

الآية

بسم الله الرحمن الرحيم

قال تعالى:-

قُلْ يَا عِبَادِيَ الَّذِينَ أَسْرَفُوا عَلَىٰ أَنفُسِهِمْ لَا تَقْنَطُوا مِن رَّحْمَةِ اللَّهِ ۚ إِنَّ اللَّهَ يَغْفِرُ الذُّنُوبَ جَمِيعَةً ۚ إِنَّهُ هُوَ الْغَفُورُ الرَّحِيمُ

صدق الله العظيم

سورة الزمر الآية 53

DEDICATION

To my lovely husband:

Because your love, acceptance, patience and encouragement.

To my parents:

For their love and support.

To my friends and colleagues

For all the nice moments we have together.

Acknowledgement

First of all, thanks to ALLAH for the completion of this dissertation and ask him to bless this effort.

I am greatly indebted to my supervisor, Dr.NazikElmalaika for her motivation, guidance and useful advices which help greatly in making this dissertation to be beneficial.

I would also like to thank everyone who encouraged and supported me to perform this work.

Abstract

This is a descriptive and cross sectional study conducted in Central Blood Bank, Khartoum State, Sudan in the period from October to November 2015. The study aimed to determine the frequency of ABO and Rh-D blood group antigens and phenotypes of Sudanese blood donors.

A total of five hundred blood samples were obtained in Citrate Phosphate Dextrose Adenine CPDA-1 blood bags of Sudanese donors. The whole blood samples were tested for ABO and Rh-D antigens by slide agglutination technique. The frequency and phenotype were determined and the results were analyzed by SPSS program version 22.

Male donors were (97%) of total study subjects, while female donors were (3%).

The donors were classified according to their age into 4 groups; group one (less than 20 years), group two (20-29 years), group three (30-39 years), and group four (40-50 years).

Group three were the most frequent (48%) followed by group two (39.2%), then group one (8%) and the fewest donors were from group four (4.8%)

The results showed that O-antigen was the most common antigen among the study group (45.4%) followed by A-antigen (29%), B-antigen (20.8%) and the least common phenotype was AB-antigen (4.8%).

Rh-D positive individuals were (92.2%) of group under study and Rh-D negative were (7.8%).

This study found that the O-antigen was the most common antigen and Rh-D positive individuals predominate. This is in agreement with some other national and international studies.

المستخلص

هذه دراسة وصفية مقطعية أجريت في السودان ، في بنك الدم المركزي ، ولاية الخرطوم. هدفت الدراسة الى تحديد وتيرة الزمر الوظيفية والشكل الظاهري لأنظمة (أ، ب، و) والعامل الريصي (د) عند السودانيين المتبرعين بالدم في الفترة بين شهري اكتوبر ونوفمبر 2015 م.

جمعت 500 عينة دم سترات الفوسفات دكستروز الادنين من وحدات الدم لمتبرعين سودانيين في بنك الدم المركزي. فحصت خلايا الدم بطريقة التراص على الشريحة الزجاجية لتحديد الزمر الوظيفية (أ، ب، و) والعامل الريصي (د). تم تحديد الزمر الوظيفية والشكل الظاهري وحللت النتائج وفقا لبرنامج الحزم الاحصائية للمجتمع (نسخة 22).

المتبرعين الذكور كانوا بنسبة (97%) من مجموع الاشخاص تحت الدراسة، بينما كانت المتبرعات الاناث بنسبة (3%).

تم تقسيم المتبرعين حسب اعمارهم الى اربعة مجموعات: المجموعة الاولى اقل من 20 سنة، المجموعة الثانية 20 و 29 سنة، المجموعة الثالثة بين 30 و 39 سنة والمجموعة الرابعة بين 40 و 50 سنة.

المجموعة الثالثة كانت الاكثر ترددا بنسبة (48%) تليها المجموعة الثانية بنسبة (39.2%) ثم المجموعة الاولى بنسبة (8%) بينما كانت المجموعة الرابعة هي الاقل بنسبة (4.8%).

اظهرت النتائج أن الزمرة (و) هي الاكثر ترددا بنسبة (45.4%)، تليها الزمرة (أ) بنسبة (29%)، ثم الزمرة بنسبة (ب) (20.8%)، بينما كانت الزمرة (ا ب) هي الاقل بنسبة (4.8%).

العامل الريصي (د) كان موجبا في (92.2%) من المتبرعين تحت الدراسة، بينما كان سالبا في (7.8%) منهم.

وجدت هذه الدراسة أن الزمرة (و) هي الاكثر ترددا والمتبرعين ذوا العامل الريصي (د) هم السائدون. هذا يتوافق مع بعض الدراسات قوميا وعالميا.

List of abbreviations

Ab: Antibody

Ag: Antigen

AHG: Anti human globulin

CPDA-1: citrate phosphate dextrose adenine

Fab: fragment antigen binding

Fc: fragment crystallizable

HDN: Hemolytic disease of newborn.

HTR: Hemolytic transfusion reactions.

IAT: Indirect antiglobulin test.

ICT: immune chromatography test.

IgG: Immunoglobulin G.

IgM: Immunoglobulin M.

ISBT: International society of blood transfusion.

RBCs: Red blood cells.

Rh: Rhesus blood group system.

Table of Contents

Content	Page
الاستهلال	I
Dedication	II
Acknowledgment	III
Abstract	IV
ملخص الدراسة	VI
List of abbreviations	VIII
Table of contents	IX
Table of figures	XII
Table of tables	XIII
Chapter One: Introduction and literature review	
1.1. Introduction	1
1.2.2. History of blood group discovery	2
1.2.3. Red cells antigens	2
1.2.4. ABO system	5
1.2.5. ABO antigens and encoding genes	5
1.2.6. Bombay blood group	7
1.2.7. ABO subgroups	7
1.2.7.1. Subgroup A	7
1.2.7.2. Subgroup AB	8
1.2.8. Secretors and non-secretors	8
1.2.9. ABO antibodies	8
1.2.9.1. Anti-A and anti-B	9
1.2.9.2. Anti-A ₁ and anti-H	9
1.2.10. History of Rhesus system discovery	9
1.2.11. Rhesus system	10
1.2.12. Rh antigens and encoding gens	10
1.2.12.1. Fisher-Race theory	10
1.2.12.2. Alexander-Wiener et al theory	11
1.2.13. D ^u phenotype	11
1.2.14. Partial D antigen	11
1.2.15. Rh null phenotype	12
1.2.16. Rh antibodies	12
1.2.17. Rh nomenclatures	13
1.2.17.1. Rh-Hr terminology	13

1.2.17.2. DCE terminology	13
1.2.17.3. Numerical terminology	13
1.2.18. Clinical significance of Rh system	14
1.2.19. Rh and HDN	14
1.2.20. Blood transfusion	15
1.2. previous studies	16
1.2.1. ABO and Rh frequencies in Sudan	18
1.3. Rational	20
1.4. Objectives	21
1.4.1. General objectives	21
1.4.2. Specific objectives	21
Chapter Two: materials and methods	
2.1. Study design	22
2.2. Study setting	22
2.3. Study populations	22
2.3.1. inclusion criteria	22
2.3.2. exclusion criteria	22
2.4. sampling technique	22
2.6. Method	23
2.6.1. collection of blood Sample	23
2.6.2. Manual method	23
2.6.2.1. ABO grouping	23
2.6.2.1.1. Principle of ABO grouping	23
2.6.2.1.2. Test procedure	23
2.6.2.1.3. Interpretation of results	24
2.6.2.2. Determination of Rh-D phenotype	24
2.6.2.2.1. Test procedure	24
2.6.2.2.2. Interpretation of results	24
2.6.2.2.3. Test for D ^u	24
2.6.2.2.4. Principle of antiglobulin test	24
2.6.2.2.5. Procedure	25
2.6.3. Quality control	25
2.7. Data analysis	26
2.8. Ethical considerations	26
Chapter Three: Results	
Chapter Four: Discussion, conclusion and recommendation	31

4.1. Discussion	31
4.2. Conclusion	34
4.3.Recommendations	35
References	36
Appendices	39

Table of figures

Figure number	Title	Page
Figure 3-1	Characteristics of the studied population according to gender	28
Figure 3-2	Age group frequency among the studied group	28
Figure 3-3	Frequency of ABO blood group among the studied group	29
Figure 3-4	Frequency of Rh-D phenotype among the studied group	29
Figure 3-5	Frequency of ABO and Rh-D phenotype among the studied group	30
Figure 3-6	Frequency of ABO according to age group among studied group	30

Table of Tables

Table number	Title	Page
Table (1-1)	Blood group system recognized by ISBT working party	4
Table (1-2)	ABO genes and antigens	6
Table (1-3)	Fisher-Race and the corresponding short notations	14
Table (1-4)	Comparison of ABO and Rh-D groups	16