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Incidence, Prevalence and Mortality of Urolithiasis in the German Federal Republic

E. W. Vahlensieck, D. Bach, and A. Hesse

Department of Urology, University Hospital Bonn, Federal Republic of Germany

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Summary. Two nationwide surveys were conducted in the German Federal Republic. An incidence of 0.54% and a prevalence of 4% were registered. The ratio of men to women for incidence was 2:1 and for prevalence 1:1. Stone prevalence increased from 1.28% to 6.79% with increasing age. The occupational groups mostly affected were pensioners (34.3%), housewives (23.5%) and employees (16.9%). In cities the prevalence rate was higher than in rural areas. In recent years the mortality rate has decreased.

Key words: Urolithiasis, Epidemiological survey, Incidence, Prevalence, Mortality.

Introduction

The ascertainement of the morbidity of urolithiasis in a population is necessary to demonstrate its socio-economic importance and to intensify the clinical and basic research in this field. This needs epidemiological studies which are designed to discover the true distribution of the disease in the population. Until now there has not been such a study in the German Federal Republic (GFR). For this reason we have conducted two nationwide surveys in cooperation with the experienced Institute for Applied Social Sciences (INFAS, Bonn-Bad Godesberg).

Methods

1. Pilot-study: In accordance with the criteria laid down by INFAS from February to May 1979 in the German Federal Republic without West Berlin 4,015 persons were interviewed to find out the prevalence of urolithiasis in the GFR. All persons in this sample were older than 18 years and completed a standard questionaire.

2. Second study: From January to June 1980 a total of 10,130 individuals aged over 18 were interviewed to find out the incidence and prevalence of urolithiasis in 1979.

3. From the Statistisches Bundesamt, Wiesbaden, we obtained the data on mortality of urolithiasis in the German Federal Republic. In this Institution all cases and causes of death are registered. As they are uni-causal statistics they include only cases of stone disease as sole cause of death.

Results

1. In the pilot-study we registered a prevalence of 5% of urolithiasis in Germany. 6% of the men and 4% of the women were found to have had one or more stone episodes during their life. The recurrence rate was 44.6%. The stone-episode rate of the women reaches a first relative maximum between 16 and 20 years and a second between 36 and 40 years. In the male group a steady increase up to the age of 40 was found. Stone prevalence increased with age and reached 7%–8% in the group aged over 50 years. The occupational groups mostly affected by urinary stone disease were pensioners (19.5%), employees (19.7%) and housewives (23.3%). In bigger cities the prevalence was higher (5%–6%) than in rural areas (3%–4%) [6, 23].

2. *Table 1*

In the second survey we found an *incidence of urolithiasis of 0.54%* for the year 1979. Among the 10,130 people interviewed 54 had had symptoms of urinary stone disease. Twelve persons developed a urinary stone for the first time, and 42 persons had a manifestation of a recurrence. Among the group who showed lithogenesis for the first time the sex distribution men to women was 2:1.

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Table 1. Incidence of urolithiasis 1979 in the German Federal Republic. Nationwide survey 1980: Urological Dept. University Hospital and INFAS Bonn

Interview with 10,130 inhabitants aged over 18 years			
Men		Women	
n = 4,620		n = 5,510	
54 urinary stone manifestations in 1979 → Incidence = 0.54%			
First manifestation		Recurrency	
Men	n = 8 = 0.08%	Men	n = 23 = 0.23%
Women	n = 4 = 0.04%	Women	n = 19 = 0.19%
	n = 12 = 0.12%		n = 42 = 0.42%
60 mill. inhabitants → 324,000 stone episodes in 1979			

Table 2. Prevalence of urolithiasis 1979 in the German Federal Republic. Nationwide survey 1980: Urological Dept. University Hospital and INFAS Bonn

Interview with 10,130 inhabitants aged over 18 years			
Men		Women	
n = 4,620		n = 5,510	
408 urinary stone episodes until 1979 → Prevalence = 4%			
Men	n = 183 = 1.8%	Women	n = 225 = 2.2%
60 mill. inhabitants → 2.4 mill. stone episodes until 1979			

Table 3. Increasing prevalence in different aged samples. Age distribution on prevalence. Nationwide survey in 1980: Urological Dept. University Hospital and INFAS Bonn

Interview with 10,130 inhabitants aged over 18 years

408 urinary stone episodes until 1979 → Prevalence = 4%

Age/years	n	% of all quest. persons	% of the age group
18–34	38	0.37	1.28
35–49	110	1.08	3.81
50–64	118	1.15	5.35
65 and more	142	1.40	6.79

Table 4. Distribution of prevalence with respect to place of residence

Inhabitants on place of resid.	Quest. persons	Stone formers	% of stone formers	% of the group	% of all quest. pers.
< 2,000	848	27	6.62	3.18	0.27
2,000–9,999	2,028	83	20.34	4.09	0.82
10,000–99,999	3,927	173	42.40	4.40	1.71
> 100,000	3,327	125	30.64	3.76	3.75

Table 5. Distribution of prevalence with respect to occupation

Occupation	Stone formers n	% of all stone formers (n = 408)	% of all quest. persons (= 10,130)
Self-employee	19	4.8	0.19
Employee	69	16.9	0.68
Civil servant	14	3.4	0.14
Worker	54	13.2	0.53
Housewife	96	23.5	0.95
Pensioner	140	34.3	1.38
No answer	16	3.9	0.16

Table 2

The registered urolithiasis *prevalence* was *4.08%*. 408 persons reported one or more stone episodes until 1979. Seen against the background of the 10,130 interviewed persons 183 men amount to 1.8% and 225 women amount to 2.2%. Seen against the background of the sample of interviewed men and women we noted a prevalence of 3.96% (183/4620) for men and of 4.08% (225/5510) for women.

Table 3

The prevalence increases with age. Seen against the background of the 10,130 interviewed persons it rises from 0.37% in the case of people aged 18–34 to 1.40% in the case of people aged over 64 years. Seen against the sample of every age group there was an increase from 1.28% to 6.79%.

Table 4

The correlation of the number of urinary stone formers to the place of residence seen against the background of the 10,130 interviewed persons shows that the prevalence in rural areas of 0.27%–0.82% is less than 1.71%–3.75% found in cities with more than 10,000 inhabitants.

Table 5

The occupational group mostly affected by urinary stones were pensioners –1.38% of all questioned persons. Among

Table 6. Specific death rate of urolithiasis in the Federal Republic of Germany 1974–1979

Year	Sex	*n*	–34 y.	35–49	50–64	65–79	⩾80	Total
1974	♂	463	2	21	88	257	95	879
	♀	416	9	24	79	244	60	
1975	♂	414	7	19	70	230	88	771
	♀	357	9	18	60	200	70	
1976	♂	382	4	24	59	211	84	713
	♀	331	1	16	60	181	73	
1977	♂	313	1	20	45	180	67	647
	♀	334	1	20	50	189	74	
1978	♂	302	1	12	49	168	72	608
	♀	306	4	11	42	170	79	
1979	♂	208	3	4	32	124	45	427
	♀	219	1	10	29	122	57	

the 408 stone formers they amounted to 34.3%. They were followed by the group of housewives with 0.95% respectively 23.5% and employees with 0.68% respectively 16.9%. Workers were involved with 0.53% respectively 13.2%.

Table 6

The annual mortality rate in the German Federal Republic shows a steadily decreasing tendency with 879 cases in 1974 to 427 cases in 1979. In all years there was no significant difference in sex distribution.

Discussion

Most epidemiological studies of urolithiasis have used hospital statistics, general practice surveys or selected group surveys. From these many interesting details resulted about this multifactorial disorder but for different reasons in an epidemiological sense they do not suffice to find out the true incidence and prevalence in a population [5, 10, 11, 14, 16, 19–21]. Data from special population surveys in cities or small geographical areas [1, 2, 7, 11, 15, 19, 21, 24] are more easily obtained.

These studies need a considerable amount of time, effort and expenditure. Furthermore, there is the problem of randomisation [19, 20], or the difficulty of registering all individuals. Thus in the surveys by Ljunghall et al. [7–11] the participation rate in the different samples varied between 73.9% and 83.9%. In the first survey by Bengtsson et al. [1] 90% of all women in Gothenburg were registered and in the second survey six years later only 89% of this sample were re-examined. Very important too is that the sex distribution corresponds to the sex distribution in the population in its entirety. In the study of Ljunghall et al. [9] 5,020 males and 9,623 females were registered whereas the distribution in our state is nearly half and half. Age distribution of the sample surveyed must also be taken into account. Thus Ljunghall et al. [9] studied women aged 20–63 while Bengtsson et al. [1] had in their survey women aged from 38 to 60 years.

All these difficulties may be overcome with nationwide studies of the kind we have employed. However, a precondition is close cooperation with a specialised and experienced Institution. The validity of this method has become undisputed since in many such surveys in different fields it has been shown possible to obtain accurate data for a entire population. This approach guarantees that the distribution of sex, age, occupation, and places of residence corresponds well to the population of a country. Using the same method it makes the registered data comparable all over the world. The advantage of this method is furthermore that it does not need much effort and time by the clinicians and that it is relatively not inexpensive. The question is if persons under aged 18 should be included. We did not include them because we know that stone formation in this group does not exceed about 2% of all stone formers. Schneider and Hienzsch [18] stated a 0.5% morbidity of urolithiasis in children. In a study on 1,000 children (496 girls, 504 boys) aged between 6–15 Remzi et al. [15] registered an incidence of 0.8% and a prevalence of 1.0%. These low rates are explicable by the finding of Robertson et al. [17] that within the normal population the values of probability of forming stones are lowest in children. The data for this group can be calculated and do not disturb seriously the calculation for the whole population. Furthermore it seems difficult to get a representative sample of children aged 1–15 year. That may be the reason that in other studies, too, children were not included [1.11] or only children aged over 10 years are registered [20].

In our second epidemiological study in the German Federal Republic we ascertained an *incidence* of urolithiasis of *0.54%*. That means that in 1979 there have been 54 stone manifestations in 10,000 inhabitants. Out of this follows that in 1979 of the whole German population (around 60 million) about 324,000 persons experienced urolithiasis. We have an incidence distribution ratio of 2:1 for men to wom-

en, including recurrences, corresponding to the incidence found by Bengtsson et al. [1] with 3.7 per 1,000 women per years in Gothenburg, Sweden.

The *prevalence* rate in the second study was *4.08%*. With respect to the larger sample this percentage seems to us more suitable than the 5.03% of the pilot-study. The percentage of 4.08% means that, until 1979, 408 inhabitants per 10,000 and, for the entire population 2.4 million persons have had one or more stone episodes. That corresponds very well with the figure of 4.7% by Boer et al. [2] and 4.8% by Marberger et al. [12]. In contrast Martin Vivaldi et al. [13] found only 2.95%.

It seems important to us that with a ratio of 1.8% in men to 2.2% in women there was no significant difference between the sexes [23]. Our observation corresponds to the reports by Scott et al. [19, 20] which also did not find an abvious difference between men and women with respect to stone prevalence. In contrast Marberger et al. [12] registered 5.7% in men and 4% in women. In the study of Boer et al. [2] 61.2% were males and 38.8% were females.

The increase of prevalence with age from 1.28% in the case of the 18–34 age group to 6.79% in the case of people over 64 years aged is remarkable. A similar tendency was found in other studies [9, 10, 11, 19–21, 24].

The registered occupational and residential distribution may give interesting information with respect to the natural history and the importance of affluence on urolithiasis.

The mortality rate underlines the severity of urolithiasis. For the German Democratic Republic Dahm [4] stated urolithiasis as the most common cause of death in urological patients. The decreasing tendency in our study may be a sign that advances in research are followed by a better prognosis.

In conclusion it seemed to us necessary to repeat a nationwide survey after 5 years to find out if urolithiasis is dramatically increasing as suggested by Boyce [3], Schneider and Hienzsch [18], Ljunghall et al. [11] and Robertson et al. [17]. Furthermore, answers are needed to the question whether younger individuals are affected earlier and to a greater extent as Ljunghall et al. [11] stated and if there is a change of incidence in different periods. We would suggest that similar studies are done in other countries to discover whether there are any differences.

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Professor W. Vahlensieck
Department of Urology
University Hospital Bonn
5300 Bonn-Venusberg
Federal Republic of Germany