

Dedication

To my parents

To my husband

To my brother and sisters

To the teaching staff and colleagues at

College of Technical Sciences

Acknowledgment

I wish to express my sincere thanks and gratitude to my supervisor **Dr. Mohammed Siddig M. Ali**, head of the Hematology department for his invaluable and patience helps in conducting this research.

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ملخص الأطروحة

هذه الدراسة وصفية مقطعية هدفت لدراسة تردد الزمر الوظيفية والنمط الظاهري والوراثي لنظامي الدم ABO و Kidd. أجريت هذه الدراسة على القبائل الأساسية في الولاية الشمالية (الجعليين - الشاذلية - الدناقلة - المحس والحفاويين) في الفترة من يناير 2005 وحتى أغسطس 2007. بعد أخذ الموافقة من الأفراد تم تجميع خمسمائة عينة من كل القبائل. حيث تم جمع 100 عينة من كل قبيلة في وعاء سعة 2.5 مل يحتوى على مادة مانعة للتخثر EDTA من أشخاص لا تربطهم صلة قرابة من الدرجة الأولى ولا من الدرجة الثانية.

تم فحص العينات لمعرفة الزمر الوظيفية لنظام Kidd بواسطة Gel technique. ونظام الدم ABO تم استخدام طريقة الشريحة المباشرة.

أوضحت الدراسة أن الزمرة الوظيفية O هي الأكثر شيوعاً عند المحس بنسبة 82% والجعليين 56% والدناقلة 55% والحفاويين 53% والشوايقة بنسبة 50%.

والزمرة الوظيفية A هي أكثر شيوعاً عند الشاذلية بنسبة 27% تليها الدناقلة (25%) والحفاويين (23%) ، الجعليين (16%) والمحس هي النسبة الأقل شيوعاً (1%) أما الزمرة الوظيفية B فهي أكثر شيوعاً عند الجعليين (21%) ثم الشاذلية (20%) والحفاويين ، والدناقلة (11%) والمحس (8%).

الزمرة AB أكثر شيوعاً عند الحفاويين بنسبة 13% يليهم المحس و الدناقلة (9%) ، الجعليين (6%) و الشاذلية (3%).

في نظام الدم Kidd وجد أن الزمرة الوظيفية Jk^a أكثر شيوعاً عند المحس بنسبة 94% و أقل شيوعاً عند الشوايقة بنسبة 28% ثم المحس بنسبة 8%.

وجد أيضاً أن الزمرة الوظيفية Jk^b أكثر شيوعاً عند الشاذلية بنسبة 54% بينما لم توجد هذه الزمرة عند المحس (0%).

النمط الظاهري Jk^{a+b+} أكثر شيوعاً عند المحس (94%) ثم الدناقلة (69%) ، الحفاويين (66%) ، الجعليين (65%) والشاذلية أقل بنسبة 46%. أما النمط الظاهري Jk^a $^{+b}$ فكان أكثر شيوعاً عند الشاذلية (22%) يليهم الحفاويين (10%) ثم الدناقلة والجعليين (6%) بينما لم يوجد هذا النمط عند قبيلة المحس (0%). النمط الظاهري Jk^{a+b+} وجد أكثر شيوعاً عند الشاذلية بنسبة 32% ثم الدناقلة بنسبة 24% والحفاويين والجعليين بنسبة 21% بينما لم يوجد عند قبيلة المحس.

بينما وجد النمط الظاهري Jk^{a-b} عند قبيلة الجعليين أكثر شيوعاً 8% من المحس 6% , الحفاويين 3% و الدناقلة 1% بينما لم تظهر عند الشاذلية. تمت مقارنة النتائج المتحصلة في هذه الدراسة مع نتائج بعض القبائل السودانية في نفس الأنظمة فوجد أن هناك تشابه في بعض الزمر الوظيفية لنظام الدم ABO مع قبائل بنى عامر والنوير. نخلص إلى أن التشابه بين القبائل السودانية التي تقطن في منطقة واحدة ناتج عن التداخل والتزاوج بين هذه القبائل.

Abstract

This descriptive cross sectional study was aimed to measure the frequency of ABO and blood group systems antigens and phenotypes. The study performed on the major northern Sudanese tribes (Shawaia, Mahas, Galeen, Halfaween and Danagela) between Jan 2005 to Aug 2007.

Consent was taken before blood collection from each individual. One hundred blood samples were obtained from each tribe and 2.5ml was collected in EDTA anti coagulated container from each individual. Samples were analyzed by the saline technique for the detection of ABO system Phenotypes and by Immuno-diffusion (ID) for the detection of Kidd blood group antigens.

Concerning ABO system, the study revealed the high frequency of group O (50%, 53%, 55%) followed by A (27%, 23%, 25%), B (20%, 11%, 11%) and AB (3%, 13%, 9%) in Shawaiga, Halfaween and Danagla respectively. While in Mahas and Galeen the high frequent group is O (82%, 56%), followed by B (8%, 21%), A (1%, 16%) and AB (9%, 7%) respectively.

Concerning Kidd blood group system, the frequency of Jk^a is 78%, 94%, 86%, 87%, 93% and of Jk^b is 54%, 0%, 27%, 31%, 30% in Shawaiga, Mahas, Galeen, Halfaween and Danagla respectively.

The study concluded slight variation between Danagla, Shawaiga, Galeen and Halfaween in the frequency of ABO blood group system phenotype, with considerable variation between the three tribes and Mahas. On the other hands, Shawaiga, Galeen and Halfaween have similar frequencies of Kidd system antigen and phenotypes and were clearly differ from Shawaiga and Mahas.

Therefore, the study recommend to screen blood donors and recipient for Kidd antigens and to consider these antigens in cases of hemolytic disease of newborn (HDN) as well as hemolytic transfusion reaction (HTR).

CONTENTS

No Page No	Subject	Page No
I	اللاية	
II	Dedication	I
III	Acknowledgment	II
IV	Abstract(Arabic)	III
V	Abstract (English)	IV
VI	List Contents	V
VII	List of tables	VI
VIII	List of figures	VII
IX	List of Abbreviations	VIII
	Chapter One	
	Introduction and Literature Review	
1	Introduction	1
2	Literature Review	4
2.1	Kidd blood group antigen's	4
2.1.1	The gene	4
2.1.2	Kidd blood group antigens distribution	6
2.1.3	Inheritance of alleles	6
2.1.4	Phenotypes	6
2.1.5	Kidd blood group antigens reaction	8
2.1.6	Effects of enzymes on Kidd blood group antigens	9
2.1.7	Immunogenicity	9
2.1.8	The Antigens modification	9
2.1.9	Biochemistry	10
2.1.10	Antigens associated disease	11
2.2	Antibodies of kidd blood group antigens system	11
2.2.1	Anti jka and anti jkb	11
2.2.2	Anti jk3	13
2.2.4	Effects of complement	14
2.2.5	Clinical significance of kidd blood group system	15
3.1	Previous studies	18
3.2	ABO blood group system	27
3.3	The rhesus blood group system	28
3.4	Other blood group systems	29
3.5	Laboratory methods used serology	30
3.6	Ethnicity of Sudan	41
	Chapter Two	

	Objectives	
2.1	General objectives	44
2. 2	Specific objectives	44
	Chapter Three	
3	Material and Methods	
3 .1	Study design	45
3 .2	Study area	45
3 .3	Study population	45
3 .3.1	Inclusion criteria	45
3 .3.2	Exclusion criteria	45
3 .4	The sample size and sampling technique	45
3.5	Data collection	45
3 .6	Study period	45
3 .7	Methodologies	46
3.7.1	Sample collection	46
3 .7 .2	Laboratory method	46
3.7.2.1	ABO grouping (slide method)	46

3.7.2.2	Kidd blood system typing (Immunodifusion gel method)	48
3.7.2.3	Sample material	49
3.8	Interpretation of results	49
3.9	Ethical considerations	50
3.10	Data analysis	50
	Chapter Four	
	Results	
	Chapter Five	
	Discussion	72
	Chapter Six	
	References	77
	Appendices	86

List of Tables

Table No.	Title	Page No.
1.1	Distribution of Kidd phenotypes among Whites, Black and Asian.	26
1.2	The frequency of ABO system phenotypes in UK .	27
1.3	Frequencies of ABO system phenotypes in Whites and Blacks of USA.	27
1.4	Distribution of antigens and antibodies in ABO system and the frequency in UK.	28
1.5	Rh-D genotypes and phenotypes in UK.	29
4 .1	The correlation between both Kidd and ABO system antigens and gender in Shawaiga tribe individuals.	53
4 .2	Correlation between Kidd blood group system and ABO blood group phenotypes in the Shawaiga ethnic group .	54
4 .3	Correlation between Kidd and ABO system antigens and gender in Mahas tribe individuals	56
4 .4	The association between Kidd blood group system and ABO blood group phenotypes in the Mahas ethnic group.	57
4 .5	Cross tabulation between Kidd and ABO system antigens and gender in Galeen tribes group	59
4 .6	Correlations between (jk^a – jk^b) antigens and ABO blood group phenotypes in the AL G aleen ethnic group	60
4 .7	The correlation between Kidd and ABO blood group antigens and gender in Hlfaween tribe	62
4 .8	Correlation between (jk^a – jk^b) antigens and ABO blood group phenotypes among Halfaween tribe	63
4 .9	Association between Kidd and ABO system antigens and gender in Dnagla tribe individuals.	65
4 .10	Relation ship between (jk^a – jk^b) among Danagala ethnic group.	66
4 .11	ABO blood group system phenotypes among the	67

	major Sudanese northern tribes.	
4 .12	Frequency of Kidd blood group antigens in the major northern Sudanese ethnic group	68
4 .13	Correlation between ABO blood group phenotypes and Kidd blood group antigens detected in the major northern Sudan's tribes	69
4 .14	The frequency of Kidd blood group system phenotypes among the major northern tribes	70
4 .15	Cross tabulations between ABO blood group system phenotypes and Kidd blood group phenotypes in all tribes	71

List of Figures

Fig. No	Title	Page
1.1	Genetic structure of Kidd blood group system in human	5
1.2	Genetic structure of Kidd blood group system in mammalian	5
4:1	The frequency of ABO and Kidd blood group system antigens and phenotypes among Shawaiga tribe individuals	52
4:2	The frequency of ABO and Kidd blood group system antigens and phenotypes among mahas ethnic group	55
4:3	The frequency of ABO and Kidd blood group system antigens and phenotype among Galeen tribe	58
4:4	The distribution of ABO and Kidd blood group system antigens and phenotypes among Halfaween ethnic group	61
4:5	The frequency of ABO and Kidd blood group system antigens and phenotypes among Danagla ethnic group .	64
6.1	Correlation between height of individuals (in all tribes) and both Kidd system antigens and ABO system phenotypes .	86
6.2	Cross tabulation between eye color of individuals in (all tribes) and both Kidd system and ABO system antigens and phenotypes.	87
6.3	The relation ship between hair type (all tribes) and both Kidd system, and ABO system phenotypes.	88
6.4	The correlation between skin color in (all tribes) individuals and both Kidd system and ABO system antigens and phenotypes.	89
6.5	Kidd system phenotypes in relation to the gender of individuals belong to the major northern tribes in Sudan's	90
6.6	The frequency of ABO blood group phenotypes in	91

	northern Sudanese tribes	
6.7	The frequency of Kidd system phenotypes in northern tribes individuals	92
6,8	The frequency of Kidd system antigens $jk^a(a+ \setminus -)$ in studied population	93
6.9	The frequency of Kidd system antigens $jk^b(b+ \setminus -)$	94

List of Abbreviation

RBCs	Red blood cells
ISBT	International society of blood transfusion
HUT	Human urea transporter
HUT11	human urea transporter2
ASP	Amino acid substitution polymorphism
ASN	Amino acid substitution nucleotide
SLC14A1	Solute carrier family 14,membrs1
Slc14A2	Solute carrier family 14,member2
TATA	Thyroxin adenine thyroxin adenine
CAAT	Cynen adenine adenine thyroxin
GATA	Guanine adenine thyroxin adenine
UTE	Urea transporter erythroryte
UT2	Urea transporter2
TonE	Tonicity enhoncer
LISS	Low ionic strength solution
IAT	Indirect antiglobulin test
DAT	Direct antiglobulin test
PEG	Polyether glycol
SDS	Sodium podecyl sulfate
PAGE	Poly-acrylamide gel electrophoresis
EDTA	Ethylene di-amine tri-choro-acetic acid
HDN	Hemolytic disease of the new born
HTR	Hemolytic transfusion reaction
2m urea	Beta 2 micro globulin urea
SNP	Single nudeotide polymorephism
NSO	National Statistic Office
BBT	Basal body temperature
US	United state
UK	United kingdom
Rh	Rhesus blood group system
ID	Immuno-diffusion
IgG	Immnglobulin G