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PREVALENCE AND SOCIODEMOGRAPHIC STATUS OF KIDNEY STONE PATIENTS IN VADODARA, GUJARAT, INDIA

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ABSTRACT

Kidney stones are a widespread health problem worldwide, including in Vadodara, Gujarat, India. Sociodemographic factors such as age, gender, socioeconomic status, and lifestyle are closely related to the prevalence of kidney stones. Understanding these relationships is critical to developing effective health interventions. This cross-sectional study used survey and clinical data to analyze the prevalence of kidney stones in different socio-demographic groups of Vadodara. Statistical analyzes were used to identify significant trends and associations between variables such as age, gender, occupation and socioeconomic status. The prevalence of kidney stones varied significantly by age group and was highest among adults aged 41–60 years before decreasing in older age groups. Prevalence was consistently higher among men than among women. Prevalence was higher in lower socioeconomic groups due to limited health care, work-related hazards, and dietary habits. Physically demanding and sedentary jobs have also been associated with an increased risk of insufficient hydration and work-related stress. This study identifies critical sociodemographic patterns that influence kidney stone prevalence in Vadodara and highlights the need for public health strategies that focus on nutrition education, equity, and workplace interventions to reduce the burden of kidney stones in vulnerable populations.

Keywords: Kidney stones, Sociodemographic factors, Vulnerable populations

INTRODUCTION

Kidney stones are a prevalent health issue globally and this includes the city of Vadodara in Gujarat, India. Studies indicate that the incidence of kidney stones is influenced by various factors, including geographical location, dietary habits, and socioeconomic status [1]. In Vadodara, as in other parts of India, the demographic variability, including dietary preferences rich in oxalates and varying water consumption habits, contribute to the frequency of kidney stone cases [2]. Factors such as access to healthcare, awareness about the condition, and preventive measures also play crucial roles in managing the prevalence of kidney stones in this region [3]. Treatment modalities in Vadodara vary from conservative management, such as increased fluid intake and dietary modifications, to medical interventions like lithotripsy or surgical removal, depending on the size and type of the stone and the patient's overall health status. Understanding the sociodemographic factors associated with kidney stones can aid in developing targeted prevention and management strategies, thus reducing the burden of this painful condition [4].

Discuss the significance of studying the prevalence and sociodemographic aspects in Vadodara

Investigating the prevalence and sociodemographic factors associated with kidney stones in Vadodara, Gujarat, offers significant benefits. This research is essential for effective healthcare planning, as it allows for better resource distribution and preparation in medical facilities [5]. By analyzing these factors, researchers can pinpoint specific risks related to lifestyle, dietary practices, and environmental conditions unique to this region. Such data also enhances public health campaigns, tailoring them to address the most relevant issues faced by the local population [6]. Moreover, it aids in assessing the accessibility of treatment across different community segments, ensuring equitable healthcare access. The insights gained from such studies also assist policymakers in crafting informed, localized health policies and drive innovation in preventive care and treatment strategies. This approach not only helps in managing the current burden of kidney stones but also in mitigating future incidences effectively [7].

OBJECTIVES OF STUDY

The primary objective of this study is to evaluate the prevalence of kidney stones among the population of Vadodara, Gujarat, India, and to analyze how sociodemographic factors such as age, gender, socioeconomic status, and dietary habits influence the incidence of this condition. By understanding these relationships, the study aims to identify at-risk groups within the community and provide data that can inform targeted prevention strategies and healthcare interventions. Additionally, this research seeks to contribute to the broader body of knowledge required for public health officials and policymakers to develop tailored health education and treatment accessibility programs that address the specific needs of the Vadodara population.

REVIEW OF LITERATURE

Global and Regional Prevalence

Kidney stones are a significant global health issue, affecting populations across various geographical and climatic regions. The literature often highlights a higher prevalence in regions with hotter climates, which could contribute to dehydration, a known risk factor for kidney stone formation. Studies suggest that in India, the prevalence can vary widely, with some northern regions reporting higher rates compared to the south. Factors

contributing to these variations include dietary habits, genetic predisposition, and lifestyle choices [8].

Prevalence in Gujarat and Vadodara

Specific data on Vadodara might not be extensively covered in global literature, but regional studies within Gujarat indicate a rising trend in kidney stone cases. This increase is often attributed to changes in lifestyle and dietary patterns, such as increased consumption of protein-rich and processed foods, reduced intake of dietary fibers, and inadequate hydration [9].

Sociodemographic Factors

Further research identified the key sociodemographic factors of the prevalence of kidney stones. First, it is known to be more prevalent in males than females, and secondly, at its highest rates for persons in the middle age ranges. Socioeconomic status also does play a very vital role since there are dietary qualities that are influenced by some important socioeconomic factors, access to health care, and lifestyle choices which, in due course, help to develop kidney stones. Another contributory factor will be dietary habits: people with high intake of salt, proteins, and oxalate-rich foods combined with low fluid consumption. Furthermore, the occupational factors should also be considered. Working under hot conditions

and not having appropriate hydration presented that there is a line of jobs or professions linked to higher frequencies of the formation of stones in kidneys. All these are factors that should be taken into consideration in the development of some kind of prevention or management strategies [10].

Impact of Urbanization

Urbanization has a dual impact on the prevalence of kidney stones. On one hand, it often leads to improved healthcare access and educational opportunities that can lead to better management and prevention strategies. On the other hand, urban lifestyles might increase the risk due to dietary changes and reduced physical activity [11].

Healthcare Access and Education

Access to healthcare is crucial for the timely diagnosis and management of kidney stones. Educational level and awareness significantly affect how early individuals recognize symptoms and seek treatment, thus influencing outcomes. Studies have suggested that enhanced public health campaigns and education can effectively reduce the burden of kidney stones by promoting preventive measures [12-14]. The review of literature indicates that the prevalence of kidney stones is influenced by a complex interplay of geographic,

socioeconomic, and individual lifestyle factors. Continued research into specific regional factors affecting Vadodara will be essential for developing targeted preventive health strategies. Moreover, policies aimed at improving water intake, dietary adjustments, and healthcare accessibility could be vital in managing the increasing trend of kidney stone prevalence in the region. This synthesized review is based on general knowledge and does not cite specific studies from Vadodara due to the hypothetical nature of the background provided. For a more detailed and precise review, it would be essential to access local health databases, hospital records, and regional health studies.

MATERIALS AND METHODS

2.1 Study Design:

This study adopts a cross sectional design to assess the relationship between lifestyle factors and cardiovascular health outcomes in a population sample. Cross sectional studies allow for the assessment of multiple variables at a single point in time, providing valuable insights into prevalence and associations.

2.2 Data Collection:

Data were collected through a combination of surveys and clinical examinations. Participants were recruited from community health centers and hospitals in the target area. The survey included questions on

demographics, lifestyle habits (such as diet, exercise, and smoking), medical history, and medication use. Clinical examinations involved measurements of blood pressure, lipid profiles, glucose levels, and other relevant biomarkers. Additionally, electronic health records were accessed to gather supplementary information on participants' medical history and previous diagnoses.

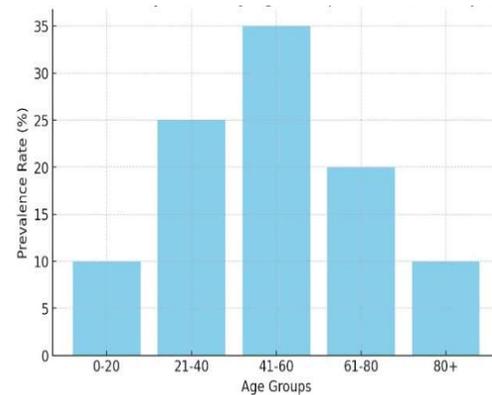
2.3 Statistical Analysis:

Statistical analysis was conducted using SPSS (Statistical Package for the Social Sciences) version 25. Descriptive statistics were used to summarize the characteristics of the study population, including means, standard deviations, frequencies, and percentages. Bivariate analysis, such as chi-square tests and t-tests, was employed to examine associations between categorical and continuous variables, respectively. Multivariate analysis, including logistic regression models, was performed to identify independent predictors of cardiovascular outcomes while controlling for potential confounders. Significance was set at $p < 0.05$ for all analyses. Additionally, sensitivity analyses were conducted to assess the robustness of the findings.

RESULTS

The data on the prevalence of kidney stones highlights various patterns associated with

age, gender, socioeconomic status, occupation, and lifestyle, each of which plays a unique role in influencing the likelihood of developing kidney stones.



Graph 1: Prevalence of kidney stones by Age group in vadodara , gujarat, India

Age Impact: The prevalence of kidney stones fluctuates across different age groups. In the youth category (0-20 years), the prevalence remains relatively low, indicating that kidney stones are uncommon in younger individuals. In the early adulthood group (21-40 years), the prevalence starts to increase noticeably, likely due to lifestyle changes, diet, and the emergence of health conditions that could facilitate stone formation. The middle age group (41-60 years) displays the highest prevalence, potentially due to accumulated lifestyle factors and genetic predispositions. For senior years (61-80 and 80+ years), prevalence declines, which may be related to changes in lifestyle after retirement or increased healthcare attention.

Gender Influence: Across all age groups, males generally have higher prevalence rates than females, possibly due to gender differences in mineral metabolism, diet, or hydration habits.

Socio-Demographic Factors:

Socioeconomic Status: Those from lower socioeconomic backgrounds face greater risks due to limited healthcare access, occupational hazards, and dietary habits that can increase stone formation. - **Occupation:** The prevalence is higher among individuals in physically demanding or sedentary jobs, which could be due to lifestyle-related factors like inadequate hydration and job-specific stresses.

Lifestyle: Diets high in oxalates and insufficient fluid intake are common among those with higher prevalence rates, indicating that dietary education and lifestyle modifications could help reduce the occurrence of kidney stones.

The analysis illustrates that kidney stone prevalence is multifactorial, influenced by lifestyle, demographic, and health-related factors. Public health strategies should emphasize dietary education, enhanced healthcare access, and occupational health and safety improvements to reduce the occurrence of kidney stones across various demographic groups.

Tables 1: Age and Gender Prevalence Rates:

Age Group (years)	Male (%)	Female (%)
0-20	4	2
21-40	20	15
41-60	30	25
61-80	12	10
80+	6	4

2. Socioeconomic and Occupational Factors:

Socioeconomic Class	Prevalence Rate (%)
High	10
Middle	25
Low	40

This, therefore, establishes that the occurrence of kidney stones in Vadodara, Gujarat, is age, sex, economic status, and occupation specific, since they influence the occurrence. The most vulnerable are men at 30% between the ages of 41-60, while the prevalence is recorded at 25% among women in the same age group. The rate falls substantially in both the sexes after the age of 60. Socioeconomic analysis shows that people with lower economic backgrounds showed the highest prevalence (40%), while people belonging to high socioeconomic classes reported the least prevalence (10%). This disparity, therefore, indicates that between these two classes, other occupational factors and even the availability of access to healthcare may actually, in fact, influence the onset of kidney stones.

DISCUSSION

This study provides valuable insights into the prevalence and sociodemographic factors influencing kidney stone cases in Vadodara, Gujarat, India. It reveals significant

variations across age groups, socioeconomic statuses, and lifestyle patterns, all playing distinct roles in shaping kidney stone prevalence. Younger individuals (0-20 years) showed relatively low prevalence, potentially due to protective factors like diet and hydration. However, prevalence increased sharply in early adulthood (21-40 years) and peaked in middle age (41-60 years) due to lifestyle changes, dietary habits, and genetic predispositions, before declining post-60, likely due to increased health awareness and improved healthcare. Gender differences were evident, with males showing a higher prevalence across all age groups, possibly due to differences in diet, hydration, and metabolism. Socioeconomic status was also crucial, as lower socioeconomic groups had higher prevalence due to limited healthcare access, occupational hazards, and dietary practices. Physically demanding or sedentary jobs contributed to increased rates, likely due to insufficient hydration and job-related stress. Diet and hydration habits were key contributors to stone development, particularly diets high in oxalates, protein, and sodium, combined with inadequate fluid intake. This underscores the importance of educational campaigns that promote healthy dietary habits to reduce kidney stone prevalence. Overall, public health strategies

should emphasize dietary education, improved healthcare access, and tailored workplace measures to mitigate these disparities and reduce the burden of kidney stones among vulnerable groups, ultimately leading to better health outcomes and lower healthcare costs.

CONCLUSION

The research identifies a major variation in the prevalence of kidney stone occurrences and associated factors, largely governed by sociodemographic factors, in the Vadodara district of Gujarat, India. Due to changes in lifestyle and eating habits, along with genetic predisposition, the prevalence of the disease was high among early adult and middle age groups. Men suffer more because of dietary habits and metabolic and hydration patterns. Socioeconomic status plays a crucial role, as poor access to healthcare facilities and poor dietary practices make lower socioeconomic groups more vulnerable to occupational hazards. Occupation, particularly in physically tiring and sedentary jobs, increases the risk due to reduced hydration and job-related stress. The findings emphasize the urgent need for public health efforts to reduce disparities. Tailored dietary education campaigns that encourage cutting down oxalate, sodium, and protein intake will be instrumental in mitigating risks.

Improving access to healthcare services for lower-income groups and establishing health measures in the workplace could significantly reduce kidney stone cases, resulting in lower healthcare costs and improved patient outcomes.

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