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Efficacy and safety of low molecular weight heparin compared to unfractionated heparin for chronic outpatient hemodialysis in end stage renal disease: Systematic review and meta-analysis

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Introduction: Low molecular weight heparin (LMWH) is an effective anti-coagulant to prevent thrombotic events. However, due to its predominant renal clearance, there are concerns that it might be associated with increased bleeding in patients with renal disease. In this systematic review we assessed the available literature to determine the efficacy and safety of LMWH compared to unfractionated heparin (UFH) in patients with end stage renal disease (ESRD) receiving maintenance hemodialysis.

Method and Materials: Pubmed, Embase and cochrane central were searched for eligible citations. Selection criteria included English language, randomized controlled trials, comparing LMWH and UH, involving adult (age >18 years), ESRD patients receiving outpatient, chronic, intermittent hemodialysis. LMWHs studied in our review were those that are currently approved by the Food and Drug Administration (FDA). We only included studies that had an explicit random allocation. We excluded controlled clinical trials that did not have an explicit random allocation. Two reviewers performed independent data abstraction. Random effects model was used for meta-analysis. Clinical heterogeneity was determined based on clinical knowledge. Statistical heterogeneity was assessed using I² statistic.

Results: Nineteen studies (total patient pool of 13,274 patients) were included for systematic review and 4 were included for meta-analysis. The included studies were of poor quality with high risk of bias and had considerable heterogeneity. 133 patients on LMWH and 129 patients on UHF reported extracorporeal circuit thrombosis and 36 and 31 patients reported bleeding complications while using LMWH and UHF respectively. There were no significant differences between LMWH and UFH for extracorporeal circuit thrombosis [risk ratio: 1 (95% C.I: 0.62-1.62)] and bleeding complications [risk ratio: 1.16 (95% C.I: 0.62-2.15)].

Conclusion: Our result suggests that LMWH was similar to UFH with respect to efficacy (extracorporeal circuit thrombosis) and safety (bleeding complications) in patients with ESRD receiving maintenance hemodialysis. However, considering the high heterogeneity and risk of bias of the included studies, results need validation in larger sample RCTs with better randomization protocol. Also, since the review involved only LMWHs approved for use in the United States, generalizability of obtained results to other LMWHs is unknown.

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