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RESEARCH ARTICLE
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Clinical and Hematological Profile of Patients with Multiple Myeloma

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Abstract

Background: Multiple myeloma (MM) is a malignant plasma cell disorder characterized by bone marrow infiltration, production of monoclonal proteins and multi-organ involvement. Early identification of clinical and hematological patterns is critical for diagnosis and management, especially in resource-limited settings. **Methods:** This cross-sectional study was conducted in the Department of Haematology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka from July 2021 to June 2022. A total of 58 newly diagnosed multiple myeloma patients were enrolled over a one-year period. Diagnosis was based on International Myeloma Working Group (IMWG) criteria. Clinical presentations, hematological parameters, biochemical profiles and radiological findings were recorded and analyzed using SPSS version 22. **Results:** Most patients were aged ≥60 years (46.6%) and male (62.1%). Urban residents made up 56.9% of the cohort. The most common symptoms were bone pain (82.8%), anemia (69.0%) and fatigue (62.1%). The mean hemoglobin level was 8.9 ± 1.4 g/dL; anemia (Hb <10 g/dL) was present in 69.0%. Elevated ESR (mean 75 ± 20 mm/hr) and rouleaux formation (79.3%) were common. Biochemically, elevated serum creatinine (>1.5 mg/dL) was found in 37.9% and hypercalcemia in 34.5% of patients. Lytic bone lesions were observed in 75.9%, with monoclonal bands present in 89.7% and Bence Jones proteinuria in 31.0% of cases. **Conclusion:** Bone pain, anemia and renal impairment were the most frequent initial features of MM. Hematological and biochemical abnormalities aligned with classical disease patterns. Early recognition of these findings can aid timely diagnosis and appropriate intervention in clinical practice.

Keywords: Multiple myeloma, Clinical profile, Hematological parameters, Bone lesions.

INTRODUCTION

Multiple myeloma (MM) is a malignant plasma cell disorder characterized by clonal proliferation of plasma cells in the bone marrow, leading to the production of abnormal monoclonal immunoglobulins, bone destruction and multi-organ dysfunction [1]. It accounts for approximately 10% of all hematological malignancies and remains an incurable but treatable disease [2]. The clinical presentation of multiple myeloma varies widely, with patients often presenting with anemia, bone pain, renal insufficiency, hypercalcemia and susceptibility to infections [3]. These features reflect the underlying pathological mechanisms of the disease, including marrow infiltration, cytokine dysregulation and monoclonal protein production [4].

The diagnosis of MM relies on a combination of clinical, laboratory and radiological findings [3]. According to the International Myeloma Working Group (IMWG), the diagnosis is established by the presence of ≥10% clonal plasma cells in the bone marrow or a biopsy-proven plasmacytoma, along with evidence of end-organ damage—commonly referred to as the CRAB features: hyperCalcemia, Renal insufficiency, Anemia and Bone lesions [4]. Additional biomarkers such as the involved/uninvolved free light chain ratio and the presence of more than one focal lesion on MRI have also been incorporated into diagnostic criteria to facilitate earlier detection and risk stratification [5].

The clinical and hematological manifestations of MM can differ significantly depending on geographic, ethnic and socioeconomic factors. In many developing countries, including those in South Asia, patients often present at an advanced stage due to delayed diagnosis and limited access to specialized healthcare [6]. Moreover, variations in baseline hematological and biochemical profiles may influence both the presentation and prognosis of the disease [7]. For instance, the degree of anemia, renal function impairment and the extent of skeletal involvement are known to correlate with disease burden and outcomes [8].

Despite advances in the understanding of MM pathogenesis and the availability of newer therapeutic options such as proteasome inhibitors, immunomodulatory drugs and monoclonal antibodies, timely diagnosis and accurate clinical profiling remain essential [9]. In resource-limited settings, the initial evaluation based on basic clinical assessment, hematological parameters, serum protein electrophoresis and bone marrow examination continues to be the cornerstone for diagnosis and monitoring [10].

Understanding the local spectrum of clinical features and laboratory findings is crucial for improving early diagnosis, optimizing treatment and predicting prognosis. However, data on the clinical and hematological profile of MM patients in our population remain limited. Therefore, this study aimed to evaluate the presenting symptoms, hematological abnormalities and diagnostic features of patients with multiple myeloma in a tertiary care setting. This analysis is intended to support clinicians in recognizing common patterns of disease presentation and to provide baseline data that may help guide future research and health policy planning related to plasma cell dyscrasias.

METHODOLOGY & MATERIALS

This cross-sectional study was conducted in the Department of Haematology at Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, over a period of one year from July 2021 to June 2022. A total of 58 patients who were newly diagnosed with multiple myeloma during the study period were included based on predefined inclusion and exclusion criteria. Patients of all ages and both sexes who met the diagnostic criteria of multiple myeloma according to the International Myeloma Working Group (IMWG) were enrolled. Individuals with incomplete records or other hematological malignancies were excluded.

After obtaining informed written consent, relevant data were collected through face-to-face interviews, clinical examination, review of hospital records and laboratory reports. A structured data collection form was used to gather socio-demographic information, clinical symptoms and laboratory results. Hematological parameters such as hemoglobin concentration, total leukocyte count, platelet count, erythrocyte sedimentation rate (ESR) and peripheral blood smear features were recorded. Bone marrow examination findings were assessed, particularly the percentage of plasma cells. Biochemical investigations including serum creatinine, calcium, albumin, globulin and total protein levels were documented. Monoclonal protein detection was done through serum protein electrophoresis (SPEP) and urine protein electrophoresis (UPEP), with attention to the presence of Bence Jones protein.

Radiological evaluations including skeletal surveys and spinal X-rays were analyzed for osteolytic lesions, vertebral collapse, or pathological fractures. All laboratory and radiological investigations were performed using standard procedures at the institutional diagnostic facilities. Data were checked for accuracy and completeness before analysis.

Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 22. Descriptive statistics were used to summarize the data. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as means and standard deviations.

RESULTS

Table 1: Socio-Demographic Characteristics of the Patients (n = 58)

Characteristics	Frequency (n)	Percentage (%)
Age Group (years)		
< 50	12	20.7
50–59	19	32.8
≥ 60	27	46.6
Sex		
Male	36	62.1
Female	22	37.9
Residence		
Urban	33	56.9
Rural	25	43.1
Occupation		
Service	14	24.1
Farmer	10	17.2
Housewife	20	34.5
Others	14	24.1

Table 1 shows the socio-demographic characteristics of the 58 multiple myeloma patients. Most patients were aged 60 years or older (46.6%) and the majority were male (62.1%). Urban residents comprised 56.9% of the study population. Regarding occupation, housewives (34.5%) and service holders (24.1%) were the most common groups, followed by farmers (17.2%) and others (24.1%).

Table 2: Clinical Presentations of Multiple Myeloma Patients (n = 58)

Symptom	Frequency (n)	Percentage (%)
Bone pain	48	82.8
Fatigue/Weakness	36	62.1
Anemia	40	69.0
Recurrent infections	12	20.7
Weight loss	18	31
Pathological fractures	10	17.2
Renal impairment	15	25.9
Hypercalcemia symptoms	9	15.5

Table 2 shows the clinical presentations of patients with multiple myeloma. Bone pain was the most common symptom, reported by 82.8% of patients, followed by anemia (69.0%) and fatigue or weakness (62.1%). Other symptoms included weight loss (31.0%), renal impairment (25.9%), recurrent infections (20.7%), pathological fractures (17.2%) and features of hypercalcemia (15.5%).

Table 3: Hematological Parameters at Presentation (n = 58)

Parameter	Mean ± SD or n (%)
Hemoglobin (g/dL)	8.9 ± 1.4
Anemia (<10 g/dL)	40 (69.0%)
Total leukocyte count (×10⁹/L)	6.2 ± 2.1
Platelet count (×10⁹/L)	180 ± 60
ESR (mm in 1st hr)	75 ± 20
Rouleaux formation (on PBS)	46 (79.3%)
Plasma cells in bone marrow	>10% in 58 (100%)

Table 3 shows the hematological parameters of the patients at presentation. The mean hemoglobin level was 8.9 ± 1.4 g/dL, with 69.0% of patients presenting with anemia (Hb <10 g/dL). The mean total leukocyte count was 6.2 ± 2.1 × 10⁹/L and the mean platelet count was 180 ± 60 × 10⁹/L. The mean ESR was markedly elevated at 75 ± 20 mm in the first hour. Rouleaux formation on peripheral blood smear was observed in 79.3% of cases and all patients had bone marrow plasma cell infiltration exceeding 10%.

Table 4: Biochemical Parameters (n = 58)

Parameter	Mean ± SD or n (%)
Serum creatinine (mg/dL)	2.1 ± 1.2
Elevated creatinine (>1.5 mg/dL)	22 (37.9%)
Serum calcium (mg/dL)	11.2 ± 1.6
Hypercalcemia (>10.5 mg/dL)	20 (34.5%)
Serum total protein (g/dL)	8.6 ± 1.3
Serum albumin (g/dL)	3.2 ± 0.5
Serum globulin (g/dL)	5.4 ± 1.2

Table 4 shows the biochemical parameters of the study patients. The mean serum creatinine was 2.1 ± 1.2 mg/dL, with elevated levels (>1.5 mg/dL) in 37.9% of cases. The mean serum calcium was 11.2 ± 1.6 mg/dL and hypercalcemia (>10.5 mg/dL) was observed in 34.5% of patients. The average serum total protein was 8.6 ± 1.3 g/dL, with a mean albumin level of 3.2 ± 0.5 g/dL and mean globulin level of 5.4 ± 1.2 g/dL.

Table 5: Radiological and Diagnostic Findings (n = 58)

Finding	Frequency (n)	Percentage (%)
Lytic bone lesions (X-ray/Skeletal survey)	44	75.9
Vertebral collapse	16	27.6
Pathological fracture	10	17.2
Monoclonal band in serum (SPEP)	52	89.7
Bence Jones proteinuria (UPEP)	18	31.0

Table 5 shows the radiological and diagnostic findings among the patients. Lytic bone lesions were present in 75.9% of cases, while vertebral collapse and pathological fractures were observed in 27.6% and 17.2% of patients, respectively. A monoclonal band on serum protein electrophoresis (SPEP) was detected in 89.7% of cases and Bence Jones proteinuria was found in 31.0% of patients.

DISCUSSION

This study presents the clinical, hematological, biochemical and radiological profiles of 58 patients with multiple myeloma (MM) treated at a tertiary care center. The findings highlight the common

patterns of disease presentation in our patient population and reinforce known diagnostic features of MM while reflecting trends seen in other regional and global studies.

In our cohort, the majority of patients were aged 60 years or above and predominantly male, which is consistent with international data indicating that MM primarily affects older adults, with a slight male predominance [11]. Similar age and gender distributions were reported in studies by Lu et al. [12], who examined newly diagnosed Chinese patients and by Ramsenthaler et al. [13], who conducted a systematic review and meta-analysis of MM symptom prevalence.

Bone pain (82.8%) was the most common presenting symptom in our study, followed by anemia (69.0%) and fatigue or weakness (62.1%). These findings are in line with Ramsenthaler et al. [13], who identified bone pain and fatigue as the most frequent and burdensome symptoms in MM patients. Anemia remains a hallmark of MM, resulting from bone marrow infiltration and cytokine-mediated suppression of erythropoiesis [14]. Rouleaux formation, seen in 79.3% of peripheral smears in our study, is a characteristic hematological finding due to increased plasma protein levels, particularly monoclonal immunoglobulins.

Renal impairment was present in 25.9% of our patients, with 37.9% showing elevated serum creatinine. This aligns with the findings of Dimopoulos et al. [15], who emphasized that renal dysfunction affects up to 40% of MM patients at diagnosis and is a significant prognostic factor. Hypercalcemia was found in 34.5% of our cohort, consistent with the CRAB criteria and reflective of osteolytic activity and cytokine dysregulation associated with advanced disease [11].

Radiologically, lytic bone lesions were present in 75.9% of patients, consistent with data from Morgan et al. [16], who noted high rates of skeletal involvement in newly diagnosed patients. Vertebral collapse and pathological fractures, seen in 27.6% and 17.2% respectively, were similarly reported in global MM studies and contribute significantly to morbidity [16].

The presence of a monoclonal band on serum protein electrophoresis (SPEP) was observed in 89.7% of patients and Bence Jones proteinuria in 31.0%, supporting the diagnostic utility of these tests. According to Puchades-Carrasco et al. [17], serum metabolomic profiling, including monoclonal protein detection, offers valuable insights into disease activity and remission status. Additionally, Paiva et al. [18] highlighted that monoclonal protein expression correlates with circulating tumor cell burden and disease progression.

All patients in our study had more than 10% plasma cells in bone marrow aspirates, confirming diagnosis as per International Myeloma Working Group (IMWG) guidelines. Cytogenetic and molecular profiling, though not performed in our study, has been shown by Sawyer [14] and Avet-Loiseau et al. [19] to provide important prognostic information. High-risk cytogenetic features, such as del(17p) or t(4;14), are associated with poor progression-free survival even with novel therapies like carfilzomib [19].

While our study focused on baseline characteristics at diagnosis, findings are relevant to clinical decision-making and early risk stratification. Morgan et al. [20] demonstrated that treatment regimens such as cyclophosphamide, thalidomide and dexamethasone (CTD) are still widely used in patients ineligible for transplantation, particularly in resource-limited settings similar to ours. Moreover, Palumbo et al. [21] advocated for age- and vulnerability-based personalized treatment approaches, which can be tailored once comprehensive clinical and hematological profiles are established.

Limitations of the study

The strength of our study lies in its detailed clinical and laboratory evaluation of a well-defined MM cohort. However, some limitations should be noted. Advanced molecular testing and imaging such as MRI or PET-CT were not uniformly available, which may have led to under-detection of early or

extramedullary disease. In addition, being a single-center study, the findings may not be generalizable to all patient populations across the country.

CONCLUSION

In conclusion, our study reinforces that bone pain, anemia and renal dysfunction are the most common clinical presentations of multiple myeloma in our setting. Hematological and biochemical profiles align with existing global data, while the high frequency of skeletal involvement and monoclonal protein detection underlines the importance of early diagnostic evaluation. These findings contribute to the growing body of literature supporting timely diagnosis and comprehensive baseline assessment in patients with MM, particularly in resource-constrained healthcare environments.

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