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Outcome of Treatment of Prostate Cancer at Sohag University Hospital between 2017 to 2021

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ABSTRACT

Background: Prostate cancer is a prevalent and serious health concern among men, with various treatment options available, including androgen deprivation therapy (ADT), radiotherapy, and surgery, each having distinct outcomes.

Objective: This study evaluates the treatment outcomes of prostate cancer patients at Sohag University Hospital from 2017 to 2021.

Patients and Methods: A retrospective cohort study was conducted on 49 prostate cancer patients. Data on demographics, cancer staging, Gleason scores, treatment modalities, and outcomes were analyzed.

Results: The mean age of patients was 70.51 years. A significant proportion (53.1%) were diagnosed with high-risk locally advanced prostate cancer, and 42.9% had metastatic cancer. ADT was administered to 95.9% of patients, and 38.8% received radiotherapy. Overall survival (OS) rates were 100% at 1 year, 88.9% at 3 years, and 66.7% at 5 years. The duration of hormonal treatment significantly impacted OS, while no significant differences were noted across age, T stage, and Gleason score subgroups.

Conclusions: The study highlights the severity of treated prostate cancer cases and the high overall survival rates. The duration of hormonal treatment was a significant factor in overall survival, emphasizing the importance of treatment duration management.

Keywords: Prostate cancer, Androgen deprivation therapy, Radiotherapy, Survival rate, Gleason score, Hormonal treatment.

INTRODUCTION

Prostate cancer is the second most frequently diagnosed cancer and the fifth leading cause of cancer-related death among men worldwide. Its treatment outcomes have been extensively studied, with numerous research articles examining various aspects of different treatment modalities. Radical prostatectomy, a common surgical treatment for localized prostate cancer, has been shown to significantly reduce mortality compared to conservative management. However, surgery is also associated with potential adverse effects, including urinary incontinence and erectile dysfunction [(1)].

Radiation therapy, including external beam radiation therapy (EBRT) and brachytherapy, is another primary treatment option. Studies have demonstrated that EBRT combined with androgen deprivation therapy (ADT) improves overall survival in high-risk patients [(2)]. Brachytherapy, involving the implantation of radioactive seeds, has been reported to have favorable long-term biochemical control rates, especially in low- to intermediate-risk patients [(3)].

Hormone therapy, or ADT, is commonly used for advanced or metastatic prostate cancer. While ADT can effectively control disease progression and alleviate symptoms, it is often associated with significant side effects, such as osteoporosis, cardiovascular issues, and metabolic changes [(4)]. Recent advancements in hormone therapy, including the use of newer agents like abiraterone and enzalutamide, have shown promising results in improving survival and quality of life in metastatic castration-resistant prostate cancer [(5)].

Active surveillance is an option for men with low-risk prostate cancer, aiming to monitor the disease closely and intervene only if there is evidence of progression. This approach can help avoid or delay the side effects associated with more aggressive treatments. Studies have indicated that active surveillance is a safe and effective strategy for appropriately selected patients, with favorable long-term outcomes [(6)].

The choice of treatment for prostate cancer depends on various factors, including disease stage, patient health, and preferences. Each treatment modality has its benefits and risks, and ongoing research continues to refine these strategies to optimize outcomes for prostate cancer patients [(7)]. This study aimed to evaluate the outcomes of different treatment strategies for prostate cancer, including surgery, radiation therapy, hormone therapy, and active surveillance. By analyzing survival rates, recurrence rates, and quality of life measures, this research sought to provide a comprehensive overview of the efficacy and safety of these treatments.

PATIENTS AND METHODS

This study employed a retrospective cohort design to analyze the outcomes of prostate cancer treatments of patients diagnosed and treated for prostate cancer at the Oncology Department of Sohag University Hospital from January 2017 to January 2021.

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Inclusion Criteria

Patients were eligible for inclusion if they met the following criteria:

- Aged 18 years or older.
- Diagnosed with any stage or grade of prostate cancer.
- Histologically confirmed epithelial type of prostate cancer.

Exclusion Criteria

Patients were excluded from the study if they met any of the following criteria:

- Aged below 18 years.
- Diagnosed with other malignancies.

Treatment Outcome Measures

Primary Outcome Measures:

- **Overall Survival (OS):** Defined as the time from the date of diagnosis to the last date the patient was seen.
- **Progression-Free Survival (PFS):** Defined as the length of time during and after treatment that the patient lives with the disease without it worsening, particularly important in the metastatic setting.
- **Disease-Free Survival (DFS):** Defined as the time from the end of treatment to the date of the first relapse.

Secondary Outcome Measures:

- **Early and Late Treatment Toxicities:** Adverse effects experienced by patients during and after treatment.

Data Collection

Patient data were extracted from electronic health records. Collected data included demographics (age, race), prostate cancer staging (T stage), Gleason score, type of treatment received (androgen deprivation therapy, radiotherapy, surgery), duration of treatment, and follow-up data. Additional data collected included prostate-specific antigen levels, presence of metastases, and comorbidities.

Ethical Considerations

The privacy of patient data was strictly maintained. Ethical approval for the study was obtained from the Medical Research Ethics Committee of Sohag University Hospital. The Helsinki Declaration was followed throughout the study's conduct.

Statistical Analysis

Data were analyzed using IBM SPSS software version 25.0 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). Qualitative data were described using frequencies and percentages. The Shapiro-Wilk test was applied to verify the normality of distribution. Quantitative data were described using the range (minimum and maximum), mean, standard deviation, and median. Statistical significance was judged at the 5% level. Kaplan-Meier survival curves were constructed to assess OS and PFS, and the Log-Rank test was used to compare survival distributions between groups.

RESULTS

The ages of the patients ranged from 49 to 88 years, with a mean age of diagnosis in our cohort was 70.51 ± 8.40 years with a range from 49 to 88 years. The majority of the patients (89.8%) were over 60 years old, and 67.3% resided in rural areas. The majority of patients (53.1%) were diagnosed with high-risk locally advanced prostate cancer, while 42.9% had metastatic prostate cancer to the bone, and 4.1% had intermediate-risk prostate cancer.

Radiological findings from MRI or CT scans before intervention are detailed in table 1. Significant findings included moderate to marked prostate enlargement in 98% of patients, indentation or infiltration into nearby structures in 22.4%, and the presence of metastases in 38.8%.

Table 1: Findings on MRI or CT before intervention in the studied prostate cancer patients.

Findings on MRI or CT before intervention	Studied patients (N= 49)	
	N	%
Enlarged prostate cancer:		
– **Mild**	1	2.0%
– **Moderate**	26	53.1%
– **Marked**	22	44.9%
Prostatic nodules or focal:		
– **Single**	0	0%
– **Multiple**	1	2.0%
Relation to nearby structure: – **Indentation or infiltration**	11	22.4%
Presence of enlarged regional L.Ns	6	12.2%
Presence of obstructive uropathy (back pressure)	2	4.1%
Presence of metastasis (bone, lung, liver, nonregional L.Ns and other)	19	38.8%
Marked enlarged prostate with mass invading posterior bladder wall	2	4.1%

CT : computed tomography .
MRI: Magnetic resonance imaging .
L.N : lymph node

Table 2 summarizes the tumor characteristics. The T stage distribution showed that 57.1% were T2. The mean Gleason score was 7.98 ± 0.90, with scores of 7 being

most common (38.8%). Grade III tumors were predominant (42.9%).

Table 2: Tumor characteristics among the studied prostate cancer patients.

		Studied patients (N= 49)	
		N	%
T stage	T1	2	4.1%
	T2	28	57.1%
	T3	8	16.3%
	T4	11	22.4%
Gleason score	Mean± SD	7.98± 0.90	
	Median	8.0	
	Range	7.0 – 10.0	
	7	19	38.8%
	8	13	26.5%
	9	16	32.7%
	10	1	2.0%
Primary Gleason pattern	Mean± SD	4.23± 0.63	
	Median	4.0	
	Range	3.0 – 5.0	
Secondary Gleason pattern	Mean± SD	3.77± 0.63	
	Median	4.0	
	Range	3.0 – 5.0	
Percentage of positivity of resected cores	Mean± SD	56.77± 19.85	
	Median	60.0	
	Range	5.0 – 90.0	
Gleason grades	High grade	1	2.0%
	II	18	36.7%
	III	21	42.9%
	IV	6	12.2%
	V	2	4.1%
	VI	1	2.0%

Table 3 outlines the systemic therapy administered. Most patients (95.9%) received ADT (Zoladex and Casodex). The mean duration of hormonal treatment was 23.65 ± 11.7 months. No patients received chemotherapy, and 46.9% were given bone remodeling agents. Definitive radiotherapy was administered to 38.8% of patients, with varying prostate doses (60 Gy in 16.3% and 66 Gy in 18.4%). Pelvic radiation at 45 Gy was given to 38.8% of patients, and palliative radiotherapy to metastases was provided to 46.9%.

Table 3: Systemic and radiotherapy therapy among the studied prostate cancer patients.

Treatment		Studied patients (N= 49)	
		N	%
Hormonal treatment regimens	ADT (Zoladex and Casodex)	47	95.9%
	Casodex	2	4.1%
	Orchiectomy	1	2.0%
Duration of hormonal treatment (months)	Mean± SD	23.65± 11.7	
	Median	24.0	
	Range	4.0 – 51.0	
Chemotherapy	Yes	0	0%
	No	49	100%
Bone remodeling agents	Yes	23	46.9%
	No	26	53.1%
Definitive radiotherapy	Yes	19	38.8%
	No	30	61.2%
Prostate radiotherapy dose	60 Gy	8	16.3%
	66 Gy	9	18.4%
	70 Gy	1	2.0%
	74 Gy	1	2.0%
	No	30	61.2%
Pelvic radiotherapy dose	45 Gy	19	38.8%
	No	30	61.2%
Palliative radiotherapy	To metastasis	23	46.9%
	To prostate	0	0%

ADT : androgen deprivation therapy .

Regarding the outcomes of the studied patients, biochemical failure, indicated by rising PSA levels, was observed in 28.6% of cases. Three patients (6.1%) died due to cancer, while the remaining 93.9% were alive at the end of the study.

Our study examined the correlation between overall survival and factors such as age, treatment modalities, cancer stages, and Gleason scores among prostate cancer patients. The mean survival time for patients aged ≤60 years was 60.0 months, while for those older than 60, it was 57.4 months, with no significant difference. Patients treated with both Zoladex and Casodex had a mean survival of 58.75 months, whereas those treated only with Casodex had a significantly lower mean survival of 23.50 months. Radiotherapy showed no significant impact on survival as shown in table 4.

Table 4: Correlation between overall survival and age, treatment, stages and Gleason score among the studied prostate cancer patients

		Overall survival			P value
		Mean survival (months)			
		Estimate	95% CI		
Age	**Age ≤60 years**	60.0	60.0	60.0	0.492
	Age >60 years	57.4	53.9	60.9	
Hormonal treatment	**Zoladex and Casodex**	58.75	55.36	62.14	**0.001**
	Casodex	23.50	0.00	49.14	
Radical radiotherapy	**No**	59.07	52.68	65.46	0.193
	Yes	60.0	60.0	60.0	
Stage	**T1**	35.0	35.0	35.0	0.484
	T2	60.0	60.0	60.0	
	T3	39.0	39.0	39.0	
	T4	59.91	49.695	59.124	
Gleason score	**7**	56.7	47.96	65.4	0.426
	8	60.0	60.0	60.0	
	9	49.0	43.49	54.6	
	10	60.0	60.0	60.0	

Overall survival rates were 100% at 6 months and 1 year, 95.5% at 2 years, 88.9% at 3 years, and 66.7% at 5 years, with a mean survival of 57.7 months. Cancer stage significantly affected survival, with T2 and T4 stages showing higher mean survival times of 60.0 and 59.91 months, respectively, compared to T1 and T3 stages. Gleason scores did not significantly impact overall survival, though scores of 7, 8, and 10 showed higher mean survival times compared to score 9 as shown in table 5.

Table 5: Effects of different factors on the overall survival.

		OS %					Mean/Month			
Factors	**N**	**6 m.**	**1 yr.**	**2 yrs.**	**3 yrs.**	**5 yrs.**		**(95% CI)**		**p value**
All	49	100	100	95.5	88.9	66.7	57.702	53.901	61.50	NA
Age										
≤60	5	100	100	100	100	100	60.0	60.0	-60.0	0.492
>60	44	100	100	100	94.7	66.7%	57.4	53.9	-60.9	
Smoking										
No	25	100	100	100	100	100	50.12	46.51	-53.73	0.989
Yes	24	100	100	100	100	100	57.69	51.55	-63.84	
HTN										
No	41	100	100	100	100	100	58.66	56.06	61.26	0.056
Yes	8	100	100	100	95.5	88.9	52.5	34.5	-70.5	
DM										
No	38	100	100	100	100	100	60	60	-60	0.711
Yes	11	100	100	100	95.5	88.9	50.5	36.05	-64.85	
Hormonal treatment										
Zoladex and Casodex	47	100	100	100	95.5	88.9	58.75	55.36	-62.14	**0.004**
Casodex	2	100	100	100	100	100	23.50	.00	-49.14	
Radical radiotherapy										
No	30	100	100	100	95.5	100	59.07	52.68	-65.46	0.193
Yes	19	100	100	100	100	88.9	60.0	60.0	-60.0	
Stage										
T1	2	100	100	100	100	100	35.0	35.0	-35.0	0.484
T2	28	100	100	100	95.5	100	60.0	60.0	-60.0	
T3	8	100	100	100	100	88.9	39.0	39.0	-39.0	
T4	11	100	100	100	100	100	59.91	49.695	-59.124	
Gleason score										
7	19	100	100	100	100	100	56.7	47.96	-65.4	0.484
8	13	100	100	100	100	88.9	60.0	60.0	-60.0	
9	16	100	100	100	95.5	100	49.0	43.49	-54.6	
10	1	100	100	100	100	100	60.0	60.0	-60.0	

NA: not applicable, CI: Confidence Interval

Biochemical progression-free survival (BPFS) rates mirrored overall survival trends, with 100% at 6 months and 1 year, 95.5% at 2 years, 88.9% at 3 years, and 66.7% at 5 years, with a mean BPFS of 23.12 months. Significant factors affecting BPFS included cancer stage and Gleason scores, with lower scores indicating better outcomes as shown in table 6.

Table 6: Effects of different factors on the BPFS.

		BFS %					Mean/Month			
Factors	**N**	**6 m.**	**1 yr.**	**2 yrs.**	**3 yrs.**	**5 yrs.**		**(95% CI)**		**p value**
All	49	100	100	95.5	88.9	66.7	23.12	12.0	-32.0	NA
Age										
≤60	5	100	100	100	100	100	26.33	8.65	-24.0	0.797
>60	44	100	100	100	94.7	66.7%	22.33	15.94	-24.0	
Smoking										
No	25	100	100	100	100	100	20.58	13.25	-27.92	0.349
Yes	24	100	100	100	100	100	26.0	16.71	-35.29	
HTN										
No	41	NA	100	100	100	100	NA	NA	NA	0.056
Yes	8	100	100	100	95.5	88.9	NA	NA	NA	
DM										
No	38	100	100	100	100	100	22.92	16.70	-29.14	0.978
Yes	11	100	100	100	95.5	88.9	24.0	4.37	-43.63	
Hormonal treatment										
Zoladex and Casodex	47	100	100	100	95.5	88.9	23.117	17.18	-29.05	**NA**
Casodex	2	100	100	100	100	100	NA	NA	NA	
Radical radiotherapy										
No	30	100	100	100	95.5	100	20.63	11.84	-29.42	0.366
Yes	19	100	100	100	100	88.9	26.29	18.11	-34.47	
Stage										
T1	2	100	100	100	100	100	NA	NA	NA	**0.022**
T2	28	100	100	100	95.5	100	25.62	17.39	-33.85	
T3	8	100	100	100	100	88.9	24.2	14.14	-34.26	
T4	11	100	100	100	100	100	9.0	3.12	-14.88	
Gleason score										
7	19	100	100	100	100	100	25.2	6.41	-37.77	**0.012**
8	13	100	100	100	100	88.9	10.0	6.08	-13.92	
9	16	100	100	100	95.5	100	26.5	19.25	-33.75	
10	1	100	100	100	100	100	NA	NA	NA	

NA: not applicable, CI: Confidence Interval.

DISCUSSION

Prostate cancer is a significant health concern affecting men worldwide. It is the most common cancer in men, with varying treatment outcomes depending on factors such as disease stage, patient characteristics, and treatment approach. Advances in medical knowledge and technology have led to improved diagnostic techniques and treatment options for prostate cancer. These include radical prostatectomy (surgical removal of the prostate gland), radiation therapy, hormonal therapy, and active surveillance. However, the relative effectiveness and long-term outcomes of these treatments remain areas of active research and clinical debate [8].

The primary aim of this study was to evaluate the prognosis and survival rates of prostate cancer patients treated at Sohag University Hospital. This retrospective study included 49 patients diagnosed with prostate cancer and referred to the Oncology Department between January 2017 and January 2021. Our findings provide a comprehensive overview of patient demographics, disease characteristics, treatment modalities, and outcomes, contextualized within the broader literature.

The mean age at diagnosis in our cohort was 70.51 ± 8.40 years, with a range from 49 to 88 years. The majority (89.8%) were over 60 years old, and 67.3% resided in rural areas. These demographics align closely with those reported by **Wallis *et al.*[9]** who found a median age of 64 years (IQR 59-69) in their study on treatment approaches and outcomes in localized prostate cancer. Similarly, **Ozyigit *et al.*[10]** reported a median age range of 68 years (41–88), and **Amini *et al.*[11]** noted that 49.3% of patients were over 70 years, with 45.8% between 56-70 years. These findings underscore the generalizability of our age-related findings across different geographical and clinical settings.

Our study revealed that 53.1% of patients were diagnosed with high-risk locally advanced prostate cancer, 42.9% had metastatic disease to bone, and 4.1% had intermediate-risk cancer. These results are consistent with those of **Ozyigit *et al.*[10]**, who reported that 17.1% of patients had local, locoregional, or distant relapse and 12.0% had distant metastases. **Yahaya *et al.*[12]** observed that 40.5% of patients had lymph node involvement and metastasis to distant organs, with 22.3% involving distant organs other than lymph nodes, corroborating our findings on the spread of the disease at diagnosis.

In terms of clinical staging, T2 was the most commonly observed stage (57.1%), followed by T4 (22.4%), T3 (16.3%), and T1 (4.1%). The mean Gleason score was 7.98 ± 0.90, with a primary score of 4.23 ± 0.63 and a secondary score of 3.77 ± 0.63. These values are comparable to those reported by **Ozyigit *et al.*[10]** and diverge from **Wallis *et al.*[9]**, who found that T1 was reported in 76% of their patients and T2 in 24%, with Gleason scores of ≤6 in 52%, 3+4 in 28%, and 8-10 in 10% of patients. This discrepancy may be attributed to differences in patient selection and diagnostic criteria between studies.

Our treatment data indicated that 75.9% of patients received androgen deprivation therapy (ADT), with a mean treatment duration of 23.65 ± 11.7 months. This is in line with the findings of **Wallis *et al.*[9]**, where 87% of patients received ADT, and **Ozyigit *et al.*[10]**, who reported that 27.9% of patients received ADT for less than 2 years and 72.1% for more than or equal to 2 years, with a median duration of 24 months (range 2-72 months). The use of radiotherapy was less common, with only 38.8% receiving definitive radiotherapy, similar to patterns observed in the literature [10,11].

Regarding outcomes, 28.6% of patients experienced a rise in PSA levels, and 6.1% died from cancer. The overall survival (OS) rate was 93.9% at the study's end, with a mean OS of 57.7 months. Our results are consistent with **Ozyigit *et al.*[10]**, who reported that 82.4% of patients were alive at the end of their study, and **Yahaya *et al.*[12]**, who found a 3-year OS rate of 67.6%. Notably, our study did not find significant differences in OS related to age or treatment modalities, aligning with **Ozyigit *et al.*[10]** but contrasting with **Kim *et al.*[13]** who reported age as a significant predictor of OS.

CONCLUSION

A significant number of patients were diagnosed with high-risk and metastatic prostate cancer, reflecting the severity of the cases. The treatments varied, with most patients receiving androgen deprivation therapy and a considerable number undergoing radiotherapy. The overall survival rate was relatively high, with no significant differences observed across various subgroups such as age, T stage, Gleason score, and receipt of radical radiotherapy. However, the duration of hormonal treatment significantly influenced overall survival.

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