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Therapeutic Plasma Exchange in Yellow Phosphorous Poisoning: A Systematic Review and Meta-Analysis

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Aim and objectives: We conducted a systematic review and meta-analysis (SRMA) to evaluate the efficacy and safety of therapeutic plasma exchange (TPE) for hepatotoxicity due to yellow phosphorus poisoning.

Methodology: Following PROSPERO registration, an extensive search was conducted 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 "therapeutic plasma exchange," "plasmapheresis," "exchange transfusion," "yellow phosphorus," and "rodenticidal poisoning." The study included human research in English across all age groups, comparing TPE with standard medical treatment (SMT). We included all original studies irrespective of the study design. Risk of bias assessment employed ROBINS-I for non-randomized controlled trials and the Newcastle-Ottawa Quality Assessment Scale for observational analytical studies.

Results: The review encompassed 5 studies (4 Indian and 1 Western) involving 106 patients in total. Low-volume plasmapheresis was conducted in 4 of the 5 studies (data regarding volume unavailable in one study). Using the random-effects model, patients with acute liver failure or severe acute liver injury due to yellow phosphorous poisoning exhibited higher odds of survival with TPE compared to SMT (OR, 12.75; 95% CI, 3.81–42.74). The NNT for TPE to prevent one death is 1.8. Transient hypotension and bacteremia during TPE were reported in two studies, both effectively managed without resulting mortality. Other studies reported no adverse events. Risk of bias assessment revealed a serious risk of bias in the non-randomized trial and a moderate risk of bias in all the observational analytical studies.

Conclusions: The substantial prevalence of yellow phosphorous poisoning in India's southern and western regions, coupled with restricted access to liver transplants, highlights the emergence of TPE as a potential therapeutic modality. The results of our SRMA highlight the promising efficacy of TPE, offering a lifeline to patients who would otherwise face the grim prospect of mortality while waiting for a liver transplant. Therefore, our findings strongly suggest integrating TPE as a viable treatment option for hepatotoxicity due to yellow phosphorous poisoning in Indian settings.