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Effectiveness of Fresh Frozen Plasma in improving coagulopathy in human patients following hemotoxic snakebites: A Systematic Review and Meta-Analysis

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Aim and objectives: We conducted a systematic review and meta-analysis to evaluate the effectiveness of Fresh Frozen Plasma (FFP) as an intervention in improving Clinically Significant Envenomation, including systemic envenoming and coagulopathy, in human patients following hemotoxic snakebites

Methodology: Following PROSPERO registration, an extensive search was conducted to september 2023 across various databases, namely PubMed, ScienceDirect, Embase, Scopus, Web of Science, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, and WHO International Clinical Trials Registry Platform. A combination of medical subject headings (MeSH) and free text terms was utilized, encompassing phrases such as “Fresh Frozen Plasma,” “plasma transfusion,” “snake,” “vasculotoxic snake,” “coagulopathy in snake bite,” “venom induced consumption coagulopathy,” and “hemotoxic snake.” The study included human research in English across all age groups, comparing FFP with control group which received saline or anti snake venom. We included all original studies irrespective of the study design. Risk of bias assessment employed RoB2 tool for RCT and Newcastle-Ottawa Quality Assessment Scale for observational studies.

Results Out of the 228 studies reviewed, five were included (2 RCT’s and 3 Observational studies), totalling 376 patients. Although there was significant heterogeneity among the included studies ($Tau^2 = 1.24$, $p = 0.006$, $I^2 = 73\%$), the random-effects model indicated that patients treated with FFP had significantly better odds of resolution of coagulopathy compared to those treated with anti-snake venom alone (OR, 3.75; 95% CI, 1.14 - 12.35, p=0.03) However, mortality rates were not different between those who received FFP and those who didn’t. There was no difference in adverse reactions in the FFP versus control group across the studies, but consistent definitions across studies were lacking, preventing a meta-analysis of adverse reactions. Our bias assessment indicated serious risks in the randomized trials and moderate risks in observational studies.

Conclusions: FFP holds potential for effectively managing coagulopathy triggered by hemotoxic snakebites, as patients who receive FFP tend to experience improved recovery odds. However, the overall mortality benefit remains inconclusive. It is to be kept in mind that the regional variations in snake species, venom composition, and the effectiveness of the regionally available antivenom may influence our findings. This review suggests that FFP may serve as a significant intervention in coagulopathy following hemotoxic snakebites, but more standardized research specific to the geographic is required to confirm its benefits and risks comprehensively.