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EXTRACTION OF LECITHIN FROM EGG YOLK AND ITS CHARACTERIZATION

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ABSTRACT

The aim of the present study was to extract lecithin from egg yolk by precipitating it with acetone followed by centrifugation to separate supernatant liquid from the precipitate and then evaporate solvent with the help of lyophilizer. Egg lecithin was standardized by TLC analysis and FTIR spectroscopy. Egg lecithin was successfully isolated in a very economical way from egg yolk and all the parameters were evaluated and found within the specified limit. FTIR and chromatographic analysis shows the presence of ester linkage, alkane and hydroxyl group.

KEYWORDS

Egg lecithin, Isolation and Standardization.

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INTRODUCTION

Lecithin (derived from Greek word "lekithos", meaning "egg yolk"). This term indicates any group of yellow-brownish fatty substances which consist of choline, glycerol fatty acid, and phospholipids. It is used for smoothing food textures, emulsifying agent, and repelling sticking materials. It is actually a blanket for a series of compound[1,2].

French chemist Theodore Gobley was first to isolate lecithin in 1845[3] in which he described lecithin as a substance which allows oil and water to mix. It is used for treating liver ailments, nerve diseases, and high levels of cholesterol in the blood, as well as in the food processing industry.

Lecithin[4] has numerous applications in the food processing industry but it also plays a significant role in the encapsulation process of liposomes. The

colloidal behavior of lecithin and the lipid vesicles were described by Bangham in 1961. In his research work he found that in his study he found that "liposomes are artificial vesicles having smaller spherical shape which can be produced from natural phospholipids[5] and non-toxic cholesterol." Liposomes[6] act as drug delivery system which was developed to improve the bio distribution of compounds at particular location in the body with reduced toxicity and maximum therapeutic index.

OBJECTIVE

The main objective of this work was to isolate lecithin from egg yolk. To develop a technique this was relatively easy, inexpensive, and reproducible method. Characterization of lecithin by using modern analytical techniques involving FTIR, TLC etc. and other methods.

MATERIAL AND METHODS

Isolation

Eight egg yolks were collected and were put in a beaker. To it 50ml of acetone was added and precipitation takes place. It was stirred with the help of glass rod for some time. Precipitate was placed in the centrifuge tube. Centrifuge tubes were kept in the centrifugation machine for five minutes and it was rotated at 4000 rpm. Supernatant liquid was separated from precipitate and was kept in the beaker. Precipitate was collected and it was washed with acetone. This step was repeated for 2-3 times for filtration purpose.

After filtration the precipitate appears as white colored substance and filtrate as colorless. A mixture of chloroform and ethanol was added to the precipitate in the ratio of 2:1 for extraction purpose and it was left for 3 hrs. Precipitate was filtered and the filtrate was collected and was transferred to a petri dish. The solvent was evaporated by lyophilization technique and the crude lecithin was extracted. The extracted crude lecithin was dissolved in 10ml petroleum ether and to it only 50ml acetone was added to the precipitate and was kept for some time. Then lecithin was settled down in the petri dish and the liquid was decanted. The sticky substance which was settled down in the petri dish was the egg lecithin.

Standardization

Egg lecithin was standardized by considering the physio-chemical characteristics like state, odor, taste etc. TLC analysis and FTIR spectrometric analysis of egg lecithin was performed. FTIR study was performed by using KBr pellet technique.

RESULTS AND DISCUSSION

FTIR Spectrometric analysis

FTIR spectrum of egg lecithin shows peak at 2933.83cm^{-1} to 2852.81cm^{-1}, which indicates the presence of C-H stretching of alkane group. Another band at 1743cm^{-1} indicated the presence of ester linkage. Another band at 3508.63cm^{-1} indicated the presence of O-H stretching of hydroxyl group.

Physio-chemical characteristics

Table No.1: Results of various physio-chemical tests

S.No	Different characteristics	Results
1	State	Semisolid
2	Color	White when freshly made, but becomes yellow to brown coming in contact with air
3	Odor	Characteristics
4	Melting point	153˚C
5	pH	6.0
6	Solubility	Soluble in methanol, chloroform, petroleum ether
7	Storage	Store in a cool, dry, ventilated place in a sealed container away from heat

Thin Layer Chromatographic analysis

Table No.2: Optimized Thin Layer Chromatogram of lecithin from egg yolk

S.No	Mobile phase	Proportion (%)	Distance travelled by solute(cm)	Distance travelled by solvent(cm)	Rf value(Retention factor)
1	Chloroform: methanol: hexane	70:20:10	4.7	6	0.78
2	Chloroform: methanol: ammonia	60:30:10	1.5	4.5	0.35
3	Chloroform: methanol: ammonia: Dist water	70:20:5:5	1.6	4.4	0.36

Table No.3: Comparative study of R_f values of Egg lecithin and standard lecithin

S. No	Solvent system	Prepared		Standard		Rf value(Retention factor)	
		Dis. Travelled by solute(cm)	Dis. Travelled by solvent(cm)	Dis. Travelled by solute(cm)	Dis. Travelled by solvent(cm)	Prepared	Standard
1	Chloroform: methanol: hexane	4.7	6	4.8	6	0.78	0.80
2	Chloroform: methanol: ammonia	1.5	4.5	1.7	4.5	0.35	0.37
3	Chloroform: methanol: ammonia: Dist water	1.6	4.4	1.6	4.5	0.36	0.35

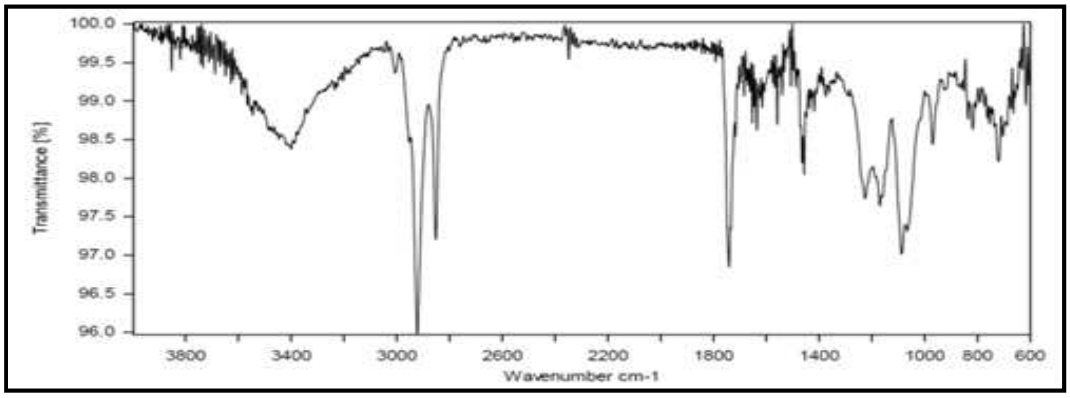

Figure No.1: FTIR spectra of egg lecithin - sample

CONCLUSION

Egg lecithin was successfully isolated in a very economical way from egg yolks and all the evaluated parameters were found within specified limit. The prepared lecithin was characterized by FTIR and TLC where the FTIR data shows that the prepared egg lecithin when compared to that of the standard one, it was found that it was similar to that of the standard one. The amount obtained (approximately 80%) was sufficient good enough so that it can be further used for the preparation of liposomes.

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CONFLICT OF BENEFIT

We declare that we have no conflict of interest

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