Hospital admissions for renal colic in Malta: Economic patterns

D Davies, J Baxter

Citation

D Davies, J Baxter. *Hospital admissions for renal colic in Malta: Economic patterns*. The Internet Journal of Urology. 2006 Volume 5 Number 1.

Abstract

Background: Renal colic is a significant phenomenon in secondary medical care.
Aims: This study aims to establish if the rate of admission for renal colic differs between districts with differing average annual household income.
Method: 519 patients were admitted for renal colic at St Luke's hospital Malta between Jan 2001 and Dec 2004, 485 patients were considered after exclusions. The residential locality of each patient was recorded; data on demographics and average earnings was obtained from the Maltese National Office of Statistics.
Results: The overall annual incidence was 32.56 per 10000 persons. Analysis revealed a significant linear relationship between income and incidence of admission for renal colic (P=0.010), with areas of higher income having significantly lower rates of admission, although proper age matching was impossible due to the limited data available. Many confounding factors exist with this method of observation. Better investigation is needed for a definitive explanation.

BACKGROUND

There are many factors predisposing an individual to urinary calculi and hence renal colic, most notably male sex[1], genetic predisposition[2], dehydration and diet[3], occupation[4], and rarely metabolic pathology[5]. Renal colic is a major player within the disease repertoire of urological practice, the prevalence of which is increasing significantly in western society[6]. Currently in the United States 1 in 1000 adults are hospitalised annually because of renal calculi[7], and in men the disease has a lifetime prevalence of 10%[9].
Approximately 90% of stones that cause renal colic will pass spontaneously and not require invasive treatment[8] requiring only fluids and analgesics. Management within the primary care setting is becoming commonplace, although severe cases with marked obstruction or severe symptoms may require hospitalisation and surgical intervention. Recurrence of stone disease occurs in approximately 50% of cases[1].

Within the Maltese isles there are 6 main districts, which shall be ranked according to their average reported earnings (1 being most affluent);

(D1) South Eastern
(D2) Western
(D3) Northern
(D4) Northern Harbour
(D5) Southern Harbour
(D6) Gozo + Comino

According to various reports from the Maltese national office of statistics, these individual districts have differing average incomes, educational levels, and occupational distributions. When considering the various risk factors for urinary tract calculi/renal colic and the circumstances under which hospitalisation is necessary, a question arises as to whether different districts in Malta have difference rates of hospital admission. A study carried out in England and Wales during 1978 concluded that significant differences in the regional incidence of renal colic and upper urinary tract stones exists[9], with Wales and southern English regions having a higher incidence than northern regions. This was mainly attributed to regional differences in diet, occupation, climate differences and composition of drinking water. Malta provides an opportunity to eradicate some of these confounding factors as the island has a common water supply and climate. As St Luke's is the only major general hospital in Malta, and the only urology unit nationally this gives a convenient opportunity to obtain the relevant data.

AIMS

The aims of this investigation are threefold.

1. To elicit whether the incidence of hospital admission for renal colic varies between the different districts of the Maltese isles.
2. To analyse the relationship between the average annual earnings of individuals living within these regions and the incidence of hospital admission for renal colic from each region.
3. To investigate weather the length of hospital stay after an admission for renal colic varies with residential district. An observation would again be made as to the relationship of average reported income had on the length of hospital stay.

We hypothesise that a significant difference will exist in the incidence of hospital admission for renal colic between the districts of the Maltese isles. If this is the case it will strengthen the evidence base supporting socio-economic factors influencing the incidence of renal colic/renal stone disease, because certain conditions throughout Malta (climate, water composition etc) are constant.

METHOD

Information regarding hospital admissions for renal colic was obtained retrospectively from the Data Management Unit at St Luke's hospital; this concerns exclusively admission to this hospital notified through the Hospital Activity Analysis System (HAA). It has been calculated that on average the HAA holds data on 75% of admissions compared to the Patient Administration System, which is considered comprehensive. Only anonymous data regarding each patient's; (i) age, (ii) sex, (iii) locality of residence (not address), and (iv) the length of stay was obtained from the HAA. The criteria for inclusion was clinical diagnosis of renal colic (ICD 10 code: N23) as reported to the HAA, patients who were not of permanent residence in Malta were excluded, as were those of an unspecified locality or age. Repeated admissions of a single individual within that year were incorporated as one admission only.

Information regarding the boundaries of each major district, and their constituent towns was kindly provided by the Maltese National Office of Statistics. Data regarding the number of inhabitants within these districts was also obtained via The Maltese Demographic Review 2003, which was also kindly provided by the national office of statistics.

The Labour Force Survey 2004, carried out by the Maltese National Office of Statistics was used to obtain information regarding the average annual earnings for members of the adult population within each of the major Maltese districts. This survey is an enquiry carried out using a random sample of 2500 private households. Separate data for males and females were not available due to under representation of the female workforce.

The average individual income for individual within districts 1-6 are as follows;

D1) 5360 Lm
D2) 5189 Lm
D3) 5116 Lm
D4) 5034 Lm
D5) 4872 Lm
D6) 4735 Lm

All cases of admission for renal colic as recorded by the HAA between January 2001 and December 2004 were collected and grouped 1-6 according to their residential locality; and the duration of stay for each individual was noted. The incidence of admission was then calculated (per 100,000 inhabitants) for each district, along with average figures for length of stay. These results were then grouped according to age.

RESULTS

Between January 2001 and December 2004, 519 patients were admitted for renal colic at St Luke's hospital matching the inclusion criteria for this investigation, 34 had an accompanying diagnosis and were excluded. The remaining 485 patients were then considered.

The overall annual incidence for the whole island was 32.56 per 10,000 persons. The annual incidence of hospital admission for renal colic for areas 1-5 (per 100,000) was 26.2 [50], 30.7 [66], 31.6 [68], 36 [172], 38.2 [128], respectively (Figure .2). District 6 was excluded from further analysis due to heavy under representation (see discussion). On comparing the relative risk (RR) of district 1 (highest earning) with the other districts (Table. 1), a significantly higher risk of admission is observable in the areas of lower income. Chi-square analysis reveals significant linear relationship between income and incidence of admission for renal colic (P=0.010), with areas of higher income having significantly lower rates of admission.

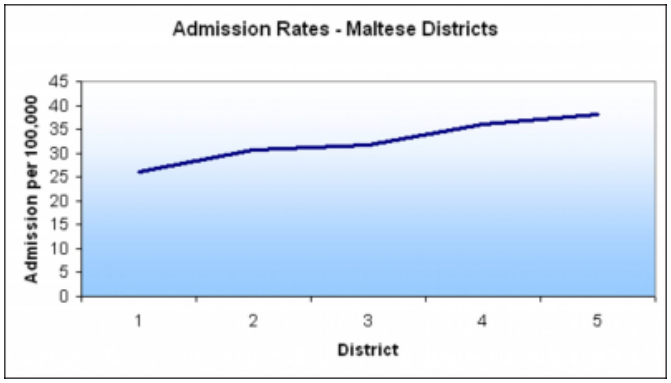
Figure 1

Table 1: Relative risk, compared to district 1.

DISTRICT	No Admissions	Population	Relative Risk (RR)	95% CI
1	50	47752	1	-
2	66	53747	1.2	0.83 – 1.73
3	68	53811	1.2	0.83 – 1.73
4	172	119403	1.38	1 – 1.9
5	128	83587	1.46	1.05 – 2.03

Figure 2

Figure 1: Overall admission Rates per district.



The results from each district were then categorised into age groups;

0-24yrs
25-49yrs,
50-70,
70+

The highest annual age incidence throughout each district was group B, with figures of 16.8[32], 17.2[37], 19.5[42], 19.5[93] and 20.3[68] per 100,000 total population for districts 1-5 respectively. A similar pattern is observable here with a significant linear increase in admissions from areas 1 to 6 (p=0.037). Within age group A, the incidence for districts 1-5= 4.2[8], 3.72[8], 3.71[8], 4.6[22] and 5.1[17], respectively. Here we see a loss of the previously observed linear association (p=0.461). Within category C, the incidence for districts 1-5= 5.2[10], 8.8[19], 8.4[18], 11.1[53], and 11.6[39] respectively, indicating once more a significant linear increase (p=0.014) in incidence of admission from groups 1 through 5. Data from group D was disregarded due to under representation. Adequate data was unavailable for satisfactory age matching (see discussion).

The average duration of hospital stay within this study was 2.69 days. The mean duration of stay for each of the districts were not significantly different at 2.52, 3.06, 2.5, 2.74 and 2.65 between districts 1-5 respectively (P=0.374). The overall mean duration of stay for age groups A-C were 2.57, 2.6 and 2.85 days respectively.

DISCUSSION

The investigation has achieved its aims in piloting the concept of an economic trend in renal colic, and establishing a convincing pattern in the incidence of hospital admission, with it being greater in areas of lower average household income, corresponding with the studies primary hypothesis. Although a larger, more comprehensive study is needed to demonstrate definitive evidence.

District 6 was discounted due under representation; this may be explained by the geographical isolation of the location (the island of Gozo). Persons suffering from renal colic in this location may be more likely to visit their general practitioner, or visit the small general hospital on Gozo, as the journey to St Luke's is time consuming. The duration of stay between districts 1-5 was not significantly different in this study, as accompanying diagnoses were excluded, and therefore confounding from other disease aetiology was removed as far as was possible.

The identification of a relationship between lower income and increased rate of admission for renal colic within Malta may aid in the identification of specific risk factors related to the development of the disorder. This in turn may lead to a redistribution of educational and financial resources in an effort to reduce such risks. This investigation however serves more to focus attention rather than resources to these phenomena.

Patients from more affluent backgrounds may have a greater predisposition to request private medical management for their conditions, therefore reducing their representation within this study. Although in the acute setting this is unlikely, as the only emergency unit nationally is at this hospital. A future study may seek to include admissions to private wards at the three private hospitals on the island, as this represents an important area of consideration within this study.

The source of all the data used was considered sufficiently reliable for the purposes of this investigation, and the estimated 75% of admissions recorded by the HAA database can be considered representative. Data acquired from Labour Force Survey 2004 is reliant on the declared/taxable income of any household in question, and therefore not be representative of the ‘true' total income of a given household. For the purposes of this investigation, an assumption is made that ‘undeclared' income is directly proportional to ‘declared' income in each district, although this may be incorrect, and is therefore a limitation of this

study. Obtaining accurate data regarding 'true' incomes for individual households would be impossible, alternative measures of affluence (car ownership etc) may be more suitable, and considered for future studies.

The apparent trend observed within this study in some aspects runs contrary to other published data regarding the epidemiology of renal stone disease, where increasing incidence is observed with higher socioeconomic status[10]. Other observations suggest affluent Asian countries such as Taiwan and Japan, have been demonstrated to have lower rates of incidence than the poorer regions of the continent, and rates in industrial Europe were observed as being much higher than in North Africa[11]. One study observes renal stone disease as being most prevalent in the lower middle classes[12]. Our observations differ in that they relate to hospital admissions only, and required a clinical diagnosis of renal colic.

The peak incidence seen here in age group B conforms to peak ages of incidence in established literature[13,14]. Unfortunately, specific demographic reviews for the individual districts do not exist; only national data is available on age distribution. Therefore the relevance of the figures quoted in this review is dependant on the assumption that the number of individuals in each age group is equal in each district. The existence of a comprehensive district specific demographic review would be of benefit in any future study, in order to match for age specific risk.

As mentioned, genetic predisposition also is a major factor in the development of urinary stone disease/renal colic, and therefore differences in ethnic and foreign inhabitation of different districts may be confounding factors in this study. A future study may consider ethnicity/nationality variance between investigated populations.

In conclusion, this investigation highlights a possible economic trend in the incidence of admission for renal colic in Malta. Further more comprehensive investigation is needed for definitive confirmation. Renal colic continues to be significant phenomena within medical practice in Malta. Identification of avoidable inequalities of education and lifestyle may pave the way for decreased incidence of the complaint and the better health of a nation.

References

1. Bihl G, Meyers A. Recurrent renal stone disease-advances in pathogenesis and clinical management. Lancet. 2001 Aug 25;358(9282):651-6
2. Griffin DG. A review of the heritability of idiopathic nephrolithiasis. J Clin Pathol. 2004 Aug;57(8):793-6
3. Reyes L et al. Clinico-epidemiologic study of urolithiasis in a Caribbean urban area. Nefrologia. 2002;22(3):239-44
4. Ferrie BG, Scott R. Occupation and urinary tract stone disease. Urology. 1984 Nov;24(5):443-5
5. Coward RJ et al. Epidemiology of paediatric renal stone disease in the UK. Arch Dis Child. 2003 Nov;88(11):962-5.
6. Marangella M. A nephrologist's tasks in nephrolithiasis. G Ital Nefrol. 2005 Jan-Feb;22(1):16-27
7. The Merk Manual of diagnosis and therapy. 2005. Section 17 Genitourinary disorders. Chapter 221 Urinary Calculi.
8. Wasserstein AG. Nephrolithiasis: acute management and prevention. Dis Mon. 1998 May;44(5):196-213.
9. Barker D J, Donnan S P. Regional variations in the incidence of upper urinary tract stones in England and Wales. BMJ. 1978 Jan 14;1(6105):67-70.
10. Lee YH, Huang WC, et al. Epidemiological studies on the prevalence of renal calculi in Taiwan. Urol Int 2002;68; 172-177.
11. Amato M et al. Epidemiology of Nephrolithiasis Today. Urol Int 2004; 72(suppl 1);1-5.
12. Robertson WG. Diet and calcium stones. Miner Electrolyte Metab. 1987;13:228-234.
13. Chauhan V et al. Effect of season, age, and gender on renal colic incidence. Am J Emerg Med. 2004 Nov;22(7):560-3.
14. Saigal CS et al. Direct and indirect costs of nephrolithiasis in an employed population: Opportunity for disease management? Kidney Int. 2005 Oct;68(4):1808-14.

Author Information

David James Davies, MB, BCh
Foundation Year Doctor- Surgery, University Hospital of Wales

Julia Baxter, MB, BCh
Foundation year Doctor- Medicine , Foundation Year Doctor- Surgery, University Hospital of Wales