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Research Article

Epidemiological, Biological and Clinical Aspects of Multiple Myeloma in Morocco: A Retrospective Study Over a 2-Year Period

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Received: October 14, 2025; **Published:** October 29, 2025

Abstract

Introduction: Multiple myeloma (MM) is a malignant hematologic disorder characterized by the malignant proliferation of bone marrow plasma cells, leading to excessive production of monoclonal immunoglobulins responsible for bone, hematologic, and renal manifestations.

Objective of the Study: The objective of this study was to describe the epidemiological, clinical, and biological profile of patients with MM hospitalized at Mohammed V Military Hospital in Rabat over a two-year period.

Patients and Methods: In this retrospective study conducted at HMIMV Rabat between June 2023 and June 2025, we included 56 patients with confirmed MM according to the International Myeloma Working Group (IMWG) criteria. The study included an epidemiological survey covering age, sex, and medical history, as well as clinical and biological data collection. Laboratory investigations included complete blood count (CBC), peripheral blood smear, bone marrow aspiration, serum protein electrophoresis, and immunofixation. Data were collected from DxLab software and patients' medical records, then analyzed using SPSS and Excel software.

Results: The mean age of patients was 64 years, with a male predominance (sex ratio 1.54). The most frequent comorbidities were hypertension, type 2 diabetes, and chronic kidney disease. Clinically, bone pain was the main reason for consultation, followed by general health deterioration and renal failure. Biologically, anemia was present in 64.3% of cases, mostly normochromic normocytic, and bone marrow plasma cell infiltration >10% was observed in all patients.

Conclusion: Our findings are consistent with international data and highlight the importance of early detection of this hematologic malignancy to improve prognosis and patients' quality of life.

Keywords: *Epidemiological Aspects; Biological Aspects; Multiple Myeloma*

Introduction

Multiple Myeloma (MM) is a malignant hematologic disorder characterized by the clonal proliferation of bone marrow plasma cells. It typically manifests with bone pain, bone marrow failure (anemia, thrombocytopenia, leukopenia), hypercalcemia, renal impairment, and increased susceptibility to infections.

MM accounts for approximately 10% of all hematologic malignancies. Its incidence increases with age and it more frequently affects men.

Diagnosis is based on the presence of specific clinical signs and biological abnormalities, according to the criteria established by the International Myeloma Working Group (IMWG).

In Morocco, epidemiological data remain limited. The objective of this study was to describe the epidemiological, clinical, and biological characteristics of patients with MM hospitalized at Mohammed V Military Hospital in Rabat over a 2-year period [1-5].

Materials and Methods

This is a retrospective and analytical study conducted at the Hematology Laboratory and the Clinical Hematology Department of Mohammed V Military Teaching Hospital in Rabat over a 2-year period, from June 2023 to June 2025.

Patients included in the study were those with complete medical records in whom the diagnosis of multiple myeloma was established based on clinical and biological criteria, according to the International Myeloma Working Group (IMWG) guidelines.

The study population consisted of 56 patients diagnosed with multiple myeloma during the study period. An epidemiological investigation was carried out, including the assessment of age, sex, medical history, as well as clinical and biological data such as complete blood count (CBC), peripheral blood smear, bone marrow aspiration, serum protein electrophoresis, and serum immunofixation.

Data collection was performed using the Dx Lab software and medical records available at the Clinical Hematology Department.

Data analysis was conducted using SPSS software and Microsoft Excel.

Results

Epidemiological data

In this study, data from 56 patients were analyzed. There was a male predominance with a sex ratio of 1.54. The mean age was 64 years, ranging from 33 to 94 years. The age distribution of patients is shown in figure 1 and 2.

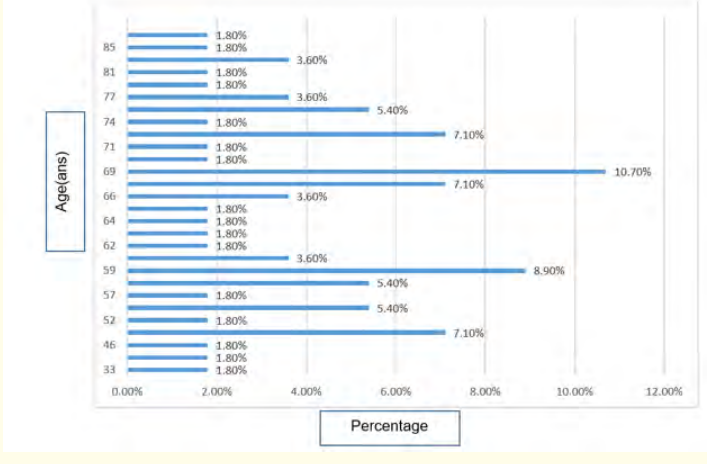

Figure 1: *Distribution of patients according to age (years).*

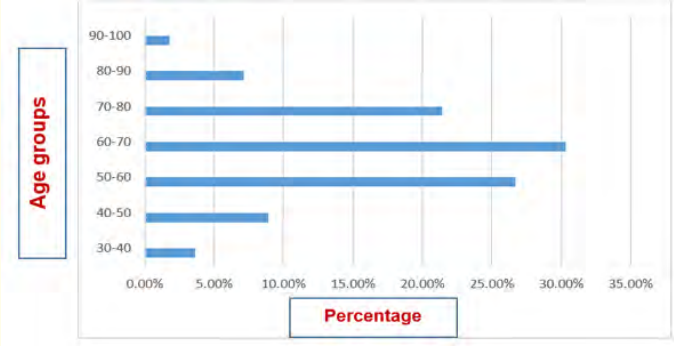

Figure 2: *Distribution of patients according to age groups.*

The most common medical histories were hypertension (28.5%), type 2 diabetes (26.7%), and chronic kidney disease (10.7%). Surgical history was less frequent, and 21.4% of patients had no prior medical history (Figure 3).

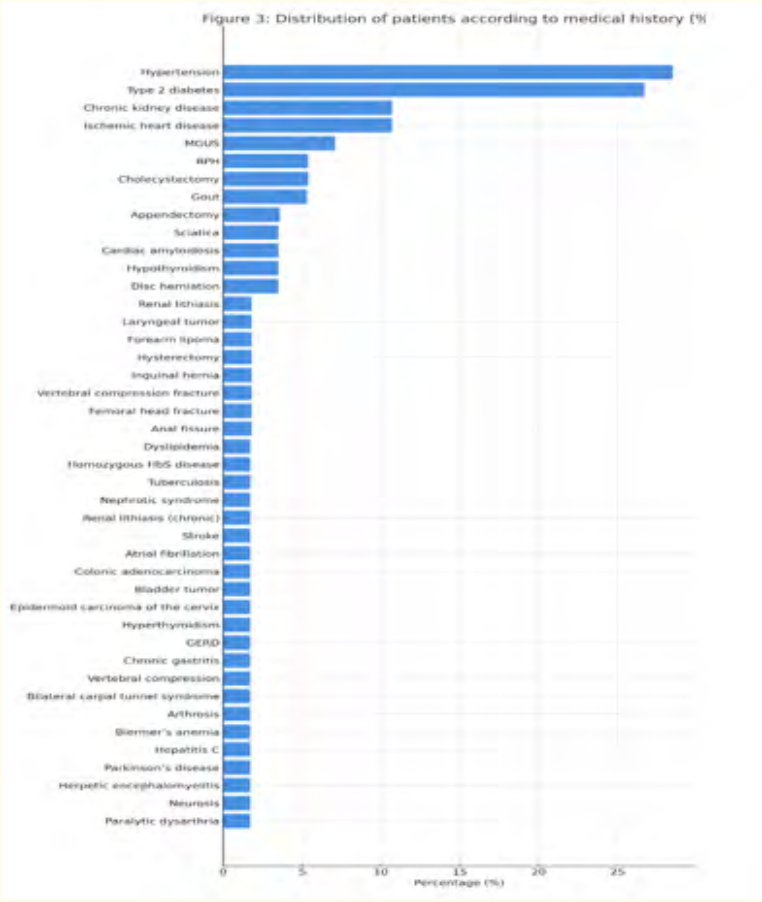

Figure 3: *Distribution of patients according to medical history.*

Clinical data

Regarding clinical data, the main reason for consultation was bone pain, reported in 69.6% of patients, primarily located in the spine and pelvis, followed by general health deterioration (fatigue, weight loss) in 64.3% of patients. Renal failure was observed in 19.6% of patients, with some progressing to end-stage renal disease requiring hemodialysis. Other bone manifestations included fractures in 3 patients: 1 femoral head fracture after a fall (1.8%), 1 vertebral compression fracture at C3 requiring surgery (1.8%), and 1 sternal fracture following a fall (1.8%). Regarding bone tumors, only 1 patient presented with spinal cord compression due to a plasmacytoma (1.8%). Additionally, neurological manifestations (spinal cord compression, sciatica) were observed in 7% of cases.

Biological data

Biologically, anemia affected 64.3% of patients, predominantly normochromic normocytic (55%), with a mean hemoglobin level of 9.78 g/dL, ranging from 5.6 to 14 g/dL. Severe anemia was observed in 30% of cases (Figure 4). Thrombocytopenia was present in 32% of cases, leukopenia in 16%, and leukocytosis in 10% of patients. Circulating plasma cells were detected in only 10% of cases on peripheral blood smear.

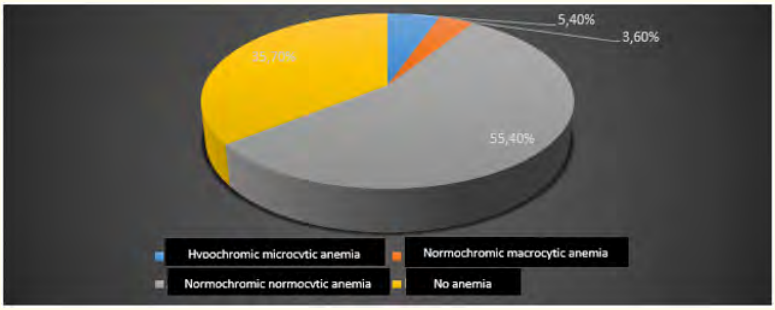

Figure 4: *Distribution of anemia types among patients.*

The myelogram revealed plasma cell infiltration >10% in all patients in the series. The mean infiltration rate was 30%, with values ranging from 11% to 95%. Signs of cellular dysplasia were observed in 98% of patients.

Table 1 illustrates the extent of plasma cell infiltration in the patients of our series.

Plasma Cell Infiltration Rate	Number of Patients	Percentage of Cases
10%-30%	34	60%
30%-60%	14	25%
>60%	8	14%

Table 1: *Distribution according to the degree of bone marrow plasma cell infiltration in patients.*

Regarding serum protein electrophoresis (SPE) and immunofixation (IF), monoclonal peaks were detected in 84% of patients, mainly of the IgG Kappa type (33.9%), followed by IgG Lambda (26.8%). Other types (IgA Kappa, IgA Lambda, and free Kappa light chains) each represented 10.7%, while CLL Lambda, IgA Lambda, and combined IgG Lambda/IgA Lambda were observed in 3.6% of cases each. -Hypercalcemia was observed in 16% of patients, whereas hypocalcemia was noted in 1.8%.

Discussion

In our series of 56 patients with multiple myeloma (MM), a male predominance was observed, with a sex ratio of 1.54, consistent with several North African studies: Gaougaou., *et al*. (1.68), Boubacar., *et al*. (1.34), Mohammadi., *et al*. (1.53), and Bouatay., *et al*. (1.7) [3,6-8].

The mean age at diagnosis in our study was 64 years. The most affected age group was 60-70 years (30.3%), followed by 50-60 years (26.7%). These findings align with other studies: Boubacar., *et al*. (mean age 59 years, 60-70 years), Mohammadi., *et al*. (53 years, 50-60 years), Gaougaou., *et al*. (59 years, 60-70 years), Elmezouar., *et al*. (60 years, 50-60 years), and Bouatay., *et al*. (67 years, 60-70 years) [2,3,6-8].

All these data confirm that multiple myeloma primarily affects older males, with cases before 40 years being exceptional; only one patient in our series was 33 years old [7].

Regarding medical history, hypertension (28.5%) and diabetes (26.7%) were the most frequent comorbidities, consistent with the findings of Benaziza., *et al*. (HTN 25%, diabetes 7.5%) and Mohammadi., *et al*. (HTN 20%, diabetes 7%). Chronic kidney disease was present in 10% of cases, higher than reported by Boubacar., *et al*. (1.36%).

Monoclonal gammopathy of undetermined significance (MGUS) was observed in only 7.1% of patients, similar to Bouatay., *et al*. (1.8%), likely due to lack of systematic screening.

Surgical history was rare, and 21.4% of patients had no past medical history, close to Benaziza., *et al*. (27.8%) but lower than Mohammadi., *et al*. (74%) [7-9].

Clinically, bone pain was the main reason for consultation, reported in 69.6% of patients, with variable locations (pelvis, spine, ribs, etc.), consistent with literature data [7,10,11]. Fractures were noted in 5.7% of patients, also reported in other studies [2,3,11].

These bone pain and fractures result from bone weakening and deterioration caused by tumor plasma cell infiltration or by cytokines secreted by plasma cells, which activate osteoclasts and suppress osteoblasts, leading to bone loss [12,13].

General health deterioration was observed in 64.3% of patients and was significant in other studies as well [3,7,11]. Along with bone pain, these are among the most dominant symptoms of MM [14].

Renal failure was observed in 19.6% of patients, with 14.28% experiencing end-stage renal disease, similar to Bouatay., *et al*. (19%) and Boubacar., *et al*. (26.23%). The main cause was myeloma cast nephropathy due to intratubular precipitation of monoclonal free light chains [14].

Neurological manifestations were present in 7% of patients, comparable to Elmoctar., *et al*. (9%) and Lazzem., *et al*. (13%), mainly including spinal cord compression and peripheral neuropathies [2,11,15].

Regarding biological data, anemia was found in 64.3% of patients, comparable to Mohammadi., *et al*. (78.5%), Gaougaou., *et al*. (84.3%), and Bouatay., *et al*. (87%) [6-8]. The predominant type was normochromic normocytic non-regenerative anemia (55%), consistent with literature [2,14]. Severe anemia (Hb < 8.5 g/dL) was observed in 30% of patients, close to Bouatay., *et al*. (29%) [7].

Anemia is the most common hematologic manifestation of MM, included in the IMWG CRAB criteria, and may result from medullary infiltration, hemodilution from hyperproteinemia, and renal failure, reflecting disease progression [8].

Thrombocytopenia was observed in 32% of patients, similar to Bouatay., *et al*. (33%) and Benaziza., *et al*. (31%). Other studies report more variable rates: Boubacar., *et al*. (11.4%), Mohammadi., *et al*. (11.56%), Gaougaou., *et al*. (22%), Lazzem., *et al*. (17%) [3,6-9,15]. Thrombocytopenia, like leukopenia, is observed in advanced disease, reflecting high tumor burden and poor prognosis, and contributes partially to bleeding risk [2,16].

Leukopenia was observed in 16% and leukocytosis in 10% of cases, consistent with reports by Boubacar., *et al*., Mohammadi., *et al*., Gaougaou., *et al*., Bouatay., *et al*. and Elmezouar., *et al*. Although rare, these findings worsen prognosis. Leukocytosis is unusual in MM and warrants investigation for infectious causes [17].

The myelogram allowed quantitative and qualitative assessment of bone marrow plasmacytosis, exceeding 10% in all patients, meeting the IMWG diagnostic criteria for MM [5]. The mean plasma cell infiltration was 30%, ranging from 11% to 95%, close to Boubacar., *et al*. (27%, range 10-79%) [3].

The most frequent infiltration range was 10-30%, and signs of cellular dysplasia were observed in 98% of patients, corroborating findings from Boubacar., *et al*., Mohammadi., *et al*., Gaougaou., *et al*. and Lazzem., *et al*. [3,6,8,15].

SPE detected a monoclonal peak in 83% of cases, predominantly in the gamma-globulin zone, followed by the beta-globulin zone. Serum immunofixation confirmed the monoclonal nature and determined the immunological type. IgG Kappa was the most frequent paraprotein, followed by IgG Lambda, IgA Kappa, and IgA Lambda. These results are consistent with the literature [3,6-8].

Hypercalcemia results from increased osteoclastic bone resorption and can reach high levels (>150 mg/L), causing clinical manifestations. In our study, hypercalcemia was observed in 16% of patients, with other studies reporting 20% (Gaougaou., *et al*.), 26% (Bouatay., *et al*.), 25% (Benaziza., *et al*.), and 9% (Elmoctar., *et al*.) [6,7,9,11]. Hypercalcemia is included in the IMWG CRAB criteria [5].

Overall, our data are largely consistent with national and international studies in terms of epidemiological, clinical, and biological profiles.

Conclusion

Multiple myeloma remains a serious hematologic malignancy, primarily affecting older men, often presenting with bone pain and characteristic laboratory abnormalities.

Our study at the Military Hospital of Rabat confirms that the epidemiological, clinical, and biological profile of MM in Morocco generally aligns with international data, showing male predominance, frequent bone involvement, and suggestive laboratory abnormalities.

These findings highlight the importance of heightened awareness among healthcare professionals and the general population regarding nonspecific symptoms and laboratory abnormalities, to enable earlier diagnosis and improve prognosis.

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Volume 8 Issue 11 November 2025