

Bipedalism and human body-mass index

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Body-mass index, abbreviated as BMI and given by M/H^2 with the mass M and the height H , has been widely used as a useful proxy to measure a general health status of a human individual. We generalise BMI in the form of M/H^p and pursue to answer the question of the value of p for populations of animal species including human. We compare suitably extracted values of p for several different datasets for human populations with the ones obtained for other animal populations of fish, whales, and land mammals. All animal populations but humans analyzed in our work are shown to have $p \sim 3$ unanimously.

In contrast, human populations are different: As young infants grow to become toddlers and keep growing, the sudden change of p is observed at about one year after birth. Infants younger than one year old exhibit significantly larger value of p than two, while children between one and five years old show $p \sim 2$, sharply different from other animal species.

The observation implies the importance of the upright posture of human individuals. We also propose a simple mechanical model for a human body and suggest that standing and walking upright should put a clear division between bipedal human ($p \sim 2$) and other animals ($p \sim 3$).