

Summary

In the Everest valley of Nepal, because of the rugged mountain terrain, the ‘roads’ are nothing more than dirt mountain footpaths. Most of the material is conveyed over long distances by professional porters who carry impressive burdens in a wicker basket supported by a strap looped over their head.

We measured the body weight and loads carried by the Himalayan porters passing along the busy footpath to Namche Bazaar, the main market place of the Everest region. On average, the porters were carrying loads equivalent to 90% of their body weight on the last day of a 7-9 day trip covering a horizontal distance of ~100 km with >8000 m of total ascents and >6300 m of total descents. Interestingly, these porters adopt a specific rhythm of walking: they generally walk slowly and make very frequent rest stops using a T-stick or stone-platforms built along the trail to support the load during the pause.

It has been shown that African women could carry head-supported loads more economically than Western subjects because they have developed a mechanical energy-saving strategy. Similarly, Nepalese porters could also have developed a mechanism to carry economically their very heavy loads. To test this hypothesis, we measured the energy consumption and the mechanical work done during level walking under different loading and speed conditions in the Nepali porters and in Western subjects. We compared these results to those of the African women.

Nepalese porters carry loads at a lower cost than either the control subjects or the African women. For example, for a load equivalent to 60% of body weight, western Caucasian subjects increase their metabolic rate by 60%, the African women by 40% and the Nepalese porters by only 30%.

Contrary to the African women who are taking advantage of the load to reduce the work performed, Nepalese porters do not modify their gait while carrying a load. Consequently, the mechanical work performed is not reduced as compared to control subjects walking at same speed-load combinations.

Yet the Nepalese porters are the most economical load-carriers measured to date, particularly while carrying heavy loads at walking speeds slower than 1.4 m s^{-1} , but the exact mechanisms by which they save energy are still unknown.



G.J. Bastien

Unité de physiologie et biomécanique de la locomotion

Institut d'éducation physique et de réadaptation

Université Catholique de Louvain

www.md.ucl.ac.be/iepr