CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
http://doi.org/10.5281/zenodo.4013406

Available online at: http://www.iajps.com *Research Article*

HAEMATOLOGICAL REFERENCE VALUES FOR FULL TERM NEONATES

Dr Saba Hammad[1], Dr Sana Naveed[2], Dr Sair Ahmad Tabraiz[3]
[1]Jinnah Hospital, Lahore
[2]CMH Kharian Cantt

Article Received: July 2020 **Accepted:** August 2020 **Published:** September 2020

Abstract:
Introduction: *Several factors influence the health of individuals. These variables include demographic aspects such as place of residence or country, race, timing of the year, and the age of the individuals.* ***Objectives:*** *The main objective of the study is to analyse the haematological reference values for full term infants.* ***Material and methods:*** *This cross-sectional study was conducted in Jinnah Hospital, Lahore during March 2018 to June 2019. All new borns at 1st day of life that underwent blood sampling. After delivery of the baby, umbilical cord was immediately clamped; 5 ml cord blood was taken from the umbilical vein and transferred into an EDTA containing tube. The sample was then transported as early as possible (maximum 3 to 6 hours) to the laboratory for analysis.* ***Results:*** *Full blood count parameters are summarized, which shows a mean Hb level of 17.7 ± 2 g/dL (range 5.1–23.6) and a mean red blood corpuscle (RBC) count of 5.6% ±5.1% (range 2.8–25.5). The mean total white cell count was 16.7 ± 9.3 × 10^3/µL, (range 3.9–365) and the mean platelet count was 238.4 ± 6.6 × 10^3/µL (range 30.6–787). Red blood cell parameters (Hb, hematocrit, MCV, mean corpuscular hemoglobin [MCH], and mean corpuscular hemoglobin concentration [MCHC]) in cord blood for males and females showed no statistical significant gender differences (P > 0.05) in red cell count, hematocrit, MCH, and MCHC.* ***Conclusion:*** *It is concluded that our study on reference ranges of full term, healthy newborns may thus provide clinicians the normal values for our community, which they can use to compare with their patients.*

Corresponding author:
Dr. Saba Hammad,
Jinnah Hospital, Lahore
.

QR code

Please cite this article in press Saba Hammad et al, ***Haematological Reference Values For Full Term Neonates.,*** *Indo Am. J. P. Sci, 2020; 07(09).*

INTRODUCTION:

Several factors influence the health of individuals. These variables include demographic aspects such as place of residence or country, race, timing of the year, and the age of the individuals. Personal factors such as diet and drug intake also have to be taken into consideration. Methods employed for assessment, as well, could variably influence the accuracy of the assessment [1]. Therefore, there is a necessity to reference data when thoroughly focusing on individuals' health status and particularly when discussing infants, in regards of blood picture parameters. Because variables such as hematological parameters differ between infants, neonates, and adults and differ as per location. Investigation of an individual should entirely depend on the normal ranges, which have been established to an individual's locality. Reference value is defined as a set of laboratory test values obtained from an individual or group in a defined state of health. This term replaces normal values because it is based on a defined state of health rather than on apparent health [3].

A previous study, published in 2001, was conducted to determine the values in apparently healthy Saudi children screened during a household screening program. The study attempted to establish the normal reference values for hematological parameters in Saudi children and adolescents with ages ranging from 1 to 15 years. However, no particular emphasis was made on the very rapidly changing parameters, in the 1st weeks of newborn's life [4].

Blood indices in infants and neonates vary depending on gestational age, maternal factors, mode of delivery, and site of blood collection. Determination of reference ranges for healthy and full-term neonates is clinically important, also for clinical diagnosis, treatment, and public health interventions. Hemoglobin (Hb) and hematocrit are routine investigations on normal newborns to determine anemia, and more commonly, polycythemia. Some disorders in the pregnant mother, such as preeclampsia, can lead to neutropenia in infants [5]. The use of absolute blood neutrophil count has improved the sensitivity in screening for neonatal bacterial diseases. Platelet count is essential in the assessment of newborn's hemostatic status. Hematological values are also frequently determined in the newborns for diagnostic purposes in suspected infections and bleeding disorders [6].

Objectives

The main objective of the study is to analyse the haematological reference values for full term infants.

MATERIAL AND METHODS:

This cross-sectional study was conducted in Jinnah Hospital, Lahore during March 2018 to June 2019. All new borns at 1st day of life that underwent blood sampling. The exclusion criteria for the mother were, multiple pregnancy, diseases complicating pregnancy (anaemia, antepartum haemorrhage, pregnancy induced hypertension, eclampsia, diabetes (gestational or insulin dependent), heart, kidney or lung disease, malaria, disseminated intravascular coagulation), Thalasemia / Sickle cell disease, drug or alcohol abuse, immediate shock like state after post partum period, and emergency caesarian section. After delivery of the baby, umbilical cord was immediately clamped; 5 ml cord blood was taken from the umbilical vein and transferred into an EDTA containing tube. The sample was then transported as early as possible (maximum 3 to 6 hours) to the laboratory for analysis.

The data was collected and analysed using SPSS version 19. All the values were expressed in mean and standard deviation.

RESULTS:

Full blood count parameters are summarized, which shows a mean Hb level of 17.7 ± 2 g/dL (range 5.1–23.6) and a mean red blood corpuscle (RBC) count of 5.6% ±5.1% (range 2.8–25.5). The mean total white cell count was $16.7 \pm 9.3 \times 10^3/\mu L$, (range 3.9–365) and the mean platelet count was $238.4 \pm 6.6 \times 10^3/\mu L$ (range 30.6–787). Red blood cell parameters (Hb, hematocrit, MCV, mean corpuscular hemoglobin [MCH], and mean corpuscular hemoglobin concentration [MCHC]) in cord blood for males and females showed no statistical significant gender differences ($P > 0.05$) in red cell count, hematocrit, MCH, and MCHC. The Hb Level was 17.7 ± 1.9 g/dL in males and 17.8 ± 2 g/dL in females ($P = 0.465$), and mean corpuscular volume (MCV) was 105.1 ± 7.1 fl in males compared with 105.1 ± 7.3 fl in females ($P = 0.828$).

Table 01: Descriptive statistics of red blood corpuscle, white blood corpuscle, and platelet parameters

Parameter	Range	Mean ± SD
Hemoglobin (g/dL)	11–17.3	12.76 ± 1.56
Red cell count ($\times 10^{12}$/L)	3.12–7.3	4 ± 0.47
Hematocrit (%)	35.4–56.5	45.46 ± 4.75
MCV (fl)	90.4–128	111.56 ± 6.09
MCH (Pg)	26–41.1	33.41 ± 2.41
MCHC (g/dL)	25.8–33.6	30.93 ± 1.90
WBC ($\times 10^{9}$/L)	3.1–21.6	11.12 ± 2.9
Lymphocytes (%)	15–75	39.81 ± 10.17
Neutrophils (%)	15–78	51 ± 11.24
Monocytes (%)	1–14	7.91 ± 2.67
Basophils (%)	0–2	0.10 ± 0.36
Eosinophils (%)	0–5	1.31 ± 0.97
Nucleated RBC/100 WBC	0–3	0.07 ± 0.37
Platelets count ($\times 10^{9}$/L)	152–472	271.63 ± 61.62
RDW	11.4–21.5	18.01 ± 1.56

DISCUSSION:

Interpretation of values obtained in an individual baby depends on the knowledge of the normal values for the locality. Hence, a study was conducted to determine the reference ranges of complete blood count of term, healthy newborns. It was observed that the mean haemoglobin of our population was comparable with the figures of Abidjan, but were lower than the European and Indian results, probably due to varying numbers of newborns, low socioeconomic status, poor nutrition, maternal factors such as low iron high gravidity and time between birth and clamping of the cord [7,8].

Regarding the red cell parameters, no statistically significant differences were evident between males and females. From WBC parameters, there was a significant difference only between total leukocytic counts and monocytes in both genders [9]. Comparison of red blood cell parameters in neonatal cord plasma for the current study with reference values cited by other studies shows that only the red cell counts were higher than both the reference values (4.62×10^{6}/µL) and the three other studies (4.29, 4.35, and 4.45×10^{6}/µL). This may be due to varying numbers of newborns in the studies, varying time intervals between birth and clamping of the cord, ethnic differences, severity of anemia in the mothers, or the mothers having received different hematinic doses during pregnancy. This also might have possibly been due to postmaturity, diabetes in the mother, or a low oxygen level in the fetal blood [10].

CONCLUSION:

It is concluded that our study on reference ranges of full term, healthy newborns may thus provide clinicians the normal values for our community, which they can use to compare with their patients.

REFERENCES:

1. Mohson A, Hazmi E, Warsy A. Normal reference values for hematological parameters, red cell indices, HBA2 and HbF from early childhood through adolescence in Saudis. Ann Saudi Med 2011;21:165-9.
2. Noguera NI, Detarsio G, Pérez SM, Bragós IM, Lanza O, Rodríguez JH, Acosta I, Davoli R, Milani AC. Hematologic study of newborn umbilical cord blood. Medicina (B Aires) 1999;59 (5 Pt 1):446-8
3. Manroe BL, Weinberg AG, Rosenfeld CR, Browne R. The neonatal blood count in health and disease. I. Reference values for neutrophilic cells. J Pediatr 1979;95:89-98.
4. Kabata J, Raszeja-Specht A, Steffek I, Angielski S. Reference values for peripheral blood morphology in countryside population of Northern Poland. Pol Tyg Lek 1995;50:62-5.
5. Santiago Borrero PJ. Hemoglobin concentration, hematocrit and red cell index values in metropolitan San Juan children and adolescents. Bol Asoc Med *P* R 1981;73:538-47.
6. Jopling J, Henry E, Weidmeier SE. Reference ranges for hematocrit and blood hemoglobin concentration during the YH neonatal period: Data from a multi hospital healthcare system. Pediatrics 2009;123:e333-7
7. Mukiibi JM, Nkrumah FK, Kaur M, Pollard R, Akino V, Nhembe M. Neonatal haematology in Zimbabwe. II: The red cell and white cell parameters. Cent Afr J Med 1995;41:76-82.
8. Reinhardt MC, Marti HR. Haematological data of African newborns and their mothers in Abidjan. Helv Paediat Acta Suppl 1978; 41: 85-99.

9. Sheffer-Mimouni G, Mimouni FB, Lubetzky R, Kelpfermine M, Deutsch V, Dollberg S. Labour does not affect the neonatal absolute nucleated red blood cell count. Am J Perinatol 2003; 20: 367-71.

10. Stancheva VP, Sherman GG, Avent M, Cory BJ, Ballot DE, Cooper PA, et al. Hematological reference ranges in black very low birth weight infants. Pediatr Hematol Oncol 2002; 19: 91-4.