

口腔ケア用ジェルへの応用を目指した 中性電解水配合ジェルの簡便な調製法とその除菌効果

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要旨： 殺菌性電解水の中で安静時の唾液 pH (約 7) に最も近い中性電解水を口腔ケア (清掃・マッサージ) 用ジェルに応用するために、中性電解水配合ジェルの簡便な調製法を検討した。有効塩素濃度の異なる中性電解水 (標準: 30 mg/L、高濃度: 140 mg/L) と増粘材/ゲル化材 (カルボキシビニルポリマー [カルボマー]、寒天、メチルセルロース) を組合せて、混合・攪拌、適宜 pH 調整を行い試作ジェルを調製した。試作ジェルの有効塩素濃度と除菌効果から口腔ケア用ジェルとしての有効性を、調製全工程の所要時間からジェル調製の操作性を調べ、総合的に評価して最適なジェル調製法を具体化した。いずれの濃度の中性電解水でも増粘材/ゲル化材の添加で有効塩素濃度は低下し、その低下率はカルボマーで 80%以上、寒天で約 40%、メチルセルロースでは約 10%であった。カルボマー添加ジェルは除菌率 20%未満であったが、寒天あるいはメチルセルロース添加ジェルでは、24 時間冷蔵保存後でも 99.9%以上の高い除菌率を示した。カルボマーの使用は pH 調整が必要で約 30 分間を、寒天ではゾルゲル転移のための加熱・冷却が必要で約 25 分間を要した。一方、メチルセルロースでは高速攪拌により 1 分間以内で調製可能だった。以上の結果より、メチルセルロースによる中性電解水のジェル化は、短時間で簡便な中性電解水配合ジェルの調製法として有効であることが示唆された。

キーワード： 中性電解水、口腔ケア用ジェル、ジェル化、有効塩素濃度、除菌効果

Simple preparation method of neutral electrolyzed water-based gel for oral care and its bacteria removal effect

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To apply neutral electrolyzed water, which is closest to the pH of saliva at rest (approximately 7) among electrolyzed water for sterilization, to gels for oral care, we investigated a simple method for preparing gels containing neutral electrolyzed water. Each prototype gel was prepared by mixing and stirring a neutral electrolyzed water (standard: 30 mg/L or high concentration: 140 mg/L) and a thickener/ gelling agent (carboxy vinyl polymer [carbomer], agar, or methylcellulose), and adjusting pH as appropriate. The effectiveness of each prototype gel as a gel for oral care was

examined based on its available chlorine concentration and bacteria removal effect, and the operability of the gel preparation was examined based on the time required for the entire preparation process. The available chlorine concentration decreased with the addition of each thickener/ gelling agent in both concentrations of neutral electrolyzed water, with a reduction rate of more than 80% for carbomer, approximately 40% for agar, and approximately 10% for methylcellulose. The gel prepared with carbomer showed a less than 20% bacteria removal rate. On the other hand, the gel prepared with agar or methylcellulose showed a high bacteria removal rate of more than 99.9% even after 24-hour refrigerated storage. The preparation method by adding carbomer required pH adjustment, which took about 30 minutes, and the preparation method by adding agar required heating for solation and cooling for gelation, which took about 25 minutes. On the other hand, the preparation method by adding methylcellulose could be prepared within 1 minute by high-speed stirring. These results suggest that the preparation by adding methylcellulose is effective as a quick and simple method for preparing gels for oral care containing neutral electrolyzed water.

Keywords: Neutral electrolyzed water, Oral care gel, Gelling, Available chlorine concentration, Bacteria removal effect

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