Preparation and Evaluation of Novel Solid Chlorine Dioxide-based Disinfectant Powder in Single-pack

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Objective To prepare and evaluate novel chlorine dioxide-based disinfectant powder in single-pack that is more convenient for use and transportation. **Methods** Orthogonal experiment was performed to determine the recipe of the disinfectant powder. Stability test, suspension quantitative bactericidal test, simulation field trial, and animal toxicity test were carried out to observe its bactericidal and toxicological effects. **Results** The orthogonal experiment showed that the type of water solution had no effect on the disinfectant powder and the best ratio of sodium chlorite to solid acid was 1:3. Ten grams of the disinfectant powder was fully dissolved in 20 mL water for 2 min, and diluted to 500 mL in water. After 5-10 min, the concentration of chlorine dioxide (ClO_2) solution was 266 mg/L to 276 mg/L. After stored at 54℃ for 14 d, the average concentration of ClO_2 was decreased by 5.03%. Suspension quantitative bactericidal test showed that the average killing logarithm (KL) value for both *Staphylococcus aureus* and *Escherichia coli* in 100 mg/L ClO_2 solution for 2 min was over 5.00. In simulation field trial, the average descending KL value for *Escherichia coli* in the solution containing 100 mg/L ClO_2 for 5 min was over 3.00. The mouse acute LD_{50} in the solution 5 times exceeded 5000 mg/kg. The disinfectant powder was not toxic and irritative to rabbit skin and had no mutagenic effect on mouse marrow polychromatic erythrocytes (PCE). **Conclusion** The stability and bactericidal efficacy of solid chlorine dioxide-based disinfectant powder in single-pack are good. The solution containing 100 mg/L ClO_2 can kill vegetative forms of bacteria. The concentration of ClO_2 on the disinfecting surface of objects is 100 mg/L. The disinfectant powder is not toxic and irritative.

Key words: Chlorine dioxide; Disinfectant powder; Single-pack

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