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Capsular polysaccharide loaded chitosan nanoparticles for mucosal immunization via respiratory tract against *Klebsiella pneumonia*

Menon MD¹, Jain RR¹, Mehta MR¹ and Bannaliker AR²

¹Bombay College of Pharmacy, India

²Bombay Veterinary College, India

Vaccines given by the mucosal routes like nasal, pulmonary, buccal and oral can prove to be an effective alternative to conventional parenteral vaccines, since majority of human pathogens enter the body via mucosal surfaces. However, delivery of antigens through mucosal route is difficult, as these antigens have to be taken up by M-cells to induce an immune response. Multiparticulate systems like liposomes, nanoparticles (NP) which are easily taken up by M cells, can be explored as carriers for mucosal delivery of these antigens. *Klebsiella pneumonia* (KP) is one of the commonest causes of nosocomial infections in human beings, which are often difficult to treat due to the antibiotic resistance developed. In the present study, NP – based systems of KP capsular polysaccharide (KP-CPS) for mucosal immunization by nasal and oral inhalation delivery were prepared and evaluated for their immunogenicity.

Capsular polysaccharide (KP-CPS), the antigenic fraction was extracted from *K. pneumoniae* by hot phenol extraction method. Chitosan NP co-entrapping KP-CPS and DLMT were prepared by ionotropic gelation method. Further, NP were spray dried with lactose as carrier to obtain inhalable (DPI) formulation. *In vivo* efficacy studies of developed systems were carried out in female Wistar rats via mucosal routes (intranasal and pulmonary), and antibody titres were measured by ELISA (IgG and IgA), followed by serum bactericidal assay.

Nanoparticles with particle size around 470 nm and entrapment efficiency of 87.9% for KP-CPS were obtained. The spray dried formulation were obtained as spherical particles (average particle size 3.6 ± 1.2 micron, MMAD 2.66 μm and GSD of 2.71 μm). Results of antibody (IgG & IgA) titres as well as the serum bactericidal assays have revealed superior protective effect conferred by mucosal vaccine compared to the injectable vaccine.

In conclusion, CPS based NP-based mucosal vaccine can prove to be a promising approach for immunization against *K. pneumoniae* infections.

Biography

Dr Mala Menon, PhD in Pharmaceutics from Mumbai University, is currently Professor of Pharmaceutics at the Bombay College of Pharmacy, Mumbai, INDIA. Experience- Industry- 2 yrs; Teaching – 30 years. Key research areas - Drug Delivery Systems-Conventional & Novel type, Pulmonary & Nasal Delivery Systems, Novel Vaccine Delivery Approaches, especially mucosal vaccines, Probiotic formulations, Novel Veterinary formulations. Research projects- Government & Industry sponsored- around 25; Publications- National & International-34; Presentations- more than 80; Book chapters- 2; Patent applications filed- 4.

maladm@rediffmail.com

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