The relationship obesity-blood pressure,
attending to ontogenetics and socio-
environmental variation. Study in Cuenca
province (Spain) ¹

The present work collects one of the partial aspects treated in a larger
study about the morphophysiological characteristics of the Cuenca
population: the incidence of obesity and their possible effects in
present day populations.
Cuenca is a province in Castilla country with perfectly defined geo-
ographical areas and micro-environments which makes it a particularly
interesting place for this kind of study.
More than 2000 persons of both sexes from the rural zones (Sierra
and Alcarria) and urban zones (Cuenca city) were studied. We have
analyzed, in the school age populations and in young adults (up to 30
years old), the influence of obesity on blood pressure, and on the
sexual, ontogenetic and socio-environmental variables.
This study was included in the grant project from RUMASA anthrop-
ometry in Spain.

Key words: obesity, blood pressure, variations ontogenetics and socio-
environments, Cuenca.

Introduction

The aetiology of hypertension is not well-known. However, it is known that a
combination of genetic and environmental factors contribute to a high blood pressure
(Hamilton et al., 1954; Langford et al., 1968; Weinberg et al., 1979). Furthermore, an
unimodal-type distribution suggests a type of poligenetic inheritance (Hamilton et al., 1954;
Dahl K., 1963), because, if it were determined by a single pair of genes, the distribution
would be bimodal or trimodal.

Some socio-cultural variables have been suggested as causal elements. The number of
sons and daughters, the social status, the job, the geographic environment (Scotch, 1963) or
diet (Gayton, 1974). The relationship obesity-hypertension-higher danger of cardiovascular
disease was emphasized by Abraham (Abraham et al., 1971), emphasizing the importance of
the obesity studies in developed societies and in some under-developed nations (Neuman,
1979), in which the index of deaths from cardiovascular diseases has passed from 5% in the
last century to 40-45% (C.A. Urquijo et al., 1969). It is evident that obesity establishes a
different probability for these diseases. Mueller (1983) concludes that the incidence of
these diseases is not the same in people who have been obese since childhood, as it is in
those who became overweight as adults. Weight change can be classified as predecessor of
cardiovascular diseases.

In the present work we analyze the childhood weight up to the adult, together with the
triceps skinfolds and arm diameters. These parameters are considered by several authors as
a good estimation of the nutritional status of the individuals (Jelliffe and Jelliffe, 1969;

¹ Paper presented at the 4th congress of the European Anthropology Association (Florence, Sept.
1984).
Gurney et al., 1973; Frisando, 1974; Martorell et al., 1976) they furthermore have an ontogenetic relation with blood pressure. Populations in three different environments were studied: one urban and two in the countryside.

**Material and Methods**

The sample includes 2000 individuals, 1000 males and 1000 females, with ages between 7 and 17, and a group of young adults (18-25 years old). Three sub-populations were sampled; two of them in the countryside: Sierra, with an average altitude of 1000 m; and Alcarria, typical plateau population, and the capital of the province (Cuenca), with an urban environment. Twenty anthropometric variables were studied as well as physiological and socio-economic factors. The measures were taken following the I.B.P. normative, using a Holtain caliper for the measures of subcutaneous fat, and a non digital tensiometer for the measure of arterial tension. All the data were collected by the authors.

The «ideal weight» (P.I.) was calculated by the method of Behnke and Wilmore (1974).

\[
\varphi \text{ P.I.} = \frac{L.B.W}{0.82} \quad \sigma \text{ P.I.} = \frac{L.B.W}{0.88}
\]

The formulas used for the arm areas were:

- Arm area (cm²) = \( \frac{Ca^2}{4} \)
- Muscular area (cm²) = \( \frac{(Ca - st)^2}{4} \)  \[Ca = \text{arm circumference}\]
- Fat area (cm²) = \( \frac{Ca^2}{4} - \frac{(Ca - st)^2}{4} \)

The tension index was considered as:

\[
I.T. = \frac{\text{Systolic tension} - \text{Diastolic tension}}{\text{Diastolic tension}} \times 100
\]

**Results**

The real weight of the subpopulations are shown in Table 1, ranked according to age and sex. The calculated ideal weight is also reported taking into account the height of the individuals. The weights observed during childhood are inferior to those ones considered idoneous in both sexes, with a greater difference for males. During puberty, there is a great change in the weight in the three subpopulations. In the capital and in the Alcarria, males, at the age of 13 begin a weight increment that gives values higher than ideal weights at the ages of 15 and 16. This overweight is 3 Kg in the young adults. In the Sierra group the weight increment is not so big, and the ideal weight is never overpassed at any age.

The girls show a similar trend though they are never so far from the ideal weight. The increment in weight is at an earlier age, 10 in the populations of the Sierra and the Alcarria and at the age of 9 in the Capital. After 12 the values overpass the ideal weight in the urban