

Pattern of Hb genotype in surgical patients at a tertiary hospital in Southern, Nigeria

EliS¹, Aaron FE², Okagua KE^{1,*}, Iwo-Amah RS¹, Owihonda G³, Okoh D⁴, Sapira-Ordu L¹, Amadi SC¹, Wakama IE², Mpi Abbey¹ and Ohaka C¹

¹ Department of Obstetrics and Gynaecology, Rivers State University Teaching Hospital, Nigeria.

² Department of Surgery, Rivers State University Teaching Hospital, Nigeria.

³ Department of Community Medicine, Rivers State University, Nigeria.

⁴ Department of Haematology, Rivers State University, Nigeria.

Abstract

Background: Haemoglobin (Hb) genotype is not a routine test in adult pre-operative investigations in majority of clinical settings, though in the obstetric and gynaecological patients already have their Hb genotype as a part of the routine antenatal investigations. However, in paediatric work up for surgical procedures Hb genotype is a routine investigation. This is due to sickle cell endemicity in our locality.

Aim: To determine the pattern of HB Genotype in surgical patients at the Rivers State University Teaching Hospital (RSUTH).

Method: This was a one-year retrospective study of surgical patients (Surgery and Obstetrics/Gynaecology departments) of the RSUTH. The patients comprised of all the consecutive cases of the surgeries in these departments for the period under review. Ethical clearance was obtained from ethical committee of the Rivers State Hospital Management Board. Structured profoma was used to extract information from patients' case notes and analyzed using SPSS version 25.

Result: There were a total of 370 subjects that were recruited for the study under review. There were 146 (39.5%) males and 224 (60.5%) females. The mean age was 31 years. The age range was 22 years to 56 years. One hundred and ninety four (52.4%) were obstetrics and gynaecological surgeries while 176 (47.6 %) were non-gynaecological surgeries. The commonest indication for surgery was caesarean representing 126 (34.1%) of the subject. The most common Hb genotype was AA 246 (66.5%) of which females contributed to 148 (40%) and males 98(26.5%) had Hb AA while 124 (33.5%) of the subjects were Hb AS. Females that were Hb As were 74 (20%) while males were 50 (13.5%). There were no subjects that were Hb SS.

Conclusion: This study showed the most prevalent Hb Genotype as AA (66.5%) in surgical patients at the Rivers State University Teaching Hospital (RSUTH), while 33.5% had Hb AS genotype. None of these subjects had sickle cell (HbSS) homozygous trait.

Keywords: Pattern; Genotype; Surgical Patients; Tertiary Hospital; Nigeria

*Corresponding author: Okagua KE

Department of Obstetrics and Gynaecology, Rivers State University Teaching Hospital, Nigeria.

1. Introduction

Haemoglobin genotype is not a routine test in adult Pre-operative investigations though in obstetric and gynaecological patients already have access to their Hb genotype due to the routine antenatal investigations which include Hb genotype request.[1,2] The reason for this is because sickle cell anaemia is endemic in sub-Saharan Africa.[1] As such readiness by clinicians to offer prompt management associated with homozygous sickle-cell disease such as catastrophic complications such as chest syndrome, stroke and death may follow inadequate pre-operative evaluation of such patients.[1-4]

Surgical procedures are high risk for patients with sickle cell disease and is associated with many complications including an increasing risk of painful crisis and acute chest syndrome. It is therefore essential that we have a robust mechanism to identify and manage patients with sickle cell disease to prevent peri-operative complications.[1-8] There are more than 10,000 patients with sickle disease (SCD) are resident in the UK, the majority live in London.[3-8]

Homozygous Sickle cell anaemia (HbSS) is the most common and severe form of SCD in the UK, accounting for 70% of the Patients.[3-4] Heterozygotes for Hbs and Hbc (HbSC) account for the majority of the remainder.[3-4] Patients with sickle cell trait (AS- carriers) have symptoms only in very extreme circumstances.[3-4]

There are protocols to provide advice on the basic minimum standard of care for patients requiring anaesthesia for surgical procedures for the confinement of this discussion details of such protocols will not be discussed here.

As a result of endemicity of sickle disease in this part of the world.[2-3] There are reasons why research may be interested in conducting research work to ascertain the pattern of haemoglobin genotype among adult populations. More so in surgical patients. One of such reason is to ascertain the percentage distribution of the haemoglobin genotype and compare it with other studies.[3-4]

In addition, clinician may also discover the prevailing figure of the variants of sickle cell disease such as HbSC discover that patients with HbAS under critical surgical procedures may be at risk of exhibiting crisis thus the reason for conducting this research work.

Aim

To determine the pattern of HB Genotype in surgical patients at the Rivers State University Teaching Hospital (RSUTH).

2. Material and methods

This was a one-year retrospective study of surgical patients (Surgery and Obstetrics/Gynaecology departments) of the RSUTH. The patients comprised of all the consecutive cases of the surgeries in these departments for the period under review. Ethical clearance was obtained from ethical committee of the Rivers State Hospital Management Board. Structured proforma. The content of the proforma were bio-data, socio-demographic characteristics and information on current and previous gestations was used to extract information from patients' case notes and analyzed using SPSS version 25.

2.1. Study Population

This study was 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 (13) and twelve (12) Consultant Staff respectively..

2.2. 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.

3. Results

A total of 370 patients were recruited for the study under observation. There were 146 (39.5%) males and 224 (60.5%) females. The mean age was 31 years. One hundred and ninety four (52.4%) were obstetrics and gynaecological surgeries while 176 (47.6 %) were non-gynaecological surgeries. The commonest indication for surgery was caesarean representing 126 (34.1%) of the subjects. The most common Hb genotype was AA 246 (66.5%) of which females contributed to 148 (40%) and males 98(26.5%) had Hb AA while 124 (33.5%) of the subjects were Hb AS. Females that were Hb AS were 74 (20%) while males were 50 (13.5%). There were no subjects that were Hb SS. 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 Indicating the number of subjects recruited for the study, the age range, the mean age and the most Hb genotype in surgical patients

Number of subjects recruited	370
Age range	22 – 56 years
The mean age	31 years
The most prevalent Hb genotype AA	246 (66.5%)

Table 2 Sex distribution of Hb AA and Hb AS genotypes in surgical patients

Blood group	Frequency (n)	Percentage (%)
Hb AA (Female)	148	40
Hb AA (Male)	98	26.5
<u>Total</u>	246	66.5
Hb AS (Female)	74	20
Hb AS (Male)	50	13.5
Total	124	33.5

Table 3 Sex distribution of subjects in the study

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

Table 4 Distribution of Surgeries

Surgeries	Frequency	Percentage (%)
Obstetrics/gynaecological surgeries	194	52.6
Non-obstetrics/gynaecological surgeries	176	47.4
	370	100

Pie chart showing

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

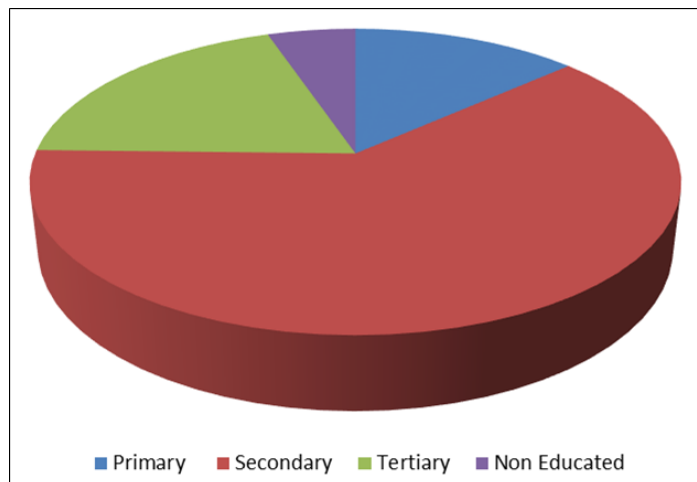


Figure 1 Distribution of educational status of the subjects

4. Discussion

Our study revealed that Hb genotype AA (66.5%) was the commonest Hb genotype at the Rivers State University Teaching Hospital in Surgical patients (table. This was not in agreement with Akogu et al in North Central Nigeria where Hb AA was though commoner but the prevalence was 75.1% indicating that it was higher than that of our study which was 66.5% (table 1). This was also in agreement with the study by Onwurah O et al in Anambra, south east Nigeria where they found out that Hb AA was the commonest Hb genotype with a figure of 74.65% which was higher than that of revealed in our study.[3]Our study was in agreement with the previous studies that the normal hemoglobin genotype AA was in the range of 55 to 75%.[4-5]

Our study revealed that 40% of the females had Hb AA and 26.5 % of the males. In addition to this, our study revealed that Hb AS accounted for 33.5% of the study population (table 2]. This figure was higher than those obtained from the study of Onwurah OW et al which was 23.16% of those obtained from their subjects.[4]However, for the sickle cell trait HbAS, figure, gotten from our study which was 35.5% was higher than the range of 20-30% in Nigeria but within African range of 20 to 40%.[4]

In our study no record of Hb AC, SS or SC was gotten as compared with other studies from parts of Nigeria, Africa and the globe.[5-9]The reason for this perhaps may have been due to the smaller sample size of 370 compared to other studies with larger sample sizes.[1,2-7]

The higher proportion of the subject were females because increased number of females visited the hospital and are more interested about knowing their Hb genotype than males.[4] In addition, females are more interested in their awareness and genetic counseling of sickle cell disease and other haemoglobinopathies since the Hb genotype test is mandatory for ante natal booking once they become pregnant.[4-8]

Studies done in other parts western Nigeria also revealed that the female subjects had higher frequency distributions in the entire haemoglobin variant than male.[7]

From our study 60% and 32% of the respondents had secondary and tertiary levels of education respectively (see Pie-chart).This implies that counseling these patients further on some of life- long decisions such choosing compatible life partners and also providing Hb AA blood for transfusion for HbSS patients prior to surgery in situations of severe anaemia.

5. Conclusion

Our study at the Rivers State University Teaching Hospital in 370 surgical patients revealed that Hb AA dominated the highest Hb genotype variants followed by Hb genotype AS. There were no subjects with Hb genotype SS, Hb genotype AC and Hb genotype SC.

Compliance with ethical standards

Acknowledgments

Mother, Baby and Adolescent Care Global Foundation.

Disclosure of conflict of interest

Authors have declared there was no conflict of interest

Statement of ethical approval

The permission for the study was granted by the ethical committee of the Rivers State Hospital Management Board.

Statement of informed consent

It was a retrospective study.

Funding

There was no funding/Grant for the research work.

References

- [1] Akogu SPO, Akor SE, Owenidu I. Distribution of ABO, Rhesus factor, Blood Phenotype and Hemoglobin Genotype Among Antenatal Clinic Attendees in Antigua, North Central Nigeria. *European Journal of Medical and Health Sciences* 2021; 3(6):11-13.
- [2] ChimaOk et al . " ABO and Rhesus blood groups among blood donors in Kano, North - Western Nigeria. " *Nigerian sciences* 2021; 9: 11-13.
- [3] Onwurah OW, Ajuba CF, Anokwute MU, Nkemjika UN, Nwachukwu EP, Eze CG. Echelon of Hemoglobin Genotype Variants in Anambra State, Southern Nigeria from 2005 to 2019. *Int J dmmn.Sci. Res*, 2021;2(1): 3-5
- [4] Pennap GR, Envoh E, Ighawua I. Frequency distribution of hemoglobin variants, ABO and Rhesus blood groups among students of African descent. *British microbiology Research Journal* 2011; 1: 35 - 40
- [5] Chinawa JM, Mayike PC, Aron AE, Obu HA, Chizwa AT. Sick cell anaemia; errors in hemoglobin genotyping: impact on parents of children attending two hospital in south - East Nigeria. *Journal Paediatrics*. 2015; 5: 7-11.
- [6] Okoroma IL, Obeagu EI, Christian SG, Elemchukwu Q, Ochei KC. Determination of the hemoglobin genotype and ABO blood group pattern of some students of Imo state university, Owerri, Nigeria. *International journal of current Research and review* 2015; 3(1): 20-27
- [7] Akhigbe RE, Ige SE, Ajolabi AO, Azeez OM, Adegunlola GJ, Banidele JO. Prevalence of hemoglobin variants ABO and Rhesus blood groups in Ladoke Akintola University of Technology, Ogbomosho, Nigeria. *Trends in medical Research* 2009; 4: 24-29
- [8] Evhabor O, Adidas TC, Jeremiah ZA, Hart MI. Abnormal hemoglobin variants, ABO and Rhesus blood group distribution among students in the Niger Delta of Nigeria. *Pathology and Laboratory Medicine International* 2010; 2: 41-46
- [9] Weather et al D. The inherited disorders of hemoglobin an increasing neglected global health burden. *Indian journal of med research* 2011;134(4) 493- 497