International Journal of Advanced Science and Research
ISSN: 2455-4227; Impact Factor: RJIF 5.12
Received: 28-10-2020; Accepted: 14-11-2020; Published: 02-12-2020
www.allsciencejournal.com
Volume 5; Issue 5; 2020; Page No. 30-35

Proximate, minerals and anti-nutritional analysis of pumpkin (*Cucurbita pepo* L) pulp extract

AM Bagudo[2], MM Warrah[2], Kofa ID[1], Senchi DS[1]
[1] Department of Pure and Applied Chemistry, Kebbi State University of Science and Technology, Aliero, Nigeria
[2] College of Agriculture Zuru, Kebbi, Nigeria

Abstract
Developing countries like Nigeria wage a perpetual uphill battle to produce sufficient food for their ever increasing population and at the same time gain economic independence. Hence, this research reveals the proximate, minerals and anti- nutritive components of the edible pulp of Nigeria cucurbita pepo L. On dry weight basis, the pulp has the following proximate composition: moisture content (2.00%); ash content (12.5%) crude lipid (13.16%); crude fibre (2.5%); crude protein (16.7%); available carbohydrate (55.15%); and calorific value (564Kcal/100g). The elemental analysis shows that potassium is the most abundant element (282.15/100g) sodium (154.10mg/100g) calcium (28.34mg/100); magnesium (120.24mg/100g) phosphorus (4.3568mg/100g); iron (0.78mg/100g) cobalt (1.99mg/100g);zinc (5.25mg/100g), while manganese is the least (0.13mg/100g). The anti-nutritional parameter analyzed include phytate (126.7.3±2.406mg/100g); Oxalate (0.0126±0.017mg/100g) hydrocyanic content ($0.132\pm9.06\times10^{-3}$mg/10g) and nitrate (0.0105±5.730µg). The results indicated that pumpkin (cucurbita pepo L) pulp is an important source of protein, carbohydrate and essential minerals with low concentration of anti- nutritional factors which if properly utilized would assist curtailing the problem of malnutrition in the society.

Keywords: food, nutrition, anti- nutrition, phytate, carbohydrates

Introduction

Developing countries like Nigeria wage a perpetual uphill battle to produce sufficient food for their ever growing population and at the same time gain economic independence. This is very critical in Nigeria, owing mainly to our failure to utilize the enormous natural resources that waste annually. Pumpkin *cucurbita pepo L* has received considerable attention in years back of the nutritional and health protective values of the pulp. The *cucurbita pepo L* pulp is an excellent source of protein and also has pharmacological activities such as anti- diabetic (Abubakar *et al*., 2014) [1]. Antibacterial and anti- inflammation activites and in addition to good health (Achigan *et al*., 2014) [2]. The treatment of pregnant woman and children affected by infestation of tape worms is effectively carried out using pumpkin pulp remedy, on disorders such as sudden spell of dizziness can be also treated by pumpkin pulp remedy and the leaves are also used to reduce fever (Achinewhu *et al*., 1995) [3]. The pulp of pumpkin is used as an emollient to soften skin dryness (Muhammad *et al*., 2011) [33]. Pumpkin with botanical name cucurbita pepo L belongs to the family cucurbita (English name; pumpkin, Yoruba name; Elegede; Hausa name; kabewa). Due to the wide use of the pumpkin as food there is a great need to determine the nutrients, minerals and anti- nutritional composition in the plant pulp as it has potential in contributing to our balance diet intake by consumers.

Material and methods

Sample Collection and Treatment: A cucurbita pepo L was obtained in Zuru local government area Kebbi State. It was washed and piled using a knife and separated the flesh (pulp) from the fruit, it was air dried for three weeks and milled with the help of ceramic mortar and pestle. The sample was kept in a plastic container before it was used for the analysis.

Methods: The recommended methods of the Association of official Analytical chemist (AOAC, 1990) [34], were used for the determination of moisture, ash, crude lipid, crude fibre and crude protein contents.

Moisture Content: A clean watch glass was dried to a content weight in an oven at 105^0 and cooled in a desiccator and weighed (W_0). Two grams of finely sample was accurately weighed into the previously labelled watch glass and reweighed (W_1). The watch glass containing the sample was dried in an oven for 24hour to a constant weight (W_2). The percentage moisture content was calculated.

$$\%\ \text{Moisture} = \frac{W1 - W2}{W1 - W0} \times 100$$

Ash Content: The porcelain crucible was dried in an oven at 100 ^{0}C for 10 minute, cooled in a desiccator and weighed (W0). Two grams of the finely ground sample (*Cucurbita pepo* L.) was placed into the previously weighed porcelain crucible and weighed (W_1). It was first ignited and then transferred into a furnace, which was set at 600 ^{0}C. The sample was left in the furnace for 8 hours to ensure proper ashing. The crucible containing the ash was then removed, cooled in a desiccator and weighed (W_2). The percentage ash content was calculated as;

$$\%\ \text{Ash content} = \frac{W1 - W2}{W1 - W0} \times 100$$

Crude Lipid Content: A clean, dried 500ml round bottom flask, containing few anti bumping granule was weighed

(W_1) and 300ml of petroleum ether (b.p 40 60 ^{0}C) for the extraction was poured into the flask fitted into the soxhlet extraction unit. The extractor thimble containing 20g was fixed into the soxhlet extraction unit. The round bottom flask and a condenser were connected to the soxhlet extractor and cold water circulation was put on. The heating mantle was switched on and heating rate was adjusted until the solvent was refluxing at a steady rate. Extraction was carried out for 8 hours. The solvent was recovered and the oil was dried in the oven at 70 ^{0}C for an hour. The round bottom flask and oil was cooled in a dessicator and reweighed (W_2).

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

Crude Fibre Content: The crude fibre content was estimated acid-base digestion with 10% H_2SO_4 (w/v) and 10% NaOH (w/v) solutions. The residue after crude lipid extraction was put into 600ml beaker and 20ml of boiling 10% H_2SO_4 was added. The content was boiled for 30 minutes, cooled, filtered through a filter paper and the residue washed three times with 50ml aliquots of boiling water. The washed residue was returned to the original beaker and further digested by boiling in 20ml of the residue which was washed three times with 50ml ethanol. The washed residue was dried in an oven at 105 ^{0}C to constant weight (W_1) and cooled in a dessicator. The residue was scraped into a pre-weighed porcelain crucible, weighed, ashed at 600 ^{0}C for two hours, cooled in a desiccator and reweighed (w_2) crude fibre content was expressed as percentage loss in weight on ignition the loss in weight on ignition = w_1-w_2

$$\% \text{ Crude fibre} = \frac{W2 - W1}{\text{Weight of sample}} \times 100$$

Protein Digestion: The method of (Agbede *et al*., 2012) [5] was adopted. Macro Kjeldahl method was used to determine the nitrogen content. 0.5g of powdered seeds of pumpkin were dropped into 300ml micro kjeldahl flask. 15ml of concentrated H_2SO_4 and 2g of digested mixed catalyst (weighed separatedly into an ashless filter) was also dropped into the kjeldahl flask. The sample was digested until the mixture was clear. The digested sample was cooled and filtered into a 100ml volumetric flask and up to 100ml distilled water.

Distillation of the digest: 10ml of diluted digest was measured into a 500ml kjeldahl flask slowly added by the side of the flask. A 250ml conical flask containing a mixture of 100ml 2% boric acid and 4 drops of mixed indicator was sued to trap the ammonia being liberated. The conical flask and the kjeldahl flask were then placed on kjeldahl distillation apparatus, with the tubes inserted into the conical and the kjeldahl flask. The flask was heated to distilled out ammonia gas and collection of the distillate was done using the boric acid solution. From the point where the boric acid turns green it allowed for 10 minutes for complete distillation of the ammonia present in the digest. Nitrogen was determined by titrating with standard 0.01M H_2SO_4 solution. The percentage of nitrogen is calculated thus:

$$2\% \text{ Nitrogen} = \frac{\text{Tv} \times \text{M} \times 0.014 \times \text{VT} \times 100}{\text{Weight of sample} \times \text{Va}} \times 100$$

% Crude protein= % Nitrogen (N_2) ×6.25

Where: M- actual molarity of acid, Tv- titre volume of H_2SO_4 used, Vt- total volume of dilute digest, Va- aliquot volume distilled

Carbohydrate (by differences): The total carbohydrate was determined by difference. The sum of the ash, crude lipid, crude protein and crude fibre was subtracted from 100. % Carbohydrate available = 100- (% ash + % fat +% protein +% fibre)

Estimation of calorific value: The samples calorific value were estimated (in kcal/100g) by multiplying the percentage of crude protein, crude lipid and carbohydrate by the factor 4, 9, 4 respectively and the product summed up.

Determination of Phytate: 4g of the powdered sample was soaked in 100ml of 2% HCl acid for 3 hours and filtered, 25ml of the filtrate, 5ml of 0.3% NH_4SCN (aq) and 53.3ml of distilled water were mixed together and titrated against 0.01M standard $FeCl_3$ (aq) solution containing 0.00195Fe/cm3 until a brownish yellow color persisted for 5 minutes. Pytin phosphorus (1ml=1.19mg phytin-phosphorus) was determined and the phytate content was calculated by multiplying the value of phytin phosphorus by 3.55 (Watzl and Leitzann, 1999) [31].

Phytate content (Mg %) = Tv × phytin phosphorus (1.19g) ×3.55

Oxalate: Oxalate is precipitated as calcium oxalate, the concentration is determined which gives a faint pink end point. 2g of the powered sample were placed into a 250ml volumetric flask containing 190ml of distilled water and 10ml of 6M HCl acid. The content was digested for one hour in a boiling water bath, cooled and made up to the mark and then filtered. There 50ml aliquots of the sample were taken into a beaker and 20ml of 6M HCl added. The mixture was evaporated to about half of the volume and filtered. The precipitate was washed several times with warm distilled water and 3 drops of methyl orange indicator was added to the 25ml of the filtrate and titrate against 0.1M $KMnO_4$ solution till a faint pink colour appeared that persisted for 30 seconds. (1ml of 0.1N KMnO4 = 0.0045g oxalic acid)
The total oxalate content is calculated as follows:
Oxalate content (mg %) = TV×0.0045

Hydrocyanic acid: 5g of the ground sample, 50ml of distilled water were added in a corked flask and cotton wool. To 1ml of the filtered, 4mls of the alkaline picrate solution was added and test tube corked. The test tube were incubated in a water bath at 25 ^{0}C for 5 minutes. The test tube cooled and measured at 490nm against a reagent blank. The amount of cyanide was calculated by using the formula as reported by (Watzl and Leitzann, 1999) [31].

$$\text{Cyanide content (mg\%)} = \frac{\text{Absorbance of test} \times \text{Concentration of standard}}{\text{Absorbance of the standard}}$$

Nitrate: 100mg of the powdered sample was weighed into a 15cm^3 centrifuge tube and 10cm3 of distilled water was added. The content was incubated in water bath at 45 ^{0}C one hour, cooled and centrifuged at 5000 revolution per minute for 15 minutes. The clear supernatant was put into a clean test tube, stopped and stored in a refrigerator prior to nitrate analysis.

Nitrate stock solution was prepared (100ppm) by dissolving KNO_3 (1.63g) with distilled water in a 100 cm3 volumetric flask and made up to the mark. Prepared series of standard solution of 0, 1,2,3,4 and 5ppm, 0.20.0.4, 0.6, 0.8 and 0.10 cm3 of the stock solution were added to six 20cm3 volumetric flask, 0.8 cm3 5% (W/v) salicyclic acid sulphuric acid reagent was added and mixed thoroughly. The content were allowed to stand for 20 minutes followed by the addition of 2M NaOH solution (to raise to the PH to above 12) to the mark. The content were cooled to room temperature and its absorbance measured at 410nm with spectrophotometer (6000 model, Jenway). Nitrate content was calculated using the formula (AOAC 1990) [34].

$$\text{Nitrate } (\mu g/ml) = \frac{\text{absorbance of test} \times \text{concentartion of standard}}{\text{absorbance of the standard}}$$

Mineral Content: The minerals were extracted from the samples by the wet digestion method (Ghosh *et al*., 2015) [8]. 400mg of the powered sample of the seeds was acid digested separately with two acid mixture (HNO_3: HCl 3:1, v/v) in a digested chamber. The filtrate was made 100ml with distilled water and was used for the determination of minerals. The concentration (in mg/100g) of Ca, Zn, Fe, Na, Co, Mg, Mn, K and P were determined using Atomic absorption Spectroscopy (Alpha-4 model) at the National Research Institute of Chemical Technology, Zaria.

Results and Discussion

Table: 1: Results of the proximate composition of *cucurbita pepo L pulp*

Parameter	Concentration
Moisture content	2.00% DW
Ash content	12.5% DW
Crude lipid	13.16%DW
Crude fibre	2.5%DW
Crude protein	16.7%DW
Available Carbohydrate	55.15%DW
Calorific value (Kcal/100g)	344.72%DW

Keywords: DW- Dry weight, Kcal- Kilocalories, G- Gram

Table 2: Results of the mineral composition of *cucurbita pepo L pulps*

Parameter	Concentration
Moisture content	2.00% DW
Ash content	12.5% DW
Crude lipid	13.16%DW
Crude fibre	2.5%DW
Crude protein	16.7%DW
Available Carbohydrate	55.15%DW
Calorific value (Kcal/100g)	344.72%DW

Table 3: Results of anti-nutritional composition of *cucurbita pepo L pulps*

Anti-nutritional Factors	Concentration
Phytate	126.73± 2.406mg/100g
Oxylate	0.0126±0.017406mg/100g
Hydrocyanic acid	0.132±9.06× 10^{-3}406mg/100g
Nitrate	0.0105± 5.73 (µg)

Discussion

The results from table shows that pumpkin (*cucurbita pepo L*) pulp has considerable nutritional value for human consumption due to its low moisture content (2.00% DW) below the value of 15% above which was reported to favour microbial activities during storage. (Hassan and Umar, 2006) [9]. The low moisture of the pulp is an indication that they have good storage quality which would not permit the growth microorganisms. The percentage yield of the crude lipid in *cucurbita pepo* L pulp was found to be (13.16% DW). This shows that the pulp could be classified as a source of oil like melon and groundnut etc. If the percentage yield of the crude lipid is below10%, then *cucurbita pepo* L pulp could not be classified as a source of oil, compared to locust beans with crude lipid yield below 10% and was not classified as a source of oil (Hassana *et al*., 2017) [10]. Lipid are principal source of energy but should not exceed the daily recommended intake of not more than 30 calories to avoid obesity and other related disease (Agdebe *et al*., 2018). Lipid are able to supply more than twice the amount of energy than the same amount protein and carbohydrate will supply. In light of these, lipids performed critical function in the body and is required for life exist. Fats can be stored in the tissue depots and later mobilized to provide energy under starvation or stressful condition (Capuano *et al*., 2018) [7]. Percentage yield of the ash content of the pulp was found to be (12.5%DW). This is an indication that the pulp contains nutritional important mineral elements (Hassan and Umar, 2006) [9]. It was recorded by (Muhammad *et al*., 2011) [33] samples that contained high percentage of ash content have high concentration of various elements which can speed up metabolic processes and improve growth and development. The fibre content of the *cucurbita pepo* was found to be 2.5DW. This implies that it is moderate and when consumed adequately, it would aid the movement of food through the intestine since high fibre content in food expand the walls of the colon by easing the passage of waste material through the intestine which can be toxic to the body, Fibre content are responsible for providing cells and tissues with both support and mechanical strength (Hazra and Gogtay, 2016) [11]. The percentage of crude protein content of *Cucurbita pepo L* pulp was found to be 16.7%. This is moderate compared to that of legume pulps such as cowpea (20.0-25.1%), (Sharp, 2010) [29]. This indicated that pulp could be an important source of proteins supplement to both human and livestock feed formulation. Protein functions as an antibody, some proteins are involved in defending the body from antigens, and also involved in muscle contraction and movement. Protein stored amino acid like ovalbumin and casein. Ovalbumin is found in egg whites and casein in a milk base protein. The carbohydrate content is (55.15DW). This

shows that pulp contain good percentage of carbohydrate. The primary function of carbohydrate in the body is to provide the body with energy this can be stored as glycogen. Thus this could probably be the reason for high calorific value of the pulps. The mineral composition was evaluated, the concentration of potassium was 282.15mg/100g of *Cucurbita pepo L pulp.* High amount of potassium in the body was reported to increase iron utilization (Ozturk *et al*., 2015) [27]. Potassium also control hypertension, salt sensitivity, the risk of stroke and it helps to maintain body weight, regulate the water balance and acid-base balance in the blood and tissues (Marles, 2017) [18]. It, may protect against osteoporosis and kidney stones. Despite its importance, very few people around the world get enough potassium (Malik *et al*., 2016) [14]. A healthy adult should aim to consume 3500-4700mg daily from food. WHO suggests a potassium intake of at least 90mmol/day (5310mg/day for adult). Deficiency of potassium in the body results to hypertension, congestive heart failure, cardiac arrest, paralysis, fatigue and depression and other mood changes. The calcium content is (28.34mg/100g) when compared with the pulp of the fruit of *Gardenia Aqualla* in which its calcium content was (4.80mg/100g). This is high and the pulp of pumpkin is not seems to be source of calcium to human. Virtually all human needs this element in their body due to its vital role it plays. Calcium is for hormonal activities, fertilization and cell division. Bones is the body served as calcium nutrient reserved. Calcium function as tissues, including clotting of blood, the stimulation of secretory activity endocrine system and its deficiency will leads to porous and weaker bone function, rickets in infant and weak teeth formation (Khan and Hanaru, 2014) [12]. The concentration of sodium in the pulp is 154.10mg/100g when compared with the value of *Gardenia Aqualla* (200±20.0), the pulp seems to be a potential source of sodium. A healthy adult should eat less than 240mg of sodium per day to reduce the risk of elevated blood pressure, on the average, the higher an individual's salt intake the higher the blood pressure. Keeping the blood pressure in the normal range reduces an individual's risk of coronary heart diseases, stroke, congested heart failure and kidney disease (NRC, 1989). Excess of sodium intake would lead to high blood pressure and hypertension and thus it should be consumed in a moderate level. Absent of sodium in our diet would result in muscle cramps, headache, poor appetite and dehydration, but the main sign is fatigue, hence, the need to consume the seeds is very vital in human system. The concentration of Magnesium content of the pulp is 120.24mg/100g. This results calls for moderate intake of the pulps. Since, Magnesium plays a major role I relaxing muscle along the air way to the lungs thus, allowing asthma patients to breathe easier. It also helps in reactions involving phosphates transfer. Its deficiency leads to skin lesion and swollen gums (Rahman *et al*., 2015) [28]. The phosphorus content of the pulp of Cucurbita pepo L is 4.34mg/100g this is low which calls for adequate consumption of the pulps in order to meet dietary allowance of 800mg/day (Muhammad *et al*., 2011) [33]. Phosphorus contributes to the constituent of high energy compound ATP. The oxidation of carbohydrate leading to the formation of ATP also requires phosphorus since phosphorylation is an obligatory step in the metabolism of the monosaccharide. It is essential component of bones and teeth (Muhammad *et al*., 2011) [33]. The concentration of manganese in the pulp is 0.013mg/100g. This is low compared to the value obtained from pulp of Gardenia Aqualla (2.6mg/100g.). Manganese helps in giving support to the immune system, regulation of blood sugar level, production of energy and cell production. It works with vitamin K to support blood clotting, and it helps to control the effect of stress. Birth defects can possibly result when an expecting mother does not get enough of manganese (Kin *et al*., 2016). It also function as enzyme activator and it deficiency has been reported to cause impaired growth, skeletal abnormalities and defect in carbohydrate and fat metabolism (NRC, 1989). Low intake can also nausea, vomiting, poor glucose tolerance, skin rash, loss of hair colour. The concentration of cobalt in the pulp is 1.99mg/100g. Cobalt is an essential mineral needed in a very small amount in the diet. It is an integral part of vitamin B12 (cobalamin), which support red blood cell production and the formation of myelin nerve covering. It also function as an activating ion in some enzymes (Marion and Roy, 2006). The amount of zinc in the pulp is 5.25mg/100g. Zinc is important to human health as it is present in many important enzymes essential for metabolism. Most of the zinc in the body is in the skeleton but other tissue (such as skin and hair) and some organ particularly the prostate) have high concentration. Zinc important during pregnancy and for growing foetus whose cells are rapidly dividing. Zinc also helps to avoid congenital abnormalities and preterm delivery. Zinc is vital in activating growth- height, weight and bone development in infants, children and teenagers. Zinc plays a vital role infertility. In male zinc protect the prostate gland from infection, zinc helps maintain sperm count and mobility and normal level of serum testosterone. In female, zinc can help treat menstrual problems and alleviate symptoms associated with premenstrual syndrome (Manurung *et al*., 2018) [16]. Early zinc deficiency also leads to impaired cognitive function, behavioral problems, memory impairment and problems with spatial learning and neuronal atrophy. The iron content of pulp extract is 0.78mg/100g and does not meet the recommended dietary allowance of 2-5mg/day (NRC, 1989). Iron is an important element in the diet of pregnant woman, nursing mother, infant convulsing patients and elderly to prevent anaemia and other related diseases (Oluyemi *et al*., 2012) [24]. It also function as oxygen distribution which carry red blood cell through the vein as oxyhaemoglobin and act as energy production in the body. Iron deficiency causes microcytic and hypochronic anaemia. The concentration of phytate in the pulp extract of pumpkin is (126.73±2.40mg/100g). The result is low when compared to common cereals such as sorghum, 373mg/100g, maize 384mg/100g, millet 104mg/100g, soya beans 808mg/100g (Oluyemi *et al*., 2015) [25]. Phytate are salts of phytic acid. A high dietary phytate was reported to cause growth reduction (Omotayo *et al*., 2018) [26] affects food value by binding and making minerals, ions unavailable to the consumer, affects the homeostasis of zinc and iron, inhibit enzymatic digestion of proteins and causes rickets in young animals (Nisha *et al*., 2012) [20]. As the seed has relatively low phytate content compared to common food items, the level is significant as this may decrease the bioavailability of minerals, especially Ca and Zn (Marshall *et al*., 2016) [19]. Phytate intake of 4-9mg/100g dry matter was reported to decrease iron absorption by 4-5 fold in human (Okon and Utuk, 2016) [22]. Thus, with the low level of phytate content in the pulp, the

pulp would be of nutritional advantageous to human. The oxalate content is (0.0126 ± 0.07). Since the value is low, the pulp is safe for human consumption. The presence of oxalate in the food we eat causes irritation in the mouth and interferes with the absorption of divalent minerals particularly calcium by forming insoluble salt with them (Hassan and Umar, 2006) [9]. Consumption of oxalate may results in kidney disease (Nwachuku ana Obi, 2007) [21]. Oxalate toxicity occurs only when the excess oxalate ions react with calcium of the fluid, thereby rupturing the renal tubules which reduces excretory ability of the kidney. The hydrocyanic acid content in the pulp is (0.132±9.0× $10^{-3mg/}$100g. The low content shows that the level of acid in the pulp is within the permissible range for human consumption (Muhammad *et al*., 2011) [33]. When the value was compared to the toxic level of 35mg/100g dry weight and 20mg/HCN equivalent Kg^{-1} as recommended by Standard Organization of Nigeria (SON). The value is below this recommended value, hence, the pulp is safe for human consumption. The side effect of cyanide when consumed include pancreatic diabetes, vitamin B12 deficiency and decrease in mineral uptake (Olawoye and Gbadamosi, 2017) [23]. The concentration of nitrate in the pulps is (0.0105±5.730µg). The result obtained is very low, below the acceptable daily intake level of 3.7mg/kg body weight equivalent of 220mg for 60kg person (WHO, 2002) [32]. The low level of nitrate in pulp of *cucurbita pepo L* is not a threat to human beings. Although, nitrate helps in plant growth, there are some negative effect when ingested by humans. It is not the nitrate that causes the damage, but our body metabolizes and convert them to nitrite. The nitrate is converted into nitrite in the body and causes a condition called methaemoglobin and this causes body to carry less oxygen through the red blood cells and resulting into oxygen defiencieny. This condition is called blue baby syndrome, other effects which nitare can cause are cancer of the lungs, liver, eosophagus and stomach respectively (Mantha *et al*., 2018) [15].

Conclusion

The results of this study shows that the *cucurbita pepo pulp* has a good storage capacity, due to its low moisture content. The fibre content if consumed adequately will help the development of cell tissues and also give support and mechanical strength to the body, the ash content is also moderate, *Cucurbita pepo L* could be source of oil due to its high crude lipid yield and also good source of proteins. The available carbohydrate and calorific values shows that the pulp is a high potential source of energy for our day to day activities. The anti- nutritive factors in the pulp are generally tolerable within the physiological functioning of human system which cannot cause adverse effect even when consumed in large quantity. The mineral element are present in moderate quantity which has the advantage of supplying adequate minerals required by the body. In light of this study, a conclusion can be drown that *Cucurbita pepo pulp* is a very good for human consumption.

References

1. Abubakar S, Usman AB, Ismaila IZ, Aruwa G, Azizat SG, Ogbadu GH *et al*. Nutritional and Pharmacological Potentials of *Leptadenia hastata*. Journal of Food and Nutrition Research. 2014; *2*(1):51-55.
2. Achigan EG, Sogbohossou OED, Maundu P. Current knowledge on *Amaranthus spp*.: Research avenues for improved nutritional value and yield in leafy *Amaranths* in sub-Saharan Africa. Euphytica. 2014; 197(3):303–317.
3. Achinewhu SC, Ogbonna CC, Hart AD. Chemical composition of indigenous wild herbs, spices, fruits, nuts and leafy vegetables used as food. Plant Foods for Human Nutrition. 1995; 48:341-34.
4. Agbaire PO, Emoyan OO. Nutritional and antinutritional levels of some local vegetables from Delta State, Nigeria. Africa. Journal for Food Science. 2012; 6:8-11.
5. Agbede JO, Adeyeye SA, Adegbenro M. Nutritional functional property and bioactive components of the leaf products from edible vegetables Propiedad nutritiva y funcional y componentes bioactivos de los productos de la hoja de vegetales comestibles Division of Nutritional Biochemistry, Dep. Revista Científica UDO Agrícola. 2012. 12(3):741-748.
6. Agbede JO, Adeyeye SA, Adegbenro M. Nutritional, functional property and bioactive components of the leaf products from edible vegetables| Propiedad nutritiva y funcional y componentes bioactivos de los productos de la hoja de vegetales comestibles. UDO Agrícola, 2012, 12(3).
7. Capuano E, Oliviero T, Fogliano V, Pellegrini N. Role of the food matrix and digestion on calculation of the actual energy content of food. Nutrition reviews. 2018; 76(4):274-289.
8. Ghosh-Jerath S, Singh A, Kamboj P, Goldberg G, Magsumbol MS. Traditional knowledge and nutritive value of indigenous foods in the oraon tribal community of Jharkhand: an exploratory cross-sectional study. Ecology of food and nutrition. 2015; 54(5):493-519.
9. Hassan LG, Umar KJ. Nutritional valueof balsam apple (*Momordica balsamina* L.) leaves. Pakistan Journal of Nutrition. 2015; 5(6):522-529.
10. Hassan UF, Hassan HF, Baba H, Shibdawa MA, Iorfa EN. Nutritional evauation of *Leptadenia hastata* leaves. 2017; 6(3):4-10.
11. Hazra A, Gogtay N. Biostatistics series module 6: correlation and linear regression. Indian journal of dermatology. 2016; 61(6):593.
12. Khan ME, Hanatu I. Anti-Nutritional / Nutritional Analysis and Anti-Microbial Investigation of the Ethanol Extract of the Stem Bark of *Leptadenia hastata* (Asclepiadaceae). 2014; 1(3):208-212.
13. Kim MJ, Moon Y, Tou JC, Mou B, Waterland NL. Nutritional value, bioactive compounds and health benefits of lettuce (*Lactuca sativa* L.). Journal of Food Composition and Analysis. 2016; 49:19-34.
14. Malik K, Nawaz F, Nisar N. Antibacterial Activity of Amaranthus Viridis. Bull. Env. Pharmacol. Life Sci. 2016; 5:76-80.
15. Mantha OL, Polakof S, Huneau JF, Mariotti F, Poupin N, Zalko D *et al*. Early changes in tissue amino acid metabolism and nutrient routing in rats fed a high-fat diet: evidence from natural isotope abundances of nitrogen and carbon in tissue proteins. British Journal of Nutrition. 2016; 119(9):981-991.
16. Manurung H, Kustiawan W, Kusuma IW. Evaluation of soil and leaves nutrient on the growth of cultivated tabatbarito (*Ficus deltoidea* Jack.) in Makroman

Village, Sambutan District of East Kalimantan, Indonesia. In IOP Conference Series: Earth and Environmental Science. 2018; 144(1):012-017. IOP Publishing.
17. Marion K, Roy T. Conservation of leather and related materials. Butterworth-Heinemann, 2006, 23. ISBN 978-0-7506-4881-3.
18. Marles RJ. Mineral nutrient composition of vegetables, fruits and grains: The context of reports of apparent historical declines. Journal of Food Composition and Analysis. 2017; 56:93-103.
19. Marshall DL, Dickson JS, Nguyen NH. Ensuring food safety in insect based foods: mitigating microbiological and other foodborne hazards. In Insects as Sustainable Food, Ingredients Academic Press, 2016, 223-253.
20. Nisha Sharma PC, Gupta, Ch V Rao. Nutrient content, mineral and antioxidant activity of *Amaranthus viridis* and *Moringa oleifera*. Source research journal for medicinal plants, academic journal: national botanical research institute, Rana pratap marg lucknow, india. 2012; 253:259
21. Nwachukwu N, Obi CE. Comparative Studies on the Effect of Open and Drying on the Antinutrient Content of some Leafy Vegetables of Eastern Nigeria. Faculty of Biological Sciences, University of Nigeria, Nsukka. Bio-Resource. 2007; 5(1):216-220.
22. Okon UA, Utuk II. Ascorbic acid treatment elevates follicle stimulating hormone and testosterone plasma levels and enhances sperm quality in albino Wistar rats. Nigerian medical journal: journal of the Nigeria Medical Association. 2016; 57(1):31.
23. Olawoye BT, Gbadamosi SO. Effect of different treatments on *in vitro* protein digestibility, antinutrients, antioxidant properties and mineral composition of *Amaranthus viridis* seed. 2017; *3*(1):1-14. Cogent Food & Agriculture, 23311932.2017.1296402.
24. Oluyemi AO, Abdulkareem FB, Awolola NA. Signet ring carcinoma of the esophagogastric junction in a Nigerian man. 2012; 4:152-154.
25. Oluyemi AO, Abdulkareem FB, Awolola NA. Signet ring carcinoma of the esophagogastric junction in a Nigerian man, 2015. https://doi.org/10.5897/IJMMS1 2. 046
26. Omotayo MO, Martin SL, Stoltzfus RJ, Ortolano SE, Mwanga E, Dickin KL *et al.* With adaptation, the WHO guidelines on calcium supplementation for prevention of pre-eclampsia are adopted by pregnant women. Maternal, child nutrition. 2018; 14(2):e12521.
27. Ozturk B, Argin S, Ozilgen M, McClements DJ. Nanoemulsion delivery systems for oil-soluble vitamins: Influence of carrier oil type on lipid digestion and vitamin D3 bioaccessibility. Food chemistry. 2015; 187:499-506.
28. Rahman AHMM, Akter S, Rani R, Islam AKMR. Taxonomic study of leafy vegetables at Santahar Pouroshova of District Bogra, Bangladesh with emphasis on medicinal plants. Int. J Adv Res. 2015; 3:1019-1036.
29. Sharp PA. Intestinal iron absorption: regulation by dietary and systemic factors. International Journal for Vitam and Nutrition Research. 2010; 80(4-5):231-242.
30. Wang Y, Gan N, Zhou Y, Li T, Hu F, Cao Y *et al*. Novel label-free and high-throughput microchip electrophoresis platform for multiplex antibiotic residues detection based on aptamer probes and target catalyzed hairpin assembly for signal amplification. Biosensors and Bioelectronics. 2010; 97:100-106.
31. Watzl B, Leitzmann C. Bioaktive Substanzen in Lebensmitteln. Hippokrates Verlag, Stuttgart, ISBN, 1999, 978-383045308.
32. WHO. World Health Organization. Evaluation of certain food additives, Technical Report Series 913, Geneva, 2002, 20-32.
33. Muhammad A, Dangoggo SM, Tsafe AI, Itodo AU, Atiku FA, Chemistry A *et al*. Proximate, Minerals and Anti-nutritional Factors of Gardenia aqualla (Gauden dutse) Fruit Pulp. 2011; 10(6):577-581.
34. AOAC. Official methods of analysis, 14thedition, Association of Official Analytical Chemists, Washington DC, 1990.
35. National Research Council. Recommed Dietary Allowance, National Academy Press, Washington DC, 1989.