

## ABSTRACT

In this research study, edible films were prepared by using Eucalyptus essential oil. Essential oil had promising anti-microbial properties, that were optimized in the form of nano-emulsion. Whey protein was used as a natural emulsifier with the essential oil. For carrier oil, sunflower was taken in equal ratio to essential eucalyptus oil i.e. 1:1. Aqueous phase (whey protein) and oil mix were used in 1:12 (ratio) quantity to formulate the nano-emulsion by using ultra-sonication method for 30 minutes. All the parameters of nano-emulsion formulation were optimized by UV spectra. Then Zeta characterization was performed that confirmed the droplet size in rang (less than 200nm), the resulted droplet size was 195nm. GC-MS of essential oil was done to confirm its chemical constituents. Anti-microbial activity of oil and nano-emulsion was checked against microbes. A bio-composite film of starch and CMC was prepared by using glycerol and citric acid that served as plasticizer and linker respectively. 0.75g of CMC, 5% starch, 5ml glycerol, 0.5ml citric acid and 12ml of EEO-nano-emulsion were used to prepare the standard film with anti-microbial properties. SEM micrograph showed smooth morphological results of the prepared film. The anti-microbial efficacy of prepared film was checked by applying disc diffusion method for *E. coli* and *S. aureus*. Then the resulted film was used to wrap meat samples as its application testing procedure. Film without EEO-nano-emulsion as control 1 and PVC as control 2 to wrap three meat samples and the pH/weight-loss changes and total colony count were observed after storing the samples for 12 days in refrigerator. The results proved that eucalyptus oil incorporated edible films can be certainly used as food packaging material on commercial scale.