DESIGN AND BIOLOGICAL EVALUATION OF HYDROGEL BIOCOMPOSITES WITH ANTI-OBESITY ACTIVITY.

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Type II diabetes is a chronic condition that is progressive with no effective cure till date. Glycaemic control is very critical so as to reduce long-term micro and macro-vascular complications resulting from its progressive nature. Hydrogel biocomposites prepared from a combination of thermally reduced graphene oxide, natural and synthetic polymers were encapsulated with anti-hyperglycemic drugs in selected ratios. The biocomposites were further characterized by Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis (TGA), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM) and RAMAN. Successful drug encapsulation was confirmed by Fourier transform Infrared and UV-vis spectroscopy. In vitro drug release studies were performed at selected physiological pH values. The hydrogels biocomposites exhibited controlled release profile at pH 7.4 and a sustained release profile at pH of 1.2 suggesting that the hydrogels are potential targeted drug delivery systems. Biological evaluation was performed against 3T3-L1 pre-adipocytes cell lines and successful expression of the gene regulators confirmed that their anti-obesity activities were not significantly different from positive control metformin.

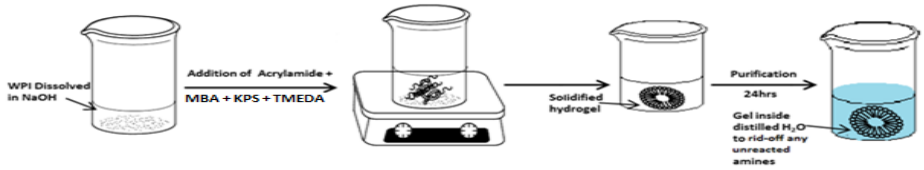

Fig. 1: Preparation of hydrogel by free radical polymerization

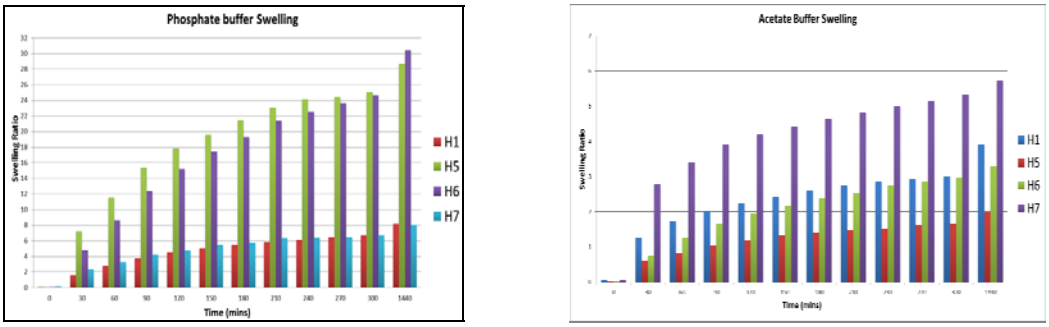

Fig. 2: Swelling rate of hydrogel biocomposite in buffer solutions.

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References

[1]Gudeman, L. F.; Peppas, N. A. *Journal of Applied Polymer Science*. ***1995***. 55,919–928.
[2]Gupta, P.; Vermani, K.; Garg, S. *Drug Discovery Today*. ***2002***. 10, 569-579.
[3]Peppas, N.A.; Buresa, P.; Leobandunga, W.; Ichikawab, H. *European Journal of Pharmaceutics and Biopharmaceutics*. **2000**, 50, 27-46.