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Determination of Calorie Contents of Myanmar Snacks from Thanlyin Township

Nyo Nyo Aung[1], Mya Mya Mu[2], Myat Sandar Hla[2]

Abstract

The main aim of our project work is to determine the calorie content of the five items of Myanmar snacks such as shwe hta min, kauk nyin htoke, mont kywe the, htan thee mont, and mont sein paung from Thanlyin Township. In this research work vitamin B_1 content was determined by fluorometric method. The highest content of vitamin B_1 (0.057mg%) was found in htan thee mont. The protein, carbohydrate, and fat contents were also determined and the highest contents were found in mont sein paung and the values are 4.13g/100g; 39.95g/100g; and 1.88g/100g respectively. Mineral contents of the five items of Myanmar snacks were also determined by AAS method. Phosphorous content was the highest in mont sein paung (56.99 mg%); iron content was the highest in htan thee mont (12.17 mg%); sodium, magnesium and potassium contents were the highest in kauk nyin htoke and the values were 10.58 ppm; 4.21 ppm and 7.29 ppm respectively. Calcium content was the highest in mont kywe the (143.08 mg%). The highest energy value of total digestible nutrient were calculated for the given samples and the highest value (187.21 cal/100g) was found in mont sein paung. According to the observation of this work it is clear that among the five items, mont sein paung has the highest calorie content as well as energy value. Not only mont sein paung but also other four items (shwe hta min, kauk nyin htoke, mont kywe the, and htan thee mont) have enough calorie contents to meet human energy requirements.

Key Words : Snacks, TDN Total digestible nutrients, Nitrogen-free extract, Moral vitamin, Anoneria dyspepsia

Introduction

Most of Myanmar snacks are made from rice and sticky rice. Snack foods are important source of nutritious foods particularly for children and these kinds of foods are essentially needed for the nutrition of the people (Aye Aye Myint, 1992).

The chemical components of food that supplies the body with needed nourishment are called nutrients. The study of various nutrients in relation to their effect upon the human body is called nutrition science.

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Good nutrition is to be maintained for the body's required energy for building and repairing of tissues and for regulation of body's processes. Proteins are nitrogenous substances necessary for building up the body and repairing of tissues with the help of vitamins and minerals. They are also a valuable source of energy in the body (A Lockhart, 1994).

Carbohydrates and fats are used as fuel for work or heat and energy. Vitamins occur in small quantities and are used for many purposes, if not all, which help to regulate metabolic processes. Vitamin B_1 (Thiamine) is known as the 'moral vitamin' because it is of primary importance in keeping the nervous system healthy and in maintaining a healthy mental attitude. It is essential in converting glucose into energy, as well as improving the muscle tone of the stomach, intestines, and heart. It is also essential in helping to contract appetite. Because of its effect on the nervous system, it can also improve individual learning capacity and is necessary of consistent growth in children (Dunne, Lavon J, 1990).

Minerals are necessary for growth and repairing, help to regulate body processes. The mineral important in building and repairing body tissues and in regulating certain body processes are Ca, P, Fe, Cu, Na .... etc. In bones and teeth the minerals of calcium and phosphorus are deposited in protein material. Iron is found in blood as a part of the red pigment, hemoglobin (Mudamb, S.R and Rajagopal, M.V, 2003)

Experimental

Chemicals and Apparatus

Ammonium molybdate, amyl alcohol, boric acid, copper sulphate, absolute ethanol, hydrochloric acid, lead acetate, methyl red, methyl orange, petroleum ether, pepsin takadistase mixture, potassium dihydrogen phosphate, anhydrous sodium sulphate, sodium hydroxide, sodium carbonate, sulphuric acid and Tin (II) chloride dihydrate were used. A 200 ml beaker, a 50 ml burette, Conway units with glass covers, a desiccator, glass funnels, a hot plate, micro kjeldahl flasks, a moisture cup, 100 ml measuring cylinder, 5 ml and 10 ml pipette, porcelain crucibles, 0.5ml graduated pipette, porcelain crucibles, 0.5 ml graduated pipette, a sand bath, a 250 ml of round bottomed flask, a Soxhlet apparatus, 50 ml and 100ml volumetric flasks, a water bath and a watch glass. An electric oven (Gallenkamp Co. England), a muffle furnace (Kiln West model), Pfaltz

Bauer's photofluorometer and visible spectrophotometer (spectronic 20D + England).

Samples

Five samples of Myanmar snacks - shwe hta min, kauk nyin htoke (with banana), mont kywe the, mont sein paung and Htan thee mont.

Determination of Moisture contents in some Myanmar Snacks

The Myanmar snack sample of shwe hta min (3.3160 g) was placed in the moisture cup and the sample was spread uniformly over the base of the cup. The cup and contents were put in an oven maintained at 105 °C and dried for 3 hrs. Then the cup was removed from the oven and cooled in a desiccator and was finally weighed. The process of drying, cooling and weighing was repeated until a constant weight was obtained. The moisture content of the sample was then calculated from the weight loss of the sample. This experiment was done in triplicate. Similar experiments with other snacks samples were carried out.

Determination of Ash content in some Myanmar Snacks

A dried Myanmar snack sample of shwe hta min (3.0619g) was added to a dried porcelain crucible. The sample in crucible was charred on a sand bath. Then the charred samples were placed inside the furnace. Incineration was done at 550°C until a white ash was obtained and then retrieved from the furnace, cooled, and weighed. The process of heating, cooling and weighing was repeated until a constant weight was obtained. The ash value of the sample was then calculated. This experiment was done in triplicate.

Determination of Protein content in some Myanmar Snacks by the Conway Micro- diffusion Technique

A dried Myanmar snack sample of shwe hta min (0.9998g) was put in the micro kjeldahl flask through a funnel. Then 4g of anhydrous sodium sulphate, 0.5 g of copper sulphate, and 5 ml of concentrated sulphuric acid

were added to the flask and swirled thoroughly. The flask was heated on a hot plate at lower temperature and the temperature was raised slowly to achieve complete digestion. The solution turned pale-blue colour when complete digestion was attained. The digested solution was cooled for a few mins. and then diluted with distilled water and the volume made up to 50 ml in a volumetric flask to give the sample solution. The series of Conway units (3 numbers) were taken and the outer compartments were divided into two parts, using candle wax. Then the outer rims of these units were smeared with grease. A 2% boric acid solution (2ml) was placed in each of the inner compartments followed by the addition of one drop of methyl red. For the outer compartment, the digested solution (1ml) was added to one part of each unit (kept in row) and then 1ml of saturated sodium hydroxide solution was added to the other part of the first unit and the unit was immediately covered with a glass plate. This procedure was repeated with the two remaining units. Then the Conway units were swirled uniformly each in turn so as to mix the two solutions in the outer compartment. The units were left overnight so that the ammonia liberated was completely absorbed by 2% boric acid. The above procedure was repeated for 3 Conway units with 1 ml each of distilled water in place of the digested sample solution. The absorbed ammonia was titrated with 0.0545 M sulphuric acid solution until a red colour end point was just obtained. Finally, the total nitrogen % was calculated and multiplying this value with 6.25 gave the protein %. This experiment was done in triplicate.

Determination of Fat in Some Myanmar Snacks

A dried powdered Myanmar snacks sample of shwe hta min (2.5848 g) was placed on Whatman No.1 filter paper and sample were packed with a fat-free cotton thread. The package of the sample was placed in the central synphon portion of the Soxhlet apparatus. Redistilled petroleum ether (40-60 °C) (100ml) was added into a dried 250 ml round-bottomed flask, which was connected to a Soxhlet synphon and condenser. The fat of the sample was extracted with petroleum ether (40-60 °C) on the water bath for about 5hrs. After this time, the fat-free sample was dried in an oven at 70°C for 15 mins. It was cooled in desiccator and weighed. The fat content was calculated from the weight loss of the sample. This experiment was done in triplicate (M.A. Joslyn, 1970).

Determination of Crude-fibre in some Myanmar snacks

A fat free Myanmar snacks sample of shwe hta min(1.1647 g) was placed in a 200 ml beaker. A 100ml solution of 0.1283 M sulphuric acid was added and the mixture was stirred. The beaker was covered with a clock glass and heated on a water bath for 1hr. Any loss in volume was made up during slow boiling. The hot solution was filtered through a Whatman. No. 54 filter paper and the residue washed with distilled water until free from acid. The residue was washed back in the beaker with a total of 100 ml hot distilled water and then 50 ml of 0.2826 M sodium hydroxide solution were added. The beaker was then covered with a clock glass heated on a water bath for 1hr. Any loss in volume was made up during slow boiling. The hot solution was then filtered through a whatman No. 54 filter paper and the residue washed with hot distilled water until free from base.

The paper and residue were dried in an oven at 100°C for 15 mins and cooled in desiccator and weighed into a crucible. The crucible with contents was ignited over a hot plate until ash was obtained. Then the ash in the crucible was cooled in a desiccator and weighed again. The process of heating, cooling and weighing was repeated until a constant weight was obtained. The loss of weight is crude fibre. This experiment was done in triplicate.

Determination of Mineral Content

The amount of mineral contents were determined by atomic absorption spectro-photometric method at the Applied Geology Department. Ash sample (0.1)g was digested for 15 mins with 2ml of concentrated hydrochloric acid solution. The solution was evaporated to dryness and dissolved in 6ml of 25% (v/v) hydrochloric acid solution, followed by centrifugation. The centrifuged solution was decanted and the clear solution was transferred to a 100 ml volumetric flask and the volume made up to the mark with distilled water. Mineral contents in the above solution was determined by the atomic absorption spectrophotometer (G.W. Monier, Willians, 1950).

Determination of Phosphorus

Ash sample (1.0)g was dissolved in 30ml of concentrated nitric acid and 5ml of concentrated hydrochloric acid and boiled until organic matter was destroyed. The residue was treated with 5ml of 6M hydrochloric acid solution and diluted with 10ml of distilled water followed by filtration. The filtrate and washed solution were collected in 100ml volumetric flask and made up to the mark with distilled water. Sample solution (5ml) was pipetted into 100ml volumetric flask and neutralized by 10% sodium hydroxide with phenolphthalein indicator. Distilled water was added up to 95ml and 4ml of ammonium molybdate solution was added. It was shaken, 6 drops of chlorostannous acid solution was added and then volume made up to the mark with distilled water. The absorbance of the sample was measured at 660 nm after 10 mins.

Determination of Vitamin B_1 content in some Myanmar snacks

25 gms of food stuff was hydrolysed by 100ml of 1N sulphuric acid in a boiling water bath for one hour. It was cooled to room temperature and 5 ml of pepsin takadistase mixture, was added shaken thoroughly, then it was centrifuged again. It was then heated in a water-bath at 80°C for 10 mins in order to destroy the enzyme. It was then filtered, 20 ccs of the filtrate was taken and 10ccs of 40% basic lead acetate was added, stirred thoroughly and then centrifuged for 15 mins. The clear solution was then transferred to another centrifuge tube, 0.1ml of 85% sulphuric acid was added and it was then centrifuged again. The solution was first shaken with petroleum ether and then with amyl alcohol. 25 ml of the solution was taken and the volume made up to 35 ml with distilled water. Then 10ml aliquots were taken in three separating funnels: Standard (R), test(T), and blank(B). To these the following procedure should be done.

Standard (R) = 10 ccs of aliquot + 1 cc standard + 3ccs of 1% Potassium ferricyanide + 3 ccs of 15% sodium hydroxide

Test (T) = 10 ccs aliquot + 3 ccs of 1% potassium ferricyanide + 3 ccsof 15 % sodium hydroxide

Blank (B) = 10 cc aliquot + 3ccs 15% sodium hydroxide

Immediately, 15 ml of amyl alcohol was added from a burette and it was shaken vigorously and kept for 3 minutes. Then the separating funnels were kept for separation. The aqueous layer was removed and the alcohol layer was transferred to the test tube. It was then cleared by addition of a pinch of anhydrous sodium sulphate. Fluorescence was read on Pfaltz & Bauer's Photofluorometer using B, filters, after the instrument has warmed up. The working quinine sulphate standard is used to set the machine at 100.

Results and Discussion

Determination of Moisture contents of some Myanmar snacks

The moisture % of five Myanmar snacks were determined (cf. Table 1) by the use of an electric oven. These were measured by drying to constant weight at 100–150°C in an oven for all the samples. It was found that, mont kywe the has the highest % of moisture (ie. 77.11 ± 0.31 g/100g) where as shwe hta min has the lowest, moisture % (ie. 56.34±0.72 g/100g) (D.Pearson, 1958).

Determination of ash content of some Myanmar snacks

The quantity of ash in the snacks was determined in order to calculate the carbohydrates content by difference method. The wet sample is dried at 90°C, then put in a muffle furnace and ashed at temperature not exceeding 650 °C. The ash % (s) of five Myanmar snacks are given in Table 2. It was found that mont kywe the has the highest content of ash (1.37 ± 0.11g/100g) where as mont sein paung has the lowest ash (0.21 ± 0.02 g/100g).

Determination of protein contents of some Myanmar snacks

Since proteins are complex nitrogenous substances, the protein % of any food material is obtained by determining the total nitrogen by the micro Kjeldahl method and multiplying it by 6.25.The protein %(s) of Myanmar snacks were determined by the Conway micro-diffusion technique. The protein content of five sample items of commonly eaten Myanmar snacks are given in Table 3. It was found that mont sein paung has the highest content of protein. (4.13 ± 0.12 g/100g) whereas mont kywe the has the lowest content of protein (1.87 ± 0.06 g/100g) (H.C. Shermann, 1946).

Determination of fat contents of some Myanmar snacks

The fat contents of the Myanmar snacks were determined by the Soxhlet extraction method. The fat % of five items of commonly eaten Myanmar snacks are listed in Table 4. It was found that mont sein paung has the highest content of fat (1.88 ± 0.23 g/100g) and shwe hta min has the lowest content of fat (0.70 ± 0.06 g/100g).

Calculation of total carbohydrate contents of some Myanmar snacks

The carbohydrate content of the diet is then calculated as follow.

g carbohydrate = 100 –(g protein + g fat + g moisture + g ash)

The total carbohydrate % of five items of commonly eaten snacks are listed in Table 5. It was found that mont sein paung has the highest source of carbohydrate (39.95 ± 0.59 g/ 100g) and mont kywe the has the lowest source of carbohydrate (18.64 ± 0.66 g/100g). The heat of combustion of starch determined in bomb calorimeter, is 4.20 calories/g whereas that glucose is 3.74 cal/g. The average calorie value (gross energy value) for carbohydrate is 4.1 cal/g. Each gram of carbohydrate provides 4 cal/g (metabolizable energy).

Calculation of energy value of some Myanmar snacks

The calorie content of Myanmar snacks were calculated by the calculation method. The calorie content of five items of commonly eaten Myanmar snacks are given in Table 6. It was found that mont sein paung has the highest source of calorie (193.25 ± 1.23 g/100g) and mont kywe the has the lowest source of calorie (91.37 ± 1.93 g/100g).

Determination of crude fibre content of some Myanmar snacks

In the determination of crude fibre the sample was dried and extracted with petroleum ether. (40-60°C) to remove the fat. In this research, the fibre % of the Myanmar snacks were determined. If the fat free sample is treated under standardized conditions with boiling dilute sulphuric acid and boiling sodium hydroxide the residue contains most of the cellulose and other complex polysaccharides along with some mineral

matter. The residue is filtered, washed dried and weighed, then ignited and weighed again. The lost of weight in ignition represents the crude-fibre amount (R. Less, 2006).

The crude fibre % of five sample items of commonly eaten Myanmar snacks are given in Table 7. It was found that kauk nyin htoke has the highest content of crude fibre (1.50 ± 0.02 g/100g) and mont kywe the has the lowest content of crude fibre (0.58 ± 0.01 g/100g)

Calculation of nitrogen-free extract of Myanmar snacks

In this work, nitrogen-free extract of the Myanmar snacks was calculated for the calculation of total digestible nutrients. The nitrogen extract of five items of commonly eaten Myanmar snacks are shown in Table 8. It was found that mont sein paung has the highest source of nitrogen free extract (39.16 ± 0.61 g/100g) and mont kywe the has the lowest sources of nitrogen-free extract (18.03 ± 0.59 g/100g).

Calculation of total digestible nutrients of some Myanmar snacks and calculation of energy value of total digestible nutrient of these snacks

The total digestible nutrients (T.D.N) represents all of the available energy both useful and waste. It includes not only the useful energy but also the energy lost as urine, methane, and heat increment. It is a quantity familiar in many ways to be summation of Physiological fuel values, each expressed in terms of carbohydrate equivalent.

Since T.D.N is a measure of useful energy of a feed, the weighing of the term 1,1,1 and 2.25 presumes that digestible protein, digestible fibre and digestible nitrogen-free extract yield indentical energy where as digestible fat yields 2.25 times as much energy per unit weight of the feed function. Crude fibre is also considered, so carbohydate are dealt with under two categories. Crude fibre and nitrogen free extract.

In equation form total digestible nutrients is written.

$$TDN = (\%\ \text{protein} \times \text{Dig}) + (\%\ \text{fibre} \times \text{Dig}) + (\%\ \text{N-free extract} \times \text{Dig}) + 2.25\ (\%\ \text{fat} \times \text{Dig})$$

For the determination of T.D.N, digestibility of protein, fibre, nitrogen free extract, and fat are 0.75, 0.50, 0.90 and 0.90, respectively.

In the present work, the total digestible nutrient % of the Myanmar snacks were calculated by above eqùation. The T.D.N % of five items of commonly eaten Myanmar snacks are given in Table 9. It was found that mont sein paung has the highest source of T.D.N (42.55 ± 0.31 g/100g) and mont kywe the has the lowest source of T.D.N (20.01 ± 0.41 g/100g). T.D.N is a measure of useful energy of food in terms of carbohydrate equivalent. The calorie value of T.D.N for most food stuffs is approximately 4.4 calories /g.

In this study, energy value of T.D.N in Myanmar snacks were calculated. The energy value of five items of commonly eaten Myanmar snacks are shown in Table 10. It was found that mont sein paung has the highest source of energy value (187.21 ± 1.34 g/100g) and mont kywe the has the lowest source of energy value (88.06 ± 1.78 g/100g).

Determination of mineral contents of some Myanmar snacks

Mineral contents of five items of commonly eaten Myanmar snacks were investigated; Potassium (K), Sodium (Na), Copper (Cu), Magnesium (Mg) and Zinc (Zn) by Atomic Absorption. In the present work, the mineral of five items of commonly eaten Myanmar snacks are given in Table 11. It was found that sodium, magnesium and potassium content were the highest in kuak nyin htoke and the lowest in shwe hta min. Calcium content was the highest in kauk nyin htoke and the lowest in htan thee mont. Phosphorus content was the highest in mont sein paung and the lowest in htan thee mont. Iron content was the highest in htan thee mont and the lowest in mont sein paung.

Determination of Vitamin B_1 content of some Myanmar snacks

Recommended daily allowance which is 1-1.5 mgm per day (cf. Table 12) The early symptoms of B_1 deficiency are anoneria dyspepsia, heaviness and weakness of legs and needles sensation, subjects feel weak and get easily exhausted while working. It is also essential for prevention of beriberi a nervous system disease that involves considerable sickness and death. It is not stored in the body, so there is no danger in taking large doses because this is fragile water soluble vitamin.

Calorie or energy requirements

Fats, carbohydrate and proteins can all be used by the body to provide energy. Carbohydrate fats, proteins when oxidized or burned in body, furnish energy. A gram of carbohydrate has an energy or fuel value of 4 calories, a gram of fat 9 calories, a gram of protein 4 calories. The energy need depends chiefly upon activity, age and size, but also upon climate and season. The body's energy requirement is stated in terms of calories. The daily requirement of a woman may range from 2100 to 2700 calories or more, and the daily requirement for males occurs between age 15 and 22, and for females between 11 and 14 are 3000 and 2400 colories respectively (cf. Table 13).

During the periods of growth, additional nutrients are required for the formation and development of tissues in the diet. Thus the calorie requirement is increased. They are usually more active than adults. Calorie allowances should be based upon the desirable weight for height and health. A person occupied in a heavy manual work will require more energy than a person whose job is entirely sedentary. A person who is suffering from a disease may require less energy, an emotional or mental strain can sometimes mean that the body requires more energy. A woman who is pregnant will require more energy (W. Heiman, 1980).

Table 1. Moisture(water) contents of some Myanmar snacks

No.	Type of snacks	Moisture content	Mean
1	Shwe hta min	56.30 55.64 57.08	56.34 ± 0.72
2	Kauk nyin htoke (with banana center)	67.80 66.70 67.10	67.20 ± 0.77
3	Mont kywe the	76.80 77.13 77.41	77.11 ± 0.31
4	Mont sein paung	53.43 54.21 53.83	53.82 ± 0.39
5	Htan thee mont	68.73 67.52 68.33	68.19 ± 0.61

Table 2. The ash contents of some Myanmar snacks

No.	Type of snacks	ash content g/100g	Mean
1	Shwe hta min	0.46 0.50 0.57	0.51 ± 0.06
2	Kauk nyin htoke (with banana center)	0.62 0.60 0.55	0.59 ± 0.04
3	Mont kywe the	1.25 1.40 1.46	1.37 ± 0.11
4	Mont sein paung	0.20 0.21 0.23	0.21 ± 0.02
5	Htan thee mont	0.80 0.61 0.54	0.55 ± 0.06

Table 3. The protein contents of some Myanmar snacks

No.	Type of snacks	Protein content g/100g	Mean
1	Shwe hta min	3.80 4.30 3.56	3.89 ± 0.38
2	Kauk nyin htoke (with banana center)	2.96 3.41 3.50	3.29 ± 0.29
3	Mont kywe the	1.67 1.94 2.01	1.87 ± 0.06
4	Mont sein paung	4.03 4.27 4.10	4.13 ± 0.12
5	Htan thee mont	2.60 2.83 2.73	2.71 ± 0.11

Table 4.The fat contents of some Myanmar snacks

No.	Type of snacks	Fat content g/100g	Mean
1	Shwe hta min	0.75 0.64 0.73	0.70 ± 0.06
2	Kauk nyin htoke (with banana center)	1.25 1.10 1.22	1.19 ± 0.08
3	Mont kywe the	1.01 1.10 0.99	1.03 ± 0.10
4	Mont sein paung	1.80 1.94 1.90	1.88 ± 0.23
5	Htan thee mont	1.57 1.60 1.69	1.62 ± 0.06

Table 5. Total carbohydrate contents of some Myanmar snacks

No.	Type of snacks	Total carbohydrate content (g/100g)	Mean
1	Shwe hta min	38.65 38.96 38.06	38.56 ± 0.46
2	Kauk nyin htoke (with banana center)	27.43 28.19 27.57	27.73 ± 0.40
3	Mont kyaw tha	19.37 18.45 18.11	18.64 ± 0.66
4	Mont sein paung	40.54 39.37 39.94	39.95 ± 0.59
5	Htan thee mont	26.60 26.74 27.44	26.93 ± 0.45

Table 6. Calorie contents of some Myanmar snacks by the calculation method

No.	Type of snacks	calorie content cal /100g	Mean
1	Shwe hta min	176.35 178.80 173.05	176.13 ± 2.90
2	Kauk nyin htoke (with banana center)	132.57 136.30 135.50	134.79 ± 1.96
3	Mont kyaw tha	93.25 91.46 89.39	91.37 ± 1.93
4	Mont sein paung	194.48 192.02 193.26	193.25 ± 1.23
5	Htan thee mont	130.93 135.48 132.97	133.13 ± 2.28

Table 7. Crude fibre contents of some Myanmar snacks

No.	Type of snacks	Crude fibre content (g/100g)	Mean
1	Shwe hta min	0.96 0.95 0.97	0.96 ± 0.01
2	Kauk nyin htoke (with banana center)	1.49 1.52 1.48	1.50 ± 0.02
3	Mont kyaw tha	0.58 0.59 0.57	0.58 ± 0.01
4	Mont sein paung	0.77 0.81 0.79	0.79 ± 0.02
5	Htan thee mont	0.80 0.83 0.81	0.81 ± 0.02

Table 8. Nitrogen-free extract contents of some Myanmar snacks

No.	Type of snacks	Nitrogen-free extract content (g/100g)	Mean
1	Shwe hta min	37.73 37.97 37.09	37.60 ± 0.45
2	Kauk nyin htoke (with banana center)	25.88 26.67 26.13	26.23 ± 0.40
3	Mont kyaw tha	18.69 17.84 17.56	18.03 ± 0.59
4	Mont sein paung	39.77 38.56 39.15	39.16 ± 0.61
5	Htan thee mont	25.80 26.61 25.90	26.10 ± 0.44

Table 9. Total digestible nutrients contents of some Myanmar snacks

No.	Type of snacks	Total digestible nutrient contents (g/100g)	Mean
1	Shwe hta min	38.81 39.17 38.45	38.81 ± 0.36
2	Kauk nyin htoke (with banana center)	28.79 29.55 29.37	29.24 ± 0.39
3	Mont kyaw tha	20.41 20.03 19.60	20.01 ± 0.41
4	Mont sein paung	42.85 42.24 42.55	42.55 ± 0.31
5	Htan thee mont	28.75 29.73 30.08	29.52 ± 0.69

Table 10. Energy value of Total digestible nutrients (T.D.N) in some Myanmar snacks

No.	Type of snacks	Energy value of T.D.N (cal/ 100g)	Mean
1	Shwe hta min	170.76 172.35 169.18	170.76 ± 1.59
2	Kauk nyin htoke (with banana center)	126.68 130.02 129.23	128.64 ± 1.67
3	Mont kyaw tha	89.80 88.13 86.24	88.06 ± 1.78
4	Mont sein paung	188.54 185.86 187.22	187.21 ± 1.34
5	Htan thee mont	126.50 130.81 132.35	129.89 ± 3.03

Table 11. Mineral contents of some Myanmar snacks

Item	Shwe hta min	Kauk nyin htoke	Mont kywe the	Mont sein paung	Htan thee mont
Na (ppm)	7.15	10.58	7.21	8.21	8.98
Mg (ppm)	1.64	4.21	2.19	2.19	3.17
Cu (ppm)	ND	0.003	0.002	ND	0.003
Zn (ppm)	ND	0.002	ND	ND	0.002
K (ppm)	5.21	7.29	5.44	7.19	5.43
Ca (mg%)	59.73	44.78	143.88	16.59	33.02
P (mg%)	2.01	1.98	3.78	56.99	1.26
Fe (mg%)	1.99	2.38	1.23	1.09	12.17

mg % = 10 ppm

Table 12. Vitamin B_1 contents of some Myanmar snacks

No.	Type of snacks	Vitamin B_1 content mg %	Mean
1	Shwe hta min	0.024 0.021 0.029	0.028±0.004
2	Kauk nyin htoke (with banana center)	0.045 0.041 0.039	0.041±0.003
3	Mont kywe the	0.027 0.021 0.025	0.024±0.003
4	Mont sein paung	0.050 0.043 0.053	0.048±0.005
5	Htan thee mont	0.060 0.054 0.058	0.057±0.003

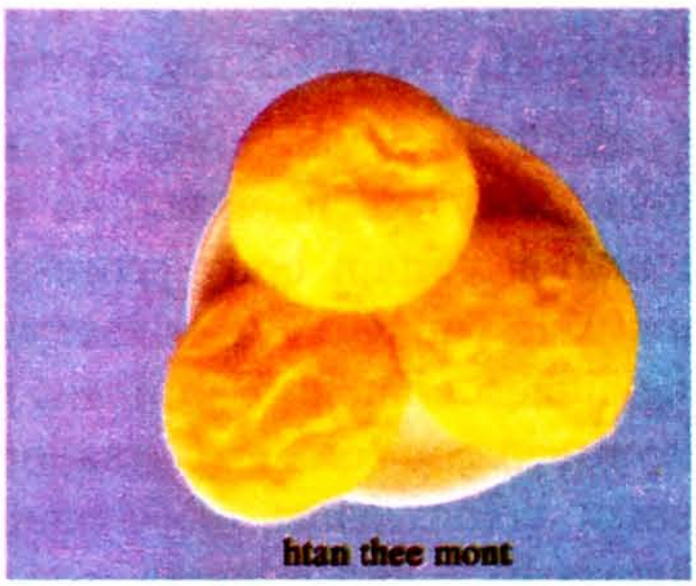
Table 13. Average minimum calorie requirements per day.

Type of human	age (years)	weight (lbs)	energy (cal)
Children	1-3	28	1300
	4-6	44	1800
	7-10	66	2400
Male	11-14	97	2800
	15-18	134	3000
	19-22	147	3000
	23-50	154	2700
	51 +	154	2400
Female	11-14	97	2400
	15-18	119	2100
	19-22	128	2100
	23-50	128	2000
	51 +	128	1800


shwe tha min


kauk nyin htoke


mont kywe the


htan thee mont


mont sein paung

Conclusion

For the five items of Myanmar snacks the protein contents, carbohydrate contents and fat contents were found in the range between 1-5; 15-40 and 0.5-2% respectively. Among them mont sein paung has the highest values of protein, carbohydrate and fat. Fats, carbohydrates and protein can be used by the body to provide energy. Hence mont sein paung has also highest calorie percentage as well as energy values. Not only mont sein paung but also other four items such as (shwe hta min , kauk nyin htoke , mont kywe the and htan thee mont) have enough calorie contents to meet human energy requirements. Vitamin B_1 content was found in the range between 0.024 and 0.057% in all samples. The daily consumption of vitamin B_1 is 1-1.5 mg so this amount would be supplied by eating of Myanmar snack daily. Na, Mg and K content were the highest in kauk nyein htoke. They are important in building and repairing body tissue and in regulating certain body process. Phosphorous content was the highest in mont sein paung and it is essential for the development of bones and teeth. The highest content of iron was found in htan thee mont. (12.17 ppm) and it plays a major role in formation of haemoglobin and very important for human being. Most of Myanmar snacks were eaten mainly to supply vitamin B_1 , and minerals and to supply energy especially for Myanmar people.

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