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Research Article

COMPARATIVE TRANSMISSION ELECTRON MICROSCOPIC STUDIES ON MONOCYTES OF HORSE AND DOG

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ABSTRACT

The monocytes were oval in outline in horse whereas irregularly spherical in dog. The cytoplasmic processes were few and comparatively smaller in size in horse however, comparatively numerous and longer in dog. The nucleus was comparatively smaller in size and more eccentrically placed, varied in shape and generally deeply indented in horse. The nuclear membrane was well distinct in horse and poorly visible in dog. The heterochromatin and euchromatin were distributed in patches in horse while heterochromatin was peripherally located and euchromatin was centrally located in dog. The cytoplasm showed very few large sized electron dense granules in horse however granules were smaller in size in dog. The mitochondria were comparatively larger in size in horse however, vacuoles were numerous in dog.

Keywords: Dog, Horse, Monocytes, Transmission electron microscopy

Examination of blood is vital to assess the general health and diagnosis of haematological diseases. The monocytes are the second line of cellular defense and are at times also referred as scavenger cells. The ultrastructural studies of blood cells of different domestic animals and birds, *viz*. canine (Sonoda and Kobayashi, 1970), camel (Singh *et al.*, 1997), buffalo calves (Singh, 2000), black bear (Salakij *et al.*, 2005), fishing cat (Prihirunkit *et al.*, 2007), macaque (Sakulwira *et al.*, 2008) and pig (Mehta *et al.*, 2013) have been documented. References on blood cells of horse and dog are meager. Hence, the present study was conducted to explore its application in various fields of veterinary sciences.

MATERIALS AND METHODS

The study was conducted on 6 apparently healthy horses and dogs maintained at College of Veterinary Sciences and Animal Husbandry, Kanke, Ranchi as well as nearby villages. Five ml of blood was taken from the jugular vein in horse and sephanous vein in dog, in a sterilized and siliconized tube containing EDTA as anticoagulant and centrifuged at 3000 rpm for 30 minutes. The excess of plasma was drained off leaving a small amount over the buffy coat. Then 2–3 ml of modified Karnovsky's fluid was poured along with the sides of test tube drop by drop without disturbing the buffy coat for fixation and formation of buffy coat plug. The buffy coat plug was taken out of the tube with the help of hooked needle or wire and placed in petri dish containing phosphate buffer. The plug was cut into thin and small slices of approximately 1 mm thickness. The samples were submitted in phosphate buffer at pH 7.2 to the electron microscopy facility at AIIMS, New Delhi for further processing and sectioning of the blood cells for the transmission electron microscopic studies. The samples were dehydrated in graded acetone solutions and embedded in beam capsule. Ultrathin sections of 60–80 nm thickness were cut and stained in alcoholic uranyl acetate and lead citrate. These sections were then placed on grids and examined under JEOL electron microscope at College of Veterinary Sciences, G.B. Pant University of Agriculture and Technology, Pantnagar.

RESULTS AND DISCUSSION

The monocytes were oval in outline in horse, whereas irregularly spherical in dog. Mehta *et al.* (2013) described that the monocytes of pig were spherical in out line with slight distortion. The cytoplasmic processes were few and comparatively smaller in size in horse (Fig. 1) however, comparatively numerous and longer in dog (Fig. 2). Mehta *et al.* (2013) described that the cytoplasmic processes were comparatively long which varied in shape, size and number in case of pig. The nucleus was comparatively smaller in size and more eccentrically placed, varied in shape and generally deeply indented in horse (Fig. 1). Yamada (1970) reported that horse shoe shaped nuclei in the sheep monocytes. Salakij *et al.* (2005) stated that black bear monocytes showed variable shaped nuclei. Gupta and Singh (2008) observed that the nucleus of guinea fowl monocyte was kidney shaped and indented. Sakulwira *et al.* (2008) reported that under electron microscope, the nucleus of monocytes of macaque appeared irregular. Mehta *et al.* (2013) described that the nucleus varied in shape and generally deeply indented in pig. The nuclear membrane was well distinct in horse (Fig. 1) and poorly visible in dog (Fig. 2). Mehta *et al.* (2013) described that in case of pig the nuclear membrane was distinct with distinct nuclear pores. The heterochromatin and euchromatin were distributed in patches in horse (Fig. 1)

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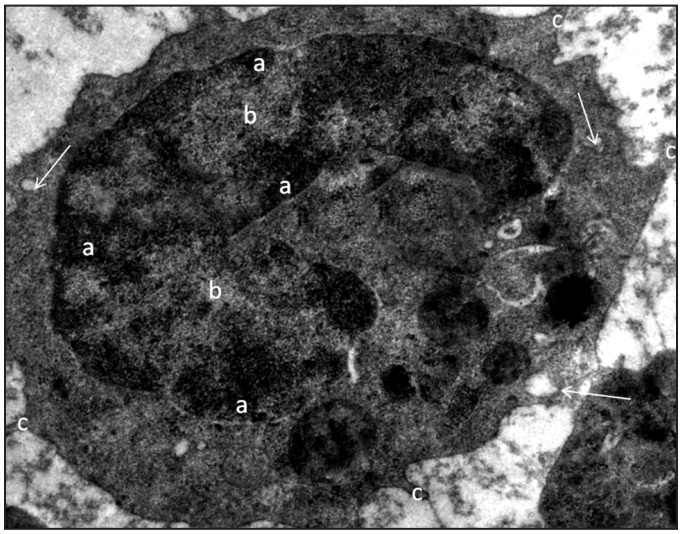

Fig. 1. Transmission electron photomicrograph of monocyte of horse showing heterochromatin (a), euchromatin (b), cytoplasmic process (c), → Vacuole and nuclear membrane.

Uranyl acetate and lead citrate × 33200

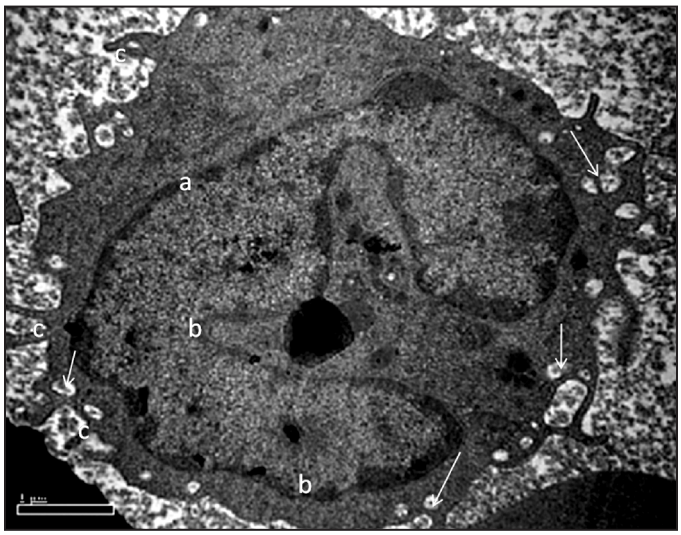

Fig. 2. Transmission electron photomicrograph of monocyte of dog showing heterochromatin (a), euchromatin (b), cytoplasmic process (c), → Vacuole and nuclear membrane.

Uranyl acetate and lead citrate × 25500

while heterochromatin was peripherally located and euchromatin was centrally located in dog (Fig. 2). Mehta *et al.* (2013) described that in case of pig the heterochromatin was confined towards periphery except the nuclear pore area and was less in amount as compared to the euchromatin. The cytoplasm showed very few large sized electron dense granules in horse (Fig. 1) however granules were smller in size in dog (Fig. 2). Hammer and Weber (1974) noticed pleomorphic granules in cow monocytes. The mitochondria were comparatively larger in size in horse (Fig. 1) however vacuoles were numerous in dog (Fig. 2). Sonoda and Marshak (1970) described that cow monocyte showed large homogeneous gray substance, which appeared to be mitochondria and other small ones, which were enclosed by membrane and correspond to azurophilic particles. Yamada (1970) reported that had large number of mitochondria and endoplasmic reticulum in the cytoplasm. Singh *et al.* (1997) reported that the camel agranulocytes had large number of mitochondria and vesicles. Salakij *et al.* (2005) stated that black bear with several mitochondria and pseudopodia. Gupta and Singh (2008) observed that Short strands of rough endoplasmic reticulum were numerous in the cytoplasm. The mitochondria of different sizes were commonly seen. Sakulwira *et al.* (2008) reported that under electron microscope, the cytoplasm contained mitochondria and endoplasmic reticulum.

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