemia in pregnancy accounts for about 40% of maternal deaths.^{5, 6}

Anemia in pregnancy is a potential danger for both the mother and the unborn child. Its impact can be felt during pregnancy, childbirth and the puerperium.¹ Anaemia in pregnancy is said to occur when the hemoglobin levels are between 7-10.5 g/dL.¹ During pregnancy, irrespective of the cause of anaemia it can lead to complications such as: disruption of normal fetal development, miscarriage, risk of preterm birth, low birth weight, bleeding, infectious diseases and death.^{1, 2, 3} The treatment of anaemia depends on its cause such as: blood booster tablets, ensuring adequate nutritional intake Blood transfusions, iron supplementation (Oral iron, intravenous iron) Vitamin B supplementation and folic acid are some of the available methods of treating pregnant women with haemoglobin levels less than 10g/d.^{1, 7} The Non-pharmacological methods of treating anaemia include the consumption of green vegetables, beans, chicken livers, salted fish, beetroots (or beets), and dragon fruit, etc.¹

Beetroot is the Taproot portion of a beet plant scientifically known as *Beta vulgaris* L. It has been found that it has a lot of therapeutic functions such as; it increases hemoglobin,

hematocrit and erythrocyte levels. Beetroot contains nitrate which controls high blood pressure, ascorbic acid, carotenoids, phenolic acid, flavonoids and high level of betalanin pigments, high folic acid and iron content and thus aids in the prevention and treatment of anaemia.^{2, 5, 8} Hence this study aimed at assessing the determinants of beetroot utilization for the treatment of anaemia among pregnant women attending antenatal Clinic at State Specialist Hospital, Asubiaro. This study is first of its kind in Osogbo and Osun State thus making it a novel in this part of the world.

METHODS AND MATERIALS

Study design: A descriptive cross-sectional research design was employed to assess the determinants of beetroot use for the treatment of anaemia among pregnant women attending the antenatal clinic at State Specialist Hospital, Asubiaro, Osogbo.

Study area: This study was conducted at the State Specialist Hospital Asubiaro, Osogbo, Osun state, Nigeria. The hospital was owned by Osun State Government, it operates 24 hours services. It has about 250-bed capacity, it serves as a referral center for other hospitals and provides both in, outpatient and specialize services for the people of the town and beyond. The Nigerian Ministry of Health has granted license to the facility and registered as a Tertiary Health Care Center. The Antenatal Unit of the hospital was specific location of this study.

Study population: The target populations for the study were pregnant women attending the ante-natal clinic at State Specialist Hospital Asubiaro. The total population of pregnant women visits to the clinic averagely in a week is 150. Participants were sampled during clinic hours

Sample size determination: The sample size was determined using the Taro Yamane's formula $n = N / (1 + N(e)^2)$ Where: n =no sample size, N =total population size, e =margin of error (0.05) Substitute numbers in formula: $N=150$, $e= 0.5$ $n = 150 / (1 + 150(0.5)^2)$ $n = 150 / (1 + 150(0.0025))$ $n = 150 / (1 + 0.375)$ $n = 150 / 1.375$ $n = 109$. Attrition rate 10% was calculated 11 same was added to cover for any loss or incomplete filling of the questionnaire. The calculated sample size for the study is 120

Sampling procedure

A simple random sampling technique was employed to select eligible pregnant women attending the antenatal clinic at State Specialist Hospital, Asubiaro, Osogbo, Osun State. During each antenatal clinic visit, a sampling frame of all eligible pregnant women who met the inclusion criteria was prepared. Each eligible participant was assigned a unique

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identification number, and simple random sampling (balloting without replacement) was used to select respondents. Participants who were selected and gave written informed consent were recruited into the study. The recruitment process continued during successive antenatal clinic visits until the required sample size was attained. The study included pregnant women who were attending antenatal care at the study facility and had booked for antenatal care. Pregnant women who were hospitalized at the time of data collection, and those who declined to participate were excluded from the study.

Research instrument

A self-structured questionnaire was used as the instrument for data collection. The instrument was developed following an extensive review of relevant literature and in line with the objectives of the study. Prior to data collection, the questionnaire was subjected to face and content validity, and its reliability was established. The questionnaire consisted of four (4) sections: **Section A:** Socio-demographic characteristics of the respondents. This section contained ten (10) items designed to obtain information such as age, educational level, occupation, parity, gestational age, and other relevant background characteristics. **Section B:** Awareness of the availability of beetroot. This section contained nineteen (19) items that assessed respondents' awareness regarding the availability and accessibility of beetroot. **Section C:** Knowledge of the nutritional value of beetroot among pregnant women. This section consisted of seven (7) items with **Yes/No** response options. Responses were scored and categorized into **high** and **low knowledge** based on the predetermined scoring criteria. **Section D:** Perception of the use of beetroot for the treatment of anaemia during pregnancy. This section contained five (5) items with **Yes/No** response options. Responses were scored and categorized as either **positive** or **negative perception** according to the established scoring criteria. The face and content validity of the instrument were established by experts in maternal and child health nursing and research methodology to ensure that the questionnaire adequately measured the intended variables. Reliability testing was conducted among pregnant women in a health facility outside the study area but with similar characteristics to the study setting. The internal consistency of the instrument was determined using Cronbach's alpha, which yielded a reliability coefficient of **0.75**, indicating that the instrument was reliable for the study. The questionnaire was administered to respondents after obtaining informed consent and explaining the purpose of the study as well as the instructions for completing the questionnaire. Respondents were encouraged to answer all questions honestly and independently. Completed questionnaires were collected immediately after completion to minimize loss and ensure a high response rate.

Data Analysis

The retrieved questionnaires were checked for completeness and consistency before data entry. The data were coded, entered into the Statistical Package for the Social Sciences (SPSS) version 27.0, and analyzed using descriptive statistics, including frequencies and percentages. The results were presented in tables.

Ethical statement

Ethical clearance with reference no OSHREC/PRS/569T/506 was obtained from the Osun State ministry of health to carry out the study. Informed consent (both verbal and written) was obtained from the respondents. The principle of confidentiality and anonymity was maintained throughout the study. Participation was entirely voluntary; participants were not coerced into the study.

RESULTS

Table 1: Socio-demographic Characteristics of the Respondents

Variable	Categories	Frequency	Percent
Age	Less than 20	7	5.8
	20-29	74	61.7
	30-39	34	28.3
	40 and above	5	4.2
Highest level of education	Primary School	8	6.7
	Secondary School	55	45.8
	Tertiary	57	47.5
Employment Status	Student	5	4.2
	Full Housewife	6	5.0
	Self employed	79	65.8
	Civil Servant	23	19.2
	Unemployed	7	5.8
Religion	Christianity	67	55.8
	Islam	48	40.0
	Traditional	1	.8
	Others	4	3.3
How many children do you	None	42	35.0

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have?

	One	33	27.5
	Two	30	25.0
	Four and above	15	12.5
Ethnic Group	Yoruba	115	95.8
	Igbo	5	4.2
Trimester	First	40	33.3
	Second	50	41.7
	Third	30	25.0
Monthly income	<10,000	9	7.5
	11-15,000	8	6.7
	16-20,000	12	10.0
	Above 20,000	91	75.8

Table 1 presented the Socio-demographic characteristics of respondents. In which majority 74(61.7%), were between ages 20-29yrs, while very few 5(4.2%) were within the ages of 40yrs above. Educationally, less than average of the respondents 57(47.5%) had tertiary education, 79(65.8%) were predominantly self-employed. 67(55.8%), the result showed that the respondents were Christian dominated 67(55.8%), followed by Islam 48 (40.0%). Their family size varied, 42(35.0%) of the respondents had no child, while 33(27.5%) had just one. 115(95.8%) were from Yoruba ethnicity. Less than average 50(41.7%) of the respondents were in the second trimester. Majority 91(75.8%) reported monthly incomes above 20,000.

Table 2. Awareness on beetroot among pregnant women attending antenatal clinic at the State Specialist Hospital, Asubiaro

Variables	Yes (%)	No (%)
Information about beetroot		
Have you heard about beetroot before?	41 (34.2)	79 (65.8)
Source of information concerning beetroot		
Internet	39(32.5%)	81(67.5)
Social media	62(51.7%)	58(48.3)
Family/friends	15(12.5)	105(87.5)
Hospital	6(3.3%)	114(95.0)
Have you seen beetroot before?	29 (24.2)	91 (75.8)
Description of Beetroot		
It is a tuber-like type of fruit	28 (23.3)	92 (76.7)
It is reddish purple in color	31 (25.8)	89 (74.2)
It is readily available in the market	39 (32.5)	81 (67.5)
It is very cheap	27 (22.5)	93 (77.5)
Taste of Beetroot		
Have you taken it before?	9 (7.5)	111 (92.5)
It has a bitter taste	0 (0.0)	120 (100.0)
It has a coarse nature on the tongue	11 (9.2)	109 (90.8)
It has a very sweet taste	0 (0.0)	120 (100.0)
Usefulness		
It can be used for lowering blood pressure	20 (16.7)	100 (83.3)
It can be used for prevention of anemia	24 (20.0)	96 (80.0)
It can be used for treatment of anemia	37 (30.8)	83 (69.2)
It can improve heart failure and heart diseases	25 (20.8)	95 (79.2)
It can fight against cancerous cells	21 (17.5)	99 (82.5)
It can help to keep your weight in check	33 (27.5)	87 (72.5)
It can reduce glucose levels and symptoms of diabetes	31 (25.8)	89 (74.2)
It can improve exercise performance	31 (25.8)	89 (74.2)

Table 2. Revealed that only 29(24.3%) of the respondents had adequate level of awareness and more than three quarter, 91(76%) of the respondents had inadequate level of awareness.

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Table 3: Knowledge of the nutritional value of beetroot among pregnant women attending antenatal clinic at the State Specialist Hospital, Asubiaro

Variables	Yes (%)	No (%)
Content		
Beetroot contains iron	38 (31.7)	82 (68.3)
Beetroot contains folic acid	22 (18.3)	98 (81.7)
Beetroot contains nitrate	14 (11.7)	106 (88.3)
Consumption		
It can be eaten raw like that	20 (16.7)	100 (83.3)
It can be processed into juice form	31 (25.8)	89 (74.2)
It needs to be cooked before consumption	1 (0.8)	119 (99.2)
It can be processed into yogurt	12 (10.0)	108 (90.0)

Table 3 illustrated that less than average 25 (20.8%) of the respondents had good level of knowledge on beetroot while majority 95(79.2%) had poor level of knowledge.

Table 4 Perception of Pregnant women attending antenatal clinic at the state specialist hospital, Asubiaro on ways of using beetroot for anemia treatment

Questions	Yes/positive (%)	No/negative (%)
Do you believe that beetroot can effectively treat anemia during pregnancy?	50(41.7)	70 (58.3)
Have you ever consumed beetroot during pregnancy?	3 (2.5)	117(97.5)
Are you willing to include beetroot in your diet for anemia prevention/treatment?	49(40.8)	71 (59.2)
Do you prefer taking beetroot to other iron supplements?	31(25.8)	89 (74.2)
Do you prefer consuming the beetroot juice than the whole fruit?	19(15.8)	101 (84.2)

Table 4 showed that less than half 50 (41.7%) of the respondents had good perception of beetroot in the treatment of anemia during pregnancy while, majority 71 (59.2%) had negative perception.

DISCUSSION

Results of this study showed that majority of the pregnant women falls within the age range of 20-39 years (approximately 90%), these indicate that these women were at the stage where pregnancy is relevant. Moreover, the values 93% reflected in the findings showcase a commitment to education, this suggests a certain level of literacy and similar findings on the age range of respondents were reported in a study conducted by

Wahab et al., who stated that majority (60%) of the respondents were between the ages of 20 — 35 years.⁹ They also reported similar findings on the level of education of the respondents as half (50%) of their respondents had high school education, The employment status and monthly income distribution of the respondents of this study further elucidates the respondents' financial capacity. 76.7% have a monthly income exceeding 15,000 naira. This financial stability indicates the potential for affording beetroot and other essential nutritional items during pregnancy. The observed financial stability among respondents of this study is contrary to findings of Hoofman et al.¹⁰ Who reported a high level of low monthly income among respondents which created economic challenges and uptake of adequate fruit which include beetroot. Furthermore, the diverse gestational trimester distribution among respondents underscores the varying stages of pregnancy and their unique nutritional requirements, which is a foundation for promoting healthy eating habits during pregnancy.

Findings of this study revealed that the level of awareness of beetroot among pregnant women attending ante-natal clinic at state specialist hospital Asubiaro is very low 29(24.3%). This showed that few were aware of its availability, affordability and cost-effectiveness, which could influence consumption patterns. This is in line with the results of the study conducted by Maloba which revealed that only 14.1% of pregnant women were aware of beetroot fruit prior antenatal clinic.¹¹ Similarly, a study conducted by Sakdah et al. revealed low level of awareness on the nutritional benefit, and management of anaemia in pregnancy; also, an observational study by Sakdah et al., reported similar findings of lack of awareness about beetroot's usefulness this can leads to low level of consumption and high prevalence of anemia among pregnant women.¹² In contrast the findings of this study is not in line with the findings of Kusumahati and Rahmawati., reported that 97.6% of pregnant women display high level of awareness of making healthy drinks from beetroot. This indicates that much work needs to be done by the healthcare workers, social media and community as a whole in creating more awareness about the beetroot fruits, its usefulness and cost effectiveness so as to reduce the prevalence of anaemia in pregnancy. Furthermore, findings of this study revealed that majority 95 (79.2%) of the pregnant women possess inadequate knowledge on the nutritional value of beetroot fruits. Majority lacks understanding of its beneficial components such as iron, folic acid, and nitrate. This indicates a potential gap in understanding the comprehensive nutritional profile of beetroot, which includes essential nutrients crucial for maternal and fetal health. This finding is contrary to that of Kusumahati, & Rahmawati, which revealed that larger proportion of pregnant women were able to identify beetroot as source of iron.³ Similar study by Khairiah and Butar showed that third trimester pregnant women at Budhi Asih Hospital had adequate level of knowledge on the nutritional content of beetroot after they had been exposed to counseling on beetroot as an essential source of iron supplementation which can also be

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used in the management of anaemia in Pregnancy.¹³ This showed that adequate information / training for pregnant women will go a long way in increasing their level of understanding and readiness to use beetroot as a means of treatment for anaemia in pregnancy. Furthermore, findings of this study also shed light on pregnant women's understanding of how beetroot can be consumed. About one-quarter of the respondents acknowledged that beetroot can be processed into juice form suggesting openness to incorporating it into their diets in a convenient and palatable manner. This finding is contrary to that Wahab et al. on the effect of beetroot juice on management of anaemia in third-trimester, majority of their respondents are vast in knowledge of preparing beetroot for consumption.⁹ In addition findings from this study is similar to that of Rifni et al. who observed that only few respondents were aware of different methods of consuming beetroot rather than raw consumption. This implies that pregnant women needs to be enlightened on different methods of consuming beetroot without losing the nutritional value in managing anaemia in pregnancy.¹⁴

PERCEPTION OF PREGNANT WOMEN ON THE USE OF BEETROOT FOR ANEMIA TREATMENT

It was deduced from the findings of this study that the perception of pregnant women on potential role of beetroot in managing anaemia during pregnancy is negative because minority of the respondents believed in beetroot's efficacy for the treatment of anemia in pregnancy, this was in agreement with the findings from the study of Lestari et al. which stated that few of their respondents believed that beetroot not only treats anemia when it occurs but also prevents anemia in pregnancy.¹⁵ Despite the low consumption rates, among the respondents less than average of them express willingness to including beetroot in their diet for anemia prevention or treatment. This willingness signals receptiveness among pregnant women to explore alternative dietary approaches to manage anemia, highlighting the potential for education and awareness campaigns to promote beetroot as a viable nutritional intervention during pregnancy. Additionally, the preference for beetroot over conventional iron supplements among the respondents underscores the perceived value of natural dietary sources, suggesting a preference for holistic approaches to health management. In contrast to the findings of this study Pibriyanti and Safira et al. in Saudi Arabia reported contradictory findings as majority of their respondents had good perception and prefer beetroot juice and ice cream as an alternative technique of preventing anaemia.¹⁶

CONCLUSION

The study revealed low level of awareness, knowledge and negative perception of beetroot as a means for treatment of anaemia in pregnancy, lack of awareness,

accessibility and cost effectiveness may be a prevailing factor for the prevalence of anaemia in pregnancy in this part of the world, considering the complications of anaemia in pregnancy. It is therefore, recommended that similar topics should be done among midwives/ healthcare workers, also pregnant women needs to be trained on the accessibility, nutritional values and cost effectiveness of beetroot in the management of anaemia in pregnancy.

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