Original Research Article

Frequency of Red cell alloantibodies among pregnant women receiving Antenatal care in a tertiary health facility in Jos, Nigeria

ABSTRACT

Aims: To determine the frequency of red blood cell alloantibodies among pregnant women in Jos, Nigeria.
Study design:A cross sectional study carried out among pregnant women accessing ante natal care.
Place and Duration of Study: Department of Obstetrics and Gynaecologyand Department of Haematology and Blood Transfusion, Jos University Teaching Hospital (JUTH) Jos Nigeria April 2017 and May 2017.
Methodology: We included 200 pregnant women accessing ante natal care. Data on clinical details were obtained with an Interviewer administered questionnaire. Screening and identification of red blood cell alloantibodies was done using the DiaCells, and DiaPanels (DiaMed GmbH, Switzerland). ABO and Rh blood groups were done using antisera from Biotec (Ipswich, UK).
Results: Out of 200 participants, alloantibodies were found in 24 (12.0%) of participants and their specificities were as follows; anti-E, 9 (4.5%); anti- e, 1 (0.5%); anti-C, 6 (3.0%); anti- c, 2 (1.0%); anti- K, 2 (1.0%); anti- P, 1 (0.5%); anti- N, 1 (0.5%), while 2 (1.0%) showed a combination of antibodies of whose specificities could not be determined by the Diamed 11 panel cells. Multigravidity was identified as a risk factor for alloimmunization (P= 0.01) However, alloimmunization status was independent of previous abortions, trimester of pregnancy, and ABO blood group of the studied population
Conclusion: Alloantibody screening and identification is should be included in routine antenatal care especially for at risk populations.

Comment [TK1]: Paraphrase to read as « The study was conducted at Department of Obstetrics and Gynaecology and Department of Haematology and Blood Transfusion, Jos University Teaching Hospital (JUTH) Jos Nigeria from April 2017 to May 2017». *please indicate the start and end dates.

Keywords: Alloimmunization, antenatal, Jos, Nigeria, Red blood cells, alloantibodies

1. INTRODUCTION

Blood group antibodies are immunoglobulins (Ig) that react with antigens on the surface of red blood cells (RBCs). They can either be acquired naturally or through immunization with foreign RBCs [1]. The naturally occurring antibodies are produced in response to the environmental stimulants such as bacteria [1]. These antibodies are present when the corresponding antigens are absent on the red cells [1]. All antibodies to red cell antigens other than naturally occurring anti-A and anti-B are considered 'unexpected' or 'irregular' [2]. They can either be alloantibodies, directed toward non-ABO antigens absent on the host's red cells or autoantibodies, directed towards self-antigens [2]. Pregnancy and blood transfusion are two major risk factors for developing irregular antibodies (alloimmunization) to RBCs in affected individuals [3]. Other implicated factors includes organ transplantation or injection with immunogenic materials [3, 4].

World best practices for prenatal immunohaemtologic care of pregnant women includes amongst other things, the screening of unexpected RBCs antibodies in pregnancy [5]. When these antibodies are present, it is necessary to identify and determine their clinical significance [5]. This is important considering its relevance in finding compatible blood when needed and, the possibility of haemolytic transfusion reaction and haemolytic disease of the foetus and newborn (HDFN) [6]. In many developing countries of the world, including Nigeria, screening for irregular antibodies and subsequent typing when present, are not done routinely [6]. Hence the incidence of maternal RBC alloimmunization and its contribution to HDFN and blood transfusion reaction is largely unknown.

Alloimmunization to clinically significant red cell antigens is a major complication associated with blood transfusion services in developing countries [6]. The possibility of developing alloantibodies to red blood cell antigens had been focused on individuals that do not possess Rh D antigen on the surface of their red cells [7]. This led to the use of Rh (D) immunoglobulin (Rhogam), used both as prophylaxis and in therapy, with resultant significant reduction in cases of severe HDFN and poor obstetric history associated with maternal alloimmunization [8, 9]. However, developing alloimmunization to other red cell antigens has become increasingly problematic especially the resulting HDFN, and difficulty in provision of compatible blood for transfusion [10]. Neonatal jaundice contributes to 11% of admission and 5.4% of mortality at the special care baby unit (SCBU) in Jos University Teaching Hospital (JUTH) [11]. HDFN is second only to G6PD as a leading cause of neonatal jaundice [11]. Despite the above challenges, data on the prevalence of maternal alloimmunization, and complications including HDFN and transfusion reactions resulting from such alloimmunization is scarce in our environment.With the development and implementation of antenatal Rh (D) immunoglobulin (Rhogam) prophylaxis in Rh D negative pregnant women in the 1960s, there has been a significant reduction in the frequency of maternal alloimmunization to Rh D antigen, especially in developed countries [12]. However, alloimmunization to Rh D and other clinically significant antigens remains a problem in developing countries including Nigeria [13]. Alloimmunization to RBC antigens has been implicated in pregnancy losses and poor obstetric history. Also, poorly managed pregnancy losses have resulted in development of alloimmunization to RBC antigens [14,15]. Timely detection of resulting antibodies in antenatal women will be essential both for transfusion safety in the mother, and early and successful management of haemolytic disease of the foetus and newborn [15].

Evidenced-based practice recommends the universal testing of all pregnant women in the West for irregular alloantibodies [5].

Since Landsteiner discovered ABO blood groups in 1901, thirty (30) blood group systems have been described16. Each system is a series of red cell antigens, determined by a single genetic locus or very closely linked loci [16]. The International Society of Blood Transfusion recognizes three hundred and eight (308) red cell antigens, two hundred and seventy (270) of which belong to one of the 30 blood group systems. Thirty eight (38) antigens have not been included into the known blood group systems [17].

Antibodies to RBC antigens can either be natural or immune. Natural antibodies, usually IgM, are acquired during the first few months of birth probably as a result of exposure to ABH antigen-like substances in diet or the environment [17]. They are present in the absence of corresponding antigens. Immune antibodies, usually IgG result from alloimmunization by sensitizing events mainly pregnancy or transfusion. Close to 300 different blood group alloantibodies have been described [1].

Alloimmunization in pregnant women has been found to range from 0.4% to 2.7% worldwide [18-20]. Two studies in Port-Harcourt, Nigeria, showed a prevalence of 3.4% and 4.8%-[21, 22]. The identified alloantibodies included anti- C, anti- E, anti- Jsb and anti- K but no anti- D alloantibodies were found in both studies though 8.6% of the women were Rh D negative [21, 22]. Another study in Benin, Nigeria found a prevalence of 4.7% among pregnant women [23].

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

A hospital- based, analytic, cross- sectional study was performed among 200 pregnant women attending Antenatal Clinic of JUTH between April 2017 and May 2017. Sample size of minimum 70 was calculated using the formula (n = (z2pq)/d2) for cross- sectional survey based on reported prevalence of 4.8% in Port- Harcourt [22,23]. The two hundred and fifty (200) participants were recruited into the study using nonrandom, convenience sampling. Pregnant women that received any blood components in the preceding 4 months were excluded to prevent false reactions from exogenous antibodies. Furthermore, pregnant woman that had received passive immunization with Anti- D IgG or intravenous immunoglobulin in the preceding 3 months were excluded to prevent false negative reactions. A written informed consent was obtained from each study participant. Each participant was interviewed with a pretested, structured, interviewer- administered questionnaire.

ABO blood grouping was done using anti-A, anti-B, and anti-A+B (Biotec, Ipswich UK), with standard tube agglutination technique. All blood groups were confirmed with known RBCs (serum grouping). Rh grouping was done using anti-D monoclonal reagents (Biotec, Ipswich, UK). The sera were screened alloantibodies using antibody screening panels- 3 cells (Diamed, Switzerland). The serum with alloantibodies was further tested to determine the specificity of the antibodies using identification panel- 11 cells (Diamed, Switzerland) by tube method in low ionic strength solution, and anti- human globulin.

To all tests that were negative at the AHG phase, was added 1 drop of IgG-sensitized RBCs (Coombs' Control Cells). This was centrifuged for 15-20 seconds on high revolution, and examined macroscopically and microscopically for agglutination or haemolysis. The Coombs' Control Cells yielded a positive reaction. If no agglutination was observed, the result for that panel cell was read as invalid and the test repeated beginning using that cell.

The data collected was analyzed using Epi Info version 3.4.3. Continuous data presented as mean and standard deviation (SD). Student's t-test was used to assess the significance between means of two groups and ANOVA used to compare the means of multiple groups. X2 (chi-square) was used to compare categorical data. A p-value of <0.05 was considered statistically significant. The results were reported in tables.

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3. RESULTS AND DISCUSSION

RESULTS

Within a period of one month, blood samples were collected from two hundred pregnant women receiving ante- natal care in Jos University Teaching Hospital.

The ages of the studied population ranged between 18 and 44 years (mean ± SD = 29.57 ± 5.99 years). Most (73.5%) of the participants were aged between 20 and 35 years.

The Hausas were the predominant ethnic group accounting for 59 (29.5%) of participants. This was followed by Beroms, 23 (11.5%); Igbos, 14 (7.0%); Ngas, 14 (7.0%); Yorubas, 9 (4.5%); Fulanis, 7 (3.5%); Mwaghavul, 6 (3.0%); Others which included- Afizere, Langtang, Tiv, Idoma, Chibok, Kare- Kare, Efik, Ibibio, Tarok, Kataf, Urhobo, Ibie, Kagoro, Eggon, Ron, Babul, Ikwere, Kono, Mupun, Fem, Igede, Igala, Jukun, Kutere, Irikwe, Bura, Jikun, Amo, Tangali, Igbira, Chip and Jabba ethnic groups accounted for 68 (34.0%).

Most of the participants were civil servants, 58 (29%); followed by house wives, 57 (28.5%). Forty two (21%) were traders, twenty seven (13.5%) were students, while sixteen (8.0%) were artisans.

All the participants were married. One hundred and eighteen (59%) had obtained tertiary education, sixty six (33%) had secondary education, twelve (6%) had primary education, while four (2%) had no formal education (Table 1).

Most of the participants were multigravida, 144 (72.0%), while the remaining fifty eight (28.0%) were primigravida. Ninety five (47.5%) were in the third trimester of pregnancy, eighty four (42.0%) in the second trimester, while twenty one (10.5%) were in the first trimester. Fifty eight (29.0%) of the multigravidae had previous miscarriages, and twenty (10.0%) of them had children with neonatal jaundice. Fourteen (7.0%) of the participants had previous blood transfusion, two of which had alloantibodies (Table 2).

Alloantibodies were identified in the serum of 24 (12.0%) of the pregnant women. The specificity of the antibodies were as follows: anti-C, 6 (3.0%); anti- c, 2 (1.0%); anti- K, 2 (1.0%); anti-E, 9 (4.5%); anti- e, 1 (0.5%); anti- P, 1 (0.5%); anti- N, 1 (0.5%), while 2 (1.0%) showed a combination of antibodies of whose specificities could not be determined by the Diamed 11 panel cells (Table 3). Only one (0.5%) of the participants who lacked Rh D antigen on her RBC had an alloantibody in her serum, which was found to be Anti- E.

ABO blood group and Rh type distribution showed, 88 (44.0%) were of blood group “O,” out of which 84 (42.0%) and 4 (2.0%) were Rh D positive and negative, respectively. Sixty two (31.0%) of the subjects were of blood group “B,” out of which 57 (28.5%) and 5 (2.5%) were Rh positive and negative, respectively. Participants with blood group “A” were 38 (19.0%) of which 35 (17.5%) and 3 (1.5%) were Rh D positive and negative, respectively. The remaining 12 (6.0%) of the participants were of “AB” blood group out of which 11 (5.5%) and 1 (0.5%) were Rh D positive and negative, respectively (Table 4).

Association between the obstetric, blood transfusion, previous neonatal jaundice history, ABO/ Rh blood group, and alloimmunization among participants were compared. Seventeen (8.5%) of the multigravida and Seven (3.5%) of the Primigravida had alloantibodies. There was a statistical difference between alloimmunization and number of pregnancy (*P= 0.01*). One (0.5%) of the Rh D negative participant had an alloantibody (anti- E), the remaining 23 (11.5%) participants lacked Rh D antigens on their red cell. This difference was statistically significant (*P = 0.003*). The distribution of the antibodies was found to be independent of the previous miscarriage,Trimester of pregnancy, and ABO blood group of the participants (P = 0.40, P= 0.19, P= 0.8 respectively) Table 5.

Table 1; Socio- demographic characteristics of participants

Characteristic	Frequency (n, %)
Age	
≤20	17 (8.5)
21-25	34 (17.0)

26-30	64 (32.0)
31-35	49 (24.5)
36-40	30 (15.0)
41-45	6 (3.0)
Total	200 (100.0)
Ethnicity	
Berom	23 (11.5)
Fulani	7 (3.5)
Hausa	59 (29.5)
Igbo	14 (7.0)
Mwaghavul	6 (3.0)
Ngas	14 (7.0)
Yoruba	9 (4.5)
Others	68 (34.0)
Total	200 (100.0)
Occupation	
Artisan	16 (8.0)
Civil servants	58 (29.0)
House wife	57 (28.5)
Student	27 (13.5)
Trader	42 (21.0)
Total	200 (100.0)
Marital Status	
Single	0 (0.0)
Married	200 (100.0)
Divorced	0 (0.0)
Widowed	0 (0.0)
Total	200 (100.0)
Educational qualification	
No formal education	4 (2.0)
Primary education	12 (6.0)
Secondary education	66 (6.0)
Tertiary education	118 (59.0)
Total	200 (100.0)

Comment [TK5]: No need to mention those variables which didn't have participant or zero.

Table 2: Obstetric, neonatal, and previous blood transfusion history of participants

Characteristics	**Frequency n (%)**
Gravidity	
Primigravida	56 (28.0)
Multigravida	144 (72.0)
Total	200 (100.0)
Trimester	
First	21 (10.5)

Second	84 (42.0)
Third	95 (47.5)
Total	200 (100.0)
Miscarriages	
None	142 (71.0)
Once	43 (21.5)
Twice	10 (5.0)
Thrice	4 (2.0)
Four times	1 (0.5)
Total	200 (100.0)
Blood Transfusions	
None	186 (93.0)
Once	12 (6.0)
Twice	2 (1.0)
Total	200 (100.0)
Neonatal Jaundice	
None	180 (90.0)
With hospital admission	9 (4.5)
Without hospital admission	11 (5.5)
Total	200 (100.0)

Table 3: Frequency and specificity of alloantibodies among participants

Alloantibody	**Frequency n (%)**
anti- E	9 (4.5)
anti- C	6 (3.0)
anti- K	2 (1.0)
anti- c	2 (1.0)
anti-e	1 (0.5)
anti-P	1 (0.5)
anti-N	1 (0.5)
Mixed field	2 (1.0)

None	169 (84.5)
Total	200 (100.0)

Mixed field represent alloantibodies (anti - k, - kp^b, -lu^b, -xg^a) of which the specific alloantibody could not be determined by the Diamed 11 panel cells

Table 4: ABO and Rh blood groups of participants

	Rh group		
ABO group	**Rh D^{positive}(%)**	**Rh D^{negative} (%)**	**Total (%)**
O	84 (42.0)	4 (2.0)	88 (44.0)
B	57 (28.5)	5 (2.5)	62 (31.0)
A	35 (17.5)	3 (1.5)	38 (19.0)
AB	11 (5.5)	1 (0.5)	12 (6.0)
Total (%)	187 (93.5)	13 (6.5)	200 (100)

Table 5: Association of risk factors, ABO/ Rh blood group, and alloimmunization among participants

	Antibody screening					
	Positive	**Negative**				
Parameter	**n (%)**	**n (%)**	**Total (%)**	**χ^2**	**P value**	**Fisher exact test**
Gravidity						
Multigravida	17 (8.5)	127 (63.5)	144 (72.0)			
Primigravida	7 (3.5)	49 (24.5)	56 (28.0)	0.0184	0.0114	
Total	24 (12.0)	176(88.0)	200 (100.0)			
Trimester						
First	1 (0.5)	20(10.0)	21 (10.5)			
Second	14 (7.0)	70 (35.0)	84 (42.0)		0.1875	
Third	9 (4.5)	86 (43.0)	95 (47.5)			
Total	24 (12.0)	176 (88.0)	200 (100.0)			
Miscarriage						
Previous	7 (3.5)	51 (25.5)	58 (29.0)			
None	17 (8.5)	125 (62.5)	142 (71.0)	4.0464	0.3998	
Total	24 (12.0)	176 (88.0)	200 (100.0)			
Blood transfusion						
Previous	2 (1.0)	12 (6.0)	14 (7.0)			
None	22 (11.0)	164 (82.0)	186 (93.0)		0.0236	0.52098
Total	24 (12.0)	176 (88.0)	200 (100.0)			

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Neonatal jaundice					
Previous	1 (0.5)	19 (9.5)	20 (10.0)		
None	23 (11.5)	157 (78.5)	180 (90.0)	0.04261	0.2738
Total	24 (12.0)	176 (88.0)	200 (100.0)		
ABO group					
A	3 (1.5)	35 (17.5)	38 (19.0)		
B	8 (4.0)	54 (27.0)	62 (31.0)		
AB	2 (1.0)	10 (5.0)	12 (6.0)	0.8200	
O	11 (5.5)	77 (38.5)	88 (44.0)		
Total	24 (12.0)	176 (88.0)	200 (100.0)		
Rh group					
Rh $D^{positive}$	23 (11.5)	164 (82.0)	187 (93.5)		
Rh $D^{negative}$	1 (0.5)	12 (6.0)	13 (6.5)	0.0028	0.5210
Total	24 (12.0)	176 (88.0)	200 (100.0)		

DISCUSSION

Alloimmunization to RBCs antigen results from sensitizing events, majorly; previous blood transfusions, pregnancies, and or injection of antigenic substances.

The result showed the frequency of alloantibodies to be 12.0% in the two hundred pregnant women studied. This is comparable to 13.7% found by Bashawari in a retrospective study of sickle cell anaemia patients in Saudi Arabia [25]. The frequency in this study is less than 16.3% reported in Sokoto by Isaac et al [26]. The high frequency in this study is possibly due to the number of multiparous women (72.0%) involved in the study, as the risk of sensitization is known to increase with pregnancy [17]. Also, most of the women were in their second or third trimester (89.5%) of pregnancy. Hence, there is increased possibility of detecting alloantibodies that could have been missed if the test was conducted in the first trimester [27,28]. This could have also resulted from a presumed high phenotypic incompatibility between the mothers and their foetuses. Some of the women with alloantibodies also had previous blood transfusion which increased the possibility sensitization. The frequency is higher than 3.4% and 4.8% found among pregnant women in Port Harcourt by Jeremiah et al [21,22]. Also higher than the 4.7% reported in Benin by Adewoyin et al [23]. The difference could be due to geographical location between Northern and Southern Nigeria, and the sensitivity of reagents used. This is also far higher than 0.0%, 1.1%, 1.3%, 1.4%, and 1.5% reported in Uttarakhand, Tirupati, New Delhi, Karnataka and Tamil Nadu respectively [1,12,15,26,29]

Antibodies against antigens of the Rh blood system were the most prevalent (75.0%), followed by antibodies against the Kell blood group antigens (8.3%). Al- Ibrahim et al reported antibodies against Rh and Kell blood group system accounting for 52.38% and 2.38% respectively of the alloantibodies in pregnant women in Saudi Arabia [19]. The anti- E had the highest prevalence of 4.5% in this study comparable to that of Jeremiah et al, where anti-E was found to be commonest alloantibody with a frequency of 1.2% [22]. This is possibly due to the high prevalence of pregnant women in the environment lacking the E antigens on their red cells. Erhabor et al found that 71.6% of pregnant women in Sokoto North West Nigeria lacked E antigens on their red cells, and were at risk of developing anti- E if exposed to the E antigens [30]. The ability of anti E to cause severe HDFN and HTR is mild compared to those of anti- D and anti- K. This is probably because many anti-E are weak, naturally occurring antibodies17. Anti- C was found in 3.0% of the studied population. Jeremiah et al found anti-C to be the most common alloantibody (1.2%) among another group of pregnant women in Port Harcourt21. The C antigen is least immunogenic among the common antigens of the Rh blood group system; D > c > E > e > C17. The corresponding Anti-C can be associated with mild HDFN and HTR16. Anti C is very rare in Caucasians, and can be found inseparably with anti- D, where it is more appropriately named anti G [17]. In this study anti-C was found independent of anti- D similar to the findings in Port Harcourt by Jeremiah et al [21,22]. Anti-K and anti-c each had a prevalence of 1.0% in this study. Jeremiah et al reported an anti-K prevalence of 0.8% and 1.0% in two different studies among pregnant women in Port Harcourt [21,22]. K antigen stimulates the formation of anti-K in about 10% of K-negative people given one unit of K-positive blood [17]. About 0.1% of all cases of HDFN are caused by anti- K; most of the mothers will have had previous blood transfusions [17]. None of the participants in this study with K alloantibodies had previous blood transfusions. Anti-c is the most immunogenic after anti-D in the Rh group system [17]. Anti-e, anti-N and anti-P accounted for 0.5% each of the alloantibodies found in this study. Anti-N is rare and nearly always cold-reactive IgM [17]. Anti-P1 is naturally occurring and commonly found in the serum of P1-negative individuals. Anti-P1 rarely causes transfusion reactions because it is usually not reactive above 30°C [17]. The low prevalence of anti-c and anti-e is in keeping with studies that reported high prevalence of the c and e antigens in Nigeria. Erhabor et al in Sokoto reported the prevalence of Rh c and e phenotypes at 92% and 98.5% while Jeremiah et al in Port Harcourt reported a prevalence of 99.8% and 98.7% respectively [31,32]. No anti- D was detected despite 6.5% of the studied subjects being Rh D negative similar to the findings by Jeremiah et al [21,22] and was slightly higher than 4.7% reported by Adewoyin et al [23]. Only

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one (7.7%) of the thirteen Rh D negative participants had an alloantibody (anti- E) in her serum. The participant's husband was said to be Rh D negative, and so was not expected to have anti-D in her serum. In Sokoto and Benin, Isaac et al and Adewoyin et al respectively, also reported alloantibody in one of the Rh D negative participants [23,24]. The specificity of this antibody was not determined in the findings by Isaac et al [25]. Adewoyin et al found reported the antibody to be anti-D, in a multi gravid participant who had previously received Rhogam [23]. This is at variance with the studies in Port Harcourt, where no alloantibodies were found in the studied Rh D negative populations [21,22]. ABO incompatibility between foetus and mother, use of Rhogam and improved health seeking behaviour and better blood transfusion practice are possible explanations for these findings. Also, only 17% of D negative women are reported to become immunized by one pregnancy with an Rh D-positive offspring [17]. This differs markedly from the study in Tirupati, where Suresh et al reported an anti- D prevalence of 63.8% among Rh D negative participants in a study population with 6.5% being Rh D negative [1]. Alloantibodies in this study were more common in participants who had more than one pregnancy and those with Rh D antigens on their red blood cells. These differences were statistically significant (P= 0.01). This is at variance from the findings by Adewoyin et al, where alloantibodies were commoner (71%) among primigravida or those pregnant for the second time [23].

Regular screening for maternal alloantibodies is not common in practice around this setting either for the prevention of HDFN or blood transfusion practice. Fortunately, the need for management of anti- D negative women who have developed alloimmunisation endangering their fetouses is not common as improved health care and use of Rhogam prophylactically has reduced such incidences. This may not be true for women that are not accessing health care in a tertiary institution. Also, there is the danger in future of finding compatible blood donors for women that have developed alloantibodies. The slightly higher alloantibodies among previous transfused participant suggests the need for putting up Institutional protocol and national policies detection, prevention and management of maternal alloimmunization by relevant stakeholders. There is need to expand the battery of tests done during antenatal care to include among others, antibody screening, especially when such women are multigravda, had previous abortions and or had previous blood transfusion, and those needing blood transfusion. Postnatal prophylactic use of Rhogam among Rh D negative women is advocated and should be made a national policy with some subsidy to make it readily available nationwide.

4. CONCLUSION

This study showed a 12.0% prevalence of alloantibodies in pregnant women, majorly directed against antigens of the Rh blood group system. One of the identified risks for alloimmunization is multigravidity. It also showed blood group O is the predominant ABO group while AB is the least frequent, and most people possess Rh D antigens on their RBCs in this environment.

CONSENT

All authors declare that 'written informed consent was obtained from the participants for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

ETHICAL APPROVAL

Ethical approval (ref; JUTH/DCS/ADM/127/XIX/6587) was obtained from JUTH Research and Ethics Committee prior to commencement of the study.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS

Here is the Definitions section. This is an optional section.

Term: Definition for the term