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EVAPORATIVE HEAT LOSS FROM THE SKIN OF CAPTIVE ASIAN ELEPHANT CALVES (*ELEPHAS MAXIMUS MAXIMUS*)

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The Asian elephant (*Elephas maximus maximus*) is among the largest terrestrial vertebrates. Elephants have a small surface/volume ratio and scarce sweat glands that may cause difficulties in thermoregulation. However, it has several adaptations to maintain its thermal balance which include both behavioural (e.g. ear-flapping) and morphological (e.g. well-anastomosed arterioles and venules of the ear) mechanisms. As little is known about the involvement of the skin in thermoregulation, the present study was undertaken to monitor the rate of water evaporation from the skin of unrestrained captive elephant calves and to understand its importance in thermoregulation. The study population comprised six captive elephant calves under the age of seven, at the Elephant Transit Home, Udawalawe, Sri Lanka. Skin surface temperature (T_{SS}) was taken at seven points including lateral ear pinna, lateral body and rump at three-hourly intervals from 6:00 to 18:00 h, using a non-contact infra-red thermometer. Cutaneous evaporation was also measured from the same sites using the cobalt chloride method. The surface area of the skin was determined by assigning geometrical shapes to each body part. Ambient temperature (AT), relative humidity (RH) and radiation heat load (RHL) was also monitored throughout the day. AT gradually increased during the day reaching its maximum around 15:00 h. RH was at its minimum in the early morning. RHL did not show any significant diurnal changes. T_{SS} differed among lateral ear pinna, lateral body and the rump with the highest and lowest T_{SS} being recorded from the rump lateral ear pinna, respectively. There was a weak positive correlation between T_{SS} and AT ($R^2 = 0.54$). T_{SS} was correlated with RH ($R^2 = 0.71$; $P = 0.05$) but this may not be biologically significant as RHL did not show diurnal variation. Cutaneous evaporative water loss had a weak negative correlation with AT ($r = -0.01$), a positive correlation with RH ($R^2 = 0.25$) and no correlation with RHL. The average cutaneous evaporation rate of elephant calves was calculated as 403 $g/m^2/h$. It was concluded that a large volume of water is evaporated from the skin of elephant calves and evaporative heat loss may contribute significantly to thermoregulation. However, the influence of environmental factors on evaporative heat loss has to be investigated in order to fully understand the thermoregulatory mechanisms of Asian elephant calves.

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