

PROFILE OF PROSTATE CANCER PATIENTS AT DR. MOEWARDI HOSPITAL PERIOD JANUARY 2017 - JANUARY 2022: RETROSPECTIVE STUDY

¹Joko Wibowo Sentoso, ²Setya Anton Tusarawardaya, ²Syaeful Agung Wibowo.

¹ Surgical Study Department, Faculty of Medicine/University of Sebelas Maret, Moewardi General Hospital, Surakarta.

² Urology Department, Moewardi General Hospital, Surakarta.

ABSTRACT

Objective: This study aims to know the profile of prostate cancer patients treated at Moewardi General Hospital from January 2017 to January 2022. **Material & Methods:** A retrospective study was conducted in prostate cancer patients who have or are undergoing therapy at Moewardi General Hospital from January 2017 to January 2022 using purposive sampling techniques. **Results:** From January 2017 to January 2022, 441 male patients were diagnosed with prostate cancer which is dominated able to go home alive, around 92.97%. The age of study subjects was overlooked of 70-80 years with a total of 182 people, dominated by self-employed as many as 420 people. The breakdown of PSA scores of 1-20 in as many as 247 people, Adeno Ca Prostate as many as 374 people with the majority of prostate Ca cases in subjects in non-metastatic status (359 people). The results of variable Rectal Toucher examination described results dominated by palpable prostate and hard as many as 437 people. **Conclusion:** The most important prognostic indicators in prostate cancer are the patient's age and general health at the time of diagnosis, the cancer stage, the level of pre-therapeutic PSA, and the Gleason score. A worse prognosis is associated with high levels of the disease, more advanced stages, younger age, and elevated levels of PSA.

Keywords: Prostate cancer, patient's age, PSA, male.

ABSTRAK

Tujuan: Penelitian ini bertujuan untuk mengetahui profil pasien kanker prostat yang dirawat di RSUD Moewardi periode Januari 2017 hingga Januari 2022. **Bahan & Cara:** Penelitian retrospektif dilakukan pada pasien kanker prostat yang telah atau sedang menjalani terapi di RSUD Moewardi pada bulan Januari 2017 hingga Januari 2022 dengan menggunakan teknik purposive sampling. **Hasil:** Pada kurun waktu Januari 2017 hingga Januari 2022 terdapat 441 pasien laki-laki yang terdiagnosis kanker prostat. Kondisi akhir pasien didominasi dapat pulang hidup dengan presentase mencapai 92.97%. Usia subjek penelitian didominasi pada kelompok usia 70-80 tahun dengan jumlah 182 orang dengan didominasi wiraswasta sebanyak 420 orang. Dominasi profil pemeriksaan telah didapat, dengan rincian skor PSA 1-20 sebanyak 247 orang, Adeno Ca Prostat sebanyak 374 orang dengan mayoritas kasus Ca Prostat pada subjek dalam status tidak metastasis (359 orang). Variabel hasil pemeriksaan Rectal Toucher didominasi oleh teraba prostat dan keras sebanyak 437 orang. **Simpulan:** Indikator prognostik pada kanker prostat yang paling penting adalah usia pasien dan kesehatan umum pada saat diagnosis, serta stadium kanker, tingkat PSA pra-terapi, dan skor Gleason. Prognosis yang lebih buruk dikaitkan dengan penyakit tingkat tinggi, stadium yang lebih lanjut, usia yang lebih muda, dan peningkatan kadar PSA.

Kata kunci: Kanker prostat, usia pasien, PSA, laki-laki.

Correspondence: Joko Wibowo Sentoso; c/o: Surgical Study Department, Faculty of Medicine/University of Sebelas Maret, Moewardi General Hospital, Jl. Kolonel Sutarto No.132, Jebres, Surakarta 57126, Indonesia. Email: jokowibowo.dr@gmail.com.

INTRODUCTION

Prostate cancer is a malignancy of the urogenital system that originates in the stromal cells of the prostate. Generally, prostate cancer occurs at the age of > 50 years. The most frequent complaints

are difficulty urinating, increased frequency, and nocturia. At a more advanced stage, complaints of urinary retention. Although approximately more than 50% of prostate cancer cases grow slowly, there are others where it grows aggressively. Because it seems asymptomatic in the early stages, it often goes

undetected, goes untreated, and causes death.¹⁻²

Prostate cancer is cancer with the second most cases in men after lung cancer and one of the leading causes of death in the male population. According to GLOBOCAN 2018, a total of 1.276.106 new cases of prostate cancer were reported worldwide in 2018, with a higher prevalence in developing countries. Differences in incidence rates worldwide reflect differences in diagnostic test options.³ The incidence of prostate cancer varies by ethnicity and region. Prostate cancer cases that occur in countries in Asia are significantly lower than in Western countries. The incidence of prostate cancer in North America is 97.2 out of 100.000 men; in Malaysia, which is similar to Indonesia, the incidence was reported by only 10.8 out of every 100.000 males. In Indonesia, the estimated incidence rate by age in 2018 has increased from 10.6 to 14.8 in 2022 per 100,000 men. Based on the Global Cancer Observatory in 2020, the incidence of prostate cancer in Indonesia is 11.6 per 100.000 men.⁴⁻⁶

Other factors that can increase the risk of prostate cancer are family history, diet, and physical activity. Dietary factors in prostate cancer affect androgens and estrogens that circulate and act as protectors against mitogens. High intake of meat, fat, dairy products, and eggs increases the risk of prostate cancer. Some studies have also found an increased risk of prostate cancer in men with obesity (BMI > 25). Other factors, such as smoking and tobacco, can also increase the risk of prostate cancer because they are known to affect steroid levels and contain many carcinogens.⁷⁻⁸ Data in the United States shows that more than 90% of prostate cancer patients are diagnosed at an early stage. On the other hand, in Indonesia, many people are still diagnosed at an advanced stage due to delays in diagnosis. The inequality of facilities and urologists in various parts of Indonesia results in differences in the diagnosis and management of prostate carcinoma patients.⁹

Although the incidence of prostate cancer and mortality is relatively high, there is currently no data that describes the profile of people with prostate cancer in Surakarta. Therefore, this study aims to determine the profile of prostate cancer patients treated at Moewardi General Hospital in January 2017 to January 2022 and is expected to add knowledge and insight into the profile of prostate cancer patients at Moewardi General Hospital in the period January 2017 to January 2022. The results of this study are expected to be used as data and input

for consideration in conducting early detection of prostate cancer to carry out optimal therapy and reduce mortality rates.

OBJECTIVE

This study aims to know the profile of prostate cancer patients treated at Moewardi General Hospital from January 2017 to January 2022.

MATERIALS & METHODS

This study design is a retrospective study of prostate cancer patients which was conducted at Moewardi General Hospital Surakarta, Central Java. The study was undertaken for six months, starting from June to December 2022.

Samples were taken using purposive sampling methods. The population in this study was all prostate cancer patients at Moewardi General Hospital in the period January 2017 to January 2022 who had met the inclusion and exclusion criteria with a minimum amount as determined by the sample calculation technique and selected through an agreed sampling method. The minimal sample size is calculated using a reference formula¹⁰ and the size of the sample used in this study is as many as 55 people.

The inclusion criteria in this study are patients diagnosed with prostate cancer who have or are undergoing therapy at Moewardi General Hospital from January 2017 to January 2022. In contrast, the exclusion criteria in this study were cancer suspect patients who had not yet been diagnosed with prostate cancer and cancer patients with incomplete primary data.

The free variable in this study was the condition of prostate cancer patients treated at Moewardi General Hospital from January 2017 to January 2022. Meanwhile, the bound variables measured are age, occupation, domicile, level of education, main complaints, and supporting examination results (PSA levels, histopathological picture, Gleason Score grading, and metastasis). The data collection method carried out by researchers uses medical records of patients with prostate cancer at Moewardi General Hospital so that the data obtained is secondary data. The data obtained were recorded and performed statistical analysis using descriptive analysis and univariate analysis was processed using SPSS (Software Statistical Package and Service Solutions 25.0 for Windows).

Descriptive analysis is a statistical analysis method that aims to provide a description or overview of the subject of study based on variable data obtained from certain groups of subjects. Univariate analysis is carried out to see a summary of the distribution characteristics and frequency of the variables studied.

RESULTS

This research was conducted at Dr. Moewardi Hospital Surakarta from January 2017 to January 2020. In the period set by the researchers, 441 patients diagnosed with prostate cancer were treated at Moewardi General Surakarta Hospital.

The research conducted data collection by taking patient medical record data. Profiles of study subjects as many as 441 cases described in tables and diagrams based on the state of post-treatment exit and the type of malignant.

This section will be described from the data of each information regarding self-identity starting post-treatment exit. The type of malignancy in the descriptive form will display the characteristics of the sample used in the study presented in Table 1 below.

Table 1. Patient Characteristics.

Characteristics	N	%
Gender		
Male	441	100
Post Treatment Output		
Back Home Alive	410	92.97
Died <48 Jam	8	1.81
Died >48 Jam	22	4.99
APS/Forced Return Home	1	0.23
Remark Ca Prostate		
Malignance of the Prostate	441	100

Based on Table 1, it can be seen that the characteristics of 441 patients with Prostate Cancer at Moewardi General Hospital in the period January 2017 to January 2020. The features of patients based on gender are all male. Based on the patient's discharge situation, predominantly patients can go home alive with a percentage reaching 92.97%. Patients who died less than 48 hours were about eight (1.81%), while patients who died more than 48 hours were 22 (4.99%). The patient signs a letter not to take further medical action. All patients in the study were diagnosed with malignant prostate neoplasms (100%)

The author provides the following illustration in the bar chart presentation to facilitate understanding of the graphic picture in Figure 1.

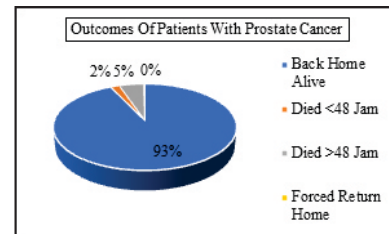


Figure 1. Descriptive Bar Graph of Characteristics of Research Subjects.

Furthermore, a review was carried out related to the frequency and description of each research variable. This study consisted of age, education, gender, occupation, residence domicile, PSA score, histopathological picture, metastases, and rectal toucher. Where each of these variables has been analyzed with the following results:

a.Age

In the age variable, in this study, an age grouping was carried out with an interval of 10 years for each group and obtained as was shown in Figure 2.

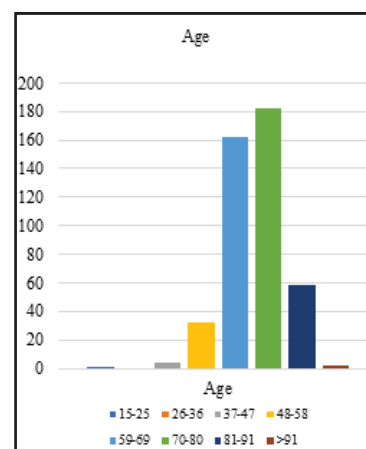


Figure 2. Descriptive bar graph of the age of the study subject.

From the results of the analysis of age variables in the study subjects, researchers divided into eight groups with ages 15-25 years, ages 26-36 years, ages 37-47 years, ages 48-58 years, ages 59-69 years, ages 70-80 years, ages 81-91 years, ages > 91 years. From the results of the analysis, it was found

that based on the age of the study subjects dominated in the age group of 70-80 years with a total of 182 people, followed by the age group of 59-69 years with a total of 162 people, followed by the age group of 81-91 years with 58 people, then successively the group of 48-58 years with 32 people, the group of 37-47 years with four people, the group of > 91 years with two people, groups of 15-25 years with one person, and groups of 26-36 years with 0 people.

b. Education

In the Education variable, in this study, a division was carried out into five groups with the

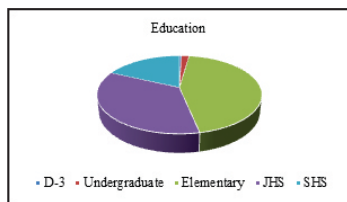


Figure 3. Descriptive bar graph of research subject education.

In the presentation of Figure 3, it is found that at the level of the elementary education group has a subject frequency of 196 people, the middle school group with 155 people, the high school with 80 people, D-3 with two people, and S-1 with eight people. In other words, the elementary school group dominated the frequency of subjects based on the educational variables in this study.

c. Gender

On the sex variable, a division is divided into two groups, namely male and female.

In this study, out of a total of 441 study subjects, all were male, so in this study, it was found that the frequency of 0 in the female group. (Figure 4)

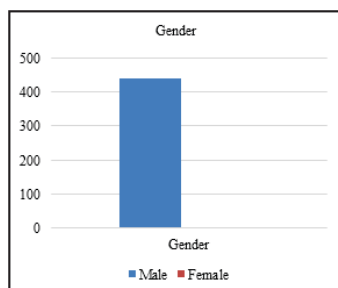


Figure 4. Descriptive bar graph of the gender of the research subject.

d. Occupation

On the employment variable, this study was divided into five workers: farmers, civil servants, the private sector, the self-employed, and the non-employed. Based on job variables, the frequency of the self-employed group dominates with 420 people. They were followed by farmers with 16 people, civil servants with three people, private with one person, and non-employed with one person. (Figure 5)



Figure 5. Descriptive bar graph of the research subject's occupation.

e. Domicile of Residence

In the residential domicile variable, this study was divided into 23 groups of living areas, with the frequency of subjects of each group, namely: Blora (2 people), Boyolali (19 people), Fak-Fak (3 people), Grobogan (4 people), Madiun Regency (5 people), Karanganyar (42 people), Klaten (21 people), Madiun City (2 people), Magetan (19 people), Ngawi (41 people), Pacitan (6 people), Pemalang (1 person), Ponorogo (22 people), Rembang (3 people), Semarang (1 person), Serang (1 person), Simalungun (1 person), Sleman (9 people), Sragen (35 people), Sukoharjo (70 people), Surakarta (39 people), Tangerang (3 people), Wonogiri (92 people). The Wonogiri group has the highest frequency (92 people).

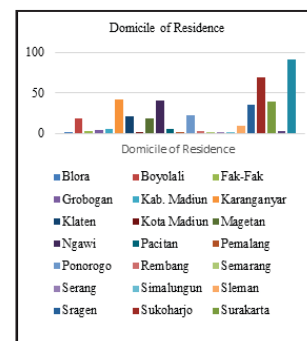


Figure 6. Bar graph of domicile distribution of research subjects.

f. PSA Score

The PSA score variable in this study was divided into seven groups with an interval of 10 for each group. With the frequency of each group, namely: a score of 0-10 with 107 people, a score of 10.1-20 with 247 people, a score of 20.1-30 with 60 people, a score of 30.1-40 with 18 people, a score of 40.1-50 with six people, a score of 50.1-60 with 0 people, and a score of >60 with three people.

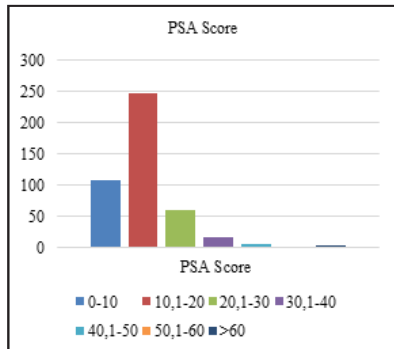


Figure 7. Bar graph distribution of psa scores of research subjects.

g. Histopathology

In the histopathological variables, this study was divided into four groups, with the frequency of each group, namely: Adeno Ca Gleasson (1 person), Adeno Ca Prostat (374 people), Benign prostat (1 person), and Transitional Ca Prostat (65 people). So in this study, the majority frequency was Adeno Ca Prostat.

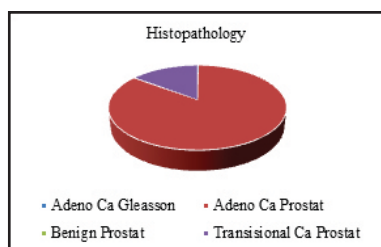


Figure 8. Graph of the histopathological distribution circle of the research subjects.

h. Metastatic

In the histopathological variables, this study was divided into five groups with the frequency of each group, including Bone (39 people), Brain (6 people), Hepar (17 people), Lung (20 people), No Metastases (359 people). So in this study, most cases of prostate Ca in subjects are not metastatic.

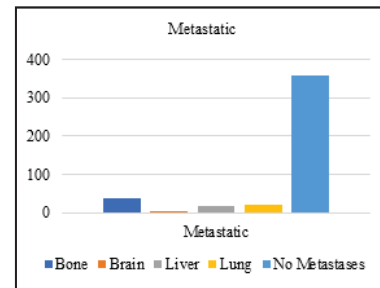


Figure 9. Graph of the histopathological distribution circle of the research subject.

i. Rectal Toucher

In the rectal toucher variable in this study, it was divided into three groups with the frequency of each group, including palpable prostate, hard (437 people), palpable prostate, hard, slippery surface (1 person), and palpable prostate, cystic (3 people). So it can be concluded that in this study, most of the subject's rectal toucher results have palpable prostate and complex values.

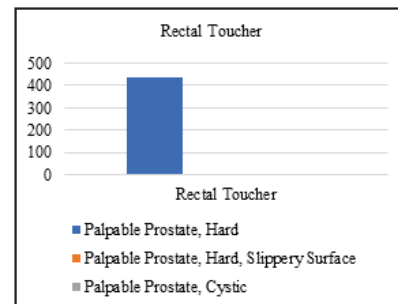


Figure 10. Circle graph distribution rectal toucher research subject.

DISCUSSION

Prostate cancer is a typical representative male cancer which is reported to be the second most common cancer in men, accounting for about 15% of male cancers.¹¹ Prostate cancer incidence rates vary across regions and populations.¹² In 2018, 1,276,106 new cases of prostate cancer were registered worldwide, representing 7.1% of all cancers in men. The incidence rate of prostate cancer varies widely around the world. The standard age rate (ASR) was highest in Oceania (79.1 per 100.000 people) and North America (73.7), followed by Europe (62.1). The incidence of prostate cancer increases with age. Although only 1 in 350 men under 50 will be diagnosed with prostate cancer, the incidence rate

increases to 1 in every 52 men for ages 50 to 59. The incidence rate is almost 60% in men over the age of 65 years.¹³ Other sources mention the average age at the time of diagnosis of prostate carcinoma is 67 years.¹⁴

Prostate cancer is clinically and molecularly heterogeneous and is usually suspected based on clinical findings of rectal plug examination or prostate-specific antigen (PSA) levels. However, which diagnostic or prognostic factors can be used to select patients for therapeutic options remains unclear mainly.¹⁵ Specific biomarkers in the urine or the blood are available on top of traditional PSA testing, such as PCA3, TMPRSS2-ERG fusion, or kallikreins incorporated in the Phi or 4Kscore tests, along with other parameters, including family history. However, due to limited data, the current European Association of Urology (EAU) guidelines (2021) do not provide general recommendations for implementing these biomarkers into routine screening programs. As part of the American Society of Clinical Oncology (ASCO) guidelines, Eggener et al. recommend commercially available biomarkers, which have been shown to provide prognostic significance and additional information beyond standard clinical models in patient selection in local contexts: Oncotype Dx Prostate, Prolaris, Decipher, and ProMark.¹⁶

Prostate cancer may be asymptomatic in the early stages, often have a sluggish course, and require minimal or no treatment. However, the most frequent complaints are difficulty urinating, increased frequency, and nocturia, all possible symptoms that also arise from prostate hypertrophy. A more advanced stage of the disease may appear with urinary retention and back pain since the axillary skeleton is the most common place of metastatic bone disease. Many prostate cancers are detected based on elevated plasma levels of a prostate-specific antigen (PSA > four ng/mL), a glycoprotein typically expressed by prostate tissue. However, since men without cancer are also found with increased PSA, tissue biopsy is the standard of care to ensure the presence of cancer. Diet and physical activity play an essential role in the development and development of prostate cancer. Dietary factors are mainly related to the differences worldwide and ethnicity observed in the incidence rate of prostate cancer.¹⁷

The main treatment options for prostate cancer, such as surgery, radiation therapy, and proton

beam therapy are current prostate cancer treatment options. However, chemotherapy, hormonal therapy, cryosurgery, and high-intensity focused ultrasound (HIFU) are also included in treatment strategies, depending on clinical conditions and outcomes. In addition, the choice of treatment depends on the stage of development of the disease, the level of prostate-specific antigen (PSA), and the Gleason score among others. The patient's age, general health condition, interest in treatment, and possible side effects can also influence the selection of treatment options. Each treatment may have significant side effects, so treatment discussions often focus on balancing therapeutic goals with the risk of lifestyle changes. Dietary management and other lifestyle modifications of prostate cancer patients have also shown some positive results for controlling and preventing prostate cancer. Patients with prostate cancer are strongly advised to work closely with their doctor and use a combination of treatment options when administering prostate cancer.¹⁸

Prostate cancer can be cured if localized and often responds to treatment when widespread. Tumor growth rates vary from very slow to reasonably fast, and some patients may have prolonged survival even after cancer has spread to distant places, such as bones. The relative survival rate of 5 years for men diagnosed in the United States from 2011 to 2017 with local or regional diseases was greater than 99%, and the distant disease rate was 31%; A survival rate of 98% was observed for all combined stages. The approach to treatment is influenced by age and the accompanying medical problems. Side effects of various treatment forms should be considered when choosing the proper management.^{14,19}

Several factors affect the survival of prostate cancer patients, including tumor area, histological tumor level, age and patient health, and prostate-specific antigen (PSA) levels. The long-term prognosis is excellent when cancer is limited to the prostate gland. Patients with locally advanced cancer are usually incurable, but 5-year survival is still excellent. If prostate cancer has spread to distant organs, current therapy will not cure it. The average survival is usually 1 to 3 years, and most of these patients will die of prostate cancer. Even in this group of patients, a sluggish clinical course lasting many years can be observed. Poorly differentiated tumors are more likely to metastasize before diagnosis and are associated with a worse prognosis. The most commonly used method for reporting

tumor differentiation is the Gleason score (PDQ Adult Treatment Editorial Board, 2022). Histological grading is a critical factor for the assessment of prognosis. While reproducibility is imperfect, the Gleason grading system is still the most preferred prognostic factor and is strongly linked to survival or development. In addition, tumor volume, vascular invasion, tumor expansion through the prostate capsule, and invasion of seminal vesicles may be promising prognostic factors for disease progression and survival. Different biomarker values (p53, ki-67, androgen receptor mutations, IGF, E-cadherin) should still be applied in clinical practice.²⁰

Any benefit of definitive local therapy with curative purposes may take years to emerge. Therefore, treatment with curative intent is usually reserved for men with a long life expectancy. For example, radical prostatectomy is often performed for men with an estimated life expectancy of at least ten years. PSA, a specific marker of the organ, is often used as a tumor marker. The higher the level of PSA at the beginning, the higher the risk of metastatic disease or the subsequent development of the disease. However, this is an improper risk marker. For example, the baseline PSA and the rate of change in PSA were associated with subsequent metastases or deaths from prostate cancer in a cohort of 267 men with clinically localized prostate cancer who were managed with watchful waiting or active surveillance in a control group from a randomized trial comparing radical prostatectomy by staying with an alert or operational management. Nevertheless, the accuracy of classifying men whose cancer remained sluggish compared to those whose cancer progressed poorly at all PSA cut points, or the degree of PSA change examined.²¹

Prostate cancer is the second most commonly diagnosed cancer and the fifth leading cause of cancer death among men worldwide, with an estimated 1,414,000 new cancer cases and 375,304 deaths in 2020.²² Old age, black race, and family history are well-established risk factors for prostate cancer. Meanwhile, more lifestyle and dietary risk factors that may increase the risk of prostate cancer have been suggested sequentially, such as obesity, fitness, diabetes mellitus, diet, and vitamin E supplementation. Gross national income per capita has shown an impact on the incidence and mortality of prostate cancer.²³ Despite these improvements in survival, an increased incidence of distant-stage prostate cancer may have contributed

to declining prostate cancer mortality during 2013-2017.²⁴⁻²⁵ A study on the profile of prostate cancer at Dr. Moewardi Hospital during the period January 2017 - January 2020 found from 441 patients, 92.97% of patients had a good prognosis.

CONCLUSION

Prostate cancer is the most common malignancy in men, ranking second to lung cancer. Identifying biomarkers such as PSA that correlate positively with a prostate cancer diagnosis revolutionized the disease's epidemiology. The diagnosis is primarily based on prostate-specific antigen (PSA) testing, MRI scans, and prostate tissue biopsy, although PSA testing for screening is controversial. New diagnostic technologies are now available, including risk stratification bioassay tests, germline testing, and various PET scans. Cancer is considered localized and potentially curable when it is limited to the prostate. If the disease has spread to the bone or elsewhere outside the prostate, pain medications, bisphosphonates, rank ligand inhibitors, hormonal treatment, chemotherapy, radiopharmaceuticals, immunotherapy, focused radiation, and other targeted therapies can be used. Prognosis depends on age, associated health problems, tumor histology, and cancer rate.

Patients with local or regional diseases at the time of diagnosis had a 5-year survival rate of almost 100%, while patients with distant metastases had an overall 5-year survival rate of only 29%. In patients undergoing treatment, the most important prognostic indicators are the patient's age and general health at the time of diagnosis, cancer stage, pre-therapeutic PSA level, and the Gleason score. A worse prognosis is associated with a high degree of the disease, a more advanced stage, a younger age, and increased PSA levels.

REFERENCES

1. Chen FZ, Zhao XK. Prostate cancer: Current treatment and prevention strategies. *Iran Red Crescent Med J.* 2013; 15(4): 279-84.
2. W. Leslie MKDS. Prostate specific antigen. *StatPearls.* 2022; 40(10): 755.
3. Benafif S, Kote-Jarai Z, Eeles RA. A review of prostate cancer Genome-Wide Association Studies (GWAS). *Cancer Epidemiol Biomarkers Prev.* 2018; 27(8): 845-57.
4. Nieder C, Haukland E, Pawinski A, Dalhaug A. Pathologic fracture and metastatic spinal cord compression in patients with prostate cancer and bone

- metastases. *BMC Urol.* 2010; 10(December).
5. Bleyer A, Spreafico F, Barr R. Causation of increased prostate cancer in young men. *Oncoscience.* 2021; 8: 37-9.
6. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2018; 68(6): 394-424.
7. Chen N, Zhou Q. The evolving gleason grading system. *Chinese J Cancer Res.* 2016; 28(1): 58-64.
8. Hughes CE, Nibbs RJB. A guide to chemokines and their receptors. *FEBS J.* 2018; 285(16): 2944-71.
9. Schumacher FR, Al Olama AA, Berndt SI, Benlloch S, Ahmed M, Saunders EJ, et al. Association analyses of more than 140,000 men identify 63 new prostate cancer susceptibility loci. *Nat Genet.* 2018; 50(7): 928-36.
10. Liao Q, Long C, Deng Z, Bi X, Hu J. The role of circulating adiponectin in prostate cancer: A meta-analysis. *Int J Biol Markers.* 2015; 30(1): e22-31.
11. Ko YH. Functional recovery after radical prostatectomy for prostate cancer. *Yeungnam Univ J Med.* 2018; 35(2): 141-9.
12. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, et al. Cancer statistics for the year 2020: An overview. *Int J Cancer.* 2021; 149(4): 778-89.
13. Perdana NR, Mochtar CA, Umbas R HA. The Risk Factors of Prostate Cancer and Its Prevention: A Literature Review. *Acta Med Indones.* 2018; 48(3): 228-38.
14. American Cancer Society. 2022-cancer-facts-and-figures (n.d). 2022.
15. Filella X, Fernández-Galan E, Bonifacio RF, Foj L. Emerging biomarkers in the diagnosis of prostate cancer. *Pharmgenomics Pers Med.* 2018; 11: 83-94.
16. Bleyer A, Spreafico F, Barr R. Prostate cancer in young men: An emerging young adult and older adolescent challenge. *Cancer.* 2020; 126(1): 46-57. A
17. Rawla P. Epidemiology of prostate cancer. *World J Oncol.* 2019; 10(2): 63-89.
18. Suzman DL, Boikos SA, Carducci MA. Bone-targeting agents in prostate cancer. *Cancer Metastasis Rev.* 2014; 33(2-3): 619-28.
19. Wang G, Zhao D, Spring DJ, Depinho RA. Genetics and biology of prostate cancer. *Genes Dev.* 2018; 32(17-18): 1105-40.
20. Buhmeida A, Pyrhönen S, Laato M, Collan Y. Prognostic factors in prostate cancer. *Diagn Pathol.* 2006; 1(1): 1-15.
21. Bethesda (MD). PDQ Adult Treatment Editorial Board. *Natl Cancer Inst.* 2022; 38(5): 225-58.
22. Wang L, Lu B, He M, Wang Y, Wang Z, Du L. Prostate Cancer Incidence and Mortality: Global Status and Temporal Trends in 89 Countries From 2000 to 2019. *Front Public Heal.* 2022; 10(February).
23. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin.* 2021; 71(3): 209-49.
24. Siegel, D. A., Mary, O'neil, E., Richards, T. B., Dowling, N. F., & Weir HK. Prostate Cancer Incidence and Survival, by Stage and Race/Ethnicity - United States, 2001-2017. 2020.
25. Strassberg DS, Zavodni SM, Gardner P, Dechet C, Stephenson RA, Sewell KK. Quality of Life Following Prostatectomy as a Function of Surgery Type and Degree of Nerve Sparing. *Curr Urol.* 2017; 11(1): 16-20.