evaluated their interaction with anti-TB agents effective against clinical MDR-TB isolate [87]. Lately, stealth liposomes have gained significant attention in lung cancer treatment as they circulate in blood system for longer time and increase the chances of targeted delivery of therapeutic agent at the affected site and regulate the spread of lung cancer [60].

5.2. Niosomes

Niosomes are multilamellar vesicular nanocarrier structure similar to liposomes and are composed of cholesterol and nonionic surfactant. These multilamellar vesicular serve as an alternative to liposomes [88]. These nanocarriers comprise two components such as additives and nonionic surfactant. The nonionic surfactant includes alkyl amides, alkyl ethers, alkyl esters, amino acid compounds, and fatty acid. These nonionic surfactants are used to form the vesicular layer of nanocarrier whereas additives like charged molecules and cholesterol are used for preparing niosomes [89]. These additives aid in improving the fluidity, permeability, and rigidity of bilayer. These nanocarriers are used to deliver antigens, bioactive agents, and hormones as it protects them from premature degradation or inactivation because of unwanted immunological effect. Moreover, these nanocarriers are also used to overcome challenges such as instability, insolubility, and rapid degradation of therapeutic drugs [90].

Niosomes have emerged as a promising therapeutic carrier system. Recently, salbutamol sulfate containing niosomes have been developed and evaluated for stability, sterility, and pharmacological studies for therapeutic potential against Asthma [91]. Even, polysorbate 20 has been encapsulated in niosomes for targeted delivery in COPD patients [92]. The comprehended literature reported about synthesis of ofloxacin and rifampicin-encapsulated niosomes, which has been further evaluated against drug-resistant *M. tuberculosis*. The result obtained from this study showed significant inhibition and controlled growth of drug resistant *M. tuberculosis* [93]. Lately, group of researchers have developed Adriamycin containing niosomes and evaluated in lung cancer-bearing mice. The result revealed that growth of tumor delayed for longer time and suggested therapeutic administration of adriamycin can be enhanced by using it as niosomes [94].

5.3. Nanoparticles

5.3.1. Magnetic nanoparticles

These are those nanocarrier system which gets influenced under the magnetic force and get to the target site within the body either by active or passive approach, due to the presence of ligands present on its surface [95]. Usually, these nanocarriers are composed of super paramagnetic entities as core, which is of the size less than 25 nm. This core contains the material such as nickel, gold, iron, and cobalt and is covered by surface coat which obstructs the interaction of core with the other particles [96]. Moreover, these magnetic nanoparticles show thermic effect when magnetic field is applied from external source, as it initiates the apoptosis signal when 42°C temperature is attained and triggers direct killing on reaching the temperature to 45°C. Whereas in case of nonbiodegradable magnetic nanocarrier, they are coated with layer which leaches the magnetic core from them and the core gets excreted through kidneys [97]. Due to biocompatibility, good loading capacity and definite shape of this nanocarrier make it the effective system for both radiotherapy and diagnosis purpose [98].

The advancement in the field nanotechnology has enabled to developed polyethylene glycol-coated magnetic nanocarriers for noninvasive magnetic resonance imaging (MRI) and specific targeting in asthmatic patient [56, 59, 99]. Another study reported about the synthesizing of antibody-associated magnetic nanoparticles for specifically targeting the alveolar macrophage and MRI in animal model with COPD [100]. Moreover, iron oxide magnetic nanoparticles have emerged as bacterial detection and therapy approach because of its magnetic properties. And, now this approach is also used for imaging and therapy for treating infection caused by *M. tuberculosis* [101]. One more study reported about the development of Fe_3O_4-surface-coated magnetic nanoparticle conjugated with -poly(lactic-*co*-glycolic acid) for controlled drug delivery of quercetin at targeted site in lung cancer cells [102].

5.4. Polymeric Nanoparticles

Polymeric nanoparticle is an effective strategy for targeted delivery of therapeutic agents as they are easy amendable and morphology can be easily altered as per the need [103]. Different types of polymers like alginic acid, gelatin, polylactic acid, chitosan, polylactide-*co*-glycolide, and polycaprolactone are generally used for constructing these nanocarriers. Further, supplementing of sulfide bond to these polymeric nanoparticles provides it the ability to control the release of drug [104]. Usually, cationic polymers are found to be toxic and they also get accumulated at the targeted site because of their poor biocompatibility and nondegradable nature. This provokes the need of consistent monitoring of toxicity, as interaction of these cationic polymers with biosurfactant elicits the complication