

Research Article

EVALUATION OF THE BIOCHEMICAL COMPOSITION AND PROXIMATE ANALYSIS OF INDOMIE NOODLE

EJEMBI Daniel¹, SANNI Momoh¹, EMMANUEL T Friday², ABBAH Okpachi C¹

1. Department of Biochemistry, Kogi State University, Anyigba, Nigeria.

2. Department of Medical Biochemistry, Kogi State University, Anyigba, Nigeria

Corresponding Author: EJEMBI, Daniel

ABSTRACT

Evaluation of the biochemical composition and proximate analysis of indomie noodles was investigated. Pearson's methods of 1976 were adopted for the determination of the proximate analysis of a 120g pack of indomie noodle. The result obtained showed that, indomie noodle of 120g pack contained 2.60g of moisture, 0.50g of ash, 0.20g crude fibre, 24.00g fats, 12.69% proteins and 60.01% of carbohydrates per serving.

Key words: indomie noodles, fibre, proteins

INTRODUCTION:

Indomie is a brand of instant noodles by Indofood, the world's largest instant noodle manufacturer, located in Indonesia. Indofoods is one of the world's largest manufacturers of dried instant noodles based in Indonesia, the world's largest Muslim country with a population of about 140 million people [1]. Indomie (the name derived from the Indonesian MiGoreng, which means fried noodle) is an instant noodle sold dried in packets or cups. The company's products sell throughout Indonesia, Malaysia, Australia, Nigeria, the United States, and 25 other countries – and not just to expatriate Indonesians [1]. The noodles are quick and easy to make, and can be eaten as a snack or as part of a main meal. Their versatility means that people can carry them to work or on trips, and cook them simply by adding hot water from a kettle. Indofood is one of the largest pre-packaged food companies in Indonesia, and was founded in 1972 as Panganjaya Intikusuma before changing to its current name in 1990 by Sudono Salim under the Salims group [2].

COMPOSITION

Indomie instant noodle chicken flavor is claimed to have the following nutritional information per serving

Serving per package of 120g (super pack)

Serving per container 1

Amount per serving Calories 630 calories from fat 220

Nutrient	amount (g)	Daily value (%)
Total fat	24g	37%
Saturated fat	7g	35%
Trans fat	0g	0%
Cholesterol	0mg	0%
Sodium	1.95g	81%
Total carbohydrate	93g	31%
Dietary fiber	3g	14%
Sugars	5g	31%
Protein	12g	24%

Data obtained from product sachet label.

VITAMINS AND MINERAL ELEMENT

Vitamin A	35%
Thiamin	25%
Pantothenate	6%
Vitamin B6	35%
Vitamin B12	10%
Calcium	4%
Vitamin D	30%
Riboflavin	15%
Niacin	4%
Folic acid	25%
Vitamin C	0%
Iron	15%

Data obtained from product sachet label.

INGREDIENTS

Noodles: wheat flour, vegetable oil, iodized salt, sodium polyphosphate, sodium carbonate, potassium carbonate, guar gum, tartrazine (CI 19140), antioxidant (TBHQ)

Seasoning powder: iodized salt, monosodium glutamate (621), hydrolyzed vegetable protein, soy powder, pepper, garlic powder, chicken flavor, Chili powder.

Indomie noodles contain Tartrazine, a synthetic lemon yellow azo dye primarily used as food colouring agent (Food standards agency website, 2011). It has a batch category code of E102 C.I. 19140, FD&C Yellow 5, acid yellow 23, food yellow 4 and trisodium-1-(4-sulfonatophenyl)-4-(4-sulfonatophenylazo)-5-(pyrazolone-3-carboxylate). It is water soluble and has a maximum absorbance in aqueous solution at $427 \pm 2 \text{ nm}$ [3]. Tartrazine is a commonly used colorant all over the world, mainly for yellow, but can also be used with brilliant blue (FD&C Blue; E133) or Green (E142) to produce various green shades.

Tartrazine was believed to cause most of the allergic and intolerance reaction experienced amongst all the azo dyes, particularly in asthmatic patients and those with aspirin intolerance [4]. Symptoms of tartrazine sensitivity can occur from either ingestion or cutaneous exposure to substances containing tartrazine. Symptoms could either be mild to severe [5]. A variety of immunological responses have been attributed to tartrazine ingestion, including anxiety, migraine [4], clinical depression, blurred vision, itching, general weakness, feeling of suffocation, purple skin patches and sleep disturbance [6]. People who are exposed to the dye experience symptoms of tartrazine sensitivity even at extremely small dose, some for periods up to 72 hours after exposure [7]. In children, asthma attack and hives have been claimed, as well as supposed link to thyroid tumors, chromosomal damage and hyper reactivity [8].

POSSIBLE HEALTH EFFECTS OF TARTRAZIN

The British food standards agency On September 6, 2007, revised, advice on certain artificial food additives, including tartrazine [9]. Professor Jim Stevenson of Southampton University, the author of the report said, "This is an important investigating area of research". The result suggests that consumption of certain mixture of artificial food color and sodium benzoate preservatives are associated with increase in hyperactive behavior in children.

The food standards agency (FSA) in April 10, 2008, called for voluntary removal of the colors (but not sodium benzoate). In addition, it recommended that the colors should be phased out in foods and drinks in the European Union (EU) over a specific period [10]. Tartrazine has a noticeable effect on the behavior of young mice;

- Tartrazine inflamed the stomach lining (increased the number of lymphocytes and eosinophils of rats) when given in the diet for a prolonged time [11].
- Tartrazine was found to adversely affect and alter biochemical markers in vital organs e.g. liver, kidney, small intestines etc of rat not only at higher doses but also at low doses [12].

MATERIALS AND METHODS

APPARATUS: Water bath, separating funnel, filter paper, stirrer, measuring cylinder, test tubes, beakers, conical flask, test tubes, test tube racks, aluminum foil, weighing balance, volumetric flask, micro pipettes, reagent bottles, sample bottles, syringe and needle, automated homogenizer, and latex hand glove

EQUIPMENTS: Incubator, refrigerator (thermo cool, from west point, tropical France), water bath (from ambassador laboratory electrical water bath, France). Electronic weighing balance, spectrophotometer (Genesys-20 and Jenway), oven.

DETERMINATION OF MOISTURE CONTENT BY VACUUM OVEN METHOD [13]**Procedure**

- Each sample was thoroughly mixed.
- About 5g of the sample was rapidly transferred into pre-weighed dry dish. The dish and contents was weighed.
- Sample was dried to a constant weight at 95-100°C under pressure not exceeding 100mmHg (about 5 hours)
- When sample was completely dried, the dish was placed in a dessicator to cool. Sample was reweighed, and the loss in weight as moisture was reported

Calculation of moisture:

The percentage moisture was calculated as follows:

$$\% \text{moisture} = \frac{W_2 - W_3}{W_2 - W_1} \times 100$$

Where:

W_1 = initial weight of empty crucible

W_2 = weight of crucible + food before drying

W_3 = final weight of crucible + food after drying

DETERMINATION OF ASH CONTENT [13]**Procedure**

- 2-5g finely grounded indomie powder was accurately weighed, sample was evaporate to dryness in an oven at 100°C), into a tarred silica crucible.
- Sample was charred on a Bunsen flame inside a fume cupboard, to drive off most of the smoke.

- Sample was transferred into a pre-heated muffle furnace at 550C°. and left at this temperature till white or light, moisten with a small amount of water to dissolve salts, sample was dried in an oven and the ashing process was repeated.
- Sample was cooled in a desicator and reweighed [13]

Calculation:

% Ash (dry basis) = $\frac{\text{weight of ash}}{\text{Weight of original food}} \times 100$

Weight of original food

= $\frac{W_3 - W_1}{W_2 - W_1} \times 100$

$W_2 - W_1$

Where:

W_1 = initial weight of empty crucible

W_2 = weight of crucible + food before ashing

W_3 = final weight of crucible + food after ashing

DETERMINATION OF CRUDE FIBRE [13]

Procedure

- About 2g of the sample was defatted with petroleum ether.
- The sample was boiled under reflux for 30minutes with 200ml of a solution containing 1.25g of H₂SO₄ per 100ml of solution.
- The solution was filtered through paper sieve on a fluted funnel.
- The residue on filter paper was washed with boiling water until the washings are no longer acid.
- The residue was transferred to a beaker and boiled for 30mins with 200ml per 100ml.
- The final residue was filtered through a thin but close pad of washed and ignited asbestos in a Gooch crucible.
- Residue was dried in an electrical oven and weighed.

The loss in weight after incineration $\times 100$ is the percentage crude fibre [13].

DETERMINATION OF FAT CONTENT BY SOXHLET EXTRACTION METHOD [13]

Procedure

- 250ml clean flasks was dried in an oven at 105-110°C for about 30mins.

- About 2g of the sample was weighed accurately into labeled thimbles
- Corresponding labeled cooled boiling flasks were weighed.
- The boiling flasks were filled with about 300ml of petroleum ether (boiling point 40-60°C).
- The extraction thimble was plugged lightly with cotton wool.
- The soxhlet extractor apparatus was assembled and allowed to reflux for about 6 hours.
- The thimble was removed with care and petroleum ether was collected in the top container of the setup and drained into a flask for re-use.
- When flask was almost free of petroleum ether, the flask was removed and dried at 105-110°C for 1 hour.
- The flask was transferred from the oven into a desicator and allowed to cool, then weighed

Calculation:

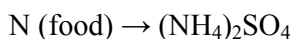
$$\% \text{ fat} = \frac{\text{Weight of fat}}{\text{Weight of sample}} \times 100$$

Weight of sample

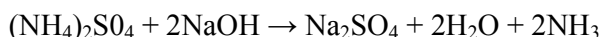
DETERMINATION OF PROTEIN CONTENT [13]

Principle:

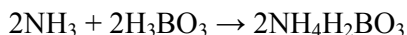
Designated weight of a given food was digested with concentrated H_2SO_4 (an oxidizing agent); anhydrous sodium sulphate (to increase boiling point) and a catalyst such as Copper, Titanium, Selenium or Mercury was applied. This treatment converts the nitrogen component in the food, (except nitrate and nitrite nitrogen), into ammonium sulphate



The resultant ammonium sulphate was converted to ammonia gas by heating with sodium hydroxide in the presence of steam:

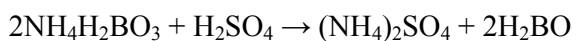


The ammonia generated is collected in excess of boric acid:



Subsequently, nitrogen is estimated by the titration of ammonium borate produced with standard H_2SO_4 or HCl .

i.e



When:

1 mole of $\text{H}_2\text{SO}_4 = 2 \text{ moles N} = 28\text{gN}$

Or 1 mole $\text{HCl} = 1 \text{ mole N} = 14\text{gN}$

Thus: 1 ml 0.1M $\text{H}_2\text{SO}_4 = 0.0028\text{gN}$

1ml 0.1M $\text{HCl} = 0.0014\text{gN}$

Procedure:

a. Protein Digestion:

- 2g of sample was weighed into a kjedahl flask
- 5g of anhydrous sodium sulphate was added.
- This was followed up with the addition of 1g copper sulphate and a speck of selenium.
- 25ml concentrated Sulphuric acid and 5 glass beads were introduced into the mixture.
- The mixture was heated in the fume cupboard, first rapidly and then increased heating with occasional shaking till solution assumed a green color.
- The black particles showing at the neck and mouth of the flask was cleaned with distilled water. It was then re-heated gently till the green color disappeared. It was then allowed to cool.
- After cooling, the digest was transferred with several washings into a 250ml volumetric flask and made up to the mark with distilled water.
- Distillation was done with Markham distillation apparatus (Pearson, 1976).

b. Protein distillation and titration:

- The Markham distillation apparatus was steamed for about 15 minutes before it was used.
- Under the condenser, 100ml conical flask containing 5ml of boric acid indicator was placed, such that the condenser tip is under the liquid.
- 5ml of the digest was pipette into the body of the apparatus via a small funnel aperture; the digest was washed down with distilled water followed by 5ml of 60% NaOH solution.
- The mixture was steamed through for about 5-7 minutes to collect enough ammonium sulphate.
- The receiving flask and the condensed water were removed.

- Titration of the solution was made in the receiving flask using N/100 (0.01N) hydrochloric or sulphuric acid and calculation of the nitrogen content was made and hence the protein content of the food [12].

DETERMINATION OF CARBOHYDRATE CONTENT [13]

The total carbohydrate content of the sample was obtained by subtraction of the percentage of all the other food contents from 100% i.e

Calculation: %Carbohydrate = 100% - (moisture+ash+fat+fibre+protein)%

RESULT OF PROXIMATE ANALYSIS

The results obtained from the proximate analysis of a pack of indomie weighing 120g showed that; moisture was 2.6% indicating the noodle was somewhat a dry packed fast food, ash content which shows the percentage of minerals constituents of the food sample was 0.5%, crude fibre was 0.2% indicating a low proportion of crude fibre in the noodles, the fat content of the sample was found to be 24%, an indicator of appropriate dietary source for fat in energy metabolism but not sufficient enough to last for a long time, protein composition was 12.69% and the total carbohydrate content was 60.01% indicating a high presence of carbohydrates and consequently a good source of immediate energy for normal cell functioning.

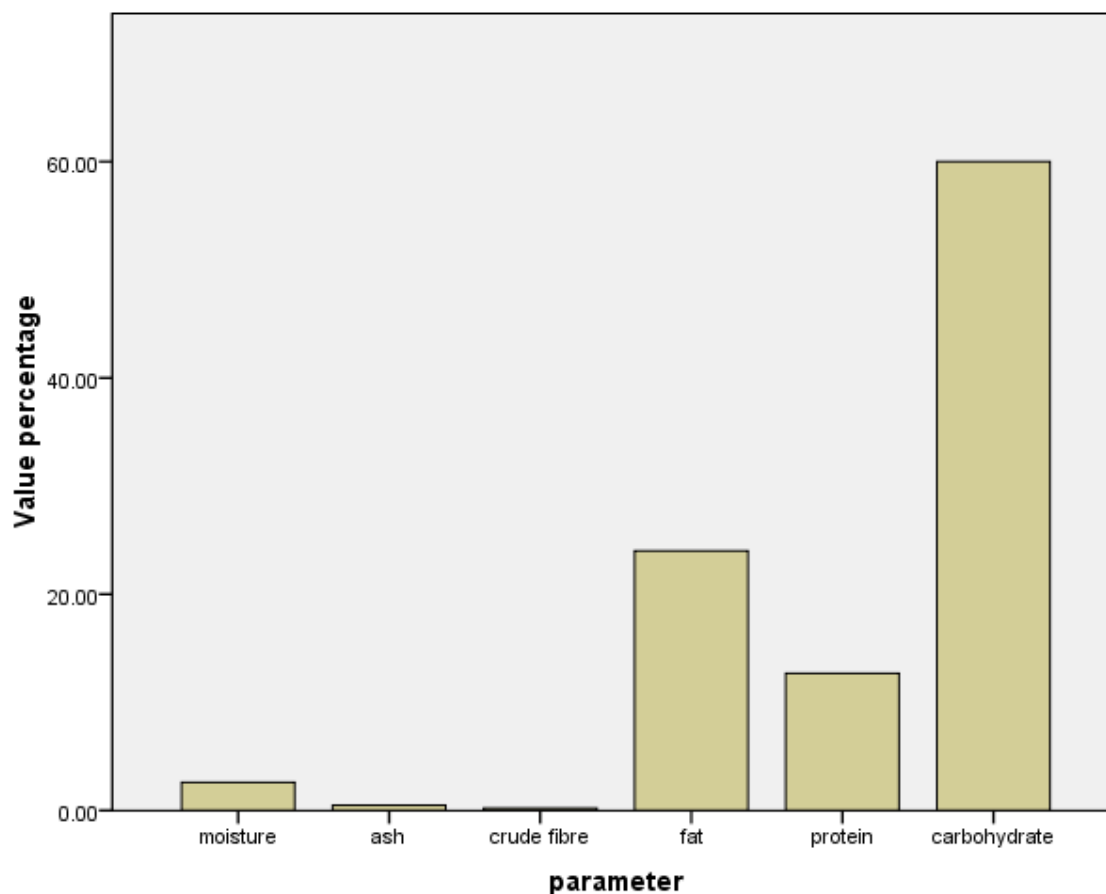


Figure2. Graph of proximate analysis result

Figure2 represents the chart for the results obtained from the proximate analysis of indomie noodles

Moisture was found to constitute about 2.6%, ash about 0.5%, crude fibre about 0.2%, fat about 24%, protein about 12.69% and carbohydrates about 60.01% of the total content of indomie (per serving)

DISCUSSION AND CONCLUSION

The proximate analysis of any food sample is done to determine the nutritional composition of that sample and also its proportion in the food sample being analyzed by weight. This analysis is very essential as it shows the analyst a better view on the possible nutritional benefits of diet from such food.

Studies have shown that, indomie noodle contains appreciable nutrients for the body as shown in table 1 below. Obviously, indomie noodle is good for young and growing children as a supply of right nutrients for growth and body functioning.

TABLE1. PROXIMATE ANALYSIS DATA

PARAMETER	PERCENTAGE (%)
Moisture content	2.60
Ash content	0.50
Crude fibre	0.20
Fat content	24.00
Protein content	12.69
Carbohydrate content	60.01

REFERENCES

1. Indofood (2010) "Our history". http://www.indofood.com/about_history.aspx
2. Witular, and Rendi, A., (2004) "Salim at driving seat at indofood". The Jakartapost. Retrieved 1 Feb. 2010
3. Jain, R., Bhargava, M., and Sharma, N., (2003)"Electrochemical studies on a pharmaceutical Azo dye: tartrazine". Industrial chemistry research 42(2):243.doi:10.1021/ie 020228g.
4. UK food guide (2007) "E102 tartrazine, FD&C yellow no 5". www.ukfoodguide.net/e102.htm
5. Alvarez, C.E., Alcover, S.R., Anaya, T.M., and Garcha, R.D (1981)." Pharmaceutical preparations which contains tartrazine".Allergolimmunopathol (Madr) 9(1):45-54
6. Rowe, K.S., and Rowe, K.J., (1994) "Synthetic food coloring and behavior: a dose response effect in a double blind, placebo-controlled, repeated-measures study". The journal of pediatrics 125(53t1):691-8 doi: 10.1016/S0022-3476(06) 80164-2.PMID 7965420.
7. Dipalma, J.R., (1990)" tartrazine sensitivity" American family physician 42(5):1347-50 PMID 223964
8. Donna, M., (2007). "Food additives and hyperactive behavior in 3-year-old and 8/9-year-old children in the community: a randomized, double blinded, placebo-controlled trial" the lancet 370 (9598): 1560-1567.doi:10.1016/S0140-6736(07)61306-3. PMID 17825405.

9. BBC, (2008) in “ministers agree food color ban”
10. FSA. (2008) “board discussion color advice” Food standards agency website, (2011) “Tartrazine, the azo dye”
11. Mountinho, I.L., Bertges, L.C., and Assis, R.V., (2007)” prolonged use of the food dye tartrazine and its effect on gastric mucosa of Wister rats”. Brazilian Journal of biology.67 (1):141-5 doi 10.1590/51519-69842007000100019PMID.17505761
12. Amin, K.A., Abdel, H.H., and AbdElsttar, A.H.,(2010)” effect of food azo dyes tartrazine and carmoisine on biochemical parameters related to renal, hepatic, intestinal function and oxidative stress biomarkers in young male rats” food chemical toxicol. 48(10):2994-9 doi 10.1016/j.fct.2010.07039.PMID 20678534.
13. Pearson (1976). “Proximate analysis of food materials”. Journal of food chem.PMID 12678084.