

EXPLORING THE POTENTIAL OF NANOPARTICLES FOR TARGETED DRUG DELIVERY IN DISEASE TREATMENT

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ABSTRACT

In recent years, there has been growing interest in the use of nanotechnology for drug delivery in disease treatment. Nanoparticles, which are particles with a size range of 1-100 nanometers, have unique properties that make them attractive for targeted drug delivery. They can be designed to specifically target diseased cells and tissues and can also protect the drug payload from degradation and elimination before reaching the target site. Therefore, further research and development were needed to fully realize the potential of nanoparticles for targeted drug delivery. Furthermore, this paper aimed to introduce the ongoing research on the use of nanoparticles for targeted drug delivery that was conducted at the Kenya Medical Research Institute (KEMRI) in Nairobi, Kenya. KEMRI was a leading research institution in East Africa with a strong focus on advancing health research in the region. The study focused on developing nanoparticle-based drug delivery systems for the treatment of infectious diseases prevalent in the region. To carry out this research, a mixed-methods approach was adopted, using both quantitative and qualitative data collection methods. A population of 100 pharmacists in Nairobi, Kenya, was targeted, from which 10 were randomly selected using simple random sampling technique. For the quantitative data collection, a structured questionnaire was used to collect information on the pharmacists' knowledge of nanoparticle-based drug delivery, their opinions on the potential of nanoparticles for drug delivery, and their experience with the use of nanoparticles in drug delivery. The questionnaire was administered through face-to-face interviews and was analyzed using SPSS. Descriptive statistics were used to analyze the data, and the findings were presented in tables and graphs. For the qualitative data collection, in-depth interviews were conducted with selected pharmacists to explore their perceptions and experiences with the use of nanoparticle-based drug delivery in disease treatment. The interviews were audio-recorded, transcribed, and analyzed using thematic analysis. Open-ended questions were used to encourage the pharmacists to express their thoughts and ideas freely. The findings of the study were presented in two parts. The quantitative findings were presented in tables and graphs, summarizing the pharmacists' knowledge, opinions, and experiences with the use of nanoparticles for drug delivery. Furthermore, the qualitative findings were presented in the form of themes that emerged from the interviews, providing insights into the pharmacists' perceptions and experiences with nanoparticle-based drug delivery. Based on the findings, conclusions were drawn on the potential of nanoparticle-based drug delivery for disease treatment, as well as the challenges and opportunities associated with its use in clinical practice. The results of this study contributed to the development of effective and safe nanoparticle-based drug delivery systems that can be used to treat diseases in the region and beyond.

Key words: *Nanoparticles, Drug Delivery, and Disease Treatment.*