Safety and efficacy of hydroxyurea and interferon in myeloproliferative neoplasms: a systematic review

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Background

Myeloproliferative disorders such as essential thrombocythemia (ET) and polycythemia vera (PV) are driven by abnormal stem cell proliferation, commonly caused by JAK2 mutations. These conditions lead to excessive platelet and red blood cell production, increasing the risk of thrombosis, bleeding, and other serious complications .

Interferon-alpha and hydroxyurea are widely used treatments: interferon promotes cell cycle arrest and apoptosis to reduce abnormal growth, while hydroxyurea inhibits DNA synthesis to achieve therapeutic myelosuppression. Both demonstrate effectiveness but are limited by adverse effects, including cytopenias, anemia, and systemic symptoms.

This review evaluates and compares their clinical outcomes, focusing on hematologic response, mutation burden reduction, hematocrit control, and spleen size in patients with ET and PV.

Aims & Objectives

To evaluate the relative benefits and risks of HU and IFN in MPN management.

Materials & Methods

Following PRISMA guidelines, randomized controlled trials, non-randomized clinical trials and observational studies including MPN-112, PROUD-PV, CONTINUATION-PV and others were systematically reviewed.

All the patients included in these studies had either PV or ET and were treated with either HU or PEG-IFN. Protocol is registered on PROSPERO (Registration no: CRD42023399263). Data extraction and Quality assessment was done according to Cochrane handbook of systematic reviews and meta-analysis.

Results

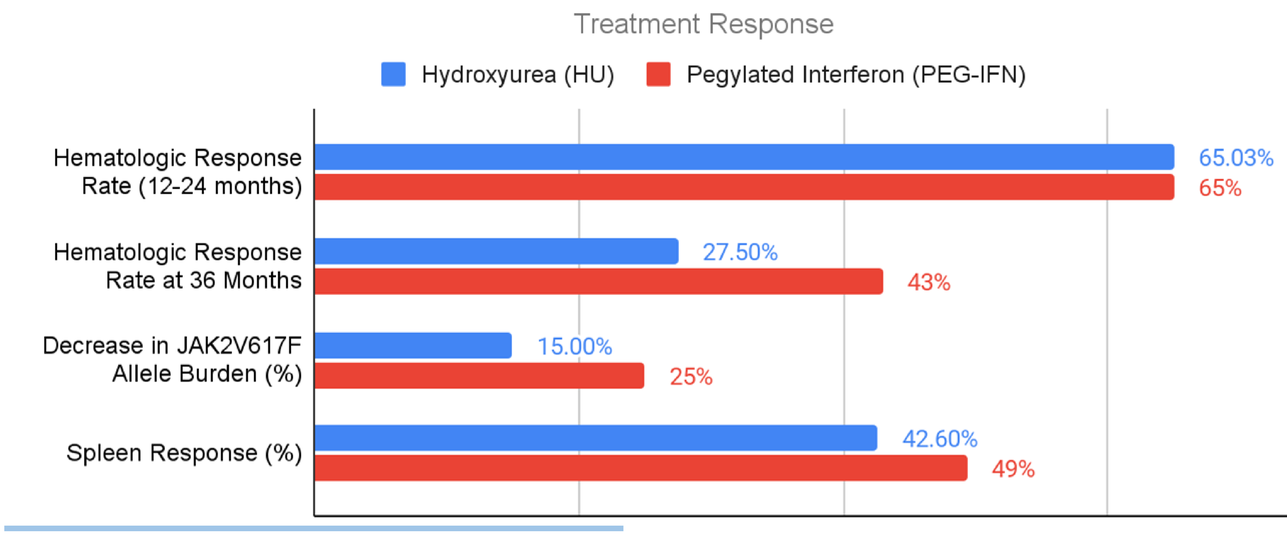
- Six studies with 1,012 patients (ages between 50 to 63) with MPNs (Polycythemia Vera or Essential Thrombocytopenia) were included (552 treated with HU; 460 treated with PEG-IFN)
- Treatment duration ranged from 12 to 36 months.

Response:

- Mean hematologic response rate was 65% for both groups at 12 to 24 months; better response at 36 months with PEG-IFN.
- Hematocrit control was obtained in 65% of patients in each group.
- PEG-IFN resulted in larger decreases in JAK2V617F allele burden (Mean decrease: 25% vs 15% with HU).

Adverse Effects:

- Hematologic toxicities occurred in 25% of HU-treated patients.
- Leukemic or fibrotic transformation in 2% of HU group.
- PEG-IFN caused more immune-related adverse events in 15% (common: transaminitis 4.3%, thyroid toxicities 2.4%).



Conclusion

HU and PEG IFN are both associated with hematologic response in MPN; however, PEG IFN is associated with a greater long-term molecular response.

Limitations

- Focuses on only PV and ET, thus findings do not apply to other MPNs
- Only two studies compared outcomes at 36 months

References

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