EVALUATION OF ADULT EGYPTIAN POPULATION BASED REFERENCE INTERVALS FOR PARAMETERS OF COMPLETE BLOOD PICTURE

Thesis

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By

Heba Mohamed Atif Ismail
(M.B., B.Ch) Ain Shams University

Supervised By

Professor/ Iman Mohamed Amin Omar
Professor of Clinical and Chemical Pathology
Faculty of Medicine
Ain Shams University

Professor/ Dina Adel Fouad Mohamed
Professor of Clinical and Chemical Pathology
Faculty of Medicine
Ain Shams University

Doctor/ Deena Mohamed Mohamed Habashy
Lecturer of Clinical and Chemical Pathology
Faculty of Medicine
Ain Shams University

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بسم الله الرحمن الرحيم
قَالُوا سُبْحَانَكَ
لاَ عِلْمَ لَنَا
إِلاَّ مَا عَلَّمْتَنَا
إِنَّكَ أَنتَ
الْعَلِيمُ الْحَكِيمُ
صدق الله العظيم
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List of Abbreviations

% Bias	Percentage Bias
ATYPDEP	Atypical depolarization
B	Basophils
CBC	Complete blood count
CI	Confidence interval
CLIA	Clinical Laboratory Improvement Amendments
CLSI	Clinical Laboratory Standard Institute
CV	Coefficient of variation
DFLT	Default
DNA	Deoxy ribonucleic acid
EDC	Extended differential count
EDTA	Ethylenediaminetetraacetic acid
EQA	External Quality Assessment
EQC	External quality controls
FS	Forward angle scatter
FWBC	Fragile white blood cells
GLP	Good laboratory practice
Hb	Haemoglobin
Hct	Haematocrit
HPCs	Hematopoietic progenitor cells
ICSH	International Council for Standardization in Hematology
IFCC	International Federation of Clinical Chemistry
IGs	Immature granulocytes
IQC	Internal quality control
IQC & EQC	Internal and external quality controls
ISLH	International Society of Laboratory Hematology
ISO	International Organization for Standardization
K3	Tripotassium
LED	Low-energy light emitting diode
L-J	Levy-Jenning
LM	Lymphocytes

List of Abbreviations

LRI	lower reagent interference
LURI	Lower upper reagent interference
MAPPS	Multi-angle polarized scatter separation
MCH	Mean cell haemoglobin
MCH	Mean cell (corpuscular) haemoglobin
MCHC	Mean cell (corpuscular) haemoglobin concentration
MCV	Mean cell volume
MPV	Mean platelet volume
NCCLS	National Committee for Clinical Laboratory Standards
NE	Neutrophils
NOC	NOC
NRBCs	Nucleated red blood cells
NWBC	Nucleated white blood cells
PB	Peripheral blood
PCV	Packed cell volume
PDW	Platelet distribution width
PLT	Platelet
PT	Proficiency Testing
QA	Quality assurance
QC	Quality control
QCID	Quality control identification document
RBC	Red blood cell
RBC MORPH	Red blood cell morphology
RDW	Red cell distribution width
RI	Reference interval
RNA	Ribonucelic acid
RRBCs	Resistant red blood cells
SD	Standard deviation
SS	Side scatter
TAT	turnaround time
TEa	Total allowable error

List of Abbreviations

TPO	Thrombopoietin
TQM	Total Quality Management
URI	Upper reagent interference
VAR LYMP	Variant lymphocytes
WBC	White blood cell
WHO	World Health Organization
WOC	White blood cell optical count

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INTRODUCTION

Complete blood count (CBC) is the most commonly performed blood test as it is used for proper diagnosis and monitoring of diseases. Although appropriate reference intervals are essential for the interpretation of patients' results ***(kueviakoe et al., 2011)*** its latest evaluation in Egypt was proposed and updated by the World Health Organization (WHO) on 2006 ***(WHO, 2006).***

Reference values for African populations are not readily available and the values used are usually based on results of measurements in advanced countries taken from the literature of advanced countries or from package inserts that accompany reagent kits. However, these parameters even in the healthy state are affected by several factors including age, ethnicity, gender, altitude and geographical origin ***(kueviakoe et al., 2011).***

The few studies that have been undertaken have indicated differences in normal values of African populations, even in children and adolescents, compared to those derived from industrialized populations especially for haematologic indices. Therefore, recent advances in full blood count coupled with the changing population demographics have necessitated re-evaluation of the reference ranges currently in use ***(Lawrie et al., 2009).***

Laboratories throughout the world are realizing that their reference intervals are either not accurate or in-appropriate for the population they serve and are updating them by either the transference method or conducting a full scale reference intervals study ***(Aytekin and Emerk, 2008).***

In establishing reference values, it is essential that the population is well defined and properly selected to be representative of that population. The lower and upper limits of measurements are known to be affected by the choice of the sample population, standardization of the sample collection, handling and also the statistical analysis ***(Erik, 2004).***

Reference ranges are usually given as what are the usual (or normal) values found in the population, more specifically the prediction interval that 95% of the population fall into. This may also be called standard range. In contrast, optimal (health) range or therapeutic target is a reference range or limit that is based on concentrations or levels that are associated with optimal health or minimal risk of related complications and diseases. For most substances presented, the optimal levels are the ones normally found in the population as well. More specifically, optimal levels are generally close to a central tendency of the values found in the population ***(Aytekin and Emerk, 2008).***