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Exploring role of nanotechnology in cardiovascular management in urban societies

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Abstract
This study was intended to explore the applicability of the Nanotechnology in Cardiovascular Management. The research study was carried in context of the theoretical context. The secondary support has been adopted for exploring the results of the study. The meta-analysis technique has been adopted to explore the results of the study. The results obtained on the basis of eth evidence reported in the above stated review indicated that nanotechnology hold effective role in treatment of the cardiovascular diseases. The development of nanotechnology has been systematically passed number of procedure. However, with the growing investment in nanotechnology and appropriate infrastructure globally, it is only a matter of time before Nano medicines, nanomaterial devices, and other related technologies successfully complete the rigorous clinical trial procedure and reach the market.

Keywords: nanotechnology, cardiovascular management, urban societies

1. Introduction
Cardiovascular Management is considered a global challenge for entire world. In the contemporary world we found that large number of the death is taking place due to cardiac failure. It is conceded the fast life taking disease in the entire world. However, while observing the current status of the cardiovascular endurance then it can be said that this disseises is largely depended on the medicine. Globally, cardiovascular diseases claim a large number of lives; many of these are preventable. The increase in diets high in saturated fat, salt, and sugar, the prevalence of lethargic life style and the prevalence of obesity all contribute to an increase in the occurrence of cardiovascular complexities. These causes, together with more sophisticated methods of diagnosis, have resulted in statistics that demonstrate a definite upward trend in the prevalence of cardiovascular complexities. Currently, treatment options for cardiovascular illnesses are restricted to oral medications or invasive surgery. The both procedure of medicine and technology has been seen adverse in the patients holding co-morbidity or multi-morbidity. In this matter nanotechnology may hold the key to more effective illness therapy, with improved prognoses and a lower risk of side effects. This review will look for potential answers to the restricted number of available pharmacological medicines and the future role of nanotechnology in cardiovascular care. In addition to this the clinical history reveals that in urban areas there is prevalence of sedentary life style so it creates lethargy on part of urban residents. Hypertension and hypercholesterolemia are the main factors of morbidity and mortality in today's Indian society, since they are two key risk factors for the emergence and development of cardiovascular diseases such as acute myocardial infarction, stroke and thrombosis, among others. Multiple drug therapies for the treatment of these conditions, in most cases based on the use of synthetic active ingredients, are known. However, the use of these drugs frequently results in the occurrence of adverse effects. This fact has led researchers to conduct numerous studies in order to find safer therapeutic alternatives.

1.1 Location of research gap
Nanotechnology being the recent applicability in health system has contributed a lot in the domain of health system. In consonance to same, large number of eth research studies has been conducted in the domain of the applicability of the nanotechnology in health management. The notable research studies have been conducted by; Sahoo and Labhasetwar

2003), Allijs I. E., Czarny S. M. S, Wang X, Chong SY, Weiler M, da Silva AE, Metselaar JM, Lam CSP, Pastorin G, de Kleijn DPV, Storm G, Wang J-W, Schiffelers RM (2017) [5], Banach M, Serban C, Sahebkar A, Mikhailidis D, Ursoniu S, Ray K, Rysz J, Toth P, Muntner P, Mosteoru S, García-García H, Hovingh G, Kastelein J, Serruys P (2015) [6], Alaarg A, Hamers A, Versloot M, Lobatto M, Mulder WJM, Stroes ESG, Storm G, Metselaar JM (2015) [4], Banik BL, Fattahi P, Brown JL (2016) [7], Bietenbeck M, Florian A, Sechtem U, Yilmaz A (2015) [9], Binsalamah ZM, Paul A, Prakash S, Shum-Tim D (2012) [10], Bennett MR (2003) [8], Burman A, Mukherjee R, Khatta D, Mullick S, Jaggi M, Singh M, Kumar M, Prusthy D, Gupta P, Praveen R, Singh S (2015) [13]. Very few research studies have been conducted on applicability of the nanotechnology in cardiovascular management. So the investigator consider ample gap to explore the below mentioned research problem:

1.2 Research problem under investigation

The research problem under investigation is itemized as:
Analysing role of nanotechnology in cardiovascular management in urban societies

1.3 Purpose of the study

The purpose of the study was to explore the role on of nanotechnology in cardiovascular management.

1.4 Rationale of the study

Cardiovascular Management is considered a global challenge for entire world. In the contemporary world we found that large number of the death is taking place due to cardiac failure. It is conceded the fast life taking disease in the entire world. However, while observing the current status of the cardiovascular endurance then it can be said that this disseises is largely depended on the medicine.

1.4.1 Liposomes

Liposomes is an important technique most often used in drug delivery system. It forms phospholipid structure for almost 50-20mm in size. This procedure has been treated effective in cardiovascular management. All the three classifications of Liposomes based on their size are used effective procedure for cardiovascular management. While dealing the thrombosis, Liposomes has been seen effective. The treatment for blockage of blood vessels is being done in this procedure. Large number of the research studies has supported its applicability viz. Sahoo and Labhasetwar 2003), Allijn IE, Czarny SMS, Wang X, Chong SY, Weiler M, da Silva AE, Metselaar JM, Lam CSP, Pastorin G, de Kleijn DPV, Storm G, Wang J-W, Schiffelers RM (2017) [5], Banach M, Serban C, Sahebkar A, Mikhailidis D, Ursoniu S, Ray K, Rysz J, Toth P, Muntner P, Mosteoru S, García-García H, Hovingh G, Kastelein J, Serruys P (2015) [6], Alaarg A, Hamers A, Versloot M, Lobatto M, Mulder WJM, Stroes ESG, Storm G, Metselaar JM (2015) [4], Banik BL, Fattahi P, Brown JL (2016) [7], Bietenbeck M, Florian A, Sechtem U, Yilmaz A (2015) [9], Binsalamah ZM, Paul A, Prakash S, Shum-Tim D (2012) [10], Bennett MR (2003) [8], Burman A, Mukherjee R, Khatta D, Mullick S, Jaggi M, Singh M, Kumar M, Prusthy D, Gupta P, Praveen R, Singh S (2015) [13].

1.4.2 Polymeric nanoparticles

Polymeric nanoparticles procedure is also effective procedure for managing the cardiovascular endurance management. Polymeric nanoparticles make up a large class of system. These consists of solid nanoparticles, amphiphiphilic nanoparticles, forming micelles, vesicles and rods), dendrites, and star-shaped systems. This system possesses their own unique architecture and properties. Apart from this polymer based system are more cost effective and easier to manufacture the scale up compared to liposomes with longer stability profits. Large number of the research studies has supported its applicability of this procedure effectives, viz. Sahoo and Labhasetwar 2003), Zhu MT, Wang B, Wang Y *et al*. (2013) [38]. Yilmaz A, Rosch S, Klingel K *et al*. (2013) [36], Van ES, Leipsic J, Paul Man SF, Sin DD. (2010) [34], Richards JM, Semple SI, Macgillivray TJ *et al*. (2013) [30], Pai AB, Nielsen JC, Kausz A, Miller P, Owen JS. (2013) [29], Kagaya H, Oba M, Miura Y, Koyama H, Ishii T, Shimada T, Takato T, Kataoka K, Miyata T (2011) [28], Jain PP, Leber R, Nagaraj C, Leitinger G, Lehofer B, Olschewski H, Olschewski A, Prassi R, Marsh LM (2014) [26].

1.4.3 Dendrimers

Dendrimer is derived from the Greek word dendron, which means tree, and appropriately describes the structure of these frequently branching molecules (Crampton and Simanek 2007). Dendrimers are remarkable due to their multibranched, three-dimensional design, low polydispersity and high functionality (Sherje *et al*. 2018). There are numerous obvious advantages of using dendrimers as non-viral vectors for medicinal purposes over other nanotechnologies.

1.4.4 Gel Nanoparticles

The nanoparticles are the least prevalent type of polymer-based particle. These nanoparticles generate hydrogel matrices into which medications can be integrated as the polymer concentration increases. These technologies enable a greater delay in the release of the medicine and improved long-term stability (Hamidi *et al*. 2008). Nano-coated stents. Apart from the above reported technique and procedure there are number of supplementary procedure which is being used for generating effective contribution in the cardiovascular health management.
Therefore, Deepening knowledge and increasing use of nanotechnology as a therapeutic tool for the treatment of many cardiovascular diseases will enable clinicians to achieve objectives that until recently seemed unattainable. This prospect turns nan medicine, together with its advances and applications, into a real light at the end of the tunnel, giving great hope in the near future for the recovery in patients suffering from diseases such as hypertension and atherosclerosis, or who have suffered a cardiovascular event disabling squeal such as AMI or stroke. At the same time, it is probable that even these important developments represent only the beginning of a tremendous growth and development in the field of public health worldwide.

2. Support to findings

The present study reveals that nanotechnology hold effectives relevance in the management of cardiovascular diseases. The results of the present study are supported by host of eth researchers like; Zhu MT, Wang B, Wang Y *et al*. (2013) [38]. Yilmaz A, Rosch S, Klingel K *et al*. (2013) [36], Van ES, Leipsic J, Paul Man SF, Sin DD. (2010) [34], Richards JM, Semple SI, Macgillivray TJ *et al*. (2013) [30],

Pai AB, Nielsen JC, Kausz A, Miller P, Owen JS. (2013) [29], Kagaya H, Oba M, Miura Y, Koyama H, Ishii T, Shimada T, Takato T, Kataoka K, Miyata T (2011) [28], Alaarg A, Hamers A, Versloot M, Lobatto M, Mulder WJM, Stroes ESG, Storm G, Metselaar JM (2015) [4], Banik BL, Fattahi P, Brown JL (2016) [7], Bietenbeck M, Florian A, Sechtem U, Yilmaz A (2015) [9],

3. Conclusion

The results obtained on the basis of eth evidence reported in the above mentioned review indicated that nanotechnology hold effective rile in treatment of the cardiovascular diseases. The development of nanotechnology has been systematically passed number of procedure. However, with the growing investment in nanotechnology and appropriate infrastructure globally. There is little doubt that nanotechnology has the potential to improve patient health and general well-being, and that any progressions in current therapeutics will have a positive influence on the lives of patients worldwide. To have the maximum impact in medicine, additional *in vivo* investigations and clinical trials will need to be undertaken to completely understand the systemic behaviour of Nano particulates. As the future of therapeutics shifts toward more modified medicine, nanotechnology may be best equipped to complete the objective of tailoring treatment to specific disease conditions. Additionally, rising healthcare outflows necessitate the exploration of alternatives to current pharmacological and surgical therapy in order to contain these exponential rises. Besides, there is plentiful evidence to provision the notion that the prevalence of nanotechnology has not yet had a really transformative effect on medicine.

4. Conflict of interest

During the entire research process, the investigator has not declared any conflict of interest.

5. Reference

1. Akagi D, Oba M, Koyama H, Nishiyama N, Fukushima S, Miyata T *et al*. Biocompatible micelle Nano vectors achieve efficient gene transfer to vascular lesions without cytotoxicity and thrombus formation. Gene Ther 2007;14:1029-1038.
2. Akbarzadeh A, Rezaei-Sadabady R, Davaran S, Joo S, Zarghami N, Hanifehpour Y *et al*. Liposome: classification, preparation, and applications. Nanoscale Res Lett 2013;8:102
3. Al Meslmani B, Mahmoud G, Bakowsky U. Development of expanded polytetrafluoroethylene cardiovascular graft platform based on immobilization of poly lactic-co-glycolic acid nanoparticles using a wet chemical modification technique. Int. J Pharm 2017;529:238-242.
4. Alaarg A, Hamers A, Versloot M, Lobatto M, Mulder WJM, Stroes ESG *et al*. Targeted liposomal drug delivery to inhibit atherosclerotic plaque inflammation. Atherosclerosis 2015, 24-87.
5. Allijn IE, Czarny SMS, Wang X, Chong SY, Weiler M, Da Silva AE *et al*. Liposome encapsulated berberine treatment attenuates cardiac dysfunction after myocardial infarction. J Control Rel 2017;247:127-133.
6. Banach M, Serban C, Sahebkar A, Mikhailidis D, Ursoniu S, Ray K *et al*. Impact of statin therapy on coronary plaque composition: a systematic review and meta-analysis of virtual histology intravascular ultrasound studies. BMC Med 2015;13:1-20.
7. Banik BL, Fattahi P, Brown JL. Polymeric nanoparticles: the future of nanomedicine. WIREs Nanomed Nanobiotechnol 2016;8:271-299.
8. Bennett MR. In-stent stenosis: pathology and implications for the development of drug eluting stents. Heart 2003;89:218-224.
9. Bietenbeck M, Florian A, Sechtem U, Yilmaz A. The diagnostic value of iron oxide nanoparticles for imaging of myocardial inflammation-quo Vadis? J Cardiovasc Magn Reson 2015;17:1.
10. Binsalamah ZM, Paul A, Prakash S, Shum-Tim D. Nanomedicine in cardiovascular therapy: recent advancements. Expert Rev Cardiovasc. Ther 2012;10:805-815.
11. British Heart Foundation BHF CVD statistics compendium 2017. British Heart Foundation, London, 2017, 1-123.
12. Burke AR, Singh RN, Carroll DL *et al*. Determinants of the thrombogenic potential of multiwalled carbon nanotubes. Biomaterials 2011;32:5970–5978.
13. Burman A, Mukherjee R, Khatta D, Mullick S, Jaggi M, Singh M *et al*. Biocompatible, non-biodegradable, non-toxic polymer useful for nanoparticle pharmaceutical compositions 2015;8:9270-23B2.
14. Cai J, Hatsukami T, Ferguson M, Kerwin W, Saam T, Chu B *et al*. *In vivo* quantitative measurement of intact fibrous cap and lipid-rich necrotic core size in atherosclerotic carotid plaque: comparison of high-resolution, contrast-enhanced magnetic resonance imaging and histology. Circulation 2005;112:3437-3444.
15. Califf R. The future of cardiovascular medicine from the regulatory perspective. J Am Coll. Cardiol 2016;68:766-769.
16. Celo Nova Biosciences COBRA PzF nanocoated stent: COBRA PzF stent with polyzene-F nanocoating 2018. [Online]. http://celonova.com/cobra-pzf-nanocoated-stent/. Accessed 18 Apr 2018
17. Chan JW, Lewis DR, Petersen LK, Moghe PV, Uhrich KE. Amphiphilic macromolecule nanoassemblies suppress smooth muscle cell proliferation and platelet adhesion. Biomaterials 2016;84:219-229.
18. Chen Y, Yeager D, Emelianov S. Photoacoustic imaging for cancer diagnosis and therapy guidance. Cancer theranostic. Elsevier Inc., New York 2014, 139-158.
19. Erdely A, Hulderman T, Salmen R *et al*. Cross-talk between lung and systemic circulation during carbon nanotube respiratory exposure. Potential biomarkers. Nano Lett 9:36-43.
20. Hamzah J, Kotamraju VR, Seo JW *et al*. Specific penetration and accumulation of a homing peptide within atherosclerotic plaques of apolipoprotein E-deficient mice. Proc. Natl. Acad. Sci. USA 2013;108:7154-7159.
21. Hubbs AF, Mercer RR, Benkovic SA *et al*. Nanotoxicology-a pathologist's perspective. Toxicol. Pathol 39:301-324.
22. Immordino M, Dosio F, Cattel L. Stealth liposomes: review of the basic science, rationale, and clinical applications, existing and potential. Int. J Nanomed 2006;1:297-315.

23. Irhaam SK. Effectiveness of nanotechnology in treatment of cardiovascular complexities. Journal of creative research 2005;12(10):37-84.
24. Isha AFA, Abdulmajid AMS, Ismail Z, Alrokayan SA, Abu-Salah KM. Development of polymeric nanoparticles of *Garcinia mangostana* xanthones in eudragit RL100/RS100 for anti-colon cancer drug delivery. J Nanomater 2015;16:385 (Article 2015:ID 701979)
25. Jabeen NK. Role of nanotechnology in treatment of cardiovascular complexities. International journal of creative research 2012;12(10):37-84.
26. Jain PP, Leber R, Nagaraj C, Leitinger G, Lehofer B, Olschewski H *et al*. Liposomal nanoparticles encapsulating iloprost exhibit enhanced vasodilation in pulmonary arteries. Int. J Nanomed 2014; 9:3249-3261.
27. Jang WD, Aida T. Dendritic Physical Gels: Structural Parameters for Gelation with Peptide-Core Dendrimers. Macromolecules 2003;36:8461-8469.
28. Kagaya H, Oba M, Miura Y, Koyama H, Ishii T, Shimada T *et al*. Impact of polyplex micelles installed with cyclic RGD peptide as ligand on gene delivery to vascular lesions. Gene Ther 2011;19:61-69.
29. Pai AB, Nielsen JC, Kausz A, Miller P, Owen JS. Plasma pharmacokinetics of two consecutive doses of ferumoxytol in healthy subjects. Clin. Pharmacol. Ther. 2013;88:237-242.
30. Richards JM, Semple SI, Macgillivray TJ *et al*. Abdominal aortic aneurysm growth predicted by uptake of ultrasmall superparamagnetic particles of iron oxide: a pilot study. Circ. Cardiovasc. Imaging 2013;4:274-281.
31. Rosner MH, Auerbach M. Ferumoxytol for the treatment of iron deficiency. Expert Rev. Hematol. 2011;4:399-406.
32. Samad SK. Effectiveness of nanotechnology in treatment of cardiovascular complexities. International journal of creative research 2005;12(10):37-84.
33. Singh SK, Singh MK, Kulkarni PP, Sonkar VK, Gracio JJ, Dash D. Amine-modified graphene: Thrombo-protective safer alternative to graphene oxide for biomedical applications. ACS Nano 6 2011, 2012, 2731-2740.
34. Van ES, Leipsic J, Paul Man SF, Sin DD. The relationship between lung inflammation and cardiovascular disease. Am. J Respir. Crit. Care Med 2010;186:11-16.
35. Wang H, Zhao Y, Wu Y *et al*. Enhanced antitumor efficacy by co-delivery of doxorubicin and paclitaxel with amphiphilic methoxy PEG-PLGA copolymer nanoparticles. Biomaterials 32, 8281-8290.
36. Yilmaz A, Rosch S, Klingel K *et al*. Magnetic resonance imaging (MRI) of inflamed myocardium using iron oxide nanoparticles in patients with acute myocardial infarction-preliminary results. Int. J Cardiol 2013;108:7154-7159.
37. Zhang SF, Gao C, Lü S, He J, Liu M, Wu C *et al*. Synthesis of PEGylated polyglutamic acid peptide dendrimer and its application in dissolving thrombus. Colloid Surface B Biointerface 2017;159:284-292.
38. Zhu MT, Wang B, Wang Y *et al*. Endothelial dysfunction and inflammation induced by iron oxide nanoparticle exposure: risk factors for early atherosclerosis 2013.
39. Zhu MT, Wang Y, Feng WY *et al*. Oxidative stress and apoptosis induced by iron oxide nanoparticles in cultured human umbilical endothelial cells. J Nano Sci. Nanotechnol 2012;10:8584-8590.