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COMPARATIVE PROXIMATE AND ELEMENTAL ANALYSIS OF DIFFERENT BRANDS OF NOODLES (INDOMIE, TUMMY-TUMMY AND BESTIE)

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ABSTRACT

Many households depend on easy and quickly prepared foods that are intended to be nutritional. One of such foods is instant noodles, which the nutritional contents are not always guaranteed. This study was conducted to determine the proximate and elemental composition of three different brands of instant noodles. Standard analytical methods were used for the analysis. The result of the proximate analysis indicated that Indomie instant noodles had the highest concentration of fat content of 5.139% and carbohydrate content of 84.340%, followed by Bestie instant noodles with fat content of 4.748% and carbohydrate content of 76.770%, while Tummy-Tummy instant noodles had the highest concentration of moisture content of 5.55%, fiber content of 1.688% and protein content of 4.200%. The metal analysis showed that Indomie noodles had the highest concentration of Fe (7.54ppm), which was below the WHO stipulated standard of 10.000-50.000ppm. It also had the least concentration of Hg and Pb with 0.474ppm and 0.364ppm respectively, and the Pb content was far higher than 0.025ppm stipulated by the WHO. The Na content of Tummy-Tummy noodles was 81.476ppm and this value was far greater than 3.290ppm obtained from Indomie noodles. But, the Na contents of the three brands of noodles were in tandem with <5000 per day stipulated by the WHO. Indomie noodles may be said to be preferred to the other noodles because it contains a reasonable amount of carbohydrate and lesser amount of heavy metals.

Key words: Indomie, Tummy-Tummy and Bestie Noodles, Proximate and Elemental Analysis

INTRODUCTION

In recent years, the Nigerian market has become saturated with various brands of instant noodles. Noodles are widely consumed throughout the world and their global consumption is second only to bread; it is a fast growing sector of the pasta industry (Bugusu *et al*, 2001; Owen, 2001). The World Instant Noodles Association ranked Nigeria as the eleventh country with the highest consumption rate of instant noodles in 2016. This is not surprising, especially considering that about sixteen different instant noodles brands are readily available across the country. Some of these brands include Indomie, Tummy-Tummy, and Bestie, etc. Without a doubt, these brands are all trying their best to maintain market supremacy in the face of fierce competition, (Anonymous, 2008). Instant noodles are often criticized as unhealthy or junk food (Zukowska and Biziuk, 2008).

Wheat flour noodles are staple foods in many Asian countries. Historically speaking, noodles originated from Northern China and subsequently introduced to other countries by traders, seafarers and migrants. Noodles have now become more widely adopted for everyday use and its storage has been facilitated by the introduction of dried noodles (AOAC, 2000). Flour of hard wheat (*Tritium aestivum L*) is the main primary ingredient (Burmon, 2015) and the addition of alkaline salts can help strengthen the structure and hence improve

the firmness of the final product. Many developing nation like Nigeria spend huge amount on the importation of wheat. One of the solutions is the use of flour from other source which is called composite flour (Sanni *et al.*, 2004). Composite flour can be described as a mixture of several flours obtained from roots and tubers, cereal, legumes etc with or without the addition of wheat flour. Several research works have been carried out on the production of noodles from composite flour. For instance, the use of lupine as composite flour in noodles production (Vijay *et al.*, 2008), wheat and millet noodles (Poongodi *et al.*, 2009) and noodles from wheat and fermented cassava flours (Husniati and Anastasia 2013). This study was based on the comparative proximate and elemental analyses of 3 brands of noodles. Moisture content influences the taste, texture, weight, appearance, and shelf life of foodstuffs (Olaoye and Onilude, 2008). In many foods the lipid component plays a major role in determining the overall physical characteristics, such as flavor, texture, mouth-feel and appearance (Slavin, 2005).

MATERIALS AND METHODS

Materials

Sample Collection: Three different brands of instant noodles namely: Indomie, Bestie and Tummy-Tummy were bought from Eke Oko market in Orumba North local Government Area of Anambra State, Nigeria.

Chemicals and Reagents: Nitric acid, boric acid, petroleum ether, H_2SO_4, NaOH, EDTA, HCl, bromescresol green and methyl red indicator, n-hexane, $CuSO_4$, Na_2SO_4, selenium catalyst.

Proximate Composition Determinations (AOAC, 2006)

Ash Content

Empty platinum crucible was washed, dried and the weight was noted. Two grams of wet sample was weighed into the platinum crucible and heated in a muffle furnace at 500°C for 3hours. The sample was cooled in a desiccators after burning and weighed.

$$\% \text{ Ash content} = \frac{W3-W1}{W2-W1} \times \frac{100}{1}$$

Where W1= weight of empty platinum crucible, W2 = weight of platinum crucible and sample before burning, W3 = weight of platinum and ash.

Moisture Content

A petri dish was washed and dried in the oven. Two grams of the sample was weighed into petri-dish, and the weight of the petri dish and sample was noted before drying. The petri-dish and sample were put in oven, heated at 100°C for 1hour and allowed to cool. The weight was

noted. It was further heated for another 1 hour until a steady weight was obtained and the weight noted. The drying procedure was repeated until a constant weight was obtained.

$$\% \text{ Moisture content} = \frac{W1-W2}{Weight\ of\ sample} \times \frac{100}{1}$$

Where W1= weight of petri-dish and sample before drying, W2= weight of petri-dish and sample after drying.

Crude Fat Content

Five grams of the sample was dried in a flask in an oven at 105-110°C for about 30 minutes and transferred into a dessicator and allowed to cool. The flask was filled with 300 mL petroleum ether (boiling point 40-60°C). The extraction thimble was lightly plugged with cotton wool and soxhlet apparatus was assembled and allowed to reflux for about 6 hours. The thimble was carefully removed and petroleum ether at the top of the set up was allowed to drain into a container for re-use. When the flask was almost free of petroleum ether, the sample was removed and dried at 105-110°C for 1 hour. It was transferred from the oven into a dessicator and allowed to cool, and then weighed.

Crude Fibre

Two grams of the defatted sample from crude fat analysis was boiled under reflux for 30 minutes with 200 mL of a solution containing 1.25g of H_2SO_4 per 100 mL of solution. The solution was filtered through linen on a fluted funnel and further washed with boiling water in a beaker until the washings are no longer acidic which was confirmed by testing with litmus paper. The residue was transferred to another beaker and boiled for 30 minutes with 200 mL of a solution containing 1.25g of carbonate free NaOH per 100 mL. The final residue was filtered through a thin but close pad of washed and ignited asbestos in a Gooch crucible, and further dried in an electric oven and weighed. It was finally incinerated, cooled and weighed.

The loss in weight after incineration × 100 is the percentage of crude fibre.

$$\%\text{Crude fibre} = \frac{Weight\ of\ fibre}{Weight\ of\ Sample} \text{ X } 100.$$

Crude Protein

This was done by Kjeldahl method described by Chang (2003). The total nitrogen was determined and multiplied with factor 6.25 to obtain protein content.

Two grams of the sample was put into Kjeldahl flask and added 25 mL of concentrated H_2SO_4. Half of cupper sulphate, five grams of sodium sulphate and a speck of selenium catalyst was added to it before it was heated under a fume cupboard until a clear solution was obtained (the digest). The digest was diluted to 100 mL in a volumetric flask and used for the analysis.

The 10 mL of the digest was mixed with equal volume of 45% NaOH solution in a Kjeldahl distillation apparatus. The mixture was distilled into 10 mL of 40% boric acid containing 3 drops of mixed indicator (bromo cresol green/ methyl red). A total of 50 mL of distillate was collected and titrated against 0.02N EDTA from green to a deep red end point. A reagent blank was also digested, distilled and titrated. The nitrogen content and hence the protein content was calculated using: 1mL of 1N H_2SO_4 = 14mg.

%N = $\left(\frac{14\ x\ VA\ x\ 0.1\ x\ W}{1000\ x\ 100}\right)$ X 100; VA = volume of acid used, W = Weight of sample, %crude protein = %N X 6.25.

Carbohydrate

The carbohydrate content was determined by subtraction method (Olaoye, and Onilude, 2008)

(%Total Carbohydrate = [100 - %(Moisture + Protein + Fat + Ash + Fibre)].

Preparation of Samples for Mineral Analysis

Two grams of the samples was measured out and heated in a furnace for 2hr at 550^{0}C and was added with 20 mL, 20% H_2SO_4 and filtered with filter paper. Sodium, calcium, mercury, lead and iron were determined using FS240 AA Agilent AAS (Zukowska, and Biziuk, 2008)

RESULTS AND DISCUSSION

Since the consumption of instant noodles has become an alternative source of food to some indigenous foods in most homes, therefore, there is a need to ascertain the nutritional contents of the noodles. The proximate analyses of these brands of noodles (Besties, Indomie and Tummy-Tummy) in TableI showed that Tummy-Tummy had high moisture content of 5.550% followed by Bestie with 5.250% and thus are more prone to bacterial attack. But both had high contents of fat with 4.748% and 3.934% respectively for Tummy-Tummy and Bestie noodles when compared with Indomie noodles. Indomie instant noodles had the highest content of carbohydrates with 84.360%, followed by Tummy-Tummy with 77.554% and 76.779% for Bestie noodles. All these parameters were in line with what Onyema *et al.* (2014), reported except that the crude protein of Tummy-Tummy and Indomie were 0.202% and 0.176% respectively, as against 4.200% and 2.800% obtained from the analysis.

Table 1: The results of Proximate Analysis of the Instant Noodles.

Parameters (%)	Indomie	Bestie	Tummy Tummy
i. Fat Content	1.390	3.934	4.748
ii. Moisture Content	3.698	5.250	5.550
iii. Ash Content	3.850	10.250	7.100
iv. Crude Fibre	0.148	1.688	0.848
v. Crude Protein	2.800	2.100	4.200
vi. Carbohydrate Content	84.360	76.779	77.554

It is important to note that some of the elemental contents of these noodles such as mercury, lead are carcinogenic which has detrimental health effects in the body (WHO, 2011). Therefore, the consumption rate of noodles especially Tummy-Tummy noodles should be at a minimal rate as its mercury and lead contents been presented in Table 2 were 0.635ppm and 2.743ppm respectively, followed by Bestie noodles which had 0.995ppm of lead and 0.479ppm of mercury. The WHO stipulated that the permissible standards for mercury and lead in noodles are 0.500ppm and 0.025ppm respectively (WHO, 2011). The mercury content in Tummy-Tummy is higher than the WHO standard. Most concern is the lead contents of the noodles especially, Tummy-Tummy which was 2.743ppm as against 0.025ppm WHO standard. Although, Tummy-Tummy noodle has high mercury and lead contents, it is also a good source of calcium but its high sodium content should be a source of concern. Excess sodium in the body has been linked to adverse health outcomes, including increased blood pressure (WHO, 2012). WHO (2012) recommended that adults should consume less than 5g of salt per day. Also in Table 2, Bestie noodle had moderate elemental contents though it has the tendency of being toxic to the body due to its high concentration of lead. Generally, Indomie tends to be of better choice since all its proximate composition and elemental contents are relatively moderate and thus pose little or less toxic effect to the body. It is also a good source of iron and calcium. While Tummy-Tummy is the worst preferred due to its high contents of heavy metals and sodium and low content of iron.

Table. 2 The results of Elemental Contents of the Instant Noodles

Parameters (ppm)	Indomie	Bestie	Tummy Tummy	WHO (Standard)
i. Sodium	3.298	41.217	81.476	<5000 per day
ii. Iron	7.539	5.167	0.969	10.000-50.000
iii. Calcium	3.669	3.657	4.169	---

iv. Mercury		0.474	0.479	0.635	0.500
v. Lead	0.364	0.995	2.743	0.025	

CONCLUSION

There were little variations observed in the proximate and elemental analysis of the selected noodles, especially as it concerns their sodium, mercury and lead contents. These metals may not pose any immediate serious health problems but prolonged usage may cause high blood pressure and various types of cancer since the heavy metals are known to be carcinogenic.

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