

**Sudan University of Science and Technology**  
**College of Graduate Studies**

**Frequencies of ABO and Rhesus blood group  
antigens and phenotypes among Al Halanga  
Sudanese Ethnic Group**

**نسبة تردد الزمر الوظيفية والنطط الظاهري لأنظمة  
ABO، والعامل الريسي في مجموعة الحلنقة السودانية**

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى :

( وَيَسْأَلُونَكَ عَنِ الرُّوحِ قُلِ الرُّوحُ  
مِنْ أَمْرِ رَبِّي وَمَا أُوْتِيْتُمْ مِنَ الْعِلْمِ  
إِلَّا قَلِيلًا )

سورة الإسراء الآية ٨٥

## **Dedication**

*-To my parents Father (Mokhtar) and Mother*

*(Ihesan) who enlighten my way with their passion,  
golden wisdom, and blessings.*

*-to my uncles specially Mohammed.*

*-To my teachers who always offer an unlimited support  
and help.*

*-To my brother and sisters who give the courage,  
strength and power to go forward in my career.*

*-To my friends and students in past, present, and  
future.*

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## ملخص الدراسة

هذه دراسة وصفية ، تحليلية أجريت فى قبيلة الحنقة السودانية هدفت لتحديد نسب تردد الأليل (الانتجين) ، . لقد استغرقت الدراسة ثلاثة شهور (من أبريل إلى يوليو، ٢٠٠٧). هدفت الدراسة لتكوين قاعدة معلومات لهذه القبيلة لتحديد مدى التداخل بينها وبين القبائل الأخرى بعد مقارنتها معها. استخدمت الدراسة الزمر الوظيفية للعامل الريصي كعلامات للهوية لتحديد الأصل المشترك المحتمل . أخذت الموافقة من الأشخاص الذين سحب منهم الدم وقد تم أحاطتهم بأهداف البحث. تم تجميع عينات من مائة شخص من القبيلة بحيث لا توجد بينهم صلة قرابة . تم تجميع كل عينة في وعاء سعة ٢٠.٥ مل يحتوى على مادة مانعة لتجفط الدم (EDTA). تم فحص جميع العينات لمعرفة الزمر الوظيفية للعامل الريصي باستخدام طريقة الشريحة ، أيضا فحصت بطريقة حديثة تسمى جل (مانعة النفاذية) ومن ثم تم تحديد الزمر الوظيفية و تحديد نسب التشابه بين هذه القبيلة و القبائل السودانية والدول الأخرى بواسطة قانون جاكرد للتشابه.

وأظهرت نتائج الدراسة أن نسبة تردد الزمر الوظيفية للدم التابعة لنظام ABO أن الزمرة الوظيفية O كانت الأكثر ترددآ بنسبة (47%) تليها A بنسبة (28%) ، ثم B بنسبة (22%) وقد كانت الزمرة الوظيفية AB هي الأقل ترددآ بنسبة (3%).

وفي نظام العامل الريصي تبين ان الزمر الوظيفية c,e و D هي الأكثر ترددآ وقد كانت نسبها (96%), (91%) و (82%) على التوالي. وقد كانت الزمرة الوظيفية C ، E هي الأقل ترددآ بنسبة 40%، 15% على التوالي.

نجد أن هنالك تشابه في الزمر الوظيفية لنظام ABO ونظام العامل الريصي بين القبائل السودانية التي تعيش في منطقة جغرافية واحدة وهذا قد يكون بسبب التزاوج بين تلك القبائل ، وأن الاختلاف الذي وجد في بعض القبائل السودانية يمكن أن يكون بسبب الترحال وعدم التقييد بمنطقة جغرافية محددة.

## ***Abstract***

This prospective and analytical study, aimed to determine the frequency of ABO, Rh antigen, and phenotypes, among Halanga Sudanese Ethnic group. Also aims to establish ABO, Rh blood group baseline data for this Sudanese tribe to determine the similarity between this tribe and other Sudanese tribes which will be useful in the blood transfusion.

The study was conducted during three months (April to July, 2007), Following informed consent, a total of hundred venous blood samples were collected from unrelated individual into 2.5 ml EDTA containers. All samples were tested for ABO and for common Rhesus antigens by using the slide agglutination techniques, and immune-diffusion gel technique. The antigens and phenotypes were determined. Similarities between this tribe and other Sudanese tribes and with other countries were calculated using Jaccard's coefficient of similarities.

The results obtained showed that, The O group was most common frequently occurred (47% ), followed by group A ( 28%), group B was found ( 22% ) and least common was group AB ( 3%).

The e, c, and the D antigens were the commonest alleles detected with frequencies of 96%, 91% and 82%, respectively. The C and the E antigens were the least frequent with 40% and 15% frequencies respectively.

There was a marked similarities between the Sudanese tribes that lived in same geographical area this could be due to intermarriage , while the difference that seen in some tribes could be most probably due to the wandering nature of these tribes.

## *List of abbreviations*

**Ab:** Antibody.

**AE1:** Anion Exchanger 1.

**Ag:** Antigen.

**AIHA:** Autoimmune Hemolytic anemia.

**Amt:** Ammonium Transporters.

**Appro:** Approximately.

**BFU-E :** Burst-Forming Unit, Erythroid.

**CFU-E :** Colony-Forming Unit, Erythroiod.

**cDNA:** Complementary Deoxyribonucleic Acid.

**CHO:** Carbohydrates.

**CML:** Chronic Myeloid Leukemia.

**DNA:** Deoxyribonucleic Acid

**Fy Ag:** Duffy Associated Glycoprotein.

**GPB:** Glycoprotein-B.

**H-chain:** Heavy Chain.

**HDN:** Hemolytic Disease of The Newborn.

**ID:** Immunodiffusion.

**IgA:** Immunoglobulin A.

**IgD**: Immunoglobulin D.

**IgE**: Immunoglobulin E.

**IgG**: Immunoglobulin G.

**IgM**: Immunoglobulin M.

**ISBT**: International Society of Blood Transfusion.

**L-Chain**: Light chain.

**Le**: Lewis.

**Lu**: Lutheran.

**LW**: Landsteiner and Wiener.

**Mep**:Methylamine Permease Transporters

**mRNA**: Messenger ribonucleic acid.

**PCR**: Polymerase Chain Reaction.

**RBC**: Red blood cells.

**Rh Ag**: Rhesus Antigen.

**Rh**: Rhesus blood group system.

**RNA**: Ribonucleic acid.

**SGP**: Sialoglycoprotein.

**UK**: United Kingdom.

**VH**: Variable heavy chain.

**VL**: Variable light chain.

## ***Contents***

	<b><i>SUBJECT</i></b>	<b><i>PAGE</i></b>
	اًدَبٌ	
	Dedication	I
	Acknowledgement	II
	Abstract (Arabic)	III
	Abstract (English)	IV
	List of abbreviations	VI
	List of contents	VIII
	List of tables	XIII
	List of figures	XIV
Chapter I <i>Introduction and literature review</i>		
1.1	Introduction	1
1.2	Literature Review	3
1.2.1	Human Blood Group	3
1.2.1.1	Alleles	5
1.2.1.2	Blood group antigen	6
1.2.1.3	Clinical importance of blood group systems	7
1.2.2	The ABO system	8
1.2.2.1	Historical Background	8

1.2.2.2	.Inheritance of ABO	9
1.2.2.3	Antigens of the ABO blood group system	10
1.2.2.3.1	Secretors and Nonsecretors	11
1.2.2.3.2	The sub-groups of A	12
1.2.2.3.3	The H antigen	14
1.2.2.3.4	Development of the A, B and H antigens	15
1.2.2.3.5	The distribution of the A and B antigens	15
1.2.2.3.6	Bombay phenotype	17
1.2.2.3.7	The acquired B antigen	16
1.2.2.4	Antibodies of the ABO system	16
1.2.2.4.1	Anti-A and anti-B	16
1.2.2.4.2	Dangerous universal donors	18
1.2.2.4.3	Anti-H	18
1.2.2.4.4	Rare ABO variants	19
1.2.2.4.5	Rare alleles of ABO genes	20
1.2.2.4.6	Sub-groups of B	21
1.3	Rh blood group system	22
1.3.1	Rh inheritance	23
1.3.2	The antigens of the Rh system	24

1.3.2.1	The D Antigen	27
1.3.2.2	Alleles at the D locus (D <sup>u</sup> )	28
1.3.2.3	The Genetics of D <sup>u</sup> —Direct Inheritance and “Position” Effect	29
1.3.2.4	Subgroups (Subdivisions of D (D Variants); the D Antigen Mosaic	30
1.3.2.5	Nomenclatures and genetic theories	31
1.3.2.5.1	The Fisher-Race Nomenclature	32
1.3.2.5.2	The Wiener Nomenclature	33
1.3.2.5.3	The Rosenfield Nomenclature	34
1.3.2.5.4	Tippett theory	35
1.4	Gel Technique	38

Chapter II  
**OBJECTIVES**

2.1	Rationale	42
2.2	objectives	43
2.2.1	General objectives	43
2.2.2	Specific objectives	43

Chapter III  
*MATERIALS AND METHODS*

3.1	Study design	44
3.2	Research Tools.	44
3.3	Materials	44
3.4	Methods	45
3.4.1	Sampling	45
3.4.2	Slide method	46
3.4.3	Tube method	46
3.4.4	Rh system by Tube method	47
3.4.5	Gel technique	48
3.5	Data analysis	50

<p>Chapter IV</p> <p><b><i>THE RESULTS</i></b></p>		
<b>4.1</b>	Characteristic of the study	51
<b>4.2</b>	ABO Blood Groups system	51
<b>4.3</b>	Rh Blood Groups system	51
<p>Chapter V</p> <p><b><i>DISCUSSION</i></b></p>		
5	Discussion	59
<p>Chapter VI</p> <p><b><i>CONCLUSIONS AND RECOMMENDATIONS</i></b></p>		
6.1	Conclusion	63
6.2	Recomendation	64

## ***List of Tables***

<i><b>NO.</b></i>	<i><b>Table Name</b></i>	<i><b>Page no.</b></i>
<b>1.1</b>	<b>Human blood group systems.</b>	<b>4</b>
<b>1.2</b>	<b>ABO system Groups-Antigens-Antibodies.</b>	<b>13</b>
<b>1.3</b>	<b>Numbers of A and B antigen sites on red cells of various A and B groups.</b>	<b>15</b>
<b>1.4</b>	<b>Some properties of immune and naturally occurring anti-A and anti-B.</b>	<b>20</b>
<b>1.5</b>	<b>Comparison in Rh haplotypes nomenclature.</b>	<b>36</b>
<b>1.6</b>	<b>Comparison in Rh antigens nomenclature.</b>	<b>37</b>
<b>1.7</b>	<b>Tippett's Genetic Model Applied to the Eight Common Rh Gene Complexes.</b>	<b>37</b>
<b>4.1</b>	<b>the Sex –related incidence distribution in AlHalanga Ethnic Group.</b>	<b>53</b>
<b>4.2</b>	<b>Frequencies of ABO Blood group distribution among AlHalanga Ethnic Group.</b>	<b>54</b>
<b>4.3</b>	<b>Rh fisher incidence distribution a among AlHalanga Ethnic Group.</b>	<b>55</b>
<b>4.4</b>	<b>The Expected Frequencies and percentage of Rh Phenotypes distribution among AlHalanga Ethnic group.</b>	<b>56</b>
<b>4.5</b>	<b>The relation between ABO and Rh distribution among AlHalanga Ethnic Group.</b>	<b>57</b>
<b>4.6</b>	<b>Comparison between Agglutination and Immunodifusion Technique.</b>	<b>58</b>

## ***List of Figures***

<i><b>NO.</b></i>	<i><b>Figure Name</b></i>	<i><b>Page no.</b></i>
1.1	<b>Diagram showing the carbohydrate chains which determine the ABO blood group.</b>	10
1.2	<b>Pathways from HAB Blood group genes to antigens</b>	16
1.3	<b>Rh inheritance with Fisher-Race</b>	25
1.4	<b>The direct inheritance of D<sup>u</sup>.</b>	30
1.5	<b>The effect of the C gene when in the “trans” position for D<sup>u</sup>.</b>	31
1.6	<b>Missing determinants of Rh<sub>o</sub> (D) antigen</b>	32
1.7	<b>Rh inheritance with Wiener nomenclature</b>	38
4.1	<b>the Sex –related incidence distribution in AlHalanga Ethnic Group.</b>	53
4.2	<b>Frequencies of ABO Blood group distribution among AlHalanga Ethnic Group.</b>	54
4.3	<b>Rh fisher incidence distribution a among AlHalanga Ethnic Group.</b>	55
4.4	<b>The Rh phenotype distribution among AlHalanga Ethnic Group.</b>	56
4.5	<b>The relation between ABO and Rh distribution among AlHalanga Ethnic Group..</b>	57