

The present study was to develop and characterize some properties of tetracycline hydrochloride gels for periodontitis treatment. These formulations were applied with the biodegradable substances and the other substances for gel formulations. Eight tetracycline hydrochloride formulations were conducted to characterize four major properties, such as physical, *in vitro* release, antibacterial activity and stability properties. There are no a significant difference among these formulations after determined their appearances, pH, and viscosities. The second study was tested the *in vitro* release of each formulation. The results exhibited a linear relationship between the cumulative amount of released drug and the square root of time. These results further exhibited that the additional hydrophilic polyols in the formulations can increase the rate of drug release. The antimicrobial study of each formulation against 3 potent periodontal pathogens, namely, *Porphyromonas gingivalis*, *Prevotella intermedia*, and *Bacteroides melaninogenicus*, were also demonstrated. The last study, The physical and chemical stabilities of each formulation

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at various temperatures were carried out. It was suggested that their stabilities were changed if they were set at high temperature, 45°C. The aging of drug in each formulation were calculated by Arrhenius equation. It was found that the shelf-life of each formulation was 64.52-74.07, 17.64-19.42, and 8.55-9.86 days when stored in 4, 30, and 45°C, respectively.