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Impact of MRD Status on Survival Rates in Newly Diagnosed Transplant-Eligible Multiple Myeloma Patients: A Systematic Review and Meta-Analysis

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INTRODUCTION

Despite improved prognosis and survival rates in multiple myeloma (MM) patients, most eventually succumb to the disease. Deeper initial responses and negative measurable residual disease (MRD) status are independent prognostic factors. Negative MRD status is associated with improved progression-free survival (PFS) and overall survival (OS).

AIM

This systematic review and meta-analysis aim to assess the survival rates in newly diagnosed MRD-positive and MRD-negative transplant-eligible MM patients.

METHOD

A literature search was performed on PubMed, Cochrane, and Embase from January 1, 2013 to December 20, 2023. A total of 832 articles were screened using the PRISMA flow chart. Fourteen phase 2, 3, and retrospective studies were included. Two-year survival rates were extracted from visualization of Kaplan-Meier curves if data were not provided in the text of the included articles. "Meta" package in "R" programming language software was used to conduct this meta-analysis.

RESULTS

In 14 studies (n=4118), MRD status was determined using multiparameter flow cytometry and next-generation sequencing. Various induction regimens were used, including traditional myeloma induction backbones: proteasome inhibitors, immune modulatory inhibitory drugs, and daratumumab. Two-year PFS was superior in MRD-negative *vs* MRD-positive patients with a range of 52.7-78 months *vs* 16-45 months respectively. Two-year OS was better in MRD-negative *vs* MRD-positive patients with a range of 78%-100% *vs* 59%-96%, respectively. Three-year PFS was better in MRD-negative *vs* MRD-positive patients with a range of 63%-94% *vs* 38%-86%, respectively.

In a subset of 6 studies that provided direct comparison (n=1119), the odds ratio (OR) for 2-year PFS was 4.94 (95% CI, 2.52-9.70; I2=72%) in favor of MRD-negative as compared to MRD-positive post-transplant patients. The OR for 2-year OS was 3.04 (95% CI, 1.43-6.47; I2=38%) in favor of MRD-negative as compared to MRD-positive posttransplant patients.

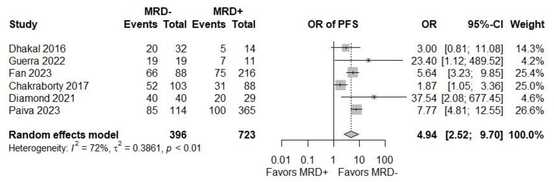


Fig 1. Progression free survival (PFS) in Minimal residual disease (MRD)+ vs. MRD- patients with multiple myeloma.

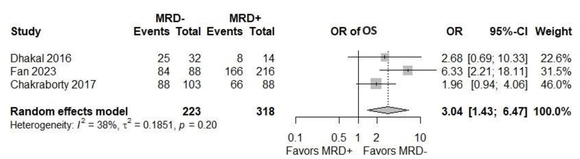


Fig 2. Overall survival (OS) in minimal residual disease (MRD)+ vs. MRD- patients with multiple myeloma.

CONCLUSIONS

The odds of achieving better 2-year PFS or OS were significantly better in MRD-negative as compared to MRD-positive patients. Therefore, achieving MRD negativity status can be considered as a predictor of improved prognosis and better survival. More large-scale multicenter prospective studies with longer follow-up are needed to confirm these results. This analysis has limitations with heterogeneity among studies, different induction regimens, and retrospective studies.

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