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# A Study of Evaporative Heat Loss from the Skin of Baby Elephants (Elephas maximus maximus) at Elephant Transit Home

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**Abstract :** Elephant is the largest resident of the wild and has small surface to volume ratio as well as less number of sweat glands which cause challenges to the thermoregulation of this mammal. However, this megaherbivore has adopted specialised meachanisms to maintain its thermal balance through behavioral adaptations, ear flapping and well anastomosed arterioles and venules of the ear. Nevertheless, little is known on the involvement of the skin in the process of thermoregulation. The present study was undertaken to monitor the water evaporation rate from the skin of unrestrained wild elephant calves throughout the day and to understand its importance in the thermoregulation. Seven baby elephants housed in the elephant transit home, Udawalawe were used. Ambient temparature, relative humidity (RH) and radiation heat load was monitored throughout the day of the study period. Similarly, surface temparature of the skin was taken at six points including lateral ear pinna, lateral body and the rump during the same period. The skin water evaporation was also measured from the same sites using cobolt chloride method. The surface are of the skin was determined by assigning geometrical shapes to each body part. The results showed that the ambient temperature gradually increased with the day reaching maximum around 3.00 pm. The relative humidity was lowest early in the morning. The radiation heat load did not show any significant change in the study period. The skin temperature was different among lateral ear pinna, lateral body and the rump where the highest temperature was on the rump and the lowest on the lateral ear pinna. The skin temperature gradually increase with increasing ambient temperature but there was not a strong correlation (R2 =53.53) between these two. The skin temperature had strong correlation with RH ($p<0.05$ R2 =70.84% ) but a significant relationship was not considered since the radiation heat load was not varying in large scale. The skin evaporative water loss had a weak negative correlation with ambient temperature (correlation coefficient= -0.01) whereas strong positive correlation with RH (correlation coefficient= 25.275 ) and no corelation with radiation heat load. It also appeared that skin water loss increases as the skin temperature increased. In the present study, it was observed that on average, skin of the baby elephant looses 403 g/m2/h of water. Based on these observations it can be concluded that a large volume of water is evaporated from the skin of baby elephants and evaporative heat loss may be contributing significantly to the thermoregulation. However, further investigation on the influence of environmental factors on evaporative heat loss has to be conducted to understand the thermoregulatory mechanisms of the baby elephant.

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