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Microencapsulation: A Taste and Odour Masking Approach for Garlic (*Allium sativum*) Powder

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SUMMARY

The purpose of this study was to prepare a convenient formulation of garlic powder which has enhanced user compliance by suppressing its characteristic odour and masking the taste. Microcapsules of garlic powder were formulated by solvent evaporation method. Results show >80% yield, >70% drug loading efficiency and slow release profile (promising sustained action for more than 2hrs) and a significant reduction in the aromatic smell and taste evaluated through a single blind cross-over study conducted using ten healthy human volunteers.

INTRODUCTION

Garlic (*Allium sativum*) is a useful herbal remedy having antimicrobial, antioxidant, anti-tumour, and antihypertensive activity. It lowers serum cholesterol levels and known to show dynamic hypoglycaemic effects (Bayan et al, 2014). Garlic is available in diversified forms including; the intact cloves, powder, extract, oil and aged garlic extract. Daily use of garlic is hampered because of its depraved odour and disagreeable taste. Many strategies have been made to mask the bad odour/taste of garlic. These include formation of complex coacervates of garlic oil (Hansanugrum and Barringer, 2010), ingestion of milk after its garlic consumption (LeeFong and CheeSian, 2013) and spray drying to produce microcapsule (Balasubramani et al, 2015). These formulations mainly used garlic extract/oil, however, extraction process itself is very complicated and difficult so it is more preferable to use garlic powder, which shows quite similar activities as like other forms of garlic (Ross et al, 2001). The aim of present study is to facade the taste and odour of garlic powder by using microencapsulation technique.

MATERIALS AND METHODS

Fresh cloves of garlic were obtained from local market. Polymers, Ethyl cellulose (EC) and Hydoxypropyl cellulose (HPC), magnesium stearate and liquid paraffin were purchased from local supplier. The garlic cloves were peeled, sliced, and dried at 40°C for three days, and crushed into a fine powder

Microcapsules of garlic powder were prepared by solvent evaporation method. For this, accurately weighed 2g of garlic powder was triturated in a clean and dry and mortar pestle, EC (1g) was dissolved in~20ml acetone and was kept aside. In a glass jar, 200ml liquid paraffin was taken and garlic powder

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and HPC (1g) was added. The mixture was stirred at 800 rpm along with the drop wise addition of organic polymeric mixture (EC/acetone). The microcapsules were filtered and washed with three 25 ml volumes of n-hexane and dried at 40°C for 2 hours. The prepared microcapsules were photographed and analysed for % yield, entrapment efficiency. A single blind cross-over study was conducted using ten volunteers. All the volunteers were given samples of microcapsules to smell them, and then put a small amount of sample on the tongue for 30 seconds, and then asked for the taste and odour of microcapsules prepared on the given questionnaire.

RESULTS AND DISCUSSION

Two samples of microcapsules were prepared. Sample A contained garlic 2g, polymer EC 1g and HPC 1g whereas Sample B is the formulation of 2g garlic in 1.25g of EC and 1.25g of HPC. The results of both samples regarding %age yield, entrapment efficiency and drug loading were mentioned in the Table 1.

Table 1. *Various characteristics of microcapsules of both formulations A and B (Q120 represents drug release in 120 min).*

Formulation	Field (%)	Drug loading (%)	Entrapment efficiency (%)	Q120 (%)
A	85.53	70.63	60.41	70.63
B	79.12	76.44	64.28	76.44

The blind cross-over study shows the 50% of volunteers feels no taste, while 30% fails to recognize the taste and only 20% successfully identify the taste of garlic in the microcapsules of sample A, while the result for sample B is 50% for no taste, 40% unknown taste and only 10% recognize the taste.

However, the odour of garlic is significantly masked in only one sample B (2:2.25) with odourless evaluation up to 60%, and 30% of volunteers reported a slight odour. Sample A gives a slight, medium and characteristic garlic odour 30%, 50% and 20% respectively. The probable reason behind this is lower quantity of polymer as compared to sample A. Therefore, it is evident from the results that the combination of EC and HPC has effectively masked the astringent taste and odour of garlic for which these two materials are already well-known (Taki et al, 2017).

CONCLUSIONS

Garlic microcapsules efficiently conceals the overpowering taste of garlic by solvent evaporation techniques using a combination of polymers and shows significant reduction in the aromatic odour making it more user friendly overcoming the issue of bad taste and enhancing the compliance of garlic as a powder.

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REFERENCES

Balasubramani, P., et al., 2015. International Journal of Biological Macromolecules. 72: 210-217.

Bayan, L., et. Al., 2014.Avicenna Journal of Phytomedicine, 4(1), 1-14.

Hansanugrum, A. and Barringer, S.A., 2010.Journal of Food Science,75(6), C549- C558.

LeeFong, S. and CheeSian, O., 2013. Journal of Food Processing and Technology,4(1).

Ross, Z.M., et. al., 2001.Applied and Environmental Microbiology, 67(1), 475-480.

Taki, M., Tagami, T. and Ozeki, T., 2017. Drug Development and Industrial Pharmacy, 43(5), 715-722