

# Nutritional Composition, Mineral analysis and Sensory Evaluation of Cake and Chocolate with *Moringa oleifera* Leaf Powder for Anaemic Adolescent's

## 1. Abstract

*Moringa oleifera* is a plant native to India that thrives in tropical and subtropical climates around the world. It's also called a 'drumstick tree' or a 'horse radish tree'. Moringa is commonly farmed around the world because it can resist both severe drought and moderate winter. Every portion of the tree is suitable for nutritional or economic applications due to its high nutritious contents. Minerals, vitamins, and other phytochemicals are abundant in the leaves. The nutritional composition of dry *M. oleifera* leaf powder was investigated in this study. The leaf extract was examined for its proximate, mineral, vitamin, and sensory properties. The analysis were carried out in supplemented *M. oleifera* in cake and chocolate prepared with varying proportions such as C, 10%, 15% and 20% respectively. The results in Chocolate sample were carried out for nutritional analysis represented in moisture (1.36, 1.56, 1.73 and 1.96 g/100g), in ash (3.44, 3.75, 3.96 and 4.03 g/100g), Protein (8.25, 9.25, 9.87 and 10.01 g/100g) and Fat (36.38, 30.47, 28.29 and 27.22 g/100g). Mineral analysis for Calcium (43.13, 47.73, 48.75 and 49.22 mg), Potassium (558.55, 587.90, 589.20 and 599.73 mg), Phosphorus (76.64, 89.44, 90.24 and 91.74 mg) and Iron (8.43, 9.44, 9.78 and 9.94 mg). Vitamin analysis for  $\beta$  - Carotene (0.02, 0.06, 0.06 and 0.08 mg) and Vitamin - C (0.23, 0.47, 0.53 and 0.61 mg). The sensory analysis was carried out for Concentration of Leaf Powder, Colour and Appearance, Smell, Taste, Mouth Feel and over all Acceptability. Whereas in Cake sample the nutritional analysis represented in moisture (04.32, 05.23, 5.44 and 5.93 g/100g), in ash (05.73, 06.43, 6.76 and 7.06 g/100g), Protein (08.16, 08.75, 8.95 and 8.54 g/100g) and Fat (04.74, 04.23, 04.15 and 04.08 g/100g). Mineral analysis for Calcium (26.71, 27.21, 27.43 and 26.43 mg), Potassium (32.44, 35.26, 35.64 and 35.21 mg), Phosphorus (53.76, 53.99, 57.25 and 55.16 mg) and Iron (01.25, 1.86, 2.05 and 2.16 mg). Vitamin analysis for  $\beta$  - Carotene (00.04, 0.05, 0.05 and 0.06 mg) and Vitamin - C (00.08, 0.12, 0.13 and 0.08 mg). With the addition of *moringa* leaves powder, the sensory qualities were found to be within acceptable limits. *Moringa* leaves are a good source of proteins, minerals, and vitamins, and they can be used as a supplement to improve the nutritional profile of chocolate and cake in the baking industry.

**Keywords:** *M. oleifera*, Minerals, Vitamins, Nutritional analysis, sensory analysis, Cake, Chocolate.

## 2. Introduction

Anaemia occurs when the quantity of red blood cells or the concentration of haemoglobin within them is lower than usual. Haemoglobin is required to transport oxygen, and if you have too few or malformed red blood cells, or not enough haemoglobin, your blood's capacity to transport oxygen to the body's tissues will be reduced. Symptoms include weariness, weakness, dizziness, and shortness of breath, to name a few. Snacking is an important habit of eating that helps youngsters achieve their daily nutritional needs and contributes significantly to their healthy growth and development (Serrano and Powell, 2013). Energy, protein, iron, calcium, and vitamins are all important food sources in processed snacks. Processed snacks are becoming increasingly popular in poor and middle-income countries in Asia, Latin America, and Africa

**Comment [H1]:** Maybe is better "bakery products"

**Comment [H2]:** It is suggested take out this part of title

**Comment [H3]:** Please, take out this sentence

**Comment [H4]:** Please, take out this sentence

**Comment [H5]:** It is suggested summarize this part. Avoid the detailed information. Use a general description of results

**Comment [H6]:** It is suggested change the redaction and also de reference used. References suggested: [https://doi.org/10.1016/S0140-6736\(15\)60865-0](https://doi.org/10.1016/S0140-6736(15)60865-0) [https://doi.org/10.1016/S0140-6736\(10\)62304-5](https://doi.org/10.1016/S0140-6736(10)62304-5)

46 (Huffman et al., 2014). Cakes are one of the most popular bakery foods consumed by people of  
47 all social classes due to their ready-to-eat nature and availability in a variety of flavours at a  
48 reasonable price (Ben et al., 2017).

49 Baked cakes are currently an important part of an adolescent's diet to meet their  
50 nutritional needs in addition to basic foods. Wheat flour, sugar, eggs, and baking powder are  
51 commonly used in traditional cakes (Atef et al., 2011). This type of cake, on the other hand, is  
52 high in sugar and high in carbohydrates and fat, but low in protein, minerals, and vitamins  
53 (Ameh et al., 2013). Furthermore, the World Health Organization (WHO) has declared high-  
54 sugar, high-fat snacks to be unhealthy (WHO, 2010). In this environment, there has been an  
55 increase in demand for functional foods that contain more nutrients and minerals. Nutrients have  
56 traditionally been thought of as food components that cannot be manufactured in the body (for  
57 example, vitamin C) or whose synthesis requires a specific ingredient that may be lacking or  
58 insufficient in certain conditions (for example, some amino acids, fatty acids, and vitamins).  
59 Many other plant-based substances, such as dietary fibre, flavonoids, sterols, phenolic acids, and  
60 glucosinolates, are increasingly being linked to a reduced risk of disease. Many good impacts on  
61 human health have been related to phytochemicals found in plant diets, including coronary heart  
62 disease, diabetes, high blood pressure, cataracts, degenerative disorders, and obesity (Liu et al.,  
63 2000).

64 *M. oleifera* is one of the promising plants that could help people get more of the nutrients  
65 they need and health-promoting phytochemicals they need. *M. oleifera* is the most well-known  
66 of the thirteen Moringaceae species. It is native to India, but it has been planted and naturalised all  
67 over the world (Adenipekun and Oyetunji, 2010; Martin, 2007). According to recent research,  
68 the leaves of this plant have a high nutritional value. Vitamins, minerals, and all of the essential  
69 amino acids are abundant in them (Balbir, 2006). *M. oleifera* has been touted as an excellent  
70 source of important nutrients (protein, iron, calcium, vitamins, carotenoids, and other  
71 phytochemicals) for the past two decades (Fahey, 2005). As a result, the goal of this research is  
72 to determine the proximate, mineral (iron and calcium), vitamin (ascorbate and beta-carotene),  
73 and phytochemical (flavonoids and alkaloids) composition of dry *M. oleifera* leaf extract, as well  
74 as the organoleptic properties of a beverage made from its leaf powder. As a result, the goal of  
75 this research is to assess the nutritional analysis (~~moisture, ash, protein, and fat~~), mineral analysis  
76 (~~calcium, potassium, phosphorus, and iron~~), vitamin analysis (~~beta-carotene and vitamin C~~), and  
77 sensory analysis of dry *M. oleifera* leaf powder.

### 80 3. Material and Methods

#### 81 3.1 Raw material preparation

82 *M. oleifera* was found in the Erode District. Indoors, the plant was air dried and powdered  
83 with a mortar and pestle. For further investigation, the powdered material was stored in an  
84 airtight container.

#### 85 3.2 Nutritional Analysis

##### 86 3.2.1 Determination of Moisture Content

87 Empty crucibles were dried in a 105°C oven for 3 hours, cooled in a desiccator, and  
88 weighed as soon as they reached room temperature. Following that, a 5 g cake sample was taken  
89 and placed in each dried crucible. The crucible containing the samples was dried overnight in a  
90 105°C oven, then moved to a desiccator and weighed shortly after reaching room temperature;

**Comment [H7]:** the strikethrough text should be described in methodology not in this part of manuscript.

**Comment [H8]:** I suggest change the redaction. The real interest is evaluating the nutritional and sensory properties of bakery products that include the *M. oleifera* powder

**Comment [H9]:** Was found? Maybe is more convenient indicate: "was collected"

**Comment [H10]:** Why you decided this area? If the *M. oleifera* is present in many others parts of India or others country? Is important indicate the reasons by you decided collect the plants in this area

91 the moisture content of cake samples was then measured using the technique provided by  
92 (AOAC, 2012).

93 % Moisture = [Loss of the weight of the sample (g) / Weight of the sample (g)] × 100  
94

### 95 3.2.2 Determination of Ash Content

96 A 5 g homogenised sample was obtained and measured exactly in the dry silica dish. The  
97 sample was dried for one day on an electrical coil rack in a 130°C oven, and then chipped until it  
98 was no longer smoking. After that, the sample was ignited in a 550°C muffle chamber until  
99 greyish or white ash produced. The samples were quickly cooled in desiccators and tested at  
100 room temperature to determine the ash percentage (AOAC, 2012). The proportion of ash in the  
101 sample was calculated using the formula below

102 % Ash = [Weight of ash (g)/ Weight of sample (g)] × 100  
103

### 104 3.2.3 Determination of Crude Protein

105 The AOAC 990.033 Process was used to determine the crude protein content of the cake  
106 samples (AOAC, 2005). The LECO Truspec Nitrogen Analyser was used to determine the  
107 protein level of the cake samples. The cake samples were loaded into a 950°C combustion  
108 chamber using an autoloader. The nitrogen extracted from the samples was then converted into a  
109 protein amount by multiplying it by 6.25 and using the procedure below.

110 % Crude protein = %N × 6.25  
111

### 112 3.2.4 Determination of Fat

113 The fat content of the cake samples was evaluated using a Soxhlet extractor and a  
114 weighted flask, as described by the AOAC in 2005. For determining fat content, petroleum ether  
115 was utilised as an extraction solvent. The following formula was used to get the crude fat content

116 % Fat in sample = [Weight of residue (g)/ Weight of sample (g)] × 100  
117

### 118 3.3 Mineral determination

119 The sample's mineral content, such as calcium, potassium, phosphorus, and iron, was  
120 assessed using Atomic Absorption Spectroscopy, as reported in (Laveena et al., 2013).  
121

### 122 3.4 Vitamin Analysis

#### 123 3.4.1 Estimation of Vitamin C

124 The vitamin C content of the fruit sample was tested using the AOAC, 2006 technique.  
125 Pipette 5mL of the working standard solution into a 100mL conical flask, followed by 10mL of  
126 4% oxalic acid, and titrate against the dye (V1 ml). The end result is the appearance of a pink  
127 colour that lasts for a few minutes. The amount of dye consumed equals the amount of ascorbic  
128 acid consumed. A 1 g sample was extracted in 4% oxalic acid, diluted to a specified volume  
129 (100ml), and centrifuged. Pipette off 5mL of the supernatant, add 10mL of 4% oxalic acid, and  
130 titrate against the dye (V2 ml).  
131

#### 132 3.4.2 Determination of Total Carotenoids

133 Each sample (1 g) was combined with approximately 50 mL acetone and pulverised with  
134 a pestle and mortar. The extract was filtered, and the process was repeated until the extract was  
135 colourless. In a separating funnel, the extracts were combined with 50 mL petroleum ether and  
136 400 mL distilled water. The petroleum ether layer was separated and washed 2–3 times with

Comment [H11]: Is not cake  
sample??

137 water before being dried with anhydrous sodium sulphate and filled with petroleum ether up to  
138 100 mL. The total carotene concentration was determined using the molar extinction coefficient  
139 of  $\beta$ -carotene and the absorbance at 452 nm (AOAC, 2006).

140

### 141 3.5 Organoleptic analysis

142 Sensory evaluation was carried out by a panel of ten semi trained panel members.  
143 Hedonic rating test was employed using 9-point hedonic scale. Sensory parameters such as  
144 colour, taste, texture and overall acceptability were evaluated (Ranganna, 2001). The following  
145 were the numerical scores assigned: 9: Like extremely 8: Like very much 7: Like moderately  
146 6: Like slightly 5: Neither like nor dislike 4: Dislike slightly 3: Dislike moderately 2: Dislike  
147 very much 1: Dislike extremely.

148

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## 150 4. Result and Discussion

### 151 4.1 Nutritional Analysis

152 The samples Cake and chocolate were prepared and tested for different nutritional  
153 parameters, mineral analysis, Vitamin analysis and Sensory evaluation. Table 1 and Figure 1  
154 presents the nutritional analysis for Cake and chocolate samples. The Moisture content for  
155 control ( $1.36 \pm 0.03$ ,  $04.32 \pm 0.09$ ), 10% ( $1.56 \pm 0.02$ ,  $05.23 \pm 0.03$ ), 15% ( $1.73 \pm 0.01$ ,  $5.44 \pm$   
156  $0.04$ ) and 20% ( $1.96 \pm 0.04$ ,  $5.93 \pm 0.04$ ). Dry *M. oleifera* leaf extract has a high moisture  
157 content, indicating that it is sensitive to microbial development. It also means the product's shelf  
158 life is short. The high moisture content also contributes to the low quantities of protein, ash,  
159 crude fibre, fat, and carbohydrate. The lower the nutrient density of a food, the higher the  
160 moisture content (Udofia and Obizoba, 2005). Shokery et al. (2017) found dry *moringa* leaves  
161 powder to have a similar moisture content (8.81%). The decreased moisture level of the leaves  
162 powder makes it shelf stable, and when packaged appropriately, the leaves can be stored for a  
163 long time (up to a year) at room temperature.

164 Ash content for control ( $3.44 \pm 0.04$ ,  $05.73 \pm 0.02$ ), 10% ( $3.75 \pm 0.03$ ,  $06.43 \pm 0.04$ ), 15%  
165 ( $3.96 \pm 0.03$ ,  $6.76 \pm 0.04$ ) and 20% ( $4.03 \pm 0.05$ ,  $7.06 \pm 0.04$ ). Whole wheat flour had 1.33  
166 percent ash level, while *moringa* leaves powder had 12.98 percent. Kaur et al. (2017) discovered  
167 a similar ash concentration in whole wheat flour. Miller et al. (2016) reported a 0.96 percent ash  
168 concentration in wheat flour. Our results for ash content of *moringa* leaves powder are consistent  
169 with those of Sanchez-Machado et al. (2010), who found that *moringa* leaves have an ash  
170 percentage of 14.2 percent on a dry weight basis. When supplemented with low ash foods like  
171 wheat, the higher ash level is beneficial in terms of increasing the mineral content of the diet.  
172 Protein content for control ( $8.25 \pm 0.01$ ,  $08.16 \pm 0.02$ ), 10% ( $9.25 \pm 0.01$ ,  $08.75 \pm 0.03$ ), 15%  
173 ( $9.87 \pm 0.02$ ,  $8.95 \pm 0.03$ ) and 20% ( $10.01 \pm 0.18$ ,  $8.54 \pm 0.02$ ). When sponge cake was  
174 supplemented with up to ten percent *moringa* leaves powder, the protein level increased (7.86-  
175 8.30 percent) (Premi and Sharma, 2018). Proteins are necessary for children's body repair,  
176 growth, and maintenance. It also serves as an enzyme, a hormone, and keeps the body's  
177 electrolyte and acid-base balance in check (Adeola and Ohizua, 2018). *Moringa* leaves are  
178 extremely high in protein content, which could be due to the increased protein content of the  
179 fortified cake (Baker et al., 1998). Yang et al., 2006 observed a 17–88 percent increase in protein  
180 content in bread samples supplemented with MOLP, which is consistent with the study. The fat  
181 content ( $36.38 \pm 0.30$ ,  $04.74 \pm 0.04$ ), 10% ( $30.47 \pm 0.06$ ,  $04.23 \pm 0.04$ ), 15% ( $28.29 \pm 0.12$ ,  
182  $04.15 \pm 0.02$ ) and 20% ( $27.22 \pm 0.02$ ,  $04.08 \pm 0.02$ ). The fat content of jering bean flour

183 augmented biscuits was found to be between 26.54 and 25.67 percent (Cheng and Bhat, 2016). In  
 184 contrast to our findings, Sharma et al. (2013) found that guduchi leaf powder enriched biscuits  
 185 had a fat level of 17.24 to 16.865 percent.

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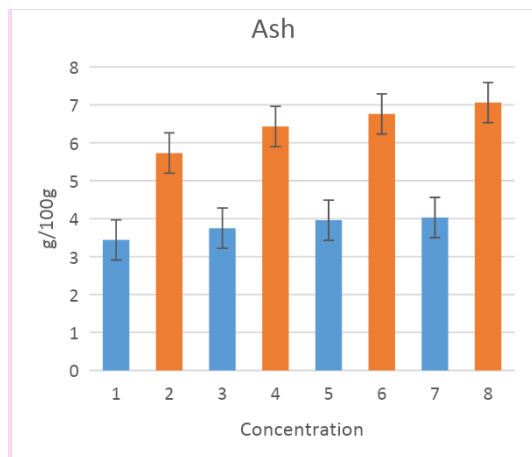
**Table 1: Nutritional Analysis for Chocolate and Cake**

Analysis	Control		10%		15%		20%	
	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake
Moisture (g/100g)	1.36 ± 0.03	04.32 ± 0.09	1.56 ± 0.02	05.23 ± 0.03	1.73 ± 0.01	5.44 ± 0.04	1.96 ± 0.04	5.93 ± 0.04
Ash (g/100g)	3.44 ± 0.04	05.73 ± 0.02	3.75 ± 0.03	06.43 ± 0.04	3.96 ± 0.03	6.76 ± 0.04	4.03 ± 0.05	7.06 ± 0.04
Protein (g/100g)	8.25 ± 0.01	08.16 ± 0.02	9.25 ± 0.01	08.75 ± 0.03	9.87 ± 0.02	8.95 ± 0.03	10.01 ± 0.18	8.54 ± 0.02
Fat (g/100g)	36.38 ± 0.30	04.74 ± 0.04	30.47 ± 0.06	04.23 ± 0.04	28.29 ± 0.12	04.15 ± 0.02	27.22 ± 0.02	04.08 ± 0.02

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**Figure 1: Nutritional Analysis for Chocolate and Cake**

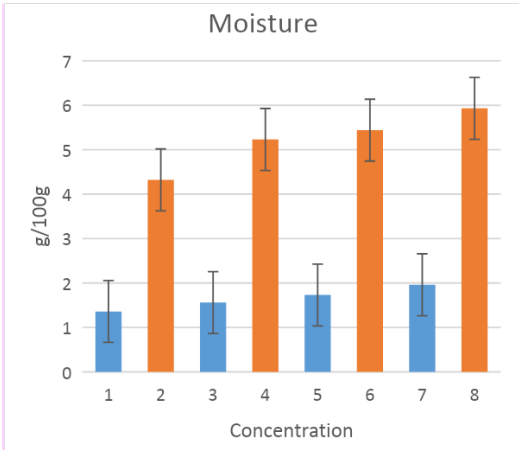
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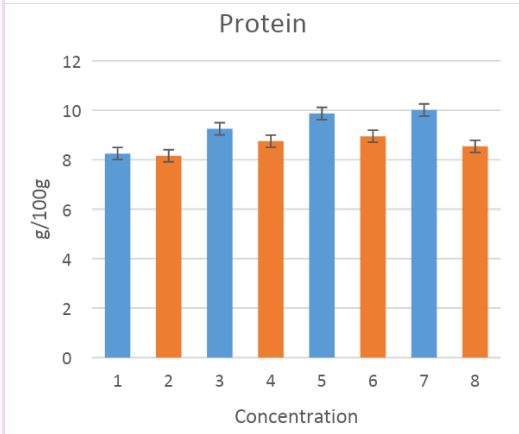
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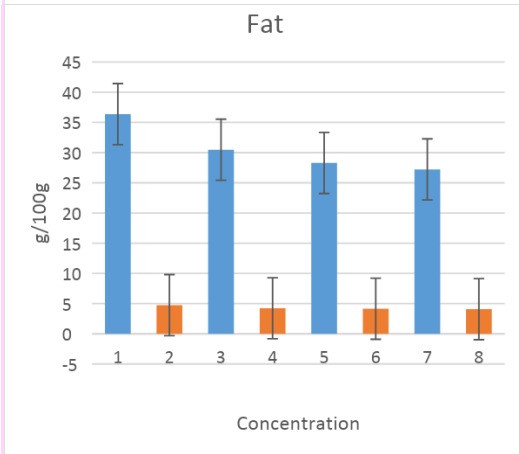
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**Comment [H12]:** You should decide if use the table or figure. Not both with the same information. Because the information is dense, I suggest use the table and take out the figure

195 **4.2 Mineral Analysis**

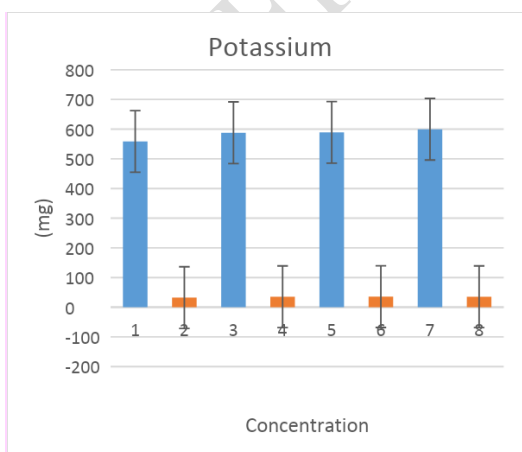
196 ~~During the mineral analysis, many factors such as~~ **Were measured the following minerals:**  
 197 calcium, potassium, phosphorus, and iron ~~were measured~~. Calcium is required for blood clotting,  
 198 blood pressure regulation, appropriate brain function, and bone health in the body. The calcium  
 199 content for control is (43.13 ± 0.50, 26.71 ± 0.02), 10% (47.73 ± 0.04, 27.21 ± 0.02), 15% (48.75  
 200 ± 0.05, 27.43 ± 0.04) and 20% (49.22 ± 0.03, 26.43 ± 0.04). The potassium content for control is  
 201 (558.55 ± 0.30, 32.44 ± 0.03), 10% (587.90 ± 0.61, 35.26 ± 0.04), 15% (589.20 ± 0.07, 35.64 ±  
 202 0.05) and 20% (599.73 ± 0.03, 35.21 ± 0.01). The phosphorus content for control is (76.64 ±  
 203 1.94, 53.76 ± 0.02), 10% (89.44 ± 0.31, 53.99 ± 0.07), 15% (90.24 ± 0.03, 57.25 ± 0.02) and  
 204 20% (91.74 ± 0.04, 55.16 ± 0.07) Table 2 and Figure 2. Potassium and phosphorus, which are  
 205 important for heart and blood pressure control, were shown to be considerably greater in fortified  
 206 cakes than in non-fortified cakes. This could be owing to the addition of MOLP and RBF, which  
 207 have a greater phosphorus and potassium content (Kraithong and Issara, 2021; Ma et al., 2020).  
 208

**Table 2: Mineral Analysis for Chocolate and Cake**

Analysis	Control		10%		15%		20%	
	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake
Calcium (mg)	43.13 ± 0.50	26.71 ± 0.02	47.73 ± 0.04	27.21 ± 0.02	48.75 ± 0.05	27.43 ± 0.04	49.22 ± 0.03	26.43 ± 0.04
Potassium (mg)	558.55 ± 0.30	32.44 ± 0.03	587.90 ± 0.61	35.26 ± 0.04	589.20 ± 0.07	35.64 ± 0.05	599.73 ± 0.03	35.21 ± 0.01
Phosphorus (mg)	76.64 ± 1.94	53.76 ± 0.02	89.44 ± 0.31	53.99 ± 0.07	90.24 ± 0.03	57.25 ± 0.02	91.74 ± 0.04	55.16 ± 0.07
Iron (mg)	8.43 ± 0.04	01.25 ± 0.05	9.44 ± 0.03	1.86 ± 0.03	9.78 ± 0.03	2.05 ± 0.03	9.94 ± 0.08	2.16 ± 0.07

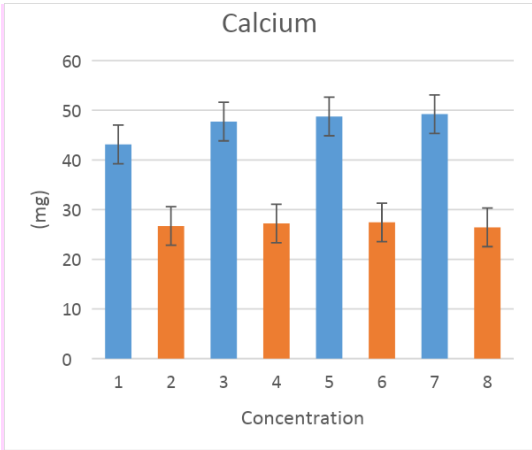
**Comment [H13]:** If you describe in the text the values measured for each mineral, is not necessary include a table or figure with the same information. I suggest modify the redaction of the text such as "...in the control the concentration of calcium was higher (or lower) than mixtures in both cake and chocolate (table 2)....."

**Figure 2: Mineral Analysis for Chocolate and Cake**

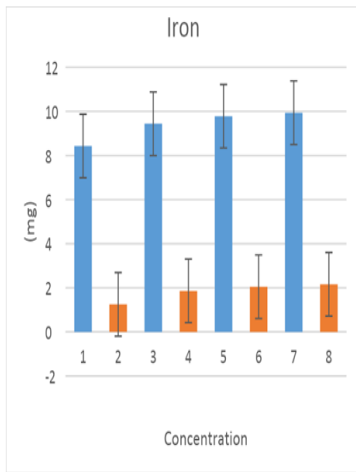


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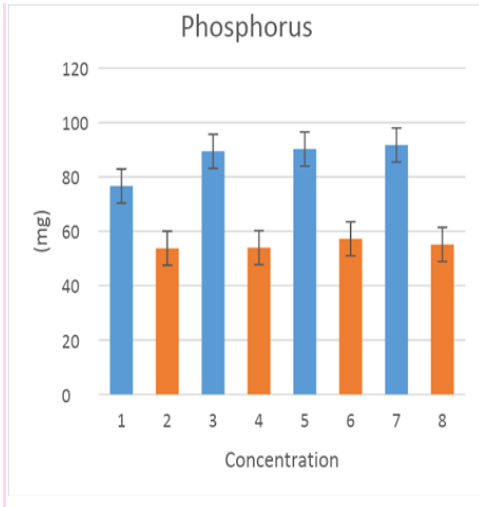
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The Iron content for control is  $(8.43 \pm 0.04, 01.25 \pm 0.05)$ , 10%  $(9.44 \pm 0.03, 1.86 \pm 0.03)$ , 15%  $(9.78 \pm 0.03, 2.05 \pm 0.03)$  and 20%  $(9.94 \pm 0.08, 2.16 \pm 0.07)$ . With increasing levels of MOLP in the flour blend, the iron concentration increased considerably. This was to be predicted, given the high iron content of *Moringa* leaves and ripe bananas (Fuglie, 2005; Bibiana et al., 2014). Gernah and Sengev (2011) found 26.20 mg/100g iron in *Moringa* leaf powder, and Barminas et al., 1998 found 454.00 mg/100g calcium and 450.60 mg/100g magnesium in *Moringa* leaf powder.

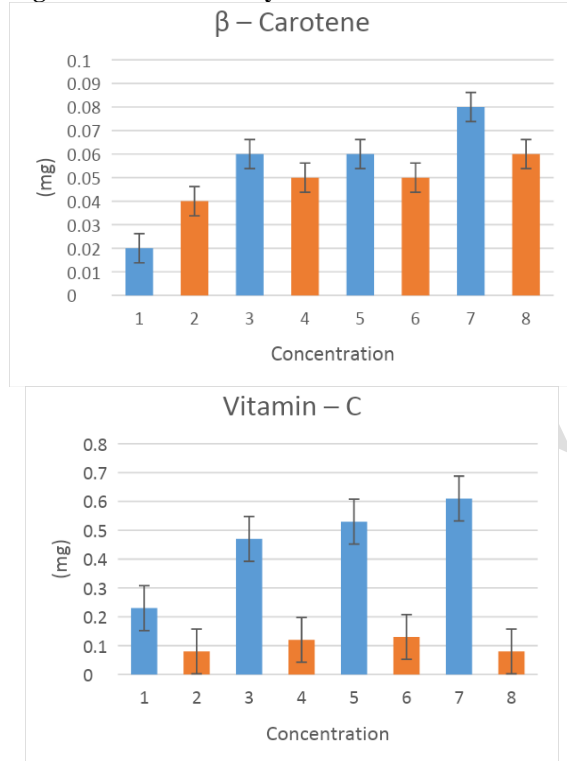
#### 4.3 Vitamin Analysis

The vitamin analysis is carried out for  $\beta$  – Carotene and Vitamin – C. In  $\beta$  – Carotene the control is  $(0.02, 00.04)$ , 10%  $(0.06, 0.05)$ , 15%  $(0.06, 0.05)$  and 20%  $(0.08, 0.06)$ .

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**Figure 3: Vitamin Analysis for Chocolate and Cake**



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In Vitamin- C analysis the control is (0.23, 00.08), 10% (0.47, 0.12), 15% (0.53, 0.13) and 20% (0.61, 0.08). Gernah and Sengeev, 2011 also reported a high value of 5232.40 mg/100g total carotenoids for *Moringa* leaf powder (Table 3 and Figure 3).

**Table 3: Vitamin Analysis for Chocolate and Cake**

Analysis	Control		10%		15%		20%	
	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake	Chocolate	Cake
β – Carotene (mg)	0.02 ± 0.00	00.04 ± 0.00	0.06 ± 0.00	0.05 ± 0.00	0.06 ± 0.00	0.05 ± 0.00	0.08 ± 0.00	0.06 ± 0.00
Vitamin – C (mg)	0.23 ± 0.02	00.08 ± 0.02	0.47 ± 0.01	0.12 ± 0.03	0.53 ± 0.02	0.13 ± 0.01	0.61 ± 0.02	0.08 ± 0.02

**Comment [H15]:** Please, take out the table 3

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**4.4 Sensory analysis**

The Sensory analysis for colour and appearance in control (Dark Brown Colour, Smooth, Bright Surface and Light Brownish Green), 10% (Dark Brown Colour, Smooth, Bright Surface and Light Greyish Green), 15% (Lower Dark Brownish Colour, Air Bubbles (Small Numbers) and Dark Brownish Green) and 20% (Lower Dark Brownish Colour, Air Bubbles (Small Numbers) and Dark Brownish Green). Smell for each concentration is flavoured. Taste for

control is Sweet, 10% is Sour, 15% and 20% is bitter. The mouth feel for different concentration is Sour and Sweet with Bitterness. In overall acceptability control and 10% is acceptable and 15%, 20% is not acceptable. The colour score of the control and *moringa* enriched biscuits agrees with Galla et al., (2017), who found a colour score of 8.33 to 6.63 for spinach powder supplemented cookies. Other studies have backed up the findings of the current study. Batista et al. (2017) conducted study on green algae integration in cookies. The green colour of the cookies, according to their findings, had a unique and appealing appearance and was well received by the consumer. The findings of this study correspond with those of Gramza-Michalowska et al., (2016), who found a substantial change in the colour score of cookies supplemented with green and yellow tea leaves.

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## 5. Conclusion

Two samples (Chocolate and Cake) were prepared and tested for different parameters such as nutritional analysis, mineral analysis, Vitamin analysis and Sensory analysis. Compared to each and every results of chocolate and cake, chocolate shows better activity. AS the chocolate shows more activity the nutrient analysis for moisture is (1.36, 1.56, 1.73 and 1.96 g/100g), Ash is (3.44, 3.75, 3.96 and 4.03 g/100g), Protein is (8.25, 9.25, 9.87 and 10.01 g/100g) and Fat is (36.38, 30.47, 28.29 and 27.22 g/100g) results were listed in different concentration such as control, 10%, 15% and 20%. In mineral Analysis Calcium is (43.13, 47.73, 48.75 and 49.22 mg), Potassium is (558.55, 587.90, 589.20 and 599.73 mg), Phosphorus (76.64, 89.44, 90.24 and 91.74) and Iron (8.43, 9.44, 9.78 and 9.94). Vitamin analysis for  $\beta$  – Carotene is (0.02, 0.06, 0.06 and 0.08 mg) and Vitamin – C (0.23, 0.47, 0.53 and 0.61 mg). It may be inferred that *moringa* leaves powder can be employed as a functional ingredient in food items based on the results of *moringa* leaves powder. The nutritional analysis, mineral analysis, and vitamin analysis of chocolate and cake treated with 10% *moringa* leaves powder increased significantly. Both the chocolate and the cake had sensory scores that were satisfactory. Because the different content of chocolate and cake increased by 10%, more research should be done to identify the microbiological analysis of the chocolate and cake.

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**Comment [H16]:** The data collected should be presented in table or figure and Is important indicate as part of discussion what was the perception regarding the parameters measured not only indicate if was similar or different with others reports

**Comment [H17]:** the strikethrough text should be taken out. Is redundant include data in the conclusions

**Comment [H18]:** Please use a unique reference system for all of the references list. Also, the same type and size of letters.

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