

Bio ceramic Zirconia/Hydroxyapatite nano composite extracted from bovine bone

ABSTRACT

These days bone and joint problem is one of the serious health issues in the whole world, millions of people are suffered from it and number is increasing with an alarming rate. Annually, there are more than million surgeries getting done in the world just because of injuries to human hard tissue system. Recently in medical applications, synthetic Hydroxyapatite (HA) has been widely used as an important material because of excellent properties such as bio affinity and high osteogenic potential. HA, particles prevent the growth of cancer cells. Recently, natural hydroxyapatite bio ceramics are extracted by normal calcinations of some bio wastes. Biologically derived natural materials such as bovine bones, fish bones, oyster shells, corals and egg shells, they have converted into useful biomaterials. Moreover, extraction of HA from bio-waste is simple, economically and environmentally preferable. The mechanical Properties of HA is low in comparison with cortical bone. As a result, incorporation of resistant oxide phase has been resistant to optimize biocompatibility and improve mechanical properties of HA. Zirconia (ZrO_2), is one of the best materials which can increase the HA properties. ZrO_2 is a well known material which has high mechanical properties and greater strength, low toxicity and lower magnetic susceptibility in comparison with Ti and Titanium's alloys. In the present work, HA/ ZrO_2 bio ceramic were fabricated in various sintering conditions and nano particle size is achieved by milling technique. HA was derived from natural sources that chosen bovine bone. Effects of ZrO_2 on the composites were investigated. Adding the additive resulted in the values of higher density. Density of the sintered samples was determined by using the Archimedes method and distilled water was used as the fluid medium. The phase formation of the sintered samples was analyzed by X-ray diffraction technique (XRD). The micro structural investigation of the samples was performed using a scanning electron microscope (SEM).

Keyword: Bioceramic; Hydroxyapatite; Zirconia; Bovine bone