Application of Nanoparticles as New Therapeutic Methods on Monitoring and Treating Obesity: a Systematic Review

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Abstract

Introduction: Nowadays, obesity has become a major global health challenge and it is closely linked with many metabolic disorders like diabetes and hypertension. Although various types of drugs have been developed, the prevalence of obesity is increasing worldwide. One of the effective way to treat obesity and prevent metabolic disorders coming after, is using nanoparticles as new therapeutic methods. This study reviewed nanoparticles effects on monitoring and treating obesity.

Methods and Results: In this systematic review, based on PRISMA guidelines, two persons independently searched MeSH terms "nanoparticles", "drugs" and "obesity" and some other relevant terms in databases including PubMed, Medline, Scopus, and Cochrane library up to July 2017, and all the articles with considered inclusion criteria were added to the study.

145 articles were obtained by primary searching. After removing 12 irrelevant and 57 duplicate articles, 76 with inclusion criteria were added to this study. Nanoparticles could be used on both monitoring and treating obesity. These nanoceria when conjugated with antibodies are used for monitoring proteins involve in inflammation and insulin signaling without cell lysis. For example, due to TNF- α inflammatory cytokine that has an important role in insulin resistance in obesity, these nanoceria can be applied on monitoring some proteins like multiple kinases that ameliorate insulin resistance in obesity. Drug delivery via nanoparticles made it more possible to have better effects on regulating lipase cycle in adipose cells and tissues. Furthermore, application of nanoparticles conjugated with some agents can affect intracellular signaling or mechanisms in order to treat obesity. For example, silica nanoparticle has anti-brown adipogenic effect via regulation of p38 phosphorylation which involves in obesity.

Conclusions: Application of nanoparticles increases the accessibility of adipose targeting cells. these nanoceria might be used to detect and treat many metabolic disorders like obesity. Producing more efficient and complicated nanoparticles in sizes depended manner, provides more opportunities to access better on targeted cells for treatment, however, their side effects on normal cells should be considered.

Key words: Nanoparticles, Obesity, Adipose tissue, Therapeutics

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