

The Eurasia Proceedings of Science, Technology, Engineering & Mathematics (EPSTEM), 2021

Volume 16, Pages 191-194

IConTES 2021: International Conference on Technology, Engineering and Science

Urinary Stone in Outdoor and Indoor Workers Patients with Family History

Zena A. M. AL-JAWADI
University of Mosul

Abstract: A biochemical study of 365 patients with urinary stones disease according to occupation and family history, and the occupation divided to two subgroups (outdoor workers (n=183) and indoor workers (n=182)) and evaluated laboratory test was done for each patients included phosphorus, calcium, uric acid, urea and creatinine in serum of patients and control group. The results showed a higher significant difference serum phosphorus, uric acid, urea and creatinine in patients outdoor workers compared with the patients' indoor workers and control group at ($P=0.001$), and the higher significant difference more obvious in patients with family history, as a higher significant difference serum calcium in patients with family history outdoor workers compared with the patients' indoor workers and control group at ($P\leq 0.05$). Finally, this study proved the strong relationship between occupation and urinary stones formation, the epidemiology of stones increases according to the type of occupation. In addition, the study proved that patients' outdoor workers have incidence more than patients' indoor workers, and increase with family history.

Keywords: Urinary Stone, Family History, Outdoor Workers, Indoor Workers

Introduction

Urinary stones can develop when certain chemicals in urine form crystals that stick together. The crystals may grow into a stone ranging in size from a grain of sand to a golf ball (Pearle et. al., 2005; Delvecchio et. al., 2003; Menon et. al., 2002), small stones can pass through the urinary system without causing problems. However, larger stones might block the flow of urine or irritate the lining layer of the urinary tract (Pietrow et. al., 2006; Reungjui et. al., 2002; Segura et. al., 1997).

A consecutive series of patients presenting to institutions in world for the management of proven urinary stones was interviewed by questionnaires designed to obtain data on age, gender, ethnicity, occupation, stone location, a family history of certain medical disease (Lotan et. al., 2004; Anatol et. al., 2003).

Most stones 62.8% contain mainly calcium oxalate crystal, 26.8% contain uric acid stones, 9.9% phosphate stones and 0.5% cystine stones. The incidence of calcium oxalate and phosphate stones is similar to that in other studies from different countries. The incidence of uric acid stone was higher than that reported in western industrialized countries. Therefore, it seems that our stone composition lies between those of the developing and industrialized countries (Al-Jawadi, 2002).

The aim of this study to identify the risk factor of occupation on renal stones formation, to planning treatment and prevention of recurrence of stones.

Method

- This is an Open Access article distributed under the terms of the Creative Commons Attribution-Noncommercial 4.0 Unported License, permitting all non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

- Selection and peer-review under responsibility of the Organizing Committee of the Conference

© 2021 Published by ISRES Publishing: www.isres.org

Our study included (365) patients with urinary stone attending the urological out patient's clinic in Al-Zahrawi Teaching Hospital in Mosul for stone removal. In the collections from North of Iraq, the patient's occupation (outdoor(n=183) and indoor(n=182)) was provided in 365 cases (excluding housewives) every patient was evaluated clinically and by a biochemical laboratory test, and compared with (50) normal subjects as control group. Biochemical analysis was done for phosphorus, calcium, uric acid, urea and creatinine in serum by using commercial kits (BioMerieux Vitek, Inc., UAS).

The statistical methods used to analyse the data include mean, standard deviation, minimum and maximum, while Z-test was used to compare between total control and total patients according to the occupation at $p \leq 0.05$ (Steel & Torrie, 1980).

Results and Discussion

The results in Table (1) showed a higher significant difference serum phosphorus and uric acid in patients' outdoor workers more than patients indoor workers compared with control group at $P=0.001$, $P \leq 0.05$ respectively, may be due to secondary urinary tract infection or/and stone formation (Menon & Resnick, 2002).

In addition, a higher significant difference serum urea in patients' outdoor workers more than patients' indoor workers compared with control group at $P=0.001$ was noted, Postrenal uraemia occurs due to outflow obstruction, which may occur at different level (i.e., in the ureter, bladder or urethra), due to renal stones. Back-pressure on the renal tubules enhances back-diffusion of urea, so that serum urea rises disproportionately more than serum creatinine (Smith et. al., 1998).

Table 1. Compares between serum phosphorus, calcium, uric acid, urea and creatinine in patients without family history and control groups according to occupation.

Parameters	Patients of urinary stones without family history (n=165)		Control (n=50)
	Outdoor workers (n=83)	Indoor workers (n=82)	
Phosphorus(mg/dl)	4.51± 1.32**	4.39 ± 1.73*	4.03±0.69
Calcium(mg\dl)	9.07 ± 1.09	8.93 ± 1.11	8.99±0.53
Uric acid(mg\dl)	4.95 ± 1.20**	4.88 ± 1.74*	4.40±1.13
Urea(mg\dl)	35.14±11.05**	33.86±10.37*	29.70±5.42
Creatinine(mg\dl)	0.88±0.29	0.84±0.367	0.77±0.12

Significant difference at $P \leq 0.05$, **Significant difference at $P=0.001$

These results increased incidence in individuals living in areas with a hot climate and those with predominantly sedentary work, may be because of inadequate access to bathroom facilities or drinking water, athletic activity, heat and sun exposure (Giovanni et. al., 2006; Borghi et. al., 1993). In Table (2), a higher significant difference serum uric acid and urea in patients' outdoor workers more than patient's indoor worker compared with control group at $P=0.001$ was noted and this agree with other study (Tosukhowong et. al., 2001).

Also, in the same table showed a significant difference in phosphorus and calcium in patients' outdoor workers more than patients indoor workers compared with control group at ($P=0.001$, $P \leq 0.05$) respectively, and these results agree with Pin et al study who's found the prevalence of urinary stone disease was five times higher in outdoor workers compared to indoor workers (Sharma, 2000; Pin et. al., 1992). Chronic dehydration is likely to be the most important risk factor for the increased risk of urinary stones in outdoor workers in the tropics, and should be easily prevented by increased water intake (Ozmen, 2004). Person with positive family history have a high-risk factor to increase the ratio of renal stones more than person without family history (Thun & Schober, 1991), and this agree with the results in Table (2).

The results showed a higher significant difference between serum phosphorus and calcium in patient worker (indoor and outdoor) with family history compared with patient worker (indoor and outdoor) without family history and this agree with the previous studies (Giovanni et. al., 2006; Lotan et. al., 2004). And in the same table showed a higher significant difference in serum uric acid, urea and creatinine in patient worker (indoor and outdoor) with family history compared with patient worker (indoor and outdoor) without family history may be because indicates a fall in GFR is found in urinary tract obstruction (Smith et. al., 1998), but patients' workers outdoor more than patients' worker indoor as seen in Table (2) and this agree with Krop et al studies 2007 (Krop et. al., 2007).

Table 2. Compares between serum phosphorus, calcium, uric acid, urea and creatinine in patients with family history and control groups according to occupation.

Parameters	Patients of urinary stones with family history (n=200)		Control (n=50)
	Outdoor workers (n=100)	Indoor workers (n=100)	
Phosphorus(mg\dl)	4.78±1.86**	4.51±0.97*	4.03±0.69
Calcium(mg\dl)	9.36±0.87*	9.11± 0.90	8.99±0.53
Uric acid(mg\dl)	5.19±1.08**	4.98±1.08*	4.40±1.13
Urea(mg\dl)	38.27±9.49**	37.13±8.82**	29.70±5.42
Creatinine(mg\dl)	1.21±0.30	1.09±0.39	0.77±0.12

*Significant difference at $P \leq 0.05$, **Significant difference at $P = 0.001$

Conclusion

Finally, this study proved the strong relationship between occupation and urinary stones formation, the epidemiology of stones increases according to the type of occupation. In addition, the study proved that patients' outdoor workers have incidence more than patients' indoor workers, and increase with family history.

Acknowledgements or Notes

The researcher is grateful the Mosul University, the management.

Scientific Ethics Declaration

The author declares that the scientific ethical and legal responsibility of this article published in EPSTEM journal belongs to the author.

References

- Al-Jawadi, Z. A. M. (2002). *Clinical and biochemical study of urinary stone disease in Ninevah and surrounded province* [Doctoral dissertation, Mosul University].
- Anatol, T., Pereira, L. P., Simeon, D., & Sawh, L. (2003). Risk factors for urinary tract calculi in Trinidad. *Tropical medicine & international health*, 8(4), 348-353.
- Borghesi, L., Meschi, T., Amato, F., Novarini, A., Romanelli, A., & Cigala, F. (1993). Hot occupation and nephrolithiasis. *The Journal of Urology*, 150(6), 1757-1760.
- Delvecchio, F. C., & Preminger, G. M. (2003). Medical management of stone disease. *Current Opinion in Urology*, 13(3), 229-233.
- Krop, E. J., Doekes, G., Stone, M. J., Aalberse, R. C., & Van der Zee, J. S. (2007). Spreading of occupational allergens: laboratory animal allergens on hair-covering caps and in mattress dust of laboratory animal workers. *Occupational and Environmental Medicine*, 64(4), 267-272.
- Lotan, Y., Cadeddu, J. A., Roerhborn, C. G., Pak, C. Y., & Pearle, M. S. (2004). Cost-effectiveness of medical management strategies for nephrolithiasis. *The Journal of Urology*, 172(6 Part 1), 2275-2281.
- Menon, M., & Resnick, M. I. (2002). Urinary lithiasis: etiology, diagnosis, and medical treatment. In *Campbell's Urology*, (pp. 3287-3289), Saunders Elsevier.
- Ozmen, O. (2004). Kidney Pathology in Non- obstructive Urolithiasis in Cattle. *Journal of Veterinary Medicine Series A*, 51(9- 10), 405-408.
- Pearle, M. S., Calhoun, E. A., Curhan, G. C., & Urologic Diseases of America Project. (2005). Urologic diseases in America project: urolithiasis. *The Journal of Urology*, 173(3), 848-857.
- Pietrow, P. K., & Karellas, M. K. (2007). Medical management of common urinary calculi. *South African Family Practice*, 49(3), 44-48.
- Pin, N. T., Ling, N. Y., & Siang, L. H. (1992). Dehydration from outdoor work and urinary stones in a tropical environment. *Occupational Medicine*, 42(1), 30-32.

- Reungjui, S., Prasongwatana, V., Premgamone, A., Tosukhowong, P., Jirakulsomchok, S., & Sriboonlue, P. (2002). Magnesium status of patients with renal stones and its effect on urinary citrate excretion. *BJU International*, 90(7), 635-639.
- Segura, J. W., Preminger, G. M., Assimos, D. G., Dretler, S. P., Kahn, R. I., Lingeman, J. E., & Macaluso, J. N. (1997). Ureteral stones clinical guidelines panel summary report on the management of ureteral calculi. *The Journal of Urology*, 158(5), 1915-1921.
- Sharma, O. P. (2000). Hypercalcemia in granulomatous disorders: a clinical review. *Current Opinion in Pulmonary Medicine*, 6(5), 442-447.
- Smith, A. F., Beckett, G. J., Walker, S. W. & RAE, P. W. H. (1998). *Clinical Biochemistry* (6th ed).,WB Saunders.
- Steel, R. G. D., & Torrie, J. H. (1980). *Principles and procedures of statistics a biometrical approach*. (2nd ed.). McGraw-Hill, Inc.
- Thun, M. J., & Schober, S. (1991). Urolithiasis in Tennessee: an occupational window into a regional problem. *American Journal of Public Health*, 81(5), 587-591.
- Tosukhowong, P., Sriboonlue, P., Tungsanga, K., Bovornpadungkitti, S., Chatuporn, S., Muktahant, B., ... & Sitprija, V. (2001). Potassium status of Northeast Thai constructors in three different geographic locations. *Journal of the Medical Association of Thailand*, 84, 163-72.

Author Information

Zena A. M. Al-Jawadi

University of Mosul, College of Science, Department of Chemistry, Mosul, Iraq.

Contact e-mail: zena_aljawadi@uomosul.edu.iq

To cite this article:

Al-Jawadi, Z.A.M. (2021). Urinary stone in outdoor and indoor workers patients with family history. *The Eurasia Proceedings of Science, Technology, Engineering & Mathematics (EPSTEM)*, 16, 191-194.