Acute Cardiorespiratory and Kinematic Adjustments upon Early Exposure to Barefoot Running

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PURPOSE: To characterize oxygen uptake (VO_2) and kinematic adjustments during initial exposure to barefoot running (BF) and whether the adjustments persist at the onset of a second trial a minimum of 48 hours later. **METHODS:** Eleven, moderately active subjects (male = 7; female = 4) naïve to BF completed two, 11-minute BF trials on a treadmill (5 mph). Expired gases (min 0-3 and 9-11) were analyzed for determination of running economy, respiratory exchange ratio, ventilation, and oxygen consumption. Cinematography evaluated stride frequency and length, along with joint angles and striking pattern to assess kinematic adjustments over the two trials. **RESULTS:** The group mean difference between initial VO_2 in Trial 1 (29.2 ± 0.8 ml·kg^{-1}·min^{-1}) to final assessment in Trial 2 (27.2 ± 1.2 ml·kg^{-1}·min^{-1}) revealed a 6.8% decrease in oxygen cost. Within Trial 2, VO_2 decreased by 5.2% from minute 3 to minute 11. However, these changes in oxygen cost were not significant ($p>0.05$). Initial stride frequency increased non-significantly from Trial 1 to Trial 2. At final measures of both trials, stride frequency did not differ. The most economical subject's initial and final ankle range of motion increased more during Trial 1, but still increased during Trial 2. The subject's knee range of motion decreased from the initial to final during both trials, but during Trial 2 it decreased more.

	Trial 1	Trial 2	Significance
Stride Length (m) initial	1.6±0.06	1.6±0.05	0.639
Stride Length (m) final	1.7±0.04	1.7±0.03	0.594
Stride Frequency (strides·sec^{-1}) Initial	1.3±0.03	1.6±0.06	0.611
Stride Frequency (strides·sec^{-1}) Final	1.4±0.03	1.4±0.03	0.646

CONCLUSION: While becoming acclimated to BF, individuals may improve their economy by altering gait pattern as evidenced by subject-specific changes in ankle angles. These changes may reflect the transition from a rearfoot strike to a forefoot strike pattern, contributing to improved running economy.