Evidence for a Secular Trend in Age of Menarche

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Accessibility
Table 1. Diagnoses in 30 Patients with Transient Proteinuria and Incidence Rates of Proteinuria.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of Patients with Transient Proteinuria</th>
<th>Total No. of Patients</th>
<th>Incidence of Proteinuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congestive heart failure</td>
<td>10</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>Seizures</td>
<td>5</td>
<td>13</td>
<td>38</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>4</td>
<td>11</td>
<td>36</td>
</tr>
<tr>
<td>Infection, other sites</td>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
<td>2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fever *</td>
<td>8</td>
<td>49</td>
<td>16</td>
</tr>
</tbody>
</table>

*Fever is considered independently, and these patients may have other diagnoses.

References


Evidence for a Secular Trend in Age of Menarche

Grace Wyshak, Ph.D., and Rose E. Frisch, Ph.D.

We present data documenting a secular trend toward an earlier age of menarche in Europe and the United States in the past century. There has been recent controversy on whether such a change has taken place.1,2 We have reviewed 218 reports on age of menarche in Europe from 1795 to 1981, covering 220,037 individuals.3-5 The historical European data are mainly from Backman’s extensive collation.3

Figure 1 and Table 1 show that in Europe the age of menarche has become earlier by two to three months per decade in the past century and a half. The greatest rate of decline, 3.2 months per decade, has been observed in the Scandinavian countries.3-5 The smallest rate of decline, 1.1 month per decade, has been observed in France.

Although the European historical data are undoubtedly variable in quality and method of collection, the overall trend is statistically significant (Table 1) and consistent with the well-documented acceleration in height and weight of girls and boys in the past century.3-5 When the rate of growth levels off with optimal conditions, the age of menarche also levels off.3,6 Also consistent with the data on growth is the disappearance of rural–urban differences in age of menarche and of differences associated with social class, occurring as socioeconomic conditions became more equitable in 20th-century populations.4,5

The data from the United States also indicate a secular trend in age of menarche of about two months per decade in the past century.7 The average age of menarche was 14.73 years in Bowditch’s pioneer study in 1877,7 about 14 years at the turn of the century, and 12.8 years in 1947.2-8,10 The downward trend apparently leveled off at about 12.8 years; recent ages of menarche are still the same.11-13 (Fig. 1). Between 1900 and 1945 in the United States, a downward trend

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From the Department of Social Medicine and Health Policy, Harvard Medical School, Boston, and the Harvard Center for Population Studies, Cambridge, Mass. Address reprint requests to Dr. Wyshak at Harvard Center for Population Studies, 9 Bow St., Cambridge, MA 02138.
Figure 1. Mean or Median Age of Menarche as a Function of Calendar Year from 1790 to 1980.
The symbols refer to England (○); France (●); Germany (□); Holland (□); Scandina
vnia (×) (Denmark, Finland, Norway, and Sweden); Belgium, Czecho
slavia, Hungary, Italy, Poland (rural), Romania (urban and rural), Russia (15.2
years at an altitude of 2500 m and 14.4 years at 700 m), Spain, and Switzerland (all labeled ○); and the United States (○, data not included in the regression line). Twenty
seven points for Europe were identical and do not appear on the graph. The regression line cannot, of course, be extended indefinitely.

The age of menarche has already leveled off in some European countries, as it has in the United States (see text).

Sources of data on the United States are Englmann19 for 1900; Damon et al.19 for mothers (m₁) in 1920 and daughters (d₁) in 1947; Gould and Gould26 for mothers (m₂) and daughters (d₂) in 1932; Boas, cited in Zacharias and Wurtman;13 for private-school students in 1932; MacMahon11 for 1965; and Zacharias et al.15 for 1976.
in age of menarche of about three months per decade occurred in mothers of twins or of singletons, correlating with a more rapid gain in body weight (Wyshak G: unpublished data).

The findings in Europe and the United States are consistent with the fact that menarche is delayed by undernutrition5,8,14 and strenuous physical exercise.15-17 For example, the age of menarche is still relatively late, about 15 years, among poor girls in developing countries5,18 and among dancers15,16 and athletes17 in affluent countries. Menarche may also be delayed in girls living at high altitudes, in association

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of Samples</th>
<th>Time Period</th>
<th>Regression Equation *</th>
<th>Decline in Months/Decade</th>
<th>Correlation Coefficient (r)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe t</td>
<td>218 (220,037)</td>
<td>1795–1981</td>
<td>Y = 51.74 – 0.0192(±0.0015)X</td>
<td>−2.3</td>
<td>0.658</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Europe excluding</td>
<td>170 (192,178)</td>
<td>1795–1981</td>
<td>Y = 62.38 – 0.0246(±0.0014)X</td>
<td>−3.0</td>
<td>0.801</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>France</td>
<td>68 (83,957)</td>
<td>1839–1972</td>
<td>Y = 66.88 – 0.0207(±0.0018)X</td>
<td>−3.2</td>
<td>0.879</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Scandinavia</td>
<td>63 (76,800)</td>
<td>1795–1939</td>
<td>Y = 48.65 – 0.0172(±0.0028)X</td>
<td>−2.0</td>
<td>0.619</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Germany</td>
<td>47 (26,959)</td>
<td>1830–1967</td>
<td>Y = 32.50 – 0.0094(±0.0020)X</td>
<td>−1.1</td>
<td>0.570</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>England $</td>
<td>19 (29,427)</td>
<td>1832–1981</td>
<td>Y = 45.54 – 0.0162(±0.0022)X</td>
<td>−1.9</td>
<td>0.870</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Y denotes age of menarche, and X calendar year.
†Historical data are from Backman,7 and data on Holland and England (1981)8 are included. Recent ages of menarche for Belgium, Czechoslovakia, Hungary, Italy, Poland, Romania, Russia, Spain, and Yugoslavia (symbol ○ in Figure 1), are from Eveleth and Tanner1 (no numbers given). If the 17 samples from these nine countries are omitted from the total for Europe, the regression equation is: Y = 45.01 – 0.0156(±0.0017)X; the decline is 1.9 months per decade; r = 0.544; P<0.001.
‡Includes 1981 age of menarche from reference 6.
with slower rates of physical growth (Fig. 1). In
Bangladesh, unfortunately, there has recently been a
trend toward a later age of menarche accompanying
adverse economic conditions and a deterioration in
the diet. In evaluating the age of menarche of a popu-
lation or an individual girl, it is important to consid-
er these environmental factors.

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CASE 17-1982

PRESENTATION OF CASE

A 77-year-old man was admitted to the hospital
because of fever and subcutaneous masses.

He was well until three months previously, when a
dry cough developed. Two months before admission
the temperature rose to 38.9°C, accompanied by chills,
pleuritic pain, and anorexia. Erythromycin was ad-
ministered for two weeks, without improvement. He
was admitted to another hospital. X-ray films of
the chest showed small bilateral pleural effusions. A tu-
berculin skin test was markedly positive. Repeated blood
cultures and cultures of urine and pleural fluid yield-
ed no microorganisms. Cytologic examination of the
pleural fluid and microscopical examination of a pleu-
ral-biopsy specimen were negative; no acid-fast bacilli
were observed. An intravenous urographic examination
disclosed a large, irregular mass invading the base
of the bladder, especially on the right side; there was
slight dilatation of both ureters, and a small diverticu-
lum projected from the right wall of the bladder; the
upper urinary tracts and kidneys appeared normal. A
computed tomographic (CT) scan of the abdomen
showed a solid mass involving the right posterolateral
portion of the bladder wall and considerable enlarge-
ment of the prostate gland; a diverticulum of the blad-
er was observed on the right side; the pancreas and
retroperitoneum appeared normal; there was no evi-
dence of an abscess or lymphadenopathy. The fever
subsided, and the pleural effusions resolved. The pa-
tient left the hospital before a barium-enema examina-
tion and upper gastrointestinal series were accom-
plished. Soon after discharge fever recurred. One or
two weeks before entry tender masses appeared in
the left thigh and the right gluteal region. One week before
admission he was first seen at this hospital. An intrave-
nous urographic examination disclosed probable cal-
ification in the retropubic area and degenerative
changes in the lower lumbar spine; there was prompt
symmetric opacification of the collecting systems, and
nephrotomographic examination disclosed normal
renal parenchyma and outlines; the ureters appeared
normal; the bladder was trabeculated, with a diver-
ticulum on its right side and an irregular impression on
the bladder base; there was a moderate postvoiding
residuum of urine. On follow-up examination one
week later fever persisted, and the patient was ad-
mitted to this hospital.