

# **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.

Also we would like to thank the **staff of the Hematology department** of the Faculty of Medical Laboratory Sciences in College of Technical Sciences.

All thanks to our colleagues at Faculty of Medical Laboratory Sciences, our friends and all those who helped us.

Many thanks due to individuals who donated blood samples for this study.

## ملخص الأطروحة

هـ ذـهـ الـدـرـاسـةـ وـصـفـيـةـ مـقـطـعـيـةـ هـ دـفـتـ لـدـرـاسـةـ تـرـدـدـ الزـمـرـ الـوـظـيـفـيـةـ وـالـنـمـطـ الـظـاهـرـيـ والـوـرـاثـيـ لـنـظـامـيـ الدـمـ ABO وـ Kiddـ.ـ أـجـرـيـتـ هـذـهـ الـدـرـاسـةـ عـلـىـ الـقـبـائـلـ الـأـسـاسـيـةـ فـيـ الـوـلـاـيـةـ الـشـمـالـيـةـ (ـالـجـعـلـيـبـيـنـ -ـ الشـاـيـقـيـةـ -ـ الدـنـاـ قـلـةـ -ـ الـمـحـسـ وـالـحـلـفـاوـيـبـيـنـ)ـ فـيـ الـفـتـرـةـ مـنـ يـنـاـيـرـ 2005ـ وـحـتـىـ أـغـسـطـسـ 2007ـ.ـ بـعـدـ أـخـذـ الـمـوـافـقـةـ مـنـ الـأـفـرـادـ تـمـ تـجـمـيـعـ خـمـسـمـائـةـ عـيـنـةـ مـنـ كـلـ الـقـبـائـلـ.ـ حـيـثـ تـمـ جـمـعـ 100ـ عـيـنـةـ مـنـ كـلـ قـبـيـلـةـ فـيـ وـعـاءـ سـعـةـ 2.5ـ مـلـ يـحـتـوـيـ عـلـىـ مـادـةـ مـانـعـةـ لـلـتـخـنـثـ EDTAـ مـنـ أـشـخـاصـ لـاـ تـرـبـطـهـمـ صـلـةـ قـرـابـةـ مـنـ الـدـرـجـةـ الـأـوـلـىـ وـلـاـ مـنـ الـدـرـجـةـ الـثـانـيـةـ.

تمـ فـحـصـ الـعـيـنـاتـ لـمـعـرـفـةـ الـزـمـرـ الـوـظـيـفـيـةـ لـنـظـامـ Kiddـ بـوـاسـطـةـ Gel~technique~.ـ وـنـظـامـ

الـدـمـ ABOـ تـمـ اـسـتـخـدـمـ طـرـيـقـةـ الشـرـيـحةـ الـمـبـاـشـرـةـ.

اـوـضـحـتـ الـدـرـاسـةـ أـنـ الـزـمـرـةـ الـوـظـيـفـيـةـ Oـ هـيـ الـأـكـثـرـ شـيـوـعـاـ عـنـ الـمـحـسـ بـنـسـبـةـ 82%ـ وـالـجـعـلـيـبـيـنـ 56%ـ وـالـدـنـاـ قـلـةـ 55%ـ وـالـحـلـفـاوـيـبـيـنـ 53%ـ وـالـشـوـاـيـدـقـيـةـ بـنـسـبـةـ 50%ـ.

وـالـزـمـرـةـ الـوـظـيـفـيـةـ Aـ هـيـ اـكـثـرـ شـيـوـعـاـ عـنـ الشـاـيـقـيـةـ بـنـسـبـةـ 25%ـ تـلـيـهـاـ الـدـنـاـ قـلـةـ 27%ـ وـالـزـمـرـةـ الـوـظـيـفـيـةـ Bـ هـيـ اـكـثـرـ شـيـوـعـاـ عـنـ الـجـعـلـيـبـيـنـ 21%ـ ثـمـ الشـاـيـقـيـةـ 20%ـ وـالـحـلـفـاوـيـبـيـنـ،ـ وـالـدـنـاـ قـلـةـ 11%ـ وـ الـمـحـسـ 8%ـ.

الـزـمـرـةـ ABـ اـكـثـرـ شـيـوـعـاـ عـنـ الـحـلـفـاوـيـبـيـنـ بـنـسـبـةـ 13%ـ يـلـيـهـمـ الـمـحـسـ وـ الـدـنـاـ قـلـةـ 9%ـ،ـ الـجـعـلـيـبـيـنـ 6%ـ وـ الشـاـيـقـيـةـ 3%ـ.

فـيـ نـظـامـ الـدـمـ Kiddـ وـجـدـ أـنـ الـزـمـرـةـ الـوـظـيـفـيـةـ Jk<sup>a</sup>ـ اـكـثـرـ شـيـوـعـاـ عـنـ الـمـحـسـ بـنـسـبـةـ 94%ـ وـ اـقـلـ شـيـوـعـاـ عـنـ الـشـوـاـيـدـقـيـةـ بـنـسـبـةـ 28%ـ ثـمـ الـمـحـسـ بـنـسـبـةـ 8%ـ.

وـجـدـ أـيـضـاـ أـنـ الـزـمـرـةـ الـوـظـيـفـيـةـ Jk<sup>b</sup>ـ اـكـثـرـ شـيـوـعـاـ عـنـ الشـاـيـقـيـةـ بـنـسـبـةـ 54%ـ بـيـنـماـ لـمـ تـوـجـدـ هـذـهـ الـزـمـرـةـ عـنـ الـمـحـسـ 0%ـ.

الـنـمـطـ الـظـاهـرـيـ Jk<sup>a+b</sup>ـ اـكـثـرـ شـيـوـعـاـ عـنـ الـمـحـسـ 94%ـ ثـمـ الـدـنـاـ قـلـةـ 69%ـ،ـ الـحـلـفـاوـيـبـيـنـ 66%ـ،ـ الـجـعـلـيـبـيـنـ 65%ـ وـ الشـاـيـقـيـةـ اـقـلـ بـنـسـبـةـ 46%ـ.ـ أـمـاـ النـمـطـ الـظـاهـرـيـ Jk<sup>a</sup>ـ فـكـانـ اـكـثـرـ شـيـوـعـاـ عـنـ الشـاـيـقـيـةـ 22%ـ يـلـيـهـمـ الـحـلـفـاوـيـبـيـنـ 10%ـ ثـمـ الـدـنـاـ قـلـةـ وـالـجـعـلـيـبـيـنـ 6%ـ بـيـنـماـ لـمـ يـوـجـدـ هـذـهـ النـمـطـ عـنـ قـبـيـلـةـ الـمـحـسـ 0%ـ.ـ النـمـطـ الـظـاهـرـيـ Jk<sup>a+b</sup>ـ وـجـدـ اـكـثـرـ شـيـوـعـاـ عـنـ الشـاـيـقـيـةـ بـنـسـبـةـ 32%ـ ثـمـ الـدـنـاـ قـلـةـ بـنـسـبـةـ 24%ـ وـالـحـلـفـاوـيـبـيـنـ وـالـجـعـلـيـبـيـنـ بـنـسـبـةـ 21%ـ بـيـنـماـ لـمـ يـوـجـدـ عـنـ قـبـيـلـةـ الـمـحـسـ.

، بينما وجد النمط الظاهري  $Jk^{a-b}$  عند قبيلة الجعليين أكثر شيوعاً 8% من المحس ، الحلفاويين 3% و الدنا فلة 1% بينما لم تظهر عند الشايقية. تمت مقارنة النتائج المتحصلة في هذه الدراسة مع نتائج بعض القبائل السودانية في نفس الأنظمة فوجد أن هناك تشابه في بعض الزمرة الوظيفية لنظام الدم ABO مع قبائل بني 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).

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## 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 podesyl 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 polymorphism
NSO	National Statistic Office
BBT	Basal body temperature
US	United state
UK	United kingdom
Rh	Rhesus blood group system
ID	Immuno-diffusion
IgG	Immnoglobulin G