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SHORT COMMUNICATION

UROLITHIASIS

Mortality and burden of disease associated with kidney stone disease in children and young persons (<20 years): Trends in Europe between 1990–2019 according to the Global Burden of Disease database

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Introduction The incidence of urolithiasis in children has increased. However, research regarding the associated mortality burden group is lacking. Our objective was to evaluate trends across Europe.

Material and methods Data on mortalities associated with urolithiasis in persons under 20 years was obtained from the Global Burden of Disease database for the period 1990–2019. Data included demographic information such as gender and age as well mortality rate, crude number of deaths and disability adjusted life years (DALYs). Data was collected from the European region as defined by the World Health Organization.

Results Over 30-year period and across 53 countries, there were 184 deaths (106 males, 78 females) recorded in persons <20 years. The highest crude number of deaths occurred in the 10–14-year-old group (n = 54), followed by 5–9 years (n = 53), 15–19 years (n = 52) and <5 years (n = 25). The distribution in the total number of deaths according to these age groups, did not change over time. Overall, there was a 73% decrease when comparing the number of deaths in 1990 with 2019. Between these two time points, the overall death rate also decreased from 0.006 to 0.002 per 100,000. Over time the gender gap narrowed in terms of the number of deaths and by 2019, the male to female ratio was at its lowest to date (1.2 : 1).

Conclusions Mortality associated with kidney stone disease in children and young persons has improved in recent decades. More deaths have occurred among males, but this gender gap is narrowing.

Key Words: paediatric ‹› mortality ‹› sepsis ‹› urolithiasis ‹› urinary calculi

INTRODUCTION

The incidence of kidney stone disease in children and young persons is recognized to be increasing in recent decades [1]. Of note, among all age groups, the demographic that is currently experiencing the biggest rise is among adolescent females [2]. Recent reports have revealed that the burden of deaths associated with adult KSD has risen in countries such as England and Wales [3]. Compared to adult stone formers, children with KSD have a higher proportion of comorbidities. It may be hypothesized therefore that the burden of mortality associated with paediatric KSD is likely to have risen and perhaps to a greater extent. While an increasing number of series are being published on the epidemiology

of paediatric KSD, mortality data is scarcely reported. To this end, our objective was to evaluate trends in mortality burden among this age group.

MATERIAL AND METHODS

Mortality data on persons under 20 years was obtained from the Global Burden of Disease (GBD) database for the period 1990–2019 (https://ghdx.healthdata.org/gbd-2019) across the geographic region of Europe (53 countries) according to the World Health Organization (WHO) (https://www.who.int/europe/about-us/about-who-europe) [4]. Of note, this is how GBD categorises the data. Data sourced included demographic information such as gender and age as well mortality rate, crude number of deaths, disability adjusted life years (DALYs) and years of life lost (YLL). Given all data was anonymized at source as well as publicly available, ethical approval was not deemed to be required.

RESULTS

Over 30-year period, there were 184 deaths (106 males, 78 females) recorded in persons <20 years (Figure 1). The highest crude number of deaths occurred in the 10–14-year-old group (n = 54), followed by 5–9 ye- ars (n = 53), 15–19 years (n = 52) and < 5 years (n = 25). The distribution in the total number of deaths according to these age groups, did not change over time. Overall, there was a 73% decrease when comparing the number of deaths in 1990 with 2019. Between these two time points, the overall death rate also decreased from 0.006 to 0.002 per 100,000. Among males, the death rate recorded was highest among the 5–9-year group followed by 10–14 years, 15–19 years and lowest among <5 years. Among females, the highest death rate recorded was in age groups 15–19 years and 10–14 years, followed by 5–9-year and finally <5 years. Over time the gender gap narrowed in terms of the number of deaths and by 2019, the male to female ratio was at its lowest to date (1.2 : 1). While the death rate was higher among males across the whole study period, this also narrowed over time. For DALYs, the rate per 100,000, decreased among the whole group and both sexes from 0.92 to 0.59. Similarly, YLLs, the rate per 100,000 decreased from 0.38 to 0.11.

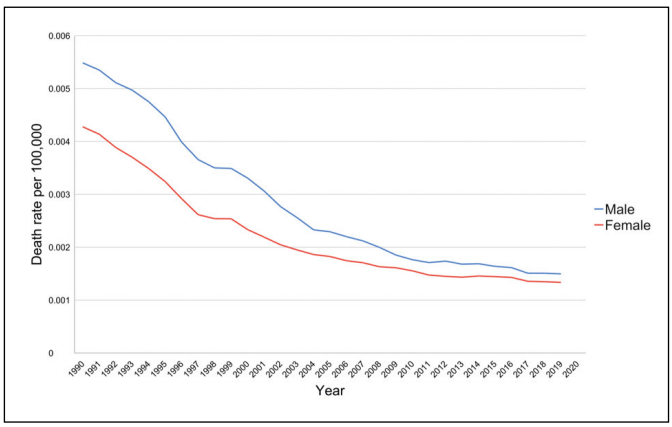

Figure 1. *Trends in mortality associated with kidney stones in persons under 20 in Europe between 1990–2019.*

DISCUSSION

These findings show in contrast to what has been published for adults, mortality in the paediatric KSD setting is declining. However, like in adults, deaths are higher among males, and the gender gap is also narrowing. In terms of paediatric KSD management, practice patterns vary widely and with relatively low case volumes in many countries, paediatric endourology is often undertaken by adult endourologists. This could be also perceived as a potential risk for worse outcomes [5]. The findings of this study are therefore reassuring. While the exact reasons for these trends are unknown, improvements in endourological equipment and technology may have contributed to this. The development of newer laser systems such Thulium fiber laser, which allow for shorter operative times and the miniaturization of percutaneous nephrolithotomy with its reduced risk of bleeding represent two examples [6, 7]. This has likely been further supported by the advances in the other specialties that form part of the multidisciplinary care for paediatric KSD. Public health initiatives such as to improve nutrition among children are also considered to have had a positive effect [8].

Limitations to acknowledge include that data obtained from the GBD also does not differentiate stones according to location e.g., ureter vs kidney. Census data collected in this way does also not differentiate primary and secondary causes of deaths i.e. while KSD may have been a contributing factor and a concomitant diagnosis, it may not have been the final cause. This is important when considering the strengths of the study findings. However, to our knowledge, this represents one of the only studies, which has addressed the subject of paediatric KSD mortality to date.

CONCLUSIONS

Mortality associated with urolithiasis in children and young persons has improved. More deaths have occurred among males, but this gender gap is narrowing. Improvements in minimally invasive sur-

gical treatments and multidisciplinary care have likely contributed to this change.

CONFLICTS OF INTEREST

Øyvind Ulvik has acted as a consultant for Olympus. The other authors declare no conflict of interest.

FUNDING

This research received no external funding.

ETHICS APPROVAL STATEMENT

All data was freely and publicly available as well as anonymized at source. Therefore no ethical approval was deemed necessary.

References

1. Edvardsson VO, Ingvarsdottir SE, Palsson R, Indridason OS. Incidence of kidney stone disease in Icelandic children and adolescents from 1985 to 2013: results of a nationwide study. Pediatr Nephrol. 2018; 33: 1375-1384.
2. Gillams K, Juliebo-Jones P, Juliebo SO, Somani BK. Gender Differences in Kidney Stone Disease (KSD): Findings from a Systematic Review. Curr Urol Rep. 2021; 22: 50.
3. Juliebø-Jones P, Ulvik Ø, Æsøy MS, Gjengstø P, Beisland C, Somani BK. Mortality due to urolithiasis in England and Wales: updated findings from a national database over a 23-year period. Cent European J Urol. 2023; 76: 141-143.
4. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019 (GBD 2019). Seattle USIfHMaEI 2020.
5. Pietropaolo A, Geraghty R, Griffin S, Skolarikos A, Seitz C, Bujons A, et al. Worldwide trends of practice and intervention in paediatric endourology: comparison of European versus Non-European responses. Cent European J Urol. 2023; 76: 245-250.
6. Jones P, Hawary A, Beck R, Somani BK. Role of Mini-Percutaneous Nephrolithotomy in the Management of Pediatric Stone Disease: A Systematic Review of Literature. J Endourol. 2021; 35: 728-735.
7. Juliebø-Jones P, Keller EX, Haugland JN, et al. Advances in Ureteroscopy: New technologies and current innovations in the era of Tailored Endourological Stone Treatment (TEST). J Clin Urol. 2023; 16: 190-198.
8. Bertuccio P, Alicandro G, Malvezzi M, et al. Childhood cancer mortality trends in Europe, 1990-2017, with focus on geographic differences. Cancer Epidemiol. 2020; 67: 101768.