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Patterns of Care and Treatment Outcomes in Multiple Myeloma: A Retrospective Observational Study

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ABSTRACT

Introduction: Multiple myeloma (MM) is a plasma cell neoplasm with heterogeneous clinical behaviour. Globally, the therapeutic landscape has evolved with the introduction of proteasome inhibitors, immunomodulatory drugs, and autologous stem cell transplant (ASCT), significantly prolonging survival. However, disparities in care access, particularly in rural and resource-constrained settings, hinder optimal outcomes. This study aimed to evaluate treatment patterns, hematologic responses, and survival outcomes in MM patients.

Methods: This was a retrospective single center observational study conducted at Government Medical College Anantnag. We reviewed clinical records of 64 MM patients treated between 2019 and 2024. Data on demographics, disease stage, treatment regimens, response to therapy, and survival were analysed.

Results: The cohort consisted of 42 males (65.6%) and 22 females (34.4%), with a median age of 63.3 and 57.3 years, respectively. Most patients (62.5%) presented with ISS Stage III disease. The most common first-line therapy was CYBORD (53.1%), followed by VRD (34.4%). ASCT was performed in only 15.6% of patients. Post-hematologic parameters demonstrated significant improvement, particularly in M-protein reduction and β2-microglobulin levels. The overall response rate (CR+PR) across regimens was 64.3%. Median overall survival (OS) was 18 months, and 3-year OS was approximately 68%. Eight patients (12.5%) were lost to follow-up.

Conclusion: Despite access limitations, patients achieved meaningful hematologic responses with standard regimens. The underutilization of ASCT and high follow-up attrition highlight critical structural gaps in rural oncology care. These findings underscore the need for systemic interventions to enhance long-term care and access to curative therapies in under-resourced settings.

Keywords: *Multiple myeloma; treatment patterns; autologous stem cell transplant; rural oncology; CYBORD; VRD; survival outcomes; kashmir.*

INTRODUCTION

Multiple myeloma accounts for approximately 10% of hematologic malignancies and 1% of all cancers globally (1). It is a complex and challenging hematologic malignancy that continues to pose a significant global health burden. Clinical manifestations include bone lesions, anaemia, renal failure, hypercalcemia, and monoclonal protein in the urine or serum. These manifestations not only complicate diagnosis but also have a profound impact on patient's quality of life and long-term outcomes.

The prognosis of MM has changed dramatically over the last 20 years due to developments in therapeutic approaches, such as the use of monoclonal antibodies, immunomodulatory medications, and proteasome inhibitors (PIs). The mainstay of consolidative therapy is still autologous stem cell transplantation (ASCT), especially in qualified individuals (2).

However, the benefits of these therapeutic breakthroughs are not universally accessible. There remains a stark contrast in outcomes between high-income countries and low- and middle-income countries. India presents a unique challenge due to high MM incidence, heterogeneous healthcare access, infrastructure limitations, and poor health literacy.

Understanding real-world treatment patterns and outcomes in MM is essential for identifying gaps in care and informing policy decisions aimed at improving equity and access. The study aimed to investigate the real-world patterns of MM treatment and clinical outcomes. We specifically evaluated the use of frontline regimens, the application of ASCT, and hematologic outcomes to identify potential barriers and guide policy-level improvements.

METHODS

Study Design and Patient Selection

This was a retrospective, single-center study conducted at Government Medical College, Anantnag, serving rural and semi-urban populations in the union territory of Jammu and Kashmir. We included all adult patients (≥18 years) diagnosed with symptomatic MM between January 2019 and December 2024 who had received at least one cycle of systemic therapy. Patients with incomplete records or smouldering/asymptomatic MM were excluded.

Data Collection

Data were extracted from electronic medical records and departmental registries using a structured proforma. Variables collected included demographics (age, sex, residence, smoking history), clinical stage (ISS), hematologic parameters (hemoglobin, serum calcium, creatinine, M-spike, β2-microglobulin), treatment details (first-line and subsequent regimens, use of radiotherapy, ASCT), and follow-up status. Hematologic parameters were recorded at baseline and post-treatment (after 6 cycles or last follow-up).

RESULTS

Baseline Characteristics

The cohort consisted of 64 patients diagnosed with multiple myeloma, with a median age of 60.3 years (range: 41–79 years). The mean age was 63.3 years in males and 57.3 years in females. The majority were male (42 patients, 65.6%), while females accounted for 34.4% (22 patients). Age-wise distribution revealed that 28 patients (43.8%) were in the 40–60 years' age group, comprising 12 males (42.9%) and 16 females (57.1%). The remaining 36 patients (56.2%) belonged to the 61–80 years' group, including 30 males (83.3%) and 6 females (16.7%) (Table 1).

Table 1: Patient Characteristics.

S.NO	Parameter		Male	Female	Total
1	Age	40-60	12 (42.9%)	16 (57.1%)	28 (100%)
		61-80	30 (83.3%)	6 (16.7%)	36 (100%)
		Mean	63.3	57.3	-
		Median	65	57.7	-
	Gender		42 (65.6%)	22 (34.4%)	64 (100%)
2	Smokers		7 (87.5%)	1 (12.5%)	8 (100%)
3	Family History		-	-	
4	Habitation	Rural	42(65.6%)	22(34.4%)	64 (100%)
		Urban	0	0	0
5	Stage	II	16 (66.7%)	8 (33.3%)	22 (100%)
		III	26 (65%)	14 (35%)	40 (100%)

All patients hailed from rural areas, with no representation from urban populations. Agriculture and manual labour were the most common occupations. A history of smoking was documented in 8 patients (12.5%), predominantly among males (7 out of 8). No patient reported a family history of hematologic malignancy.

At presentation, 40 patients (62.5%) had advanced disease (ISS Stage III), with 26 males (65%) and 14 females (35%), while 22 patients (37.5%) were diagnosed at Stage II, including 16 males (66.7%) and 8 females (33.3%) (Table 1). Bone pain and fatigue were the most commonly reported symptoms at diagnosis. Additionally, renal dysfunction was observed in 16 patients (25%), underlining the systemic nature of the disease at presentation.

Treatment Patterns

The most frequently used first-line regimen was CYBORD (bortezomib, cyclophosphamide, dexamethasone), administered to 34 patients (53.1%), followed by VRD (bortezomib, lenalidomide, dexamethasone) in 22 patients (34.4%). Eight patients (12.5%) received alternative regimens, typically lenalidomide plus dexamethasone, due to cost constraints or comorbidities (Table 2).

Table 2: Treatment Received.

Treatment Recieved		N(64)	%
Chemotherapy	CYBORD	34	53.12
	VRD	22	34.37
	OTHERS	8	12.5
Radiation		18	28.12
ASCT		10	15.62
Lost to Follow Up		8	12.5
Multiple Lines of Chemo		16	25

Eighteen patients (28.1%) received palliative radiotherapy for symptomatic lytic lesions or spinal cord compression. Only Ten patients (15.6%) proceeded to ASCT, largely due to financial or logistic limitations. Second-line treatment was administered to 25% of patients, most commonly in the form of lenalidomide/ Carfilzomib/ Pomalidomide based combinations (Table 2).

Hematologic Response

Post-treatment, significant improvements were observed in key hematologic markers. Mean hemoglobin increased from 9.03 g/dL to 10.02 g/dL. M-protein levels reduced from a mean of 3.19 g/dL to 0.2 g/dL in all available cases. Median β2-microglobulin dropped from 6,739 ng/mL to 3,361ng/ml (Table 3).

Table 3: Comparison of Key Biochemical Parameters Before and After Treatment

PARAMETER	PRE TREATMENT		POST TREATMENT	
	Average	*Median*	*Average*	*Median*
Hemoglobin	9.03 g/dl	8.8 g/dl	10.02 g/dl	10 g/dl
Creatinine	1.75mg/dl	1.15 mg/dl	1.69 mg/dl	1.54 mg/dl
Calcium	8.84 mg/dl	8.8 mg/dl	9.48 mg/dl	9.39 mg/dl
M-Spike	3.19g/dl	3.7 g/dl	0.2 g/dl	0.2 g/dl
B2-microglobulin	16988.43ng/ml	6739 ng/ml	5366.29 ng/ml	3361 ng/ml

Serum calcium and creatinine levels also showed normalization trends. These findings suggest a favourable biochemical response to first-line therapy, despite heterogeneity in regimen choice and adherence.

Table 4 summarizes response rates and survival outcomes for patients receiving CYBORD and VRD. Overall, both regimens demonstrated comparable response rates, with slightly better CR and survival rates seen with VRD. The overall response rate (CR+PR) was 64.3%, and 3-year OS and PFS were approximately 68% and 58%, respectively.

Table 4: Treatment Outcomes

Outcomes	CYBORD (n=34)	VRD (n=22)	Total
Overall Response Rate (CR+PR)	22 (64.7%)	14 (63.6%)	36 (64.3%)
Complete Remission (CR)	10 (29.4%)	8 (36.4%)	18 (32.1%)
Partial Remission (PR)	12 (35.3%)	6 (27.3%)	18 (32.1%)
Very Good Partial Response (VGPR)	8 (23.5%)	6 (27.3%)	14 (25.0%)
Stable Disease (SD)	2 (5.9%)	1 (4.5%)	3 (5.4%)
Progressive Disease (PD)	2 (5.9%)	1 (4.5%)	3 (5.4%)
Alive till last follow-up	20	15	35
Deaths till last follow-up	8	5	13
Lost to follow-up	6	2	8
3-year Overall Survival (OS)	~65%	~72%	~68%
3-year Progression-Free Survival (PFS)	~55%	~60%	~58%

DISCUSSION

This study provides a real-world snapshot of MM care in a resource-constrained setting. While treatment initiation and hematologic response were generally favourable, gaps in follow-up and access to ASCT emerged as major limiting factors. Despite these challenges, ASCT has been shown to be cost-effective and associated with a progression-free survival (PFS) benefit comparable to Western data (30–40 months) (3).

Underutilization of ASCT in our cohort (15.6%) mirrors broader Indian experience where ASCT access is limited by cost and logistics; a recent systematic review of Indian ASCT data highlighted persistent under-utilization despite demonstrated efficacy and acceptable safety in Indian centers (3). Our findings align with other LMIC-based studies from resource-limited settings, where bortezomib-based regimens are common but ASCT remains underutilized due to systemic barriers (4).

Hungria VTM, et al reported ASCT usage in ~33% of patients across Latin America, higher than our 15.6% (5). Financial barriers, geographic isolation, and infrastructure gaps likely contribute to this discrepancy. Moreover, high follow-up attrition limits accurate assessment of progression-free survival and long-term toxicity.

The preference for CYBORD over VRD reflects cost-sensitive decision-making, though both regimens yielded acceptable responses. Despite this, absence of novel agents like monoclonal antibodies limits second-line options.
Our study is limited by its small sample size. Nonetheless, it underscores the urgent need for policy reform to support rural oncology infrastructure, patient navigation systems, and insurance coverage for ASCT and novel therapies.

CONCLUSION

Patients with MM treated in rural India can achieve meaningful hematologic responses with standard regimens. However, systemic inequities — particularly in ASCT access and follow-up continuity — continue to undermine long-term outcomes. Strategic investment in rural cancer care delivery and equitable resource distribution is essential to bridge this survival gap.

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