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ASSESSMENT OF PATIENT KNOWLEDGE CONCERNING CONTRIBUTING FACITORS OF RECURRENT UROLITHIASIS AT TIKRIT TEACHING HOSPITALS

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ETHICS STATEMENT

The thesis titled "**Assessment Of Patıent Knowledge Concernıng Contrıbutıng Facıtors Of Recurrent Urolıthıasıs At Tıkrıt Teachıng Hospıtals ”** which I prepared and presented as a master's thesis; Written by me in accordance with scientific morals and values. The idea/hypothesis of my thesis is entirely my own and my thesis advisor. The research in the thesis was done by me, and all sentences and comments are my own.

I declare that the above-mentioned points are correct.

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ABSTRACT

ASSESSMENT OF PATIENT KNOWLEDGE CONCERNING CONTRIBUTING FACITORS OF RECURRENT UROLITHIASIS AT TIKRIT TEACHING HOSPITALS

Burhan Salih Kareem KAREEM
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Urolithiasis is one of the most common urinary system diseases affecting individuals in a wide age range. The aim of this study is to evaluate the knowledge of patients treated in Tikrit Training Hospitals about the factors contributing to recurrent urolithiasis.

The sample of the study consisted of 100 patients who applied to the urology polyclinics of Tikrit Training Hospital between 25 December 2021 and 25 May 2022. The study was conducted as a descriptive cross-sectional study. A total of 33 questions were used to evaluate the data about the patient information form and the reasons contributing to urolithiasis. The data were collected face to face by the researcher. Ethics Committee Approval No. 23 dated 20.12.2021 was obtained from Tirkit Training Hospital and Çankırı Karatekin University ethics committee for the study. SPSS version 22 was used in the analysis of the data. Numerical data are reported as frequency and percentage.

The mean age of the individuals participating in the study was 34.2±14.00 years and 64% of the individuals were male patients, and 39% of the patients were between the ages of 18-29. The average of the answers given by the patients to the questions about the risk factors for recurrence of urolithiasis is 30.7%, and the total mean score of the MMS (1.28), shows that the patients have low knowledge about the treatment and prevention of recurrent urolithiasis. More than three-quarters of the participants (82.0%) showed that their level of knowledge was weak, (15.0%) moderate, and only (3.0%) had good knowledge.

As a result, it is seen that the individuals participating in the study have insufficient knowledge about the lifestyle changes to be made regarding the recurrence of urolithiasis. It is recommended that healthcare professionals include urolithiasis risk factors, lifestyle changes and possible treatments in patient education.

2023, 97 pages
Key words: Urinary system stone, Nephrolithiasis, Urolithiasis, Kidney stone.

ÖZET

TİKRİT EĞİTİM HASTANELERİNDE TEDAVİ GÖREN HASTALARIN TEKRARLAYAN ÜROLITIAZISE KATKIDA BULUNAN FAKTÖRLERE İLİŞKİN BİLGİLERİNİN DEĞERLENDİRİLMESİ

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Ürolitiazis geniş yaş aralığında bireyleri etkileyen, oldukça sık görülen üriner sistem hastalıklarından biridir. Bu çalışmanın amacı Tikrit Eğitim Hastanelerinde tedavi gören hastaların tekrarlayan ürolitiazise katkıda bulunan faktörlere ilişkin bilgilerinin değerlendirilmesidir. Çalışmanın örneklemini Tikrit Eğitim Hastanesi üroloji polikliniklerine 25 Aralık 2021- 25 Mayıs 2022 tarihleri arasında başvuran 100 hasta oluşturmuştur. Çalışma tanımlayıcı kesitsel araştırma tipinde yürütülmüştür. Veriler hasta bilgi formu ve ürolitiazis'e katkıda bulunan nedenler hakkındaki bilgilerini değerlendiren toplam 33 soruluk anket formu kullanılmıştır. Veriler araştırmacı tarafından yüz yüze toplanmıştır. Çalışma için Tirkit Eğitim Hastanesinden ve Çankırı Karatekin Üniversitesi etik kurulundan 20.12.2021 tarihli 23 Nolu Etik Kurul Onayı alınmıştır. Verilerin analizinde SPSS 22 versiyon kullanılmıştır. Sayısal veriler frekans ve yüzde olarak rapor edilmiştir.

Çalışmaya katılan bireylerin Çalışmaya katılan bireylerin yaş ortalaması 34,2±14,00 ve bireylerin %64'ü erkek hasta idi, hastaların %39'u 18-29 yaş aralığında idi. Hastaların ürolityazisin tekrarlaması için risk faktörlerine ilişkin sorulara verdikleri yanıtlar ortalaması %30,7, Ortalama skorun (MMS) toplam ortalaması(1.28), hastaların tekrarlayan ürolitiyazın tedavisi ve önlenmesi konusunda düşük bilgiye sahip olduğunu göstermektedir. Katılımcıların yaklaşık dörtte üçünden fazlasının (%82,0) bilgi düzeyinin zayıf olduğunu, (%15,0) orta düzeyde olduğunu ve yalnızca (%3,0) iyi düzeyde bilgi sahibi olduğunu göstermiştir.

Sonuç olarak çalışmaya katılan bireylerin ürolitiazisin tekrarlanması ile ilgili yapılacak yaşam şekli değişikliği konusunda yetersiz bilgiye sahip olduğu görülmektedir. Sağlık profesyonelleri hasta eğitimlerinde ürolitiyazis risk faktörleri, yaşam şekli değişiklikleri ve olası tedavileri konusuna yer vermesi önerilmektedir.

2023, 97 sayfa
Anahtar kelimeler: Üriner sistem taşı, Nefrolitiazis, Ürolitiazis, Böbrek taş

GENİŞLETİLMİŞ ÖZET

TİKRİT EĞİTİM HASTANELERİNDE TEDAVİ GÖREN HASTALARIN TEKRARLAYAN ÜROLITIAZISE KATKIDA BULUNAN FAKTÖRLERE İLİŞKİN BİLGİLERİNİN DEĞERLENDİRİLMESİ

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Ocak 2023

Ürolitiyazis, üriner sistemde taş veya taşların varlığını ifade eden, böbreklerin yanı sıra mesane ve üretrada da görülebilen bir hastalıktır. Erkek cinsiyetinde ve 30 yaş üzerinde sık görülmektedir. Taş oluşumunu yaş, cinsiyet, ırk, etnisite, beslenme, günlük su alımı, iklim, coğrafya, fiziksel aktivite ve beden kütle indeksi (BKI) gibi birçok faktör etkilemektedir. Mevcut çalışma Tikrit Eğitim Hastanesinde tedavi gören hastaların tekrarlayan ürolitiazis'e katkıda bulunan nedenler hakkındaki bilgilerini değerlendirmek amacı ile kesitsel tipte yapılmıştır. Araştırma 25-12-2021 ile 25-05-2022 tarihleri arasında Tirkit şehrinde bulunan Tirkit eğitim hastanesinde üroloji polikliniklerinde yapılmıştır. Çalışma için dahil edilme kriterleri 18 yaş ve üzeri olmak, üriner sistemde taş hastalığı tanısı almış olmaktır. Çalışma için dışlama kriteri okur yazar olmayan bireyler, çalışmaya katılmaya gönüllü olmayan bireyler ve iletişime engel olacak mental hastalık tanısı olan bireylerdir. Veriler sosyodemografik bilgilerin toplandığı bilgi formu ve ürolitiazis'e katkıda bulunan nedenler hakkındaki bilgilerini değerlendirmek amacı ile de toplam 33 soruluk anket formu kullanılmıştır. Veriler araştırmacı tarafından yüz yüze toplanmıştır. Çalışma için tirkit eğitim hastanesinden çalışma izni, hastalardan bilgilendirilmiş onam ve Çankırı Karatekin Üniversitesi etik kurulundan 20.12.2021 tarihli 23 Nolu Etik Kurul Onayı alınmıştır. Verilerin analizinde SPSS 22 versiyon kullanıldı, sayısal veriler frekans ve yüzde olarak rapor edildi. Çalışmaya katılan bireylerin yaş ortalaması 34,2±14,00 ve bireylerin %64'ü erkek hasta idi, hastaların %39'u 18-29 yaş aralığında idi. Bireylerin %40'ı ilkokul mezunu, %32'si çalışan bireylerden oluşuyordu. Hastaların %53'ü bekar bireylerdi, hastaların %62'sinde aile

hikayelerinde üriner sistem taş hastalığı mevcut idi. Hastaların %87'si kentte yaşıyor idi. Hastaların ürolityazisin tekrarlaması için risk faktörlerine ilişkin sorulara verdikleri yanıtlar ortalaması %30,7, Ortalama skorun (MMS) toplam ortalaması(1.28), hastaların tekrarlayan ürolitiyazın tedavisi ve önlenmesi konusunda zayıf bir anlayışa sahip olduğunu göstermektedir. Katılımcıların yaklaşık dörtte üçünden fazlasının (%82,0) bilgi düzeyinin zayıf olduğunu, (%15,0) orta düzeyde olduğunu ve yalnızca (%3,0) iyi düzeyde bilgi sahibi olduğunu göstermiştir.

Çalışmamızda literatüre benzer şekilde böbrek taşı hastalığı erkek cinsiyetinde, ailesinde taş öyküsü olan kişilerde daha fazla görülmektedir. Mevcut çalışmada 18-29 yaş grubunda fazla iken literatürde genelde 30 yaş ve üzerinde daha fazla olduğunu göstermiştir. Suudi Arabistanda yapılan bir çalışmada Ürolitiyazis risk faktörleri ile ilgili bilgilerinin genellikle düşük olduğu ve Ürolitiyazis en yaygın bilinen risk faktörü, katılımcıların %72,5'i tarafından belirlenen "düşük sıvı tüketimi" idi ve bunu % 34,40 ile "günlük kafein tüketimi" izlemiştir. Halim ve arkadaşlarının yaptığı çalışmada bireylerin %31'i böbrek taşları hakkında iyi derecede bilgisi varken, bireylerin %13,3'ü böbrek taşları hakkında yetersiz bilgiye sahipti. Sonuç olarak Ürolitiyazis hastaları ve risk taşıyan hastaları için üriner taş oluşumunu önleyen yaşam tarzı düzenlemelerini içeren eğitim ve eğitim broşürlerinin sağlanması.

PREFACE AND ACKNOWLEDGEMENTS

I would like to express my sincere thanks to my family who have helped me in my education since my childhood, and also to my family, who contributed to my education and training and gave me useful information. I would like to thank Dr.Öğr. Üyesi Huri Seval Gönderen Çakmak

Burhan Salih Kareem KAREEM

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ABBREVIATIONS AND SYMBOLS

Abbreviations	Description
AKI	Acute Kidney Injury
.ANA	American Nurses Association
BMI	Body Mass Index
CI	Confidence Interval
DM	Diabetes Mellitus
ED	Emergency Department
ESWL	Extra Corporal Shock Wave Lithotripsy
HDL	High-Density Lipoprotein
IBD	Irritable Bowel Syndrome
LDL	Low-Density Lipoprotei
PCNL	Percutaneous Nephrolithotomies
RR	Relative Risk
SD	Standard Deviation
Sig	Significant
UTI	Urinary Tract Infection
WHO	World Health Organization
X	Mean
%	Percent

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1. INTRODUCTION

Urolithiasis refers to the presence of calculi or stones in the urinary system. Calcification of the urinary system is a common cause of this illness, which can occur in the bladder and urethra as well as the kidneys. The global prevalence, incidence, and composition of calculi have changed dramatically during the 1970s and 1980s. 7 to 13% of the population in North America, 5% to 9% of the population in Europe, and 1% to 19% of the population in Asia have urinary tract stone disease (Liu Y. C., 2018). In addition, the kidney and ureter of the upper urinary system are commonly affected. There have been shifts in different countries and regions over time owing to socio-economic factors as well as geographical factors (Nouri, 2018). Men made up the majority of those diagnosed, and those over 30 were the most likely to be so (Liu Y. C., 2018) . Because of the frequent occurrence of new and recurrent stones, this illness has a high risk of acute and chronic morbidity. A growing number of people worldwide are suffering with stone disease, and the gender gap is narrowing. The increase in kidney stone cases is attributed in part to an expanding population and increased rates of obesity and diabetes (Sorokin, 2017). An increase in patients with kidney stones has been seen in the previous 15 years, which is most likely due to dietary and medical practices that have changed over that time. Recurrence of nephrolithiasis affects up to 50% of patients after five years. Kidney stones have a significant financial impact, with annual health care expenses exceeding $10 billion per year (Scales, 2016).

A primary care physician or nephrologist does not follow up with more than half of the kidney stone patients treated in the emergency room (Luckenbaugh, 2019). Even if medical treatments' cost-effectiveness differed from country to country, therapy and surgery expenses had a substantial impact on overall health care spending. An increase in hospitalizations and a 10% lifetime risk have been identified in individuals with kidney stones who are anxious and stressed out (Liu Y. C., 2018) . Reducing the amount of food in one's diet can help alleviate many of the underlying reasons of renal lithiasis. In reality, changing one's terrible eating habits is a highly efficient strategy to avoid kidney stones. When it comes to preventing chronic or acute conditions, trace elements have garnered a lot of attention over the years (Ferraro, 2018).

Nephrolithiasis has been related to an increased risk of chronic and end-stage renal disease, probably because of kidney damage induced by blockage. 67 percent of urinary tract stones are calcium oxalate, followed by 17 percent by calcium phosphate and 8 percent by uric acid, 3 percent by struvite, and 0.4 percent by cystine, all of which are calcium oxalate. More than one factor might have an impact on the occurrence of urinary stones. These include metabolic anomalies, genetic causes, anatomical and functional abnormalities, and nutritional deficiency.. The quantity of salt in a person's urine can be affected by their diet, which in turn might affect their risk of developing urinary stones (Williams, 2021).

In most situations, the production of stones is a result of a mix of inherited and environmental factors. To put it another way, those who are at risk include those with high levels of calcium in their urine as well as those who are either overweight or don't drink nearly enough fluids. Mineral concentrations in urine that are too high lead to the development of kidney stones. When diagnosing anything, several factors come into play. It is also possible that blood tests can be useful. Some of the most frequent forms of stones include nephrolithiasis, ureterolithiasis, and cystolithiasis, although they can also be categorized based on their composition (calcium oxalate, uric acid, struvite, cystine). Drinking enough water to produce more than two liters of urine a day prevents stones in people who have previously had them. If this doesn't work, further options include thiazide diuretics, citrate, or allopurinol. It is best to avoid soft drinks that contain phosphoric acid (such as colas). If a stone is not producing any symptoms, there is no need to treat it. No steroidal anti-inflammatory medications (NSAIDs) or opioids are often the first lines of defense for pain treatment. Many alternatives exist for the treatment of big stones, such as tamsulosin, ureteroscopy, and renal artery percutaneous necrosis necrosis (Rohit et al., 2018).

Kidney stones affect anywhere from 1% to 15% of the world's population at some point in their lives. The illness claimed the lives of almost 16,100 people in 2015, which impacted 22.1 million people. Since the 1970s, they've become more common in Western countries. Generally speaking, men are more likely to be affected than women. Surgical treatments to remove kidney stones extend as far back as 600 BC, when the first cases of the disease were first documented. Dehydration from insufficient fluid intake exacerbates stone development. Additionally, obesity is a major risk factor. Those who consume large amounts of animal protein, salt, refined sugar (honey), and oxalate (found in grapefruit and apple juice) are more prone to suffer from kidney stones. Metabolic disorders such as Dent's disease, hyperparathyroidism, and primary hyperoxaluria can all lead to the production of kidney stones. Between 3% and 20% of kidney stone sufferers are affected by the medullary sponge kidney. Crohn's illness is associated with hyperoxaluria and magnesium malabsorption, both of which increase the incidence of kidney stones. Patients who suffer from frequent kidney stones may benefit from an examination by a doctor to rule out other problems. The most typical urine sample is one collected over the course of a whole day. The properties of the urine that facilitate the formation of stones are investigated (Rohit, et al., 2018).Small precipitate stones form in the kidneys, but as they become larger, they become kidney stones. As a result of the minerals in food being evacuated through urine, they form a crystal aggregation in the kidney (renal pelvis). The process of making stone involves several processes. Sodium salts, such as calcium, oxalate, uric acid, magnesium, and phosphate can precipitate as crystals in the urine that has been oversaturated (Ghimire, 2019). A low urine volume as a result of insufficient fluid intake or excessive fluid loss is a major risk factor for kidney stone formation. Several physiological and pathological conditions might affect the body's water requirements, and all of them can result in dehydration. Several factors lead to excessive perspiration, including heat, mental tension, and physical activity. A further risk factor is a chronic diarrhea brought on by numerous gastrointestinal diseases that result in fat malabsorption (Williams, 2021).

Workers in the medical field who do not have access to clean drinking water are also at risk of acquiring kidney stones. It was revealed that operating room doctors (17.4% v. 9.7%) were more likely to suffer from renal lithiasis, and their stress levels and fluid

consumption were found to be lower than those of physicians who worked in other departments (Linder, 2013). Urolithiasis can be worsened in some jobs, such as truck drivers, airline pilots, or schoolteachers, by the lack of quick access to fluids or bathrooms (Malieckal, 2020).

1.2. The importance of the research

The urinary stone disease affects around 1 in 11 persons throughout the course of their lives. More than half a million children, women, and people of color have been infected with the virus in the last decade. The incidence of USD has climbed by 75% in women since 1994 and by 1.12% in blacks since that time. Kidney stones are becoming more common all around the world, affecting people of all sexes, ethnicities, and geographical places. Several factors have a role in the development of this disease, which has a multifactorial origin. A range of genetic factors can contribute to kidney stone formation, however, no specific genes have been linked to the formation of kidney stones. A person's diet has a significant impact on the formation of urinary stones, which can either speed up or slow down the process. For the prevention and recurrence of kidney stones, the European Association of Urology recommends drinking at least 2.5 liters per day in urine volume (Turk et al., 2018). The incidence of kidney stones is steadily rising over the glob Excess oxalate, citrate, calcium, and phosphate salts produce kidney stones when they crystallise and are evacuated through the urethra in urine (Sofia, 2016). Two of the most common disorders with the urinary system are infections of the urinary tract and prostate disease. Kidney stones are the third most common (Delfan, 2015). In addition to calcium oxalate and calcium phosphate kidney stones, additional types of kidney stones might include cysteine, struvite, and mixed. Nearly 70% to 80% of all kidney stones are calcium stones, according to the National Kidney Foundation (Nikpay, 2016). To maintain a healthy, strong, and developing body, it is important to eat a diet that provides all of the nutrients it needs to thrive. A healthy lifestyle must include both regular physical activity and a well-balanced diet. Nutritional deficiencies can lead to lower immunity, increased sickness risk, impaired physical and mental development and decreased productivity. In order for our bodies to work correctly, we need to eat a healthy, well-balanced diet. Including fruits, vegetables, grains, proteins, and dairy products in your diet is essential,

but they must be taken in the correct quantities to maintain a healthy body. In order to keep our bodies healthy and fit, we need to drink more water, which is mostly excreted in the form of urine with the help of our kidneys. Numerous essential functions of the kidney include maintaining fluid and mineral balance as well as removing waste. Consequently, the aim of this research was to find out how well University of Baghdad students at the College of Nursing know about Urolithiasis recurrence risk factors and how to avoid it by minimizing those risk factors. (Recherché)

1.3. Statement of the problem

"Assessment of patient knowledge concerning contributing factors of recurrent urolithiasis in tikrit teaching hospitals"

1.4. The purpose of the study

The aim of this study is to evaluate the knowledge of patients treated in Tikrit Training Hospitals about the factors contributing to recurrent urolithiasis.

1.5. Definition of the terms

1.5.1 Assessment

1.5.1.1 Theoretical definition

In a continuous process, data can be collected using qualitative and quantitative evaluation methods (Jordan & Franklin, 2013).

1.5.1.2 Operational definition

The amount of information being obtained on the factors that raise the risk of kidney stone recurrence and how to avoid them is so vast that it is impossible to convey it all.

1.5.2 Patient

1.5.2.1 Theoretical definition

A person who receives medical attention from a healthcare professional is referred to as a patient (Bates, 2018).

1.5.2.2 Operational definition

A individual who has been diagnosed with kidney stones by a urological expert.

1.5.3 Knowledge

1.5.3.1 Theoretical definition

Is the status of having and utilizing information or skills (Rav-Marathe, 2016).

1.5.3.2 Operational definition

A level of nursing student remembering, understanding, and applying of risk factors related to recurrent urolithiasis.

1.5.4 Contributing factors

1.5.4.1 Theoretical definition

Are causes and predisposing factors that make individuals high increase the chances of an individual developing the disease (World Health Organization, 2020).

1.5.4.2 Operational definition

A sum of factors exacerbates health condition that acts as a factor or situation that influences personal health and increase the risk of getting the kidney stones.

1.5.5 Urolithiasis

1.5.5.1 Theoretical definition

Nephrolithiasis (stones in the kidneys and bladder) is a medical term for having crystalline stones (calculi) in the urinary tract (kidneys and ureter). It is not uncommon for these kidney stones to include varying amounts of crystalloid and organic matrix. Urinary tract stones that originate in the kidneys almost always end up in the ureter (Khan, 2016).

1.5.5.2 Operational definition

Stones in the urinary system, kidney stones, or the bladder (ureterolithiasis) (cystolithiasis).

2. GENERAL INFORMATION

2.1. Historical overview

Historically speaking, the history of urinary stones predates the history of mankind. The earliest traces of contemporary science and philosophy may be found in the social and scientific development of the Ancient Egyptians. An English archaeologist unearthed a bladder stone from a cadaver that was 4500–5000 years old in 1901 in El Amrah, Egypt, thanks to the work of E. Smith, an Englishman. The treatment of stones has been mentioned in ancient Egyptian medical literature as far back as 1500 B.C (Shah, 2002). Texts written in Mesopotamia between 3200 and 1200 BC include the oldest literary allusions to stone illness, which explain the symptoms and offer methods to break down the stone. "Cutting for the stone" first appears in writing in Hindu and Greek literature. An ancient Indian physician named Sushruta (about 600 BC) documented over 300 surgical operations in his book Sushruta Samhita, one of which is the perianal lithotomy technique (Shah, 2002). When it comes to bladder stones, there are several theories. Bladder stones often enter the bladder through the urethra. Phlegm and urine can become stony if the digestive tract is not kept clean or if unwholesome food is ingested. Bigger stones form in the same manner as precipitate occurs after some time when even clean water is stored in a fresh pitcher," They suggested a vegetarian diet, an injection of therapeutic milk and clarified butter into the bladder, and alkalis to treat kidney stones in ancient Indians. Sushruta turned to surgery when all other options failed, and he goes into considerable detail about the procedure in his works (Chakravorty, 1982). Ancient Greeks created the groundwork for philosophy and science by first observing and documenting ureteritary stone illness. Hippocrates (460–377 BC) highlighted the symptoms of bladder stones and renal disease. In his renowned Oath of Medical Ethics for physicians, he declared, "I will not cut for the stone, but will let this to be done by practitioners of this duty." Hippocrates was certain that bladder diseases were deadly in those days when merely a perineal incision was utilized to do lithotomies. This admonition has been given to doctors for years to warn them against a dangerous practice (Dimopoulos, 1980).

The notion of fracturing the stone into smaller pieces to make it simpler to remove was hatched by Ammonius of Alexandria in 276 BC. After securing the stone with a hook, he used a small blunt-ended instrument to smash it. A "lithotomus" is someone who coined the term "lithotomies" to describe how a stone is carved. However, his idea was not widely embraced at the time (Tefekli, 2013). Perianal lithotomy was originally described in full by Cornelius Celsius, a Roman physician and encyclopedia compiler who lived from 25 BC to 40 AD (De Medicine). Urologists didn't realize the necessity of this operation until he described perianal lithotomy in the early 1900s. The "Operation Minor" or "petit appareil" strategy was used for the next 1500 years with little or no change. Between the ages of 9 and 14, with the help of two strong and intelligent companions, Celsius recommended that the procedure be carried out. Calus Plinus Secundus, Galen, and Paul of Aegina were all renowned Greek physicians who employed lithotomy during the period of Celsius' works (Tefekli, 2013). Ancient Arabic medicine drew heavily on Greek and Roman sources. In the Renaissance, the translation of ancient Latin literature by Muslim academics was a major factor in the growth of European inquiry. Rhazes described perineal lithotomy in a way similar to that employed by Paul of Aegina in a medical book (Shah, 2002). Albucasis (Ibn Abbas Alzahrawi, 930–1013 AD) from Cordova then shown considerable surgical expertise by changing the lithotomy process used by the Greeks (Abdel-Halim, 2003). Perineal incision was made to the bladder neck, and then through it, in order to get to the stone. It is apparent from Albucasis' Al-Tasreef that Albucasis considerably improved the operation and reduced the risk (Abdel-Halim, 2003). As part of his research, Albucasis also came up with the name "nechil" for a new type of lithotomy scalpel he envisioned. Both the Italian surgeon "Marianus Sanctus" and the English surgeon "Shelsden" referred to a "Novacu1a" and a "Shelsden" in the 16th and 18th centuries, respectively (Abdel-Halim, 2003). Prior to Albucasis, there was little emphasis on avoiding the midline perineal incision in ancient and Greco-Roman texts. Anatomically, Albucasis' contribution to the perianal cyst lithotomy procedure was a paradigm shifter. Forceps have been used to remove bladder stones as a result of Albucasis' pioneering work. An old spoon-like utensil was used to dig out the stone around it. Most well-known lithotomists in Renaissance Europe employed Albucasis' lateral approach to cut on the left side, including the Italian "Marianus Sanctus" (16th century AC), the French "Jack De Beaulieu" (17th century AC), and the English

"Shelsden" at that time period (18th century AC). Prior to performing the perennial cystolithotomy surgery, he used an instrument to confirm if a stone was there. The two-step technique for complicated bladder stones was one of his surgical inventions. A perineal approach, rather than Albucais's adjustments and inventions, was not extensively employed until the beginning of the eighteenth century, when the present method of removing bladder stones via suprapubic, rather than a was first developed. Between 1096 and 1438, Europe made little attempt to combat stone disease (Bagwell, 2005). Lithotomists would cut everyone in their path as they travelled from town to town in search of business. Despite their illiteracy and dishonesty, a few of these individuals made for entertaining audiences nonetheless. In the presence of the general public, the surgery took only a few minutes without anaesthetic (Urquhart-Hay, 1999). However, limbologists were held accountable and penalised for their bad performance. French physician Chauliac (1300–1367) drew inspiration from the Greeks, the Arabic, and his personal experiences to compose Chirugia Magma (Chirugy Magma) in the early 14th century (Luckenbaugh, 2019). While he wrote extensively on lithotomy, a dangerous technique at the time, he never performed it himself. Surgery was forbidden in 1215 by the Fourth Lateran Council because surgeons were deemed polluted by contact with blood or human fluids, which was viewed as a hindrance to medical development in Medieval Europe. Students were required to complete an apprenticeship with a guild before being allowed to practice surgery as a profession. It was necessary to finish a university-mandated curriculum that obliged students to study the classics and the teachings of ancient medical authors like Galen, but it did not allow for any unfettered inquiry or critical thought. Before Henry VIII granted a charter in 1540, there was strong rivalry among physicians and surgeons, even the lowest surgical practitioners, barbers. As an early mover in establishing surgery as a legitimate profession, the Guild of Barbers of Surgeons established a training and certification program for surgical practitioners (Bagwell, 2005). During the Renaissance (1453–1600), a wave of new ideas swept through a wide range of academic fields. In this period, criminals may face new penalties. As a result of his activities in 1475, Colot was able to remove stones from a criminal's suprapubic area. The Colot family in France had a "lithotomy monopoly" for more than two centuries (Shah, 2002).

They were well-known surgeons who belonged to the College of Surgeons. Farncisco de Romanis, on the other hand, achieved the first significant development in science since Celsus and Albucasis in 1520 (Shah, 2002). His perianal incision was made with a "novacula," a large knife used to locate the bladder neck with the sound he introduced. In addition, he hired a number of dissenters to conduct more study. The "Marian operation" or "Grand Appareil" was popularised by Marius Sanctus's student Marius Sanctus (Herr, 2008). Around the same time in the 15th century, Turkish surgeons Sabuncuoglu Serafettin and Ahi Ahmed Celebi both invented a new technique for transurethral stone breakage and bladder irrigation (Verit, 2003). In their texts, they also offered comprehensive directions for dissolving and passing through stones. For his time, the foremost French surgeon in France, Pare (1510–1590), wrote extensively about urinary stone disease and lithotomy, even though he never performed either procedure himself. Long and detailed prescriptions for those who suffer from stones were also offered. The first reported suprapubic lithotomy was done by Pierre Franco in 1561, during the Renaissance (Shah, 2002). The fact that his patient had a good recovery, Franco urged others against following his example because of the severe risks associated with this method. When kidney surgery was first reported, it took place in the Renaissance period. Cardan of Milan opened a lumbar abscess in 1550 and discovered 18 stones within (Shah, 2002). This therapy, on the other hand, was mostly ignored for a long time. Jacques de Beaulieu (1651–1714) popularised lateral lithotomy, making substantial contributions to the discipline of lithotomy. Later, this treatment was developed and made more well known by Ferre Jacques, who performed over 5000 surgeries. William Cheselden (1722) and John Douglas (1719) were the first to discover that a swollen bladder pushed the abdomen higher, paving the way for the extraperitoneal procedure. However, for many years, these two well-known acquaintances fought over plagiarism accusations (Tefekli, 2013). After the Nitze cystoscope and the Hopkins rod-lens system gained popularity, Young and Mckay (1870–1945) were able to develop the cystoscopic lithotrite. Additionally, they were the first to perform and document ureteroscopies (1912 and 1929) (Tefekli, 2013). Flexible ureteroscopes were developed before rigid ureteroscopy because of advances in fibre optics. In 1964, Marshall published the first report on flexible ureteroscopy using a 3 mm fiberscope. Tagaki arrived in 1971, followed by Bush two years later in 1972. (1970). Ureteroscopy using an intentionally stiff tube was first

described in 1977 by two distinct researchers. Intracorporeal lithotripsy saw significant progress in the 1980s. The first contemporary intracorporeal lithotriptor was designed in 1954 by Yutkin, a Kyiv-born engineer. Because the Stalinist administration refused to adopt his proposal for at least ten years, he was forced to flee. As a result, success stories about removing bladder stones have emerged in Europe and the United States (1977). Mulvaney initially looked at the removal of urinary stones with the use of ultrasonography in 1953, and Kurth followed suit in 1977. A laser was utilized for the first time in 1986 to dislodge ureteral calculi. Ureteral stones are now routinely treated with the use of laser lithotripsy due to major advances in laser fibers and power generation equipment. pneumatic lithotripsy can be used to break up pulmonary, urinary, and bladder calculi. Lithoclast, the first pneumatic device, was developed by a Swiss company in 1992. Thanks to advances in flexible ureteroscopy and laser fibers, kidney stones may now be treated via ureteroscopy (retrograde intrarenal surgery) (Tefekli, 2013).

2.2. The prevalence of urolithiasis

It is estimated that between the ages of 20 and 60, there is a rise in the prevalence of urinary lithiasis. In the Netherlands, 0.5 to 5.5 percent of people have it; in Asia, 1 percent to 5 percent; and in North America, 7 percent to 13 percent. An estimated 16% of men and 7% of women in the United States are likely to have at least one naturally passing urinary stone by the time they reach the age of 70. Recurrence increases the morbidity of urolithiasis. Recurrence is more likely in 11 percent of patients two years later and in 39 percent of patients 15 years after their initial symptomatic stone episode ((Sorokin I. M.-1., 2017); (Rule, 2014); (Scales Jr, 2012). Urinary tract stones can be exacerbated by obesity, diabetes, and other long-term health conditions. Flank pain, or renal colic, has been described by many individuals. Pain can lead to nausea and vomiting, which are both typical adverse effects of medication. Hematuria and anaemia may be present (Sohlberg, 2020). For instance, obesity and other chronic conditions, such as diabetes, tend to increase the risk of urinary tract stones. Renal colic, or flank pain, is the most common symptom voiced by patients. Nausea and vomiting often accompany the intense pain. Hematuria may be present (Tangren, 2018).

Urolithiasis, a common medical condition, affects one in every eleven Americans. 10.6 percent of the population is affected in men, whereas 7.1 percent of the population is affected in women. White, non-Hispanic people are more likely to develop stones than the Black and Hispanic population. Kidney stone disease is more likely to occur in those who are older (Sebastian, 2021). Kidney stones occur often and are a major cause of morbidity when it comes to kidney disease. A kidney stone can occur about three times as often in men and women in the United States than in any other country. Every year, the US spends $5 billion on treating people with kidney stones. Stone illness is becoming more common, both locally and abroad. Recurrence rates might be as high as 20% to 50% after five years. Because of the high rates of occurrence and recurrence, identifying risk factors that may be altered is critical (Prochaska, 2016).

Urinary stone disease is a tremendous burden on the health care system across the world because of its high prevalence and recurrence rates. Urolithiasis costs the United States an estimated $5 billion a year in direct and indirect costs. The second most expensive urological ailment is urothelial sickness ((Raheem, 2017) (Litwin, 2012). Patients' out-of-pocket payments are mostly due to preventive care and treatment. Additionally, urolithiasis is associated with considerable indirect costs because of the high recurrence rates and the peak frequency in middle age, according to Canvasser (Canvasser, 2017) (Hyams, 2014). There has been an increase in the prevalence of urolithiasis in both developed and developing countries. Race, geographic location, and lifestyle may influence the creation of stones according to studies (Wang, 2021). An increase from 14 to 16 percent in the lifetime prevalence of kidney stone disease has been documented in epidemiological research. "Rukin (Rukin, 2017). In less than 10 years, a stone will reoccur in more than half of patients. In both people and society, KSD has a huge influence. In addition to the detrimental impact on a patient's quality of life, the economic ramifications are significant. Patients' additional expenses for time away from work are not included in the projected annual cost of $4 billion in the United States in 2030 (Geraghty, 2020). Gender and age were found to impact stone composition in a recent study, with younger women having more hydroapatite stones and elderly people having more uric acid. Other European studies have confirmed an increased risk of uric acid stones in the elderly (Lieske, 2014).

Stones are more commonly created by males and women, ethnic groupings, and geographic locations. The gender disparity in kidney stone incidence is closing, following a long-term pattern. Stone-related hospital discharges in the United States decreased from 1.7 men to 1.3 women between 1997 and 2002, according to the US National Inpatient Sample (Luckenbaugh, 2019).

2.3. Calculi Types

Based on their core constituents or compositions, scientists discovered four main types of stones, and each of these is named after that (Figure 1). Most calcium stones are made up of crystals of calcium oxide and calcium phosphate (CaP). Most kidney stones include CaOx, which can be found in monohydrate or dihydrate forms. Crystals of COM arise when they are twinned, and they are thin, plate-like crystals that are discovered in urine sediments. The crystals and stones extend outward from the stones and crystals in a fan-shaped profile with noticeable concentric laminations. Calcium dihydrate (COD) crystals with bipyramidal tetragonal bipyramidal envelopes are seen in both urine sediments and kidney stones. Crystals of COM and COD are frequently seen on the surface of CaOx stones. There are a lot more Com stones than there are COD stones. Mixed stones have a jagged appearance because of the predominance of COD crystals on their surface. They appear to be six-sided prisms in comparison because of their smooth surfaces. CaOx stones are created in steps. A rise in the frequency and severity of kidney stones is one of the most alarming warning signs and symptoms (Sebastian, 2021). The chemical composition of kidney stones is determined by abnormalities in the composition of urine. Stones (mineralogy) come in a variety of shapes, sizes, and chemical compositions. According to variations in mineral content and origin, the following types of kidney, kidney stones are commonly classiIed into types as follows (Bagwell, 2005).

2.3.1. Calcium phosphate (CaP) stones

Calcium oxalate and calcium phosphate are the two main calcium stone forms that exist. Nearly one-fifth (20%) of all urinary calculi are composed of the type of calcium phosphate known as apatite (CaP). About half of all urinary calculi are composed of

Brushite, a type of calcium oxalate known as calcium hydrogen phosphate. Calcium phosphates are most commonly found in the form of Apatite. $CaC_2O_4 \bullet H_2O$ (whewellite, $CaC_2O_4 \bullet H_2O$) or COD (weddellite, $CaC_2O_4 \bullet 2H_2O$), or a combination of the two, makes up the majority of calcium oxalate kidney stones. Thermodynamic stability of COM stone is the greatest. COM is more prevalent in clinical stones than COD. In addition to hypercalciuria, other factors that contribute to the formation of calcium oxalate stones include: hyperuricosuria; renal leak; absorptive; metabolic; and hypercystinuria. Calcium phosphate stones are more likely to develop in urine with a pH of 7.5 or higher than CaOx stones when the pH of the urine is between 5.0 and 6.5. The frequency of recurrence of calcium stones is greater than that of other types of kidney stones (Alelign, 2018). Calcium stones are the most often encountered type of urinary tract stone by the general public. $CaCO_3$ and $CaPO_4$ are calcium oxalate and phosphate, respectively. Calcium oxalate, the most common kind of stone, accounts for 70 to 80 percent of all stones detected. Lower urinary volume, more calcium excretion, more oxalate excretion, and lower citrate excretion are all risk factors for them. According to the National Institutes of Health, calcium phosphate makes up around 15% of all urinary stones. They may have come from alkaline urine (pH 6.5) (Mayans, 2019).

2.3.2. Uric acid stones

Uric acid stones: They make up between 3% and 10% of all stones, depending on the kind. A diet that is high in purines, such as meat and Ish, increases the risk of uric acid stones in persons who consume these foods. The most prevalent cause of idiopathic uric acid nephrolithiasis and kidney stones in those with gouty arthritis (Alelign, 2018).

2.3.3. Struvite stones

One percent of all urinary tract stones are struvite stones. are mostly composed of magnesium ammonium phosphate. Urinary tract infections, particularly those caused by Proteus mirabilis, are a major source of infections known as infection stones. It is common for the pH of urine to increase over the typical range of roughly pH 8.5-9 when the urease enzyme is activated. Most struvite-based calculi are staghorns, which are

branching stones that occupy the renal pelvis in some or all of their entirety. In most cases, staghorn calculi demand surgery (Mayans, 2019).

2.3.4. Cysteine stones

Between 1.5% and 10% of urinary tract stones are cystine stones, however cysteine stones in children tend to be more common. As a result, these symptoms are caused by a genetic disorder known as cystinuria. Cysteine stones can form in the kidneys of people with an autosomal recessive cystine transporter impairment. Cysteine excretion is increased because cystine reabsorption is hindered. When the pH of the urine is normal, crystals of crystalline struvite can form in the kidneys and bladders, causing recurrent stones. Small, translucent, amber-colored, and homogenous stone. Cystine crystals in stone and urine deposits have a hexagonal form that can be easily seen at higher magnifications (Sebastian, 2021).

2.3.5. Iatrogenic stones

When the urine becomes too saturated with some relatively insoluble drugs and/or their metabolites, iatrogenic stones can develop. Patients with HIV who are on protease inhibitors like indinavir or atazanavir may develop nephrolithiasis. The liver breaks down the majority of medications before they are excreted in the urine as a means of preventing kidney stones. Taken in large doses, this causes the medications to crystallize, resulting in kidney stones. Even when used as part of a multi-drug regimen, atazanavir has the potential to crystallize in the urine and induce kidney stones in certain people. Any of the five antibiotic classes investigated had a relationship to nephrolithiasis. Sulfas, cephalosporins, fluoroquinolones, nitrofurantoin/methenamine, and broad-spectrum penicillin had infection risks that were 2.3 times higher in the 3-12 months preceding diagnosis than other classes of antibiotics (1.9, 1.7, 1.7, and 1.3, respectively) (2.3). In accordance with (Abdelsalam, 2018).

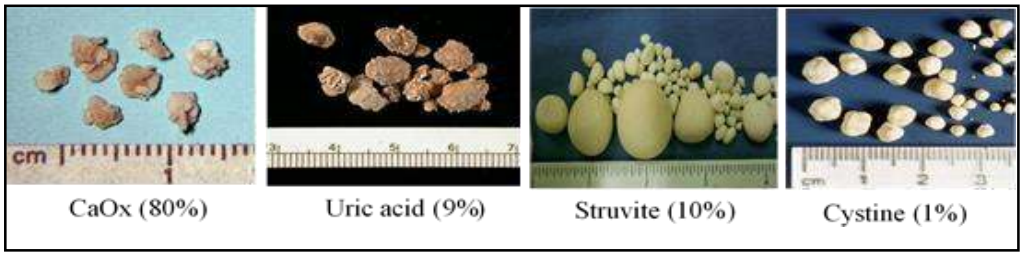

Figure 1. Renal stones types and composition (Scales, 2016).

2.4. Causes of kidney stones

Urinary calculi are caused by a combination of genetic, dietary, environmental, and behavioural factors. Obesity, hypertension, diabetes, chronic renal illness, inactivity, excessive salt intake, animal protein consumption, sugar and sweets consumption, and bacteria are a few examples, although the list is not exhaustive. Stones can form in the urinary system due to hypercalciuria, vitamin D supplementation, and other medical conditions (Sebastian, 2021). Kidney stones can occur as a result of dysfunction or damage caused by a range of etiological diseases. Kidney stone risk is influenced by a wide range of factors, including one's age, gender, race, geographic location, and body mass index (BMI). Many studies have found a correlation between a decrease in the intake of green vegetables and an increase in the consumption of animal protein. More than half of the main risk variables are urine and pre-urinary (Ghimire, 2019) .

2.4.1 Urinary risk factors

These variables in the urine may be the key risk factors for kidney stones, according to several research. Urinary risk factors include high levels of calcium, uric acid, and hypocitraturia in the bloodstream. Changes in urine due to the situations described below are considered to affect stone formation**.**

2.4.1.1Urinary salt concentration

The presence of excessive quantities of salt in the urine aids in the formation of kidney stones. It is typical for urinary salts to dissolve in urine and be removed from the body

under normal circumstances. Precipitation and crystal formation is facilitated by a reduction in urine output as the crystal count rises. reactive oxygen species are the driving force for crystal formation (ROS). To replace damaged cells or to release macromolecules that regulate crystal formation, ROS-induced cell death and survival genes boost proliferation. Replacement of injured cells may also be encouraged by ROS (Nita, 2016).

2.4.1.2. Urinary volume

Crystallization necessitates the presence of this component. Water volume helps to reduce crystal formation by diluting oxalate burden on calcium and phosphate, which in turn reduces the quantity of crystals that form (Ghimire, 2019).

2.4.1.3. Urinary pH

Urinary pH is crucial in the formation of uric acid stones. Uric acid is more likely to be found in urine with a pH of less than 5.5. At a pH of 5, it's practically insoluble in urine; however, when the pH is raised to 7, it becomes significantly more soluble. People who have both a low urine pH content and a high uric acid excretion are more susceptible to develop uric acid stones. The abnormally low pH of certain patients' urine might be caused by a lack of renal ammonia secretion, as the released hydrogen ions are less buffered as a result (Alelign, 2018).

2.4.1.4. Enzymes in Urine

The initial stage in the production of kidney stones is the precipitation of the organic matrix of mucoprotein in urine. For example, urokinase activity and/or concentration, which impact urine mucoprotein, might be important in this process. There is evidence to support the theory that urinary urokinase levels are reduced in patients with kidney stones (Ghimire, 2019).

2.4.2 Pre-urinary Factors

This might be influenced by both external and internal influences. Examples of intrinsic components are age, gender, and hereditary traits. On the other hand, extrinsic effects include things like weather, food and water consumption**.**

2.4.2.1. Age

Kidney stone disease affects one in every thirteen women and one in every seven men (nephrolithiasis). One in every thirteen Caucasian men and one in every seven Caucasian women will suffer from it at some point in their lives. Kidney stone disease is becoming more common in those over the age of 65, and 10% to 20% of all patients with nephrolithiasis are over the age of 65. As people age, they are more prone to develop kidney stones as a result of infection and other conditions that increase the risk of uric acid stones, including diabetes. In addition, many of them are using medications and supplements that change their metabolic profiles and increase their risk of developing kidney stones. Concern about kidney stones in the elderly has been raised by studies that have found links between the illness and other serious conditions such as heart disease and diabetes (Kates, 2014) .In the elderly, uric acid stones are more likely to develop, whereas calcium phosphate stones are more common in younger people. Several studies claim that metabolic issues are the major cause of kidney stone development in youngsters (Krambeck, 2013)

2.4.2.2. Gender

Various ages and genders were examined, as well as the composition and distribution of urinary tract stones, in this study. It took 1532 stone analyses between December 2014 and March 2018 to get the full picture, with 992 men and 540 women making up the sample populations. The average age of males was 45.9 years, while the average age of women was 50.0 years (p 0.001). BMI, hyperuricemia and obesity (BMI 30 kg/m2) were greater in men, but urinary tract infections were more common in women. Percutaneous

nephrolithotomies and kidney stone removal surgeries were far more common in women (p0.001). Adolescence was the time of lowest incidence for both sexes, according to age-specific prevalence ratios, with peak prevalence occurring between 50 and 70 years of age for both sexes. More CaOx stones between the ages of 30 and 49 were found in males, while UA stones between 30 and 59 and CaP stones between 30-49 were found in women. Both sexes were more prone to acquire UA stones beyond the age of 40. Additionally, we discovered a male dominance tendency of 1.8 as a result of our investigation. As a result of gender, each stone had a different makeup. Men were found to have a larger concentration of CaOx and UA stones than women, as has been seen in other regions of China. It was shown that males tended to consume more animal protein and meat, which led to an oversaturation of CaOx (Wang, 2021).

2.4.2.3. Race

A increasing incidence of kidney stones in blacks is understudied, and it's not apparent how sex changes between white and black persons in relation to kidney stone risk. Race-sex associations with kidney stone incidence rates were examined by conducting a large, prospective cohort of low-income white and black men and women from the southern United States. We hypothesised that the probability of acquiring an incident stone changed by race depending on the gender. A 95 percent confidence interval [CI] found white men and women to have age-adjusted incidence rates of 5.98 (4.73–7.23) and 4.50 (3.86–5.14) per 1000 person years, whereas blacks had rates of 2.19 (1.71–2.67) and 2.47 (2.19–2.75) per 1000 person years (age-adjusted incidence rates). 2.23 times increased risk (HR 2.23, 95 percent CI 1.97–2.53) for whites than for blacks. Compared to black males, white men had a greater risk of prostate cancer (HR = 1.45, 95 percent CI 1.20–1.75), but the difference was not statistically significant (HR = 0.90, 95 percent CI 0.75–1.07). In all models, race and gender interactions were statistically significant (P =.01 for the fully adjusted model). Kidney stones and sex are linked in distinct ways by whites and blacks. The largest risk group was white men, whereas there was no difference in risk between black men and women (Hsi, 2018).

2.4.2.4. Genetics

Twin studies indicate the heredity of nephrolithiasis to be more than 45 percent, whereas the heritability of hypercalciuria to be larger than 50 percent. Multiple genes and biological pathways have been linked to an increased risk of developing stones through genome-wide association and candidate gene studies. Studies on kidney stones have used a variety of genetic approaches, including monogenic and polygenic factors, as well as transporters and channels, ions, protons, and amino acids, as well as pathways involving the calcium-sensing receptor (a G protein-coupled receptor) signaling pathway and the metabolic pathways for vitamin D, oxalate, cysteine, and purines or uric acid. Patients with nephrolithiasis will benefit from more accurate therapies in the future owing to these improvements in our understanding of the disease's pathophysiology (Howles, 2020).

2.4.2.5. Geographical location

Variations in kidney stone pathogenesis between demographic groups can be traced back to environmental factors. According to studies of patients with urological conditions, kidney stones can be linked to a variety of factors such as gender, race and location, as well as a poor diet (high intake of caffeine and salt), as well as a high level of alcohol consumption (as well as a lack of physical activity and dehydration), as well as a lack of education and the quality of the water (Khalili, 2021).As a result of environmental factors such as temperature and moisture levels, there is a high occurrence of kidney stone disease in mountainous, deserted, or tropical areas. Stone supremacy has been related to warmer locations such as the United States, the British Isles, Scandinavia, and the Mediterranean countries, northern India and Pakistan, northern Australia, Central Europe, and portions of the Malay peninsula and China. There are many environmental elements that might contribute to the development of stone disease, and this is especially true. Heat and aridity affect the urinary system differently in different people (Han, 2015). An relationship between higher temperatures year-round and more frequent occurrences of stone formation has only been found in one study focusing entirely on the development of stones in the United States. Nephrolithiasis incidence may be influenced by temperature, according to this study (Shin, 2018).

2.4.2.6. Body mass index

Kidney stones can be caused by obesity and obesity, which are well-known risk factors. Kidney stones are more likely to form in men and women with a higher BMI, a larger BMI, and weight increase. As the BMI increases over 21.9 kg/m2, the probability of having kidney stones increases from 2.09 in young women to 1.90% in elderly women to 1.33% in males (Prochaska M. &., 2020). There was a relationship between a higher BMI, larger waist circumferences, and weight in a research by Taylor and colleagues. Inci and colleagues found that stone formers had significantly higher BMIs, suggesting that BMI and various types of urinary stone formation may be linked. It was revealed that postmenopausal women with a higher BMI were 1.30 times more likely to have kidney stones than those with a BMI in the normal range (Sorensen et al., 2014). In a retrospective study of 1698 stone-forming patients, Trinchieri and colleagues found that overweight and obese persons had more urine calcium, oxalate, and urate excretions than non-obese patients. However, this group's excretion of citric acid was higher (Trinchieri, 2017). Oxalate excretion was shown to be strongly correlated with body weight/surface area, according to Lemann and colleagues. Obese women exhibited greater levels of sodium, uric acid, sulphate, and phosphate than non-obese women (men >120 kg and women >100 kg), according to data from the National Health and Nutrition Examination Survey (NHANES). Obese males had higher amounts of sodium, oxalate, uric acid, sulphate, and phosphate (Poore, 2020).

2.4.2.7. Physical activity

It was shown that physical activity and the self-reported occurrence of kidney stones were linked by Feng et al. (2020). This study analysed data from 2013 to 2016 from NHANES individuals under the age of 20. kidney stones were detected by completing a routine questionnaire, while METs (metabolic equivalents) were employed to quantify physical activity. A logistic regression was performed to explore the association between physical activity and kidney stones, and RCS was utilised to investigate the dose-dependent relationship (Feng, 2020). There is a plateau in the association between physical activity

and kidney stone prevalence after which an increase in physical activity does not improve the prevalence of kidney stones

2.4.2.8. Migration

It's not known how much migration affects the likelihood of developing nephrolithiasis. Migration might affect the frequency of nephrolithiasis in a nation. Males and females in the 30-34 age bracket account for a disproportionate share of foreign migrants, suggesting that a preference for those in the lower half of the working age spectrum (20-64) is to blame (United Nations, Department of Economic and Social Affairs Population Division, 2017).

2.4.2.9. Animal protein

Kidney stones are caused by toxic quantities of animal protein, and this is widely agreed upon in the scientific community If you consume too much animal protein, your body will begin to break it down. The body turns amino acids like proline and hydroxyproline into poisonous organic waste products like oxalate. Animal proteins have a substantially greater percentage of hydroxyproline and proline than plant-based proteins do. These organic waste molecules will enter the circulation as a result of the kidney's natural filtration function. As a result of the higher concentration of waste molecules in the urine, waste molecule crystallization with calcium ions is more likely. By the time you've digested all of your amino acids, your environment's pH has dropped. The metabolism of animal proteins puts kidneys at risk for nephrolithiasis by reducing pH levels in the blood and urine and raising levels of organic waste molecules that crystallize with ionic calcium. These precursors ultimately lead to increased stone formation. No one animal protein is completely free of these high-risk amino acids, hence there is no one-size-fits-all animal protein. Because they include acceptable amounts of each of the 20 necessary amino acids, meat, poultry, and eggs are considered complete protein sources, but they also contain significantly greater quantities of detrimental amino acids that raise pH and increase the stress on kidneys (Kok, 2012).Fish proteins have more vitamin B6 and less oxalate-forming amino acids. They also have a lower total sulphur amino acid content.

Calcium oxalate stone formation is negatively associated with vitamin B6 intake. Additionally, animal protein consumption influences the development of metabolic illnesses like obesity and type 2 diabetes, which are often linked to each other. Type 2 diabetes is more common in nations where the bulk of their population's dietary energy consumption comes from animal protein. Consider the relationship between a diet rich in animal protein and nephrolithiasis with care because diets high in animal protein are frequently associated with diets high in fat and salt intake, but low in vitamin intake (Shang, 2016). According to two different investigations, an increased risk of kidney stone disease was linked to a larger intake of carbohydrate-rich meals including cereals and grains as well as caffeine (Ryu, 2018).If you consume a lot of calcium oxalate, your risk of forming a calcium oxalate stone increases (Turner, 2015).

1-Sodium and carbohydrate intake by increasing the excretion of urinecalcium.

2-Animal protein increases urine calcium and uric acid excretion while decreasing urinary citrate excretion.

3-When vitamin C consumption and excretion are increased, calcium oxalate stones are more prone to develop.

4-Several dietary components and methods can minimise the occurrence of calcium oxalate stones (Turner, 2015).

5-Calcium levels rise when oxalate levels are lowered in the intestines

6-Potassium-rich foods increase urinary citrate excretion while decreasing urinary calcium excretion.

7-Calcium oxalate crystals are prevented from forming by phytate .

8-Magnesium consumption reduces dietary oxalate absorption and inhibits the formation of calcium oxalate crystals.

9-Vitamin B6 deficiency promotes oxalate production and causes oxaluria.

2.4.2.10. Sugars and other sweeteners

The onset or course of a wide range of metabolic illnesses can be influenced by a person's sugar and sweetener consumption. Diabetes, heart disease, and renal disease can all be exacerbated by excessive sugar consumption. Elevated blood sugar levels decrease urine water availability, which increases the risk of stone crystals developing and finally resulting in stones. The biochemical composition and contents of blood are more sensitively influenced by many sugars than by a single sugar in isolation. Fructose metabolism raises uric acid levels in the bloodstream. Uric acid kidney stones are more likely to form if nitric oxide levels are reduced, which is essential for insulin action and can lead to long-term diabetes. Diabetes type 2 is associated with an increased risk of kidney stone development as a result of impaired insulin action in the circulation (Shin et al., 2018).

2.4.2.11. Calcium and vitamin D

Humans should take calcium and vitamin D supplements to avoid bone demineralization caused by vitamin D receptor signalling (Shin, 2018). When rats were fed a calcium-rich diet and given long-term vitamin D treatment, we wanted to see if this increased the incidence of kidney stones. Each of four groups of rats received either vitamin D supplementation (100,000 UI/kg), a calcium-enriched diet alone, or a conventional diet for a 6-month period (controls). Serum and urine parameters, as well as crystall uria, were all monitored. In addition to von Kossa/Yasue stains and SEM, 3D micro-computed tomography, and infrared spectroscopy were utilised to investigate kidney stones. Rats receiving vitamin D had higher urine calcium excretion over time than those receiving calcium alone or calcium + vitamin D alone, even though their blood calcium levels were

the same in all four groups. On the other hand, calcium excretion in the urine was unaffected by oral calcium supplements. As of six months of age, rats given both magnesium and vitamin D acquired significant kidney calcium depositions, but not those given either magnesium or vitamin D alone (mean volume, 0.121 mm3). Thus, in this rat model of tubular calcifications (or kidney stones), increasing calcium intake and vitamin D injection synergistically improved outcomes. Vitamin D supplementation plus a high calcium consumption can lead to an increased risk of kidney stone development in people (Letavernier, 2016).

2.4.2.12. Micronutrient consumption

Kidney stones can't develop without the micronutrients sodium, oxalate, and calcium. Salt causes both calcium and nephrolithiasis. Blood-soluble salts are absorbed differently by the kidneys' cells proximal tubule when present. Sodium ions attract water molecules in the surrounding environment, which affects urea concentration and the saturation levels of other minerals. There is an increase in the concentration of uric acid and oxalate in the urine when this occurs. Other crystalline salts in the urine become more concentrated as a result (Han, 2015). Oxalate, an organic waste molecule that can constitute a major health threat when present in food, can be dangerous in excessive quantities. When oxalate rapidly binds to calcium, crystals of calcium oxalate form in the kidneys. There are a lot of calcium oxalate stones in the world, and they account for the bulk of instances. Oxalate levels in the urine are significantly influenced by dietary oxalate intake. However, the breakdown of amino acids and vitamin C in meals high in oxalate can also create oxalate. When amino acids are broken down, glycine and hydroxyproline generate the most oxalate. All stone interactions are propelled by calcium, a mineral. It is responsible for the formation of every variety of stone. Calcium is necessary for muscular contraction and bone density support in healthy people, thus it must be included in the diet. There are two ways that the body can compensate for a lack of calcium in the diet: by swapping it from calcium storage areas like bone, or by absorption of calcium from the small intestine (Nouvenne, 2008).It is possible to notice higher amounts of calcium in the urine because most of it is absorbed in the small intestine and the kidneys take up relatively little of it (Sorensen, 2014) . Calcium ions can form crystals that can combine to create kidney

stones if there is a high concentration of calcium in the urine (Yiu, 2015). Oxalate and phosphate-forming molecules, which bind in the digestive tracts, can bind everywhere in the body, therefore a high intake of calcium is necessary to facilitate their elimination (Bong, 2017). Because of its ease of excretion in the urine and little risk of producing traditional stones, magnesium is an effective treatment (Słojewski, 2011). Oxalate magnesium concentrations in the urine and intestine are not harmful to the body, but they may stimulate the formation of calcium phosphate stones in certain physiological conditions. A magnesium phosphate aggregate can form brushite stones, a calcium phosphate stone and struvite stones, a struvite stone when urine concentrations of magnesium phosphate are high enough (Han, 2015).

2.4.2.13. Fluid intake

By diluting urine, decreasing urine acidity, and eliminating excess salt, increasing fluid consumption may help prevent the formation of stones in the urinary tract.. In epidemiological research, daily fluid consumption of at least 2.5 L of urine output per day has been found to be protective against kidney stone development. A correlation between fluid consumption and the risk of developing kidney stones is recognised, but the exact quantitative nature of this association and the particular effects of various fluids on this risk have not been fully confirmed. We conducted a systematic review and dose–response met analysis in attempt to evaluate the relationship between fluid consumption and kidney stone risk. 9601 instances and 351,081 participants were found in 15 studies after a search of PubMed, Embays, and the Cochrane Library database. The dose–response meta-analysis found that for every extra 500 mL of water consumed, the chance of developing kidney stones was reduced by 14 percent (RR 14 0.93; 95 percent CI: 0.87, 0.98; P 0.01). Drinking tea (RR 14 0.96; 95 percent CI: 0.93, 0.99; P 14 0.02) and alcoholic beverages (RR 14 0.80; 95 percent CI: 0.75, 0.85; P 0.02) were also shown to have a protective impact on cardiovascular health. The risk of kidney stones appears to be increased when coffee is consumed (RR 14 0.88; 95 percent CI: 0.76, 1.00; P 14 0.05). Kidney stones were not significantly increased by juice (RR 14 1.02, 95 percent CI: 0.95-1.10; P = 0.64) or soda (RR 14 1.03, 95 percent CI: 0.90-1.17, P = 0.65) consumption. Subgroup and sensitivity studies on coffee, alcohol, and milk intake came up with conflicting results,

but the overall picture was unclear. Drinking tea and alcoholic beverages may help prevent kidney stones in addition to increasing water consumption. People were advised to drink eight glasses of water a day on average in order to prevent kidney stones (Xu, 2015). Every 200 mL of fluid consumed per day reduces kidney stone risk by 13%, making fluid intake one of the most important dietary therapies to reduce kidney stone risk (Littlejohns, 2020). Despite this, the great variety of beverages available means that not all of them are equally protective. They're growing more and more popular with the general population in the United States, where they're most prevalent. This beverage has an average 150 calories per 350 mL serving of fructose. The increased excretion of calcium, oxalate, and uric acid that fructose generates has been related to an increased risk of kidney stones. That those who drink a lot of soft drinks have an increased risk of kidney stones isn't a surprise. A study of three large cohorts (the Health Professionals Follow-Up Study, the Nurses' Health Study I, and the Nurses' Health Study II) involving 194,095 participants and a median follow-up of more than 8 years found that more than one serving of sugar-sweetened non-cola per day, compared to less than one serving per week, was linked to an increased risk of kidney stones (Ferraro P. M.-4., 2013). An interesting finding from the same cohorts was that those who consumed more than 500 milligrammes of caffeine per day had a lower risk of acquiring kidney stones (26 percent, 29 percent, and 31 percent, respectively, depending on the cohort For whatever reason, the risk of kidney stones does not appear to be increased by drinking grapefruit or apple juice, however (Ferraro, 2018).Orange juice drinkers also had a 12% reduced risk of getting kidney stones than orange juice abstainers (Ferraro P. M.-4., 2013). Over time, the rate at which patients developed kidney stones was reduced from 1.00 to 0.13 per patient per year when they drank 2 L of lemonade diluted to 120 mL with concentrated lemon juice. When it comes to the effects of caffeine on the human body, it has been related to increased excretion of potassium and calcium as well as decreased excretion of oxalate. Apple juice has a greater citrate concentration but a lower sugar level than citrus juices. While orange juice and lemon juice both contain citrate, the latter appears to deliver an alkali load, elevating both urinary citrate excretion and net gastrointestinal alkali absorption as well as urine pH. Another discovery that demonstrates the significance of the citrate's accompanying action is the discovery of an anti-alkalinizing proton, similar to that found in lemonade (Ferraro P. M., 2020).

2.4.2.14. Gout

Nephritis (renal inflammation) can occur in the kidneys as a result of a decreased renal filtration rate induced by renal failure. Men with gout are more likely than the general population to develop uric acid stones, which account for 5–10% of all reported cases (Jankeer, 2020).

Phosphorus and uric acid, two products of purine catabolism shared by nucleic acids and excreted from the body through urine, are the result of a failure of purine metabolism (Saigal, 2015).

2.4.2.15. Urinary tract infection

Urolithiasis and urinary tract infection have a complex relationship. Urolithiasis is commonly accompanied with a urinary tract infection (UTI), which has been related to the onset of urolithiasis. When compared to the general population, urolithiasis was shown to be more prevalent among UTI patients in our research. An increased risk of bacteremia, uroseptic shock, and AKI has been demonstrated in UTI patients with urolithiasis. in (AKI) (Hsiao, 2019).

2.4.2.16. Gastro-intestinal disease

Kidney stones and gastrointestinal (GI) diseases have been linked in several research. Nephrolithiasis is more closely associated with the disorders listed in Table 1. Despite the fact that the relationship is merely indirect, it is probable that certain instances of Zollinger-Ellison syndrome's peptic ulcer are connected to a MEN1 syndrome that includes hyperparathyroidism and nephrolithiasis. The incidence of nephrolithiasis in people with IBD has been studied, and it ranges from 4 percent to 34 percent. More persons of the same age and gender were impacted by these findings than were the normative participants by a factor of two. There appears to be a larger risk of stone formation in patients with Crohn's disease as compared to those with ulcerative colitis. In

addition, the illness is more likely to strike those with ileus and colon involvement. Patients who have had an ileal resection in addition to an intestinal resection are more likely to develop nephrolithiasis. These outcomes were also found in obese individuals who had had bariatric surgery, underscoring the necessity of abdominal surgeries (intestinal bypass). It is the most common kind of nephrolithiasis in those with gastroenteric disease. As many as 30% of these individuals may also suffer from mixed calcium and uric acid stones. There is a higher risk of uric acid stones in people who have had their colons removed. Kidney stones can arise at any age between the ages of 30 and 50 if you've been diagnosed with IBD. A. M (Nouvenne A. M., 2008).

Table 2.1 The most common gastrointestinal diseases are risks factors for urolithiasis formation.

GI Diseases
Crohn' s disease and Ulcerative Colitis
Celiac disease
Small Intestinal Bacterial Overgrowth (SIBO)
Chronic diarrhea
Intestinal blind loop syndrome
Intestinal resection
Ileostomy
Jejuno-ileal by-pass
Biliary diversion or obstruction
Hepatic Cirrhosis
Chronic pancreatitis
Prolonged fasting

2.4.2.16. Metabolic syndrome (MS)

As many as 30 percent of the American population is impacted by metabolic syndrome (MS), which involves obesity, hypertension and high blood levels of triglycerides as well as a reduced serum HDL cholesterol level.

Kohjimoto et al. (2013) evaluated whether the accumulation of metabolic syndrome features exacerbated kidney stone disease in a survey of 11,555 participants. 61.7 percent had at least one attribute, 65.2 percent had two characteristics, 69 percent had three characteristics, and 73.3 percent had four characteristics (p 0.001). Their findings show a correlation between obesity and diabetes, hypertension and dyslipidemia, as well as an elevated risk of kidney stone production. This study found that more than twice as many patients with four characteristics had multiple and/or recurring stones (OR 1.78; 95 percent CI, 1.22-2.266) than those with zero qualities (Kohjimoto, 2013).

2.4.2.17. Diabetes mellitus (DM)

Patients with chronic renal disease are increasingly aware of the negative consequences of type 2 diabetes on kidney function as the condition's prevalence continues to rise across the world (CKD). Type II Diabetes patients are at an increased risk of developing kidney stones because of insulin resistance, which lowers the urine's pH significantly. When the pH of the urine changes, uric acid, citrate, and salt concentrations all rise, which in turn causes an increase in uric acid stone formation and calcium stone development (Strohmaier, 2012). Researchers from Hamzawy et al. conducted a study on biochemical risk factors for kidney stones in patients with diabetes (2019). Magnesium levels decreased in diabetics with renal stone disease, according to this study that reported greater 24-hour urinary uric acid, calcium, oxalate and magnesium levels as well as reduced magnesium and citrate levels in the urine. Blood reduced glutathione levels fell while urine nitric oxide levels and parathyroid hormone increased (Hamzawy, 2019).

2.4.2.18. Hypertension

Having high blood pressure raises the risk of heart disease and kidney stones. It is difficult for the kidneys to remove waste and operate properly when blood vessels are damaged by high blood pressure (Glover L. M., 2015). Our study by Sofia et al. found a relationship between diabetes, hypertension, and renal calculi (2016). Changing one's lifestyle can help reduce the frequency of stone assaults. You should drink at least two to four litres of water each day to avoid dehydration, but specific meal suggestions aren't available until the stone in your urinary system has been analysed and treated. In the wake of a dietary assessment, adjustments might be made (Sofia N. H.-1., 2016).

2.4.2.19. Dyslipidemia (DLD)

Dyslipidemia increases the risk of stone disease. Even while LDL and triglyceride levels were not connected with an increased risk of stone disease, HDL values of 45 in males and 60 in women were. To determine if a medicine can lower both atherosclerosis and

nephrolithiasis risk concurrently, lipid levels should be assessed (Masterson, 2015). Blood Cholesterol and Other Problems (Metabolic syndrome) In addition, studies have found a connection between kidney stones and hypertension, obesity, and diabetes. Cholesterol levels rise as a result of fatty deposits in blood vessels. According to research, those with high cholesterol levels are more likely to develop kidney stones (Torricelli, 2014).

2.4.2.20. Cardiovascular disease and stroke

Researchers have found a substantial association between kidney stones and cardiovascular disease and stroke, based on previous studies. Olmsted County, Minnesota, has 4564 stone-forming occurrences, according to Rule et al. (2010). Those who have had kidney stones were shown to be 38 percent more likely to have a heart attack than the general population (HR 1.38; 95 percent CI 1.07-1.77). Even after controlling for comorbidities including kidney illness, hypertension, diabetes, and obesity, the risk of developing these diseases remained high (HR 1.31; 95 percent CI 1.02 to 1.69). After adjusting for characteristics such as high blood pressure, diabetes, elevated cholesterol, and BMI, Ferraro et al. (2013) showed that participants with a history of kidney stones had a higher risk of coronary heart disease in the Nurses' Health Study I and II cohorts (95 percent CI 1.07 - 1.90). A history of kidney stones has also been linked to an increased risk of coronary heart disease in more recent studies. Over 52,000 kidney stone patients were studied in four cohort studies and one cross-sectional study by Cheungpasitporn et al. (2014). According to the computed pooled risk ratios, kidney stones and coronary heart disease have a substantial association (RR 1.24; 95 percent CI 1.10-1.40). Results for men, on the other hand, were no longer as significant as they had been for women (RR 1.14; 95 percent CI 0.94-1.38). (RR 1.34; 95 percent CI 1.12-1,82). In the words of Prof. Ferraro (Ferraro P. M.-4., 2013).

2.4.2.21. Exposure to harmful chemicals

Heavy metals can have a deleterious influence on a variety of biological systems, including the kidneys, through both environmental and occupational exposure. Even

small levels of metals that are not required by the body can induce lung sickness, cardiovascular disease, various kinds of cancer, and renal failure (Słojewski, 2011). Heavy metals create calcium stones because they have a similar charge and may readily be replaced for other available ions in the urine. Cadmium is a heavy metal often used in construction and industry to prevent steel from corroding. Cadmium is a highly toxic metal, and there is no known biological use for it. Because it is a calcium-competitive inhibitor, cadmium can cause an increase in urine calcium concentrations. Due to the development of tubular protein-urea, long-term cadmium exposure can induce kidney damage. Lead and other heavy metal pollutants may be found in virtually every product. However, despite widespread health warnings and widespread consensus that lead is hazardous to human health in industrialised countries, it is still frequently used there despite these warnings. Lead is also commonly used in the manufacture of paint and gasoline. Even a little amount of lead exposure can have a significant impact on a person's kidney function. The surge in the generation of uric acid is one such example. When uric acid levels rise, the kidneys have a harder time absorbing nutrients, which can lead to nephrolithiasis (World Health Organization, 2017).

2.4.2.22. Medications

Drugs now on the market may be helpful to cure kidney stones, but they may also have adverse effects that increase the chance of developing nephrolithiasis. This can be helped by a number of drugs, such as acetazolamide and beta blockers like warfarin and lithium chloride, as well as vitamins K and D and calcium supplements. Acetazolamide, a carbonic anhydrase inhibitor, is commonly used by glaucoma patients to decrease ocular pressure and treat their disease. From renal tubular acidosis, calcium phosphate can build up in the renal tubule (Scozzafava, 2014).

Vitamin K is administered to prevent excessive bleeding. Vitamin K deficiency may induce osteoporosis, atherosclerosis, and other calcium deposit disorders in the body. Ca2+ supplements can be used to treat calcium deficiency. Calcium supplements are readily available to the general public. Healthy Navy privates who take calcium supplements have seen a decrease in oxalates and an increase in citrate in their urine. Fat-

soluble vitamin D supplements are commonly utilised in the treatment of osteoporosis because of their role in calcium regulation. Low vitamin D levels are seen in more than half of women with osteoporosis, and this has been connected to a variety of other health problems, such as cardiovascular disease, cancer, and renal illness. Vitamin D deficiency was found in 31 percent of 456 individuals who had calcium stones, increasing the possibility that vitamin D plays a role in the formation of calcium stones. In the table above, you can find the medication list. With warfarin, blood clots can be prevented. Chronic kidney disease (CKD) sufferers may have renal damage as a result of the drug's usage. Renal damage is most commonly caused by haemorrhage and red blood cell tubular casts. Doctors frequently prescribe lithium chloride as an antidepressant. The long-term use of high amounts of lithium can induce renal damage. However, animal studies demonstrate that a little amount of lithium may be useful in preventing kidney illness caused by oxidative stress (Alsady, 2016) .

2.5. Mechanisms of stone formation

In order to make stones, this is the very first step: After a certain concentration of salt has been added to a solution (urine), the solute dissolves until the solution is saturated and the salt crystallises. While crystallisation inhibitors and promoters, which are ubiquitous in urine, might change the saturation concentration, urine is often characterised as metastable with regards to the majority of stone components. Super saturation can still be increased enough to allow crystal nucleation. Free solute ions distributed in the solvent (urine) become solid during crystal nucleation and form particles (Rodgers, 2017). Many different micro-environments may be found in the free solution as well as cell surfaces of the kidneys (Figure 2). (Khan et al., 2016). In the event that crystals have already been nucleated in solution, their surface can serve as a nucleation site for new ones. To aid in the aggregation process, the organic matrix between the stone's crystals can be made up of a variety of different protein-lipid-polysaccharide-glycoprotein mixtures (PGP).

In the renal calyces or pelvis, stones can either be free-floating or attached to renal papillae. Stag horn-shaped struvite stones are common in the renal calyces in the pelvis. If a stone is more than 5 mm in diameter, the ureter and bladder may be obstructed. The

length of the ureter is between 25 and 30 centimetres for a typical adult ureter. B) There are two theories as to how a stone nidus is formed. There is a precipitation of CaCl2 phosphate in Henle's basement membrane, which leads to aggregation in the interstitium and eventual eroding of the renal glomerulus. Randall's plugs are caused by the free-particle process, in which crystals form in the renal tubules and then aggregate to clog the terminal collecting ducts. Plaques and plugs exposed to the renal pelvis serve as a nidus for further crystal deposition from oversaturated pelvic urine. Servier Medical Art's picture templates were used and modified under the terms of a Creative Commons Attribution 3.0 Unported License. He originally referred to the two main stone-creation ideas (Figure 1B) by the names of "plugs" and "plaques" (Figure 1B). Purine over-saturation is thought to cause kidney crystal formation, which subsequently forms an obstruction in the terminal collecting duct connecting to the renal pelvis in humans, according to the "free particle model (Khan, 2016).

These plugs act as a breeding environment for crystal deposition and the production of stones when exposed to urine. These crystals of calcium phosphate are found in Henle's basement membrane or the vasarecta of Randall. These crystals begin to accumulate in the interstitium and finally erode away at the papillary surface. Crystals of calcium phosphate (CaP) are seen in the pelvic urine and act as a source of CaOx crystals. When it comes to the formation of CaOx stones and subsequent examinations, Randall's plaques have been proven to be the source, and CaP is commonly found around the nidus of these rocks (Xie, 2015).

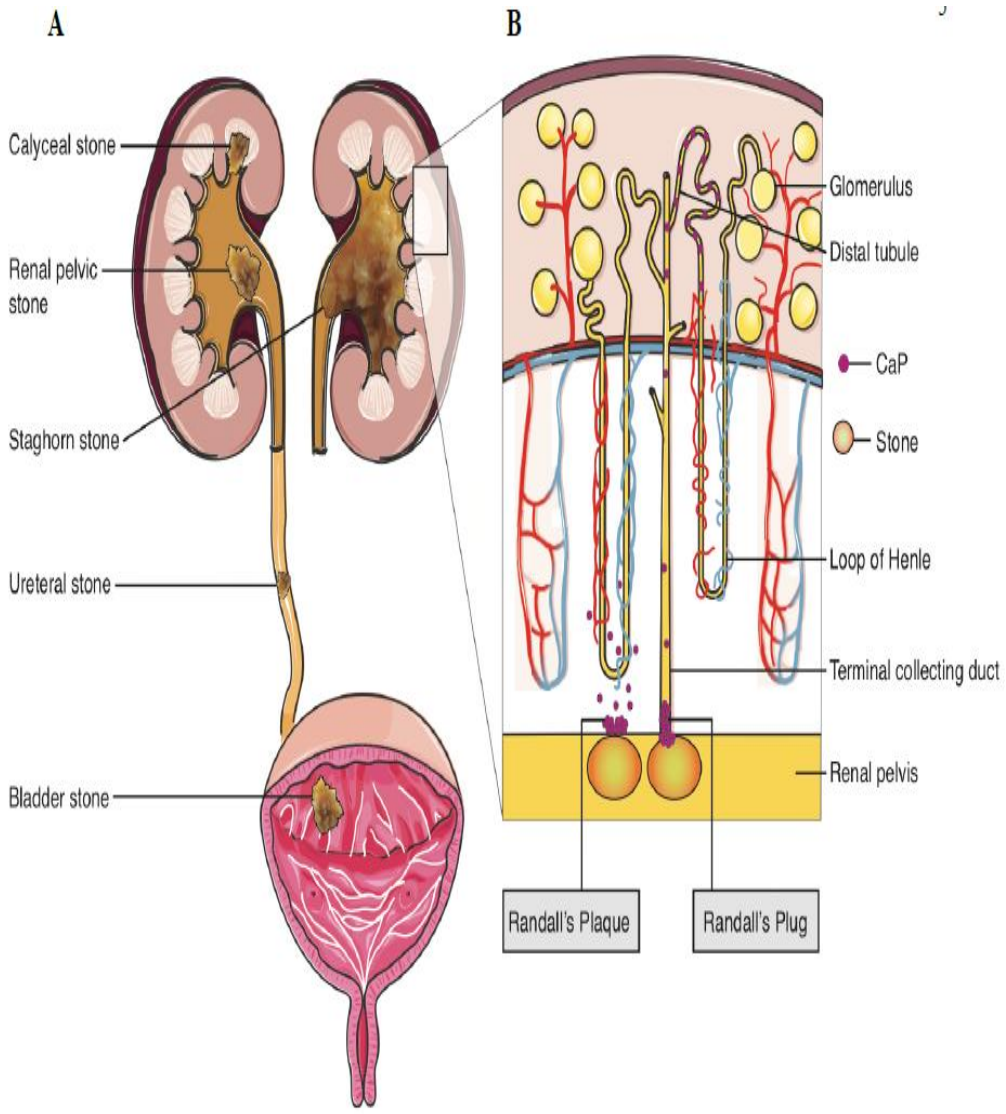

Figure 2. Anatomy of the urinary system and mechanisms of stone nidus formation (Renuka, 2020).

2.6. Previous studies

- An international investigation by Aldaher et al. (2021) indicated an increase in the prevalence of kidney stones. Some experts believe that kidney stones might be induced by a person's lifestyle and even climate change. Research on kidney stones in the United Arab Emirates (UAE) has been limited to a small number of patients. An investigation on the occurrence and knowledge of kidney stones in the United Arab Emirates is the goal of this study. A self-administered questionnaire was used to collect data from 515 participants aged 20 to 49 from the emirates of Abu Dhabi,

Dubai, Ajman, and Sharjah. IBM SPSS version 25 was used to analyse the data. The average knowledge score was (n = 500). One's own experience with kidney stones was not linked to one's knowledge of the problem. Consequently, a family history of kidney stones increases the likelihood of developing stones by 2.27 times. Those who reported their symptoms, diagnosis, and treatment for kidney stones had a high degree of awareness and comprehension of kidney stones. On the other hand, this group's understanding of dietary constraints was limited. Doctors were shown to be twice as important as the Internet and mainstream media in educating the public. Aside from basic information regarding kidney stones, the participants in this research study in the United Arab Emirates were completely unaware of the disease's possible hazards. Clearly, health education programmes aimed at preventing kidney stones are needed (Aldaher, 2021).

- A study by Wang et al., (2021) examined the association between the composition of urolithiasis and the composition of the urine component in order to predict the risk of recurrence. Analysis of the components of the kidney stones, as well as the urina sanguinis obtained before to surgery, was carried out in this study. The study's 223 participants were split evenly across sexes, with men making up more than half of the participants. Based on the mineral composition of the stones, the cases were divided into three groups. Patients who had single calcium oxalate stones were counted as well as those who had numerous calcium oxalate stones and those with other kinds of stones. Each chemical group was shown to have a link with the other members. The multivariate logistic analysis found that reduced urine magnesium and uric oxalic acid were independent risk factors when comparing the patients to the normal control group.. An independent risk factor was found in the urine magnesium levels of the single calcium oxalate group. Urine magnesium and uric oxalic acid levels were shown to be risk factors in the mixed calcium oxalate group. When the other stone group was compared to a normal control group, no risk factors were observed. As a last point, it can be claimed that the components of stones and the urine's chemical makeup were obviously connected. Possible risk factors for urolithiasis include the presence of certain chemicals in the urine (Wang, 2021).

- To conduct an observational cross-sectional study, Baatiah et al. (2020) supplied a self-reported questionnaire in two big Jeddah malls. The study included 2173 Saudi and non-Saudi participants over the age of 18. Demographics, general urolithiasis information, urolithiasis-specific dietary information, lifestyle habits, and medical conditions are all covered in the survey. An estimated 11.2% of the population has urolithiasis, with 48.8% of those people having a first-degree relative that is afflicted. Urolithiasis was 1.8 times more common in males than in women (odds ratio =1.8, 95 percent confidence range =1.4–2.4) The median age at which stone disease was identified was (25–75 percent: 26–42 years). More than three times as many people with diabetes had urolithiasis as those without diabetes (OR = 3.2, 95 percent confidence interval 2.0–4.9). This cohort had a low awareness rate of 64.1 percent, and a medium awareness rate of 35.3%, with just 37.7 percent of its members having a high level of cognition. Most of those with high awareness were 0.6 percent. According to this study, the general population has little knowledge about urolithiasis, despite the fact that it occurs frequently. Preventing urolithiasis can be accomplished through public awareness campaigns that highlight the known risk factors (Baatiah, 2020).

- Renuka and Poongodi, (2020) conducted a study to identify risk factors for renal calculi among patients who went to nephrology and to determine the link between the risk factors for renal calculi and selected demographic features of patients with renal calculi. Sources and methods: Retrospective research was employed in the study (Quantitative Approach). Thirty people with renal calculi were selected through the use of a purposeful sample. Using an open-ended questionnaire, descriptive and inferential statistics, such as frequency, percentage, mean, standard deviation, and Chi-square test, were analysed. 12 (43%), 19 (78%) and 23 (79%) of the participants in the study drank at least 3 litres of water a day, whereas 10 (40%) had diabetes mellitus, according to the findings. A total of 19 individuals (64%), 11 individuals (36%), and eighteen individuals (76%), declared that they used or did not take drugs. Thirteen (62 percent) of the samples were found to have weekly alcohol use, while 18 (64 percent) were found to have weekly meat eating. There were 16 (70%) who had a history of UTI, 23 (82%) who had no history of immobility, and 26

(86%) who voided urine 3–5 times a day, according to the findings. Milk or milk derivatives were reported to be consumed daily by 22% (or 84% of those polled). Age, gender, and salt intake were found to be associated with genetic chronic disease. Hereditary chronic illness and lower educational attainment were also shown to be linked. Those at high risk for developing renal calculi were educated on how to avoid and treat the illness. This study has been useful in determining risk factors and forecasting the future (Renuka, 2020).

- Al-Otipi et al. (2020) carried out a qualitative, cross-sectional study in 2019 at Saudi Arabia's Taif University, where Al-Otipi et al. The inquiry also included a poll of the general public. Researchers want to gauge how much participants know about the dangers of kidney stones and the characteristics of those who are more aware of those risks. Technique: Over the internet, Saudi citizens were offered the opportunity to complete a self-administered survey. The research included information on demographics, awareness of kidney stone risk factors, and prevention methods. For awareness of kidney stone risk factors, there was a mean score of 65.19 11 out of 95 There is a statistically significant difference between the genders of pupils (P-value = 0.043). Only single people, medical professionals, and participants with relatives or friends with a positive history of kidney stones had lower scores than the rest of the groups studied (p-value = 0.003). Some experts claim that Saudi citizens' knowledge of the risk factors for kidney stones is lacking. If fresh study is undertaken throughout a large swath of Saudi Arabia, it is feasible to get accurate estimates of the country's knowledge level (• AlOtipi & Med, 2020).

- Research by Moussa and Abou Chakra (2019) on the perception and compliance of patients with kidney stone prevention was descriptive quantitative. Additionally, it identifies the attitudes and practises of primary care physicians towards the prevention of kidney stones. An emergency department diagnosis of a kidney or ureteral stone was made for all 99 patients in this research, and they were all sent home between January 2018 and January 2019. A self-administered questionnaire or a question and answer session with the ED resident were offered to those who were able to read. Sixty-eight percent of patients in the emergency room didn't obtain any

advice on how to avoid getting kidney stones. These patients are more likely to be well-educated (p 0.05), insured (p 0.05), and to earn more than $1,000 per month than those who do not follow the doctor's directions. 71% of patients believe that stone avoidance is beneficial, and the vast majority of them are eager to learn more (82 percent). Asked why they didn't follow the advice for kidney stone prevention, patients mentioned high costs (53.1 percent) and a lack of explanation from emergency department doctors as their top explanations (18.8 percent). Although many patients in our ED stated a wish to avoid kidney stones, only a small percentage of them actually underwent any preventative steps. Social and economic concerns accounted for the majority of their disobedience, as well as a lack of explanation. If these instructions were included in the ED, the compliance rate may be satisfactory (Moussa, 2019).

- Alghamdi et al. (2018) conducted a cross-sectional study in Albaha, Saudi Arabia, to assess the general public's knowledge of kidney stone symptoms and an appropriate diet. Data was gathered through the use of public surveys in Albaha City, Saudi Arabia. First, participants had to fill out a brief bio, and then they were tested on their knowledge of the most common symptoms and effects linked with kidney stones in the second section of the study. As a consequence, 417 persons were signed up for service. Married women aged 34 to 49 with some college education made up the majority of those surveyed. Renal stones were unknown to most people. More than one-half of the people surveyed had no idea there were any of the eight potential danger factors (0.2 percent). Some signs and symptoms were misinterpreted, and some foods were linked to urban legends (fish and sea food, greens and spinach). Many misconceptions about kidney stone risk factors and symptoms were addressed in the conclusion of this study. There was a lack of knowledge on the role diet plays in the treatment of renal stones. It is on these inadequacies in attitude and knowledge that educational efforts should be concentrated. Patients' instructions and health education should include information about kidney stone disease, as this is where the bulk of participants obtain their information (Alghamdi, 2018).

- It was determined by Abdulrida and Kadhim, (2015), that several demographic factors (age, gender, and level of education) were associated with the patient's awareness of preventing recurrent Urolithiasis. Researchers from the Al-Kindy Teaching Hospital carried out a descriptive quantitative study between the 11th of July 3112 and the 31st of August 3112. This non-probability (Purposive) study comprised urolithiasis patients who had seen the Extra Corporal Shock Wave Lithotripsy (ESWL) department within the previous 11 years

More than 11 years old were included in this non-probability category (Purposive sample). Six items on sociodemographic data and 22 questions on the factors that contribute to recurrence are included in a semi-constructed questionnaire used to collect data from Urolithiasis patients directly. The validity and reliability of the questionnaire are determined by a pilot study and a panel of thirteen experts. The data was described and analyzed using descriptive and inferential statistical methods. Results: In this study, it was shown that patients had a poor understanding of how stones develop and behave, as well as the lifestyle factors that influence stone recurrence such as diet, fluid intake, family medical history, physical activity, and medication use. Men are more likely than women to have urinary stones because they are more likely to be married, have a lower socioeconomic position, and have a family history of urinary stones, according to the findings of this study. All urology departments in Iraq's hospitals should include an educational section on how to avoid urolithiasis, as well as provide patients with a leaflet on the risk factors for urolithiasis (Abdulrida, 2015).

3. MATHERIAL AND METHOD

The study's research design is described in this chapter.

3.1. Design of the study

In order to gauge patients' understanding of the contributing causes to recurrent urolithiasis, a descriptive research was conducted 25-12-2021 until 25-05-, 2022, in Tikrit Teaching Hospital.

3.2 Setting of the study

Study locations included tikrit Teaching Hospital in tikrit city.

Table 3.1 Setting of the study

No.	Hospital name
1	Tikrit Teaching Hospital

3.3. Sample of the study

One hundred adult patients who matched the inclusion criteria and were enrolled in urology outpatient clinics at tikrit teaching hospital were included in the research as a non-probability (purposive) sample Between 25-12- 2021 and25-05- 2022 , each patient's data was gathered

3.3.1. Inclusion criteria

The sample was collected according to following criteria:

1. Patients that are 18 years of age or older.

2. Patients having a kidney stone diagnosis.

3. Patient who was treated for a kidney stone and is now doing well.

4. Participants in the present study who voluntarily agreed to take part in it.

3.3.2. Exclusion criteria

1. This includes patients who opted out of the trial.

2. Patients who have life-threatening illnesses.

3.Patients at mental health facilities.

4. İlliterate individuals

3.4. The study instrument

The following steps were used to build instrument

A review of the relevant literature that has already been published.

Twenty (33) items make up the framework of the questionnaire, which includes an introduction page that encourages participants to engage

Part I: Socio- Demographic Information Sheet:

It includes six categories: age, gender, academic level, marital status, kind of study, and location

Part II: Patients Knowledge toward Risk Factors of Recurrent of Urolithiasis:

Items, a total of 33 questions, and a total of 10-15 minutes to answer each of the 33 questions on knowledge are included in the test. No further written test was required for the questionnaire, which had just multiple-choice questions with tick-marking alternatives. Students felt compelled to provide truthful responses (AlOtipi, 2016). (Almuhanna, 2018) (Icer, 2019) (Muhbes, 2012) (Abdulrida, 2015) (Bos, 2014) (Shin, 2018).

3.5. Methods of data collection

Data was collected by using method which included:

1-Patients who are unable to communicate verbally or in writing may utilise a combination of self-reporting and a structured interview.

2-Interviews took done in tikrit teaching hospitals' outpatient urology clinics.

Each patient completed a questionnaire and an interview that lasted around 15 minutes.

3.6. Ethical dimension of research

Oral consent was obtained from the participants. Permission was obtained from the Ministry of Health from the Salah al-Din Health Department, Training and Human Development Center, Research and Knowledge Management Division, to enter the hospital and collect data. The Helsinki Declaration was adhered . The approval of the Ethics Committee at the Çankırı Karatekin University No. 23 on 12/20/2021

3.7. Statistical analysis

we used the convenient statistical methods in the data analysis which involved the following:

3.7.1. Descriptive data analysis

This approach was performed through the determination of: Frequencies (F), Percentage (%), Mean (x):

This approach was performed through the determination of Mean of score: was assessed for patiants' knowledge by three grades (poor, fair, and good) which were calculated through the following formula:

$$\mathbf{M.S.} = \frac{\sum_{i=1}^{r} \mathbf{F_i} \times \mathbf{S_i}}{\sum_{i=1}^{r} \mathbf{F_i}}$$

The data of knowledge were ordinal according to the two level scale which were scored as (correct answer = 2, incorrect answer =1) for each level respectively so the cut of point was (1.5) as calculated through following formulas.

Cut of point= 1+2/2=1.5

Poor knowledge (1- 1.33)

Fair knowledge (1.34 -1.66)

Good knowledge (1.67-2)

F- Mean of score: was assessed for patiants attitude by three grades (negative, acceptable, and positive) which were calculated through the following formula:

$$\mathbf{M.S.} = \frac{\sum_{i=1}^{r} \mathbf{F_i} \times \mathbf{S_i}}{\sum_{i=1}^{r} \mathbf{F_i}}$$

3.7.2. Inferential data analysis

3.7.2.1. C. contingency coefficient test (C.C)

Is a statistical test used to find association between two variables (Trajkovski, 2016), Furthermore Nieswiadomy, (2012) mentioned that C.C. is common statistical procedure in nursing studies to measure association between nominal variables.

4. RESULT

Study results are given below.

Table 4.1 Distribution of the patiants sample according to socio-demographical characteristics variables (n=100)

Patient Characteristics	**Groups**	**n**	**%**
Gender	Male	64	64.0
	Female	36	36.0
Age groups 34,2±14,00	18-29	39	39.0
	30-39	27	27.0
	40-49	19	19.0
	50-59	9	9.0
	60& Above	6	6.0
Level of education	Read &write	39	39.0
	Primary graguate	40	40.0
	Intermittite graduate	7	7.0
	Secondary graduate	9	9.0
	Institute graduate	4	4.0
	College graduate	1	1.0
Occupation	Employee	32	32.0
	Free work	24	24.0
	Unemployed	9	9.0
	Retired	2	2.0
	Housewife	29	29.0
	Student	4	4.0
Marital Status	Single	53	53.0
	Married	45	45.0
	Widoed	2	2.0
Family History	Yes	62	62.0
	No	38	38.0
Residence	Urban	87	87.0
	Rural	13	13.0

F=frequency, %= percent

According to the results of the data analysis, men made up 64% of the total participants in the current study. Most participants in the study were less than 29 years of age. One-third of patients (32%) are employed, and 40 % have finished primary school. Over half the patients were single while the rest were married, and data show that 87% of the participants had a family history of kidney stones. Finally, 76% of people lived in urban regions, while just 24% of people lived in rural areas.

Table 4.2 The mean of score of patients'knowledge concerning risk factors of recurrent urolithiasis

No	Items	Resp	F	MS	SD	A.D
1	Which of the following is not a recognized risk factor for kidney stone formation?	Correct	19	1.19	.394	P
		Incorrect	81			
2	All of the following digestive system is risk factors to increase kidney stone formation, except	Correct	22	1.22	.416	P
		Incorrect	78			
3	All of the following urinary system diseases are risk factors to increase kidney stone formation, except	Correct	29	1.29	.456	P
		Incorrect	71			
4	All of the following endocrine system diseases are risk factors to increase kidney stone formation, EXCEPT:	Correct	27	1.27	.446	P
		Incorrect	73			
5	Which of the following medications should NOT increase the risk of kidney stone formation?	Correct	27	1.27	.446	P
		Incorrect	73			
6	Medications known to cause kidney stones formation which includes:	Correct	40	1.40	.492	F
		Incorrect	60			
7	One of the following blood diseases is not considered a risk factor for the formation of kidney stones.	Correct	26	1.26	.441	P
		Incorrect	74			
8	Patients with an ileostomy are at increased risk of urinary tract calculi composed of:	Correct	26	1.26	.441	P
		Incorrect	74			

Table 4.2 The mean of score of patients'knowledge concerning risk factors of recurrent urolithiasis **(Continue)**

9	The actions of parathyroid hormone (PTH) on the kidney are to:	Correct	23	1.23	.423	P
		Incorrect	77			
10	the most important factor in the formation of uric acid calculi is:	Correct	31	1.31	.465	P
		Incorrect	69			
11	Which of the following is NOT a recognized risk factor for KS formation?	Correct	53	1.53	.502	F
		Incorrect	47			
12	Which are the following strategies would not prevent nephrolithiasis recurrence in a patient with uric acid stones?	Correct	28	1.28	.451	P
		Incorrect	72			
13	The best amount of fluid should be taken in a day are:	Correct	22	1.19	.394	P
		Incorrect	78			
14	Drink fluids (ideally water) During the day	Correct	40	1.22	.416	P
		Incorrect	60			
15	The bladder should be able to store urine for periods of ----at a time during the day.	Correct	34	1.29	.456	P
		Incorrect	66			
16	Excessive intake of beverage which increased risk of kidney stone formation	Correct	35	1.27	.446	P
		Incorrect	65			
17	Reduce the consumption of stimulants or irritant urinary tract system such as	Correct	40	1.27	.446	P
		Incorrect	60			
18	To avoid recurrent urolithiasis formation daily recommended of calcium intake is	Correct	33	1.40	.492	F
		Incorrect	67			
19	To avoid recurrent urolithiasis formation daily recommended of sodium intake is	Correct	34	1.26	.441	P
		Incorrect	66			
20	All of the following endocrine system diseases are risk factors to increase kidney stone formation, EXCEPT:	Correct	19	1.19	.394	**P**
		Incorrect	81			
22	High dietary intake of -------- increase the risk of stone formation: a. red meat	Correct	19	1.19	.394	**P**
		Incorrect	81			
23	High dietary intake of ------ increase the risk of stone formation:	Correct	22	1.22	.416	**P**
		Incorrect	78			
24	Which of following condition increase risk of kidney stone formation.	Correct	29	1.29	.456	**P**
		Incorrect	71			
25		Correct	27			**P**

	Excessive intake of dietary supplementation which increase the risk of stone formation such as	Incorrect	73	1.27	.446	
26	Excessive vitamin ---------- supplementation might increase the risk of formation is	Correct Incorrect	27 73	1.27	.446	**P**
27	Kidney stones are more likely to develop, and to grow larger, if a person has	Correct Incorrect	40 60	1.40	.492	**F**
28	Excessive intake of beverage which increased risk of kidney stone formation such as.	Correct Incorrect	26 74	1.26	.441	**P**
29	The bladder should be able to store urine for periods of ----at a time during the day.	Correct Incorrect	26 74	1.26	.441	**P**
30	One of the following blood diseases is not considered a risk factor for the formation of kidney stones.	Correct Incorrect	23 77	1.23	.423	**P**
31	Medications known to cause kidney stones formation which includes:	Correct Incorrect	31 69	1.31	.465	**P**
32	Avoid intakes of oxalate-containing foods are risk factors for the formation of kidney stone such as:	Correct Incorrect	53 47	1.53	.502	**F**
33	The bladder should be able to store urine for periods of ----at a time during the day.	Correct	28	1.28	.451	**P**

(A.D.): Assessment Degree, M.s=mean of score [(1 - 1.33) = Poor (P); (1.34 – 1.166) = Fair (F); (1.67 – 2) = Good (G] .

Patients' answers to questions concerning risk factors for recurrence of urolithiasis are summarised in this table (30.7 %). The total mean of mean score (MMS) indicated that patients had a poor understanding of the therapy and prevention of recurrent urolithiasis (1.28).

Table 4.3. Descriptive Analysis of Patient Knowledge concerning Risk Factors of Recurrent Urolithiasis

Overall patients knowledge		
Levels	**n**	**%**
Poor	82	82.0
Fair	15	15.0
Good	3	3.0

This Table (4-3) illustrated a descriptive analysis of patients' knowledge toward risk factors recurrent urolithiasis. Findings indicated that approximately more than three quarter 85 (82.0 %) of participants had a poor knowledge level in addition to (15.0%) had fair level and only (3.0%) had good level.

Table 4. 4. Comparison between Sociodemographic Characteristics and Patients' Knowledge Levels of Recurrent Urolithiasis Risk Factors

Socio-demographic variables	**Knowledge level**	
	Test value*	**p value**
Age Groups(Years)	0.136	795
Gender	0.097	216
Marital Status	0.769	568
Level of education	0.911	709
Family history	0.714	312
Residence	0.161	423

* Chi-Square, Significant level at p-value ≤ 0.05

There was no significant difference between the patients' knowledge levels and age groups, gender, civilization status, education level, family history and housing type ($p < 0.05$).

5. DISCUSSION

This chapter has presented a reasonably derived discussion of the results, with a systematically organized commentary and practical support from the available literature. In this study, the knowledge levels of patients in the tikrit teaching hospital (Liu, 2018) about the risk factors for recurrent urolithiasis were discussed.

Part I: Discussion of the students Socio-Demographic Characteristics Distribution.

In keeping with Baatiah, et al. (2020), we disseminated 2300 surveys, and 2173 of those were included in the final analysis, according to their findings. With a range of 18 to 75 years old, participants in this research had a median age of 29 years (IQR = 13 years) The percentage of females in the population was similarly higher, at 68.9%. The prevalence of urolithiasis was found to be 11.2% (246), and 48.8% (119/244) of those people had a family member who also had the condition. As a result, participants with a family history of urolithiasis had chances of developing kidney stones that were 1.9 times higher than those without such a history (OR = 1.9, 95 percent CI: 1.4–2.5) (Baatiah, 2020). Out of the 381 participants, 186 (48.1 percent) were men and 195 (50.4 percent) were women. These findings are in good accord with those of AlOtipi et al. (2020). Patients between the ages of 21 and 30 accounted for 46.3% of the study participants' age groupings. Only 5.2% of respondents were over the age of 50, on the other hand. In addition, 49.9 % of the participants were married, and 44.7 % were unmarried individuals. Finally, more over half (52.5 %) of those who took the survey had a job. Those who took part in the study were also questioned about kidney stone history in their families and circles of acquaintances. According to the results, 69% of those polled had at least one family member who had experienced a kidney stone occurrence, whereas 17.3% had no family members who had kidney stones. (AlOtipi, 2016)

With the help of 417 participants in the study by Alghamdi et al., (2018) these findings are consistent. Males (71.2%), between the ages of 34 and 49, married (79.4%), and with a college degree were the majority of responders (70 %). Roughly 13% of those polled had a history of kidney stones (Alghamdi, 2018). Mahmoud et al., (2019) observed that the majority of individuals were male (69 %), workers (57.2 %), and more than half (59.5 percent) of them were between the ages of 40 and 60. These findings are in agreement with their findings. Two-thirds of them (69 %) lived in rural areas, according to the study's findings (Mahmoud, 2019). This study supports the findings of a previous study by Almuhanna et al. (2018), which enrolled (407) people. 44 % of those surveyed had relatives who had previously had kidney stones. As many as 9.6% of the participants in the study had personally dealt with kidney stones (Almuhanna A. M.-M.-5., 2018).

There were a total of 442 individuals enrolled in this study, according to Asmelash et al (2020). Males comprised 50.7 % of the 434 participants. Eighty-two percent of the participants were married, and four hundred fifty-eight percent of them worked in government. The average sample age was 54.6 12.5 years, with participants ranging in age from 18 to 90. Of those polled, 53% had less education than a high school diploma, while 19% had a diploma, 13% had a post-secondary education, and 14% had a bachelor's or higher degree or equivalent. 59.5 % of the participants (n = 440) were jobless. Eighteen percent of those surveyed (n = 132) reported having a kidney disease relative (Asmelash, 2020). Pethiyagoda et al. conducted a research similar to this one, and the results are consistent (2017) This study comprised a total of 102 individuals between the ages of 22 and 28. The average age of the participants was 25.21 1.041 years. Males made up 50.98 percent of the sample (n=52), while females made up 49.02 percent (n=50) (Pethiyagoda, 2017).

Part II: Discussion of the Mean of Score for the Items (patiants' Knowledge related Risk Factors of Recurrent Urolithiasis)

In a research by Aldaher et al., (2021), only 24.3 % and 29.7 % correctly recognised gastrointestinal disease and family history as relevant risk factors, respectively, as risk factors. More than 80% of the participants accurately identified the problems of kidney stones, according to their comments. Only 6.2 % of respondents mistook stool analysis for an investigation method, demonstrating that the majority of respondents had a solid understanding of how kidney stones are investigated. 80 % of the participants incorrectly thought that vegetables prevent kidney stones, which is not the case at all. The same is true for spinach and dark chocolate (56.5 %). Only 46 % of the research participants had adequate awareness of water consumption, followed by food variables (50.1%), and risk factors for kidney stones (50.1%). Participants' general knowledge of kidney stones was calculated by taking into account all of these characteristics (signs and symptoms, diagnosis, complications, risk factors, appropriate water intake and dietary factors). It was shocking to see that the sample's overall level of knowledge was just 56.4 %. In addition, 53.4 % of the study populations have no idea what kidney stones might cause (Aldaher, 2021).

According to the findings of this study, which correspond with those of the Baatiah et al (2020) study done in KSA in 2017, the prevalence of urolithiasis in the population is as high as 11.2%, According to the survey, 37.7 % of respondents had low awareness; 35.3 % had moderate awareness; and roughly 0.6 % had high awareness levels. It also reaffirms the need of educating the general population about kidney stones by undertaking countrywide public awareness programmes for all ages (Baatiah, 2020). Anoushka Chakra, as well as Abou Moussa (2019) Twenty-six percent of the patients who were asked about their knowledge of kidney stone prevention measures had no idea about this topic, but 71% of patients believe that if these measures are given, they will be effective, and most of them expressed an interest in learning more about prevention strategies. This was a single-institution study (82 %). There was a significant difference in patients' knowledge, opinion of the efficiency of preventative strategies, and desire in learning more about kidney stone prevention between the two groups (p 0.05). More than one-

third of kidney stone patients (38.8% vs. 0%) and one-quarter of those who believe in the efficacy of preventative measures do not receive instructions; however, most patients who believe in the efficacy of prevention measures do (respectively 96.9 % vs. 59.7 and 98.6 % vs.3.6 %) (Saraiva, 2019). The study's conclusions are in accord with those of Halim et al (2019) More than a third of participants in this study (31.0%) had a good degree of knowledge about renal stones, whereas 13.3% of individuals had inadequate knowledge about renal stones, based on the study's findings. 17.7% of the respondents in this survey had an average level of knowledge about the kidney stone; 13% of the participants had a bad degree of renal stone knowledge. Only 10% of those polled, however, had a thorough understanding of renal stones (Halim, 2019).

Many investigations have shown that there is a paucity of patient understanding about the illness process in both groups. Due to the fact that the patients did not receive adequate information from the health care team on their diseases, this may be explained by the lack of understanding about medicine, food and wound care, as well as rest and exercise. Mahmoud and colleagues (2019). However, as stated by Colela et al. (2011), a large percentage of participants in this study were ill-informed about urinary tract stones. This is in line with the findings of Maserat et al.,(2021), who found that Egyptian patients lacked basic information regarding urinary tract stone illness, including its aetiology, risk factors, symptoms, and treatment options (Colella, 2011). Pethiyagoda et al., (2015) said that the mean knowledge score was 9.03 out of 22 (41.06 %, SD=2.14), which supports this conclusion. However, the majority of them (85.9%) felt that urinary tract stones may be caused by hard water. Only a third of those polled (35.4 %) were able to name any foods that are linked to stone formation. Symptoms of urolithiasis were known to 36.81% of those polled. 44.5 % of stone disease patients see a nephrologist, and 36.9 % see a urologist for consultation. Participants with a history of stone illness had statistically significant (P value 0.01) higher levels of knowledge. Urolithiasis awareness programmes should be implemented for the general public since participants' knowledge, attitudes, and practises about the disease were lacking (Pethiyagoda A. W., 2015).

According to Almuhanna et al. (2018), participants' knowledge and attitude regarding urinary stones varied. The results show that the participants are aware of various elements of kidney stone prevention, symptoms, and diagnostic and treatment methods to a certain degree. they Renal stone sufferers have a better grasp of some concepts. A public health initiative aimed at clearing up misunderstandings and increasing preventative actions is highly recommended. It would be worthwhile to do a thorough investigation into the ways in which the community promotes practises that avoid urinary stones. It is suggested that this information be included in a bigger research. Furthermore, the study's findings underscore the importance of public health programmes aimed at increasing awareness of this condition and its connection to metabolic syndrome (Pethiyagoda A. W., 2015). AlOtipi,, (2020) did a similar study in Saudi Arabia to analyse the general population's awareness of kidney stone occurrence and associated risk factors. The average score on knowledge of kidney stones was 65.19 11 out of 95, according to the research. Most people in Saudi Arabia, especially those outside of the medical profession, have little or no information about the risk factors for kidney stones. Future research in various parts of Saudi Arabia is necessary to obtain accurate assessments of the general level of knowledge in Saudi Arabia (AlOtipi, 2016). While Baatiah et al.,(2020) found that the average percent score of the general population regarding their awareness of urolithiasis was 37.7 %, this study finds that the average percent score of the general population is 12.45 %, with a maximum score of 27 percent, and a minimum score of 3/33 %. Participants were divided into the following groups based on their final test scores: There were 1279 (64.1%), 704 (35.3%) and 11 (0.6%) individuals in the low, medium and high levels of awareness, respectively (Baatiah, 2020). The findings of Alghamdi et al. are consistent with this conclusion (2018), Some misunderstandings concerning the causes and symptoms of renal stones (especially hyperparathyroidism and Crohn's disease) surfaced despite the high level of education of the majority of responders (urine colour and odor, nausea and vomiting, fever and chills). Insufficient information was available on the role of food in the treatment of renal stones. These shortcomings in information and attitude should be the focus of renal stone disease education initiatives (Alghamdi, 2018).

A similar research by Abdulrida and Kadhim, (2015) found that patients had a poor understanding of stone formation and composition and the variables that lead to stone recurrence, such as nutrition, fluid consumption, family medical history, physical activity, medication use (Abdulrida, 2015).

Part III: The Association between patiants' knowledge and the Demographic Characteristics

Aldaher et al., (2021) found that there was no difference in knowledge ratings between males and girls in the current research. In spite of this, participants in the age categories of 20-29 and 30-39 years showed no variation in their knowledge of the material. People in the 40-49 age bracket, on the other hand, have a much better degree of knowledge than the other age groups. According to the findings of similar exams, people with greater educational degrees do not always have better understanding (Aldaher, 2021). A previous study by Alghamdi et al.,(2018) found no correlation between a patient's history of renal stones on one side and any of the recorded socio-demographic parameters. This study confirms the findings of that study (sex, age, marital status and education) (Alghamdi, 2018).

6. CONCLUSIONS

6.1 Conclusions

The current study's conclusion is as follows after data analysis, debate, and critical interpretation of the findings:

1-The bulk of the participants in the research were male (64 %), while the female population comprised (36 %).

2- The majority of the participants in the research (39 %) were between the ages of 20 and 29.

3-Nearly half (40 %) of the participants had only completed elementary school.

4-The majority of them (32 %) had a job at the time of the survey.

5-53 %of them were single, with the remaining 49% being married.

6-Sixty-two percent of those polled have a history of kidney stones in their family.

7-Overall, 87% of those studied were in urban areas, whereas only 13% were in rural areas.

8-The overall mean score was low due to a lack of awareness about urolithiasis risk factors, and the MMS was (1.28).

9-There was no correlation between sociodemographic factors and patients' knowledge.

6.2. Recommendations

The following are the study's recommendations:

1-An effective public health campaign aimed at increasing public awareness of urolithiasis-related risk factors and preventative measures should be implemented by the Ministry of Health.

2-Patients with urolithiasis should be provided frequent educational sessions to keep them up to date.

3-The lack of information concerning the nurse's understanding of the kidney stone necessitates further investigation.

4-If you're a high-risk group, an Arabic booklet with easy language and numerous photographs should be available and delivered to each adult patient for free that includes recommendations to follow, diet and lifestyle adjustments that prevent the formation of urinary stones.

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APPENDICIES

APPENDIX 1: Ethic

APPENDIX 2: Data Collection Forms

APPENDIX 3: Originality Report

APPENDIX 1: Ethics

Çankırı Karatekin University Ethics Committee Ethics Approval

Committee in Iraq Approval

APPENDIX 2. Data Collection Forms

APPENDIX 3: Originality Report

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