Literature Review:

1. Abba Danaldi et al. (2009) suggested that the quality criteria for herbal drugs should be based on a clear scientific definition of the raw materials. They also investigated that the contaminants that present serious health hazard are pathogenic bacteria such as *Salmonella*, *Escherichia coli*, *Staphylococcus aureus*, *Shigella* spp and other Gram positive and Gram negative strains of bacteria.

2. Adenike Okunlola et al. (2007) reviewed that the microbial load of the products varied in herbal formulations. Ten (47.6%) of the samples contaminated by E. coli, seven (33%) contaminated by Salmonella, fifteen (71.4%) contaminated by *Staphylococcus aureus* and twelve (57.1%) contaminated by fungi.

3. Ajay K. Gautam et al. (2009), investigated some powdered herbal materials used in Triphala preparation and mycological analysis of powdered samples was carried out for the detection and enumeration of fungi using standard media and found that fungal contamination was present in almost 91% of the samples.

4. Alok Sharma, et al. (2008), reviewed that herbal drug development is possible only through the development of standardized herbal products. Standardization should be based on chemical activity profile and Safety and stability.

5. Archana Gautam et al. (2010), investigated that medicinal plants containing bacteria and molds are coming from soil and atmosphere. Analysis of the limits of *E. coli* and molds in medicinal plants shows that the harvesting and production practices are the main reasons behind these bacteria and molds they also concluded that aflotoxins should be completely removed or should not be present.


7. Bandaranayake M. W (2006), reviewed that herbal preparations are safe but could be contaminated with microbial and foreign materials such as heavy metals, pesticide residues or even aflatoxins due to the unhygienic way many are produced he also warned that presence of any of the possible contaminants increases morbidity and mortality.
8. **Chitrarekha Kulkarni et al. (2010)**, reviewed that according to WHO standards, values of the microbial limits should not exceed 105/g for total aerobic bacteria, 103/g for yeast and moulds, 10/g for *E. coli* whereas *Salmonellae, Staphylococci* and *Pseudomonas* should totally be absent.

9. **Hardik K. Soni et al. (2010)**, analyzed Manjistha, Kokam and Punarnava for Microbial analysis and revealed that these herbal drugs shown < 10 cfu/gm total bacterial counts.

10. **Kalaivelan V. et al. (2010)**, reviewed and suggested that as the use of herbal preparations by patients is increasing, there is an urgent need for pharmacists and physicians to have knowledge about the safety of these preparations.

11. **Kedzia B. et al. (1983) and Vineeta Kumari et al. (1989)**, reviewed that the antimicrobial activity of drug plants had been studied in India and abroad but there is very less literature regarding microbial contamination of herbal drugs however some workers have reported fungi from plants part used in drug preparation.

12. **Kirtikar K.R. and Basu B.D.** Suggested that Aflotoxins should be completely removed or should not be present.

13. **Kunle et al. (2012)**, Investigated that Pathogenic organisms including Enterobacter, Enterococcus, Clostridium, Pseudomonas, Shigella and Streptococcus contaminate the herbal ingredients they also suggested that limits be set for microbial contamination.

14. **Mruthyumjaya meda rao et al. (2011)**, investigated the herbal formulations for heavy metals and pesticides residues and found that heavy metals and pesticides residues are beyond the WHO specifications.

15. **Nakajima K. et al. (2005)**, stated that presence of microbial contaminant in non sterile pharmaceutical products can reduce or even inactivate the therapeutic activity of the products and has the potential to adversely affect patients taking the medicines.

16. **Nandna Khurana et al. (2010)**, Investigated the five herbal formulation and found that total Yeast and mould count in all five samples is beyond the prescribed limits of WHO while Specific pathogenic bacteria are absent in all five sample of herbal drugs. They concluded that microbial load is higher than WHO norms may be harmful as they can produce toxic substance like aflatoxins which may cause harm to the human heath instead of curing the disease.

18. **Okoko, F. J. and Nwanade, E. E (2010)**, Studied the susceptibility of *Pseudomonas aeruginosa* and *Staphylococcus saereus* from wound infections to the gel and ethanolic leaf extracts of Aloe vera plants.

19. **Okunlola Adenike et al. (2007)**, reviewed the national Agency for Food Drug Administration and Control (NAFDAC), Nigeria is responsible for Drug Administration and control of the quality of medicinal products including herbal medicinal products available in the markets.

20. **Oluyege J. O. et al. (2010)** investigated microbial contamination of some herbal products hawked in Ado-Ekiti metropolis. They have hawked eight herbal medicines and investigated to bacteriological examination. Their findings showed total counts for *E.coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* ranged from 3.7 x 10⁴ – 2.8 x 10⁵, 1.0 x 10⁴ – 2.8 x 10⁴ and 2.0 x 10⁴ – 8.0 x 10⁴ cfu/ml respectively. Fungal counts ranged from 3.0 x 10¹ and 4.0 x 10⁴ spore forming unit per millilitres.


22. **Saurabh Parmar et al. (2011)**, analyzed the Zymodyne syrup for microbial content and found that *Escherichia coli*, *Salmonella sp.*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* were absent while yeast, moulds and total aerobic viable were present below the prescribed limit.

23. **Sherikar A. S et al. (2010)** Investigated the samples (A and B) tested for relevant physical and chemical parameters and also subjected to microbial screening through quality control measures. Pathogens *E. coli*, *S. aureus* and *P. aeruginosa* were found to be absent.

24. **Soni Hardih K. (2010)** analyzed the solid herbal formulation containing ashwagandha and found that pathogens like *E. coli*, *Salmonella*, *P.aeruginosa* and *S.aureus* were also absent in capsule.

25. **Soni Hardik K. et al. (2010)** analyzed the capsule containing herbal drug as per procedures of Indian pharmacopoeia 2007 and WHO Guideline. The test included total
bacterial count, total yeast and mould count, Identification of specified organisms such as *Escherichia coli, Salmonella sp., Staphylococcus aureus* and *Pseudomonas aeruginosa*.

26. **Sunita Panchawat et al. (2009)** analyzed the microbial contamination in herbal raw material using total plate count and MPN coliform.

27. **Ukani krunal A. et al. (2010)** reviewed that pathogens like E. coli, Salmonella, P. aeruginosa and S. aureus were absent in herbal raw materials & finished product.