



FOOD-BASED STRATEGY TO IMPROVE IRON STATUS OF PREGNANT WOMEN IN NIGERIA

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Abstract: The study determined the effect of daily consumption of periwinkle on the iron status of pregnant women. One hundred and twenty pregnant women in their second trimester who were anaemic were selected from the antenatal clinic of the Bishop Shanahan Hospital, Nsukka, Nigeria. The women were randomly assigned to two groups – test group (TG) $n = 60$ and control group (CG) $n = 60$. Women in the TG consumed 50 g of periwinkle daily for six weeks with their normal diet while those in the CG consumed only the normal diet. Haemoglobin (Hb) and serum ferritin (SF) levels of the women were taken at baseline and at the end of the study. The mean Hb and SF concentrations of the pregnant women increased from 10.87 to 12.24 g dl⁻¹ and 11.21 to 19.67 µg l⁻¹, respectively in the TG at the end of the study. There were no significant changes in the mean Hb (10.41 vs. 10.46 g dl⁻¹) and SF (11.34 vs. 11.36 µg l⁻¹) concentrations of the women in the CG.

Keywords: periwinkle; pregnant women; Hb; haemoglobin; SF; serum ferritin; public health.

INTRODUCTION

Iron deficiency anaemia (IDA) in pregnant women is one of the most important public health problems in Nigeria (National Planning Commission/UNICEF, 2001). Severe anaemia may cause death directly and even mild anaemia may increase the probability that haemorrhage or exhaustion will be fatal (Ross and Horton, 1996). Anaemia in pregnancy is partly due to poor dietary

intake of bio-available iron and repeated cycles of pregnancy and lactation. Iron-folate supplementation strategy is widely used to control IDA among pregnant women, but its effectiveness is significantly reduced by non-compliance. In many instances, the pregnant women do not take the routine tablets because the deficiency symptoms are hidden and the women feel that they are healthy. The food-based approach using

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locally available, cheap, iron rich foods with iron enhancers could help in fighting IDA among pregnant women in Nigeria.

Periwinkle (*Littorina littorea*) is a small snail like marine mollusc. The animal food is cheap and readily available in Nigeria, particularly in the riverine areas. Periwinkle is rich in micro-nutrients particularly iron, copper, B₁₂ and magnesium (Bender and Bender, 1999; Nnam and Nwabueze, 2006). The iron is in the haeme form, which is readily absorbed. The interaction of nutrients in periwinkle could improve iron status of pregnant women who are at risk of IDA because of the increased physiological demands of pregnancy. The objective of the study was to determine the effect of daily consumption of periwinkle on the iron status of pregnant women in Nigeria.

MATERIALS AND METHODS

Materials

Periwinkle (*Littorina littorea*), used for the study was purchased from mile 1 market, Port Harcourt, Rivers state of Nigeria. The periwinkle was cleaned and shelled for use.

HUMAN FEEDING EXPERIMENT

About 120 pregnant women in their second trimester who were anaemic were selected from the antenatal clinic of the Bishop Shanahan Hospital, Nsukka, Nigeria. The women were fully informed about the purpose of the investigation before they signed written informed consent forms. Approval for use of humans as experimental subjects was obtained from the University of Nigeria Teaching Hospital Enugu State, Nigeria. The pregnant women were assigned to two groups $n = 60$ on the basis of haemoglobin (Hb) level. One group served as test group (TG). The women in the TG consumed 50 g of periwinkle added daily to their soup

for six weeks to provide 9 mg iron daily. The women in the control group (CG) consumed only the normal diet. The Hb and serum ferritin (SF) levels of the women were taken at baseline and at the end of the study.

DETERMINATION OF BIO-CHEMICAL INDICES

Haemoglobin

The Cyanomethemoglobin method as specified by the International Committee for Standardization in Haematology (ICSH, 1978) was used for the determination of Hb.

Serum ferritin

SF was measured by a two-site immunoradiometric assay and a radioimmunoassay method as given in Bothwell et al. (1979).

RESULTS AND DISCUSSION

Figure 1 shows the Hb levels of the pregnant women. The mean Hb of the pregnant women in the TG was 10.87 g dl⁻¹ at baseline and rose to 12.24 g dl⁻¹ at the end of the study. There was no significant change in the mean Hb of the pregnant women in the CG (10.41 vs. 10.46 g dl⁻¹). The increase in Hb level of the pregnant women in the TG could possibly due to interaction of nutrients from the added periwinkle. Iron absorption and utilisation are known to be improved by ascorbic acid, vitamins A, C, E, B₆, B₁₂, folic acid and riboflavin (Fisher et al., 2000; McLaren and Frigg, 2001). The form of iron also affects absorption. Periwinkle contains non-haem iron, which was readily absorbed by the women to improve Hb level.

Figure 2 shows the SF levels of the women. At baseline the mean serum ferritin concentration of the women in the TG was 11.21 µg l⁻¹ and rose to 19.67 µg l⁻¹ at the end of the study. There were no significant

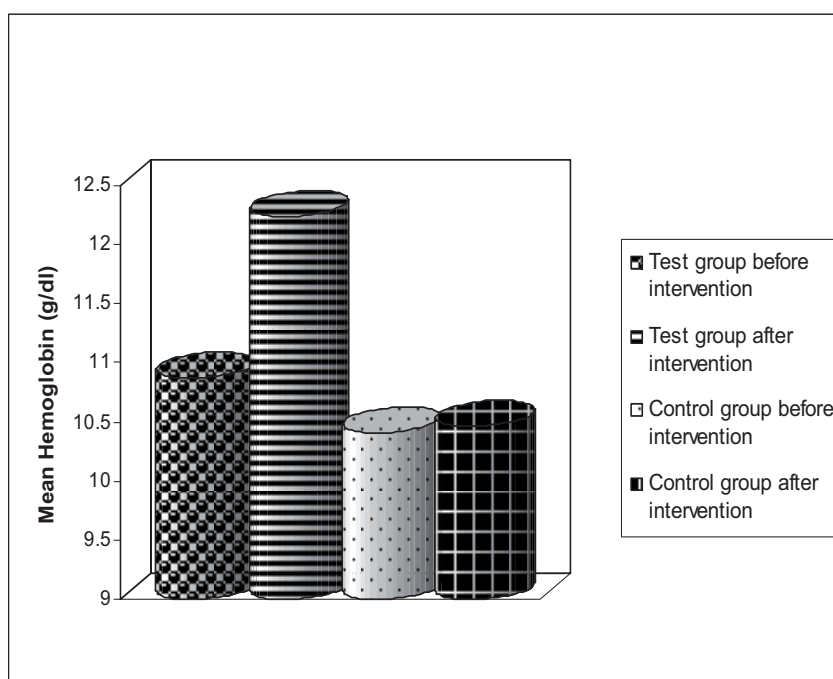


Figure 1 Hb levels of the pregnant women

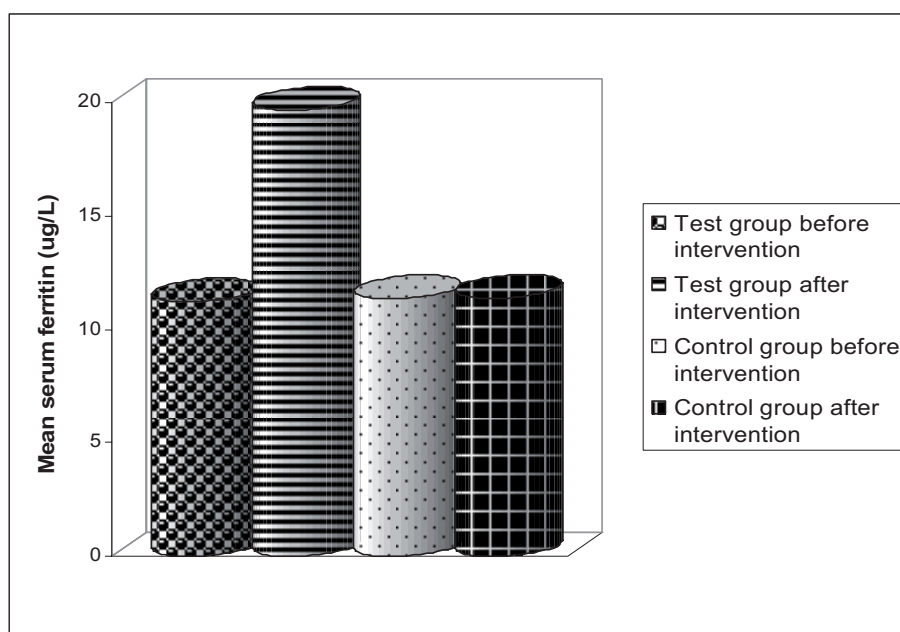


Figure 2 SF concentrations of the pregnant women

changes in the mean SF concentration of the women in the CG (11.34 vs. 11.36 $\mu\text{g l}^{-1}$). The increased SF concentration only for the women in the TG was indicative of improved iron status during the intervention. SF represents the 'bank account' or storage iron after the body has met the physiological needs. The increased physiological demand on iron during pregnancy affects SF concentrations.

CONCLUSION

Inclusion of periwinkle in the diet of the pregnant women significantly improved their iron status. Periwinkle is a cheap animal food with bio-available iron. The animal food could be easily incorporated into the diet of pregnant women to improve iron status.

BIOGRAPHY

Ngozi M. Nnam is a Professor of Public Health Nutrition. She holds a BSc in Home Science, MEd in Guidance and Counseling and MSc and PhD in Human Nutrition. She is affiliated to the Department of Home Science, Nutrition and Dietetics, University of Nigeria, Nsukka, Nigeria. She has travelled across continents to present papers in many International Science Conferences and Workshops. She has over 50 publications to her credit in reputable journals. Her research interest is on nutrition of infants, children and women.

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REFERENCES

- Bender, D.A. and Bender, A.E. (1999) Benders' dictionary of nutrition and food technology. Woodhead Publishing in Food Science and Technology, Cambridge, England. p. 434.
- Bothwell, T.H., Charlton, R.W., Cook J.D. and Finch, C.A. (1979) *Iron metabolism in Man*. Oxford: Blackwell.
- Fisher, S.M., Christian, P. and West, KP. (2000) 'Background: the role of vitamins in the prevention and control of anemia', *Public Health Nutrition*, Vol. 3, pp. 125–150.
- International Committee for Standardization in Haematology (Iron Panel) (1978) *British Journal of Haematology*, Vol. 38, p.291.
- McLaren, D.S. and Frigg, M. (2001) 'Sight and life manual on vitamin A deficiency disorders (VADD)', *Task Force Sight and Life*, Basel, Switzerland, pp.83–86.
- National Planning Commission/UNICEF (2001) 'Children's and women's rights in Nigeria: a wake-up call', *Situation Assessment and Analysis 2001*, Hodeges A Edition. pp.46–51.
- Nnam, N.M. and Nwabueze C.J. (2006) 'Evaluation of nutrient composition of periwinkle (*Littorina littorea*) and prawn (*Macrobrachium vollohovenii*) for possible use in complementary food', *Nigerian Journal of Nutritional Sciences*, Vol. 27, pp.6–8.
- Ross, J. and Horton, S. (1996) 'Economic consequences of iron deficiency', *The Micronutrient Initiative*, pp.25–26.