



Prevalence of Pre-operative Anaemia and Associated Blood Transfusion in Surgical Patients at the Rivers State University Teaching Hospital.

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ABSTRACT

Background: In sub-Saharan Africa a good number of pre-operative patients have deficit in packed cell volume or haemoglobin concentration as a result of multiple factors such as infections, poor nutrition and co-morbidities. For these reasons as work-up plan to optimize these patients prior to surgery there may be need for blood transfusion considering the benefit against the risk.

Aim: To determine the prevalence of pre-operative anaemia and associated blood transfusion in surgical patients at the Rivers State University Teaching Hospital (RSUTH).

Method: This was a six month cross sectional retrospective study of pre-operative patients at the Surgery and Obstetrics/Gynaecology department of the Rivers State University Teaching Hospital. The cut-off for anaemia was 33% in line with the World Health Organisation (WHO). Structured proforma was used to extract information from patients' case notes and analysed using SPSS version 25.

Result: The subjects for the study were 370, comprising of 146 (39.5%) males and 224 (60.5%) females. The mean age was 31 years. One hundred and ninety four (52%) were obstetrics and gynaecological surgeries while 176 (47.6%) were non-gynaecological surgeries. The commonest indication for surgery was caesarean section representing 126 (34.1%) of the subjects. Two hundred and seventy two of the subjects (73.5%) had anaemia. One hundred and eighty four (67.9%) women had anaemia while 88 (32.1%) of the men were anaemic. Forty (10.8%) of the subjects required blood transfusion.

Conclusion: The study revealed that prevalence of anaemia and blood transfusion amongst pre-operative patients at RSUTH were 73.6% and 10.8% respectively. Anaemia was highest amongst Obstetrics and gynaecological patients compared to other surgical patients. Surgical patients should be optimized prior to surgery, one of such modalities to be employed is blood transfusion when the need arises.

INTRODUCTION

Anaemia is a common feature in patients presenting for major elective surgeries.¹ It is considered an independent risk factor associated with adverse outcomes.¹ Pre-operative anaemia is defined as haemoglobin <13 g/dl.^{1-2,5} Data is scarce in middle and low income countries in patients with pre-operatives anaemia and associated blood transfusion.¹⁻³

In sub-Saharan Africa a good number of pre-operative patients have deficit in packed cell volume or haemoglobin concentration as a result of multiple factors such as infections, poor nutrition and co-morbidities.¹⁻² For these reasons as work-up plan to optimize these patients prior to surgery there may be need for blood transfusion considering the benefit against the risk.

It is worthy of note that pre-operatives anaemia is an independent risk factor associated with worse post operative outcomes, including length of hospital stay, need for critical care admission, post-operative mortality and blood transfusion.⁵⁻⁷ Scholars have suggested that all patients for elective surgery in whom blood loss is expected to be greater than 500ml should be checked preoperatively and be investigated if they are found to be anaemic.²⁻³ Women are expected to be more prone to develop anaemia when compared to men.^{4,5} This is found in situation when they present with the same amount of blood loss during surgery, because they have lower circulating blood volumes and reduced cell mass.⁴ This subsequently results in adverse clinical outcomes with higher transfusions rates and hospital length of stay.^{4,5}

Researchers globally advise that patients billed for major surgery operation and pre operative haemoglobin less than 13g/dl irrespective of gender should be considered at risk for adverse outcomes.⁷ This is based on the research work done by Rosencher et al where they investigated 1388 women who underwent borderline haemoglobin (Hb 12.0 – 12.9g/dl) was associated with increased red cell transfusion compared to higher haemoglobin levels (Hb>13g/dl).³

The World Health Organization (WHO) has emphasized that reasonable measures need to taken to optimize pre-operative patients, using patient's own blood volume using a patient blood management (PBM) approach.⁵ The burden of anaemia is more in the developing countries of the world; in these part of the globe factors that contribute to anaemia can best be explained by three important factors namely ignorance, illiteracy and poverty.³ Preoperative anaemia has been shown to be associated with increased blood transfusion, health care costs, morbidity and mortality.⁹⁻¹⁰

Aim/Objective

To determine the prevalence of pre-operative anaemia and associated blood transfusion in surgical patients at the Rivers State University Teaching Hospital (RSUTH).

MATERIALS AND METHODS

This was a cross sectional study of pre-surgical patients at Surgery and Obstetrics/Gynaecology departments of The Rivers State University Teaching Hospital. The sample size of 370 was calculated using the formular $n = Z^2 pq/d^2$. Where Z is the degree of confident = 1.96, P = 55, q = p-1, d is error margin = 0.05. Simple randomized sampling method was used. The cut-off for anaemia was 33% in line with the World Health Organization (WHO). The Information was analyzed using SPSS version 25.

Sample size estimation

The sample size of 370 was calculated using the Kish Leslie formula for cross-sectional studies calculated, based on 40% prevalence of pre-operative anaemia from the WHO study by Munoz M et al² and a confidence level of 95%.

$$n = Z^2 Pq/d^2$$

Where

n is the desired sample size

Z is the standard normal deviate usually set at 1.96, which corresponds to the confidence interval

P is the proportion of pregnant women with anaemia which in this case is 40%

q is complementary proportion equivalent to one (1), that is 1- 0.55% equal to 0.45%

d is the degree of accuracy desired which is 5.0% (0.05%)

$$n = 1.96^2 \times 0.55 (1 - 0.55)/0.05^2 \\ = 368.8$$

This was rounded up to the nearest whole number, the reason for using 370 as the sample size.

Study Population

This study will be conducted in the Rivers State University Teaching Hospital. It is a 370 bed hospital located at Harley Street Port Harcourt Local Government Area of Rivers State, South-South Nigeria. It is a tertiary health institution that provides all levels of health care services to Rivers, Bayelsa, Delta, Imo, Abia and Akwa-Ibom States. The Obstetrics/Gynaecology and surgical department are two of the clinical departments of the hospital with twelve (12) and ten (10) Consultant Staff respectively.

Methods

The relevant information for the study were extracted from case notes of patients in the obstetrics/gynaecology and surgery departments who were eligible for the study were given structured proforma. The content of the proforma were bio-data, socio-demographic characteristics and information on current and previous pregnancies.

Packed cell volume (PCV) was determined by collecting two millilitres (2mls) of venous blood. This was collected from the ante cubital vein using plastic disposable bottles for each of the subjects. The sample bottles contain ethylene diamine-tetra acetic acid (EDTA).

Packed Cell Volume estimation

The packed cell volume were obtained using a hematology auto analyser.

Inclusion Criteria

- ❖ Healthy patients with singleton pregnancy

Exclusion Criteria

- ❖ Patients with sickle cell disease and haemophilia
- ❖ Patients with vaginal bleeding in the current pregnancy

Data Analysis

The data were coded and analysed by using the Statistical Package For Social Sciences (SPSS) software version 25. P value <0.05 was considered significant.

RESULT

The subjects for the study were 370, comprising of 146 (39.5%) males and 224 (60.5%) females. The mean age was 31 years. One hundred and ninety four (52%) were obstetrics and gynaecological surgeries while 176 (47.6%) were non-gynaecological surgeries. The commonest indication for surgery was caesarean section representing 126 (34.1%) of the subjects. Two hundred and seventy two of the subjects (73.5%) had anaemia. One hundred and eighty four (67.9%) women had anaemia while 88 (32.1%) of the men were anaemic. Forty (10.8%) of the subjects required blood transfusion. For the educational status 17 (4.6%) had primary level of education, 222 (60%) had secondary education, 121 (32.7%) had tertiary education and 10(2.7%) had no formal education.

Table 1: Sex distribution of subjects in the study

| Sex | Frequency | Percentage(%) |
|--------|-----------|---------------|
| Male | 146 | 39.5 |
| Female | 224 | 60.5 |
| | 370 | 100 |

Table 2: Distribution of Surgeries

| Surgeries | Frequency | Percentage (%) |
|---------------------------|-----------|----------------|
| Obstetrics/gynaecological | 194 | 52.6 |

| Surgeries | Frequency | Percentage (%) |
|---|-----------|----------------|
| Non-obstetrics/gynaecological surgeries | 176 | 47.4 |
| | 370 | 100 |

Table 3: Distribution of anaemic and non-anaemic subjects

| Subjects | Frequency | Percentage (%) |
|-------------|-----------|----------------|
| Anaemic | 272 | 73.6 |
| Non-anaemic | 98 | 26.4 |
| | 370 | 100 |

Table 4: Sex distribution of subjects with anaemia

| Sex | Frequency | Percentage (%) |
|--------|-----------|----------------|
| Male | 88 | 23.8 |
| Female | 184 | 49.8 |
| | 272 | 73.6 |

Table 5: Comparison between the level of education and anaemia amongst pre-operative patients

| Level of education | Frequency (%) | Anaemia |
|---------------------|---------------|-------------|
| No formal education | 10 (2.7%) | 10 (2.7%) |
| Primary | 17 (4.6%) | 16 (4.3%) |
| Secondary | 222 (60%) | 214 (57.9%) |
| Tertiary | 121 (32.7%) | 32 (8.7%) |
| Total | 370 (100%) | 272 (73.6%) |

Table 6: The table shows educational status number of cases and number of cases of anaemia in pre-operative patients

| EDU GRP | NUMBER OF CASES | NUMBER OF ANAEMIA CASES | % ANAEMIA |
|--------------|-----------------|-------------------------|-----------|
| NO EDUCATION | 10 | 10 | 100 |
| PRIMARY | 17 | 16 | 94 |
| SECONDARY | 222 | 214 | 96.4 |
| TERTIARY | 121 | 32 | 26.4 |

Table 7: Distribution of Surgical patients who had blood transfusion and those not transfused

| Blood | Frequency | Percentage (%) |
|-------|-----------|----------------|
|-------|-----------|----------------|

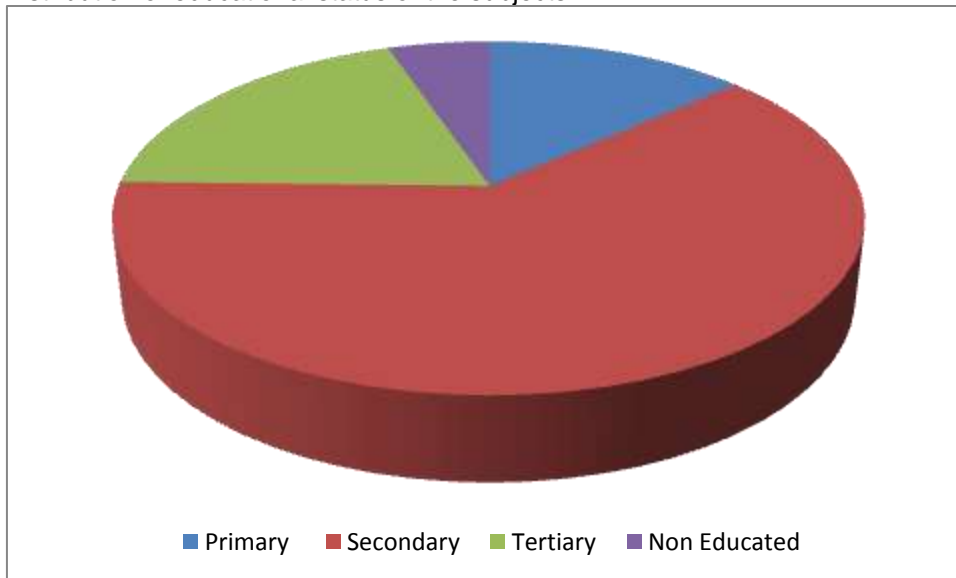
| Transfusion | | |
|-------------------------|-----|------|
| Transfused subjects | 40 | 10.8 |
| Non-transfused subjects | 330 | 99.2 |
| | 370 | 100 |

Table 8: Blood Transfusion and Sex distribution of subjects in the study

| Sex | Frequency | Percentage(%) |
|--------|-----------|---------------|
| Male | 16 | 4.3 |
| Female | 24 | 6.5 |
| | 40 | 10.8 |

PIE CHART SHOWING

Distribution of educational status of the subjects



Primary – 17 (4.6%)
 Secondary – 222 (60%)
 Tertiary – 121 (32.7%)
 No formal education – 10 (2.97%)
 Total = 370 (100%)

DISCUSSION

Our study revealed the prevalence of pre operative anaemia of 73.6% and blood transfusion rate of 10.8% (Tables 2, 3 and 7). When compared with a study by Duarte et al in Brazil the prevalence of anaemia and blood transfusion were 30.7% and 14.5% respectively.¹ This shows that the prevalence of anaemia was lower than that of what was obtained from our study while the prevalence for blood transfusion was higher.¹ The prevalence of anaemia was higher in females 184 (49.8%) when compared to males 88 (23.8%) see tables 1 and 4 this was in agreement with studies done by Duarte et al.¹ In addition patients with anaemia prior to surgery were more transfused compared with the non anaemic patients.^{1,5} Females 24 (6.5%) were more transfused when compared to 16 (4.3%) males (Table 8).

Scholars have shown that blood transfusion is the treatment of choice for acute perioperative anaemia.^{2,4} In another research work comprising of a cause

observational study compared the effect of red cell transfusion showed that higher rates of morbidity and mortality in patients receiving one unit of red cells compared to patients who were not transfused.⁴ However, the application of restrictive transfusion criteria is not sufficient to inshore outcome after surgeries and additional strategies should be implemented.⁴⁻⁷ This comprises of optimizing pre operative haemoglobin concentration reduction of surgical and iatrogenic blood loss.⁴ The involvement of multidisciplinary and multimodal patient blood management (PBM) program.⁵

Furthermore it is worthwhile to emphasize the hazards of blood transfusion which comprises of risks of circulatory overload, transfusion reactions, transfusion reaction, infections transmission immune modulatory effect.⁴⁻⁵

Majority of the subjects with pre-operative anaemia were from the obstetrics and gynaecology 52.6% with those going caesarean section representing 34.1% of the subjects (Table 2).

The study revealed that the pre-operative prevalence of anaemia for non-obstetric and gynaecological surgeries was 23.8% (Table 2). This value was in agreement with studies done in Nigeria different parts of Nigeria and in the globe.⁴⁻⁶The non-obstetrics and gynaecological surgeries were general surgery, orthopaedic, urological, ophthalmology, ear/nose/throat surgeries and other specialties of surgery.

From the study those with tertiary level of education had the lowest prevalence of pre-operative anaemia representing 8.7% of those with anaemia compared with those who had no formal education and had 100% preoperative anaemia as shown in table 5. The reason for this correlation is that those with formal education are more likely to have better nutrition with intake of haematinics in general.³⁻⁴In addition, subjects with tertiary level of education with co-morbidities such as HIV and tuberculosis or any other infections with depleted iron stores are more likely to seek treatment, thus improving their iron stores.⁵⁻⁸

Munoz M et al in a WHO study revealed the prevalence of pre-operative anaemic patients to be between 20 – 40%.⁶The pre-operative patients included general surgery, orthopaedic, cardio-thoracic and vascular surgery.^{6,7} This study showed the prevalence of pre-operative anaemia amongst non-gynaecological subjects as 23.8%.⁶In the same study by Munoz et al the prevalence of pre-operative anaemia amongst obstetrics and gynaecological subjects was approximately 50%. This was in keeping with our study which was 49.8%. This was lower in some studies done in rural parts of the country.⁸⁻¹⁰This is because our study was done in the urban area where there is high health consciousness campaigns in mass media and non-profit organization on the need to be compliant with ante natal visits and hence reducing the incidence of anaemia in general and .⁶⁻⁷

CONCLUSION

The study revealed that prevalence of anaemia and blood transfusion amongst pre-operative patients at RSUTH were 73.6% and 10.8% respectively. The prevalence of anaemia was higher in females when compared to males at 49.8% and 23.8% respectively. Females 6.5% were more transfused when compared to 4.3% males at 6.5% and 4.3% respectively. Surgical patients should be optimized prior to surgery , one of

such modalities to be employed is blood transfusion when the need arises.

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