ORIGINAL ARTICLE

The Peripheral Blood Standard Values in Newborns in Dr. Pirngadi Hospital Medan

by

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Abstracts

*A study of peripheral blood standard values was carried out on 100 healthy
full term newborns, with normal deliveries to healthy mothers in Dr. Pirngadi
Hospital Medan, comprising of 60 males and 40 females.*

The newborns were divided into three groups according to their birth weight.

*There were no significant differences of the average value of peripheral blood
counts between group I, II and III neither between males and females.*

*The average value of hemoglobin concentration with Sahli is lower than that
with Cyan method, which is significantly different ($p<0.001$).*

*The average values found in this study on newborn babies of 24 hours of age
with term deliveries were as follows :*

Hemoglobin Sahli	*: 16,13 gm %*	*Reticulocytes*	*: 40,06 %*
Hemoglobin Cyan	*: 17,88 gm %*	*Erythrocyte sedimen-*	
Leucocytes	*: 16.512/cu mm*	*tation rate*	*: 3.09/1st hour.*
Hematocrit	*: 56,4 %*		

Introduction

Children's blood components depends on various factors such as body weight, age, sex, nutritional status, geographical status (Smith, 1966). The newborn gestational age and ligation of umbilical cord are also important (Wolman, 1957).

Several works on standard hematological values has been done in various parts of Indonesia :

— The peripheral blood standard values in normal children (Gambiro and Kho, 1961);

— The bone marrow puncture in newborn infants (Kho and Wiradisurya, 1961);

— The differential count of the bone marrow in normal infants from two weeks up to one year of age (Kho and Wiradisurya, 1961);

— The blood and bone marrow in prematures in Jakarta (Kho et al., 1962);

— The peripheral blood standard values in newborns in Bandung (Tien Sumartini et al., 1972).

The purpose of our study was to determine the peripheral blood standard values in newborn infants in Dr. Pirngadi Hospital Medan.

Material and methods

The study was performed from May 20th until July 20th 1979. Every infant, 60 males and 40 females, had normal delivery and the umbilical cord was ligated immediately after birth. All the mothers were not suffering from any diseases. When the study was performed, the age of the newborns were 0 - 24 hours. The birth weight of the newborns were more than 2500 grams and the length higher than 47 cm.

On physical examination following birth the newborns did not show any abnormalities such as cyanosis, dyspnea, congenital anomalies etc.

The newborns were divided groups according to their birthweight.

Group	Birthweight
I	2501 — 3000 grams
II	3001 — 3500 grams
III	3501 — 4000 grams

The items studied were : hemoglobin concentration, leucocytes, reticulocytes, erythrocyte sedimentation rate and hematocrit. The hemoglobin was studied using Sahli and Cyan Meth Hemoglobin method.

Cyan Meth Hemoglobin Method.

The blood specimens were obtained by heel puncture allowing free flow of blood and 0,02 ml blood was taken with a haemoglobine pipette and discarded into a colorimetric tube which previously had been added with 5 ml Darbkin's solution. Investigation was done using Photo Electric Colorimeter of Klett Summerson.

Darbkin's solution was made from
Sodium bicarbonate 1 gram
Potassium cyanide 50 mg
Potassium ferri cyanide 200 mg
Aqua destilata 1000 ml for dilution.

Leucocytes count was done using Improved Neubauer Counting chamber. The

reticulocytes count was made from a sample of 1000 erythrocytes stained with Brilliant Cresyl Blue and was stated per thousand. Erythrocyte sedimentation rate was examined using micropipette. The capillary tube had an internal diameter of 1.1-1.2 mm, which contains heparin. Immediately after the micropipette was fully filled, one of the tube was shut with wax about 2-3 mm. The tube is than plazed on a holder which keeps the tube in vertical position. Reading was made after one hour. Hematocrit examination was also done using micropipettes. The micropipettes were put in a centrifuge with 3000 rpm and after 5 minutes the hematocrit was read.

Results

The infants, 60 males and 40 females were divided into three groups according to their birthweight.

The average value of hemoglobin concentration with Sahli method was 16,13 gm% with a range between 13,00 gm% and 19,00 gm% (Table 2).

The average value of hemoglobin concentration with Cyan method was 17,88 gm% with a range between 14,50% and 20,90 gm% (Table 3).

The average value of leucocyte count was 16,512/cu mm with a range between 5600-29100 cu mm (Table 4).

The average value of hematocrit was 56,4% with a range between 40% and 76% (Table 5).

The average value of reticulocytes count was 40, 06‰ with a range between 23‰ and 78‰ (Table 6).

The average value of erythrocyte sedimentation rate was 3,09 with a range between 1 and 18 (Table 7).

TABLE 1: *Grouping of newborns according to sex and birth weight*

Group	Birth Weight	Male	Female	Total	%
I	2501 — 3000 g	12	10	22	22
II	3001 — 3500 g	23	21	44	44
III	3501 — 4000 g	25	9	34	34
Total		60	40	100	100

TABLE 2: *Average value and range of hemoglobin concentration (gm%) with Sahli method*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	16,16	16,40	15,78	16,02	16,22	16,22
range	14-19	14-19	13-18,5	14-18	13-20	14,5-18

TABLE 3 : *Average value and range of hemoglobin concentration (gm%) with Gyan method*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	18,23	18,03	17,75	17,83	17,89	17,55
Range	15,4-21	16,2-20,1	14,5-19,9	15,3-20,6	14,6-20,0	15,2-19,3

TABLE 4 : *Average value and range of leucocytes count per cu mm*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	16187	15075	17060	18033	16662	16055
Range	7100-	8100-	10500-	9500-	5600-	6100-
	23700	20630	28100	28000	26000	23000

TABLE 5 : *Average value and range of hematocrit in %*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	59,83	59,8	57,21	56,95	58,2	56,88
Range	50,76	50,73	40,73	40,72	46,71	44,67

TABLE 6 : *Average value and range of reticulocytes count per thousand*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	37,83	34	42	42,61	38,04	46
Range	15,54	13,50	20-60	22-78	10-62	29-62

TABLE 7 : *Average value and range of erythrocyte sedimentation rate on the 1st hour*

	Group I		Group II		Group III	
	Male	Female	Male	Female	Male	Female
Average	2,58	4	2,63	2,95	3,64	2,77
Range	1-8	1-15	1-18	1-10	1-17	1-7

Discussion

The value of hemoglobin concentration with Sahli method was lower than Cyan method.

The difference was statistically significant (p < 0.001).

The result of this study was lower than the studies done by Tien Sumartini et al. (1972), Wintrobe (1961) and Hughes (1952), but higher than that of Reinhardt and Marti (1978) in Abidjan, Africa (Table 8).

TABLE 8 : *Comparison between our findings of hemoglobin concentration value (gm%) and other studies*

Djaman Purba	Tien Sumartini	Wintrobe	Hughes	Reinhardt & Marti
17.88	19.3	19.5	21.2	15.1 ± 1.8

The value of leucocytes count in this study was lower than the findings of Tien Sumartini et al. (1972), Bakwin and Morris (1923), Wolman (1957) and Lucas et al. (1921), but higher than that of Reinhardt and Marti (1978) in Abidjan, Africa (Table 9).

TABLE 9 : *Comparison of leucocytes count*

Djaman Purba	Tien Sumartini	Bakwin & Morris	Wolman	Lucas	Reinhardt & Marti
16.512	17.043	20.300	18.000	19.200	14.400

The results of hematocrit examination were lower than the findings of Tien Sumartini et al. (1972), Wintrobe (1961) and Hughes (1952), but higher than that of Reinhardt and Marti (1978) in Abidjan, Africa (Table 10).

TABLE 10 : *Comparison of hematocrit values*

Djaman Purba	Tien Sumartini	Wintrobe	Hughes	Reinhardt & Marti
56.4	60.3	50.0 ± 10	56.1	43.9 ± 5.6

The result of reticulocyte value was similar to the findings of Tien Sumartini et al. (1972) (Table 11).

TABLE 11 : *Comparison of reticulocytes value*

Djaman Purba	Tien Sumartini
40.06	42

There was no correlation between body weight and values of hemoglobin, leucocytes, hematocrit, reticulocytes and erythrocyte sedimentation rate.

There was also no correlation between sex and values of hemoglobin, leucocytes, hematocrit, reticulocytes and erithrocyte sedimentation rate.

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