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Study effect of age in Prostatic Hyperplasia, Prostate Cancer Patients and male infertility

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Abstract

Methods: The study aimed to assess the age, body mass index (BMI), Period of _Infertility Counts, types of infertility distribution of patients diagnosed with prostatic hyperplasia and prostate cancer in Najaf, Iraq. The data was categorized into two age groups: less than 40 years and more than 40 years. BMI was categorized into two groups: less than 25 kg/m^2 and more than 25 kg/m^2. The Chi-square test evaluated statistical significance to analyze how prostatic hyperplasia and prostate cancer affected distribution patterns of azoospermia, asthenozoospermia and teratozoospermia, oligozoospermia, and unexplained infertility.

Results: A significant association was found between age and prostate condition (X2 = 48.21, P = 0.0001). Prostate cancer was significantly more prevalent in men over 40 (77.3%), while Prostate Hyperplasia was observed in both age groups, with a slightly higher percentage in men under 40 (51.7%). No statistically significant association was found between BMI and the presence of prostatic hyperplasia or prostate cancer. The BMI distribution was similar between the two groups, with a slightly higher prevalence of normal/healthy weight (BMI < 25 kg/m^2) in both conditions. No statistically significant association was found between "Period_of Infertility Counts" and the presence of prostatic hyperplasia or prostate cancer. The distribution of "Period_Infertility Counts" was similar between the two groups. Research established an important connection between infertility type and prostate condition occurrence. "Unexplained Infertility" was the most common type in both prostatic hyperplasia (84.5%) and prostate cancer (50.0%). However, the distribution of other infertility types differed significantly between the two groups. Older age (OR = 3.64, p = 0.024), fertile periods greater than 5 years (OR = 4.87, p = 0.035), azoospermia (OR = 28.00, p = 0.005), and a combination of asthenozoospermia, teratozoospermia, and oligozoospermia (OR = 9.62, p = 0.0001) were significantly associated with increased odds of "P. Cancer a." BMI and fertile periods between 5.1 and 10 years were not significantly associated.

Conclusion: Older age functions as a primary risk factor leading to prostate cancer development in this specific demographic. Age serves as a vital element during prostate disease diagnosis and management because Prostate Hyperplasia happens in men at different age groups. Research findings showed that BMI had no impact on prostatic hyperplasia diagnosis or prostate cancer presence in addition to Period of _Infertility Counts posing no connection to these conditions. The type of male infertility

establishes the risk of prostate cancer together with age and particular male fertility factors thus making these variables significant predictors for prostate cancer.

Keywords: Prostate Hyperplasia, Prostate Cancer, Age Distribution, BMI, semen analysis

Introduction:

Epidemiologically the definition of infertility describes a situation when a person cannot get pregnant during a 12-month period of unprotected sexual intercourse. Infertility stems from either male factors or female factors as well as mixed conditions between the two genders. The pathogenesis of prostate hyperplasia and prostate cancer remains partly unknown to scientists even though research has found evidence that specific androgens play a vital role. Scientific studies confirm that certain androgens influence cell growth and development [1] and proliferation rates in prostate cancer cell lines while these hormones act as promoters for prostate carcinogenesis [2] and animal models show that denying androgens can stop prostate cancer from forming [3]. Epidemiological studies have to date provided no evidence for a relationship between elevated androgen concentrations in the circulation and excess prostate cancer risk [4]. This finding is consistent with the proposed androgen saturation model, which posits the existence of a certain threshold level of maximal androgenic stimulation, above which there is no further increase in risk of prostatic carcinogenesis [5]. A low amount of androgenic stimulation below this critical threshold creates a diminished risk of developing prostate cancer. The study on 3,518 men with Klinefelter syndrome showed only two instances of non-fatal prostate cancer because they exhibit typical congenital hypogonadism [6]. Hence this demonstrates support for the proposed hypothesis. Age is a critical factor influencing the risk and progression of prostate cancer, with incidence rates increasing significantly in men over 50. In the context of infertility, older age may correlate with altered biomarker expression, potentially affecting early detection and diagnosis. Most who suffer from congenital hypogonadism exhibit this disorder as their standard condition. Hypogonadism and testicular dysfunction affect many infertile males [7] while experts consider several of these cases to stem from fetal origins [8]. The determination of fertility status during reproductive years provides better expertise about how long-term androgenic stimulation of prostate tissue compared to later-life androgen assessments after malignancy has possibly formed. Lack of available retrospective clinical information about youth reproductive dysfunction necessitates using involuntary childlessness as a substitute measure for subnormal fertility potential. The two national cancer registry-based research studies employed this method to discover that men without children faced a statistically lower prostate cancer diagnosis risk in comparison to fathers [9]. Multiple studies demonstrate a possible relationship between childlessness and prostate cancer risk yet they failed to eliminate indirect causes of childlessness such as personal choice or lack of opportunity or female factor infertility as well as they did not consider any potential factors other than age and marital status [10]. This research evaluated the impact of age combined with BMI and Period_Infertility Counts and prostate cancer types among Iraqi patients

receiving prostatic hyperplasia and prostate cancer diagnosis in Najaf.

Materials and Methods:

All inhabitants of Najaf, Iraq, who resided there between the period 1/11/2024 and 15/3/2025 had the opportunity to join the fertility center of Al-Sader Medical City. A self-administered questionnaire alongside physical semen examination (WHO1999) served to collect baseline data. This assessment obtained data about educational background, occupational status, physical activities, social relationships, medical records, medicinal intake, and health conditions of participants. Researchers calculated baseline measurements of height, weight, and Body Mass Index (BMI) from participants' recorded height and weight information. Overall, 80 prevalent prostate hyperplasia cases were found, including 22 prostate cancers and 10 fertile controls after reviewing patient records and profiles. The survey asked participants about their attempts to conceive children, their number of biological offspring (surviving and deceased), and their diagnosis of diseases that affect fertility status (Ferlay et al., 2021). All participants provided written consent before returning completed surveys. Medical staff obtained tumor stage data through digital rectal examination assessment from specialized doctor records at the time of diagnosis. This study included only men with permanent (lifetime) childless status in its definition of infertility. This research group excluded childless men who had fathered children from the classification of infertile men and included both men who had fathered children and men who had lost their offspring outside this classification (Esteves et al., 2022)

Statistical Analysis

A statistical analysis running on the SPSS version 28.0 (SPSS Inc., Chicago, IL, USA) platform carried out this work. The study displayed data for clinical variables as mean ± SD values for normal distributions and as median with IQR for skewed data distributions using analysis of covariance as the comparison method. The analysis of Categorical variables used percentages and chi-square tests or fisher`s exact method. We analyzed correlations between markers and all demographics characteristics through Pearson’s or Spearman rank correlation analysis while multiple logistic regression provided independent predictors of Prostatic Cancer. The researchers expressed the results by using adjusted odds ratio (OR) values together with 95% confidence intervals (CI). The best threshold value for All Markers to distinguish PCOS patients from Controls was determined through the receiver operating characteristic (ROC) curve analysis. The research used a two-sided statistical approach with a threshold p value of 0.05 for statistical significance [11].

The results:

The study involved 100 male, choose 80 divided into 58 prostate hyperplasia male, 10 fertile control male and 22 patients prostatic cancer the distribution is relativel y even, with 51.7% of patients being less than 40 and 48.3% being more than 40. This suggests that hyperplasia prostate can occur in both younger and older men, though slightly more common in younger individuals in this sample , There's a strong, P = 0.0001 difference. 77.3% of patients are more than 40, while only 22.7% are less than 40. This strongly indicates that prostate cancer is significantly, P =

0.0001 more prevalent in older men in this sample. The Chi-square test (X2 = 48.21, P = 0.0001) confirms that this observed difference in age distribution between the two conditions It's highly statistically significant p=0.0001 Figure (1).

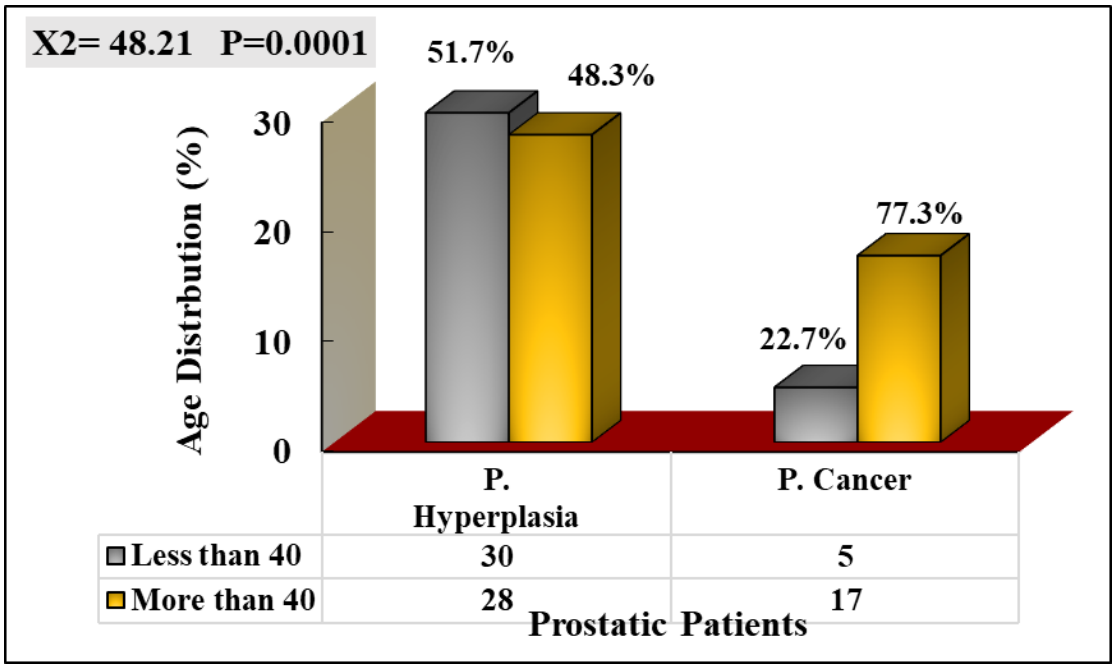

Figure (1) Correlating the age distribution (%) of patients with **Prostatic Hyperplasia** and **Prostate Cancer**

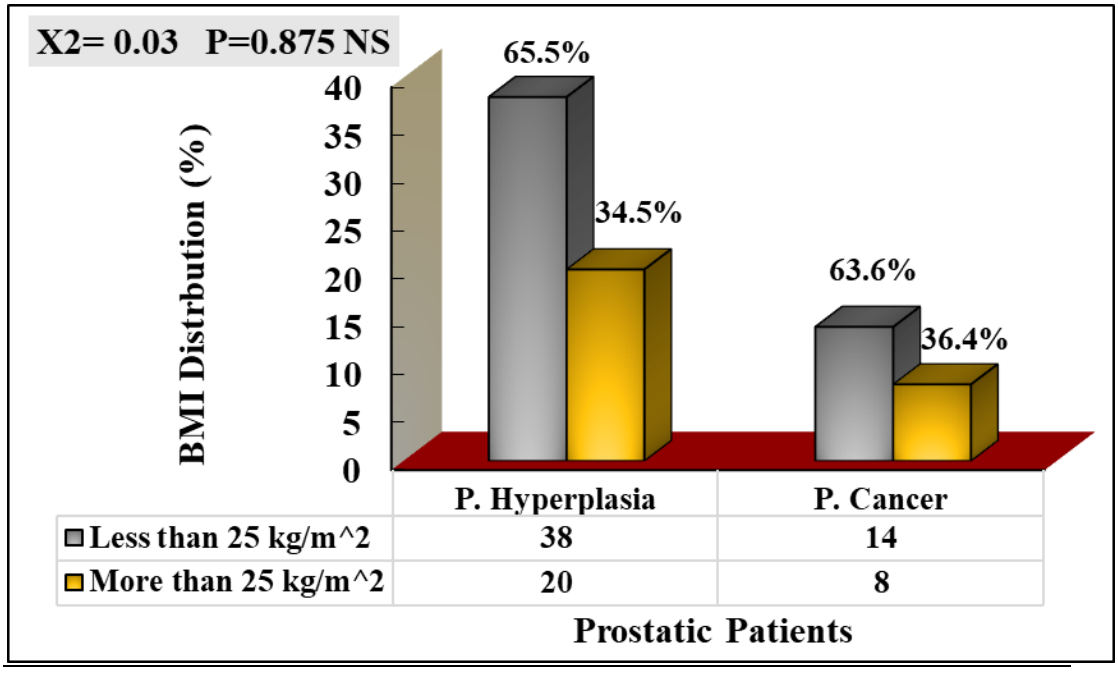

Figure (2): Comparing the Body Mass Index (BMI) distribution (%) of patients with **Prostatic Hyperplasia** and **Prostate Cancer**.

The result show the ratio of 65.5% of patients have a BMI less than 25 kg/m^2, and 34.5% have a BMI more than 25 kg/m^2. This suggests a higher prevalence of normal/healthy weight in Prostatic Hyperplasia patients in this sample while ,63.6% of patients have a BMI less than 25 kg/m^2, and 36.4% have a BMI more than 25 kg/m^2. This distribution is very similar to the Prostatic Hyperplasia group, indicating no significant difference in BMI distribution between the two conditions. The Chi-square test (X2 = 0.03, P = 0.875 NS) indicates that the observed differences in BMI distribution between the two conditions are not statistically significant Figure (2).

The figure (3) in results show the distribution of a higher percentage of patients with Period of _Infertility Counts in the "5.1 to 10" range (44.8%), followed by "Less than 5" (32.8%) and then "More than 5" (22.4%). The distribution is more evenly spread, with the highest percentage in the "More than 5" range (45.5%), followed by "5.1 to 10" (40.9%), and the lowest in "Less than 5" (13.6%). The Chi-square test (X2 = 5.12, P = 0.077 NS) indicates that the observed differences in Period_of Infertility Counts , distribution between the two conditions are not statistically significant P = 0.077 NS.

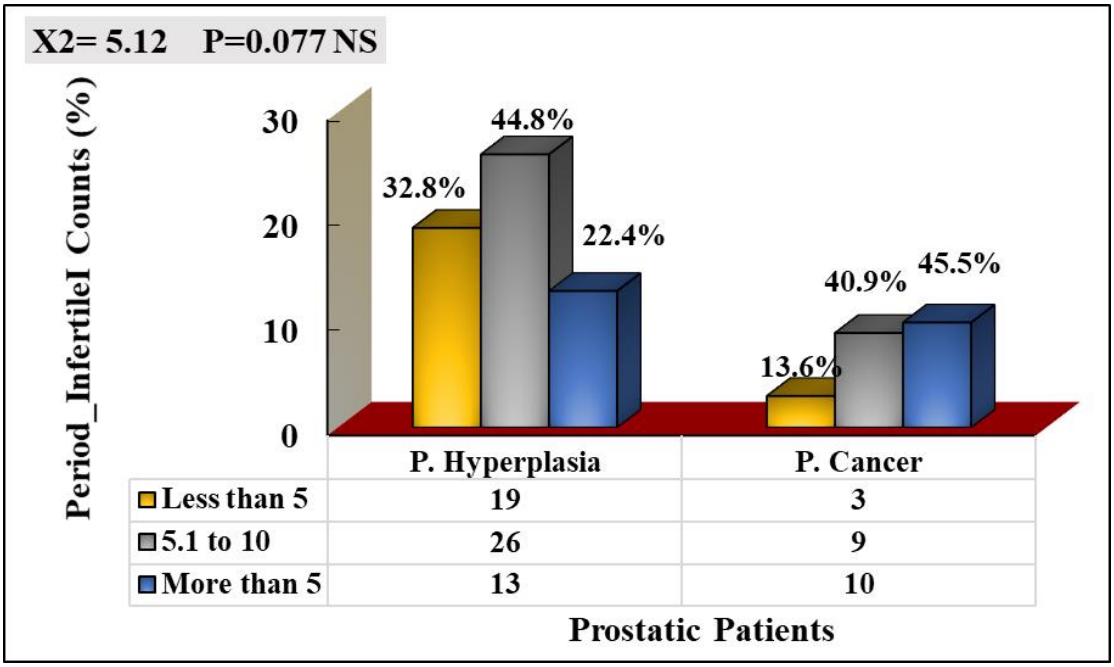

Figure (3) :Comparing the distribution of "Period_Infertility Counts" (%) in patients with **Prostatic Hyperplasia** and **Prostate Cancer**

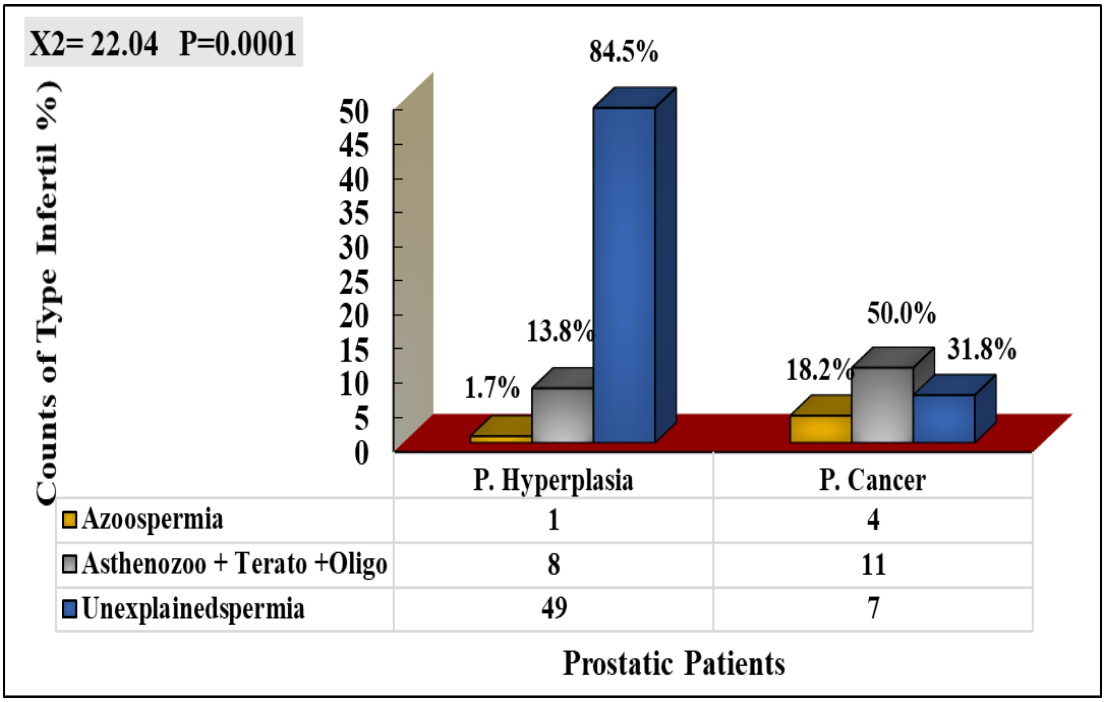

Figure (4): Comparing the distribution of different type of infertility (%)" in patients with **Prostatic Hyperplasia** and **Prostate Cancer**.

The results as show in figure (4) determine in the dominant type of infertility is "Unexplained Infertility," representing 84.5% of patients. "Asthenozoospermia + Teratozoospermia + Oligozoospermia" accounts for 13.8%, and "Azoospermia" is the least common at 1.7% in hyperplasia .in prostate cancer group the distribution is more balanced. "Unexplained Infertility" is still the most common at 50.0%, but "Asthenozoospermia + Teratozoospermia + Oligozoospermia" is also significant at 31.8%. "Azoospermia" accounts for 18.2%. The Chi-square test (X2 = 22.04, P = 0.0001) confirms that the observed differences in the distribution of infertility types between the two conditions are highly statistically significant and not due to chance.

Table (1) Logistic regression for demographics and clinic pathology as independent factors associated with the risk prostate Cancer

	Predictors in P. Cancer [a]	Wald	p-value	OR	95% CI
Age	Less than 40/ More than 40	5.10	0.024*	3.64	1.19-11.19
BMI	Less than 25/ More than 25	0.02	0.875 ns	0.92	0.33-2.56
Period of Fertile	5.1 to 10	1.15	0.283 ns	2.19	0.52-9.20
	More than 5	4.45	0.035*	4.87	1.12-21.20
	Less than 5	Ref.			
Fertile Type	Azoospermia	7.86	0.005*	28.00	2.7-287.79
	Asthenozoo + Terato +Oligo	13.52	0.0001**	9.62	2.88-32.18
	Unexplainedspermia	Ref.			

a. The reference category is: P. Hyperplasia. Significant differences at p-value ≤0.05. Ns: non- significant. 95%CI: Confidence Interval for OR (Odds Ratio).

The results in table (1) presents a logistic regression analysis aimed at identifying predictors of prostate cancer of individuals older age than 40 had a significantly higher odds of prostate Cancer (OR = 3.64, p = 0.024). A fertile period longer than 5 years was associated with significantly higher odds of prostate Cancer (OR = 4.87, p = 0.035). Men with azoospermia no have sperm, had a dramatically higher odds of prostate cancer a" (OR = 28.00, p = 0.005). and men with a combination of asthenozoospermia (low sperm motility), teratozoospermia (abnormal sperm morphology), and oligozoospermia (low sperm count) also had significantly higher odds of prostate cancer a" (OR = 9.62, p = 0.0001).

Discussion:

This study highlights the well-established association between age and prostate cancer risk. The significantly higher percentage of prostate cancer cases in men over 40 aligns with existing knowledge that age is a major risk factor. The observation that a substantial portion of prostate hyperplasia cases occur in men under 40 is interesting. While prostate hyperplasia is generally considered a condition of aging, this data suggests due to several factors lifestyle such as diet, exercise, and other lifestyle habits could play a role in early-onset prostate hyperplasia and exposure to certain environmental toxins might contribute. The number of cases grows as patients reach age 65 and above.32-35 An

identical trend was observed in another study where family pattern factors into both prostate cancer and prostate hyperplasia onset due to genetic similarity and shared environmental exposures and lifestyle choices [12].

The researchers discovered no statistical link between body mass index and the detection of prostate hyperplasia or prostate cancer throughout this study group. The research findings differ from studies which demonstrated a possible relationship between obesity and elevated prostate cancer occurrence and worse prostate hyperplasia. Multiple research variables including hormones and lifestyle and genetic background might affect the study outcomes. BMI does not prove to be the most sensitive indicator for body composition measurement. Alternative methods such as waist circumference measurements and body fat percentage seem to show different relations compared to BMI. The research validates previous findings which demonstrate obesity as the clinical condition producing the greatest reduction of testosterone in male bodies [13]. A study of low testosterone prevalence reveals that the total results reach 27.2%. The research performed analysis of BMI correlation with prostate disease yet it lacked thorough examination of other pivotal influencing elements. The definition as well as the extent of obesity found in China differs from what the Western developed nations experience [14].

Researchers determined through this study that "Period_Infertility Counts" did not correlate with the detection of prostatic hyperplasia or prostate cancer during analysis of the examined sample. This suggests that the reported instances of infertility, as measured by "Period_Infertility Counts," do not significantly differ between patients with these two prostate conditions. Several factors could explain the lack of a significant association: The sample size may be too small to detect subtle differences, and the study represents a specific population in Najaf, Iraq. Other research suggests that healthcare providers should conduct studies to understand the link between prostate health and male fertility within different cultural groups. Men participating in “the Prostate Cancer Prevention Trial” (PCPT) received treatment with finasteride to impede testosterone conversion into 5α-dihydrotestosterone leading to a 25% decrease in prostate cancer detection rates alongside delayed fertility status [15]. Data collected from men undergoing treatment with dutasteride, a different 5α-reductase inhibitor, revealed prostate cancer event reduction of 23% together with longer infertility periods in “the Reduction by Dutasteride of Prostate Cancer Events study” (REDUCE) [16].

This study reveals a significant association between the type of infertility and the presence of either prostatic hyperplasia or prostate cancer. The overwhelming prevalence of "Unexplained Infertility" in prostate hyperplasia patients suggests that factors not directly related to sperm parameters (like motility, morphology, or count) might be contributing to infertility in this group. This could include issues related to semen transport, erectile dysfunction, or other factors not measured in this study. The more balanced distribution of infertility types in prostate cancer patients suggests that both sperm-related abnormalities ("Asthenozoospermia + Teratozoospermia + Oligozoospermia") and other factors ("Unexplained Infertility") are contributing to infertility. The higher incidence of

"Azoospermia" (absence of sperm) in prostate cancer is also notable and could be related to the disease itself or its treatments. Possible Both prostate hyperplasia and prostate cancer can affect the function of the prostate gland, which plays a role in semen production and transport.Both conditions can lead to hormonal imbalances that affect sperm production and function. Chronic inflammation associated with both conditions could impact sperm quality. Treatments for prostate cancer, such as surgery or radiation, can directly affect fertility. The concept of other study draws its inference about reduced testicular function in infertile men from prior research documenting evaluations of testosterone and LH levels along with estrogen levels between men with proven fertility and those with idiopathic infertility [17]. The non-obstructive azoospermic and severely oligozoospermic male patients showed lower testosterone levels with higher estradiol and decreased testosterone-to-estradiol ratios and elevated FSH when compared to fertile age-matched controls [18].

The finding in result show that older age is associated with increased "P. Cancer a" is consistent with many cancer studies. Age is a known risk factor for various malignancies due to accumulated cellular damage and decreased DNA repair mechanisms. The strong associations between specific fertility issues (azoospermia, combined sperm abnormalities, and long fertile periods) and "P. Cancer a" are particularly noteworthy. This suggests a potential link between male reproductive health and this specific cancer. The mechanisms behind this link could involve hormonal imbalances, genetic factors, or shared environmental exposures, This association was unaffected by adjustment for a number of socioeconomic, anthropometric, and health-status-related factors. However, in agreement with some previous reports [19], having a history of epididymitis, prostatitis, urinary tract infection, or a sexually transmissible infection independently increased the odds of prostate cancer diagnosis. Also BMI and the fertile period between 5.1 and 10 years did not show a statistically significant association with "P. Cancer." This doesn't mean they have no effect, but rather that the observed associations in this study were not strong enough to be statistically significant. The left region of the cut point which corresponded to BMI values lower than 19.2 kg/m2 presented a weak and slightly significant negative relationship between BMI and TD (OR = 0.6 [0.4, 1.0], $p = .043$). Infantile hypoglycemia became less likely when their body mass index rose. However, it was opposite. An increasing BMI above 19.2 kg/m2 on the right side of the defined rate brought about an elevated incidence of TD (OR = 1.2 [1.1, 1.3], $p < 0.001$) [20].

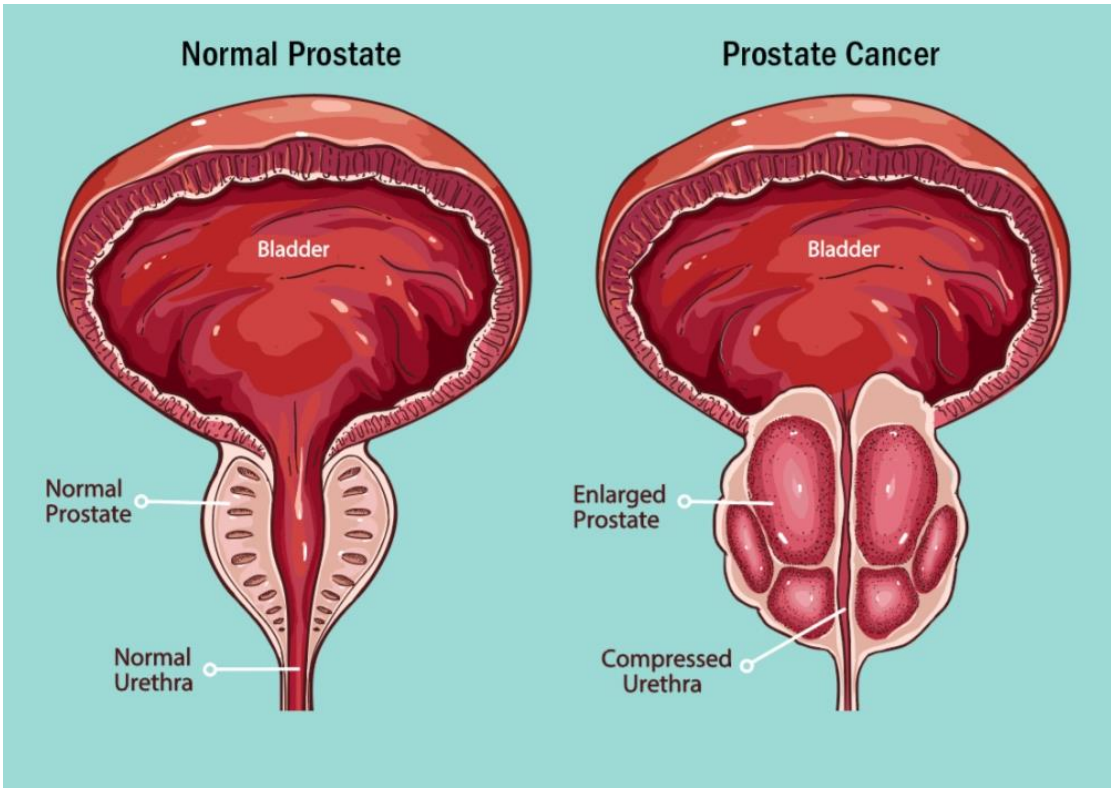

Figure 1.1 Diagram of normal prostate and prostate cancer (Dana Taylor, 2021)

Conclusion

This study demonstrates that age and specific male fertility factors, particularly azoospermia and combined sperm abnormalities, are significant predictors of prostate hyperplasia and cancer. New research data emphasizes the requirement for analyzing male reproductive health issues when assessing cancer risks.

Recommendations

Conduct genome-wide association studies (GWAS) to identify specific genetic variants associated with early-onset prostate hyperplasia in addition to collect DNA samples from younger patients with altered prostate function and compare their genetic profiles to age-matched controls fertile.

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