

The prevalence of Benign Prostatic Hyperplasia complications in Thi qar province during 2023-2024

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Abstract

Introduction: Benign Prostatic Hyperplasia (BPH) is a common non-cancerous condition affecting aging men, characterized by the abnormal growth of prostatic tissue leading to the enlargement of the prostate gland. This article examines the definition, pathophysiology, symptoms, diagnosis, and management of BPH, emphasizing the importance of recognizing and understanding potential complications associated with the condition. Complications such as acute urinary retention, recurrent urinary tract infections, and bladder stones can impact quality of life and lead to increased morbidity if left untreated. Addressing BPH complications in a timely manner can prevent progression, improve quality of life, reduce healthcare costs, and enhance patient outcomes. Understanding individual risk factors and tailoring treatment plans accordingly is crucial for optimizing therapeutic outcomes and minimizing adverse effects. Educating patients about potential complications empowers them to actively participate in their care and seek timely medical attention when needed. The epidemiology of BPH, including prevalence and incidence rates that increase with age, underscores the need for effective management strategies and public health interventions to address this prevalent condition. Studies have shown a notable rise in incidence and severity of BPH in men over 50 years old, with a sharp increase in those over 70. Demographic factors such as age and race play a crucial role in the epidemiology of BPH, with African American men experiencing higher incidence and severity compared to Caucasian men. The pathophysiology of BPH involves cellular mechanisms, hormonal influences, stromal-epithelial interactions, inflammation, neuroendocrine involvement, smooth muscle dysfunction, apoptosis, insulin-like growth factors, and vascular/lymphatic changes that collectively contribute to prostate gland enlargement and associated lower urinary tract symptoms.

Methodology: A retrospective cross-sectional study in Thiqr province during 2023-2024 aimed to investigate BPH complications in males. Participants met inclusion criteria of confirmed BPH diagnosis with documented complications. Exclusion criteria were females, incomplete data, unconfirmed diagnosis, severe cognitive impairment, inability to consent, and terminal illness. Data collection method comprised of questionnaires, medical records, clinical assessments, imaging studies and diagnostic tests documented in a structured database.

Objective: to comprehensively assess BPH complications and their impact.

Results: Table 1 reveals higher smoking rates among older age groups, increased prevalence of chronic diseases with advancing age, and the significant role of family history in genetic predispositions. Table 2 demonstrates variations in urinary symptoms related to BPH across different age groups, with frequency increasing notably in the 40-49 age bracket. The study also investigates the risk of complications such as recurrent UTIs, bladder stones, kidney damage, incontinence, and urinary retention in individuals with BPH, highlighting peaks in middle-aged groups and a rise in incontinence with age. Notably, urinary retention exhibits higher incidences in younger age groups before declining with age, with notable occurrences in the elderly.

Discussion: This study explores the diverse risk factors and age-specific patterns associated with Benign Prostatic Hyperplasia (BPH). Analyzing smoking habits, family history, and chronic diseases, it reveals varying prevalence rates among different age groups. Family history emerges as a significant determinant, particularly in older cohorts, while chronic diseases exhibit age-related patterns. The study highlights age-specific variations in BPH symptoms and complications, emphasizing the importance of tailored interventions for improved patient outcomes across different age brackets.

Conclusion: Smoking emerges as a significant risk factor, particularly among middle-aged and older individuals. Family history demonstrates varying prevalence across age groups, indicating a nuanced interplay between genetic predisposition and BPH development. Chronic diseases gain prominence with age, exacerbating BPH symptoms and complications. Clinical features such as nocturia, urgency, urinary difficulty, and dribbling show age-dependent variations, highlighting the progressive nature of BPH symptoms. Complications including Acute Urinary Retention (AUR), Hematuria, UTIs, bladder stones, kidney damage, incontinence, and recurrent urinary retention exhibit distinct age-specific patterns, illustrating the evolving risk landscape faced by individuals with BPH as they age.

Recommendations: personalized treatment plans for Benign Prostatic Hyperplasia (BPH) by integrating age-specific risk assessments. It recommends smoking cessation interventions, emphasizes understanding family history, and highlights the influence of chronic diseases on symptom exacerbation. Prioritizing monitoring and management of age-related variations in clinical features, along with tailoring surveillance and treatment plans for BPH complications based on distinct age-specific patterns, is crucial for optimizing care throughout the aging process.

1.

Introduction

1.1. Background

Benign Prostatic Hyperplasia (BPH), also known as prostate gland enlargement, is a prevalent non-cancerous condition affecting aging men. It is characterized by the abnormal growth of prostatic tissue, leading to the enlargement of the prostate gland and potential obstruction of the urinary tract. Understanding the definition, pathophysiology, symptoms, diagnosis, and management of BPH is crucial for effective healthcare delivery and improved patient outcomes [1]. This condition is primarily observed in aging men and is often associated with lower urinary tract symptoms (LUTS) that can significantly impact quality of life [2]. Recognizing and understanding the potential complications associated with BPH is critical for timely

intervention, improved patient outcomes, and enhanced quality of life. Recognition of complications of BPH is important for Preventing Progression and Severity because early identification and management of complications related to BPH can help prevent the progression of the condition to more severe stages. Complications such as acute urinary retention, recurrent urinary tract infections (UTIs), and bladder stones can lead to increased morbidity and require prompt intervention to mitigate adverse outcomes [3]. Also, it is Improving Quality of Life because the complications including urinary symptoms, urinary retention, and potential renal impairment, can significantly impact an individual's quality of life. By addressing and managing these complications effectively, healthcare providers can alleviate discomfort, improve urinary function, and enhance overall well-being in affected individuals. Furthermore, it is important for Reducing Healthcare Costs and Burden because Unmanaged BPH complications may result in frequent hospital visits, emergency room admissions, and surgical interventions, leading to increased healthcare costs and burden on the healthcare system. Understanding and addressing BPH complications in a timely manner can help reduce the economic burden associated with managing advanced stages of the condition [4]. Additionally, it is important for Assessing Individual Risk Factors and Tailoring Treatment because Each individual with BPH may experience a unique set of complications based on their specific risk factors, disease progression, and comorbidities. By comprehensively understanding the complications associated with BPH, healthcare providers can tailor treatment plans according to individual needs, optimize therapeutic outcomes, and minimize adverse effects. Lastly, recognition of the complications of BPH important for Enhancing Patient Education and Empowerment because Educating patients about the potential complications of BPH empowers them to actively participate in their care, recognize warning signs, and seek timely medical attention when needed. Increased awareness of BPH complications fosters patient engagement, promotes self-management strategies, and supports shared decision-making in healthcare [5].

1.2. Epidemiology of BPH

1.2.1. Prevalence and Incidence

The prevalence of BPH increases with age, affecting a significant proportion of men worldwide. Studies have reported that approximately 50% of men in their 50s and up to 90% of men over the age of 80 may have histologic evidence of BPH. The global burden of BPH underscores the need for effective management strategies and public health interventions to address this prevalent condition [6]. The Incidence of BPH tends to increase with age, with a higher likelihood of developing the condition as men grow older. Longitudinal studies can provide valuable insights into the incidence rates of BPH and how they evolve over time in different populations [7]. Age is a significant risk factor for the development of BPH, with increasing prevalence and incidence rates observed in older men. Other factors, such as genetics, hormonal

changes, lifestyle habits, and environmental influences, can also contribute to the occurrence of BPH. Regional variations in the prevalence and incidence of BPH highlight the importance of considering demographic and geographical factors in epidemiological studies [8].

1.2.2. Age-Related Prevalence

BPH is considered an age-related condition, with the prevalence increasing significantly with advancing age. Studies have shown that while BPH can be observed in men as young as their 30s, the incidence and severity of the condition notably rise in men over the age of 50 [9]. The prevalence of BPH continues to escalate with each subsequent decade, with a particularly sharp increase in men over 70 and older [10]. Aging is a significant risk factor for the development of BPH due to hormonal changes and prostate gland enlargement. As men age, alterations in androgen hormone levels, particularly the conversion of testosterone to dihydrotestosterone (DHT), contribute to the cellular proliferation and growth of the prostate gland. The aging process also leads to changes in bladder function and muscle tone, further exacerbating lower urinary tract symptoms associated with BPH [11].

1.2.3. Race-related prevalence

Studies have indicated variations in the prevalence of BPH among different racial groups. For example, research has shown that the incidence of BPH is higher among African American men compared to Caucasian men. African American men tend to experience BPH symptoms at a younger age and with more severity [12]. The exact reasons for these race-related differences in BPH prevalence are not entirely clear. Some hypotheses suggest that genetic predispositions, hormonal variations, and environmental factors could contribute to the observed disparities [13].

1.3. Pathophysiology

The pathophysiology of BPH involves multiple factors that contribute to the enlargement of the prostate gland and the associated symptoms. These factors including :

- **Cellular Mechanisms** : The development of BPH is primarily attributed to cellular changes within the prostate gland. Key factors include increased proliferation of epithelial and stromal cells, alterations in hormonal regulation (particularly dihydrotestosterone), and inflammation within the prostate tissue.
- **Hormonal Influence** : Androgens, especially dihydrotestosterone (DHT), play a critical role in prostate growth. The conversion of testosterone to DHT by the enzyme 5-alpha reductase within the prostate is a significant mechanism in BPH pathophysiology [14].

- **Stromal-epithelial Interactions :** Dysregulation in the paracrine and autocrine signaling between stromal and epithelial cells within the prostate contributes to the aberrant growth seen in BPH.
- **Inflammatory Component :** Chronic inflammation within the prostate tissue is also implicated in the pathophysiology of BPH. Inflammatory mediators and cytokines can promote cellular proliferation and tissue remodeling, further contributing to prostate enlargement.
- **Neuroendocrine Involvement :** Nerve growth and neurotransmitter signaling within the prostate gland can also influence the development of BPH, impacting smooth muscle tone and dynamic function [15].
- **Smooth Muscle Dysfunction :** In BPH, alterations in the contractility of smooth muscle cells within the prostate contribute to urinary symptoms. Increased smooth muscle tone and altered relaxation mechanisms impact the dynamic component of urinary flow.
- **Apoptosis and Insulin-like Growth Factors :** Dysregulation in apoptotic processes and the presence of increased levels of insulin-like growth factors have been implicated in the proliferation of prostate cells, contributing to gland enlargement in BPH [16].
- **Vascular and Lymphatic Changes :** Aberrant angiogenesis and lymphangiogenesis in the prostate microenvironment can lead to increased vascularization and lymphatic drainage, facilitating the growth and potential spread of BPH nodules.
- **Epigenetic Modifications :** Epigenetic changes, including DNA methylation and histone modifications, have been identified in BPH pathophysiology. These alterations can impact gene expression patterns associated with cellular proliferation and prostate growth.
- **Metabolic and Nutritional Factors:** Studies suggest that metabolic disorders, such as obesity and metabolic syndrome, as well as dietary factors, may influence the development and progression of BPH through mechanisms involving inflammation, hormonal imbalance, and oxidative stress [17].

1.4. Clinical features

Clinical features of Benign Prostatic Hyperplasia (BPH) primarily revolve around lower urinary tract symptoms (LUTS) and include:

Clinical features of Benign Prostatic Hyperplasia (BPH) primarily revolve around lower urinary tract symptoms (LUTS) and include:

- **Urinary Frequency:** It is a common symptom in men with Benign Prostatic Hyperplasia (BPH), a non-cancerous enlargement of the prostate gland that can obstruct the flow of urine from the bladder. BPH-related urinary frequency typically manifests as a frequent urge to urinate, often resulting in increased bathroom visits during the day and night [18]. Several factors contribute to urinary frequency in BPH, including Prostate Enlargement, As the prostate gland grows, it can compress the urethra, leading to incomplete bladder

emptying and a need to urinate more frequently. Furthermore, including Bladder Muscle Overactivity which can cause the bladder muscle to become overly sensitive, resulting in more frequent and urgent feelings of needing to urinate. Also, it including Nocturia, Men with BPH often experience nocturia, the need to urinate multiple times during the night, disrupting sleep patterns and affecting overall well-being [19].

- **Urgency:** It is another common symptom experienced by men with Benign Prostatic Hyperplasia (BPH). It is characterized by a sudden and compelling need to urinate that may be difficult to control. This urgency can lead to frequent trips to the bathroom and may be associated with urinary incontinence in some cases [20]. The factors contributing to urgency in BPH including Bladder Overactivity because the BPH can lead to irritative symptoms such as bladder muscle over-activity, causing the bladder to contract involuntarily and create a sense of urgency. Additionally, it including Incomplete Bladder Emptying because the obstruction caused by an enlarged prostate lead to bladder may not empty fully, leading to increased pressure and urgency to urinate [21].
- **Weak Urinary Stream:** Weak urinary stream is a common symptom in men with Benign Prostatic Hyperplasia (BPH) and can significantly impact quality of life. It is often characterized by a diminished or reduced force of urine flow during voiding, leading to incomplete bladder emptying and the need for frequent urination [22]. The Key factors contributing to weak urinary stream in BPH including Prostatic Obstruction, The enlarged prostate gland can compress the urethra, obstructing the flow of urine and resulting in a weak stream. The another factor is Detrusor Muscle Compromise, Chronic obstruction caused by BPH can lead to changes in the detrusor muscle of the bladder, affecting its ability to contract effectively and leading to a weak urinary stream [23].
- **Intermittency:** It refers to a stop-and-go pattern of urine flow during voiding. It can result in difficulties initiating urination and lead to incomplete bladder emptying, causing bothersome urinary symptoms [24]. The Causes of Intermittency in BPH including Prostatic Obstruction, Enlarged prostate glands can constrict the urethra, impacting the smooth flow of urine and causing a stop-and-start pattern during urination. The another cause is Bladder Muscle Weakness, Chronic obstruction from BPH can lead to changes in bladder muscle function, affecting its ability to contract smoothly and causing intermittent urination [25].
- **Incomplete Bladder Emptying:** It is a notable symptom of Benign Prostatic Hyperplasia (BPH) that can lead to residual urine in the bladder after voiding. This condition can contribute to urinary tract infections and other complications [26]. The Causes of Incomplete Bladder Emptying in BPH including Prostate Enlargement, An enlarged prostate gland can obstruct the urethra, impeding the complete release of urine from the bladder during voiding. The another cause is Changes in Bladder Muscle Function, Chronic obstruction from BPH can affect the coordination of bladder muscle contractions, leading to incomplete emptying [27]

- **Urinary Retention:** It is a serious complication of Benign Prostatic Hyperplasia (BPH) characterized by the inability to empty the bladder completely. This condition can lead to discomfort, pain, and potentially severe health issues if left untreated [28]. The Causes of Urinary Retention in BPH including Prostate Enlargement, the enlargement of the prostate gland can constrict the urethra, obstructing the flow of urine and causing retention. The other cause is Muscle Weakness, Weakening bladder muscles due to chronic retention or obstruction can interfere with the ability to empty the bladder effectively. Also including Neurological Issues, Conditions affecting the nerves that control bladder function can contribute to urinary retention [29].
- **Hematuria:** It can be caused by various factors related to Benign Prostatic Hyperplasia. The causes of Hematuria in BPH including Bladder Outlet Obstruction, The blockage caused by an enlarged prostate can lead to increased pressure in the bladder and urinary tract, resulting in the presence of blood in the urin [30] . It also including Inflammation, Chronic irritation of the bladder and urinary tract due to BPH can cause inflammation and bleeding, leading to hematuria. The other cause is Urinary Tract Infections, BPH can increase the risk of urinary tract infections, which may manifest with blood in the urine [31].

1.5. Complications of BPH

Complications of BPH can significantly impact the quality of life and health of individuals affected by this condition. The complications of BPH including :

- 1.5.1. **Acute Urinary Retention:** is a urological emergency that occurs when there is a sudden and painful inability to urinate due to an obstruction in the bladder outlet. In the context of benign prostatic hyperplasia (BPH), which is the nonmalignant enlargement of the prostate gland, the increased size of the prostate can compress the urethra, leading to urinary retention [32]. The pathophysiology of AUR in BPH involves the mechanical obstruction of the urethra by the enlarged prostate gland. As the prostate grows, it can constrict the urethra, impeding the flow of urine from the bladder. This obstruction causes increased pressure in the bladder, leading to the inability to pass urine. Additionally, factors such as inflammation and smooth muscle tone changes in the prostate can contribute to urinary retention [33]. AUR in the setting of BPH is more commonly seen in older men. The risk of experiencing AUR increases with age, as the prevalence of BPH also rises with advancing age. It is estimated that approximately 10-20% of men with BPH will develop AUR at some point in their lives [34] . Other factors that may predispose individuals to AUR include the size of the prostate, severity of BPH symptoms, and presence of comorbidities [35].

- 1.5.2. Urinary Tract Infections (UTIs):** It is a common complication of benign prostatic hyperplasia (BPH), particularly in older men. BPH can cause urinary retention, incomplete bladder emptying, and urinary stasis, creating an environment conducive to bacterial growth and infection. The presence of UTIs in individuals with BPH can lead to worsening symptoms, recurrent infections, and potential complications if left untreated [36]. The pathophysiology of UTIs in BPH is multifactorial. The enlarged prostate can obstruct the flow of urine, leading to incomplete emptying of the bladder. Stagnant urine in the bladder provides a suitable environment for bacterial proliferation, increasing the risk of infection. Additionally, the presence of residual urine can lead to bacterial colonization and ascending infections affecting the urinary tract, including the bladder and kidneys [37]. Men with BPH are at an increased risk of developing UTIs compared to those without prostate enlargement. The risk of UTIs in BPH is further exacerbated in cases of urinary retention, catheter use, or other interventions that disrupt normal urinary flow. Elderly men with BPH and underlying comorbidities are particularly vulnerable to recurrent UTIs, which can impact their quality of life and overall health [38].
- 1.5.3. Bladder Stones:** It is a potential complication of benign prostatic hyperplasia (BPH), particularly in older men. BPH can lead to urinary retention, incomplete emptying of the bladder, and stasis of urine, creating an environment conducive to the formation of bladder stones. The presence of bladder stones in individuals with BPH can cause symptoms such as urinary frequency, urgency, hematuria, and recurrent urinary tract infections [39]. Can develop as a result of several factors related to BPH. When the prostate gland is enlarged, it can obstruct the normal flow of urine, leading to incomplete bladder emptying. Residual urine in the bladder can become concentrated and form crystals, which over time can aggregate and calcify, forming bladder stones. The stagnant urine and altered urinary pH due to BPH can further contribute to the formation of stones in the bladder [40]. It is more common in individuals with BPH, especially in men over the age of 50. The incidence of bladder stones in the setting of BPH varies depending on the severity of prostate enlargement, degree of urinary obstruction, and individual predisposing factors. Men with BPH who experience recurrent urinary tract infections, urinary retention, or prolonged periods of incomplete bladder emptying are at higher risk of developing bladder stones [41].
- 1.5.4. Chronic Kidney Failure:** It can occur as a severe complication of benign prostatic hyperplasia (BPH). BPH can lead to urinary retention, bladder outlet obstruction, and recurrent urinary tract infections, which, if left untreated, may result in long-term damage to the kidneys. The progression of CKD in the setting of BPH can significantly impact kidney function and overall health [42]. Chronic kidney failure in the presence of BPH can arise from various mechanisms. The obstruction

caused by an enlarged prostate can lead to increased pressure in the urinary tract, impairing urine flow from the kidneys to the bladder. This obstruction can cause urine to back up into the kidneys, leading to hydronephrosis, renal damage, and eventually chronic kidney failure if left unresolved. Additionally, recurrent urinary tract infections associated with BPH can contribute to kidney damage and the development of CKD [43]. The exact prevalence of CKD in individuals with BPH varies depending on factors such as age, severity of BPH, presence of comorbidities, and access to healthcare services. It is essential for individuals with BPH to undergo regular monitoring and assessment to detect any signs of kidney dysfunction early and prevent the progression to chronic kidney failure [44].

1.5.5. Hematuria: It can occur as a complication of benign prostatic hyperplasia (BPH). In individuals with BPH, hematuria may result from various factors, including irritation of the bladder or urinary tract due to obstructive symptoms, inflammation, infection, or renal calculi. Understanding the underlying causes and risk factors for hematuria in the context of BPH is essential for appropriate management and treatment [45]. Hematuria in BPH can stem from multiple mechanisms. The enlargement of the prostate gland can lead to urethral compression, urinary retention, and bladder outlet obstruction, resulting in increased pressure within the urinary tract. This elevated pressure can cause the delicate blood vessels in the urinary system to rupture, leading to the presence of blood in the urine. Additionally, chronic inflammation associated with BPH can further contribute to mucosal damage and bleeding in the urinary tract, manifesting as hematuria [46]. The prevalence of hematuria in individuals with BPH varies depending on factors such as age, severity of BPH, co-morbid conditions, and lifestyle factors. Hematuria may be more common in individuals with advanced BPH or those experiencing recurrent urinary tract infections, bladder stones, or other complications. While hematuria can raise concerns about underlying conditions, proper evaluation and management are crucial for identifying the specific cause and determining appropriate treatment strategies [47].

1.5.6. urinary Incontinence: It is a common complication of benign prostatic hyperplasia (BPH) characterized by the involuntary loss of urine. In individuals with BPH, urinary incontinence can occur due to various factors, including bladder dysfunction, detrusor instability, urethral obstruction, and overflow incontinence. Understanding the relationship between BPH and urinary incontinence is crucial for effective management and treatment strategies [48]. It can arise from several mechanisms. The enlarged prostate gland in BPH can exert pressure on the urethra, leading to urethral obstruction and urinary retention. This obstruction can cause changes in bladder function, such as detrusor muscle over-activity or reduced bladder capacity, contributing to urinary incontinence. Additionally, chronic bladder outlet obstruction secondary to BPH can lead to detrusor instability,

sphincter dysfunction, and urinary urgency, ultimately resulting in episodes of incontinence [49]. Urinary incontinence can significantly impact quality of life and lead to physical, emotional, and social challenges for affected individuals. Understanding the epidemiology of urinary incontinence in the context of BPH is essential for tailored management approaches aimed at improving symptom control and overall well-being [50].

1.5.7. Recurrent Urinary Retention: It is a common and debilitating complication of benign prostatic hyperplasia (BPH). BPH, characterized by the non-cancerous enlargement of the prostate gland, can obstruct the flow of urine through the urethra, leading to difficulty in urination and incomplete bladder emptying. Recurrent urinary retention occurs when there are repeated episodes of the inability to completely empty the bladder, resulting in discomfort, urinary urgency, increased risk of urinary tract infections, and potential complications such as bladder distension and damage [51]. The pathophysiology of recurrent urinary retention in BPH is primarily attributed to the progressive enlargement of the prostate gland, which can compress the urethra and obstruct the urinary flow. This obstruction impairs the ability of the bladder to empty fully, leading to residual urine accumulation and increasing the risk of recurrent episodes of urinary retention. The detrusor muscle of the bladder may become overactive or weakened over time due to chronic obstruction, further exacerbating urinary retention. This dysfunctional relationship between the prostate gland, urethra, and bladder contributes to the cycle of recurrent urinary retention in individuals with BPH [52]. The risk of Recurrent urinary retention as a complication of BPH increasing with age. Studies have shown that up to 30% of men with BPH may experience at least one episode of urinary retention in their lifetime, and a portion of these individuals may go on to develop recurrent urinary retention. The incidence of recurrent urinary retention in BPH varies based on factors such as the severity of prostate enlargement, co-morbid conditions, and treatment adherence. Early recognition and management of risk factors for recurrent urinary retention are essential for preventing complications and improving outcomes in individuals with BPH [53].

1.5.8. Lower Urinary Tract Symptoms (LUTS): They are a common complication of benign prostatic hyperplasia (BPH) and can significantly impact the quality of life of affected individuals. LUTS encompass a range of urinary symptoms, including urinary frequency, urgency, nocturia, weak stream, hesitancy, and incomplete bladder emptying. These symptoms result from the mechanical obstruction of the urethra by an enlarged prostate gland in BPH, leading to difficulties in urination and storage of urine [54]. In BPH, the progressive enlargement of the prostate gland can compress the prostatic urethra, leading to urethral obstruction. This obstruction disrupts the normal flow of urine from the bladder, causing changes in bladder function and the development of LUTS. The increased resistance to urine

flow can lead to bladder over-activity, detrusor muscle instability, and alterations in bladder compliance. Additionally, chronic bladder outlet obstruction can result in structural and functional changes in the bladder that contribute to the development of LUTS in individuals with BPH [55]. Studies have reported that up to 50% of men over the age of 50 may experience LUTS related to BPH, with a subset of individuals experiencing moderate to severe symptoms that significantly impact their daily life. The presence and severity of LUTS in BPH can vary among individuals based on factors such as prostate size, comorbidities, and lifestyle factors [56].

1.5.9. Decreased Quality of Life: It is a common complication of BPH and is often associated with urinary symptoms, sexual dysfunction, psychological stress, and limitations in daily activities. Understanding the factors contributing to decreased quality of life in BPH is essential for effective management and improvement of outcomes for affected individuals. Lower urinary tract symptoms (LUTS) such as urinary frequency, urgency, nocturia, weak stream, and incomplete bladder emptying can disrupt daily activities, sleep patterns, and social functioning. The bothersome nature of these symptoms can lead to anxiety, embarrassment, and a decreased sense of well-being [57]. Furthermore, BPH and its treatment methods can cause sexual dysfunction, including erectile dysfunction and ejaculatory problems, which can affect intimate relationships and self-esteem. The impact of sexual dysfunction on quality of life should be addressed in the management of BPH [58]. Additionally, living with BPH and its associated symptoms can lead to increased stress, anxiety, depression, and decreased self-confidence. Psychological support and counseling may be beneficial in addressing these emotional aspects and improving overall quality of life. Severe urinary symptoms and their consequences, such as frequent bathroom trips and urinary incontinence, can restrict participation in social activities, work responsibilities, and travel, leading to a reduced quality of life and feelings of isolation [59].

1.6. Diagnosis of BPH

Diagnosing benign prostatic hyperplasia (BPH) involves a combination of medical history evaluation, physical examination, and various tests to assess the severity of lower urinary tract symptoms (LUTS) and rule out other conditions. The investigations help in confirming the presence of BPH, evaluating the extent of prostate enlargement, and guiding appropriate management strategies [60]. The investigations including :

- **Medical History and Symptom Assessment:** It plays a crucial role in diagnosing and managing benign prostatic hyperplasia (BPH). By taking a detailed medical history and examining urinary symptoms, healthcare providers can evaluate the impact of BPH on a

patient's quality of life, identify contributing factors, and tailor appropriate treatment strategies. The Medical History including Urinary Symptoms (Inquire about lower urinary tract symptoms (LUTS) such as urinary frequency, urgency, hesitancy, weak stream, nocturia, incomplete emptying, and urinary incontinence. Understanding the nature, severity, and duration of these symptoms helps in assessing the progression of BPH and its impact on daily activities), Sexual Function (Evaluate sexual function and inquire about symptoms of erectile dysfunction, decreased libido, and ejaculatory problems. BPH may affect sexual health, leading to changes in sexual desire and performance. Assessing these aspects provides comprehensive care for patients with BPH), Review past medical conditions (such as diabetes, hypertension, cardiovascular diseases, and medications that may exacerbate BPH symptoms or impact prostate health. Conditions like diabetes and obesity can contribute to urinary symptoms and influence BPH management), Family History(Inquire about a family history of prostate conditions, particularly prostate cancer or BPH. Genetic factors may predispose individuals to prostate enlargement and urinary symptoms associated with BPH) [61]

While Symptom Assessment including:

- a. International Prostate Symptom Score (IPSS) : The IPSS questionnaire is a validated tool used to quantify the severity of LUTS associated with BPH. It includes questions related to urinary symptoms, voiding patterns, and symptom bother, helping to assess symptom severity and track changes over time [62].
 - b. Quality of Life (QoL) Assessment: Evaluate the impact of urinary symptoms on daily activities, emotional well-being, and overall quality of life using the QoL component of the IPSS questionnaire. Understanding the patient's perspective on symptom burden guides treatment decisions and goal setting [63].
- **Digital Rectal Examination (DRE):** It plays a crucial role in assessing Benign Prostatic Hyperplasia (BPH) by evaluating the size, shape, and consistency of the prostate gland. BPH is a non-cancerous enlargement of the prostate gland commonly found in older men that can lead to urinary symptoms such as frequency, urgency, and hesitancy. Its values in BPH including Prostate Size assessment, During DRE, the healthcare provider can assess the size of the prostate gland. In BPH, the prostate gland typically enlarges, causing pressure on the urethra and resulting in urinary symptoms. Another value including Texture and Consistency, By palpating the prostate gland during DRE, the healthcare provider can determine if there are any nodules, irregularities, or firm areas that could indicate BPH or other prostate conditions [64]. Its procedure including : The patient is typically positioned on their side or bent over a table for the examination. The healthcare provider inserts a lubricated, gloved finger into the rectum to feel the prostate gland's size, shape, and consistency. Any signs of prostate enlargement, nodules, or areas of firmness are noted during the examination [65]. Its significance is often used in conjunction with other diagnostic tests like PSA screening, urinary flow tests, and imaging studies to

evaluate and diagnose BPH. In patients diagnosed with BPH, DRE may be used as a monitoring tool to assess changes in the prostate gland size and condition over time [66].

- **Prostate-Specific Antigen (PSA) Test:** It is commonly used to monitor BPH, a non-cancerous enlargement of the prostate gland. BPH can cause an increase in PSA levels due to the excessive growth of prostate tissue, leading to compression of the urethra and urinary symptoms [67]. In the context of BPH, the PSA test helps clinicians assess the extent of prostate enlargement and monitor its progression. Elevated PSA levels in BPH are typically moderate compared to prostate cancer [68]. PSA levels in BPH are usually mildly elevated. Monitoring PSA trends over time can provide valuable information about the rate of prostate growth and help differentiate BPH from prostate cancer. Other factors, such as age, medication use, and recent prostate procedures, can also influence PSA levels in men with BPH [69]. Regular PSA testing in conjunction with other clinical assessments is crucial for managing BPH and ruling out prostate cancer, which may coexist with BPH in some cases [70].
- **Urinalysis and Urine Flow Studies:** They are essential diagnostic tools used in the evaluation of lower urinary tract symptoms (LUTS) in individuals with Benign Prostatic Hyperplasia (BPH). These tests provide valuable information about urinary function, obstruction, and potential complications associated with BPH. Urinalysis is performed to assess the presence of blood (hematuria), protein (proteinuria), and signs of urinary tract infection (UTI) in individuals with BPH. Abnormal findings on urinalysis may guide further evaluation and treatment, especially in cases of recurrent UTIs or suspected renal complications related to BPH [71]. Urine flow studies, such as uroflowmetry, assess urinary flow rate, volume, and patterns to evaluate voiding dysfunction and obstruction in individuals with BPH. Peak urinary flow rate, voided volume, time to maximum flow, and post-void residual volume are important parameters measured during urine flow studies. Reduced peak flow rate and prolonged voiding time may indicate bladder outlet obstruction due to BPH, guiding further diagnostic and treatment decisions [72]. Urinalysis and urine flow studies are often used in combination to comprehensively assess urinary symptoms and urinary function in individuals with suspected BPH. The results of these tests help healthcare providers differentiate obstructive voiding symptoms related to BPH from other potential causes such as UTIs, bladder dysfunction, or neurogenic bladder disorders [73].
- **Trans-rectal Ultrasound (TRUS):** Trans-rectal Ultrasound (TRUS) is a valuable imaging tool used in the evaluation and management of Benign Prostatic Hyperplasia (BPH). This non-invasive procedure provides detailed images of the prostate gland, aiding in the assessment of prostate size, morphology, and potential complications associated with BPH. TRUS involves the insertion of a trans-rectal probe to visualize the prostate gland using high-frequency ultrasound waves. TRUS helps assess prostate size, volume, shape, and the presence of nodules or hypo-echoic areas indicative of BPH. TRUS can guide prostate biopsies to rule out prostate cancer in individuals with

suspected BPH and elevated prostate-specific antigen (PSA) levels [74]. TRUS provides accurate measurements of prostate volume, which is essential for determining disease severity and guiding treatment decisions in BPH. TRUS helps evaluate the degree of prostatic obstruction, urethral compression, and bladder outlet obstruction contributing to urinary symptoms in BPH. TRUS can detect complications of BPH such as bladder stones, diverticula, cysts, or abscesses that may impact management strategies [75]. TRUS is a well-tolerated, non-invasive imaging technique that is typically performed in an outpatient setting. Patients may experience mild discomfort during TRUS due to the probe insertion but discomfort is minimal and transient. TRUS is considered safe with minimal risks or complications associated with the procedure when performed by trained healthcare professionals [76].

1.7. Prognosis of BPH

BPH is a prevalent condition affecting aging men worldwide and is characterized by the non-cancerous enlargement of the prostate gland. Understanding the prognosis of BPH is essential for healthcare providers to deliver optimal care, predict disease progression, and improve patient outcomes. The Factors Influencing Prognosis including age, Advanced age is a significant risk factor for disease progression and complications in BPH, with older men experiencing a higher likelihood of symptomatic enlargement of the prostate [77]. The another factor is Prostate Size, Prostate volume is closely associated with the severity of lower urinary tract symptoms (LUTS) and can influence the prognosis of BPH, with larger prostates correlating with increased risk of obstruction and urinary complications. Furthermore, Severity of Symptoms, The severity of urinary symptoms, such as weak urinary stream, hesitancy, frequency, and nocturia, can impact quality of life and prognosis in individuals with BPH. Lastly, the Comorbidities, Presence of concomitant medical conditions, such as diabetes, hypertension, or cardiovascular disease, can influence disease progression, treatment response, and long-term outcomes in BPH patients [78]. BPH is a chronic condition. If left untreated, BPH can lead to worsening urinary symptoms, bladder dysfunction, acute urinary retention, recurrent urinary tract infections, bladder stones, and potentially renal complications. Disease progression varies among individuals, highlighting the importance of early intervention to mitigate symptoms and improve long-term outcomes [79].

2. Aim of study

to investigate and comprehensively evaluate the prevalence of various complications associated with Benign Prostatic Hyperplasia (BPH) in Thiqr province during period between 2023 and 2024 .

3. Methodology:

3.1. Study design

Retrospective cross sectional study in Thiagar province including hospitals and clinics during period between 2023 and 2024

3.2. Participants

Inclusion criteria

1. Male patients
2. Patients who have a confirmed diagnosis of BPH based on medical records, clinical assessment and imaging studies
3. Patients who have experienced or have been diagnosed with complications of BPH
4. Patients who give informed consent

Exclusion criteria

1. Female Gender
2. Patients with Missing or Incomplete Data
3. Patients with Unconfirmed Diagnosis of BPH
4. Patients with Severe Cognitive Impairment
5. Patients with Inability to Provide Informed Consent
6. Patients with Terminal Illness
7. Patients with Previous Prostate Surgery

3.3. Sampling strategy

Randomly select participants who visit the urology department in hospital and urology private clinics from each age group and BPH severity level.

3.4. Data Collection Methods

3.4.1. Medical Records Review

The data are obtained from paper medical records of male individuals diagnosed with BPH within a specific time frame. The relevant information on BPH complications documented in the medical records are extracted , including acute urinary retention, bladder stones, chronic kidney disease, recurrent UTIs, and other related complications.

3.4.2. Questionnaires and Surveys:

Our questionnaire Include questions on symptom severity, frequency of complications, impact on daily activities, and healthcare utilization related to BPH complications.

3.4.3. Clinical Assessments:

We conduct direct clinical assessments by specialist to evaluate the presence and severity of BPH complications. The specialist did physical examinations focusing on prostate size, tenderness, and signs of urinary obstruction. We Utilize standardized assessment tools for symptom assessment, such as the International Prostate Symptom Score (IPSS).

3.4.4. Imaging Studies and Diagnostic Tests:

we extracted the records of imaging studies like trans-rectal ultrasound (TRUS) or cystoscopy to detect the prostate and detect complications like bladder stones or urinary obstruction. Also we extracted the results of urine tests, including urinalysis and urine culture, to identify signs of urinary tract infections or hematuria. We collect the data about urodynamic studies, uroflowmetry tests, or post-void residual measurements to assess bladder function and urinary flow patterns.

3.4.5. Data Entry and Documentation:

we created a structured database for entering and storing collected data securely. We make an excel file with documented details of each participant, including demographics, medical history, BPH diagnosis, and complication profiles.

4. Results

4.1. Risk factors of BPH among different age groups

The table 1 show that the smoking rates are higher in older age groups, family history plays a significant role in genetic predispositions, and chronic diseases become more prevalent with age, especially in the 60-69 group.

Age group (years)	Smoking	Family History	Chronic disease
29-39			
Yes	9 (82%)	4 (36.3%)	2 (18%)
No	2 (18%)	7 (63.7%)	9 (82%)
40-49			
Yes	1 (50%)	0 (0%)	0 (0%)
No	1 (50%)	2 (100%)	2 (100%)
50-59			
Yes	5 (50%)	3 (30%)	2 (20%)
No	5 (50%)	7 (70%)	8 (80%)
60-69			
Yes	6 (54.5%)	6 (54.5%)	6 (54.5%)
No	5 (45.5%)	5 (55.5%)	5 (55.5%)
70-79			
Yes	3 (50%)	2 (33.3%)	4 (66.7%)
No	3 (50%)	4 (66.7%)	2 (33.3%)
80-89			
Yes	3 (100%)	1 (33.3%)	2 (66.7%)
No	0 (0%)	2 (66.7%)	1 (33.3 %)

Table 1. The prevalence of risk factors of BPH among different age groups

4.2. Symptoms of BPH among different age groups

Table 2 show that the frequency of urinary symptoms related to Benign Prostatic Hyperplasia (BPH) varies across different age groups. While younger individuals may experience these symptoms at a lower rate, the frequency tends to increase in the 40-49 age group before fluctuating in the subsequent age brackets

Clinical features	29-39	40-49	50-59	60-69	70-79	80-89
Nocturia:						
Yes	5 (45.5 %)	2 (100 %)	8 (80 %)	8 (72.7 %)	6 (100 %)	3 (100 %)
No	6 (54.5 %)	0 (0 %)	2 (20 %)	3 (27.3 %)	0 (0%)	0 (0 %)
Urgency:						
Yes	8 (72.7%)	2 (100 %)	5 (50%)	10 (91 %)	5 (83.4 %)	2 (66.7 %)
No	3 (27.3%)	0 (0 %)	5 (50%)	1 (9%)	1 (16.6 %)	1 (33.3 %)
Frequency:						
Yes	8 (72.7%)	2 (100 %)	8 (80 %)	10 (91 %)	5 (83.4 %)	3 (100 %)
No	3 (27.3%)	0 (0%)	2 (20 %)	1 (9%)	1 (16.6 %)	0 (0 %)
Dysuria:						
Yes	10 (91 %)	2 (100 %)	4 (40%)	8 (72.7 %)	5 (83.4 %)	2 (66.7 %)
No	1 (9 %)	0 (0 %)	6 (60%)	3 (27.3 %)	1 (16.6 %)	1 (33.3 %)
Urination difficulty						
Yes	6 (54.5 %)	0 (0 %)	6 (60 %)	3 (27.3 %)	1 (16.6 %)	2 (66.7 %)
No	5 (45.5 %)	2 (100 %)	4 (40 %)	8 (72.7 %)	5 (45.5 %)	1 (33.3 %)
Dribbling						
Yes	7 (63.6%)	2 (100 %)	9 (90 %)	6 (55.5%)	5 (83.4 %)	2 (66.7 %)
No	4 (36.4%)	0 (0 %)	1 (10 %)	5 (45.5 %)	1 (16.6 %)	1 (33.3 %)

Table 2. The prevalence of clinical features of BPH among different age groups

4.3. The prevalence of BPH complications among different age groups

The table shows varying risks of complications like recurrent UTIs, bladder stones, kidney damage, incontinence, and urinary retention with age in individuals with BPH. These issues peak in middle-aged groups, while incontinence rises with age. Urinary retention is higher in younger age groups but decreases with age, with notable incidences in the elderly.

Complications	Age groups					
	29-39	40-49	50-59	60-69	70-79	80-89
AUR						
Yes	2 (18%)	1(50%)	2 (20%)	5 (45.5%)	2 (33.3%)	2 (66.7 %)
No	9 (82%)	1(50 %)	8 (80%)	6 (55.5%)	4 (66.7%)	1 (33.3 %)
Hematuria						
Yes	2 (18%)	0 (0%)	1 (90%)	4 (36.4%)	1 (16.6%)	3 (100 %)
No	9 (82%)	2 (100%)	9 (90%)	7 (63.6%)	5 (83.4%)	0 (0%)
UTIs						
Yes	10 (91%)	2 (100%)	7 (70%)	10 (91%)	6 (100 %)	1 (33.3 %)
No	1 (9%)	0 (0%)	3 (30%)	1 (9%)	0 (0%)	2 (66.7 %)
Bladder stone						
Yes	1 (9%)	1 (50%)	3 (30%)	4 (36.4%)	1 (16.6%)	0 (0%)
No	10 (91%)	1 (50 %)	7 (70%)	7 (63.6%)	5 (83.4%)	3 (100 %)
Kidney damage		1 (50%)				
Yes	1 (9%)	1 (50 %)	0 (0%)	1 (9%)	3 (50 %)	0 (0%)
No	10 (91%)		10 (100%)	10 (91%)	3 (50 %)	3 (100 %)
Incontinence						
Yes	6 (54.5%)	2 (100 %)	1 (10%)	6 (54.5%)	2 (33.3%)	3 (100 %)
No	5 (45.5%)	0 (0%)	9 (90%)	5 (45.5%)	4 (66.7%)	0 (0%)
Recurrent retention						
Yes	9 (82%)	2 (100%)	7 (70%)	6 (54.5%)	2 (33.3%)	2 (66.7 %)
No	2 (18%)	0 (0%)	3 (30%)	5 (45.5%)	4 (66.7%)	1 (33.3 %)

5. Discussion

Benign Prostatic Hyperplasia (BPH), a common condition among aging men, presents various risk factors that can influence its development and progression. Among these factors, smoking has been a subject of interest due to its potential impact on prostate health. Analyzing the prevalence of smoking across different age groups in relation to BPH provides valuable insights into the association between smoking behavior and the risk of this condition. Data analysis reveals a spectrum of smoking percentages distributed across distinct age brackets, reflecting a diverse range of smoking behaviors among individuals. Notably, approximately half of BPH patients are smokers within three age groups — 40-49, 50-59, and 70-79. This observation underscores the prevalence of smoking among middle-aged and older individuals who are managing BPH. Interestingly, the frequency of smoking shows a slight increase among individuals aged 60-69, with 55.5% being smokers. This uptick in smoking prevalence in this age group suggests a potential correlation between smoking habits and the risk of BPH development. Moreover, the data highlights strikingly high smoking rates in the 29-39 age group (82%) and the 80-89 age group (100%), hinting at a significant relationship between smoking and the likelihood of experiencing BPH.

Other risk factor is family history which emerging as a key determinant in understanding its etiology. Assessing the prevalence of family history among individuals with BPH across different age cohorts provides valuable insights into the interplay between genetic predisposition and the development of this prostatic condition. Upon scrutinizing the data regarding family history among patients with BPH in distinct age groups, intriguing patterns emerge, shedding light on the familial component of this condition. Notably, in the age group of 40-49, the incidence of family history is notably low, registering at 0%. This initial observation suggests a lesser genetic influence on BPH development in this younger age bracket. As we traverse through the age spectrum, a nuanced depiction of family history prevalence in BPH patients unfolds. Among individuals aged 50-59, the frequency of family history rises to 30%, indicating a moderate hereditary link to the condition within this age cohort. Notably, the age groups of 70-79 and 80-89 exhibit a slightly higher prevalence of family history at 33.3%, underscoring a probable genetic predisposition towards BPH in older individuals. Contrastingly, the age group of 29-39 presents a notable family history frequency of 36.4%, surpassing the prevalence observed in some older age categories. This unexpected finding suggests a substantial genetic influence on BPH risk in younger individuals, urging further exploration into genetic susceptibility across different age ranges. The most intriguing revelation manifests in the age bracket of 60-69, where the highest incidence of family history in BPH cases (54.5 %) . This pivotal age group showcases a significant genetic predisposition, signifying an elevated likelihood of BPH manifestation in individuals with a familial history of the condition.

The other key aspect Influencing the development and progression of BPH is the presence of chronic diseases . When examining the frequency of chronic diseases as a risk factor for BPH

across various age groups, intriguing patterns emerge. For instance, among individuals aged 40-49, the occurrence of chronic diseases as a contributing factor to BPH is notably low, standing at 0%. This suggests that younger age groups may be less affected by chronic conditions that could exacerbate BPH. As we delve into the demographic segments of 29-39 and 50-59, the prevalence of chronic diseases as a risk factor for BPH increases to 18% and 20%, respectively. This slight uptick in percentages highlights a potential correlation between age, chronic diseases, and the development of BPH. Moving into the age group of 60-69, the frequency of chronic diseases as a contributing factor to BPH rises substantially to 54.5%. This sharp increase underscores the impact of age-related health concerns on the development of BPH. Moreover, older age groups, such as individuals aged 70-79 and 80-89, exhibit even higher rates of chronic diseases influencing BPH, both at 66.7%. These findings suggest that as individuals advance in age, the likelihood of chronic conditions exacerbating BPH significantly rises. The cumulative effect of multiple chronic diseases in these older age groups underscores the complex interplay between aging, health comorbidities, and the progression of BPH.

By examining the prevalence of key symptoms such as nocturia within various age brackets, healthcare professionals can gain insights into the presentation and progression of BPH among these demographics. When evaluating the prevalence of clinical features of BPH, specifically focusing on the symptom of nocturia, intriguing trends emerge across different age groups. Notably, among individuals aged 29-39, nocturia is reported at a frequency of 45.5%. This finding suggests that even in younger adult populations, nocturia, characterized by the frequent need to urinate during the night, can be a notable symptom of underlying BPH. As we shift our focus to older age groups, such as those between 50-59, 60-69, 70-79, and 80-89, the prevalence of nocturia as a clinical feature of BPH increases significantly. Among individuals aged 50-59, the rate of nocturia rises to 80%, indicating a higher incidence of this symptom in this age bracket. This trend intensifies among individuals aged 60-69, where nocturia is reported in a staggering 72.7% of cases, highlighting the growing impact of BPH-related symptoms as individuals progress into later stages of middle age. Interestingly, the highest prevalence of nocturia as a clinical feature of BPH is observed among individuals aged 40-49, 70-79, and 80-89, all standing at 100%. This finding underscores the profound influence of age on the manifestation of nocturia and suggests that as individuals advance in years, the likelihood of experiencing this symptom significantly increases. The universal presence of nocturia in these age groups underscores the pervasive nature of this symptom in the context of BPH across varying stages of adulthood and into older age.

Other symptom is urgency. When examining the prevalence of urgency as a symptom of BPH across age brackets, intriguing patterns emerge that offer valuable clinical implications. Among patients aged 29-39, urgency is reported at a frequency of 72.7%. This finding suggests that even in younger adult populations, the symptom of urgency can be a prevalent feature of BPH, indicating the importance of considering this symptom in the diagnostic process for Individuals in their late 20s and early 30s. As we transition to older age groups, such as individuals aged

40-49, the prevalence of urgency reaches a striking 100%. This high frequency in the 40-49 age bracket underscores the notable impact of urgency as a symptom of BPH in this demographic. In the age group of 50-59, the frequency drops to 50%, signifying a lower incidence of urgency within this specific age range. However, among those aged 60-69, the frequency of urgency rises notably to 91%, indicating a significant increase in the prevalence of this symptom as individuals progress into their late 60s. Further exploring urgency in older demographics, among patients aged 70-79, the frequency decreases to 83.4%, suggesting a slightly lower prevalence compared to the 60-69 age group. Lastly, among individuals aged 80-89, the frequency of urgency declines to 66.7%, indicating a decrease in the presence of this symptom in the oldest age bracket examined. The varying frequencies of urgency across different age groups highlight the complex interplay between age and the manifestation of BPH symptoms.

Furthermore, The frequency being a key indicator of the condition. Analyzing different age groups, patients aged 29-39 exhibit a frequency of 72.7%, while those aged 40-49 show a significant 100% frequency. In the 50-59 age bracket, the frequency decreases to 80%, but rises to 91% among individuals aged 60-69. Within the 70-79 age group, the frequency drops to 83.4%, and surprisingly, among those aged 80-89, the frequency reaches 100%.

Regarding dysuria, Examining different age cohorts, individuals aged 29-39 demonstrate a high frequency of 91% for dysuria, which further rises to 100% among those aged 40-49. In the 50-59 age group, the frequency drops to 40%, but increases to 72% for individuals aged 60-69. Within the 70-79 age category, the frequency decreases to 83.4%. Surprisingly, among those aged 80-89, the frequency lowers to 66.7%. These findings underscore the age-dependent nature of dysuria as a symptom of BPH, necessitating age-specific approaches to diagnosis and treatment for more targeted symptom management and improved patient outcomes.

The another feature is urinary difficulty. This symptom can greatly impact an individual's quality of life, making it essential to understand its prevalence across different age groups for effective management and treatment. Exploring the prevalence of urinary difficulty in relation to age, data indicates distinct patterns. Among individuals aged 29-39, the frequency stands at 54.5%. This suggests that even at a relatively young age, BPH can manifest in urinary issues, although the occurrence is not as pronounced as in older age groups. Surprisingly, the age group of 40-49 shows an absence of reported cases, indicating that urinary difficulty might not be a prevalent symptom in this particular demographic. This stark contrast between younger and older age groups highlights the progression and variability of BPH symptoms as individuals age. Moving on to the 50-59 age range, the frequency of urinary difficulty rises to 60%. This increase suggests a higher likelihood of experiencing this symptom as individuals enter their 50s, indicating a significant shift from the previous age bracket. In the age group of 60-69, the frequency of urinary difficulty spikes to 27.3%. This jump underscores the progressive nature of BPH symptoms, with a notable increase in the prevalence of urinary issues in this age range. Managing these symptoms effectively becomes crucial at this stage to maintain a good quality of life for affected individuals. As individuals reach ages 70-79, the frequency of urinary

difficulty decreases to 16.6%, indicating a slight decline in the prevalence of this symptom compared to the previous age group. However, it remains a noteworthy concern for a portion of individuals in this demographic, necessitating ongoing monitoring and management. Surprisingly, the frequency of urinary difficulty shoots up to 66.7% among individuals aged 80-89. This significant increase demonstrates the resurgence of urinary issues in the oldest age group, highlighting the resurgence of symptomatic presentation in this advanced age bracket.

The last clinical feature is dribbling. Analyzing the prevalence of frequency symptoms across different age groups reveals interesting patterns. Among individuals aged 29-39, the frequency is reported at 63.6%, indicating early onset in some cases. In the 40-49 age group, the frequency is alarmingly high at 100%, highlighting a significant increase. As individuals enter their 50s, the frequency remains high at 90%, suggesting a sustained presence of this symptom. However, in the 60-69 age bracket, the frequency drops to 55.5%, indicating a decrease compared to the previous groups. Moving to ages 70-79, the frequency rises to 83.4%, showing a resurgence of this symptom in older age. Surprisingly, among those aged 80-89, the frequency lowers to 66.7%, indicating a slight decrease in reported cases. These results indicate that the frequency of urinary symptoms related to Benign Prostatic Hyperplasia (BPH) varies across different age groups. While younger individuals may experience these symptoms at a lower rate, the frequency tends to increase in the 40-49 age group before fluctuating in the subsequent age brackets. The results of our study about clinical features of BPH supports the general understanding that BPH symptoms tend to worsen and become more prevalent as men age. The increasing prevalence of symptoms like nocturia, dysuria, urinary difficulty, and dribbling in older age groups is consistent with the progressive nature of BPH and its impact on urinary function[84].

Regarding complications of BPH, the first one is AUR. The frequency of Acute Urinary Retention (AUR) in individuals with Benign Prostatic Hyperplasia (BPH) varies across age groups. In the 40-49 age group, the incidence of AUR is high at 50%, decreasing to 20% in the 50-59 age group. The risk remains notable but stable in the 60-69 age bracket at 45.5% and decreases slightly in the 70-79 age group to 33.3%. However, among individuals aged 80-89, the frequency of AUR significantly increases to 66.7%.

The second complication is Hematuria. The prevalence of AUR in relation to age groups sheds light on the evolving risk profile faced by individuals with BPH. In the 29-39 age group, the frequency of AUR stands at 18%, indicating a notable but relatively lower likelihood of experiencing this complication at a younger age. Surprisingly, among individuals aged 40-49, the frequency drops to 0%, suggesting a significant decrease in the occurrence of AUR in this particular age bracket. This unexpected shift underscores the complex nature of BPH and its associated complications. However, as individuals progress into the 50-59 age group, the risk of

AUR spikes dramatically to 90%, marking a substantial increase in the likelihood of encountering this distressing complication. This stark contrast between the 40-49 and 50-59 age groups highlights the critical role age plays in reshaping the landscape of BPH complications. Moving forward, in the 60-69 age bracket, the frequency of AUR drops to 36.4%, signifying a notable decline in risk compared to the 50-59 age group. This decrease hints at a potential stabilization or reduction in the prevalence of AUR as individuals transition through different stages of BPH. As individuals reach the 70-79 age group, the frequency of AUR further diminishes to 16.6%, showcasing a positive trend towards lower rates of this complicating factor in older age. This decline could be attributed to a myriad of factors, including changes in prostate size, hormonal fluctuations, and individual health status. Surprisingly, as individuals cross into the 80-89 age group, the frequency of AUR skyrockets to 100%, indicating a drastic resurgence in the likelihood of experiencing this debilitating complication. This abrupt escalation underscores the unique challenges posed by BPH in advanced age and emphasizes the need for vigilant monitoring and tailored interventions for elderly individuals with this condition. Overall, the age-specific variations in the frequency of AUR among individuals with BPH illuminate the dynamic nature of this disease and underscore the importance of personalized care approaches that consider the evolving risk profile across different age groups.

The another complications Analyzing UTI prevalence in various age groups sheds light on the evolving risk landscape linked to BPH. In the 29-39 age group, UTI frequency among BPH patients is notably high at 81%, highlighting the challenges faced at a younger age. As individuals move into the 40-49 age group, UTI frequency rises to 100%, emphasizing the growing complexity of managing BPH in middle age. The 50-59 age bracket sees a 70% UTI frequency, indicating a slight decrease but a persistent risk. UTI rates climb to 91% in the 60-69 age group, showing a resurgence in older individuals. At 70-79, the frequency hits 100%, intensifying vulnerability among the elderly. Surprisingly, UTI frequency drops to 33.3% in the 80-89 age group, showcasing a decrease despite advanced age. The results signify that the likelihood of experiencing recurrent UTIs in individuals with BPH varies across age groups, with higher frequencies observed in middle-aged and elderly individuals.

Bladder stones' frequency varies with age, rising from 9% in those aged 29-39 to 50% in the 40-49 age group. It drops to 30% in the 50-59 age bracket before increasing again to 36.4% in the 60-69 group. Interestingly, it declines to 16.6% in the 70-79 age band and is almost nonexistent at 0% for those aged 80-89. These results indicate a peak risk in the middle-aged groups .

Regarding kidney damage, Analysis revealed varying risks of kidney damage in different age groups due to benign prostatic hyperplasia (BPH). The incidence increased from 9% in ages 29-39 to 50% in ages 40-49, dropped to 0% at 50-59, rose to 9% at 60-69, then sharply increased to 50% at 70-79. The prevalence decreased to 0% at 80-89. These results highlight age-specific fluctuations in kidney damage risk related to BPH, emphasizing the need for tailored care strategies at different life stages.

The other complication is incontinence, the prevalence of incontinence among individuals afflicted with this condition varies significantly across different age brackets. In the 29-39 age group, 54.5% exhibit symptoms of incontinence. This rate skyrockets to 100% in the 40-49 age bracket, signifying a noticeable increase in vulnerability. Moving on to the 50-59 age range, the frequency decreases to 10%, indicating a sharp decline compared to the preceding age group. Surprisingly, the 60-69 age group reports a similar incontinence frequency of 54.5% as the 29-39 age bracket. Transitioning into older age categories, a decline in incontinence prevalence can be observed. The 70-79 age group records a frequency of 33.3%, highlighting a decrease from the preceding age brackets. Lastly, in the 80-89 age bracket, the frequency of incontinence rises once more to 100%, reflecting a resurgence of this issue in the oldest age group. These results indicate that the prevalence of incontinence varies significantly with age. Incontinence becomes more common as individuals age, with higher rates observed in older age groups. The data suggests that individuals in their 40s have a 100% prevalence of incontinence, which then decreases in the 50s and rises again in the 80s and 90s.

The last complication of BPH is Recurrent Urinary Retention. It varies by age, with higher frequencies in younger age groups. For those aged 29-39 and in their 40s, the incidence is notably high at 82% and 100% respectively, decreasing in older age groups. The prevalence shifts from 70% in the 50-59 age group to 33.3% in the 70-79 age group. Even in the 80-89 age group, where the frequency drops to 66.7%, the risk remains significant .

Our results about complications associated with BPH, such as Acute Urinary Retention (AUR), Hematuria, UTIs, Bladder stones, recurrent Urinary Retention, incontinence and kidney damage appear to consistent with the general understanding within the medical community. The age-specific patterns of these complications, including variations in frequencies across different age groups, reflect the well-established understanding that BPH-related complications tend to evolve as individuals progress through various stages of life. The increasing likelihood of complications like AUR and UTIs in older age groups, as well as the fluctuating frequencies of these complications across age brackets, are consistent with the known progression and risks associated with BPH .

Limitations

1. Small sample size
2. Reliance on retrospective data can lead to incomplete or inaccurate information, affecting the validity of prevalence estimates.
3. The study sample is not representative of the general population, the prevalence estimates may not be accurate.
4. Some participants

6. Conclusion

1. Intricate associations between age, risk factors, clinical features, and complications of the condition.
2. Smoking emerges as a significant risk factor, especially among middle-aged and older individuals managing BPH.
3. Family history showcases varying prevalence across age groups, suggesting a complex interplay between genetic predisposition and BPH development.
4. Chronic diseases become increasingly influential as individuals age, exacerbating BPH symptoms and complications.
5. Clinical features like nocturia, urgency, urinary difficulty, and dribbling demonstrate age-dependent variations, underscoring the progressive nature of BPH symptoms with advancing age.
6. Complications such as Acute Urinary Retention (AUR), Hematuria, UTIs, bladder stones, kidney damage, incontinence, and recurrent urinary retention exhibit distinct age-specific patterns, emphasizing the evolving risk landscape faced by individuals with BPH as they age

7. Recommendations

1. Consider integrating age-specific risk assessments into personalized treatment plans for individuals with BPH to address the complex relationship between age, risk factors, clinical features, and complications.
2. Encourage smoking cessation interventions for middle-aged and older individuals with BPH to mitigate the heightened risk associated with smoking.
3. Emphasize the importance of understanding family history in assessing BPH risk, highlighting the need for genetic counseling and tailored screening strategies across different age groups.
4. Develop comprehensive management strategies for individuals with BPH that take into account the influence of chronic diseases, particularly as individuals age, to address symptom exacerbation and complication risks effectively.
5. Prioritize the monitoring and management of age-related variations in clinical features like nocturia, urgency, urinary difficulty, and dribbling to adapt treatment approaches as BPH symptoms progress with age.
6. Tailor surveillance and treatment plans for BPH complications like Acute Urinary Retention (AUR), Hematuria, UTIs, bladder stones, kidney damage, incontinence, and recurrent urinary retention based on distinct age-specific patterns to provide targeted care throughout the aging process.

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