**INTRODUCTION:** The application of platelet-rich plasma (PRP) gel to enhance bone regeneration and soft tissue maturation has been increasingly reported in maxillofacial and orthopaedic surgeries because of its high concentration of various growth factors released from platelets. Recently, PRP-gel has been considered to have antimicrobial activities. PRP contains a large number of platelets as well as a high concentration of several differentiated, unactivated leukocytes, which has been reported to be two to four times greater in PRP than in whole blood. Among these leukocytes, (i) neutrophils are known for their host-defense actions against bacteria and fungi through the actions of myeloperoxidase, which presents in neutrophilic granulocytes; (ii) lymphocytes produce immunocompetent cells and one of their representative functions is found in immunologic defense; (iii) monocytes (precursors of macrophages) produce cytokines and chemotactic factors that participate in inflammation. Therefore, the concentrated leukocytes in PRP may enable PRP to play an important role in the immune defense against bacterial infection. Moreover, it has been found that platelets contain multiple antimicrobial peptides. As a result, a combination of osteoinductive and antimicrobial activities may make PRP-gel effective in the treatment of osteomyelitis. To our knowledge, the exact antimicrobial activity of PRP-gel is still unknown. The purpose of this study was to determine the *in vitro* antibacterial effects of PRP-gel against bacterial strains related to bone infection and to investigate whether the concentration of thrombin (used as an activator of PRP) plays a role in the antibacterial process.

**MATERIALS AND METHODS:** Six clinically isolated bacterial strains, *Staphylococcus aureus* (Methicillin sensitive *S. aureus* or MSSA and Methicillin resistant *S. aureus* or MRSA), *E. coli*, *Group A Streptococcus*, *Pseudomonas*, and *Neisseria gonorrhoeae*, related to bone infection were chosen for this study. PRP and platelet poor plasma (PPP) were isolated by a modified twice centrifugation approach, the so-called “buffy coat” method, from peripheral whole blood obtained from 6 New Zealand white rabbits. The concentration of platelets (both in whole blood and in PRP) and leukocytes were determined. The concentration of platelets in PRP was adjusted to 2×10⁶ platelet/μl (10 fold above baseline). Three different concentrations of bovine thrombin (50 IU/ml, 100 IU/ml, and 200 IU/ml) in 10% CaCl₂ were used to form PRP-gel. In vitro laboratory susceptibility of PRP- and PPP-gel was tested up to 24 h using a bacterial kill curve assay. Each group had 3 individual samples, and all experiments were repeated at least 3 times. Results were reported as mean ± standard deviation. Statistical analysis was performed using one-way ANOVA with SPSS 11.0 software.

**RESULTS:** The platelet count of whole blood was found to be 1.98±0.22×10⁶ platelet/μl. In order to have the same concentration of platelets from each blood draw, the isolated PRP was diluted with PPP to obtain a consistent platelet concentration of 2×10⁶ platelet/μl, a significant enrichment compared to the whole blood platelet count (P<0.001). The leukocyte count increased 4.2-fold from the baseline value of 3.20±0.23×10³/μl in the whole blood to 13.51±0.43×10³/μl in PRP (P<0.001). Both PRP- and PPP-gel seemed to increase the growth of all strains of bacteria compared to the controls at time points 12 and 24 h (P<0.05).

**CONCLUSIONS:** We found that PRP-gel has a time-limited antimicrobial activity against *S. aureus*, MRSA, *Group A streptococcus*, and *Neisseria gonorrhoeae*. The concentration of thrombin is an influential factor on the antimicrobial activity of PRP-gel. PRP-gel might represent a useful new alternative strategy against postoperative bacterial infection. In the future studies, the *in vivo* antibacterial properties of PRP will be determined.

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