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Capillary Electrophoresis-Based Haemoglobinopathy Screening, and Inflammatory Indicators

David James *

Department of Hematology, Assiut University, Asyut, Eygpt

***Corresponding author:** David James, Department of Hematology, Assiut University, Asyut, Eygpt, E-mail: davidjames256941@gmail.com

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Introduction

The applicability of hematological reference intervals is determined by the use of particular instruments and innovative chemical agents. Normal parameter determination is influenced by demographic and intrinsic elements, as well as a slew of other pre-analytical variables, necessitating the identification of native laboratory limits for each reported parameter for the specific analysis. Multiple factors can influence physiological measurements in a healthy population, necessitating the construction of a set of appropriate reference values for that population before applying the results to any clinical setting or pathological condition. Effective translation and discrimination between a state of well-being and sickness in clinical practice necessitates the use of exact reference ranges that accurately represent the people being studied. This may reduce medical costs by decreasing or avoiding needless follow-up examinations of patients. One of the most significant aspects of clinical practice is the use of reference values for various laboratory tests. These values can be adopted by using manufacturer or reference laboratory values, values obtained from relevant published articles, previous values in one's own laboratory or values established locally. Individual laboratories rarely use samples from human participants to validate the adopted value, let alone develop their own reference value.

The dispersion of test values in healthy individuals is described by reference values, which are commonly presented as a population-based Reference Interval (RI) that encompasses 95 percent of the healthy population. In 1970, the International Federation of Clinical Chemistry (IFCC) and laboratory Medicine commissioned a standard for the generation of human population-based RI. The Expert Panel on the Theory of Reference Values (EPTRV) published a 6-part series on reference value creation that was adopted by numerous professional bodies, including the Clinical and Laboratory Standards Institute (CLSI). Following that, the addition of different statistical approaches for identifying outliers, analyzing reference values, and determining the requirement for partitioning was proposed. Reference values are obtained from a healthy reference group would help clinicians interpret the test results of their patients that play into the decision-making process in charting the next course of action in management.

Capillary Electrophoresis-Based Haemoglobinopathy Screening

Ambayya et al. established the most recent Malaysian population-based reference values for Full Blood Count (FBC) in 2004 using Sysmex XE 5000 (Sysmex, Kobe, Japan) and Unicel DxH 800 (Beckman Coulter, USA) haemato-analysers and following the International Council for Standardization in Haematology (ICSH) guidelines. Many ancillary investigations were conducted in this large-scale study to demonstrate its association with hematological markers. Iron investigations, capillary electrophoresis-based haemoglobinopathy screening, and inflammatory indicators were among them. Since then, local hospital laboratories across Malaysia have used the Malaysian population-based FBC reference values in reporting FBC, as have physicians involved in clinical practice. The Sysmex XN modular system is a new generation analyzer that builds on the Sysmex XE model's principles, channels, and reagents. A few studies have reported on its effectiveness on adult peripheral blood samples. The introduction of advanced test parameters such as Immature Granulocytes (IG), Reticulocyte Haemoglobin (RET-He), Immature Reticulocyte (IRF), Immature Platelet Fraction (IPF), and Fluorescent Platelet Count (PLT-F) at the Makmal Rujukan Klinikal Hematologi (MRKH) of the department of hematology, hospital ampang, introduced some advanced test parameters such as immature granulocyte A study of verification, re-verification, and establishment of reference values was conducted to ensure that all existing and advanced test parameters of the new hematology analyzer are in agreement with Malaysian population-based reference values using samples from healthy reference individuals was performed. This study aimed to assess the agreement between the Malaysian population-based FBC reference intervals and the new Sysmex hematology analyser, model XN-3000 with emphasis on advanced clinical parameters and transference of ranges from XE-5000.

Selection of the Reference Sample Group

This study was approved by the Medical Research and Ethics Committee of the Ministry of Health, Malaysia. Blood samples were collected from healthy male and female individuals, aged between 18-45 years. This is under the International Council for Standardization in Hematology (ICSH) guidelines with regards to the sampling method for determining normal values of hematology. A priori approach was applied for all healthy donors. Health assessment and blood specimen collection were executed almost at the same time after obtaining a written consent by the participant. Common disorders such as haemoglobinopathy and iron deficiency anaemia were excluded based on their FBC on the XE-5000 established reference values that had been obtained in a normal healthy Malaysia population. Any volunteers with abnormal results were referred to the local health practitioner for assessment. Reliable transference or the adoption of new reference values was performed against the previously established standards that had been done previously by our laboratory. Therefore, the establishment of reference intervals required minimal sample size as per CLSI guidelines. Thus, a total of 168 males and 222 females were evaluated and included in the study. Some volunteers were excluded from this study. This included volunteers with a history of smoking tobacco and female volunteers having menses at the time of sampling.

Blood transfusion is an important therapeutic operation all around the world because it saves lives, but it can also transmit parasite illnesses that are fatal. Blood banks and plasma manufacturing businesses have vigorously sought techniques to lower the danger of transfusing a haemoparasitized blood, since the area of transfusion medicine has encountered a big difficulty in supplying safe blood and blood products. There are several haemoparasites, but plasmodium falciparum, wuchereria bancrofti, and babesiamicroti are the most prevalent parasitic organisms implicated in transfusion research. These parasites must circulate in the bloodstream of the donors, possess certain physical properties, and survive conservation in order to be transmitted by blood transfusion to generate infection in the blood.

Thick or thin films can be used to estimate site density, with each approach having its own set of constraints. Because there is little or no parasite loss during staining, parasite density estimates from thin films are more accurate than those from thick films. The thin film approach, on the other hand, is best suited to larger parasite densities. Although parasite loss makes parasite density estimation from thick film less precise, it may be customized to work with a wide range of parasite densities at the medium to lower end of detectable parasitaemia. With higher levels of parasitaemia, thin films will be more accurate, as precise parasite counts from thick films may be difficult to achieve with these high parasite densities. The white cell count approach, the 'per High Power Field' (HPF) method, or the Earle-Perez method can all be used to determine parasite density from thick film. The Earle-Perez method, which was devised in 1932 and can be used when real WBC counts are not available, is a method for calculating parasite density from the thick film.

As a result, blood donor screening and the safety of donated blood components are critical in diagnostic and therapeutic laboratory medicine. Following records of blood-borne disease transmission in blood banks, it is necessary to synthesize relevant data in order to determine the true state of these assertions, and thus this research work aims to determine the echelons of some haemoparasites (malaria parasite, microfilaria, and babesia species) among blood donors in Port Harcourt, Rivers State, Nigeria, as well as quantify their densities.