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Prevention and Early detection of Prostate Cancer

Emmanuel Ifeany Obeagu

Department of Medical Laboratory Science, Kampala International University, Uganda.

E-mail: *emmanuelobeagu@yahoo.com*, *obeagu.emmanuel@kiu.ac.ug*,

0000-0002-4538-0161

Abstract

One of the most prevalent cancers in men is prostate cancer, and the prevalence of the disease is increasing worldwide. Reduced prostate cancer risk can be achieved through lifestyle changes like quitting smoking, exercising, and maintaining a healthy weight. Although the use of PSA screening for prostate cancer early detection is still debatable, modifying the PSA cutoff, screening frequency, and adding additional biomarkers may reduce the overdiagnosis that can result from PSA screening. In men with elevated PSA levels or prostate cancer diagnoses, a number of new biomarkers seem promising; these are likely to help distinguish between those who can avoid aggressive treatment and those who do. Several pharmaceutical substances, including aspirin, 5'-reductase inhibitors, etc. have the potential to stop the growth of prostate cancer. Men who are at high risk of prostate cancer or who have been diagnosed with the disease are managed through prevention, early detection, and treatment.

Keywords: prevention, early detection, prostate cancer

Introduction

A significant health problem affecting men everywhere is prostate cancer. It is the second most prevalent form of cancer in men and a major factor in cancer-related fatalities [14-]. The male reproductive system heavily depends on the prostate gland, a tiny walnut-sized gland that is situated beneath the bladder. Prostate cancer can, however, develop because the prostate gland is prone to cancerous growth [5–6].

Due to its high incidence and mortality rates, prostate cancer presents a serious health challenge. Prostate cancer cases worldwide are anticipated to increase by 1 point 4 million in 2020 [4]. Affected individuals' psychological, emotional, and social well-being as well as that of their families are all affected by the disease [7].

It is essential to find prostate cancer early because it enables prompt intervention and treatment.

The likelihood of effective treatment and better results is higher when the condition is detected early.A significant part of lowering the risk of prostate cancer is also played by preventive measures. People may be able to reduce their risk of contracting the illness by putting effective prevention strategies in place, such as chemoprevention and lifestyle changes [8].

Improving men's health and quality of life requires focusing on prostate cancer prevention and early detection. The burden of prostate cancer can be decreased and the general health of those affected by it can be improved by increasing awareness, promoting screening procedures, and putting preventive measures in place.

Prostate cancer

The prostate gland, a tiny, walnut-sized gland found beneath the bladder in men, is frequently affected by prostate cancer. It is the second most frequently diagnosed form of cancer in men worldwide and a major factor in cancer-related fatalities [4]. Understanding the most recent research on prostate cancer is essential for learning about the risk factors linked to the condition and for investigating preventive measures and early detection techniques. A crucial component of the male reproductive system is the prostate gland. It is essential for the development of the seminal fluid that nourishes and transports sperm during ejaculation. But the prostate can develop cancer just like any other organ. Variable levels of aggressiveness can be seen in prostate cancer, which typically develops from the glandular cells in the prostate.

Prevention Techniques

An important strategy for lowering the risk of prostate cancer is lifestyle modification, which involves adopting a healthy lifestyle. A lower incidence of the disease has been linked to several lifestyle changes. Prostate cancer prevention recommendations include eating a diet high in fruits, vegetables, whole grains, and lean proteins. Prostate cancer risk may be reduced by eating a diet rich in fruits and vegetables, especially those that contain lycopene (like tomatoes) [9]. Limiting consumption of sugary foods, high-fat dairy products, and red and processed meats may also be advantageous [10]. Exercise is a vital preventive measure as is engaging in regular exercise. Regular exercise, such as brisk walking, jogging, or cycling, has been linked in studies to a lower risk of prostate cancer [11]. Aim for 75 minutes of vigorous exercise or 150 minutes of moderate exercise per week. Keeping a healthy weight obesity and excess body weight have been connected to a higher risk of prostate cancer. Therefore, it is advised to maintain a healthy weight through a combination of regular exercise and a balanced diet for prevention [12]. Smoking and heavy alcohol use have also been linked to an increased risk of developing aggressive forms of prostate cancer. The risk can be decreased in several ways, including by giving up smoking and limiting alcohol consumption [13]. Chemoprevention entails using specific drugs or substances to lower the risk of developing cancer. For their potential to prevent prostate cancer, a number of substances have been studied. 5-alpha reductase inhibitors: Prescription medications like Finasteride and Dutasteride, which block the enzyme 5-alpha reductase and lower the production of dihydrotestosterone (DHT), have shown promise in preventing prostate cancer. The overall risk of prostate cancer has been shown to be reduced by these drugs, especially in high-risk men, but it is important to take into account their long-term effects and potential side effects [14]. Selective estrogen receptor modulators (SERMs): Drugs like Tamoxifen, which are frequently used in the treatment and prevention of breast cancer, have also been investigated for their potential to lower the risk of developing prostate cancer. Further study is required to determine SERMs' effectiveness and safety in preventing prostate cancer, though it is possible that they work by modulating estrogen receptor activity [15].

Prostate Cancer Risk Factors and Early Detection

Techniques for Early Detection

Prostate cancer management and treatment success depend heavily on early detection. Early disease detection paves the way for more efficient treatments and better overall results. For the early detection of prostate cancer, several techniques are employed [16].

PSA, a protein produced by the prostate gland, is measured in blood tests called prostate-specific antigen (PSA) tests. Although other conditions,

like inflammation or benign prostatic hyperplasia (BPH), can also result in elevated PSA levels, prostate cancer may be indicated by elevated PSA levels. The PSA test is frequently used as a prostate cancer screening tool. Due to uncertainties regarding its accuracy and the potential for overdiagnosis and overtreatment, the use of PSA screening has been controversial. High PSA levels do not always mean that prostate cancer is present, and false-positive tests can cause patients to undergo unnecessary invasive procedures and worry. When interpreting PSA test results, medical professionals take into account a number of variables, including age, PSA velocity (rate of change in PSA levels over time), and PSA density (PSA levels corrected for prostate volume). In addition, novel strategies, such as the addition of additional biomarkers or cutting-edge imaging methods, are being researched to improve the precision and dependability of PSA testing [17].

A healthcare professional will physically examine the prostate gland during a digital rectal examination (DRE). A lubricated, gloved finger is inserted into the rectum by the doctor during this procedure to feel for any abnormalities, such as lumps or hard spots in the prostate [18].

DRE is an easy and affordable technique for determining the prostate gland's size, shape, and consistency. Small tumors might not be palpable through DRE alone, limiting its ability to detect early-stage prostate cancer. In order to increase the precision of prostate cancer detection, DRE is frequently combined with other diagnostic tests, such as the PSA test and imaging modalities. Imaging Modalities A number of imaging modalities are used to visualize the prostate gland and help diagnose and stage prostate cancer [19].

The prostate gland can be visualized using sound waves during transrectal ultrasound (TRUS). It is frequently used alongside a biopsy procedure to direct the sampling of prostate tissue for additional research. TRUS can assist in locating prostate abnormalities that might need to be biopsied [20].

The prostate gland and its surroundings can be seen in great detail using magnetic resonance imaging (MRI). It can aid in determining the extent and staging of prostate cancer as well as aid in the visualization of abnormalities, such as tumors. Advanced MRI methods, such as multiparametric MRI (mpMRI), have shown promise in enhancing the precision of prostate cancer detection and directing biopsy procedures. In some circumstances, it may be necessary to assess the spread of prostate cancer to other body parts using additional imaging modalities, such as computed tomography (CT) scans and bone scans. Emerging biomarkers and genetic testing methods are being created to advance the early detection of prostate cancer and to support risk stratification and individualized treatment choices. These tests examine specific genes, proteins, or other molecular markers linked to prostate cancer to offer additional knowledge about the likelihood of the disease's occurrence or progression [21].

Prostate Cancer Risk Factors

The biggest risk factor for prostate cancer is thought to be age. Prostate cancer is more common in older men than younger ones, with incidence rising with age. Statistics show that after the age of 50, the risk of developing prostate cancer doubles every ten years of life [22].

An additional important risk factor is a family history of prostate cancer. A man's chance of getting prostate cancer increases if a first-degree relative, such as a father or brother, has the condition. If more than one relative has the disease or if the relative was diagnosed when they were younger, the risk rises even further [23].

Genes a few genetic mutations and variants have been linked to a higher risk of prostate cancer. For instance, mutations in the BRCA1 and BRCA2 genes, which are frequently known to increase the risk of breast and ovarian cancers in women, have also been linked to an increased risk of prostate cancer in men [23].

Prostate cancer risk is influenced by ethnicity, with notable differences between various racial and ethnic groups. Prostate cancer occurs most

frequently in African American men, then men of African ancestry from the Caribbean. Asian and Hispanic men, on the other hand, experience lower incidence rates [23].

Prostate cancer development is influenced by hormonal influences and hormonal factors, particularly the androgen hormone testosterone. Prostate cancer risk has been linked to higher levels of testosterone or its metabolite, dihydrotestosterone (DHT). However, the connection between hormone levels and the risk of prostate cancer is complicated and still not fully understood [24].

Conclusion

Many of the modifiable prostate cancer risk factors still have conflicting evidence. The risk of developing prostate cancer can be reduced by making lifestyle changes like quitting smoking and exercising. Despite being linked to an increase in high-grade prostate cancer cases, 5-reductase inhibitors lessen the burden of prostate cancer overall. These drugs may be economically advantageous for the prevention of prostate cancer if they have no negative effects on survival. Several additional pharmaceutical substances, e.g., Aspirin appears promising and needs to be further examined in clinical trials; numerous such trials are already under way. Even though PSA screening is still debatable, overdiagnosis related to PSA screening can be reduced by changing the PSA threshold, screening frequency, or adding additional biomarkers like the Kallikrein panel or free-PSA.

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