

Nanoceutical Intervention (Nanodrug) of Neonatal Hyperbilirubinemias Compared to Conventional Phototherapy

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Abstract : Background: Targeted rapid degradation of bilirubin has the potential to thwart incipient bilirubin encephalopathy. Uncontrolled hyperbilirubinemia is a potential problem in developing countries, including India, because of the lack of reliable healthcare institutes for conventional phototherapy. In India, most of the rural subjects dwell in the exchange limit during transport, leading to a risk of kernicterus when they arrive at the treatment centre. Thus, an alternative pharmaceutical agent is needed for the hours. Objective: Exploration of a distinct therapeutic strategy for the control of neonatal hyperbilirubinemia compared to conventional phototherapy in a clinical setting. Method: We synthesized, characterized and investigated a spinel-structured Manganese citrate nanocomplex (C-Mn₃O₄ NC, the nanodrug) along with conventional phototherapy in neonatal subjects. We have also observed BIND scores in order to assess neurological dysfunctions. Results: Our observational study clearly reveals that the rate of declination of bilirubin in neonatal subjects with nanodrug oral administration and phototherapy is faster compared to that in the case of phototherapy only. The associated neural dysfunctions were also found to be significantly lower in the case of combined therapy. Conclusion: This study demonstrates that combined therapy works better than conventional phototherapy only for the control of hyperbilirubinemia. We have observed that a significant portion of neonatal subjects requiring blood exchange has been prevented with the combined therapeutic strategy. Further compilation of a drug-safety-dossier is warranted to translate this novel therapeutic chemo preventive approach to clinical settings.

Keywords : nanodrug, nanoparticle, Neonatal hyperbilirubinemia, alternative to phototherapy, redox modulation, redox medicine

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