

Seasonal variations of Urinary Stone Colic in Arabia

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Mohamad Salim Al-Hadramy (Department of Medicine, King Abdulaziz University Hospital, Saudi Arabia.)

Abstract

The western region of Saudi Arabia is an area with a high prevalence of urolithiasis. This study was designed to find the effect of climatic changes on the occurrence of urinary stone colic as well as the effect of Ramadan fasting and pilgrimage festival. The emergency room (ER.) records at King Abdulaziz University Hospital in Jeddah were studied for 3 consecutive years. Males diagnosed as urinary colic during this period were recorded on monthly basis with correction for 30 days a month. Data were recorded before, during and after the fasting month as well as before and after the pilgrimage festival. The results showed a steady increase in urinary stone colic in the hot season with a maximum rate in the months of June, July and August. The mean number of males with stone colic in these months was 45.33, 44.19 and 45.16 respectively. The lowest number was in March (28.06) with a rate of 4.11 per 1000 patients. A strong correlation was found between urinary stone colic and both temperature and atmospheric pressure with a P value of <0.0001. No significant correlation was observed with relative humidity and similarly no significant change in relation to Ramadan fasting or the pilgrimage festival. These results suggest that there is a clear stone season in this area corresponding to the hot summer months. No significant increase in urinary stone colic was observed in relationship to the fasting month of Ramadan or the pilgrimage festival (JPMA 47:281, 1997).

Introduction

Renal stones constitute a major health problem worldwide and our group has reported a prevalence rate among males of 8.1% with a recurrence rate reaching upto 53.2%¹. Many reports have observed a seasonal variation in the occurrence of renal stones²⁻⁵, while others failed to find this variability⁶. Two reports from neighbouring countries have shown a high prevalence of renal colic in the summer period^{7,8}. In a muslim country like Saudi Arabia, two seasons may theoretically be associated with an increase in stone formation. The first is the month of Ramadan in which muslims refrain from drinking and eating from dawn to sunset and some reports have suggested its possible facilitation to uric acid and oxalate stone formation^{9,10}. The second one is at the festival of pilgrimage when many people offer their sacrifices and consume more than usual amounts of animal proteins. The high animal protein diet increases the lithogenic factors of hypercalcaemia, hyperuricosuria and acidic urine¹¹. This study was designed to find if there is any seasonal variation in renal stones throughout the year and in relation to Ramadan fasting and to the pilgrimage festival.

Materials and Methods

This was a retrospective study of medical records of the Emergency Room (ER) at King Abdulaziz University Hospital in Jeddah for 3 consecutive years (1992-1994).

Emergency room attendance was chosen rather than out-patient clinic or hospital admissions for many reasons. The (ER) is open to all cases 24 hours a day throughout the year and is not subject to closure during holidays. It is not also affected by the long-waiting lists as the other services. Dipsticks were available for the emergency room staff to find haematuria as well as plain x-ray facilities but intravenous urography (IVU) was not done on emergency bases. All males diagnosed by the emergency

room physician as acute presentation of renal stones with renal colic or ureteric colic were recorded on monthly bases with correction for 30 days a month and expressed as a rate per 1000 of the total number of all patients attending the emergency room during that month. Data were also recorded for the lunar month of fasting (Ramadan) and 1 month before and after it (Shaaban and Shawwal respectively). Similarly data were recorded for 30 days before the 10th day of Tholhejah (The Haj festival day) and sixty days following it. Since the year in the Muslim lunar calendar is about 11 days shorter than that of the Gregorian solar calendar, the lunar months are not consistent with the weather changes and so the data obtained in relation to the lunar months of Ramadan and Tholhejah were compared to the expected values in the corresponding period of the Gregorian calendar. The mean monthly temperature, relative humidity and pressure for Jeddah City during the study period were obtained from the meteorology and environmental protection administration. Data were analyzed by a personal computer using (statsgraphs) statistical package for calculating the mean, standard error, pearson product moment correlation coefficient and student's t-test. The significant P value was set to be less than 0.05.

Results

The mean monthly number of males presenting to the (E.R.) with urinary stone colic adjusted for 30 days a month is shown in Table I with the corresponding mean monthly temperature, pressure and relative humidity.

Table I. Occurrence rate of urinary stone colic with climate variables. Values are shown as the mean±SE for the 3 years period.

Month	Total E.R. Patients	Males with stone colic (number)	(Rate/1000 patients)	Temperature	Air pressure (°C)	Relative humidity hPa (%)
January	7241.61±265.46	29.68±5.28	4.10	22.60±1.30	1012.83±0.97	58.67±2.73
February	6850.42±74.78	30.42±4.65	4.44	21.60±1.04	1013.10±0.87	55.67±0.88
March	6821.94±137.50	28.06±3.66	4.11	24.13±0.33	1010.20±0.31	58.00±1.53
April	7191.67±115.50	39.00±2.89	5.42	27.47±0.64	1007.37±0.48	55.67±2.40
May	6562.58±356.91	39.68±0.97	6.05	29.80±0.62	1005.80±0.21	54.67±0.67
June	6826.00±207.44	45.33±2.33	6.64	30.73±0.26	1002.67±0.35	57.33±0.67
July	5892.90±160.01	44.19±4.23	7.50	31.90±0.35	1002.57±0.30	53.00±2.08
August	5973.23±151.55	45.16±7.27	7.56	32.50±0.00	1002.87±0.41	55.67±2.03
September	6088.33±186.23	38.33±4.48	6.30	31.50±0.23	1004.60±0.64	62.33±3.18
October	6538.39±164.08	40.32±4.34	6.17	29.80±0.38	1008.17±0.12	61.67±1.20
November	7338.33±319.37	36.00±9.02	4.91	27.13±0.44	1010.30±0.35	64.33±1.20
December	7625.48±237.30	31.29±4.12	4.10	24.30±0.93	1012.63±0.64	65.33±2.33

A highly significant correlation was found between the mean monthly number of patients with urinary stone colic and both temperature and atmospheric pressure (Figure 1 and 2)

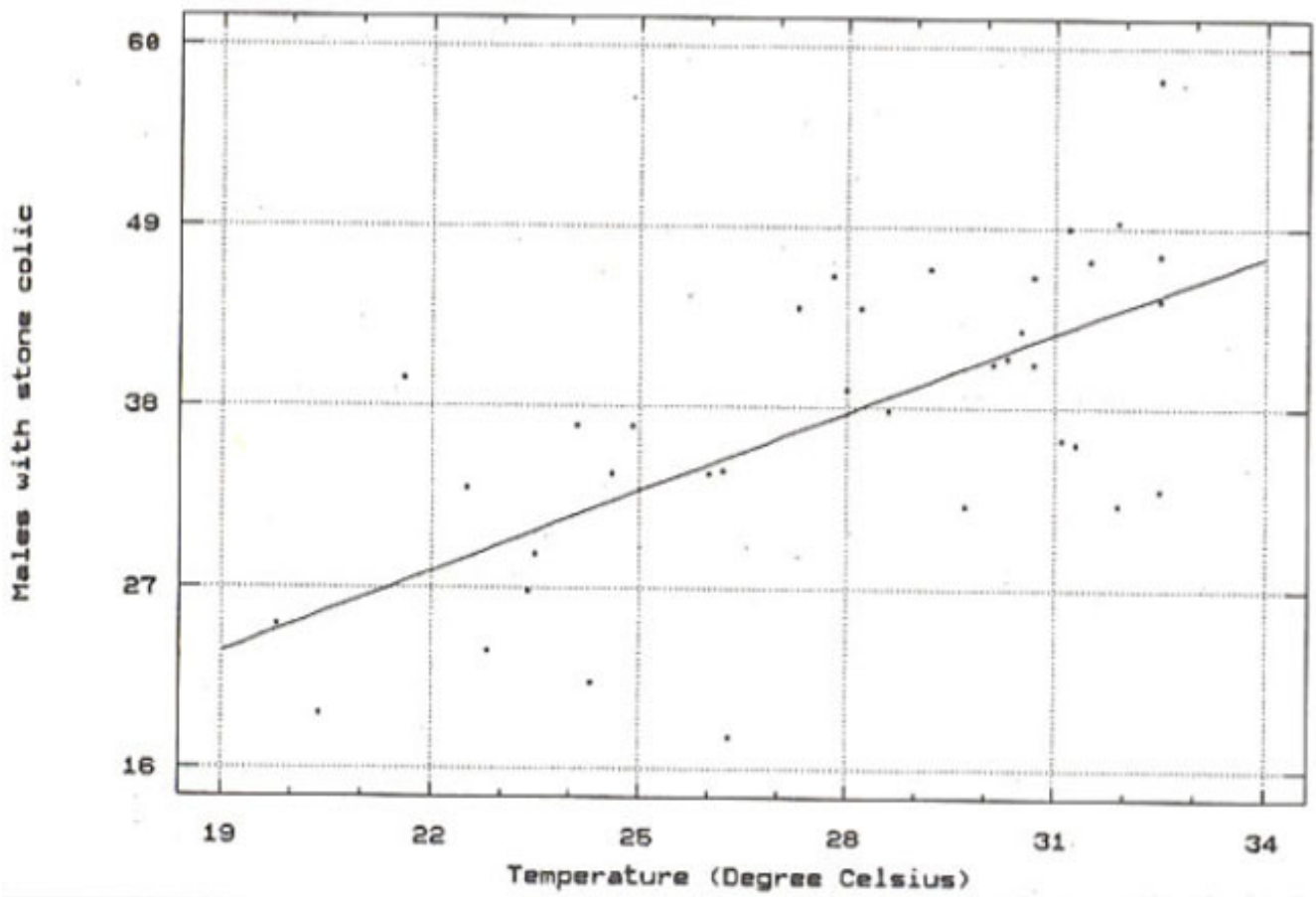


Figure 1. Regression curve of urinary stone colic vs. temperature for the 36 months.
 $r=0.67$ $p<0.0001$.

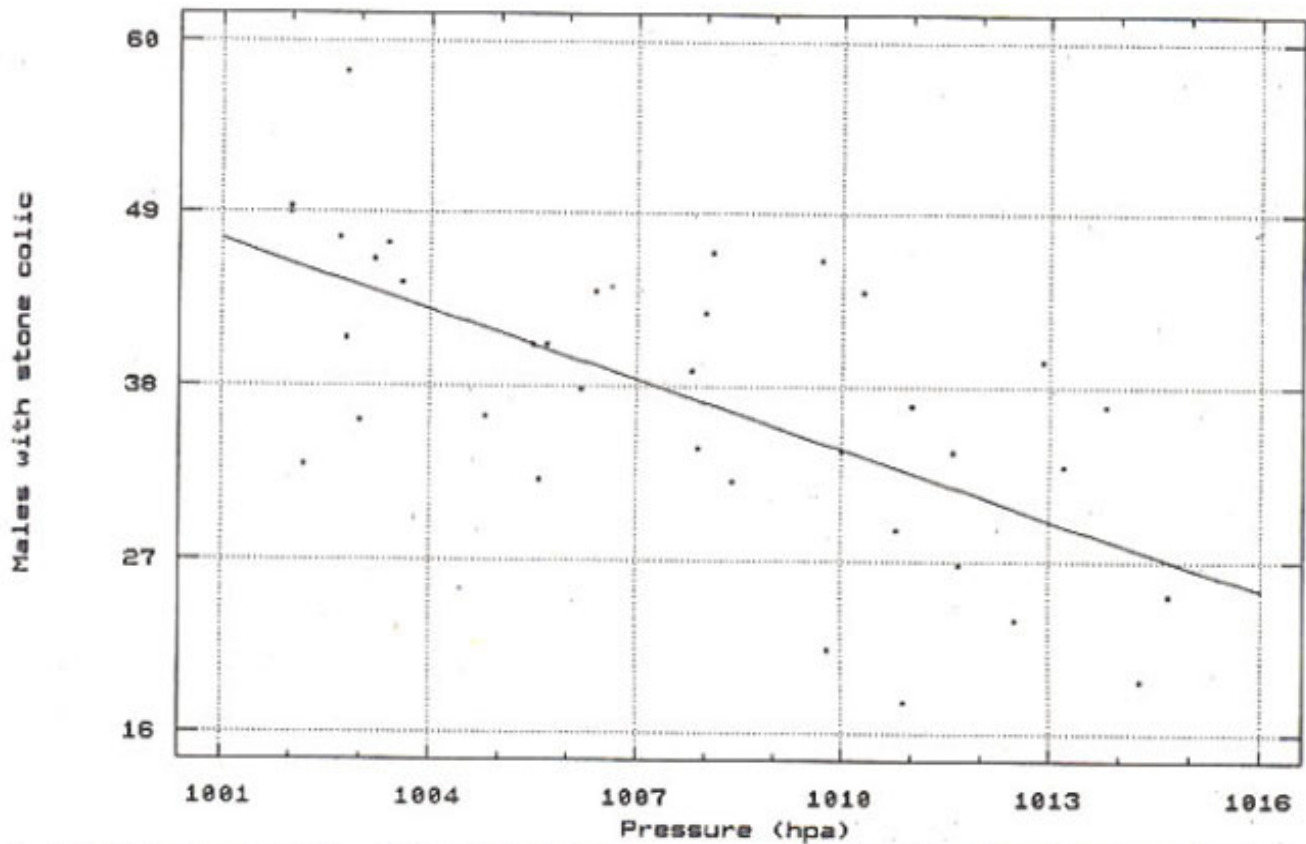


Figure 2. Regression curve of urinary stone colic vs. atmospheric pressure for the 36 months. $r = -0.64$, $p < 0.0001$.

with a correlation coefficient of + 0.067 and -0.64 respectively. The P value for both was < 0.0001 . The same was observed also when the number of patients with colic was expressed as a rate per 1000 of the total number of patients attending the (ER) each month which had a correlation coefficient with temperature and atmospheric pressure of + 0.76 and - 0.74 respectively with a P value of < 0.0001 for both. No significant correlation was observed between the number of patients with urinary stone colic and relative humidity.

Table II. The mean number of males with urinary stone colic in relation to the fasting month (Ramadan) and pilgrimage (Haj) festival.

Month	Males with stone colic No.	Expected number in corresponding Gregorian calendar
Shaaban	26.7±1.2	30.1±0.1
Ramadan	29.7±0.3*	29.2±0.3
Shawal	31.7±4.1	34.9±1.6
30 days before Haj festival	38.3±1.5	40.2±0.7
Ist 30 days after Haj Festival	45.0±2.3**	44.5±0.6
2nd 30 days after Haj festival.	47.0±2.5***	44.4±0.1

* t= 1.402 p=0.233

**t= 0.209 p=0.845

***t=1.017 p=0.367

Table II shows the number of males with stone colic in relation to the fasting month (Ramadan) and the pilgrimage festival compared to the expected values in the corresponding Gregorian calendar. The first Ramadan in the study period corresponded to 27 days of March and 3 days of April. The expected number of males with urinary stone colic during this period as calculated from the mean of these Gregorian months would be $27 \times 28.06/30 + 3 \times 39/30 = 29.2$. The expected number for the other lunar months was calculated similarly. The day of pilgrimage festival (10th day of Haj month) in the first year corresponded to June 11th. As shown in Table II, the number of males with colic was slightly higher than expected in the month of Ramadan, and the corresponding P value (0.233) was not significant. Similarly, the increase observed in the first and second 30-day periods after Hajj festival was insignificant with P values of 0.845 and 0.367 respectively. The mean number of lambs and goats processed at the slaughter houses in Jeddah in the first half of the pilgrimage month (2514.3 lambs and 4628.7 goats) was more than that recorded in 26 of the 36 months of the study period.

Discussion

The results of the study demonstrate a clear seasonal variation in urinary stone colic with a highly significant positive correlation between colic frequency and the mean monthly temperature with a maximum frequency in the summer months July- August. The pattern is basically similar to that reported from the neighbouring Kuwait⁷ and Iraq⁸. Less frequency is seen in the mild winter months of December-February and the least is seen in March which is preceded by the two "coldest" months of the year. Prince and associates found similar observation in the month following the 2 coldest months⁴. In agreement with other observations⁵ the rate in Jeddah seems to fall by about a third during the

winter months. It is believed that the dehydration and associated urinary concentration are the cause of the rise in the incidence of urolithiasis in the hot season⁴. In patients with urolithiasis attributed to chronic dehydration, hot climate was the cause in 62%¹². An interesting observation is the hypercalciuria noted in soldiers who went to the Gull in the "hot season"¹³, but this does not seem important in our population as reports from our hospital¹⁴ and Riyadh^{15,16} have shown that hypercalciuria is not common in patients with urolithiasis in this region. A highly significant negative correlation was observed between stone colic frequency and the mean atmospheric pressure and this is in agreement with another report which found that a fall in air pressure and hot days significantly provoke stone colic². While some workers suggest an influence of relative humidity on the frequency of urolithiasis¹⁷, the current study and others⁴ failed to find any significant correlation between the two variables. The relationship between urolithiasis and Ramadan fasting, if present, would be extremely important since millions of Muslims observe the fasting of this month but patients who develop urolithiasis as a result of this, would be exempted from fasting according to Islamic teachings. Although the number of stone colic patients seen during the month of Ramadan was higher than the month before it, the difference is explained by the change in temperature as one would be moving into hotter days during the study period. This is borne out by the observed lack of significance of the frequency of stone colic when compared to that predicted in the corresponding Gregorian months. These findings are consistent with the observations of Hada et al that Ramadan fasting does not put subjects to any greater risk for stone production than it is at any other time of the year's¹⁸. Quinibiet al found that the observed urinary changes were completely reversible within 10 days following the end of the fasting month¹⁰. Similarly no significant change in the frequency of renal colic was seen in relation to the festival of pilgrimage when compared to the predicted frequency according to the Gregorian calendar. This may be due to the fact that excessive meat intake does not extend in individuals over a long period of time. The effect may be more pronounced on pilgrims in Makkah where pilgrims perform their rituals in the hot season with crowding and potential dehydration. The 30 days preceding the festival of pilgrimage come only 10 days after the month following Ramadan and thus no delayed effect from Ramadan fasting was observed on the occurrence of colic.

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