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A Study on Epidemiological Risk Factors Associated with Nephrolithiasis with Special Emphasis on Diet

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Abstract

Background: Nephrolithiasis is a solid aggregation of crystals formed in the kidneys by dietary minerals in the urine. The sequence of events triggering stone formation are nucleation, growth, aggregation, and retention. Nephrolithiasis is caused by a wide variety of risk factors. Though risk factors have no direct cause of the disease, they are associated with it in some way or the other. Medical presentation, clinical history and laboratory tests help assess the immediate need for surgical/medical care.

Objective: To study the epidemiological risk factors as well as the dietary risk factors associated with Nephrolithiasis and to establish the prevention strategies for Nephrolithiasis.

Methodology: A prospective, observational study involving analysis of Inpatients and Outpatients of Urology department of Medicover Hospital, Hyderabad, India diagnosed with Nephrolithiasis and other Comorbid conditions using patient data collection form for a study period of 6 months.

Results: A total of 160 cases of Nephrolithiasis were observed. Majority of the cases were males (74%) compared to females (26%). Most of them were between the age group of 41-50 years (29%). Hypertension (24%) and Diabetes Mellitus (24%) were most common comorbidities. Stone size between 11-15 mm (42%) and present in right kidney (48%) were prevalent. Back pain (88%) was the most common symptom. Our analysis shows that (11%) are vegetarian, tomato (86%), spinach (77%) are the frequently consumed vegetables and (89%) are non-vegetarian, chicken (72%) and mutton (49%) are the most frequently consumed foods.

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Conclusion: Nephrolithiasis management can be done by raising awareness on lifestyle and by combining dietary and medical therapy to prevent stone, the risk of stone recurrence can be significantly reduced. Based on the outcome of this study, patients were advised to avoid the risk factors that could lead to stone development and educated them to change their lifestyle.

Keywords: *Nephrolithiasis, Intravenous Pyelography, Acetohydroxamic Acid, Tiopronin, Percutaneous Nephrolithotomy.*

Introduction

Nephrolithiasis is a solid crystal aggregation formed in the kidneys from dietary minerals in the urine (Shamsuddeen *et al*., 2013). It is induced due to a disturbance in the correspondence between the solubility and the precipitation of salts in the kidneys and the urinary tract (Han *et al*., 2015). Majorly two reasons may be responsible for kidney stones, the rise in obesity, high blood pressure, metabolic syndrome and diabetes being the primary reason and climate change being the secondary (Johnson *et al*., 2018).

Humanity has suffered from kidney stones, since 4000 B.C (Han *et al*., 2015). Kidney stones have become pandemic (Shadman *et al*., 2017) and are a significant cause of morbidity within the urinary tract disorders (Bushinsky, 1998).

Epidemiology

Renal stones are more common in males between 20-49 years of age than in females (Alelign *et al*., 2018). The lifetime prevalence of symptomatic nephrolithiasis is approximately 10% of adult males and 5% for adult females, and more than $2 billion per year is spent on treatment (Taylor *et al*., 2007).

Types of Kidney Stones

Approximately 75% of urinary calculus is based on calcium, 80% of which is calcium oxalate and 20% is calcium phosphate (Shadman *et al*., 2017). Of the rest, 10% are uric acid stones, 10% are struvite stones and less than 1% are cystines or are classified as stones caused by drugs (Han *et al*., 2015).

Pathophysiology

Nephrolithiasis's pathophysiology is complex and involves a mixture of metabolic, genetic, and environmental factors (Shadman *et al*., 2017) resulting from the growth of crystal leads to the formation of stone (Jayaraman *et al*., 2018).

Crystals or foreign bodies acting as nidi on which microscopic crystalline structures are created by supersaturated urine ions. The resulting calculation results in symptoms as they are impacted

within the ureter as they pass towards the urinary bladder (Dave, 2018). The series of events causing stone-formation can be divided into four stages that are as follows:

STAGE I: Crystal Nucleation
STAGE II: Crystal Growth
STAGE III: Crystal Aggregation
STAGE IV: Crystal Retention

Risk Factors (Han *et al*., 2015; Alelign *et al*., 2018; Shafiya *et al*., 2019; Barnela *et al*., 2012)

Lifestyle Habits & Dietary Factors

- Excessive intake of Animal Protein such as Chicken, Meat, Fish etc.
- Excessive intake of Sodium such as Salt etc.
- Excessive intake of Oxalate such as Spinach, Coffee, Tomato, Sweet potato, Cashew Nuts, Beets, Dried figs etc.
- Chelating Agents deficiencies such as Citrate, Fibre, Alkali foods etc.
- Potassium & Citrate.

Genetic Disorders

- A Family history of Nephrolithiasis.
- Renal Tubular Acidosis.
- Cystinuria.
- Hyperoxaluria.
- Hypomagnesemia.
- Hypercalciuria.
- Nephrocalcinosis

Metabolic Disorders

- Obesity
- Gout
- Hyperoxaluria
- Hypercalciuria
- Hyperuricosuria
- Hypocitraturia

Anatomical Abnormalities

- Medullary Sponge Kidney
- Solitary Kidney
- Horseshoe Kidney
- Polycystic Renal Disease

Low Urine Volume

- Dehydration
- Inadequate Water Intake

Systemic Diseases

- Inflammatory Bowel Disease

Lithogenic Drugs

- Uricosuric Agents
- Indinavir
- Sulfadiazine
- Triamterene

Climate

- Heat
- Water Loss
- Sweating

Others

- Hypertension
- Diabetes Mellitus
- Obesity

Clinical Manifestations (Shamsuddeen *et al*., 2013; Shafiya *et al*., 2019)

- Abdominal Pain
- Back Pain
- Hematuria (Blood in urine)
- Urinary Urgency
- Burning Sensation in Urine
- Dark Coloured Urine
- Fever
- Nausea
- Vomiting

Diagnosis (Shafiya *et al*., 2019; Shadman *et al*., 2017; Portis *et al*., 2001)

- Computed Tomography (CT) Scan
- Ultrasound
- Kidney, Ureter and Bladder (KUB) X-Ray / Plain Film Radiography
- Intravenous Pyelography (IVP)

Treatment

Nephrolithiasis treatment needs to be personalised. Medical appearance, clinical presentation, clinical history and laboratory results help to assess the immediate need for surgical or medical treatment (Barnela *et al*., 2012).

Non-Pharmacological Treatment (Shafiya *et al*., 2019; Gul *et al*., 2014; Barnela *et al*., 2012; Madani., 2020)

Hydration

Urine production is decreased for low fluid intake, which increases the likelihood of stone formation. Present recommendations include consuming adequate fluids for producing at least 2.5 litres of urine every day. Tomato, Cranberry and Grapefruit Juices are the only beverages that are needed to avoid because they are rich in oxalate.

Calcium

Evidence has shown that insufficient calcium in the diet significantly raises the possibility of developing kidney stones. For a low calcium intake, the digestive tract requires insufficient calcium to bind to oxalate, resulting in an increase in the absorption of oxalate and its excretion in the urine.

Oxalate

High levels of oxalate have been associated with an increase in the oxalate levels in the urine. Recommended method to reduce the intake of oxalate is by monitoring the consumption of certain foods like spinach, tomato, onions, sweet potatoes, nuts, coffee, soybean etc.

Citric Acid

Stone production is prevented by the consumption of fruit juices because it increases urine volume as well as it is rich in potassium and citric acid. These two processes avoid the forming of stone. Citrate binds primarily to urinary calcium and reduces water supersaturation. It also binds crystals of calcium oxalate, which prevents the growth of crystals.

Vitamins

Vitamin C, which is found in supplements, improves the levels of Urine Oxalate, as metabolism of Ascorbic Acid to Oxalate takes place. In comparison, Vitamin B-6 (pyridoxine) can reduce oxalate in the urine. Vitamin C raises the concentration of urine oxalate at super doses present in supplements since ascorbic acid is metabolized to oxalate.

Pharmacological Treatment

Potassium Citrate

Treatment with Potassium Citrate induces a substantial increase in the levels of Potassium, Urinary Citrate and pH, resulting in substantially decreased production of Renal Stones (Gul *et al*., 2014). Potassium Citrate therapy appears to improve urinary citrate mainly by adjusting the handling of the renal citrate, rather than by raising the filtered dose of the citrate. Potassium citrate induces changes in urine, thereby making the urine less resistant to crystal and salt stone growth. Higher levels of citrate in the urine can cause calcium teeth, which decreases the

activity of calcium ions and the chance of formation of calcium phosphate crystals (Drug Bank., 2015).

Thiazide Diuretics

They act by inhibiting the cotransporter NaCl in the distal convoluted tubule and increasing calcium reabsorption thereby reducing sodium reabsorption (Gul *et al*., 2014; Katzung *et al*., 2012). It encourages the depletion of sodium (Shanbhag *et al*., 2017), body water and also prevents ion transport of sodium through the renal tubular epithelium by cleaving to a thiazide-sensitive sodium chloride conveyor. It contributes to increased potassium excretion through the sodium-potassium exchange system (Katzung *et al*., 2012).

Allopurinol

Allopurinol is a structural analogue of the hypoxanthine, the natural base of purine (Drug Bank., 2005). It was synthesised for cancer chemotherapy as a purine antimetabolite (Tripathi., 2013). Allopurinol inhibits the production of uric acid by acting as a competitive xanthine oxidase inhibitor, an enzyme that converts xanthine to uric acid (Gul *et al*., 2014). It reduces the levels of uric acid in a dose-dependent manner (Wells *et al*., 2015). The consequence is a decline in the amount of plasma urate and a decrease in the total urate burden which results in decreased uric acid concentrations in the serum and urine (Katzung *et al*., 2012).

Antibiotics

To prevent infections and to treat severe complications caused by Nephrolithiasis, certain antibiotics are given. These medications (Ampicillin, Gentamycin, Acetohydroxamic acid and Fluoroquinolones such as Ciprofloxacin, Levofloxacin, Ofloxacin) are those used in the emergency room and ambulatory treatment (Dave., 2018).

Surgical Treatment

Extracorporeal Shockwave Lithotripsy

Extracorporeal shockwave lithotripsy (ESWL) is a non-surgical technique which uses shock waves to smash the renal stones into small pieces (Han *et al*., 2015). The kidney stones will be small enough to pass out of the body through urine after the treatment (Persad., 2019). When the force of a shock wave overcomes a stone's tensile strength, it is broken. It loses very little energy as a shock wave moves through a medium (water) until it passes through a channel with a distinct density. When the channel is dense, compressive forces are produced. Likewise, if the channel is less dense, in the first medium tensile stress is generated. On hitting a stone, compressive forces are induced by the density change, causing fragmentation. As the wave travels through the stone to the rear surface, the change of density from high to low represents

the shock wave's strength, creating tensile forces that break and fracture the stone again (Grasso., 2018).

Ureteroscopy

It is a technique in which a small scope (Ureteroscope) is inserted into the ureter (National Kidney Foundation., 2019) and used to detect stones. Rigid telescopes are used for stones in the lower part of ureter or bladder. Flexible telescopes are used to diagnose stones in the upper ureter and the kidneys. If the stone is found, a special tiny laser fibre is used to split the stone into very fine fragments, which are then left to pass naturally, or if sufficiently large, then removed with tiny baskets inserted through the frame (Ilango *et al*., 2015). It is an ambulatory operation, with or without a stent. At the end of the operation, the stent is placed which is a tiny rigid plastic tube helping to keep the ureter open so that the urine could flow from the kidneys into the bladder. Ureteroscopy is normally done under general anaesthesia and generally takes from one to three hours to complete. The stent is inserted because after the instrumentation the ureter is swelled, and after surgery, the swelling could obstruct the kidney (Broward Urology Centre., 2019).

Percutaneous Nephrolithotomy

Percutaneous Nephrolithotomy is a treatment for removing kidney stones from the body when they are unable to pass through urine on their own. A scope is put into the back through a small incision only large enough for a Nephroscope to pass through the hollow core of the kidney where the stone is found. The goal of this procedure is to go straight from the epidermis to the kidney, bypassing the bladder and ureter. (Broward Urology Centre., 2019). PCNL is the best treatment option for big stones because a tool that passes through the nephroscope fractures the stone and suctions the fragments. It normally takes three to four hours to complete the process. Following this treatment, a catheter is inserted into the kidney to empty the urine into a bag outside the body, preventing bleeding.

Aims & Objective

- To study the epidemiological risk factors associated with Nephrolithiasis
- To study the dietary risk factors associated with Nephrolithiasis
- To establish the prevention strategies for Nephrolithiasis

Materials and Methods

Study Design

- The study is prospective, observational study.

Source of Data and Materials

- Patient Consent Form.
- Patient Data Collection Form.
- Patient Questionnaire.
- Patient Educational Leaflet.

Inclusion Criteria

- Inpatients and Outpatients of Urology department diagnosed with Nephrolithiasis and other Comorbid conditions.

Exclusion Criteria

- Patients who are not willing to give consent.

Method of Data Collection

- Case Sheet.
- Patient Questionnaire / Interview.

Study Procedure

This is a prospective observational study in which patients who are eligible are included after obtaining their consent. A questionnaire and a data collection form are used. This form primarily comprises the patient's demographic information as well as a medication chart. In addition, a booklet is developed and distributed to the patient to inform them of the disease's outcomes. The research was carried out at the MEDICOVER hospital in Hyderabad, India. From the moment of admission to the time of release, all data relevant to the study will be collected, and the data will be analysed using a suitable statistical method.

Result

Table 1: Distribution of the study population on the basis of gender

Gender	No. of Patients
Male	118 (74%)
Female	42 (26%)

Table 2: Distribution of the study population on the basis of age

Age Group	No. of Patients
<10 years	3 (2%)
11-20 years	9 (6%)
21-30 years	20 (12%)
31-40 years	39 (24%)
41-50 years	46 (29%)
51-60 years	24 (15%)
61-70 years	14 (9%)
> 70 years	5 (3%)

Table 3.1: Distribution of cases based on the socio-economic data

Socio-Economic Data	No. of Patients
Upper Class	32 (20%)
Middle Class	50 (31%)
Lower Class	78 (49%)

Table 3.2: Distribution of cases based on personal habits of the patient

Personal Habits	No. of Patients
Smoking	28 (18%)
Alcohol	26 (16%)
Pan	6 (4%)
Pan Masala	4 (3%)

Table 4: Cases distribution based on the marital status of the patient

Marital Status	No. of Patients
Married	122 (76%)
Unmarried	38 (24%)

Table 5: Distribution of cases based on the level of education of the patient

Level of Education	No. of Patients
Primary Education	54 (34%)
Secondary Education	14 (9%)
Graduate	24 (15%)
Illiterate	68 (42%)

Table 6: Disposition of the cases related to the residential area of the patients

Area of Residency	No. of Patients
Urban Region	62 (39%)
Rural Region	98 (61%)

Table 7: Distribution of cases based on their occupation

Occupation	No. of Patients
Unemployed	48 (30%)
Employed	89 (56%)
Self Employed	23 (14%)

Table 8: The prevalence of nephrolithiasis pertaining to the body mass index (BMI) of the patient

Body Mass Index (BMI)	No. of Patients
Underweight	11 (7%)
Normal Weight	82 (51%)
Overweight	61 (38%)
Obese	6 (4%)

Table 9: The prevalence of nephrolithiasis according to the pre-existing comorbidities

Pre-Existing Comorbidities	No. of Patients
Hypertension	39 (24%)
Diabetes Mellitus	38 (24%)
Seizures	9 (6%)
Thyroid Disorders	10 (6%)
Chronic Kidney Disease	11 (7%)
Gastric Ulcers	3 (2%)

Table 10: Case disposition related to the surgical history of the patients with Nephrolithiasis

Surgical History	No. of Patients
Percutaneous Transluminal Coronary Angioplasty (PTCA)	3 (2%)
Hernioplasty	4 (3%)
Coronary Angiography (CAG)	6 (4%)
Double J Stent (DJS)	11 (7%)
Lower Segment Cesarian Section (LSCS)	2 (1%)
Ureteroscopic Lithotripsy (URSL)	13 (8%)
Percutaneous Nephrolithotomy (PCNL)	9 (6%)
Appendectomy	4 (3%)
Renal Transplant	2 (1%)

Table 11: Distribution of cases based on the medications received by the patients for the treatment of Nephrolithiasis

Medication	No. of Patients
Pantoprazole	100 (63%)
Ondansetron	106 (66%)
Ceftriaxone	102 (64%)
Paracetamol	28 (18%)
Cefoperazone + Sulbactam	26 (29%)
Metronidazole	8 (5%)
Acetaminophen	16 (10%)
Tramadol	100 (63%)
Ranitidine	42 (26%)
Furosemide	14 (9%)
Amikacin	10 (6%)
Metoprolol	8 (5%)
Ketorolac	8 (5%)
Amoxicillin	6 (4%)

Table 12.1: Distribution of cases pertaining to the family history of renal stones

Family History	No. of Patients
Parents	8 (5%)
Siblings	5 (3%)
Grandparents	6 (4%)

Table 12.2: Cases distribution based on the past history of stones

Previously had Stones	No. of Patients
Yes	52 (32%)
No	108 (68%)

Table 12.3: Disposition of cases pertaining to the sources of drinking water

Sources of Drinking Water	No. of Patients
Ground Water	55 (34%)
Filtered Water	57 (36%)
Municipal Water	32 (20%)
Mineral Water	16 (10%)

Table 12.4: Distribution of cases based on the quantity of drinking water (in litres)

Quantity of Drinking Water	No. of Patients
1 - 2 litres/day	46 (29%)
3 - 4 litres/day	82 (51%)
4 - 6 litres/day	29 (18%)
> 6 litres/day	3 (2%)

Table 12.5: Distribution of cases based on the frequency of passing urine

Frequency of Passing Urine	No. of Patients
2 - 3 times/day	17 (10%)
3 - 4 times/day	66 (41%)
4 - 6 times/day	52 (33%)
> 7 times/day	25 (16%)

Table 12.6: Distribution of cases based on the colour of urine

Colour of Urine	No. of Patients
Colourless / Pale Yellow	111 (69%)
Yellow	44 (28%)
Red / Pink	3 (2%)
Orange	2 (1%)

Table 12.7: Distribution of cases based on the location of stone

Location of Stone	No. of Patients
Left Kidney	64 (40%)
Right Kidney	77 (48%)
Bilateral Kidneys	6 (4%)
Urinary Bladder	1 (1%)
Ureter	12 (7%)

Table 12.8: Distribution of cases based on the signs and symptoms

Symptoms	No. of Patients
Abdominal Pain	129 (81%)
Back Pain	141 (88%)
Burning Sensation of Urine	16 (10%)
Urinary Urgency	5 (3%)
Stress	21 (13%)
Hematuria	3 (2%)
Nausea/Vomiting	28 (18%)
Fever/Chills	17 (11%)
Increased Sweating	34 (21%)
Weight Reduction	15 (9%)

Table 12.9: Distribution of cases based on the size of stone

Size of Stone	No. of Patients
1 - 5 mm	4 (2%)
6 - 10 mm	57 (36%)
11 - 15 mm	68 (43%)
16 - 20 mm	24 (15%)
21 - 25 mm	4 (2%)
26 - 30 mm	2 (1%)
31 - 35 mm	1 (1%)

Table 12.10: Distribution of cases based on the living environment

Living Environment	No. of Patients
Air Conditioner	15 (9%)
Cooler	21 (13%)
Fan	102 (64%)
Normal Temperature	5 (3%)
Outdoors	17 (11%)

Table 12.11: Distribution of cases based on the usage of NSAID'S

Usage of NSAID's	No. of Patients
Yes	22 (14%)
No	138 (86%)

Table 13.1: Distribution of cases based on the dietary habits of the patient

Dietary Habits	No. of Patients
Vegetarian	17 (11%)
Non-Vegetarian	143 (89%)

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Table 13.2: Distribution of cases based on the foods taken by the patient

Foods	No. of Patients
Spinach	124 (77%)
Dried Figs	18 (11%)
Nuts	131 (82%)
Cashew Nuts	5 (3%)
Soybean	29 (11%)
Chocolate	16 (10%)
Sweets	35 (22%)
Beets	10 (6%)
Tomato	138 (86%)
Sweet Potato	12 (7%)
Instant Noodles	4 (2%)
Paneer	7 (4%)
Processed/Junk Foods	9 (6%)
Pickles	32 (20%)
Cocoa	8 (5%)
Chicken	116 (72%)
Fish	62 (39%)
Mutton	79 (49%)
Beef	21 (13%)

Table 13.3: Distribution of cases based on the beverages taken by the patients

Beverage	No. of Patients
Cola	22 (14%)
Milk	49 (31%)
Soda	11 (7%)
Tea	145 (91%)
Coffee	19 (12%)
Flavoured Drinks	2 (1%)
Powdered Drugs	4 (2%)

Table 13.4: Distribution of cases based on the salt quantity taken by the patients

Salt Quantity	No. of Patients
Low	32 (20%)
Medium	114 (71%)
High	14 (9%)

Table 13.5: Distribution of cases based on the restaurant food eaten by the patient

Restaurant Foods in a month	No. of Patients
1 time	129 (80%)
2 - 3 times	22 (14%)
> 4 times	9 (6%)

Discussion

In this research, we noticed that the majority of cases were in males 118 (74%) and the remaining 42 (26%) in females, similar data were obtained in the Tamil Nadu district of Vellore where a clinical study was performed in 130 patients out of which (57.2%) were males and (28.6%) were females (Sunitha *et al*., 2018).

By studying nephrolithiasis, we found that the majority of patients were reported by the age group between 41-50 years of age 46 (29%), the average between 51-60 years of age 24 (15%) and the lowest number of cases was identified in < 10 years of age 3 (2%), likewise, among 130 renal calculi patients in the Vellore district of Tamil Nadu, the majority of cases were found in the age group of 30-50 years (85.5%), 10-30 years average (37.7%), and the lowest number of cases were found in the age group of over 50-75 years (35.1%) (Sunitha *et al*., 2018).

In our study, we find that many of the patients were also diagnosed with co-morbidity, such as hypertension 39 (24%) and diabetes mellitus 38 (24%); diabetes was also reported to be high in Lebanon (46.8%), (21.2%) in Kuwait and (35%) in Egypt (Shamsuddeen *et al*., 2013).

In our analysis, 52 (32%) patients had a history of stones and 108 (68%) had no history of stones likewise to the National Health and Nutritional Evaluation Survey (NHANES), a cross-sectional data survey in the United States from 2007-2010, the rate of recurrence over 10 years without medical care is more than (50%) (Shadman *et al*., 2017).

In different types of water, the majority of patients drank groundwater 55 (34%) and filtered water 57 (36%) comparably the local community in the urban health training centre's field practice area in Puducherry protested about the high incidence of kidney stone in the population and was attributed to drinking water hardness (Dongre *et al*., 2017).

In our study, most patients drank water in the range of 3-4 litres 82 (51%), while 46 (29%) drank between 1-2 litres of water in comparison to the recent National Institute for Excellence in Health and Treatment [NICE] guidance on urolithiasis recommends that adults drink 2.5-3 litres of water per day [91] and according to the United States National Health and Nutritional Survey (NHANES), drink enough fluids to produce at least 2.5 litres of urine a day (Gul *et al*., 2014).

Based on signs and symptoms 129 (81%) showed signs of abdominal pain, 141 (88%) showed signs of back pain, comparably a research was planned as a cross-sectional survey conducted in King Khaled Hospital in the Hail city of Saudi Arabia, with a total of 50 patients suffering from renal calculus among them (81.5%) complained of abdominal pain and (78.3%) experienced discomfort during micturition (Shamsuddeen *et al*., 2013).

22 (14%) of 160 patients use NSAIDs frequently comparably to the National Institute of Siddha's study in Chennai, India where 666 patients visited OPD-1 in the maruthuvam (medicine) department for renal calculus treatment during the period from November 2013 to October 2014 (a period of 1 year), out of 165 patients (24.77%) frequently used NSAIDs (Sofia *et al*., 2016).

Our analysis shows that 17 (11%) are vegetarian, tomato 138 (86%), spinach 124 (77%) are the most frequently consumed vegetables and 143 (89%) are non-vegetarian, chicken 116 (72%), fish 62 (39%) and mutton 79 (49%) are the most frequently consumed foods and this study concludes that vegetarians are at lower risk of stone formation as opposed to non-vegetarians similarly, the study carried out in Tamil Nadu's Vellore district found that non-vegetarian patients suffer more from kidney calculus than vegetarian patients (Sunitha *et al*., 2018).

Of the 160 patients studied, 145 (91%) consumed tea, 49 (31%) consumed milk, 22 (14%) consumed cola, 11 (7%) consumed soda comparably to the research in the United States where men who drank two or more 8-oz (240ml) glasses of skim milk a day had a higher risk of kidney stones compared to men who drank less than one glass a month (Curhan *et al*., 1993) Similarly, a prospective study involving 194,045 participants over a median follow-up of more than 8 years in the United States, 4,462 events occurred, the probability of stone, forming was (23%) attributable to the ingestion of cola sweetened with sugar and (33%) due to non-cola sweetened with sugar (Ferraro *et al*., 2013).

Conclusion

A prospective observational study was carried out for over a period of 6 months on 160 patients diagnosed with Nephrolithiasis & admitted to the Medicover Hospital, Hyderabad, India to determine the epidemiological risk factors associated with this disease. All demographic information, laboratory parameters, medical history, diagnostic tests, prescription medications and surgical details were gathered and recorded in the Data Collection Form. A questionnaire format was designed that included 15 questions and the data were gathered via a patient interview. Our data gives an idea about the epidemiological characteristics of Nephrolithiasis. Gender differences are reported in males (74%) with a higher Nephrolithiasis prevalence than females (26%). The majority of patients were reported by the age group between 41-50 years of age (29%). Many patients had Hypertension (24%) and Diabetes Mellitus (24%) and were on medications.

The largest number of patients belonged to the lower socio-economic class (49%), suggesting a lack of awareness on lifestyle. Most of the patients had symptoms of back pain (88%) followed by abdominal pain (81%). The size of the stone between 11-15 mm was most prevalent among Nephrolithiasis patients (42%).

Non-vegetarians (89%) are more prevalent than Vegetarians (11%). Chicken (72%) was the most popular Non-Veg product followed by Mutton (49%). Tomato (86%) and Spinach (77%) were the most popular Veg products.

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