ABSTRACT

Limb volumes, as would be estimated by the widely used right circular truncated cone model (right circular frustum), were analytically compared to volume estimates that would be obtained if limbs were represented by an elliptical cross section. A general expression for the ratio of circular to elliptical limb segmental volumes was developed in terms of the ratio of minimum to maximum limb radial dimensions. Analytical results showed that in general the elliptical representation resulted in smaller calculated limb volumes, with the difference increasing as the ratio of minimum to maximum limb dimension became smaller. However, differences in estimated limb volume between circular and elliptic representations were less than 5% if the minimum to maximum limb dimensions at measured circumference sites were greater than 0.64. It is concluded that although limbs deviate from circularity, the added work of determining minimum and maximum dimensions for each circumference measured, as is needed to employ elliptical models, is warranted only for extreme differences in limb radial dimensions or possibly for research purposes.