



Cytotoxicity Evaluation of PMMA Composite on Human Fetal Osteoblast Cell

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SUMMARY

Introduction: Traumatic injuries in the craniofacial areas may result in disfiguring defects and compromise the protection of the underlying brain. Reconstruction is necessary for the functional and aesthetic reasons. In this study, Polymethyl methacrylate (PMMA) was used due to the excellent properties where there are biocompatible, biologically inert and rigid for cranial bone reconstruction. However, many patients these days were exposed to infection after craniofacial reconstruction using PMMA. Therefore, incorporation of antibacterial agents to the PMMA are desirable to eliminate infection. However, cytotoxicity test needs to be conducted first before accomplish the antibacterial activity of PMMA composites. Hence, the study is aimed for the evaluation of cytotoxicity of the PMMA composites filled with β -TCP and ZnO in different composition on Human Fetal Osteoblast Cell (HFOB). **Objectives:** A study was conducted to prepare antibacterial PMMA composites incorporated with fillers β -TCP and ZnO with different composition and to investigate the biocompatibility of the PMMA composites. **Methodology:** β -TCP and Zinc Oxide were purchased from Sigma-Aldrich and Nacalai Tesque respectively. Pure PMMA as control, 5%, 10%, and 15% β -TCP filled, 15% β -TCP with 2.5% ZnO filled as well as 15% β -TCP with 5% ZnO filled PMMA were prepared. PMMA were mixed together with β -TCP and ZnO manually according to the percentages specified until it has reached the homogeneous state. Specimens were prepared by casting the paste in silicone mould which has been fabricated using 3D printed flexural template. Next, cytotoxicity evaluation was carried out on human fetal osteoblast cells (HFOB). HFOB were incubated at different concentrations (100, 50, 25, 12.5, 6.25 mg/ml) (n=3) of PMMA composites extracts for three days. Then, MTT solution (3-(4, 5-dimethylthiazoyl)-2,5-diphenyl-tetrazolium bromide) was added to each well at 37°C and after 4 hours. The culture medium with the MTT solution was removed. Farmazon crystals of viable cells were dissolved in DMSO (dimethyl sulfoxide). Lastly, ELISA reader was utilized to obtain the data and then, cell viability of HFOB was calculated. **Results:** At 100 mg/ml, PMMA filled 10% BTCP showed the highest percentages (96.53%) of cell viability and the lowest value reveal to PMMA filled 15% BTCP (64.47%) with 2.5% ZnO. Overall, PMMA filled 15% BTCP filled 5% ZnO (132.73%) reveal the highest cell viability at 25 mg/ml. **Conclusion:** It can be concluded that there was no toxicity effect of PMMA composites on human fetal osteoblast cell.