



(RESEARCH ARTICLE)



## Development of muffins from oats flour using natural sugar (Dates and honey) fortified with sunflower and pumpkin seeds powder

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### Abstract

The study of muffins development was carried out at the Department of Food Technology, Parul Institute of Applied Sciences, Parul University, Vadodara. The main aim of the study was to develop muffins. The goal of the study was to develop muffins which provides minerals which found in pumpkin and sunflower seeds and which are rich in antioxidant and antimicrobial property and rich in protein. Muffins were developed by using oats, sunflower and pumpkin seed flour which was first grounded and grind into powder and combined with other ingredients are lemon juice, honey, baking powder and baking soda, cocoa powder for taste were used. The oats, sunflower and pumpkin flour were taken into different variation during batter preparation. The batter was prepared first and filling in greased muffins cups and muffins were made. Four different formulations T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, and T<sub>0</sub> were prepared. T<sub>3</sub> was found to be the best formulation after sensory evaluation with 9 Point Hedonic Scale. Then developed muffins were further analyzed for sensory evaluation. The muffins showed 34.92% of moisture content, 2.20% Ash content, 4.50 g protein content, 5.60 g fat content, 52.78% carbohydrates content and 2.08 g fibre.

**Keywords:** Muffins; Oats flour; Pumpkin seed; Sunflower seed; Sugar free

### 1. Introduction

Muffins are a high-calorie sweet baked meal that customers adore for their exquisite flavour and delicate texture (Martinez-Cervera et al., 2012). Muffins are rapid bread as "quick-acting" chemical leavening agents are employed instead of yeast, "longer-acting" biological leavening ingredient (Hui et al., 2007). Muffins' main ingredients are flour, sugar, oil, and egg, all of which play an essential role in the final product's structure, look, and eating quality (Karaoglu and Kotancilar, 2009; Martinez-Cervera et al., 2012). Muffins are popular as a morning or after-work snack. Customers enjoy muffins because they are high in calories, have a wonderful flavour, and have a spongy feel (Matos Segura, M. E., and Rosell, C. M., 2011).

The oats (*Avena sativa*) is a member of the poaceae family. In terms of the amount of produce each year or the area farmed for production, oats are a minor cereal crop. Oatmeal is a nutritionally grain which also contains a significant amount of soluble fibre and minerals. Oats are high in vitamin E (tocotrienols), phytic acid, phenolic acid, protein, lipids (unsaturated fatty acids), and minerals (W. S. Ahmad et al., 2014).

The cucurbita maxima seed plays a significant role in the human diet as a supply of lipids, proteins, carbohydrates, and other elements required for sustaining good health (Alfawaz, M. A., 2004). The Cucurbitaceae family includes pumpkins with oily seeds. Despite the fact that several kinds are farmed all over the world, Cucurbita pepo, C. maxima, C. moschata, C. Mixta, and C. stilbo are the most economically significant species (Abou-Zeid, S. M. et al., 2018; Aktas, N. et al.,

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2018). The about 35% crude protein content of pumpkin seeds equates to a considerable and unique amount of amino acids (Jafari, M et al., 2012).

The annual plant known as the sunflower hails from America and is a member of the Asteraceae family. Its manufacture began in Europe in the early sixteenth century (Pope et al., 2001). Whole sunflower seeds are composed of 5.50 percent moisture, 18.72 percent protein, 37.47 percent crude fat, 28.30 percent crude fibre, 3.49 percent ash, and 6.11 percent carbs. While partially dehulled sunflower cake contains 5.60 percent moisture, 25.28 percent protein, 21.38 percent crude fibre, 6.89 percent ash, and 19.34 percent carbohydrates, whole sunflower cake contains 5.80 percent moisture, 23.60 percent protein, 11.01 percent crude fat, 30.18 percent crude fibre, 5.66 percent ash, and 23.75 percent carbohydrates. Dehulled sunflower cake has similar moisture contents as well as crude protein, crude fat, crude fibre, ash, and carbohydrate contents of 7.59%, 29.5%, 30.25%, 8.60%, 7.50%, and 11.17%, respectively (Srilatha and Krishnakumari, 2003).

Using different flours and seed powder to make healthier muffins can increase the nutritional content of the product. The inclusion of oats flour, pumpkin and sunflower powder in the muffins is intended to make them more nutrient-dense and accessible to all. The primary purpose of the study is to develop nutrient-dense muffins made from oats and seed powders.

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## **2. Material and methods**

The Present study entitled “Development of sugar free muffins, fortified with oats flour, pumpkin and sunflower seeds” was carried out in Department of Food Technology, Parul university, Vadodara. This section enlists the material used and elaborate the processing technique, organoleptic evaluation and analytical procedure following during the research.

### **2.1. Procuring of Raw Materials**

The ingredients used in the preparation of the muffins were oats flour, sunflower seed, pumpkin seed, lemon juice, honey, baking powder, baking soda and coco powder.

### **2.2. Roasting of seeds**

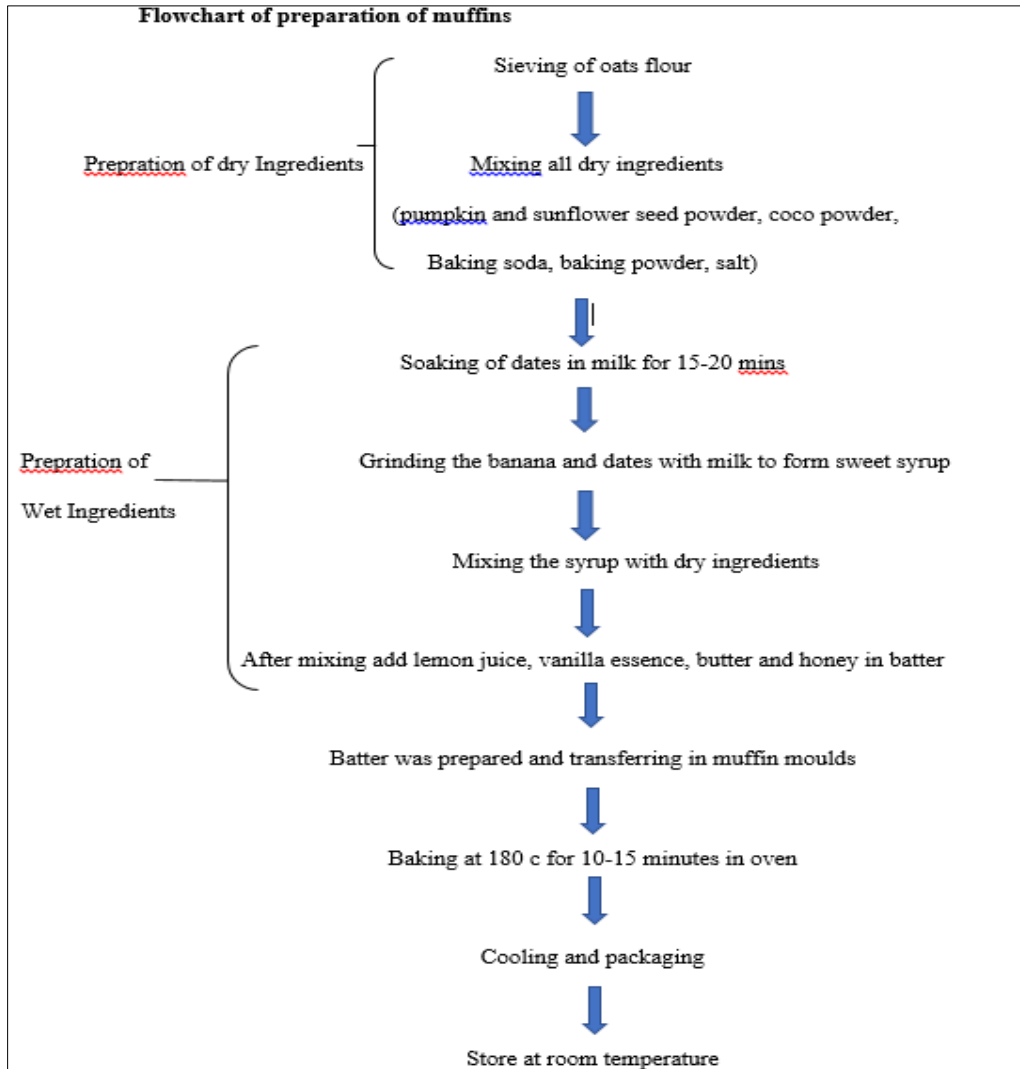
Pumpkin seeds and sunflower seeds were roasted in pan for few minutes on low flame.

### **2.3. Preparation of flour**

After roasting seeds were allowed to cool at room temperature. The seeds then ground individually in a grinder and sieved by hand to produce a fine powder.

### **2.4. Preparation muffins**

The ingredients were used to standardize the recipe for muffins.: 4.5 g sunflower seed powder, 4.5 g pumpkin seed powder, 152 g oats flour, 4 g baking powder, 4 g baking soda and lemon juice and cocoa powder for taste. The components listed above are needed to make 100 g of muffins. The dry ingredients were weighed and combined. The batter then mixed properly so not form lumps then the batter was filled in the greased muffins cups and placed in oven. For 10-15 minutes, the oven was warmed at 180°C. The muffins were then baked for 10 minutes in the oven until they had a smooth texture. The muffins were chilled before being placed in polypropylene (PP) pouches. For shelf-life evaluation, the muffins were stored at ambient and 37 °C temperatures.



**Figure 1** Flowchart of preparation of muffins

## 2.5. Formulation of muffins

**Table 1** Formulation of muffins

Ingredients	T0	T1	T2	T3
Oats	160 gm	152 gm	152 gm	152 gm
Sunflower	-	3	6	4.5
Pumpkin	-	6	3	4.5
Dates	200 gm	200 gm	200 gm	200 gm
Milk	250	250	250	250 ml
Salt	1 gm	1 gm	1 gm	1 gm
Honey	3 tablespoons	3 tablespoons	3 tablespoons	3 tablespoons
Lemon	½ teaspoon	½ teaspoon	½ teaspoon	½ teaspoon
Essence	½ teaspoon	½ teaspoon	½ teaspoon	½ teaspoon
Cocoa powder	7 gm	7 gm	7 gm	7 gm
Baking soda	4 gm	4 gm	4 gm	4 gm
Baking powder	4 gm	4 gm	4 gm	4 gm

## 2.6. Organoleptic evaluation of cookies

The Department of Food Technology at the Gujarat College of Applied Science produced and approved muffins in its food laboratory. These products were created using standardised formulas and various proportions of flour from sunflower and pumpkin seeds. At a food lab, judges were given muffins, one of which was a control sample and three of which were treatment samples. After analysing each sample, the mean scores were calculated. The judges evaluated the samples' appearance, colour, texture, flavour, and acceptability using a 9-point hedonic scale scoring method (Larmond,1970).

## 3. Results and discussion

Unlike regular muffins (which utilize oat flour), this product was made using sunflower and pumpkin seed powder, which has a better nutritional value than other varieties of plain muffins. Healthy flour is used instead of regular flour in these muffins. The nutritional content of muffins is frequently boosted by using mixed seed flour. The finished product was tested for chemical parameters, sensory analysis, and microbial analysis before being stored at room temperature.

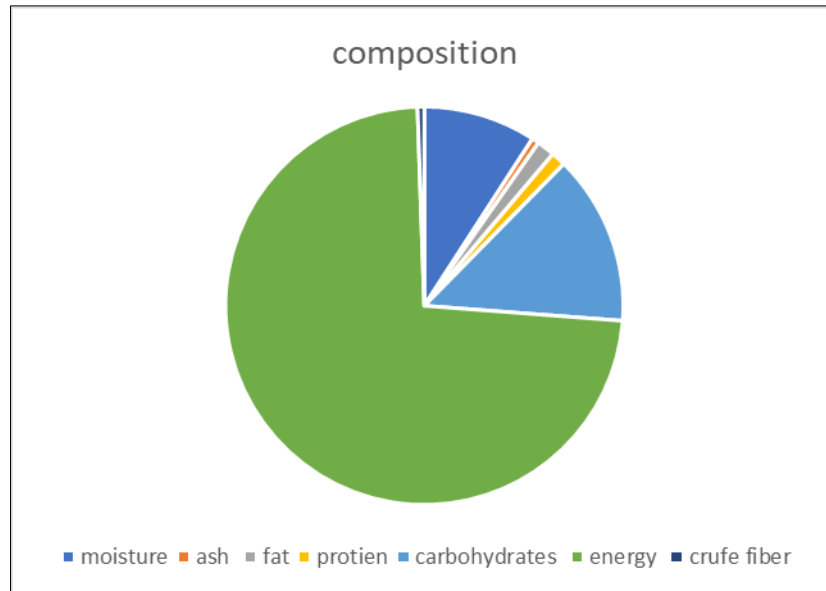


**Figure 2** Muffins prepared from selected formulation

### 3.1. Proximate composition of muffin made from sunflower and pumpkin seed powder is mentioned in Table.

**Table 2** Proximate composition muffin

Nutritional Parameters	Muffins
Moisture	34.92
Ash	2.20
Fat	5.60
Protein	4.50
Carbohydrates	52.78
Energy	279.52
Crude fiber	2.08



**Figure 3** Chemical composition of muffins

Hence, statistical sensory analysis revealed that the best product was a sample muffin containing 152 g of oats flour as well as 4.5 g sunflower and 4.5 g pumpkin powder. Table shows the approximate composition of sample.

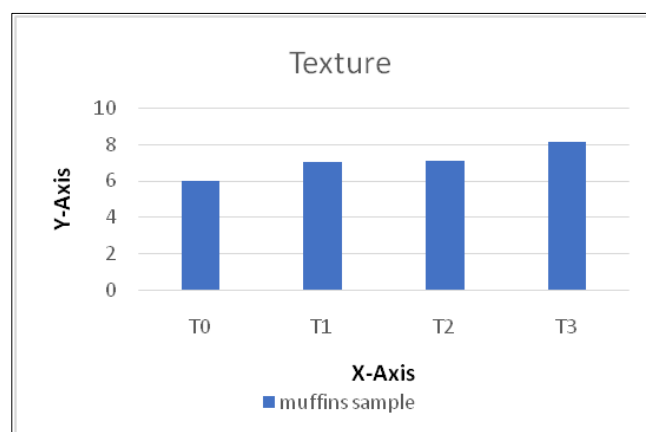
The moisture content, protein content, fat content, crude fibre content, ash content, and carbohydrate content of the product were determined to be 34.92, 4.50, 5.60, 2.08, 2.20, and 52.78, respectively.

### 3.1.1. Colour

Different degrees of the composition of oats flour, sunflower and pumpkin seed powder had no effect on the colour measurement of the muffins. The addition of cocoa powder gave the muffins their brown-black colour. The cocoa powder in the muffins contributed to the muffins' dark colour.

### 3.1.2. Texture

The mean sensory scores for texture for muffin formulations T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 6, 7, 7.1 and 8.1, respectively. The samples T<sub>1</sub> and T<sub>2</sub> were not significantly different from one another. Samples T<sub>3</sub> had higher scores than samples T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>.



**Figure 4** Texture

### 3.1.3. Appearance

For muffin formulations T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> the mean sensory score for appearance was 6.3, 7,7 and 8.4, respectively. The samples T<sub>1</sub> and T<sub>2</sub> were not significantly different from one another, but they were considerably different from each other. Samples T<sub>3</sub> had higher scores than T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>. T<sub>1</sub> and T<sub>2</sub> did not differ considerably from T<sub>3</sub>, however the score was slightly low.

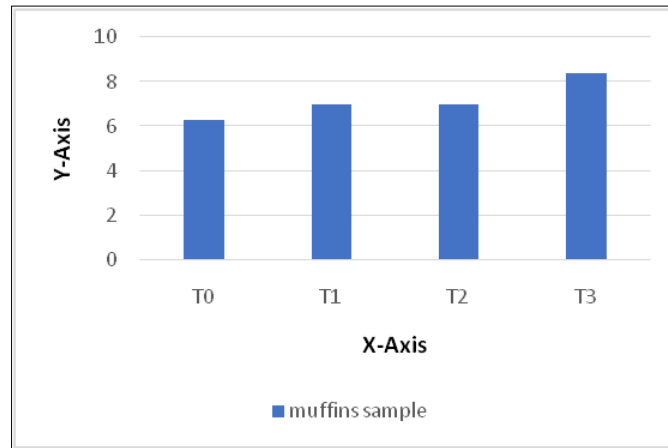


Figure 5 Appearance

### 3.1.4. Taste

The muffin formulations T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, and T<sub>3</sub> had mean sensory scores of 6.2, 7.1, 7.2, and 8 correspondingly. T<sub>1</sub> and T<sub>2</sub> samples did not differ significantly from one another.

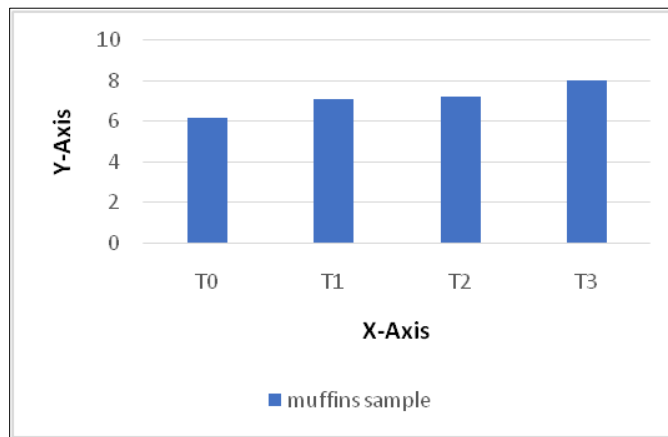


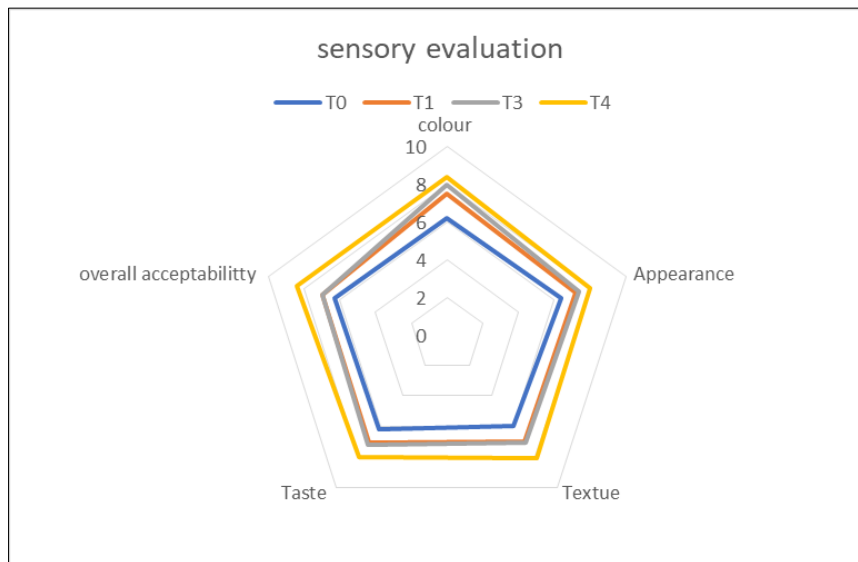
Figure 6 Taste

### 3.1.5. Sensory Characteristics of muffins

The sensory analysis result was based on the taste, texture, color, appearance, and overall acceptability as shown in Figure and Table. It was discovered that crackers made entirely of oat flour (T<sub>0</sub>) had a low rank for all qualities, indicating a poor preference. In terms of appearance, overall acceptability, taste, and color, there was no significant difference between T<sub>2</sub> and T<sub>3</sub> muffins. The texture of the T<sub>0</sub> and T<sub>1</sub> samples was nearly identical. It was the panelist's least favorite. Yet, the texture of the T<sub>3</sub> sample differed significantly from the T<sub>0</sub> and T<sub>1</sub> samples. T<sub>3</sub> was the most desired sample, with all of the panelists' attributes approved and ranked. The T<sub>3</sub> sample and the other samples showed a substantial difference. T<sub>3</sub> with a grade of 8.3 was the best and most liked muffins, with the highest overall acceptance. Each cake has its own texture, flavor, and aroma, which is influenced by ingredients, processing, and maturation stage. The texture, flavor, and perfume of the cake all have an affect on its quality, which ultimately determines whether or not consumers would accept it. Cake textures include soft, chewy, wet, and watery. While certain aromas can be mild, moderate, or overwhelming. Then there are three flavors to choose from: salty, sweet, and spicy (Kawai, et al., 2016).

**Table 3** Sensory Analysis of muffins

Sensory parameters	T <sub>0</sub>	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>
Appearance	6.4	7.2	7.4	8
Colour	6.2	7.5	8	8.4
Texture	6	7	7.1	8.1
Taste	6.2	7.1	7.2	8
Overall Acceptability	6.3	7	7	8.4

**Figure 7** Sensory analysis of muffins

#### 4. Conclusion

According to the results reported in this study, the muffins made with addition of sunflower and pumpkin were more nutritionally dense than regular oats flour muffins. The components were chosen properly in the muffins to provide ample energy and high nutritious muffins. Normal people, as well as diabetes patients, can eat the muffins. Muffins might be a great healthier alternative.

#### Compliance with ethical standards

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##### *Disclosure of conflict of interest*

The authors declare that there is no conflict of interest.

#### References

- [1] Abou-Zeid, S. M., AbuBakr, H. O., Mohamed, M. A., & El-Bahrawy, A. (2018). Ameliorative effect of pumpkin seed oil against emamectin induced toxicity in mice. *Biomedicine & Pharmacotherapy*, 98, 242-251.

- [2] Ahmad, W. S., Rouf, S. T., Bindu, B., Ahmad, N. G., Amir, G., Khalid, M., and Pradyuman, K. (2014). Oats as a functional food: a review. *Universal journal of Pharmacy*, 3(1), 14.
- [3] Aktas, N., Uzlasir, T., &Tuncil, Y. E. (2018). Pre-roasting treatments significantly impact thermal and kinetic characteristics of pumpkin seed oil. *ThermochimicaActa*, 669, 109-115.
- [4] Alfawaz, M. A. (2004). Chemical composition and oil characteristics of pumpkin (*Cucurbita maxima*) seed kernels. *Food Science and Agriculture*, 2(1), 5-18.
- [5] Hui, Y. H., Chandan, R. C., Clark, S., Cross, N. A., Dobbs, J. C., Hurst, W. J and Toldra, F. (Eds.). (2007). *Handbook of Food Products Manufacturing, Volume 2: Health, Meat, Milk, Poultry, Seafood, and Vegetables (Vol. 2)*. John Wiley & Sons.
- [6] Jafari, M., Goli, S. A. H., &Rahimmalek, M. (2012). The chemical composition of the seeds of Iranian pumpkin cultivars and physicochemical characteristics of the oil extract. *European journal of lipid science and technology*, 114(2), 161-167.
- [7] Karaoğlu, M. M., &Kotancilar, H. G. (2009). Quality and textural behaviour of par-baked and rebaked cake during prolonged storage. *International Journal of Food Science & Technology*, 44(1), 93-99.
- [8] Kawai, K., Hando, K., Thuwapanichayanan, R., and Hagura, Y. (2016). Effect of stepwise baking on the structure, browning, texture, and in vitro starch digestibility of cookie. *LWT-Food Science and Technology*, 66, 384-389.
- [9] Larmond, E. (1970). *Methods for sensory evaluation of foods*. Pub. 1284. Food Res. Inst., Central Exp. Farm, Ottawa, Canada.
- [10] Martínez-Cervera, S., Sanz, T., Salvador, A., &Fizman, S. M. (2012). Rheological, textural and sensorial properties of low-sucrose muffins reformulated with sucralose/polydextrose. *LWT-Food Science and Technology*, 45(2), 213-220.
- [11] Matos Segura, M. E., &Rosell, C. M. (2011). Chemical composition and starch digestibility of different gluten-free breads. *Plant foods for human nutrition*, 66, 224-230.
- [12] Pope, K. O., Pohl, M. E., Jones, J. G., Lentz, D. L., Nagy, C. V., Vega, F. J., &Quitmyer, I. R. (2001). Origin and environmental setting of ancient agriculture in the lowlands of Mesoamerica. *Science*, 292(5520), 1370-1373.
- [13] Srilatha, K., &Krishnakumari, K. (2003). Proximate composition and protein quality evaluation of recipes containing sunflower cake. *Plant Foods for Human Nutrition*, 58, 1-11.