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# Sensory Aspects of Adolescence Choices towards Oats Developed Products

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**ABSTRACT —** *Alarming increase in number of obese school going kids is the biggest area of concern these days, it has been found that in major cases, mothers of obese kids are working ladies who rely on ready to eat food for kids and themselves and which is usually high on refined wheat flour (Maida) content. That's where lies the scope of improvement, which can be introduced by replacing refine wheat flour (Maida) with Oat Flour. Oats has high content of dietary fibres and protein along with the bioactive compounds like β-glucan, avenanthramides, tocols, sterols, and avenacosides making it a major dietary component in modern eating lifestyle. Healthy snack is the key component for school going children as well as for working mothers. High nutritional value of oat flour was the reason to make a trial to apply it in the production of refined wheat flour products. In the present study focussed on developed value added healthy snacks for school going children. In this study four variety (Idlis, Cupcakes, Dimsums and Twisters) of product were developed in various ratio 20/80, 40/60, 70/30, 90/10 and 100. Sensory evaluation of all the products were carried out by 30 semi trained panellist. Statistical tool were applied out of all the variations 70/30 ratio was found to be best in terms of Idlis and cupcakes whereas 40/60 was found satisfactory for dimsums and twister. This way we can make a difference to the situation of concern by building a culture of health snacking.*

**Keywords:** *Obesity, Oats, dietary fibre, bioactive compounds, healthy snacks, Idlis, cupcakes, dimsums, twisters.*

## 1 Introduction

The increasing prevalence of overweight children is a significant and alarming public health problem. The International Association for the Study of Obesity (IASO) and International Obesity Task Force (IOTF) estimate that 200 million school children are either overweight or obese. In 2010, prevalence of childhood obesity was 19.3% which was a significant increase from the earlier prevalence of 16.3% reported in 2005. (R. Harish et al 2016).[1] Childhood obesity is mainly caused by poor dietary habits. Nuclear Families and working parents find it even more convenient to depend upon the ready to eat food. Development of convenience food is necessary in order to adjust to the limited time and energy available to perform household tasks. This was the reason we are coming across more number of school going overweight Kids (Parkash.s 2006) [2].
Diets of school going children tend to include fewer vegetables, fruits unrefined cereals which are often replaced by the widely available snack foods such as carbonated colas, chips, candies etc which are generally made up of refined flour, high in fat contents with low nutrients and high in calories (Sahoo.k, 2015)[3] . Therefore, there is urgent need of products which can provide nutrients to the body having high bioavailability in the form of their regular snacks which they consume on and off (KSA Consumer Outlook) [15].

Snacks play an important role in daily nutrients and calories intake. Cereals like barley, oats, finger millet, sorghum can be incorporated in the daily snacks such as biscuits, breads, pastas, muffins which can help to some extent to meet their daily requirements for nutrients and improve their nutritional status. (Parkash.s, 2018)[4].

Oats (*Avena sativa* L.) is one of the most nutritious cereals. The chief oats producing countries in the world are USA, Russia and Canada. In India, the small quantity of oats being produced is mostly used as green fodder. The most cultivated variety in India is A.byzantina and A. Sativa (B.srilaksmi, 2010) [5].

Oats 'nutritional composition in percentage is given in Table 1.

**Table. 1 Nutritional composition of oats**

| Component | Available percentage | References |
|---|---|---|
| Starch | 60% | Berski et al. (2011) |
| Protein | 15% | Klose et al. (2009) |
| Lipid | 9% | Keying et al. (2009) |
| Dietary fibre | 8.5% | Flander et al. (2007) |

| | | |
|---|---|---|
| Phytochemical | α-Tocotrienols and α-tocopherols: (86–91 % of total tocols<br>Phenolic compounds: 5.7 % | Peterson (2001)<br><br>Matilla et al. (2005 |
| Trace minerals | Calcium : 0.54 %<br>Iron : 0.047 % | Chavan and Kadam (1989) |
| Vitamins | Thiamine : 0.002 % Riboflavin : 0.001 % Niacin : 0.032 % | Chavan and Kadam (1989) |

Oat is a well-balanced cereal. It has all essential nutrients in sufficient amount which is required for maintaining good health (Head et al. 2010)[6] [7]. Now a day's Oat based breakfast cereals have received considerable attention as they are good sources of β-glucan and bioactive components which are known to reduce serum and plasma cholesterol levels and reducing postprandial glycemic response (Ryan et al. 2011)[8]. Oats are considered as suitable in celiac disease. Clinical studies have proved that consumption of oat can be tolerated by celiac disease patients. Various reports suggest safety of oats to be included in the gluten free diet in children suffering from celiac. Hence, gluten free products such as pasta, biscuit and snacks have been developed for celiac patients from oats (Ballabio et al. 2011)[9].

These days market is full of oats products - oats cookies, pasta, noodles , biscuits, bread and breakfast cereals .All products are widely accepted by consumers .(ZhongHu.X ,2014)[10]. There is increase in consideration of Oats products in the market as they are having high nutritional value which is important for good health. (R. Pasquale, 2016)[11] .

The present study was focused on replacing refined wheat flour with Oats flour, in order to make snaking habit in young children healthier and nutritive. Products developed in this process were Cupcakes, Dimsums, Twister and *Idli* with oats being a substantial ingredient to all of them. The products selection for re-development had been done on the basis of their high popularity amongst young children.

## 2 Methodology

The present study was to evolve and standardize recipes using oats. It was step to explore whether the recipes containing oats can be made acceptable or not.

### 2.1Material and Methods

Products were prepared – Idli , Cupcakes , Dim sum and Twisters .The raw ingredients of all four products was procured from local market. *Idli* – Rice, washed urad dal; Cupcakes – Refined wheat flour, sugar, butter, eggs, milk; Dimsums- refined wheat flour, cabbage, garlic; Twisters- refined wheat flour, oil and curd. Oat flakes was a common ingredient in all four products which was also procured from local market shop.

### 2.2Preparation of processing oats flour

Oat flakes are processed in order to produce oats flour. Oat flakes were roasted at 65°C in oven (R.L.Heinio 2001), then Roasted oat flakes were cooled for 45 minutes and last roasted oat flakes were converted into oats flour with the help of bender. Oats flour was stored in air tight container for further use.

### 2.3 Standardization and development of products

The Oats flour and refined wheat flour mixed together in the various proportion 20/80, 40/60, 70/30and 90/10 for cupcakes, dimsums and twisters; similar blend will be done in same variations20/80 , 40/60 , 70/30 and 90/10 for *idli* preparation with rice flour and oats flour. The blended flour was sieved three to four times for even mixing. The basic recipe for idli, cupcakes and twisters was taken from 'The art and science of cooking' by (Khanna and Gupta (2009) and dimsums recipe was adopted from 'The Art of Chinese Tea Lunch Hardcover' by (Blonder. E., 2002). The products were developed using the basic recipe given in Table.1

**Table 1: Basic recipe for preparing *Idli*, cupcake, twisters and dimsums**

| Ingredients | Idli Amounts(g) | Cupcake Amounts(g) | Twisters Amounts(g) | Dimsums Amounts(g) |
|---|---|---|---|---|
| Rice | 60 | - | - | - |
| Washed urad dal | 20 | - | - | - |
| salt | ¼ t | - | 1/2t | - |
| Refined flour | - | 55 | 100 | 100 |
| Butter | - | 35 | - | - |

| | | | | |
|---|---|---|---|---|
| Castor sugar | - | 55 | - | - |
| Egg | - | 1 | - | - |
| Milk | - | 15 ml | - | - |
| Baking powder | - | 1/2t | - | - |
| Vanilla essence | - | 2 drops | - | - |
| Oil | - | - | 2 T | 2t |
| Ajwain | - | - | 1/4t | - |
| Cabbage | - | - | - | 25 |
| Onion | - | - | - | 25 |
| Garlic | - | - | - | 10 |
| Spring onion | - | - | - | 15 |

**2.4 Sensory evaluation**

Sensory evaluation of all the products were carried out by 30 semi trained panellist. Semi trained panellist members included teaching faculty and students of Government home science college, Chandigarh. The sensory attributes evaluated were appearance, texture, taste, flavour and over all acceptability. All four products were marked in 5 point hedonic scale: unsatisfactory -1, satisfactory -2, Good –3, Very good-4, Excellent-5.

**3 Results and Discussions**

**3.1 Standardization and formulation of products using oats flour**

In standardization of recipes the main target was to replace the substantial amount of refined wheat flour, rice flour with oats flour. It is very important to included maximum amount of oats flour to make recipes more nutritious and should be acceptable by all parameters of sensory card.

All four recipes; cupcakes, dimsums, baked twisters and *Idli* were formulated in various variations (20/80, 40/60, 70/30, 90/10 and 100). Standardization of recipe was done by pilot testing; ten semi trained panellists randomly selected and evaluated all variations. Therefore, out of all the variations one or two variation were selected and finalized for sensory evaluation by panellists (30) which included teaching faculty and students of Masters in Foods and Nutrition Department, government home science college, Punjab University who analyzed the product. Final variations were evaluated.

## 3.1.1 Cupcakes

Result of Oats cupcakes shows that variation 20/80 had had excellent taste and texture, 40/60 variation had very good taste and texture whereas variations 70/30 having good taste and texture as well as had a substantial amount of oats flour i.e. 70%. Oats have a high moisture retention capacity that also keeps cupcakes fresh for longer time (R. Prasad et.al, 2013) [7]. On the other hand, variation 90/10 had a satisfactory but in terms of texture it was not acceptable. Variation 100% had insipid taste and sticky texture and was unacceptable by all. Therefore, out of all the variations only one variation was selected i.e., variation 70/30 was finalized for sensory evaluation Hence; optimum incorporation of oats flour for final recipe was 70/30.

**Table 3: Effect of addition of oats flour in cupcakes at various variations**

| Variation | Ingredients | | | | | | Remarks |
|---|---|---|---|---|---|---|---|
| | Oats flour (g) | Refined wheat flour (g) | Butter (g) | Castor Sugar (g) | Egg | Baking powder | |
| 20/80 | 11 | 44 | 35 | 55 | 1 | 1/4t | Taste -5;Texture-5 |
| 40/60 | 22 | 33 | 35 | 55 | 1 | 1/4t | Taste -4;Texture -4 |
| 70/30 | 38.5 | 16.5 | 35 | 55 | 1 | 1/4t | Taste -3;Texture-3 |
| 90/10 | 45 | 10 | 35 | 55 | 1 | 1/4t | Taste – 2;Texture2 |
| 100 | 55 | - | 35 | 55 | 1 | 1/4t | Taste – 1;texture- 1 |

Rating on 5-point rating scale – 5-excellent; 4-verygood; 3-good; 2-Satisfactory;1-Unsatisfactory

**Table 4: Variation of oats flour used final sensory evaluation of cupcakes**

| Ingredients | Amount (g)70/30 |
|---|---|
| Refined wheat flour | 16.5 |
| Oats flour | 38.5 |
| Butter | 35 |
| Sugar | 55 |
| Egg | 1 |
| Milk | 50 ml |
| Baking powder | 1/4t |
| Vanilla essence | Few drops |

## 3.2 Dim sums

Remarks in table 3 indicates that variation 20/80 had excellent taste and texture but no had significant amount of oats, variation 40/60 had very good taste and texture with good amount of oats whereas variation 70/30 , 90/10 and 100 had high amount of oats but in terms of taste and texture was not acceptable. Therefore, out of all variations 40/60 was selected for final sensory evaluation by same panellists.

**Table 5: Effect of addition of oats flour in Dim sums at various variations**

| Variations | Ingredients | | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|
| | Oats flour (g) | Refined wheat flour (g) | Spring onion (g) | Garlic(g) | Roasted Oats flakes(stuf fing)g | Onion (g) | Cabbage (g) | oil | |
| 20/80 | 20 | 80 | 15 | 10 | 25 | 25 | 25 | 2t | Taste –5 ;Texture-5 |
| 40/60 | 24 | 60 | 15 | 10 | 25 | 25 | 25 | 2t | Taste -4; Texture4 |
| 70/30 | 70 | 30 | 15 | 10 | 25 | 25 | 25 | 2t | Taste 2 ;Texture-2 |
| 90/10 | 90 | 10 | 15 | 10 | 25 | 25 | 25 | 2t | Taste -2;texture -1 |
| 100 | 100 | - | 15 | 10 | 25 | 25 | 25 | 2t | Taste 1;texture-1 |

Rating on 5-point rating scale – 5-excellent; 4-verygood; 3-good; 2-Satisfactory; 1-Unsatisfactory

**Table: 6 Variation of oats flour used final sensory evaluation of dim sums**

| Ingredients | Amount (g)40/60 |
|---|---|
| Refined wheat flour | 60 |
| Oats flour | 40 |
| Roasted Oats flakes | 25 |
| Spring onion | 15 |
| Onion | 25 |
| Cabbage | 25 |
| Garlic | 10 |
| Oil | 2t |

### 3.3 Baked Twister

Results in table 5 shows that variation 20/80 had excellent taste and texture but low amount of oats which meant not acceptable in terms of nutrition, 40/60 variation was acceptable in both the terms taste, texture and as well as nutritionally whereas 70/30 had good taste but texture was not appropriate, 90/10, 100 variations were not acceptable at all. Hence, 40/60 variation was selected for further evaluation.

**Table 7: Effect of addition of oats flour in baked twister at various variations**

| Variation | Ingredients | | | | Remarks |
|---|---|---|---|---|---|
| | Oats flour (g) | Refined wheat flour (g) | Ajwain | oil | |
| 20/80 | 20 | 80 | 1/4t | 2T | Taste -5;Texture-5 |
| 40/60 | 40 | 60 | 1/4t | 2T | Taste -4;Texture -4 |
| 70/30 | 70 | 30 | 1/4t | 2T | Taste -3;Texture-2 |
| 90/10 | 90 | 10 | 1/4t | 2T | Taste – 2;Texture1 |
| 100 | 100 | - | 1/4t | 2T | Taste – 1(insipid);texture- 1(sticky) |

Rating on 5-point rating scale – 5-excellent; 4-verygood; 3-good; 2-Satisfactory; 1-Unsatisfactory

**Table: 8 Variation of oats flour used final sensory evaluation of baked twisters**

| **Ingredients** | **Amount (g)40/60** |
|---|---|
| Refined wheat flour | 60 |
| Oats flour | 40 |
| Ajwain | 1/4t |
| Oil | 2T |

## 3.4 Oats Idli

*Idli* were developed in which oats flour was incorporated by replacing rice flour which makes *Idli* healthier. Various variations (20/80, 40/60, 70/30, 90/10 and 100) were tried to replace the maximum amount of rice flour in standardized recipe. It is important to incorporate maximum amount of oats flour to make *Idli* more nutritious and maximum amount of nutrient absorption by the body. Scores in Table 7, shows that variation 20/80 and40/60 had very good taste and texture whereas variations 70/30 had a good taste and had high amount of oats. On the other hand 90/10 and 100 variations had insipid taste and very soft in texture and were not acceptable. Therefore, out of all the variations only one variation was selected i.e. variations 70/30 were finalized for final sensory evaluation.

**Table: 9 Effect of addition of oats flour in *Idli* at various variations**

| Variation | Ingredients | | | | Remarks |
|---|---|---|---|---|---|
| | Oats flour (g) | Rice flour (g) | Washed urad dal (g) | Salt | |
| 20/80 | 12 | 48 | 20 | 1/4t | Taste –5 ;Texture-5 |
| 40/60 | 24 | 36 | 20 | 1/4t | Taste -5; Texture4 |
| 70/30 | 42 | 18 | 20 | 1/4t | Taste 4;Texture-3 |
| 90/10 | 54 | 6 | 20 | 1/4t | Taste -2;texture -2 |
| 100 | 60 | - | 20 | 1/4t | Taste 2;texture-1 |

Rating on 5-point rating scale – 5-excellent; 4-verygood; 3-good; 2- Satisfactory; 1- unsatisfactory

**Table: 10 Two variations of oats flour used final sensory evaluation of *Idli***

| Ingredients | Amount 70/30 |
|---|---|
| Rice flour | 18 |
| Oats flour | 42 |
| Washed urad dal | 20 |

### 3.2 Sensory characteristics of oats flour products

| Characteristics | Mean ± SD | | | |
|---|---|---|---|---|
| | *Idli* 70/30) | Cupcakes 70/30 | Baked twister 40/60 | Dimsums 40/60 |
| Appearance | 3.83 ± 0.53 | 4.07±0.64 | 3.70±0.47 | 3.67±0.76 |
| Texture | 3.63±0.56 | 4.23±0.57 | 3.60±0.50 | 3.80±0.76 |
| Taste | 3.77±0.63 | 4.23±0.63 | 3.87±0.35 | 3.43±0.63 |
| Flavour | 3.57±0.73 | 4.10±0.66 | 3.63±0.49 | 3.60±0.72 |
| Overall acceptability | 3.57±0.57 | 3.90±0.76 | 3.57±0.57 | 3.63±0.61 |

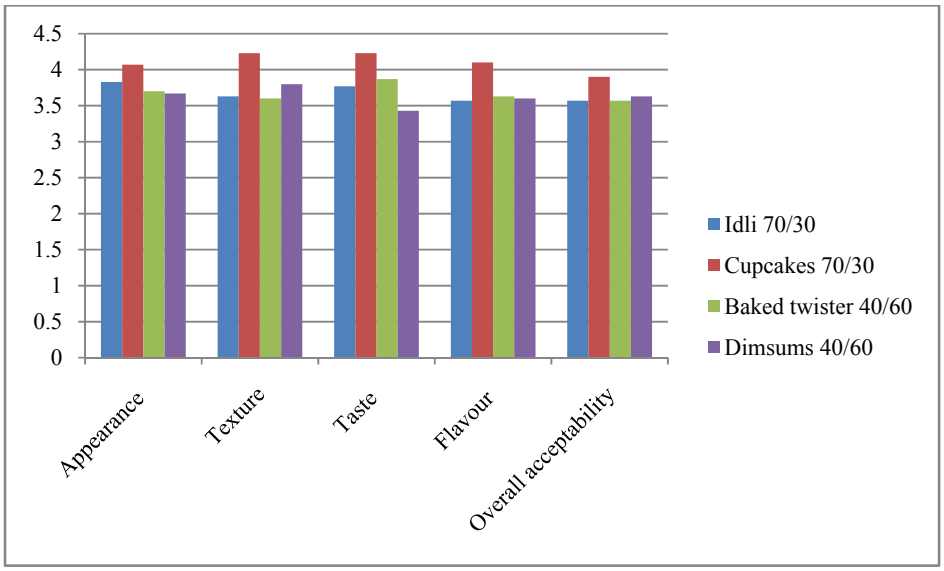


**Fig 1: Bar Graph for Mean Values of Sensory characteristics of oats flour products**

Final results of sensory evaluation of four products, following observation had been drawn. All four products were accepted equally ranging between 3.4 to 4.4 rating which meant good to excellent .Cupcakes amongst the four products remain the winner ranging between 3.9to 4.4 very good and excellent category. Keeping in mind the demography we had 70% of our panellists were in the age group of 20 to 25years, who appreciated our re developed products. This was an important reading because our target group was young ones only. Panellists between 25 to 55 years of age, who are supposed to have matured taste buds, had also well appreciated the all four hedonic parameters.

### 4. Conclusion

The research indicated that we can bring significant change in nutritive value of snacks taken by young children through re developing them with more nutritious ingredients without reducing the taste, texture, flavour and appearance. Finally 70/30 variation of oats flour replacement was acceptable in cupcakes and *Idli* and 40/60 variation of replacement was acceptable in dimsums and baked twisters.

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