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Knowledge, Attitudes And Practice Of Healthcare Professionals Regarding Nephrolithiasis In Coastal Karnataka.

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ABSTRACT

Renal stone disease is a crystal concretion within kidneys, the most increasing urological disorder. Calcium stones are the predominant type of kidney stones which constitutes about 80% of all renal calculi. Calcium oxalate stone formation is multifactorial. Aim of the study was to study the knowledge, attitude and practice regarding risk factors, symptoms of renal stones and its prevention. This Prospective Cross-sectional study was carried out in Adarsha Hospital, Udupi, Karnataka, India. 130 healthcare professionals including 82 nurses and 48 technicians were included in the study. Participants were interviewed using a pretested validated questionnaire. A self-administered questionnaire written in English was given to the participants. The content validation was carried out by peer academicians. The questionnaire was distributed to the participants by direct contact with them. Data were confirmed then coded and entered to a personal computer. It was observed that awareness of renal stone disease was better among technicians as compared to nurses. 93.8% of technicians opined that prevention of kidney stone disease (KSD) is not expensive as compared to nurses (84.15%). Awareness of risk factors for KSD among technicians and nurses, about hyperparathyroidism, Gout, recurrent UTI, chronic dehydration, Crohn's disease were 56.25% vs 45.2%, 70.83% vs 48.78%, 89.58% vs 78.05%, 85.42% vs 74.39%, 58.33% vs 50% respectively. Health professionals were not very much aware of the symptoms of KSD. Awareness of beneficial effect of dietary factors like orange, lemon juice, citrus fruits were 79.17% vs 75.61% respectively among technicians vs nurses. It can be concluded that there is lack of knowledge about the risk factors of renal stones, the symptoms of the renal stone disease, knowledge about the effect of diet on reducing complications of renal stones, knowledge, and attitude about practices that prevent kidney stones formation among healthcare professions. It is important to educate health care professionals as their role in bringing about awareness about the kidney stone disease among patients is crucial, which may in turn reduce the recurrence of renal stones.

Keywords: healthcare, nephrolithiasis, renal crystal, calcium stones.

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INTRODUCTION

Renal stone disease is a crystal concretion formed within the kidneys. It has been estimated that 12% of the world population is affected by urological disorder. It is estimated that at least 10% of the population in the industrialized part of the world is afflicted by urinary tract stone disease. Kidney stones are common in industrialized nations with an annual incidence of 0.5% to 1.9%. In India, upper and lower urinary tract stones occur frequently but the incidence shows wide regional variation. The incidence of renal calculi is comparatively low in the southern part of the country compared to other parts. It has been associated with an increased risk of end-stage renal failure.

Calcium stones are the predominant type of renal stones comprising about 80% of all urinary calculi. The proportion of calcium stones may account for calcium oxalate (50%), calcium phosphate (5%), and a mixture of both (45%) [1]. The main constituent of calcium stones is calcium hydrogen phosphate or hydroxyapatite [2,3]. Calcium oxalate is found in the majority of kidney stones and exists in the form of calcium oxalate monohydrate (COM) and calcium oxalate dihydrate (COD) or as a combination of both which accounts for greater than 60% [4]. COM is the most thermodynamically stable form of stone. COM is more frequently observed than COD in clinical stones [5].

Calcium oxalate stone formation is multifactorial and influenced by hypercalciuria, hyperuricosuria, hyperoxaluria, hypocitraturia, hypomagnesuria, and hypercystinuria [6]. Calcium oxalate stone formation is promoted by urinary pH 5-6.5 [7].

It is a recurrent condition and stone formers are much more likely to have a further stone. Sometimes the condition passes asymptotically; however, many patients had pain, urinary tract infection, hematuria or impairment of renal functions, which may require multiple hospital admissions or multiple surgical procedures [8].

Dakshina Kannada and Udupi are the districts situated at the coastal Karnataka, South India. The high incidence and prevalence of renal stone disease in coastal regions could be attributed to the effect of a certain diet peculiar to the coastal area with decreased calcium intake and high intake of animal protein (whether meat, fish or poultry) and oxalate. This results in enteric hyperoxaluria and an increased risk of calcium oxalate stone formation. Moreover, the lower urine volumes, due to the hot, humid and dry climate increased the risk of stone formation in coastal [9]. Fortunately, prevention of recurrent calculi is feasible and easily obtainable [10]. Most stone formers respond to changes in dietary habits and environmental factors.

Dietary factors remain an entity attributed to a kidney stone and thus renal stone becomes more of a 'lifestyle' disease relying more on prevention for its amelioration than advanced and specific treatment modalities [11,12]. Although there are various studies conducted in past to show the importance of dietary modification in a patient with a kidney stone, not many studies are available to the best of our knowledge which assesses the knowledge, attitude, and practice of healthcare professionals regarding etiopathogenesis and prevention of renal stone disease.

Objectives

To study the a. attitude and knowledge about the risk factors of renal stones b. knowledge about the symptoms of renal stones c. knowledge about the effect of diet on reducing complications of renal stones d. knowledge and attitude about practices that prevent kidney stones formation.

METHODS

Study design: Prospective Cross-sectional.

Study site: Collaborative study between KS Hegde Medical Academy, Nitte (Deemed to be University), Mangalore and Adarsha Hospital, Udupi, Karnataka, India.

Inclusion Criteria

130 healthcare professionals including 82 nurses and 48 technicians in the age group of 29.5 ± 7.8 years and 25.7 ± 6.4 years respectively were included in the study. Informed consent was obtained and institutional ethics committee approval was sought.

Exclusion Criteria

Health professionals who were not interested to participate in the study.

Data collection

Participants were interviewed using a pretested validated questionnaire. A self-administered questionnaire written in English was given to the participants. The content validation was carried out by peer academicians.

The questionnaire included closed-ended questions related to the following:

- Attitude and knowledge about the risk factors of renal stones
- Knowledge about the symptoms of renal stones
- Knowledge about the effect of diet on reducing complications of renal stones.
- Knowledge and attitude about practices that prevent kidney stones formation

The questionnaire was distributed to the participants by direct contact with them. Data were confirmed then coded and entered to a personal computer. Thanks and appreciations were used to inspire the participants to be involved in the study.

The questionnaire format is as given below;

A. socio-demographic data of the respondents

Age
Gender
Marital status
Educational status



B. Attitude and knowledge about the risk factors of renal stones in the respondents

1	Kidney stone prevention is expensive	Agree	Disagree
2	There is a need to make efforts to prevent kidney stone		
3	working in a hot condition/under sun lead to Kidney stone disease		
4	Which of the following do you think will increase the risk factor and complication of kidney stones?		
I	Hyperparathyroidism		
II	Gout		
III	Recurrent urinary tract infections		
IV	Chronic dehydration		
V	Prolonged catheterization		
VI	Hypertension		
VII	Diabetes mellitus		
VIII	Crohn's disease		



C. Knowledge about the symptoms of renal stones.

		Agree	Disagree
5	Which do you think is a symptom of kidney stone		
I	Urination more often than usual		
li	Urinate small amount		
lii	Persist need for urinate		
lv	Fever and chills		
v	Nausea and vomiting		
6	What you consider urine color with kidney stones?		
I	Brown		
li	Pink, red		
lii	Not affected		
7	What you consider urine odor with kidney stones?		
I	Cloudy urine		
li	Foul		
lii	No Smell		



8	Where do you think the location of pain during kidney stone		
I	Pain during urination		
li	Severe pain in the side and back, below the ribs		
lii	Pain in urination		
Iv	Pain that comes in waves and fluctuates		
V	Pain that radiates to the lower abdomen and groin		

D. knowledge about the effect of diet on reducing complications of renal stones.

9. Is it unlikely that a certain diet could prevent kidney stone development			
Yes			
No			
10. Do you think that consuming more, the same amount or less of these foods would help to reduce complications of kidney stones			
		Agree	Disagree
i	Vegetables		
ii	Fruits		
iii	Sugary food		
iv	Fish and seafood		
V	Meat		



vi	Greens		
vii	Nuts		
viii	Water		
ix	Fatty food		
x	Dark chocolate		
xi	Spinach		
xii	Salty food		
E. 11. knowledge and attitude about practices that prevent kidney stones formation			
		Agree	Disagree
I	Calcium restriction		
li	Drink plenty of fluid in hot weather		
lii	The use of ventilation and replace lost fluids if the business for a long time in hot areas such as kitchen and oven		
lv	Drinking a large amount of fluid in fever and severe diarrhea		
v	Taking adequate amounts of fluids with and between meals		
	Decrease drinking cola beverage such as Pepsi cola coca cola		



Vi			
Vii	Decrease stimulants drinking such as tea, coffee and cocoa		
Viii	Increase juices intake like orange juice, lemon juice citrus		
Ix	Checking the amount of urine output which must not be less than (2.5) liter/24 hours		
X	Do you think holding urine in the bladder will cause renal stone disease		

Sample Size Calculation- By extracting the information of prevalence of renal stone disease in India on an average to be 9.0%, derived from various studies published, we would require a sample size of 100 patients to design a study with 4% absolute precision and 95% confidence.

Statistical Analysis

Data were entered in Microsoft Excel and analyzed by descriptive statistics. The results were reported as frequencies and percentages for categorical variables.

RESULTS

On analyzing the responses of our participants, it was observed that awareness of renal stone disease was better among technicians as compared to nurses.93.8% of technicians opined that prevention of kidney stone disease (KSD) is not expensive as compared to nurses (84.15%). All technicians agreed that there is a need to prevent KSD whereas 75.61% nurses opined the same. Only 43.7% of technicians and 51.2% of nurses were aware that working in hot conditions can cause KSD.Awareness of risk factors for KSD among technicians and nurses,about hyperparathyroidism, Gout, recurrent UTI, chronic dehydration,Crohn’s disease were 56.25% vs 45.2%, 70.83% vs 48.78%, 89.58% vs 78.05%, 85.42% vs 74.39%,58.33% vs 50% respectively.Health professionals were not very much aware of the symptoms of KSD. Symptoms like increased frequency of urination, small urine, persistent need for urination were appreciated by 39.6% vs 31.71%,68.75% vs 68.29%, 54.17% vs 51.22% of technicians versus nurses respectively. They were aware that fever & chills, nausea & vomiting as symptoms of KSD (93.75% vs 95.82% and 91.67% vs 89.02%) respectively. Color and odor of urine, the location of pain in KSD were not better appreciated by the participants. Majority of them (72.92% vs 62.2% of technicians vs nurses) thought that it is unlikely that KSD development could be prevented by dietary patterns. Knowledge and attitudes regarding practices to prevent KSD like calcium restriction, drinking more water in hot weather, fever & diarrhea,restriction of coca cola and Pepsi , tea,coffee etc, were 64.58% vs 81.71%, 66.67% vs 67.07%, 79.17% vs 84.15%, 50% vs 69.51%, 50% vs 62.2% respectively among technicians vs nurses. Awareness of beneficial effect of orange, lemon juice, citrus fruits were 79.17% vs 75.61% respectively among technicians vs nurses. The number and percentage of participants responded to the questionnaire are represented in Tables 1 and 2 for technicians and nurses respectively.

Table 1: Assessment of Knowledge, Attitude, And Practice – Technicians

Quest No	Number of participants (n=48)			Percentage of Participants Responded(%)		
	Agree	Disagree	Not attempted	Agree (%)	Disagree(%)	Not attempted(%)
1	2	45	1	4.17	93.8	2.08
2	48	0	0	100.00	0.0	0.00
3	19	27	2	39.58	56.3	4.17
4i	27	17	4	56.25	35.4	8.33
ii	34	6	8	70.83	12.5	16.67
iii	43	5	1	89.58	10.4	2.08
iv	41	5	2	85.42	10.4	4.17
v	26	19	3	54.17	39.6	6.25
vi	16	31	1	33.33	64.6	2.08
vii	17	26	5	35.42	54.2	10.42
viii	28	19	1	58.33	39.6	2.08
5i	18	29	1	37.50	60.4	2.08
ii	33	15		68.75	31.3	0.00



			0			
iii	26	19	3	54.17	39.6	6.25
iv	45	2	1	93.75	4.2	2.08
v	44	4	0	91.67	8.3	0.00
6i	27	18	3	56.25	37.5	6.25
ii	34	11	3	70.83	22.9	6.25
iii	6	37	5	12.50	77.1	10.42
7i	42	2	4	87.50	4.2	8.33
ii	26	17	5	54.17	35.4	10.42
iii	9	33	6	18.75	68.8	12.50
8i	40	5	3	83.33	10.4	6.25
ii	36	11	1	75.00	22.9	2.08
iii	41	5	2	85.42	10.4	4.17
iv	33	12	3	68.75	25.0	6.25
v	45	0	3	93.75	0.0	6.25
9	35	1	12	72.92	2.1	25.00
10i	38	8	2	79.17	16.7	4.17
ii	38	7	3	79.17	14.6	6.25
iii	15	26	7	31.25	54.2	14.58
iv	17	26	5	35.42	54.2	10.42
v	19	27	5	39.58	56.3	10.42
vi	34	9	5	70.83	18.8	10.42
vii	16	27	5	33.33	56.3	10.42
viii	37	8	3	77.08	16.7	6.25
ix	7	36	5	14.58	75.0	10.42
x	9	34	5	18.75	70.8	10.42
xi	26	17	5	54.17	35.4	10.42
xii	27	10	11	56.25	20.8	22.92
11i	31	9	8	64.58	18.8	16.67
ii	32	13	3	66.67	27.1	6.25
iii	38	6	4	79.17	12.5	8.33
iv	38	7	3	79.17	14.6	6.25
v	41	4	3	85.42	8.3	6.25
vi	24	20	4	50.00	41.7	8.33
vii	24	19	5	50.00	39.6	10.42
viii	38	6	4	79.17	12.5	8.33

ix	39	4	5	81.25	8.3	10.42
x	28	14	6	58.33	29.2	12.50

Table 2: Assessment of Knowledge, Attitude, And Practice – Nurses

Quest No	Number of participants (n=82)			Percentage of Participants(%)		
	Agree	Disagree	Not attempted	Agree(%)	Disagree(%)	Not attempted(%)
1	9	69	4	10.98	84.15	4.88
2	62	19	1	75.61	23.17	1.22
3	40	40	2	48.78	48.78	2.44
4i	37	37	8	45.12	45.12	9.76
ii	40	32	10	48.78	39.02	12.20
iii	64	15	3	78.05	18.29	3.66
iv	61	15	6	74.39	18.29	7.32
v	29	45	8	35.37	54.88	9.76
vi	23	55	4	28.05	67.07	4.88
vii	22	55	5	26.83	67.07	6.10
viii	41	35	6	50.00	42.68	7.32
5i	23	56	3	28.05	68.29	3.66
ii	56	21	5	68.29	25.61	6.10
iii	42	33	7	51.22	40.24	8.54
iv	78	3	1	95.12	3.66	1.22
v	73	8	1	89.02	9.76	1.22
6i	31	36	15	37.80	43.90	18.29
ii	51	25	6	62.20	30.49	7.32
iii	6	54	22	7.32	65.85	26.83
7i	67	7	8	81.71	8.54	9.76
ii	19	40	23	23.17	48.78	28.05
iii	8	52	22	9.76	63.41	26.83
8i	59	17	6	71.95	20.73	7.32
ii	61	17	4	74.39	20.73	4.88
iii	39	26	17	47.56	31.71	20.73
iv	37	39	6	45.12	47.56	7.32
v	72	4	6	87.80	4.88	7.32
9	51	0	31	62.20	0.00	37.80
10i	46	32	4	56.10	39.02	4.88
ii	39	39	4	47.56	47.56	4.88

iii	17	58	7	20.73	70.73	8.54
iv	22	58	2	26.83	70.73	2.44
v	24	56	2	29.27	68.29	2.44
vi	56	25	1	68.29	30.49	1.22
vii	37	39	6	45.12	47.56	7.32
viii	60	21	1	73.17	25.61	1.22
ix	22	58	2	26.83	70.73	2.44
x	15	65	2	18.29	79.27	2.44
xi	36	43	3	43.90	52.44	3.66
xii	32	34	16	39.02	41.46	19.51
11i	67	14	1	81.71	17.07	1.22
ii	55	26	1	67.07	31.71	1.22
iii	47	34	1	57.32	41.46	1.22
iv	69	11	2	84.15	13.41	2.44
v	61	20	1	74.39	24.39	1.22
vi	57	24	1	69.51	29.27	1.22
vii	51	29	2	62.20	35.37	2.44
viii	62	17	3	75.61	20.73	3.66
ix	64	17	1	78.05	20.73	1.22
x	62	19	1	75.61	23.17	1.22

DISCUSSION

Most respondents (93.75% technicians and 84.1% nurses) in this study agreed that prevention of renal stones is not expensive. Majority of nurses (75.6%) and all technicians opined that there is a need to make efforts to prevent renal stones. However 23.17% nurses had a false concept that there is no need to make any efforts to prevent renal stones and this misconception has to be changed by health education, as the average rate of stone recurrence for patients is seven during a lifetime, which can be economically and practically prevented[13].

Medical conditions that may increase the risk of development of kidney stones or affect their clinical outcome included: primary hyperparathyroidism, gout, diabetes mellitus, inflammatory bowel disease [14,15], hypertension [16], chronic dehydration [17], and prolonged catheterization with recurrent urinary tract infections [18]. In our study, respondents were able to identify correctly some of the risk factors of renal stones, particularly recurrent urinary tract infections (89.58% of technicians and 78% of nurses) and chronic dehydration (85.4% of technicians and 74.39% of nurses).Technicians had a better awareness regarding the risk factors like hyperparathyroidism, gout, prolonged catheterization , hypertension, diabetes mellitus, Crohn’s disease (56.25%,70.83%, 54.16%, 33.3%, 35.4% and 58.3% respectively) as compared to nurses (45.12%,48.78%,35.36%,28%, 26.82% and 50% respectively). Knowledge about these predisposing conditions can direct the individuals at risk to take measures, which could prevent the occurrence of renal stones such as adopting changes in their diet and controlling their medical conditions.

Typical symptoms of renal stones are acute renal colic (intermittent colic in the flanks that may radiate to lower abdomen or groin) often associated with nausea and vomiting [14]. Dysuria, urgency, and frequency may occur when the stone passes into the ureter. Other symptoms included fever and chills, blood

in urine and foul odor [15]. Majority of the respondents identified fever with chills, nausea, and vomiting as symptoms of renal stone disease (93.75%, 91.67% of technicians and 95.12%, 89% of nurses respectively).

The respondents displayed lack of knowledge about some symptoms (such as urine color and odor or urge to urinate frequently), while the characters of renal pain were better recognized. 87.5% of technicians and 81.7% of nurses agreed that urine may have a foul smell. Technicians had a better knowledge regarding localization of pain; 83.3% of them felt that patient experiences pain during urination as compared to 71.95% of nurses. Awareness regarding nature and fluctuation in the pain pattern was not well appreciated by both the groups 68.75% and 47.56%.

Beneficial dietary patterns which prevent recurrent renal stone formation include: increased intake of fluids [16], vegetables [17] and citrus fruit (orange juice and home-made lemonade); decreasing animal protein, sodium, oxalate (avoidance of spinach, tea, nuts), refined sugars; and optimizing dietary calcium intake [18,19]. Dietary calcium restriction can increase the risk of stone formation and lead to bone demineralization [20]. In the present study, most respondents agreed that a certain diet could prevent the formation of renal stones; 56.1% and 47.56% of nurses were aware of the beneficial effect of vegetables and fruits as compared to a better awareness in technicians, both 79.17%. Knowledge regarding avoidance of fatty food, dark chocolate, spinach, and salty food was limited to 26.83%, 18.75%, 43.9% and 39% respectively of nurses and 14.58%, 18.75%, 54.17%, and 54.75% respectively of technicians.

The limitation in the awareness of dietary patterns among health professionals raises concerns about the adequacy and efficiency of health education delivered to those patients by them. The respondents appeared to have misconceptions about fish and seafood, greens, and spinach. Apparently, the role of excess intake of animal protein and oxalate intake in the development of renal stones is not clear to non-medical subjects. A survey about renal stone disease by Chan et al. in Hong Kong, reported that only 9% of their respondents stated that salty food should be decreased and less than 3% picked other relevant items (meat, nuts, and spinach), whilst 66% had no idea of dietary influence on renal stone disease [21]. In this study, the majority of respondents agreed to the practices that ensure prevention of renal stone disease included adequate intake of water (drinking plenty of fluid in hot weather, before sleep or at wake up, in case of fever or severe diarrhea), replacing lost fluids, increasing intake of cranberry juice and decreasing intake of cola beverages and stimulants. Most of the respondents in our study stated that the renal physician should be consulted if they had renal stones. On the other hand, Chan et al. found that 48% chose urologists to be consulted but 43% chose either internal medicine or renal physician [21].

Despite the high educational level of most respondents, some misconceptions appeared about the risk factors of renal stones (particularly hyperparathyroidism and Crohn's disease) and their symptoms (urine color and odor etc). There was a lack of sufficient knowledge about the role of diet in the medical management of renal stones. There is a need for educational programs for renal stone disease, focusing on these points of gaps in knowledge and attitude. It is recommended that health information concerning renal stone disease can be delivered through the Internet and ensuring the inclusion of this information in the routing instructions and health education of health professionals.

CONCLUSION

It is evident from our study that there is lack of knowledge about the risk factors of renal stones, the symptoms of the renal stone disease, knowledge about the effect of diet on reducing complications of renal stones, knowledge, and attitude about practices that prevent kidney stones formation among healthcare professions. Role of health-care professionals is very important as they may serve as resources in bringing about awareness about the kidney stone disease among patients, which may reduce the recurrence of renal stones. They may educate patients and also public regarding healthy dietary patterns to be followed to minimize the risk of renal stone disease. The motivation and education of individual patients in clinical settings, education of the public, and providing patients with dietary assessments and counseling can be effectively brought about health care professionals. Hence there is a need to educate health care professionals in our settings so that their role can be well appreciated.

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