Original Research Article

Exploring Prognostic Factors and Survival Rates in Prostate Cancer Patients: A Comprehensive Retrospective Analysis (2009-2018)

ABSTRACT

Objective: To evaluate prognostic factors and estimate the survival of patients with prostate cancer admitted to an oncological hospital.

Method: Retrospective cohort study, in previous patient records describing the interventions received and follow-up from the first moment of these records, from 2009 to 2018, follow-up until 2020, 3,485 patients undergoing cancer treatment at CACON, Muriaé, MG, Brazil. Overall survival estimated by Kaplan-Meier, log-rank test for pairwise comparisons, multivariate analysis by Cox Proportional Hazards method.

Results: Prevalence of PC in brown men, median age 72 years, with no family history of PC, stage II, low Gleason, PSA <10 ng/ml and radical prostatectomy as initial treatment. Highest survival rates at 60 months, 96% in <60 years, low Gleason and radiotherapy as first treatment, 98% survival for PSA <10 ng/ml and 99% for stage I. Cox, the parameters age (>70 years), clinical staging III and IV, high Gleason and PSA >10.01 ng/ml were important predictive risk factors for men with CP.

Conclusion: Individuals evaluated in this study had survival rates (at 60 months) higher than those observed in the national and world average for PC and predictive risk factors, age (>70 years), staging III and IV, high Gleason and PSA >10 .01 ng/ml. The results allow for new early diagnosis and treatment measures to be used in the public network - SUS, as well as proposing new control strategies and health promotion actions, aimed at reducing the morbidity and mortality of patients with PC.

Keywords: Prostate cancer. Survival. Epidemiology.

1. INTRODUCTION

Prostate cancer (PC) is the most frequent type of cancer in the male population in 112 countries, representing 14.1% of the incidence and 6.8% of cancer mortality worldwide, which corresponds to 1.4 million new cases and 375,000 deaths in 2020. In the same year, the standardized incidence rate of this neoplasm by age was 65.5, while mortality was 13.6 per 100,000 individuals in South America [1].

According to the José Alencar Gomes da Silva National Cancer Institute (INCA), PC represents 29.2% of all male cancers in Brazil, representing 65,840 new cases in each year

of the 2020-2022 triennium [2], representing a great demand in public health [3,4]. Among the types of cancers affecting the male population, skin cancer (non-melanoma) has the highest incidence, followed by PC. The prostatic tumor can remain asymptomatic for many years due to its slow growth. However, in some cases, it has the capacity to develop rapidly and affect other organs, contributing to the death of the patient [5].

At the regional level, an epidemiological study was carried out at the Hospital do Câncer de Muriaé (HCM) from January/2007 to July/2018, with a population sample consisting of 1890 patients with prostate cancer, registered and treated with hormone therapy in the same period , at the Cristiano Varella Foundation – Muriaé Cancer Hospital, state of Minas Gerais, Brazil. The objective was to identify the epidemiological characteristics of these patients and to evaluate monthly, quarterly and semi-annual Eligard® treatment according to efficacy and tolerability. The results showed the effectiveness of the hormone (Eligard®), an LHRH agonist used in the treatment of patients with CP, in all stages, as well as the tolerability of patients regarding this medication, with very satisfactory results in approximately 99% of all patients. [6,7].

Despite prevention strategies and early diagnoses, the results of survival analyzes indicate that approximately 15% of patients diagnosed with PC may die as a result of this neoplasm [8,9,10]. Among the variables identified as important risk factors for the development of PC, the following stand out: I) age, as it usually affects men over 50 years old, and the risk of becoming ill increases with advancing age; II) family history, individuals with first-degree relatives with PC have approximately twice the risk of developing this neoplasm than the general population; and III) skin color, the black race has higher incidence rates and more aggressive tumors [11].

Historically, it is observed that the survival of patients with PC has evolved. For example, in European countries (France, Wales and England), at the end of the 1980s, the five-year survival of patients with PC was 56%. In the same period in the United States of America (USA), the estimate was 84% for patients with localized PC, increasing to 94% in the 90s [9]. For tumors classified as low-grade, the survival of these patients reaches 100 % of cases, while in more advanced cases of PC this rate showed a modest increase. This improvement in the survival rate currently is probably due to technological advances in early diagnosis and treatment [12], as well as through epidemiological studies that contribute to a better understanding of the prognostic factors of the disease [9,13].

The evaluation of serum levels of PSA (Prostate-Specific Antigen) pre-treatment, degree of histological differentiation of biopsyed tumor fragments, according to Gleason score and tumor staging are considered important clinical prognostic markers of localized CP, which indicate the best therapeutic choice for each patient [8,14, 15,16].

The use of time as one of the variables considered in epidemiological studies is extremely important, as it contributes to the understanding of the disease and related prognostic factors. Indirectly, it also makes it possible to evaluate advances in diagnoses and therapies in health, in the organization and quality of health services provided to these patients [17,18]. Survival analysis is also an important indicator for evaluating oncological outcomes in health services. because they estimate the system's ability to provide quality care to patients[19].

Luizaga et al. [20], when assessing PC survival rates in Brazil, showed a slight reduction in mortality. This is due to the early identification and treatment of PC that has completely changed with the discovery of prostate-specific antigen. However, improved detection has also led to overdiagnosis and, consequently, overtreatment of patients with low-risk disease.

Hospital Cancer Registry (HCR) are considered fundamental in structuring an information system on any type of cancer. However, sending this data is mandatory for hospitals qualified in the specialized care in oncology of the SUS (Sistema Único de Saúde) and optional for hospitals that are not qualified [2,5], which implies limitations in the screening of PC by RHC's and, consequently, controversial results. In addition, the approaches used to determine this rate do not consider the age, general health status of the patient, response to treatment, PSA level, among other factors that can also affect the patient's prognosis [21,22].

Thus, well-conducted cohort studies are relevant for a better characterization of the survival of these individuals. Therefore, the objective of this research was to estimate survival and evaluate clinical prognostic markers in patients with PC admitted to an oncological hospital of the SUS.Provide a factual background, clearly defined problem, proposed solution, a brief literature survey and the scope and justification of the work done.

2. MATERIAL AND METHODS

2.1. Participants

This is a retrospective cohort study, which identifies previous records of subjects describing interventions received and follow-up since the time of these records, in the period from 2009 to 2018, with follow-up until 2020, with 3,485 male patients, aged between 42-93 years. Information extracted from medical records and from the HCR of patients diagnosed with PC, undergoing oncological treatment at the Hospital Oncológico de Alta Complexidade (CACON), Fundação Cristiano Varella – Hospital do Câncer de Muriaé, Minas Gerais, Brazil. This hospital is outsourced by the Ministry of Health (MS), with approximately 95% of services provided by the SUS. The majority of patients with PC treated at the hospital come from the Zona da Mata region of Minas Gerais, the interior of the state of Minas Gerais and the municipality of Muriaé itself. Some patients with CP also come from neighboring states, such as Rio de Janeiro, Espírito Santo and Bahia.

2.2. Compliance with ethical standards

The research was carried out following the criteria established in Resolution number 466/2012 of the National Health Council and approved by the Ethics and Research Committee of Santa Casa de Belo Horizonte - CAAE 42638620.3.0000.5138.

2.3. Development

To constitute the cohort of this research, patients diagnosed with CP, confirmed by anatomopathological examination, and treated at CACON were selected. Information on anamnesis, confirmatory diagnosis (anatomopathological examination) and clinical evolution (biochemical recurrence and death) of patients were obtained from medical records and RHCs made available by the hospital. Patients who remained alive until the end of the study were censored by the date of the last record in the medical record, and those who had their participation in the study interrupted (patients lost during the study) contributed to the calculation of survival until the last date recorded in the record.

For the analyses, the following variables were considered: age, race, family history of cancer; drug-hormone, clinical staging (TNM), PSA, Gleason score (evaluation of the dedifferentiation degree of cp by microscopy), first treatment at diagnosis (radical prostatectomy), hormone therapy, chemotherapy, radiotherapy), adjuvant post-surgery treatment (hormone therapy, radiotherapy, radio and hormone therapy) post-radiotherapy

hormone treatment, biochemical recurrence and metastasis location. Biochemical recurrence was characterized by a PSA value > 0.4 ng/ml in patients who underwent primary oncological treatments for PC, such as surgery (radical prostatectomy) or external radiotherapy[23,24,18].

2.4. Data analyses

Survival was calculated using the Kaplan-Meier method and hypotheses of parallelism between the different curves were tested using the log-rank test [25]. The studied variables were stratified according to the cutoff points (36, 48 and 60 months), after diagnosis, based on the literature, and analytically and descriptively demonstrated through survival curves.

For the analysis of prognostic factors associated with the tumor, hazard ratios (HR) and 95% confidence intervals were calculated, following Cox proportional hazards models, often used to analyze survival data in medical research. It is a survival analysis regression model, which describes the relationship between the incidence of the event, expressed by the risk function and a set of covariates [26].

Eventually, hazard is the instantaneous probability of the event at a given time or the probability that an individual under observation will experience the event over a period centered around that point in time [26].

The outcome of death from PC was presented accordingly. For the final model, only the variables that presented statistically significant raw HR ($p<0.05$) and with more than 80% of complete information were considered. Statistical analyzes were performed using SPSS software version 23.0.

3. RESULTS AND DISCUSSION

3.1. Characteristics of the cohort of patients with prostate cancer.

Our results show that the median follow-up time of the retrospective cohort was 3 years and 7 months (2009-2018), with a minimum follow-up of 11 months and a maximum of 10 years. During the analyzed period, 3,485 medical records and RHCs of patients with PC were evaluated, making it possible to obtain information on age in 100% of patients, race in 98.9%, family history of cancer in 62.4%, clinical stage in 91.2%, Gleason score in 97%, PSA in 85.4% and location of metastasis in 11.5% and patients without metastasis in 87.5% of the sample. Data referring to the type of adjuvant treatment used after surgery and biochemical recurrence were obtained from 100% of the medical records and RHCs analyzed. Also, among the characteristics of the studied cohort, the median age of the population was 72 years, considering the age group between 60 and 75 years with the highest concentration of patients (58.1%) (Table 1).

We observed a predominant profile of brown men (45.9%), no family history of cancer (39.6%), clinical stage II (TNM Classification) (51.7%), low Gleason score (52, 7%), based on TNM staging classification, and PSA level <10 ng/ml (40.9%) (Table 1).

The predominant initial treatment was surgery (radical prostatectomy) (58.6%), followed by hormone therapy (24.7%) and radiotherapy (16.2%). In the post-surgery adjuvant treatment, hormone therapy predominated (42.7%). In addition, among the patients who underwent radiotherapy (n=565), 88.32% (n=499) received hormone treatment, and 36.7% of the patients received antiandrogen hormone therapy (Leuprorelin (Eligard®) at some point

during follow-up. It was not biochemical recurrence was verified in most patients (43.22%), the majority (87.5%) did not present metastasis. Among the identified metastases, bone metastases were the most common (10.0%) (Table 1).

Table 1.Characteristics of the cohort of patients with prostate cancer

Age in years (median; p25-p75) (72; 62-74)		
Time (in months) from first diagnosis (median; p25-p75) (8.5; 5-26)*		
Variables	**Cases (n)**	**%**
Age (years)		
<60	627	18.00
60-75	2026	58.10
>75	832	23.90
	3,485	**100**
Ethnicity		
White	1,156	33.52
Black	681	19.75
Multiracial	1,601	46.43
Other	10	0.29
	3,448	**100**
Family history of cancer		
No history	1,381	63.53
Prior history	793	36.47
	2.174	**100**
Clinical Stage (TNM Classification)		
EC I	362	11.60
EC II	1,801	57.70
EC III	650	20.82
EC IV	308	9.88
	3.121	**100**
Gleason Score		

Low (well differentiated <= 6)	1.836	54.31
Intermediate (moderately differentiated >=7)	1.017	30.08
High (poorly differentiated 8)	527	15.59
	3.380	**100**
PSA (ng/ml)		
<10	1.427	47.98
>20.01	998	33.56
10.01-20	549	18.46
	2.974	**100**
Initial Therapy		
Surgery (radical prostatectomy)	2,043	58.60
Hormone Therapy	861	24.70
Chemotherapy	16	0.50
Radiotherapy	565	16.20
	3,485	**100**
Adjuvant therapy after surgery		
Hormone Therapy	1,489	78.99
Radiotherapy	82	4.36
Radio and Hormone Therapy	314	16.65
	1.885	**100**
Post-radiotherapy hormone therapy		
Not performed	66	11.68
Yes (performed)	499	88.32
	565	**100**
Anti-androgen hormone therapy		
Androcur	3	0.20
Bicalutamide	32	2.19

Cyproterone	16	1.09
Diethylstilbestrol	1	0.069
Flutamide	48	3.29
Zoladex® (Goserelin)	72	4.94
Eligard® (Leuprorelin)	1,281	88.04
Zometa	2	0.18
	1.455	**100**
Biochemical Recurrence		
Absent	1,506	78.40
Present	415	21.60
	1.921	**100**
Site of Metastasis		
Liver	5	0.15
Lymph nodes	20	0.57
More than one metastasis	23	0.66
Bones	351	10.17
Lung	3	0.08
No metastasis	3,048	88.35
	3.450	**100**

Source: [*]Research Data (2009-2018).
Caption: no information/not applicable: [a]Ethnicity: 37; [b]Family history of cancer:1.311; [c]Clinical Stage (TNM Classification): 364; [d]Gleason Score: 105; [e] PSA (ng/ml): 511;[f]Adjuvant therapy after surgery: 1.600; [g]Post-radiotherapy hormone therapy: 2.920; [h]Anti-androgen hormone therapy:2030; [i]Biochemical recurrence:1.564; [j]Site of metastasis: 35.

3.2. Estimated survival of patients with CP

Our results show a significant difference between the variables present in each of these parameters ($p<0.001$). The highest survival rates were identified at age below 60 years (97% at 36 and 96% at 60 months), Gleason score less than or equal to 6 (98% at 36 and 96% at 60 months), stage I, presented the highest survival rates among the items analyzed (99% at 36 and 60 months), radiotherapy as the first treatment (97% at 36 and 96% at 60 months) and PSA <10 ng/ml (99% at 36 and 98 % in 60 months). Also, the worst survival rates were identified in patients with stage IV tumors (60% at 60 months), followed by patients with a Gleason score greater than or equal to 8 (67% at 60 months). The other variables analyzed did not show a significant relationship with the patients' estimated lives (Table 2).

Table 2. Estimated survival at 36, 48, and 60 months and their respective 95% CI and the p-value of the Log-rank test of the epidemiological and clinical variables assessed in patients with prostate cancer.

Age / Time (months)	36 (IC 95%)	48 (IC 95%)	60 (IC 95%)	p-value	Log-Rank
<60	97 (-96.99)	96 (-95.98)	96 (-94.98)		
60-75	96 (-95.97)	94 (-93.96)	93 (-92.95)	< 0.001	64.1
>75	88 (-86.91)	85 (-82.88)	82 (-78.86)		
Gleason score / Time (months)	36	48	60	p-value	Log-Rank
<=6	98 (-97.99)	97 (-96.98)	96 (-95.98)		
7	95 (-93.96)	92 (-92.95)	91 (-89.94)	< 0.001	209
>=8	80 (-75.85)	73 (-68.79)	67 (-61.74)		
Staging / Time (months)	36	48	60	p-value	Log-Rank
I	99 (-97.100)	99 (-97.100)	99 (-97.100)		
II	98 (-97.99)	97 (-96.98)	96 (-95.97)	< 0.001	354
III	93 (-91.95)	90 (-88.93)	88 (-85.92)		
IV	71 (-65.78)	61 (-54.70)	60 (-52.69)		
First Therapy / Time (months)	36	48	60	p-value	Log-Rank
Surgery	97 (-96.98)	96 (-94.97)	94 (-93.96)		
Hormone Therapy	86 (-83.89)	82 (-78.86)	79 (-75.83)		
Radiotherapy	97 (-96.99)	96 (-94.98)	96 (-93.98)	< 0.001	116
Chemotherapy	91 (-75,100)	91 (-75,100)	91 (-75,100)		
PSA / Time (months)	36	48	60	p-value	Log-Rank
<10 (ng/ml)	99 (-98.100)	98 (-97.99)	98 (-96.99)		
10.01-20 (ng/ml)	96 (-93.98)	94 (-92.97)	92 (-88.95)	< 0.001	165
>20.01 (ng/ml)	86 (-83.89)	81 (-77.84)	78 (-74.82)		

Source: Research Data (2009-2018)

3.3. Epidemiological and clinical variables studied in patients with PC

For comparisons between the survival curves obtained between the analyzed categories, the Kaplan-Meier method and the Log-rank test were used, identifying the presence of parallelism between curve differences (pair-to-pair comparisons) (Figure 1 and Table 3). The data analysis showed a significant difference in the variables: age, Gleason score and PSA levels ($p<0.05$), indicating that the hypothesis of similarity in the survival curve was rejected. As for the TNM, the global comparison between the stratified curves rejected the hypothesis of similarity between the analyzed staging levels (Figure 1C, Table 2). However, in pairwise comparisons, the log-rank test identified the existence of parallelism between the curves of stages I and II, and rejected the hypothesis of similarity between the other curves (Table 3). In the global comparison between the survival curves related to the first treatment (Figure 1D), the hypothesis of similarity was also rejected (Table 2). However, in the log-rank test for pairwise comparisons, the surgery/radiotherapy and hormone therapy/chemotherapy curves did not present significant differences ($p>0.05$), indicating the existence of parallelism between them (Table 3).

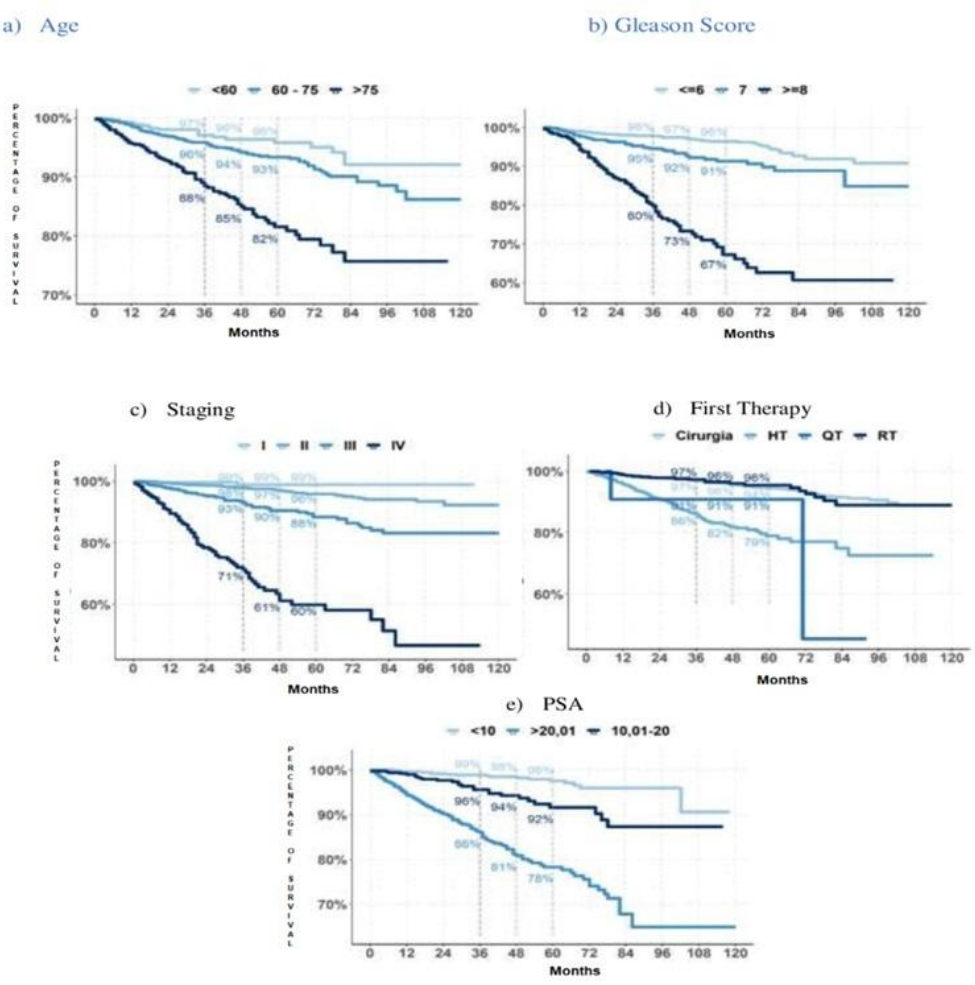

Figure 1: Kaplan-Meier curve of the epidemiological and clinical variables of the study of patients with prostate cancer: a) Age, b) Gleason score, c) Staging, d) First therapy, e) PSA levels.

Table 3. Pairwise comparisons of the epidemiological and clinical variables studied in patients with PC, according to the log-rank test.

	p-value	p-value	p-value	
Age	60-75	>75		
<60		0.043	< 0.0001	
60-75			< 0.0001	
Gleason score		7	>=8	
<=6		0.00014	< 0.0001	
7			< 0.0001	
Staging		II	III	IV
I		0.098	< 0.0001	< 0.0001
II			< 0.0001	< 0.0001
III				< 0.0001
First Therapy		Hormone Therapy	Radiotherapy	Chemotherapy
Surgery		< 0.0001	0.968	0.022
Hormone Therapy			< 0.0001	0.872
Radiotherapy				0.022
PSA		>20.01	10.01-20	
<10		< 0.0001	< 0.0001	
>20.01			< 0.0001	
p-value <=0.05	There is a difference in the survival curve (similarity hypothesis rejected)			
p-value > 0.05	There is no difference between the survival curves (parallelism)			

Source: Research Data (2009-2018)

3.4. Cohort of patients with PC

The analysis of the risk ratios for death from PC, by calculating the hazard ratios (HR), indicated that, adjusted for the other factors in the final model, patients aged over 70 years have a higher risk of death (4 .21 times) when compared to patients younger than 60 years. Patients in clinical stages III and IV are 3.27 and 14.73 times more likely (respectively) to die

compared to those with ECI and II. Patients with intermediate (7) and high (8, 9, 10) Gleason scores are 2.05 and 7.84 times (respectively) more likely to die from PC than those with low scores. In patients with PSA levels between 10.01 - 20 ng/ml and above 20.01 ng/ml, the risk of dying was 3.12 and 10.55 times higher (respectively) than those with PSA < 10 ng /ml. Regarding the type of initial treatment, the risk ratios showed that patients undergoing hormone therapy and chemotherapy are 4.03 and 5.03 times more likely to die (respectively) than the baseline treatment (surgery) (Table 4).

Table 4. Univariate analysis of the cohort of patients with PC treated at the HCM according to medical-biological variables

Variables	HR[a]	CI 95%[b]	p[c]
Age Group			
< 60 Years	Base Category		
60 - 70 Years	1.62	(1.03-2.62)	0.048
> 70 Years	4.21	(2.59-6.850)	<0.0001
Clinical Stage (TNM)			
ECI + ECII	Base Category		
ECIII	3.27	(2.22-4.80)	<0.0001
ECIV	14.73	(10.31-21.05)	<0.001
Gleason score			
Low (2, 3, 4, 5 and 6)	Base Category		
Intermediate (7)	2.05	(1.41-3.00)	0.0001
High (8, 9 10)	7.84	(5.63-10.92)	< 0.0001
PSA (ng/ml)			
≤10	Base Category		
10.01 - 20	3.12	(1.74-5.59)	<0.0001
>20.01	10.55	(6.60-16.89)	0.0001
Initial Therapy			
Surgery	Base Category		
Radiotherapy	0.97	(0.61-1.56)	0.926
Hormone Therapy	4.03	(3.03-5.43)	<0.0001
Chemotherapy	5.03	(1.23-20.48)	0.024

Legend. [a] Hazard Ratio obtained by the univariate Cox proportional hazards model; [b] 95% confidence interval; [c] Statistical Significance (p value).
Source: Research Data (2009-2018)

3.5. Prognostic factors in the cohort of patients with PC

Table 5 shows, jointly, the decomposition of the survival curves according to the variables studied using the Cox Proportional Hazards method (multivariate analysis). The analysis of the risk ratios for death from PC, using the calculation of the hazard ratios (HR), indicated that, adjusted for the other factors in the final model, patients aged over 70 years have a higher risk of death (2, 43 times) when compared to patients younger than 60 years. Patients in clinical stages III and IV have 1.93 and 5.34 times shorter survival (respectively) compared to those with ECI and II. Patients with a high Gleason score [28] are 2.56 times more likely to die than those with a low score. Patients with PSA levels between 10.01 and 20 ng/ml were 2.10 times more likely to die than those with PSA ≤ 10 ng/ml, and in those with PSA > 20.01 ng/ml, this risk was higher by 3.57 times.

Despite having shown statistical significance in the univariate analysis (Table 4), when tested in a multivariate model, the intermediate Gleason score subcategories, chemotherapy and antiandrogen hormone therapy, as initial treatments, did not demonstrate statistical significance (p>0.05). Therefore, the following variables remained in the final multivariate model: age group (>70 years), clinical stage (III and IV), high Gleason score and PSA levels (>10.01 ng/ml).

Table 5. Multivariate analysis (final model) of prognostic factors in the cohort of patients with prostate cancer treated at HCM

Variables	**HR[a]**	**CI 95%[b]**	**p[c]**
Age Group			
< 60 Years	Base Category		
60 - 70 Years	1,282	(0.7417-2.214)	0.37399
> 70 Years	2,434	(1.405-4.215)	0.00151
Clinical Stage (TNM)			
ECI + ECII	Base Category		
ECIII	1,931	(1.2371-3.015)	0.00378
ECIV	5,342	(3.4419-8.29)	<0.0001
Gleason score			
Low (2, 3, 4, 5 and 6)	Base Category		
Intermediate (7)	1,271	(0.8128-1.988)	0.29305
High (8, 9 10)	2,561	(1.6858-3.89)	<0.0001
PSA (ng/ml)			
≤10	Base Category		
10.01 - 20	2,104	(1.1131-3.977)	0.02203
>20.01	3,574	(2.0378-6.267)	<0.0001

Legend. [a] Hazard Ratio obtained by the univariate Cox proportional hazards model
[b] 95% confidence interval; [c] Statistical Significance (p value)
Source: Research Data (2009-2018)

4. DISCUSSION

PC, in addition to being one of the most prevalent neoplasms in Brazil, is one of the most studied in the world due to its high morbidity and mortality rates [3,20].

According to data from GLOBOCAN [27], the number of cases of PC in the world was 1,414,259, with a global gross mortality rate of 9.5% corresponding to 375,304/100,000 inhabitants. It is even more frequently diagnosed in approximately 87 countries, including all of America and most of Europe, Australia and Africa, according to the latest global estimate [28](Costa et al., 2022), notably in Asia with PC incidence estimate of 26.2% (371,225), Europe 33.5% (473,344), Oceania 1.6% (22,421), Africa 6.6% (93,173), North America 16.9% (239,574) and Latin America and Caribbean 15.2% (214,522). As for mortality, the estimate in Asia was 32.1% (120 593), Europe 28.8% (108 088), Oceania 1.3% (4 767), Africa 12.6% (47 249), North America 9.9% (37 192) and Latin America and the Caribbean 15.3% (57 415). The estimated 5-year survival in Asia was 23.7% (1,176,781), Europe 37.8% (1,873,814), Oceania 1.8% (89,069), Africa 3.6% (178,197), North America 18.8% (929 921) and Latin America and the Caribbean 14.3% (709 119) [27].

Survival rates obtained in the 5-year period of patients treated at the Hospital do Câncer de Muriaé were higher than those indicated by the Ministry of Health of Brazil (MS), at the regional level it was 94.6%, and that of the INCA was 83 .5% [5]. In the studied cohort, the highest survival rates in this period (5 years) were 96% for patients younger than 60 years, with low Gleason scores and use of radiotherapy as the first treatment, 98% survival for PSA levels < 10 ng/ml and 99% for stage I tumors. This disparity between survival estimates, according to several studies [23,7,28] is observed in patients with cancer residents in developed and developing countries, as the prevalence rates in the latter are considered lower than those observed in developed countries (about five times). Data similar to those of this research were found in the literature, regardless of prognostic variables, with overall survival estimated at 93.4% at 5 years [9].

In that study, the biochemical recurrence rate was found in 21.6% of the sample, while in other studies this rate was 11.90%. Regarding the age factor, the results obtained by the Cox proportional hazards model (final model) indicated a greater chance of death in patients aged over 70 years. The prognostic association between age and survival of patients with CP has also been reported in previous studies. Silva et al. [4] observed more aggressive manifestations of the disease in younger patients, which leads to lower survival.

However, Niclis et al. [29] performed a cohort study that showed a decreasing trend in PC mortality in patients aged between 40 and 50 years. This fact would be related, according to the authors, to an improvement in treatment conditions and not to the age of young patients. More recent studies indicate that the favorable trends in mortality from PC are attributable to better treatment and management of the disease, as well as some recent improvements in early diagnosis and prostate-specific antigen (PSA) screening [30].

The clinical stage (TNM) proved to be a good prognostic marker in the studied cohort. Patients with CP (CE I and II) had an estimated survival of 99% and 96% at 5 years (respectively), results superior to those presented by INCA (88% at 5 years) [31] However, recent studies show that in addition to physical examination by digital rectal examination, the most commonly used marker for the diagnosis of PC is prostate-specific antigen (PSA) [32,33].

In the Cox proportional hazards model (final model) the results indicate that patients with tumors in clinical stages III and IV are more likely to die compared to those in stages I and II. These estimates support literature data that show a good prognosis for this marker and few progression events to localized CP [10].

Regarding the Gleason score, the results obtained by the Cox proportional hazards model (final model) indicated that patients with a high score (≥8) have a 2.58 times greater risk of dying when compared to patients with a low score. These data corroborate previous studies showing that a high Gleason score is a risk factor associated with a more aggressive biological behavior and a worse prognosis in CP [14,9].

Technological advances in treatment and early diagnosis have resulted in increased survival, reinforcing the importance of analyzing this parameter for planning and strategic actions in the oncology area [17,28,13]. These advances have the potential to further improve the identification of men with low-risk disease who can be adequately treated through active surveillance. In the studied population, PC mainly affected brown men, with a median age of 72 years, with no family history of PC, with tumor in clinical stage II, low Gleason score, PSA level < 10 ng/ml and submitted to radical prostatectomy as initial treatment.

Considering the strategies currently used for PC screening in asymptomatic and symptomatic men, prostate-specific antigen (PSA) analysis has provided an increase, since the end of the 1990s, in the overall survival of patients with this neoplasm [15,18]. The survival estimates in Europe (in 5 years) was 56%, increasing to 86% and 95% in the years 2004 and 2006. However, in 2021, among the types of cancer, the lowest among men was PC, 7% in the European Union [30]. When analyzed separately, the prognostic value of pre-treatment PSA remains controversial in the literature regarding its value predictive capacity in relation to the biological aggressiveness of the PC. However, when associated with other prognostic variables, such as the TNM clinical staging and the Gleason score, it was possible to better stratify the risk groups [23].

Although there is controversy in the literature about the screening of this type of cancer using PSA, in recent decades a reduction in mortality rates of approximately 20% has been observed after the application of this diagnostic practice [22]. In the studied cohort, the results obtained from the Cox proportional hazards model (final model) indicate that PSA is an important predictive factor of prognosis, as patients with PSA between 10.01 and 20 ng/ml and > 20.01 ng/ml were more likely to die when compared with levels ≤ 10 ng/ml. In patients with localized CP12, also Although this cohort did not show significant differences between race and family history to estimate the survival of patients with CP, Costa et al.[28], when studying black American patients, found that they had a worse prognosis when compared to patients of other races.

Liu et al. [13] studying patients with localized PC undergoing surgery or external radiotherapy, found a 23% worse prognosis for those patients who had family members with PC. Costa et al. [28], Wolf et al. [22] demonstrated a relationship between PC and the presence of cases of this disease in the same family. Although most of the patients analyzed in the present study did not report a family history of this neoplasm, there was a high percentage of medical records and CSD analyzed that did not present this information (37.6%), which may have contributed to the fact that the data of patients without history were superior compared to patients with a family history of CP.

The estimate of overall survival of patients with PC, according to the primary treatment performed, showed a better prognosis in the analysis of Kaplan Meier curves. According to

the data obtained, patients submitted to radical prostatectomy (surgery) had a longer survival than those submitted to chemotherapy or antiandrogen hormone therapy as initial therapy, rejecting the hypothesis of parallelism between these variables. However, in the final Cox proportional hazards model, primary treatment does not appear to be a good prognostic factor for assessing survival in patients with CP.

Another study [15] the highest survival estimates for CP patients treated with surgery and worst prognosis received radiotherapy as initial treatment. The favorable survival in relation to surgery as the initial treatment for this neoplasm can be explained (in the present study) by the selection bias of patients undergoing the procedure. Therefore, patients undergoing surgery may have a lower baseline risk than those receiving radiotherapy.

Limitations of this study include lack of data in the medical records as it is a retrospective study, difficulty in data collection, as much of the information on older patients was found in physical medical records and the most recent information in electronic medical records.

The prospects for future work would be more information in medical records with data security and greater scope. demonstrated that the PSA has great predictive power for risk stratification.

4. CONCLUSION

Based on the results obtained, it was possible to know the epidemiological and clinical profile of patients with prostate cancer undergoing treatment at the Cancer Hospital of Muriaé. It was found that age (over 70 years), clinical staging (III and IV), high Gleason score (≥8) and PSA levels above 10.01 ng/ml were important predictive markers for worsening in clinical evolution of patients with PC. Data obtained in the analysis of survival estimation indicate that younger patients (<60 years), with low Gleason score, use of radiotherapy as the first treatment, PSA levels <10 ng/ml, tumors with stage I level presented rates of survival in 5 years (60 months) higher than that observed in the national and world average for patients with this neoplasm. Based on these results, it becomes possible to evaluate the measures of early diagnosis and treatment used in the oncological treatment units of the public network, as well as to propose new control strategies and health promotion actions, aiming at reducing the morbidity and mortality of the affected patients. by PC.

CONSENT

"All authors declare that 'written informed consent was obtained from the patient (or other approved parties). A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and the research was carried out following the criteria established in Resolution number 466/2012.The study was approved by the local research ethics committee under number CAAE 42638620.3.0000.5138.

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