

The Profile and Morphology of Proboscis Monkey's Blood Cells in South Kalimantan

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INTRODUCTION

Twenty percent of primate species is found in Indonesia¹. Proboscis monkey (*Nasalis larvatus*) or *bekantan* is one of endemic species in Kalimantan^{2,3}. This primate is belonging to *Colobinae* subfamily and distributed in Kalimantan (Indonesia), Sabah and Serawak (Malaysia), and Brunei. Proboscis monkey is belonging to endangered species based on International Union for the Conservation of Nature and Natural Resources (IUCN) assessment⁴. Indonesian Ministry of environment and forestry established Proboscis monkey is belonging to one of twenty five species which has been increased in population.

Blood cells have important role in body regulation such as maintaining body temperature, carrying oxygen, nutrition, hormone and metabolism product to the whole body⁵. Blood examination is important for body health evaluation^{6,7}, especially in non-human primate where lived in zoo, animal captive or rehabilitation center⁶. The aim of this study was to investigate the profile and morphology of female-juvenile proboscis monkey blood cells at rehabilitation center (Sahabat Bekantan Indonesia Foundation) in Banjarmasin, South Kalimantan.

MATERIALS AND METHODS

Blood sample was collected from four female-juvenile (3-5 years old) proboscis monkey from Sahabat Bekantan Indonesia Foundation, Banjarmasin, South Kalimantan. Sample was process for hematological examination and blood smear staining.

Blood sample was examined in laboratory for erythrocytes, hemoglobin (Hb), leucocytes (neutrophils, eosinophils, basophils, monocytes and lymphocytes), platelet, pack cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC).

The blood smear preparation were fixated by using methanol and then visualized by using

Giemsa staining method. Blood cells morphology were observed and analyzed descriptively by using light microscope.

RESULT AND DISCUSSION

Proboscis monkey is endemic animal from Kalimantan and their existence was endangered. Zoo, animal captive or rehabilitation center establishment is conservation effort realization from government, public community, non-profit organization or educational institution for conserve the population. Sahabat Bekantan Indonesia (SBI) foundation is non-profit organization which collaborated with educational institution to supporting government program in proboscis monkey rehabilitation and conservation.

Proboscis monkey's health status monitoring in rehabilitation center were important. Blood cell profile is one of clinical parameter to monitoring and evaluating their healthy and effective treatment for unhealthy animals⁶. The female-juvenile proboscis monkey hematological examination result was showed in Table 1. The mean of erythrocytes value was $4,50 \pm 0.07 \times 10^6/\mu\text{L}$. The mean of erythrocytes indices was Hb $11.6 \pm 0.48 \text{ g/dL}$, PCV $35.9 \pm 2.55 \%$, MCV $79.7 \pm 5.22 \text{ fl}$, MCH $25,7 \pm 0.90 \text{ pg}$, MCHC $32,2 \pm 1.04 \%$. The mean of leucocytes value was $14.0 \pm 3.12 \times 10^3/\mu\text{L}$ with differential basophils $1.3 \pm 1.13 \%$, eosinophils $0,0 \pm 0.05 \%$, neutrophils $36,7 \pm 6.90 \%$, lymphocytes $58,9 \pm 6.03 \%$ and monocytes $3,8 \pm 0.95 \%$. The mean of platelets $345.8 \pm 153.64 \times 10^3/\mu\text{L}$. There is no reference for female-juvenile proboscis monkey blood profile in rehabilitation center. Macaques (*Macaca mullata*) and blood profile in captive animal has been reported for clinical health parameter⁶. Besides, *Macaca fascicularis* blood profile in their habitat were assessed for investigated physiological parameter for their utilization in research⁸. The result of this study could be hematology parameters for female-juvenile proboscis monkey in rehabilitation center.

Table 1. Hematological profile of proboscis monkey

Parameter	Mean \pm SD
Hb (g/dL)	11.6 \pm 0.48
Leukosit ($10^3/\mu\text{L}$)	14.0 \pm 3.12
Eritrosit ($10^6/\mu\text{L}$)	4,50 \pm 0.07
Platelets ($10^3/\mu\text{L}$)	345.8 \pm 153.64
PCV (%)	35.9 \pm 2.55
Dif. Basophils (%)	1.3 \pm 1.13
Dif. Eosinophils (%)	0,0 \pm 0.05
Dif. Neutrophils (%)	36,7 \pm 6.90
Dif. Lymphocytes (%)	58,9 \pm 6.03
Dif. Monocytes (%)	3,8 \pm 0.95
MCV (fl)	79.7 \pm 5.22
MCH (pg)	25,7 \pm 0.90
MCHC (%)	32,2 \pm 1.04

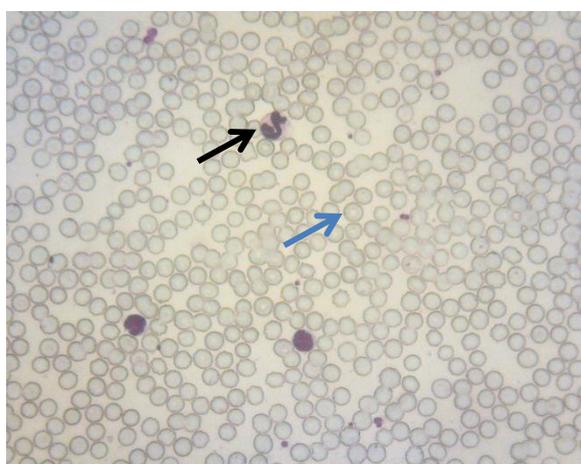


Figure 1. The morphology of eritrocytes and neutrophils (Giemsa; 500x). Biconcave shape was observed on erythrocytes (blue arrow), neutrophil's nucleus was segmented and cytoplasm was pale (back arrow)

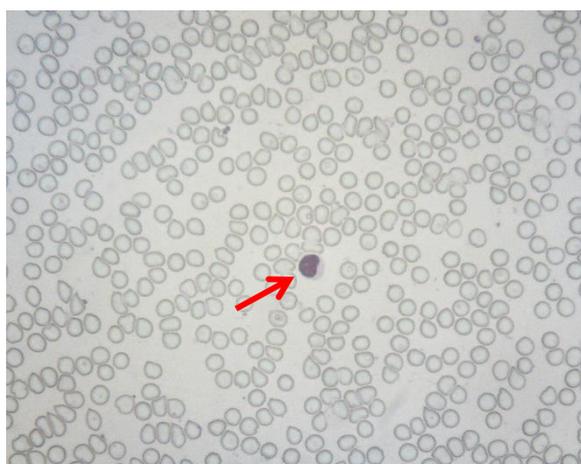


Figure 2. The morphology of monocyte (Giemsa ; 500x). Proboscis monkey's monocytes were large and the nucleus were observed horseshoe-shape like (red arrow).

Figure 1 showed the morphology of eritrocytes and leucocytes. Proboscis monkey eritrocytes showed biconcave morphology, round

shape and anucleate. Polymorphonuclear (neutrophils) dan mononuclear leucocytes (monocytes and lymphocytes) was detected on blood smear preparation. Neutrophils was round shape cells, pale cytoplasm and nucleus was segmented. The morphology of neutrophils were same with other domestic animal⁹. Figure 2 showed the monocytes morphology, round and large cells, nucleus was observed horseshoe-shape like. Mammal monocytes nucleus was various, may be oval, kidney-shape, horseshoe-shape, and irregular⁹. The shape of lymphocytes were round (Figure 3), the nucleus was round and large, almost filling the whole cell. Some domestic animal's lymphocytes were detected small, medium and large. The large lymphocytes nucleus was small and pale, the cytoplasm was abundant compared with small lymphocytes.

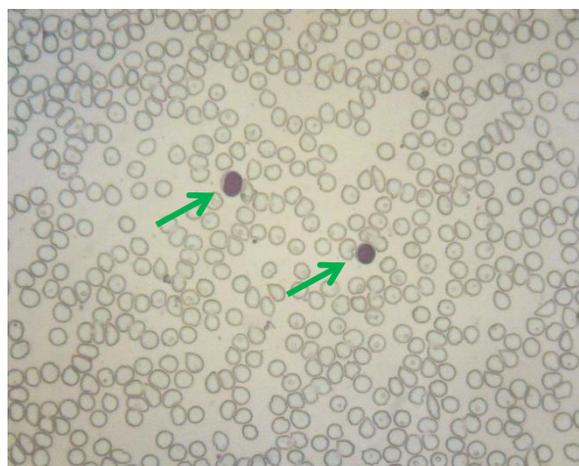


Figure 3. The morphology of lymphocytes (Giemsa : 500x). Small lymphocytes (green arrow) were detector on proboscis monkey's blood smear. The nucleus was large and less cytoplasm.

Basophils were also detected on proboscis monkey's blood smear (Figure 4). Basophil was round, the nucleus was segmented, and the cytoplasm were stain dark purple. Bashophils percentage is the small, the cells was round-oval, the nucleus was irregular, segmented, and bilobed. Basophiles cytoplasm was reddish-purple or dark purple⁹. Eosinophils were round, the nucleus was segmented and the cytoplasm was reddish (Figure 5). Eosinophils nucleus similar to neutrophils, but the nucleus less segmented⁹. Neutrophils, basophils and eosinophils were belonging to granulocytes. Neutrophils granules are plae-gray then the cytoplasm are pale (neutral). Basophils granules are blue, reddish-purple, dark-purple dan the size and the number are various among species. Eosinophils granules are pink or red. Various size and number, moreover the granules are not usually fill the cell cytoplasm⁹.

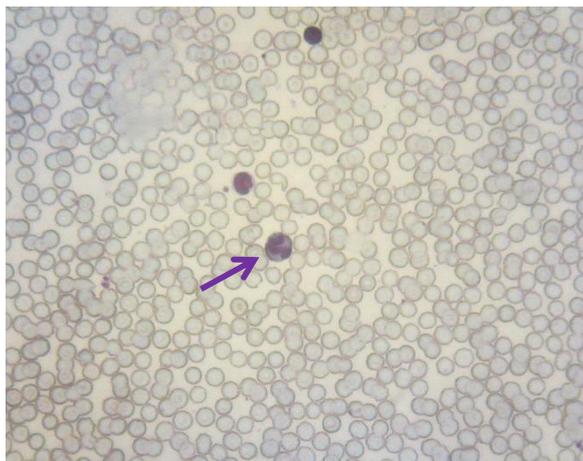


Figure 4. The morphology of basophil (Giemsa ; 500x). Eosinophils were round, segmented nucleus and cytoplasm were blueish (orange arrow).

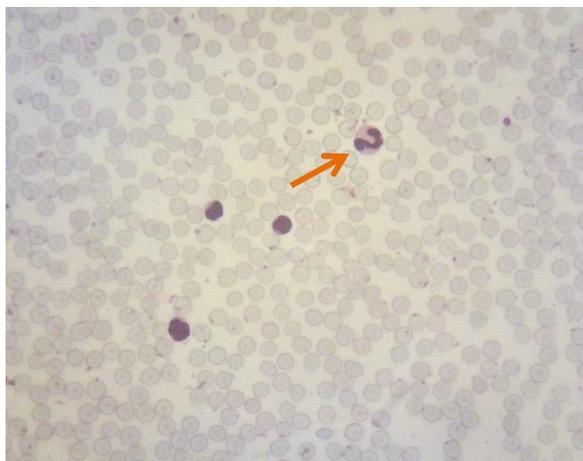


Figure 5. The morphology of eosinophil (Giemsa; 500x). Basophils were round, the nucleus were segmented and cytoplasm were reddish-purple (orange arrow).

CONCLUSION

The blood cells profile could be clinical parameter for monitoring and evaluating female-juvenile proboscis monkey in rehabilitation center and the morphology of proboscis monkey blood cells were similar to other domestic animal, even though the shape and size were various.

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