

Preliminary study on the preparation of honey tablets with Aerosil 200 as adsorbent by direct compression method

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Abstract

Further investigation on the preparation of honey tablets was carried out with the help of Aerosil 200 as adsorbent to dry up the liquid honey and the addition of manitol, lactose, aspartam, magnesium stearate strawberry as flavouring agent, and pink colouring agent. The tablets resulted had a good in appearance while the tablets. friability of the honey tablets were good *i.e* less than one percent.

INTRODUCTION

This study elaborate the preparation of honey tablet with the help of absorbent *i.e* Aerosil 200 as one of ingredients (in addition to lactose manitol, colouring and flavouring agent and magnesium stearate). Since the usage of honey is as an energy supplier, there are no report so far that search about tableting of honey. Our previous work with honey was on the lozenges tablet and granules (6,7) Tabletted honey, if possible, can be beneficial to people such as sportsman, since they can use the tablet as a source of energy. However, honey contain a high content of water, *i.e* about 17 %, which make it difficult to form a tablet. A very good absorbent is necessary to dry up "liquid honey". In this study, honey was dried using Aerosil 200 and then lactose and manitol were added and compressed into lozenges tablet, after the addition of colouring agent, magnesium stearate as lubricant and strawberry as the flavouring agent.

Lozenges are solid tablet preparations, containing one or more medications, usually in a flavoured, sweetened base which are intended to dissolve or disintegrate slowly in the mouth.

EXPERIMENTAL

In the effort to make a good quality of honey tablets, water content of honey was analysed. It was found that water content was 19,59 %. When honey was ashed there was 0,46 % of residue. It might possible that honey contained some material such as pollen, impurities such as dirt and fraction of bee heeves which contribute to the amount of residue. However, it was lower than the requirement mentioned in Indonesian Standard for Industry *ie*. 0,50 %.

The acidity of honey was investigated and showed that the acidity was 40.6 meq/kg. It might possible that the acidity was higher than 40 caused by fermentation occurred during storage.

The amount of solid content found was 0,46 %, while standard allows up to 0.50 % of solid content.

Concentration of hidroxyethylfurfural found was 63 mg/kg. It was determined by mixing five gram of honey with ether in a separator funnel. Ether layer was separated and evaporated below 25 °C . Hidroxyethylfurfural will be formed if honey expose to heat, where sugar in acid environment will form hidroxyethylfurfural. The amount of hidroxyethylfurfural in tropical area usually high.

Sugar is the main component in honey. According to Indonesian Standard for Industry the sugar content in honey at least 60%. It was found in this experiment that sugar content was 64 %.

Sucrose in the honey sample found was 9.71 %, while Indonesian Standard for Industry stated that sucrose should less than 10 %.

Appearance, odor and taste of the honey used originated from *Gossypium spp.* was light brown to yellow in color, the odour was not clear, with sweet taste.

The limit for dangerous metal that might be found in honey *ie.* for Pb is 10 ppm, Arsen 1 ppm and Cu 30 ppm. It was found that the residue contained only Cu at 0.2 ppm..

The viscosity of honey found was 43.67 psi.

Manitol is widely used in pharmaceutical formulations and used as diluent in tablet at 10 to 90 % . It is very good diluent since it is not hygroscopic and thus it may be used with moisture sensitive ingredients such as honey. Manitol may be used in direct compression tablet applications (1), for which the granular form resulted with the addition of magnesium stearate as lubricant at 1-2 % w/w, or wet granulation (2) Manitol is commonly used as an excipient in the formulation of chewable tablet, because of its negative heat of solution, sweetness and mouth feel (3). Manitol is a white, odorless, crystalline powder, free flowing granules. It has a sweet taste, approximately as sweet as glucose and half as sweet as sucrose, and give a cooling effect in the mouth.

Lactose is widely used as a filler or dilluents in tablets and capsules. Lactose that used for direct compression are more fluid and more compressible than crystalline or powdered lactose and are composed of spray dried lactose which contain specially prepared pure alfa lactose monohydrate along with a small amounts of amorphous lactose that improve the compression force/hardness profile which is good for a chewable tablets. It is used at the concentration of 65 – 85 % . In this study, some of the lactose proportion was replaced by manitol.

The formula of the tablets is presented below

Ingredients	Formula		
	Formula I	Formula II	Formula III
Honey	20.0	20.0	20.0
Aerosil 200	15.0	20.0	25.0
Manitol	35.0	35.0	35.0
Lactose	27.0	27.0	27.0
Aspartam	0.3	0.3	0.3
Mg. Stearic	1.0	1.0	1.0
Orange oil	1.3	1.3	1.3
Carmin	0.4	0.4	0.4

Honey was weighed and dried using Aerosil.200. After sufficiently dried, it was weighed to calculate the amount of Aerosil 200 added. Three different formula with

different amount of Aerosil 200 were used to see the best characteristics of honey tablets. While the amount of manitol and lactose used totally were 65.0 %, and Mg.stearate as lubricant added lastly were 0,5% and mixed well for five minutes in a plastic bag.

Honey was bought from a shop in Bandung, West Java, and was dried with the addition of Aerosil 200. To the dried honey, manitol and lactose, were added and mixed thoroughly. After the addition of magnesium stearate (0.5 %) as lubricant, (Magnesium stearate is primarily used as lubricants in tablet manufacture at concentration between 0.25 – 5.0 %). it was mixed and compressed into tablet with diameter of 20 mm.

Lozenges usually need not to check the disintegration time, therefore, only hardness, friability and diameter were tested and recorded.

RESULTS

Quality of honey used

No	Parameter	Results	Indonesian National Standard 1994
1	Water content	16.9 %	Max 22.00%
2	Ash	0.296 %	Max 0.5%
3	pH	5.6	-
4	Diastase Enzyme	+	+
5	Undissolved solid	0.44 %	0.50 %
6	Hidroxymetylfurfural	35.64 %	Max 40,00 mg/kg
7	Invert sugar	65.45 %	Min 60%
8	Metal		-
9	Colour, odour & taste	Normal	Normal
10	Viscosity	25.85	-

Tests on precompression materials

No	Parameter	Results
1	Water content of powdermix	2.1 %
2.	True density	0.07 g/ml
3.	density	0.50 g/ml
4.	Tap density	0.58 g/ml
5.	Compressibility	13.96 %
6.	Fluidity : - Without lubricant - With lubricant	4.34 g/sec 7.25 g/sec
7.	Angle of repose - Without lubricant - With lubricant	25.35 ⁰ 17.58 ⁰

In the first effort last year, first batch of tablets resulted had a fade colour with 13 mm of diameter, a little bit fade, not very good surfaces although not because of sticking but generally good in appearance. However, hardness was a little bit low, *i.e* only 30 N. It might possible that the addition of Aerosil 200 was not sufficient enough to make a good dry mix, however, the tablets. friability of the honey tablets were good *i.e* less than one percent. At that time we used ingredients as follows :Honey, Lactose as filler, Skim Milk as drying agent (for honey), Mg Stearate as lubricant, Ginger Extract as stimulant, Chocolate Powder and Essence as adjuvant,

In this experiment the lozenges resulted by using the third formula had the best appearances, with homogeneous colour and the tablets were shiny without mottling.

The Quality of Honey Lozenges

No	Parameter	Results
1	Weight	2.07 g
2	Diameter	20.22 mm
3	Thickness	4.86 mm
4	Friability	0.66%

DISCUSSION

Honey, sweet, thick, supersaturated sugar solution manufactured by bees to feed their larvae. The nectar of flowers is ingested by worker bees and converted to honey in special sacs in their oesophagi. It is stored and aged in combs in their hives. Bee honey is an important constituent of the diet of many animals, such as bears and badgers, and is put to many uses by humans, honey is traditionally used to sweeten foods - a natural sweetener from collected nectar.

Bee honey is composed of fructose, glucose, and water, in varying proportions; it also contains several enzymes and oils. The color and flavor depend on the age of the honey and on the source of the nectar. Flavours of honey are varied and have mild and strong profiles. The benefits of honey extend beyond its natural sweetness as a source of antioxidants that help break down free radicals.

Vitamins found in honey may include, depending on floral variety, niacin, riboflavin and pantothenic acid. Minerals present include calcium, copper, iron, magnesium, manganese, phosphorus, potassium and zinc.

As the colour and flavour of honey varies by floral source, vitamin, mineral, antioxidant and amino acid contents vary as well. Honey also has a phytochemical profile which includes polyphenols that can act as antioxidants. Antioxidants perform the role of eliminating free radicals, which are reactive compounds in the body. Free radicals are created through the normal process of metabolism and contribute to many serious diseases. .

The antibacterial properties of honey may help clear infection in wounds, and the anti-inflammatory action of honey may reduce pain and improve circulation, which hastens the healing process. According to Dr Peter Molan from the University of Waikato: Honey stimulates the regrowth of tissue involved in healing, making healing faster and reducing scarring. Honey has a fuel value of about 3307 cal/kg (about 1520 cal/lb). It readily picks up moisture from the air and is consequently used as a moistening

agent for tobacco and in baking. Glucose crystallizes out of honey on standing at room temperature, leaving an uncrystallized layer of dissolved fructose. Honey to be marketed is usually heated by special processes to about 66° C (about 150° F) to dissolve the crystals and is poured into containers that are then sealed to prevent crystallization.

Direct compression methods used in this study was intended to avoid the use of water and heat in the preparation. since honey contain amino acids, protein, carbohydrate, vitamins etc. which are not suitable to prepare tablets with heating, therefore, direct compression method was used.

The term direct compression was used to identify the compression of a single crystalline compound into a compact without the addition of the other substances. The term now is used to define the process by which tablets are compressed directly from powder blends of active ingredients and suitable excipients (including fillers, disintegrants and lubricants). Direct compression involve only dry blending and subsequent compression, which is more efficient and economical. The advantages is that processing without the need of moisture and heat.

It was found that the tablets resulted were much better than the previous study. This is mainly due to the inclusion of Aerosil 200 as an adsorbent to dry honey.

The use of manitol was intended as a sweetener, although honey itself has a sweet taste, however, the addition of Aerosil 200 resulted in the decrease of the sweetness.

The problem at the previous study was that the weight of each tablet (*ie.* 850 mg) compressed into 13 mm of diameter resulted in thick tablets, and can accomodate only 26 percent of the usual intake of honey. However, improvement in this study would improve the situation by replacing manitol with Aerosil 200 until sufficient dryness could be achieved. At the moment work in progress as well to improve the taste by adding strawberry as flavouring agent with the diameter of the tablets was made 200 mm. It was found that the addition of strawberry flavour improve the taste, however, investigation to find out the receptance of the user by using Hedonic test and stability study is still in progress.

REFERENCES

1. Ward, DR., Lahroph, L.B., Lynch, M.I., 1969, Dissolution and compatibility considerations for the use of mannitol in solid dosage forms, *J. Pharm. Sci.*58: 1464-1467.
2. Mendes, R.W. Goll, As., An CQ., Wet granulation,: a comparison of Manni Tab and manitol. *Drug Cosmet. Ind.* 22(3): 36.38.40.41, 87-88.
3. Daoust R.G. Lynch, MI., 1963, Manitol in chewable tablets, *Drug Cosmet. Industry*, 93 (1): 26-28, 8s, 52, 128 – 129.
4. Ainley, W., Weller, P.J., 1994, Handbook of Pharmaceutical Excipients, American Pharmaceutical Association, Washington, 252, 280, 294.
5. Goh, J.,2005, Honey: Health Naturally, *Asia Pacific Food Industry*, vol 17 no 3, page 36, 37
6. Padmadasastra, Y., Preparation Of Honey Tablets by Direct Compression Methods, 2004, International Symposium on Biomedicines, Biopharmaca Research Centre, Bogor,
7. Padmadasastra, Y, Reskantika, R., 1995, Formulation of Granules Containing Honey, as the Preparation of Ready to Use Drink. Dept. of Pharmacy, Faculty of Science, Padjadjaran University.