



**Figure 4.1** Body segment lengths expressed as a fraction of body height  $H$ .

segment lengths expressed as a percentage of body height was prepared by Drillis and Contini (1966) and is shown in Figure 4.1. These segment proportions serve as a good approximation in the absence of better data, preferably measured directly from the individual.

## 4.1 DENSITY, MASS, AND INERTIAL PROPERTIES

Kinematic and kinetic analyses require data regarding mass distributions, mass centers, moments of inertia, and the like. Some of these measures have been determined directly from cadavers; others have utilized measured segment volumes in conjunction with density tables, and more modern techniques use scanning systems that produce the cross-sectional image at many intervals across the segment.

### 4.1.1 Whole-Body Density

The human body consists of many types of tissue, each with a different density. Cortical bone has a specific gravity greater than 1.8, muscle tissue