Morphological, Proximate and Sensory Analysis of the Developed Product Made by Coconut Residue after Extraction of Cold Pressed Coconut Oil

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Abstract:- Cold pressed coconut oil is saturated fatty acid and contain medium chain triglycerides (MCT). After extraction of cold pressed coconut oil, to developed by-product from the residue (coconut flour or desiccated coconut) of coconut with flaxseed, peanut, bajara and oats. Flaxseeds rich in omega-3 fatty acid, oats have high in dietary fibre. In this research, there is a estimation of proximate analysis of the product like moisture, ash, protein, and fat. The research also include the morphological structure of the product through SEM, sensory evaluation through hedonic rating test of the product.

Keywords:- SEM and EDX, Sensory Analysis.

I. INTRODUCTION

Coconut *(Cocus nucifera)* belongs to the *Aracaceae* family. Most of the tropical countries coconut is a commercial crop that is used in the daily diets as a cooking oil. Coconut and coconut oil content rich in various constituent. Coconut oil is consumed in a large amount for domestic and industrial uses. Coconut oil contain 92% of saturated fatty acids and its taste is naturally sweet. Coconut oil is protect against the cardiovascular diseases and lowering the risk of arthrosclerosis. It contain also the antiviral, antibacterial, anti-inflammatory and anti-obesity effect of MCTs. According to the method of preparation coconut oil is classified as refined or unrefined and hot pressed and cold pressed oil.

Flaxseed *(Linum usitatissimum* L*)* belongs to *Lineaceae* family. It is locally known as *alsi*. Flaxseed is the best and richest source of omega-3 and omega-6 fatty acid, linolenic acid, polyunsaturated fatty acid (PUFA) and monounsaturated fatty acid (MUFA), soluble and insoluble fibre, phytoestrogen lignans, protein and a range of antioxidant. Flaxseed contains the many component such as oil, protein, dietary fibre, soluble polysaccharides, lignans, phenolic compounds, vitamins(A, C and E) and minerals like phosphorus, magnesium, potassium, sodium, iron, copper, manganese, zinc. The intake of flaxseed in a diet, it is beneficial in hypertension, atherosclerosis, diabetes, cancer, arthritis, and osteoporosis, auto-immune and neurology disorders.

Peanut*(Arachis hypogaes)* belongs to *fabaceae* family. It is also known as groundnut. Peanut is a type of legume. Peanut is mainly used in domestic kitchen purposes. Peanut's by-product is groundnut oil. It is excellent source of compounds like, phenolic acids, flavonoids an phytosterols. The peanut contain phytosterols block the absorption of cholesterol from diet. It contain protein, fibres, polyphenols, antioxidants, vitamins and minerals. Peanut have diseases preventive properties. Peanut is used as oil, butter, due to high amount of fat content in it. Peanut is complete dietary source and is rich in MUFA and PUFA. The component that are found in peanut is highly digestible.

Oats*(Avena sativa)* is a cereal grain which are cultivated in poor soil conditions. Those soil which are unable to thrive other crops. Now a days, the intake of oats gradually increased among the people, because it contain B-glucan and total dietary fibre. The germ and the bran of oats cover with phytochemicals includes of cotrienols, phenolic compound, tocopherol and plants sterols. Oats are eaten as a weight diet control food. It is measure as high calorie food. It is also rich in vitamin E and B complex and contain the antioxidant properties.

Pearl millet *(Pennisetum typhoideum)* and locally known as Bajra in India. It cultivated in low rainfall and low soil fertility and high temperature . It is rich in iron and zinc, contain high amount of antioxidant. It is primary source of calorie intake. Bajra is a source of protein, calcium, phosphorus. It contain fairly amount of thiamine, niacin and riboflavin.

II. MATERIAL AND METHODS

A. Preparation of by-Product (Coconut Ladoo)

➤ *Material*

This experiment was done in the kitchen of the department of food and nutrition, BBAU, lucknow. In the preparation the material is flaxseed(20g), bajra flour(20g), peanut(20g), oats(300g), ghee(40g), desiccated coconut

(100g) and sugar powder(60g). The materials are collected from the local provision shops near Saheed nagar colony, opposite, BBAU, Lucknow.

➢ *Methods*
    Firstly take all ingredient such as flaxseed, peanut, bajra, oats and desiccated that extract from the cold pressed coconut oil. Dry roast all the ingredient on a medium flame. Grind all the ingredient and transfer into a bowl. After add the ghee and sugar powder in bowl. Mix all the ingredient perfectly and make small ladoos with the help of palm. After the ladoos are store in air tight container.
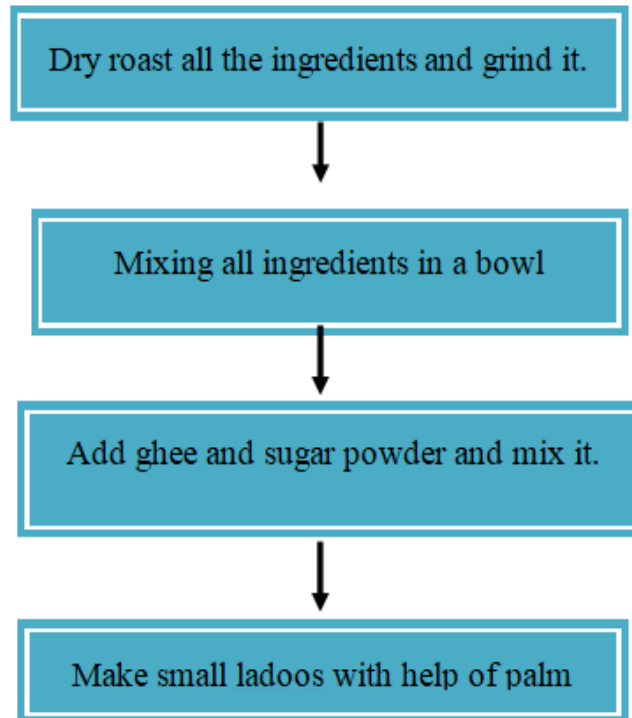

Fig 1 Flow Chart of Coconut Mix Ladoo Preparation

Fig 2 Preparation of Coconut mix ladoo.

B. Proximate Analysis of the product

➢ **Moisture Estimation**

The moisture content of sample was estimated by oven drying method. The sample of 20g were in powder from take in petri plate and dried in hot air oven at 120^0C to constant weight. When the sample was cooling in desiccator, then weigh the sample again. The weight is noted for the moisture calculation.

$$\text{Moisture(\%)} = \frac{w_1 - w_2}{w_1} \times 100$$

where,

w_1= Initial weight of the sample with patri plate before drying

w_2= Final weight of the sample after drying

➢ **Ash Estimation**

The ash of the sample was estimated in muffle furnace at 500^0C for 4 hour.

$$\text{Ash (\%)} = \frac{\text{Weight of Ash}}{\text{Weight of sample}} \times 100$$

➢ **Protein Estimation**

The protein of the sample was estimated by the kjeldahl method

$$\text{Protein(\%)} = \text{total nitrogen} \times 6.25$$

➢ **Fat Estimation**

The fat of the sample was estimated by the soxhlet method

$$\text{Fat(\%)} = (W_1 - W_2) \times 100/S$$

where,

W_1= weight of empty flask(g)

W_2= weight of flask and extracted fat(g)

S= weight of sample

C. Morphological structure of the product

The morphological structure of the product was seen by the SEM (Scanned Electron Microscope) and EDX(Energy Dispersive X- ray) was done to identify the trace element present in the product.

D. Sensory evaluation of the product

The sensory evaluation was evaluated by hedonic rating test. There are 11 consumer panelists to fill the form of hedonic scales.

Sensory evaluation of Coconut mix ladoo

Name: _____

Date: _____

Table 1 Sensory Evaluation (Hedonic Rating Scale).

Attributes	9 Like extremely	8 Like very much	7 Like	6 Like slightly	5 Neither Like or dislike	4 dislike slightly	3 Dislike Moderately	2 dislike	1 Dislike extremely
Appearance									
Flavour/ Taste									
Smell/Odour									
Texture / mouth feel									

III. RESULT AND DISCUSSION

A. Proximate Analysis of the Product

Table 2 Proximate Analysis of Coconut Mix Ladoo

Parameter	Values
Moisture(%)	0.9
Ash(%)	2.7
Protein(g)	13
Fat(g)	18

In **Table 2.** shows the proximate analysis of the coconut mix ladoo, in which estimation of moisture content was 0.9% , when sample is putted under the muffle furnace the ash content of the product was 2.7 % after weigh. The protein estimation and the fat estimation was done by the kjeldalh method and soxhlet method respectively. The protein content was 13g and the fat was 18 g after calculation according to the formulae.
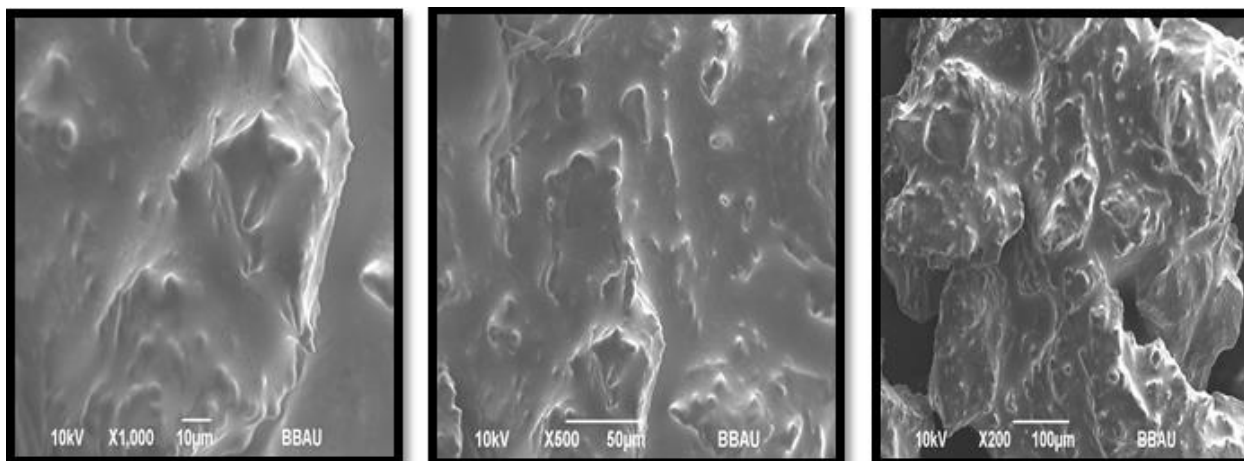
B. SEM with EDX

Fig 3 Amorphous Structure of the Product

The structure of the sample was amorphous not a crystalline structure that means it has no organization. The size is increased according to their magnifying power.
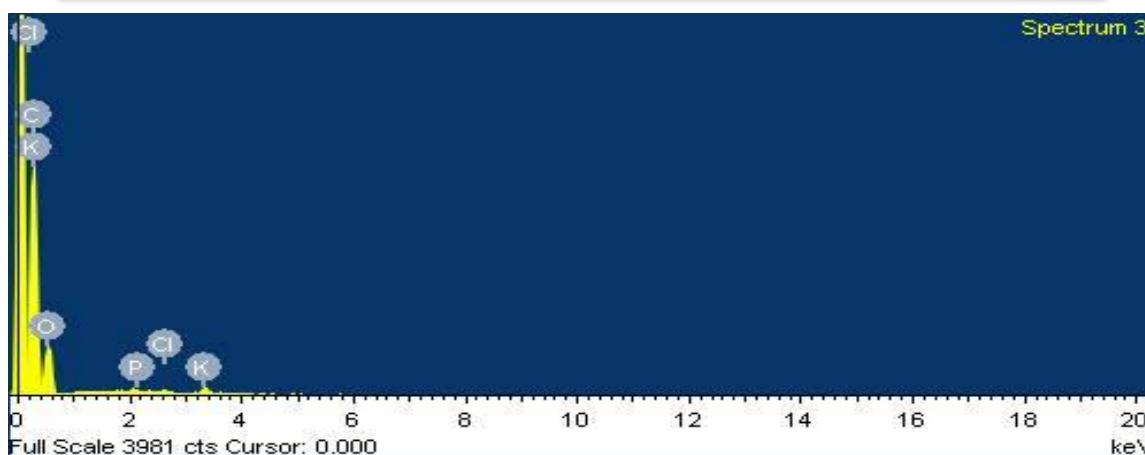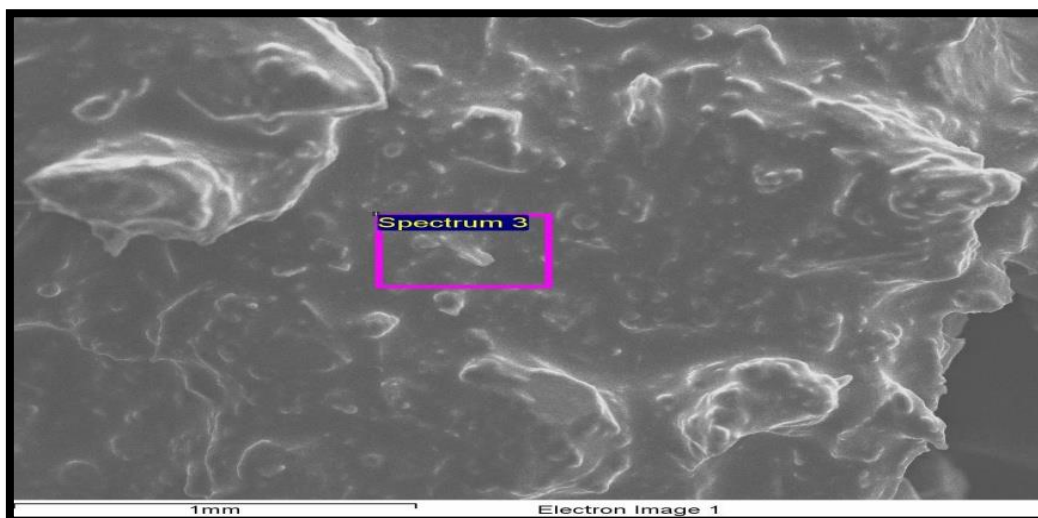

Fig 4 Amorphous Structure of the Product (EDX Graph)

The element present in the sample was Cl, C, K, O, P, in which Cl has high peak.

Table 3 Sensory Evaluation of Coconut Mix Ladoo by Hedonic Rating Scale

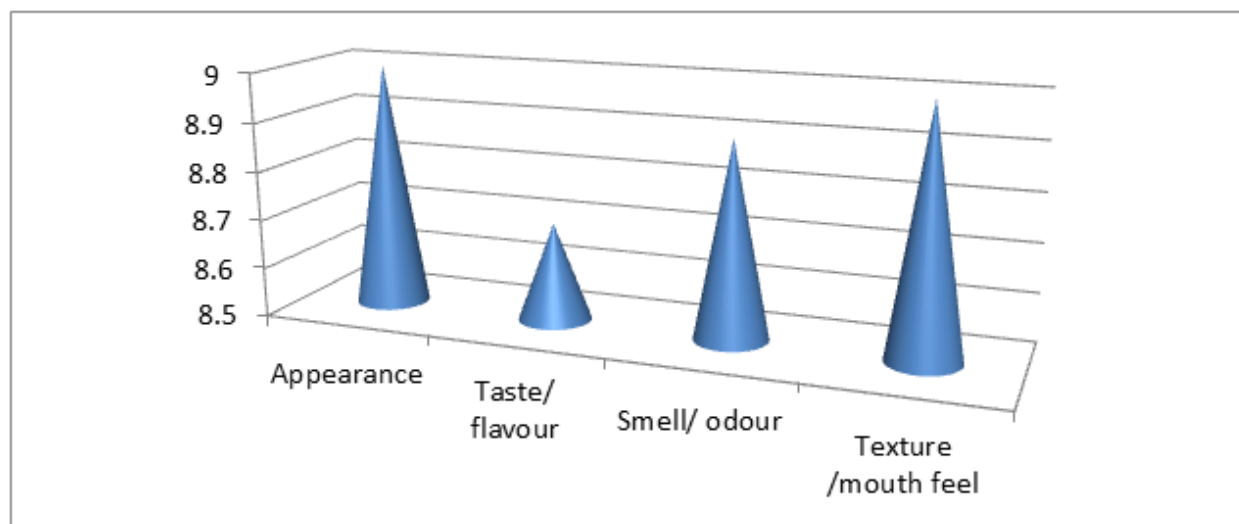| Sample	Appearance	Taste /flavour	Smell/ Odour	Texture and mouth feel
Coconut Mix Ladoo	9	8.7	8.9	9

Fig 5 Sensory Profile of Coconut Mix Ladoo

In sensory evaluation **Table 3** and **Fig.5** is showing the how much like and dislike of the product. According to data the appearance of ladoo is 9, the taste of ladoo is 8.7, the smell and odour of the ladoo is 8.9 and the texture and mouth feel of the product is 9. overall acceptance was good.

IV. CONCLUSION

Coconut mix ladoo was made up of the residue (desiccated coconut) of cold pressed coconut oil with added flaxseed, oats, bajara and peanut. As we know that flaxseed have highly rich in omega 3 and 6 fatty acid and oats has highly rich in dietary fibre. The desiccated coconut was dried in sunlight and roast then stored in air tight container for 1-2 months in refrigerator. The coconut mix ladoo was rich in protein and good fat. The morphological structure of the sample was amorphous not a crystalline. The sensory evaluation of the product was done by hedonic rating test and the product was good in taste, everyone like the product.

Conflict of interest: None.

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