Invited Review

Epidemiology and Socioeconomic Aspects of Urolithiasis

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Summary. This epidemiologic study reveals that the occurrence of urolithiasis in the nineteenth century population in Europe is quite similar to that of the twentieth century in Asia. The analogy is demonstrated for age distribution, stone localization, male/female ratio, and stone composition. The distribution of urolithiasis in a low socioeconomic level population is defined by: highest frequency in childhood, more than 40% bladder stones, less than 20% female patients, less than 40% calcium-oxalate stones, and more than 30% uric acid/urate stones. Typical for a population with a high level these characteristics of urolithiasis are: highest frequency among adults, less than 10% bladder stones, more than 25% female patients, more than 60% calcium oxalate stones, and less than 20% uric acid/urate stones. In partially developed countries those values fall in between.

Key words: Urolithiasis, Epidemiology, Age-sex-distribution, Stone composition, Stone localization.

Introduction

There are many papers about the distribution of urolithiasis concerning age, sex, stone localization, and stone composition. The distribution figures vary over a large range. Even though the discordance vanishes when a high number of reports is checked, one also does not get a single average value. The assumption for any kind of a mathematical mean is not fulfilled, namely, the distinct concentration of single values on a center. All figures for the abovementioned distribution of urolithiasis show two different patterns that are related to the socioeconomic level in developing and industrialized countries.

Method

The following statements are based on a review of the literature – roughly 250 quotations from 54 countries concerning 340,000 urinary stones. References are only cited for papers of outstanding importance (complete list of references available from the author on request).

Results

Age Distribution

Figure 1 shows the frequency of urinary stone formation per year by percentage of all stones for Europe around 1800 [6], for Asia in the twentieth century, and also for Europe in the twentieth century (the term “Europe 20th century” includes the United States and Japan).

The analogy between the two upper curves is striking. Thus the question arises: what are the similarities of living conditions between nineteenth century Europe and twentieth century Asia? When one of these two curves is compared with the age distribution curve for Europe in the twentieth century in the lower part of Fig. 1, it is evident that the age distribution changes from a maximum incidence of 4 years to a maximum of about 40 years. Now the question can be reversed: what are the essential differences in living conditions between Asia and Europe in the twentieth century? The fact that children of Turkish origin in Germany suffer twice as much from urolithiasis as German children shows that the geophysical factor alone cannot be considered the only reason for urolithiasis [4]. Six studies recently published in Afghanistan, India, Pakistan, and Thailand indicate that there is a change in age distribution there. The present age-time curves have two maxima, one for children and one for adults. The change towards the characteristics of industrialized countries is evident.

Percentage of Bladder Stones

In the literature of the nineteenth century pertaining to urolithiasis in Europe, only bladder stones are mentioned.
Kidney stones were not objects to be analyzed and studied because those patients could not get treatment by surgeons. In Fig. 2 the percentage of bladder stones is plotted against the year of publication of the report.

At the beginning of this century the percentage of bladder stones was as high as 90%, e.g., in China and Thailand. Obviously, during the last decades the frequency of bladder stones has been strongly decreasing. Industrialized countries in North America or Europe and Japan have scarcely 10% bladder stones. In Fig. 2 it can also be seen that for Turkey and Thailand, the references dated 20 years later report a smaller share of bladder stones. It is reported from Norwich (England) that the frequency of bladder stones among children decreased between 1875 and 1945 by a factor of 6 [12].

Percentage of Female Patients

The hospital statistics of the last century in Europe quote 5% female patients with urolithiasis. In the eastern part of Europe and in Asia the medical papers in the first half of this century report only 2%–5% female patients. Figure 3 demonstrates the increasing share of female patients during the last three to four decades in developing countries.