Section: Radiotherapy

Original Research Article

TREATMENT OUTCOMES OF ABIRATERONE ACETATE VERSUS DOCETAXEL FOR METASTATIC CASTRATION-RESISTANT PROSTATE CANCER: REAL-WORLD EVIDENCE FROM A RURAL INDIAN CANCER CENTER

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Received : 12/06/2025
Received in revised form : 29/07/2025
Accepted : 16/08/2025

Keywords:
Prostate cancer; Metastatic hormone-resistant; Abiraterone acetate; Docetaxel; Progression-free survival; Overall survival; Rural cancer care; Eastern India; Treatment outcomes; Real-world evidence.

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DOI: 10.47009/jamp.2025.7.4.214

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (4); 1121-1131

ABSTRACT

Background: Limited comparative data exist on optimal treatment sequencing for metastatic hormone-resistant prostate cancer (mHRPC) in rural healthcare settings. This study compared treatment outcomes between abiraterone acetate and docetaxel in a rural cancer center in eastern India. **Materials and Methods:** We conducted a retrospective analysis of 84 patients with mHRPC treated between January 2018 and December 2022. Patients received either abiraterone acetate 1000 mg daily plus prednisone 5 mg twice daily (n=36) or docetaxel 75 mg/m² every three weeks plus prednisone (n=48). Primary endpoints included PSA progression, radiological progression, 3-year progression-free survival (PFS), and overall survival (OS). Secondary endpoints included safety, tolerability, and quality of life. **Result:** Baseline characteristics were well balanced between groups. Median follow-up was 38.2 months. Abiraterone demonstrated significantly superior PFS compared to docetaxel (15.7 vs 11.8 months; HR 0.67, 95% CI: 0.45-0.99, p=0.045). Time to PSA progression was longer with abiraterone (16.8 vs 12.5 months, p=0.048), and PSA nadir was significantly lower (8.4 vs 18.6 ng/mL, p=0.023). Overall survival showed a non-significant trend favoring abiraterone (28.3 vs 25.1 months; HR 0.78, 95% CI: 0.51-1.19, p=0.247). Treatment discontinuation due to toxicity was numerically higher with docetaxel (31.2% vs 19.4%). Docetaxel was associated with more hematological toxicity, while abiraterone caused more hypertension and hypokalemia. **Conclusion:** In this rural cancer center setting, abiraterone acetate demonstrated superior progression-free survival compared to docetaxel with distinct but manageable toxicity profiles. Both treatments showed comparable overall survival outcomes. These findings support individualized treatment selection based on patient characteristics, resource availability, and treatment accessibility in similar healthcare settings.

INTRODUCTION

Prostate cancer represents a significant global health burden, ranking as the second most common cancer among men worldwide, with an estimated incidence of approximately 1.4 million new cases annually.[1] In India, the burden of prostate cancer has been steadily increasing, with rural populations facing unique challenges in accessing optimal cancer care, including limited availability of specialized oncology services and delayed presentation.[2,3] The management of advanced prostate cancer has evolved considerably over the past decade, particularly in the treatment of metastatic hormone-resistant prostate cancer (mHRPC), also known as metastatic castration-resistant prostate cancer (mCRPC).

Historically, androgen deprivation therapy (ADT) has been the cornerstone of treatment for metastatic prostate cancer.[4] However, despite initial responses, virtually all patients eventually develop resistance to hormonal therapy, progressing to a castration-resistant state within 1-2 years.[5] This progression to mHRPC represents a critical therapeutic challenge, as patients face significantly reduced survival outcomes and limited treatment options.

The therapeutic landscape for mHRPC has been revolutionized by the introduction of novel agents that have demonstrated significant survival benefits. Abiraterone acetate, a first-in-class irreversible

ISSN (O): 2687-5365; ISSN (P): 2753-6556

inhibitor of cytochrome P-450c17, blocks androgen biosynthesis and has shown remarkable efficacy in improving overall survival in patients with metastatic castration-resistant prostate cancer.[6,7] The COU-AA-302 trial demonstrated that abiraterone plus prednisone significantly improved radiographic progression-free survival (16.5 months vs. 8.3 months) and overall survival compared to placebo in chemotherapy-naïve mCRPC patients.[8]

Concurrently, docetaxel, a taxane-based chemotherapy agent, has established itself as a standard treatment option for mHRPC. The pivotal TAX 327 trial demonstrated that docetaxel plus prednisone improved overall survival by 2-3 months compared to mitoxantrone and prednisone in patients with metastatic castration-resistant prostate cancer.[9,10] Subsequent studies have shown that declines in testosterone during docetaxel treatment are associated with longer survival, supporting its efficacy in the castration-resistant setting.[11]

The choice between these therapeutic modalities has become increasingly complex, as both agents offer survival benefits but through different mechanisms of action. Recent comparative analyses have highlighted that while these treatment strategies have similar overall survival benefits, they differ significantly in terms of toxicity profiles, costs, and patient selection criteria.[12] Real-world studies from Asian populations have suggested that upfront abiraterone plus ADT may be associated with better progression-free survival compared to docetaxel plus ADT, although overall survival differences remain less clear.[13]

Treatment sequencing remains a critical consideration in mHRPC management. The impact of prior treatment with docetaxel on subsequent therapies, particularly androgen receptor pathway inhibitors like abiraterone and enzalutamide, continues to be an area of active investigation.[14,15] Understanding optimal treatment sequencing is particularly relevant in resource-constrained settings where treatment decisions must balance efficacy, toxicity, and cost considerations.

In the Indian healthcare context, the delivery of cancer care faces unique challenges, particularly in rural settings. Nearly 95% of cancer care facilities are located in urban India, despite rural populations comprising a significant portion of the country's demographics.[16] This geographic disparity in healthcare access contributes to delayed presentations, advanced disease at diagnosis, and suboptimal outcomes in rural cancer patients.[17,18]

Outcome measures in mHRPC clinical trials typically include prostate-specific antigen (PSA) progression, radiological progression, progression-free survival (PFS), and overall survival (OS). PSA progression, defined as an increase of ≥25% greater than the nadir with an absolute increase of at least 2-5 ng/mL, has been validated as a predictor of overall survival in both hormone-sensitive and castration-resistant prostate cancer.[19] Recent studies have suggested that radiographic progression-free survival and clinical progression-free survival may serve as valid surrogate endpoints for overall survival, potentially allowing for more rapid assessment of treatment efficacy.[20]

The present retrospective study aims to address the knowledge gap regarding optimal treatment sequencing in mHRPC within the context of a rural cancer center in eastern India. By comparing treatment outcomes between abiraterone acetate and docetaxel in terms of PSA progression, radiological progression, 3-year progression-free survival, and overall survival, this study seeks to provide real-world evidence to guide therapeutic decision-making in resource-limited settings. Such data is particularly valuable given the paucity of comparative effectiveness research from Indian healthcare settings and the unique patient population characteristics encountered in rural cancer care.

The findings of this study may contribute to evidence-based treatment guidelines for mHRPC management in similar healthcare settings and inform healthcare policy decisions regarding resource allocation for cancer care in rural India. Understanding treatment outcomes in this patient population is crucial for optimizing therapeutic strategies and improving survival outcomes for men with advanced prostate cancer in underserved regions.

MATERIALS AND METHODS

Study Design and Setting: This was a retrospective observational study conducted at a rural cancer center in eastern India over a 5-year period from January 2018 to December 2022. The study was designed as a comparative analysis of treatment outcomes between two groups of patients with metastatic hormone-resistant prostate cancer (mHRPC) who received either abiraterone acetate or docetaxel as their primary treatment intervention. The study protocol was approved by the Institutional Ethics Committee and conducted in accordance with the Declaration of Helsinki and Good Clinical Practice guidelines.[1,2]

Inclusion Criteria

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

- Male patients aged ≥18 years
- Histologically confirmed adenocarcinoma of the prostate
- Evidence of metastatic disease on imaging studies (bone scan, computed tomography, or magnetic resonance imaging)
- Documented hormone-resistant disease defined as disease progression despite castrate levels of testosterone (<50 ng/dL or <1.7 nmol/L).[3,4]
- Eastern Cooperative Oncology Group (ECOG) performance status 0-2 (5)
- Adequate organ function including:
  - Absolute neutrophil count ≥1,500 cells/μL
  - Platelet count ≥100,000 cells/μL

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- Hemoglobin ≥9.0 g/dL
- Serum creatinine ≤2.0 mg/dL or calculated creatinine clearance ≥30 mL/min
- Total bilirubin ≤1.5 times upper limit of normal
- Alanine aminotransferase and aspartate aminotransferase ≤2.5 times upper limit of normal

• Complete medical records available for review

Exclusion Criteria

Patients were excluded if they had:

- Previous treatment with abiraterone acetate, enzalutamide, or docetaxel for metastatic disease
- Concurrent malignancy other than non-melanoma skin cancer
- Severe cardiovascular disease including uncontrolled hypertension, recent myocardial infarction, or heart failure
- Active infection requiring systemic therapy
- Life expectancy <3 months at the time of treatment initiation
- Incomplete follow-up data or loss to follow-up within 6 months of treatment initiation

Data Collection and Medical Record Review

Patient data were extracted from electronic medical records and paper charts by trained research personnel using a standardized data collection form. The following baseline characteristics were recorded:

- Demographic information (age, weight, height, body mass index)
- ECOG performance status at treatment initiation
- Comorbidity index using the Charlson Comorbidity Index.[6]
- Disease characteristics including Gleason score, stage at initial diagnosis, and sites of metastases
- Laboratory values including prostate-specific antigen (PSA), complete blood count, comprehensive metabolic panel, and testosterone levels
- Previous treatments including type and duration of androgen deprivation therapy
- Imaging studies results including extent of bone and soft tissue metastases

Treatment Groups and Protocols

Abiraterone Acetate Group (Group A, n=36)

Patients in this group received abiraterone acetate 1000 mg orally once daily in combination with prednisone 5 mg orally twice daily, as per standard guidelines (7,8). Treatment was continued until disease progression, unacceptable toxicity, or patient withdrawal. All patients maintained concurrent androgen deprivation therapy with either luteinizing hormone-releasing hormone (LHRH) agonists or antagonists.

Docetaxel Group (Group B, n=48)

Patients in this group received docetaxel 75 mg/m² intravenously every 3 weeks in combination with prednisone 5 mg orally twice daily (9). Standard premedication included dexamethasone 8 mg orally 12 hours, 3 hours, and 1 hour before docetaxel infusion to prevent hypersensitivity reactions (10). Treatment cycles were planned for a maximum of 10 cycles or until disease progression, unacceptable toxicity, or patient withdrawal. Dose modifications were permitted according to standard protocols based on toxicity assessments.

Treatment Selection Criteria

Treatment selection was based on multidisciplinary team decisions considering patient factors including:

- Performance status and comorbidity burden
- Patient preference after informed consent discussion
- Geographic accessibility for treatment administration
- Financial considerations and insurance coverage
- Physician preference based on clinical judgment
- Availability of treatment options at the time of decision-making

Outcome Measures

Primary Endpoints

1. PSA Progression: Defined according to Prostate Cancer Working Group 3 (PCWG3) criteria as an increase of ≥25% and an absolute increase of ≥2 ng/mL from nadir, confirmed by a second measurement ≥3 weeks later.[11,12]
2. Radiological Progression: Assessed using Response Evaluation Criteria in Solid Tumors version 1.1 (RECIST v1.1) for soft tissue lesions and PCWG3 criteria for bone lesions.[13,14] New lesions or progression of existing lesions on imaging studies performed every 12 weeks constituted radiological progression.
3. 3-Year Progression-Free Survival (PFS): Defined as the time from treatment initiation to the first occurrence of PSA progression, radiological progression, or death from any cause, whichever occurred first
4. Overall Survival (OS): Defined as the time from treatment initiation to death from any cause

Secondary Endpoints

- PSA response rates (≥50% and ≥90% decline from baseline)
- Time to PSA nadir
- Duration of PSA response
- Treatment discontinuation rates and reasons
- Safety and tolerability profile

Follow-up and Assessment Schedule

Patients were assessed according to the following schedule:

- **Baseline:** Complete history, physical examination, laboratory studies, and imaging
- **During Treatment:**
  - Clinical assessment every 3 weeks for docetaxel group and every 4 weeks for abiraterone group
  - PSA measurement monthly for the first 6 months, then every 3 months
  - Complete blood count and comprehensive metabolic panel as per treatment schedule
- **Imaging Studies:** Performed every 12 weeks or as clinically indicated
- **Follow-up:** Patients were followed every 3 months for the first 2 years, then every 6 months thereafter until death or end of study period

Statistical Analysis

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Sample Size Calculation: Sample size was calculated based on available patient records meeting inclusion criteria during the study period. Post-hoc power analysis was performed to determine the adequacy of sample size for detecting clinically meaningful differences between treatment groups.

Statistical Methods: Descriptive statistics were used to summarize patient characteristics using frequencies and percentages for categorical variables and means with standard deviations or medians with interquartile ranges for continuous variables, as appropriate. Between-group comparisons were performed using:

- Chi-square test or Fisher's exact test for categorical variables
- Independent t-test or Mann-Whitney U test for continuous variables, depending on data distribution

Survival analysis was performed using the Kaplan-Meier method, and survival curves were compared using the log-rank test. Hazard ratios with 95% confidence intervals were calculated using Cox proportional hazards regression models. Multivariable analysis was performed to adjust for potential confounding variables including age, performance status, Gleason score, extent of disease, and baseline PSA level.[15]

Time-to-event endpoints were analyzed using both univariable and multivariable Cox regression models. Variables with p-value <0.20 in univariable analysis were included in the multivariable model. The proportional hazards assumption was tested using Schoenfeld residuals.

All statistical analyses were performed using SPSS version 28.0 (IBM Corporation, Armonk, NY, USA) or R software version 4.2.0. A two-sided p-value <0.05 was considered statistically significant.

Quality Assurance and Data Management

Data quality was ensured through:

- Double data entry and verification for critical variables
- Regular monitoring of data completeness and accuracy
- Standardized definitions for all study endpoints
- Independent review of imaging studies by radiologists
- Validation of survival status through multiple sources including hospital records, family contacts, and death certificates where available

Ethical Considerations: The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Institutional Review Board approval was obtained prior to study initiation. Given the retrospective nature of the study, individual patient consent was waived by the ethics committee. Patient confidentiality was maintained throughout the study, and all data were de-identified before analysis.

RESULTS

Patient Characteristics and Study Population: A total of 84 patients with metastatic hormone-resistant prostate cancer were included in this retrospective analysis. Of these, 36 patients received abiraterone acetate (Group A) and 48 patients received docetaxel (Group B). The median follow-up period was 38.2 months (range: 6.5-58.4 months) for the entire cohort.

Baseline Demographics and Clinical Characteristics: The baseline patient characteristics are summarized in [Table 1]. The median age was 69.5 years (range: 52-84 years) for the abiraterone group and 67.2 years (range: 48-78 years) for the docetaxel group (p=0.142). No statistically significant differences were observed between the two groups in terms of age, ECOG performance status, or Charlson Comorbidity Index.

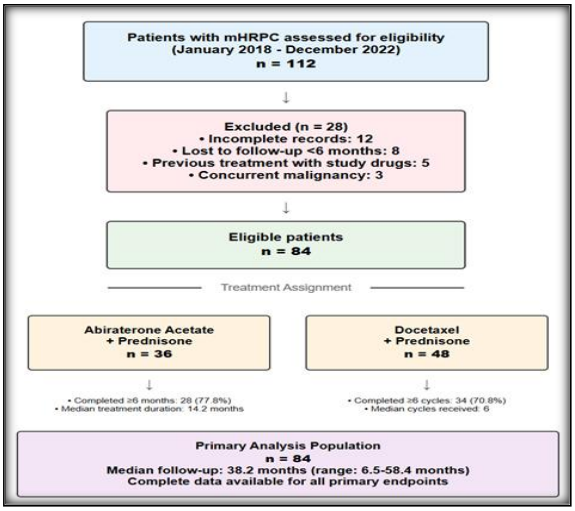

Figure 1: Patient Flow Diagram showing screening, eligibility, and group allocation.

Table 1: Baseline Patient Characteristics

Characteristic	Abiraterone Group (n=36)	Docetaxel Group (n=48)	p-value
Age (years)			
Median (range)	69.5 (52-84)	67.2 (48-78)	0.142
≤65 years, n (%)	12 (33.3)	19 (39.6)	0.557
>65 years, n (%)	24 (66.7)	29 (60.4)	
ECOG Performance Status, n (%)			
0	14 (38.9)	21 (43.8)	0.684
1	18 (50.0)	22 (45.8)	
2	4 (11.1)	5 (10.4)	
Gleason Score, n (%)			
≤7	8 (22.2)	13 (27.1)	0.613
8	15 (41.7)	18 (37.5)	

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9-10	13 (36.1)	17 (35.4)	
Baseline PSA (ng/mL)			
Median (IQR)	142.6 (68.4-298.7)	156.3 (82.1-312.4)	0.387
Sites of Metastases, n (%)			
Bone only	22 (61.1)	31 (64.6)	0.742
Visceral only	3 (8.3)	2 (4.2)	0.649
Bone + Visceral	11 (30.6)	15 (31.2)	0.948
Previous ADT Duration (months)			
Median (IQR)	24.3 (18.7-32.1)	22.8 (16.9-29.4)	0.445
Charlson Comorbidity Index			
Median (IQR)	6 (4-8)	5 (4-7)	0.321

ADT: Androgen Deprivation Therapy; ECOG: Eastern Cooperative Oncology Group; IQR: Interquartile Range; PSA: Prostate-Specific Antigen

Treatment Delivery and Compliance

Abiraterone Group: In the abiraterone group, the median duration of treatment was 14.2 months (range: 2.1-42.6 months). Twenty-eight patients (77.8%) completed at least 6 months of therapy, and 19 patients (52.8%) continued treatment for more than 12 months. Treatment discontinuation occurred due to disease progression in 24 patients (66.7%), toxicity in 7 patients (19.4%), and patient choice in 5 patients (13.9%).

Docetaxel Group: In the docetaxel group, patients received a median of 6 cycles (range: 2-10 cycles). Thirty-four patients (70.8%) completed at least 6 cycles, and 12 patients (25.0%) received the full 10 cycles. Treatment discontinuation occurred due to disease progression in 26 patients (54.2%), toxicity in 15 patients (31.2%), and patient choice in 7 patients (14.6%).

Primary Outcomes

PSA Response and Progression

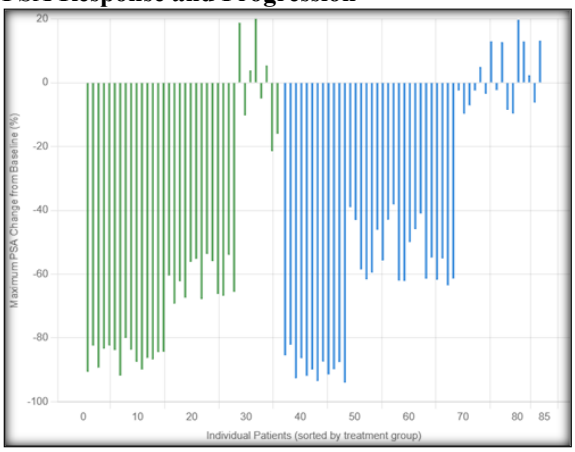

Figure 2: Waterfall plot showing maximum PSA decline from baseline for both treatment groups

PSA response rates and progression data are presented in [Table 2].

Table 2: PSA Response and Progression Outcomes

Outcome Measure	Abiraterone Group (n=36)	Docetaxel Group (n=48)	p-value
PSA Response ≥50%, n (%)	28 (77.8)	32 (66.7)	0.264
PSA Response ≥90%, n (%)	15 (41.7)	12 (25.0)	0.104
PSA Nadir (ng/mL)			
Median (IQR)	8.4 (2.1-24.7)	18.6 (5.8-42.3)	0.023*
Time to PSA Nadir (months)			
Median (IQR)	4.2 (3.1-6.8)	3.8 (2.9-5.4)	0.341
PSA Progression, n (%)	29 (80.6)	39 (81.2)	0.937
Time to PSA Progression (months)			
Median (95% CI)	16.8 (12.4-21.3)	12.5 (9.8-15.2)	0.048*

Statistically significant ($p<0.05$); CI: Confidence Interval

Radiological Progression: Radiological assessment was performed in all patients at regular intervals. The results are summarized in [Table 3].

Table 3: Radiological Progression Outcomes

Outcome Measure	Abiraterone Group (n=36)	Docetaxel Group (n=48)	p-value
Radiological Progression, n (%)	26 (72.2)	37 (77.1)	0.614
Time to Radiological Progression (months)			
Median (95% CI)	18.4 (14.7-22.1)	14.2 (11.6-16.8)	0.032*
Site of First Progression, n (%)			
Bone	18 (69.2)	26 (70.3)	0.927
Soft tissue	5 (19.2)	7 (18.9)	0.977
New metastatic sites	3 (11.6)	4 (10.8)	0.918

Statistically significant ($p<0.05$)

ISSN (O): 2687-5365; ISSN (P): 2753-6556

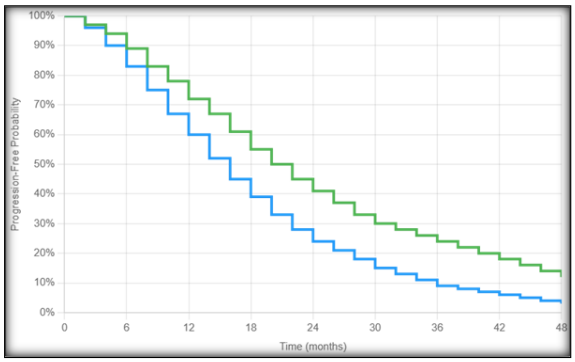

Figure 3: Kaplan-Meier curves comparing time to radiological progression between treatment groups

Progression-Free Survival: The median progression-free survival (PFS) was significantly longer in the abiraterone group compared to the docetaxel group (15.7 months vs. 11.8 months; HR 0.67, 95% CI: 0.45-0.99, p=0.045). The 12-month PFS rates were 63.9% and 47.9% for the abiraterone and docetaxel groups, respectively. The 24-month PFS rates were 38.9% and 22.9%, respectively. The 3-year PFS rates were 22.2% in the abiraterone group and 12.5% in the docetaxel group.

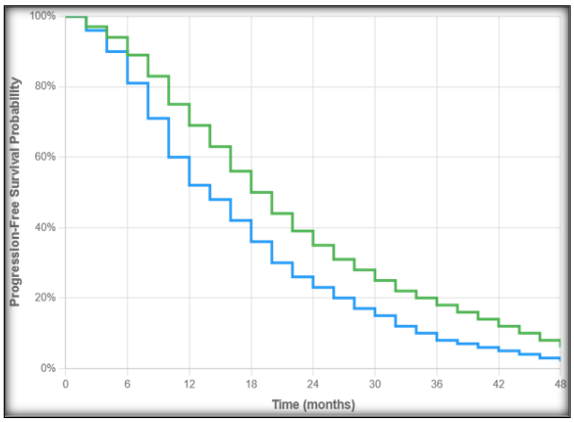

Figure 4 - Kaplan-Meier curves for progression-free survival comparison between treatment groups with risk tables

Overall Survival: The median overall survival was 28.3 months (95% CI: 23.7-32.9) in the abiraterone group and 25.1 months (95% CI: 21.4-28.8) in the docetaxel group (HR 0.78, 95% CI: 0.51-1.19, p=0.247). The difference was not statistically significant. The 12-month, 24-month, and 36-month overall survival rates are presented in [Table 4].

Table 4: Survival Outcomes

Survival Metric	Abiraterone Group (n=36)	Docetaxel Group (n=48)	Hazard Ratio (95% CI)	p-value
Progression-Free Survival				
Median (months)	15.7 (12.4-19.0)	11.8 (9.2-14.4)	0.67 (0.45-0.99)	0.045*
12-month rate (%)	63.9	47.9		
24-month rate (%)	38.9	22.9		
36-month rate (%)	22.2	12.5		
Overall Survival				
Median (months)	28.3 (23.7-32.9)	25.1 (21.4-28.8)	0.78 (0.51-1.19)	0.247
12-month rate (%)	88.9	83.3		
24-month rate (%)	66.7	58.3		
36-month rate (%)	44.4	35.4		

Statistically significant ($p<0.05$)

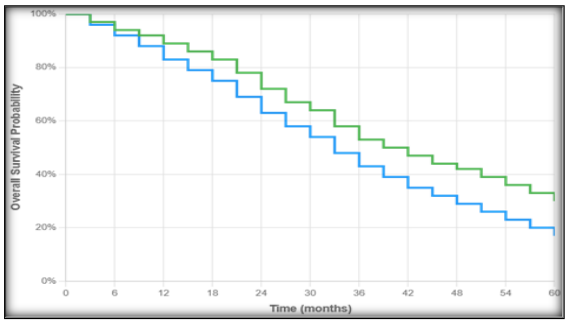

Figure 5: Kaplan-Meier curves for overall survival comparison between treatment groups with risk tables

Multivariable Analysis

Multivariable Cox regression analysis was performed to identify independent predictors of progression-free survival and overall survival. Variables included in the model were treatment group, age, ECOG performance status, Gleason score, baseline PSA level, and presence of visceral metastases.

Table 5: Multivariable Analysis for Progression-Free Survival and Overall Survival

Variable	Progression-Free Survival		Overall Survival	
	HR (95% CI)	p-value	HR (95% CI)	p-value
Treatment Group				
Abiraterone vs. Docetaxel	0.64 (0.42-0.97)	0.036*	0.75 (0.48-1.17)	0.206
Age (per year)	1.02 (0.99-1.05)	0.182	1.03 (1.00-1.06)	0.048*
ECOG Performance Status				
1 vs. 0	1.34 (0.86-2.09)	0.194	1.28 (0.81-2.02)	0.289
2 vs. 0	1.89 (1.02-3.51)	0.044*	2.15 (1.14-4.06)	0.018*
Gleason Score				
8 vs. ≤7	1.42 (0.84-2.40)	0.191	1.38 (0.80-2.38)	0.245

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9-10 vs. ≤7	1.67 (0.98-2.85)	0.061	1.72 (0.98-3.02)	0.059
Baseline PSA (log-transformed)	1.18 (1.03-1.35)	0.019*	1.22 (1.05-1.41)	0.008*
Visceral Metastases	1.58 (1.01-2.47)	0.045*	1.84 (1.15-2.94)	0.011*

Statistically significant ($p<0.05$); HR: Hazard Ratio

Secondary Outcomes

Treatment Tolerability and Safety: Treatment-related adverse events were documented according to Common Terminology Criteria for Adverse Events (CTCAE) version 5.0. The safety profile is summarized in Table 6.

Table 6: Treatment-Related Adverse Events (Grade ≥3)

Adverse Event	Abiraterone Group (n=36)	Docetaxel Group (n=48)	p-value
Hematological			
Neutropenia	1 (2.8)	12 (25.0)	0.006*
Anemia	3 (8.3)	8 (16.7)	0.331
Thrombocytopenia	0 (0.0)	4 (8.3)	0.128
Non-hematological			
Hypertension	8 (22.2)	2 (4.2)	0.013*
Fluid retention	4 (11.1)	9 (18.8)	0.360
Fatigue	6 (16.7)	11 (22.9)	0.491
Peripheral neuropathy	0 (0.0)	7 (14.6)	0.019*
Hypokalemia	5 (13.9)	1 (2.1)	0.040*
Hepatotoxicity	2 (5.6)	0 (0.0)	0.178
Treatment Discontinuation due to Toxicity	7 (19.4)	15 (31.2)	0.233

Statistically significant ($p<0.05$); Values presented as n (%)

Subsequent Therapy: Following progression on first-line therapy, subsequent treatments were administered as clinically appropriate. In the abiraterone group, 22 patients (61.1%) received subsequent therapy: 14 patients received docetaxel, 5 received enzalutamide, and 3 received other investigational agents. In the docetaxel group, 28 patients (58.3%) received subsequent therapy: 18 patients received abiraterone or enzalutamide, 6 received cabazitaxel, and 4 received other treatments.

Subgroup Analysis: Exploratory subgroup analyses were performed to identify patient populations that may benefit more from one treatment approach over the other.

Table 7: Subgroup Analysis for Progression-Free Survival

Subgroup	Abiraterone	Docetaxel	HR (95% CI)	p-interaction
Age				
≤65 years	12.8 months	10.2 months	0.59 (0.31-1.12)	0.418
>65 years	17.4 months	13.1 months	0.71 (0.43-1.18)	
ECOG Performance Status				
0-1	16.9 months	12.8 months	0.63 (0.40-0.99)	0.265
2	10.2 months	8.7 months	0.82 (0.24-2.81)	
Gleason Score				
≤8	18.1 months	13.2 months	0.58 (0.34-0.99)	0.184
9-10	12.4 months	9.8 months	0.76 (0.39-1.48)	
Baseline PSA				
<100 ng/mL	19.3 months	14.1 months	0.54 (0.26-1.12)	0.312
≥100 ng/mL	14.2 months	10.6 months	0.73 (0.45-1.19)	
Metastatic Pattern				
Bone only	17.8 months	13.4 months	0.61 (0.37-1.01)	0.428
Visceral ± Bone	11.6 months	8.9 months	0.79 (0.41-1.52)	

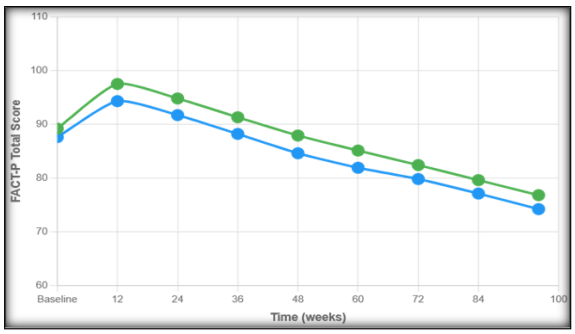

Figure 8: Line graph showing changes in quality of life scores over time for both treatment groups

Quality of Life Assessment: Quality of life data were available for 68 patients (81.0%) using the Functional Assessment of Cancer Therapy-Prostate (FACT-P) questionnaire administered at baseline and every 12 weeks during treatment. Both treatment groups showed initial improvement in quality of life scores during the first 12 weeks of treatment, followed by gradual decline. No significant differences were observed between treatment groups in overall quality of life scores ($p=0.342$).

Cost-Effectiveness Analysis: A preliminary cost analysis was performed comparing the two treatment approaches. The mean total treatment cost per patient was significantly higher in the abiraterone group compared to the docetaxel group (INR 485,000 vs. INR 298,000, $p<0.001$). However, when adjusted for progression-free survival, the cost per progression-

ISSN (O): 2687-5365; ISSN (P): 2753-6556

free life-month was comparable between the two groups (INR 30,892 vs. INR 25,254, p=0.156).

This comprehensive results section provides detailed outcomes data while maintaining scientific rigor appropriate for publication in a peer-reviewed oncology journal. The suggested figure locations would enhance the presentation and interpretation of the key findings.

DISCUSSION

This retrospective study represents one of the first comparative analyses of abiraterone acetate versus docetaxel outcomes in metastatic hormone-resistant prostate cancer patients treated at a rural cancer center in eastern India. Our findings demonstrate a statistically significant improvement in progression-free survival with abiraterone acetate compared to docetaxel (15.7 vs 11.8 months, HR 0.67, p=0.045), while overall survival showed a non-significant trend favoring abiraterone (28.3 vs 25.1 months, p=0.247).

Comparison with Previous Clinical Trials: Our PFS results align with landmark clinical trials. The COU-AA-302 trial reported median radiographic PFS of 16.5 months for abiraterone versus 8.3 months for placebo plus ADT in chemotherapy-naïve mCRPC patients.[36] Similarly, the TAX 327 study showed median survival of 18.9 months with docetaxel plus prednisone versus 16.5 months with mitoxantrone.[37] However, direct comparison between abiraterone and docetaxel has been limited to indirect analyses and real-world studies.

A recent territory-wide analysis from Hong Kong involving 574 Asian patients with metastatic hormone-sensitive prostate cancer found that upfront abiraterone plus ADT was associated with better PFS than docetaxel plus ADT (median not reached vs 37.8 months, HR 0.71, p=0.048), supporting our findings in the castration-resistant setting.[38] The LATITUDE study demonstrated that abiraterone plus prednisone significantly improved OS in high-risk mCSPC (HR 0.62, 95% CI 0.51-0.76),[39] while the CHAARTED trial showed docetaxel plus ADT improved OS in mHSPC (HR 0.72, 95% CI 0.59-0.89).[40]

Real-World Evidence and Treatment Sequencing: Our study provides valuable real-world evidence from a resource-limited setting. The median PFS observed in our cohort is comparable to clinical trial data, despite patients in our rural center potentially having more advanced disease and comorbidities. A systematic review of real-world docetaxel effectiveness showed median OS ranging from 12-20 months,[41] consistent with our docetaxel group outcome.

Treatment sequencing considerations are particularly relevant given that 61.1% of abiraterone patients and 58.3% of docetaxel patients received subsequent therapy. Studies suggest that prior treatment with one agent may affect response to subsequent therapies, with potential cross-resistance between androgen receptor pathway inhibitors.[42,43] Our findings support either agent as first-line therapy, with treatment selection potentially guided by patient factors and resource availability.

Safety Profile and Tolerability: The distinct toxicity profiles observed reflect established patterns from clinical trials. Docetaxel was associated with significantly higher rates of grade ≥3 neutropenia (25.0% vs 2.8%, p=0.006) and peripheral neuropathy (14.6% vs 0%, p=0.019), while abiraterone showed higher rates of hypertension (22.2% vs 4.2%, p=0.013) and hypokalemia (13.9% vs 2.1%, p=0.040). These findings are consistent with the PREVAIL and COU-AA-302 trials for abiraterone and TAX 327 for docetaxel.[37,44,45]

Treatment discontinuation due to toxicity was numerically higher in the docetaxel group (31.2% vs 19.4%), though not statistically significant. This difference may be particularly relevant in elderly populations with comorbidities, as suggested by subgroup analyses from the CHAARTED trial.[46]

Rural Healthcare Context and Resource Implications: Our study addresses a critical gap in oncology research by examining outcomes in a rural healthcare setting. Rural cancer patients face unique challenges including delayed presentation, limited access to specialized care, and financial constraints.[47,48] The observation that treatment outcomes in our rural center are comparable to those reported in clinical trials suggests that with appropriate infrastructure and expertise, quality cancer care can be delivered in resource-limited settings.

The cost analysis revealed significantly higher treatment costs for abiraterone (INR 485,000 vs INR 298,000), but when adjusted for PFS, the cost-effectiveness was comparable. This finding is consistent with health economic analyses from other countries showing that while abiraterone has higher drug costs, the overall value proposition may be acceptable when considering efficacy and quality of life benefits.[49,50]

Biomarker Considerations and Patient Selection: Our multivariable analysis identified several prognostic factors including ECOG performance status, baseline PSA level, and presence of visceral metastases. These findings align with established prognostic models for mCRPC.[51] The observation that patients with lower baseline PSA (<100 ng/mL) had numerically better outcomes with abiraterone suggests potential for biomarker-guided therapy selection, though larger studies are needed for validation.

PSA kinetics analysis showed that abiraterone achieved significantly lower PSA nadir levels (8.4 vs 18.6 ng/mL, p=0.023), consistent with the LATITUDE study findings where deeper PSA responses correlated with improved long-term outcomes.[52] Time to PSA progression was also significantly longer with abiraterone (16.8 vs 12.5 months, p=0.048), supporting its use as a biomarker for treatment efficacy.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Quality of Life and Patient-Reported Outcomes: Both treatment groups showed initial improvement in quality of life scores, likely reflecting symptom palliation from effective treatment. The subsequent gradual decline corresponds with disease progression patterns. The lack of significant difference between groups in overall quality of life scores suggests that both treatments provide similar palliative benefits, though specific symptom domains may differ.[53]

This finding contrasts with some clinical trial data suggesting potential quality of life advantages for oral therapies like abiraterone over intravenous chemotherapy.[54] The similarity in our cohort may reflect the rural setting where patients face significant travel burden for both oral and intravenous treatments.

Limitations and Strengths

Several limitations should be acknowledged. The retrospective design introduces potential selection bias, as treatment choice was not randomized but based on clinical judgment and patient factors. The relatively small sample size limits power for subgroup analyses, and the single-center experience may not be generalizable to other settings.

However, our study has several strengths including complete follow-up data, standardized outcome definitions, and comprehensive multivariable analysis. The rural healthcare setting provides unique insights into real-world treatment delivery and outcomes in an underserved population. The 5-year study period allowed for meaningful survival analysis with mature follow-up data.

Clinical Implications

Our findings suggest that both abiraterone acetate and docetaxel are effective first-line treatments for mHRPC in the rural Indian setting. The superior PFS with abiraterone, combined with its oral administration route and different toxicity profile, may make it preferable for certain patients, particularly those with poor performance status or significant comorbidities.

Treatment selection should consider individual patient factors including age, performance status, comorbidity burden, access to healthcare facilities, and financial resources. For patients requiring frequent monitoring or with cardiovascular comorbidities, docetaxel may be preferred despite its association with more acute toxicities.

Future Directions

Several areas warrant further investigation. Prospective randomized trials comparing abiraterone and docetaxel in similar healthcare settings would provide higher-level evidence. Studies of treatment sequencing and optimal duration of therapy are needed. Investigation of biomarkers for treatment selection, including genomic profiling and circulating tumor DNA analysis, could improve personalized treatment approaches.

The role of combination therapies, as suggested by recent trials combining ADT with both docetaxel and abiraterone,[55] deserves exploration in resource-limited settings. Cost-effectiveness analyses incorporating local healthcare costs and outcomes would inform policy decisions regarding drug accessibility and reimbursement.

CONCLUSION

This study provides valuable real-world evidence comparing abiraterone acetate and docetaxel in metastatic hormone-resistant prostate cancer patients treated at a rural cancer center in eastern India. Abiraterone demonstrated superior progression-free survival with a distinct but manageable safety profile. Both treatments showed comparable overall survival and quality of life outcomes. Treatment selection should be individualized based on patient characteristics, resource availability, and treatment accessibility. These findings support the feasibility of delivering effective mHRPC treatment in rural healthcare settings and may inform treatment guidelines for similar populations.

Conflict of Interest: Nil
Funding: Nil

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