

A Review on Stability Studies of Some Herbal Products

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Abstract

The present review is an attempt to compile information related to importance of herbal products and also about their stability. The increasing number of metabolites of absorbed drug components containing herbals as active constituent motivates the scientists to observe their formed degradation products at various environmental conditions. Many studies have done earlier to evaluate the properties of obtained degraded properties. In present studies, we focused on mainly three herbals such as ginger, ginseng and garlic derived products. This study will help to understand about the importance of stability of herbals.

Keywords: Ginger, Ginseng and Garlic derived products

Introduction

Herbal drugs have been used since prehistoric times for treating a wide range and variety of diseases. Since, herbal drugs are having natural substances, these drugs are considered to be safe for treating various kinds of diseases. In a recent study, it has been found that in order to treat primary health problems the stability testing is mandatory requirement in order to make herbal medicinal products 'registered' by statutory bodies for use by common people, and which also includes the storage conditions of herbal drugs [1]. The stability testing of herbal drugs should be done in order to ensure public health[2]. The storage conditions of herbal

drugs are determined by exposing the herbal product under some extreme conditions to check its degradation parameters. The quality of the herbal drug is checked thereby, whether it has degraded under extreme climatic conditions or it was able to retain its quality[3].

General need for stability testing of herbal products:

All herbal medicines cannot be kept for a longer period of time; those can be used only for a limited period of time. The possible reasons for degradation of herbal medicines have been listed by Rhodes in 1984. These are as follows[4, 5]. :-

1. Due to oxidative degradation of drugs.
2. Due to water evaporation.
3. Due to caking or creaming of drugs.
4. Due to altered bioavailability.
5. Due to texture change in drugs.
6. Appearance of hazardous compounds.
7. Microbiological activity.

Stability studies of ginger preparations: Ginger, belonging to the family Zingiberaceae is the dried rhizome of *Zingiber officinale*. Ginger is used as an appetizer, as a stomach reliever and to give relief in cough and cold. It has been in use in China since prehistoric era[6].

Figure 1: Constituents of fresh ginger.

Table 1: Stability studies of Gingerol and Shogoal

Ginger extracts	Degradation conditions	Results and discussions	References
6-Gingerol	pH range from 1-7 at 37 ⁰ C	Relatively stable.	[7-9]
6-Gingerol	Greater than 60 ⁰ C	Degradation of more than 50% of the Gingerol in a time period of 24 hours.	

Effect of pH:			
6-Shogol			
6-Gingerol	pH-1	Half life was found to be 14 days.	
6-Shogol	pH-1		[7-9]
6-Gingerol	pH-4	Half life was found to be 24 days.	
	pH-4	Gingerol exhibited highest stability.	
		Shogol exhibited highest stability.	

Figure 2: The process denoting the way in which gingerol undergoes degradation in acidic conditions

Degradation studies of American Ginseng (*Panaxquinquefolium*) extracts subjected to Conventional heating and Microwave conditions: Asian ginseng (*Panax ginseng*) and American ginseng (*Panax quinquefolium*) are the two essential medicinal plants, whose roots are used as healthy foods. The principle constituents in both the types are malonyl ginsenosides and neutral ginsenosides[10, 11].

Figure 3: Chemical structure of triterpene sapogenins “Protopanaxatriol” of Ginseng

Breakdown of Ginsenosides American Ginseng (*Panaxquinquefolium*) extracts subjected to Conventional heating and Microwave conditions: Ginsenosides degrade in solutions of ethanol and the reaction is of first order. Neutral ginsenosides are more stable than malonyl ginsenosides; as the malonyl ginsenosides exhibit 3-60 times more rate constant values than the neutral ginsenosides. At similar temperatures, the degradation of ginsenosides in equal concentrations of 50% ethanol-water extracts show same rate constant values between the conventional heating and microwave methods[12].

Biological and Chemical Stability of Garlic-Derived Allicin: Garlic also known as *Allium sativum* is reported to exhibit wide pharmacological activities like it stops cancer, it has antiplatelet activity, it can also stop microbial activity and also prevents thrombosis[13].

Figure 4: Chemical composition and bioactive compounds of garlic

Table 2: Stability studies of Garlic derived Allicin

<u>Garlic extracts</u>	<u>Decomposition parameters</u>	<u>Results and discussions</u>	<u>References</u>
Allicin	Treated with water or ethanol (100%)	Allicin undergoes complete degradation at room temperature within a half-month.	[14-16]
Allicin	Treated with 20% and 50% ethanolic aqueous solutions	Allicin was maintained for a number of weeks at normal temperature.	
Allicin	Biological stability of garlic extracts: In 20% alcohol	Allicin exhibited good antibacterial activity against gram-positive bacterium (Staphylococcus aureus) and against gram-negative bacterium (Escherichia coli.)	[14-16]
Allicin	50 and 70% alcohol	The zone of Staphylococcus aureus showed 3 times larger inhibition as compared to Escherichia coli; so allicin is	

Allicin	n-hexane and vegetable oils	more gram positive active as compared to gram negative. The concentration of allicin along with its activity decreased hugely as compared to solutions of ethanolic extracts.	
Allicin	Half-life: Treated with vegetable oils	Chromatographic conditions show that chemical half-life of allicin was found to be 3.1 hours, whereas the biological half-life was found to be 2.4 hours for Staphylococcus aureus and 0.8 hours for Escherichia coli.	[14-16]
Allicin	Temperature: Below 10 ⁰ C Between 10-16 ⁰ C Above 16 ⁰ C	Allicin is unstable in ethanolic garlic extracts (EGE) than in acetonic garlic extracts (AGE.) In EGE Allicin decomposition was slower than in AGE. Allicin is known to decompose faster in AGE.	[14-16]

Conclusion: In this present study we have studied about various parameters where the herbal products should be stable. We have also discussed about the structures of degraded products of few herbals such as ginger, ginseng and garlic derived products.

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