

Food Safety Evaluation and Antibacterial Efficacy of a Local Food Supplement “Medicagemgem”

Oluwafemi Flora*, Ntiwunka Uchenna Godwin, Adeleye Tolu, Oni Eniola and Badmos Amina

Department of Microbiology, Federal University of Agriculture, Abeokuta, Nigeria

*Corresponding Author: Oluwafemi Flora, Department of Microbiology, Federal University of Agriculture, Abeokuta, Nigeria.

Received: August 24, 2017; Published: October 04, 2017

Abstract

“Medicagemgem” is a composite product (Honey, ginger and Olive leaf) consumed in Southwest Nigeria, yet to be evaluated by the National Agency for Food and Drug Administration and Control. “Medicagemgem” was evaluated by determining the proximate composition, microbiological quality, toxicity and antimicrobial properties. Dried granular product (160g) was pulverized. Proximate and phytochemical analyses were conducted using standard procedures. Disc diffusion technique was used for antimicrobial studies against *Staphylococcus aureus* ATCC 6538, *Pseudomonas aeruginosa* ATCC 10031, *Bacillus subtilis* KZN, *Escherichia coli* ATCC 2538, *Lactobacillus acidophilus*, *L. delbrueckii* and *L. plantarum*. Sub-acute toxicity of the product was evaluated using albino rats fed with 100 mg/kg, 300 mg/kg and 500 mg/kg of the extracts for 28 days. Packed Cell Volume (PCV) and liver enzymes were determined. Data were analyzed using SPSS version 16.0. Moisture, protein, ash and energy contents were $5.76 \pm 0.29\%$, $2.75 \pm 0.32\%$, $1.49 \pm 0.42\%$ and 3191.512 KCal/Kg respectively. Presence of alkaloids, flavonoids, saponins, terpenes, steroids, tannins and glycosides were recorded. No microbial growth was recorded on growth media. Minimum Inhibitory Concentrations (MIC) of the extracts were 31.25 µg/ml (*E. coli*), 62.25 µg/ml (*P. aeruginosa* and *S. aureus*), 125.00 µg/ml (*B. subtilis* and *L. acidophilus*) and 250µg/ml (*L. plantarum* and *L. delbrueckii*). Toxicity evaluation revealed no death of rats. Liver enzyme activities, creatinine and urea showed no significant difference ($p \leq 0.05$) with control. PCV values were within normal range of 37.6 - 50.6 %. “Medicagemgem” is safe and can be used as both nutritional and antimicrobial food supplement at the doses studied.

Keywords: Medicagemgem; Food Safety; Microbial Evaluation; Proximate Composition Phytochemical Composition; MIC; Liver Enzymes

Introduction

Food safety is associated with the handling, preparation, and storage of food in a way that prevent food borne illnesses. Millions of people fall ill and many die as a result of eating unsafe food. The major factors that contribute to food safety are microbiological and chemical factors [1].

The contamination of food by microbiological agents is a worldwide public health concern. Most countries have documented significant increases over the past few decades in the incidence of diseases caused by microorganisms in food, including pathogens such as *Salmonella*, enterohaemorrhagic *Escherichia coli* (EHEC) and parasites such as *Cryptosporidium* and *Trematodes* [1].

Food supplements are concentrated sources of nutrients or other substances with a nutritional or physiological effect whose purpose is to supplement the normal diet [2]. They can be vitamins, minerals, herbs or other plants, amino acids or parts of these substances. They can be in form of pill, capsule, tablet, or liquid form. They supplement the diet and should not be considered a substitute for food [2].

Makers of dietary supplements cannot legally say that dietary supplements can diagnose, cure, treat or prevent diseases but they can say that they contribute to health maintenance and well-being. People have used the active ingredients in dietary supplements for thou-

sands of years to help promote health and to treat illnesses. These supplements are the basis for some of today’s common medicines. For example, people have used willow bark tea for centuries to relieve fever. Pharmaceutical companies eventually identified the chemical in willow bark that relieved fever and used that knowledge to produce aspirin. Supplements do not have to go through the testing that drugs do (Medlineplus, 2014).

The food supplement ‘Medicagemgem’ is produced in Togo and is emerging as a food supplement in Nigeria. It is composed of Olive leaf (*Olea europaea*), Ginger (*Zingiber officinale*) and Honey. The producers claim its health benefits include boosting the immune system, possession of anti- pathogenic efficacy and elimination of tooth ache.

The various components of ‘medicagemgem’, olive leaf, honey and ginger have been recorded to possess medicinal benefits when consumed. While olive oil is well known for its flavor and health benefits, the leaf has been used medicinally in various times and places (Kilham, 2013). No research has been recorded on the safety and efficacy of the product or on the antimicrobial efficacy of the synergistic effect of the three components that make up the product. Although Yahaya, *et al.* [3,4] reported that the combined antibacterial activity of honey and fresh ginger leaves or rhizome extract mixtures were superior over the use of these antimicrobial agents individually. Yalemwork, *et al.* [5] revealed that honey-ginger powder extract mixtures were found to have more antimicrobial effect than the use of honey or ginger extract solutions individually. The use of honey and ginger extracts mixtures for drug resistant bacteria such as methicillin-resistant *Staphylococcus aureus* (MRSA), *Escherichia coli*, and *Klebsiella pneumonia* is recommended [5]. According to Omoya and Akharaiyi [6] the inhibitions of ginger powder ethanol/methanol extracts were enhanced by mixing with honey due to their synergistic antibacterial effects of honey-ginger extract mixtures as already reported. The ginger powder ethanol/methanol extracts were positive for known antimicrobial agents such as saponin, alkaloids, phlobatannin, flavonoids, and cardiac glycosides. The antimicrobial effects of different honey might be related to phytochemicals such as phenolic acids (benzoic and cinnamic acids) and flavonoids (flavanones, flavanols) depending on the floral sources [7].

The combination of these three important natural products with high medicinal and nutritional properties is expected to be of tremendous benefit to health. The present study was done to evaluate the safety and antibacterial efficacy of ‘medicagemgem’.

The specific objectives of this study were:

1. To evaluate the proximate composition of the product.
2. To determine the microbiological quality of the product.
3. To evaluate the effect of the product against some beneficial bacteria.
4. To determine the antibacterial properties of the product against some pathogenic microorganisms.
5. To evaluate the toxicity associated with the product, if any, using albino rats.

Materials and Methods

Collection of samples and test organisms

‘Medicagemgem’ was purchased from local dealers in Togo.

The pathogenic microorganisms; *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* ATCC 10031, *Bacillus subtilis* KZN and *Staphylococcus aureus* ATCC 6538 were collected from the National Institute of Medical Research, Lagos, Nigeria. The lactic acid bacteria: *Lactobacillus acidophilus*, *Lactobacillus delbrueckii* and *Lactobacillus plantarum* were obtained from the Federal Institute of Industrial Research, Oshodi, Nigeria.

The animals (albino rats) used were collected from the College of Veterinary Medicine Federal University of Agriculture, Abeokuta, Nigeria. All samples were taken to the laboratory for identification and analysis.

Isolation of Microorganisms

The test sample was blended aseptically and 1g of the powdered product was dispensed into 10ml sterile normal saline. Taking 1 ml aliquot of the suspension, a five-fold serial dilution was done using sterile distilled water. 0.1 ml each of sample dilutions 10^{-2} , 10^{-3} and 10^{-4} were cultured on Plate Count Agar (PCA), MacConkey Agar, de Mann Rogosa, Sharpe Agar (MRS) and Sabouraud Dextrose Agar (SDA) by spread plate method. The inoculated plates were incubated appropriately according to the following culture conditions outlined in table 1.

Microorganism	Types of Agar	Incubation Conditions
Aerobic bacteria	Plate Count Agar	37°C for 24h
Lactic acid bacteria	De Mann, Rogosa, Sharpe Agar	37°C for 48h (anaerobically)
Fungi	Sabouraud Dextrose Agar	27°C for 3days
Enteric bacteria	MacConkey Agar	37°C for 24h

Table 1: Incubation conditions of inoculated plates for the various types of agar media used.

Proximate analysis: The proximate analysis of the sample was done according to the methods by AOAC (2005).

Moisture Content: Thermal drying method was used in the determination. One gram of the sample was weighed in triplicate and placed in washed, dried and weighed crucible. This was placed in an oven and dried at 105°C for three hour. The sample was allowed to cool in a desiccator and then reweighed. The percentage moisture content was calculated by computing or expressing the loss in weight on drying as a fraction of the initial weight of sample.

Ash Content: The ash content was determined using ignition method. The crucibles used were thoroughly washed and pre-heated in a muffle furnace to about 500°C. One gram of the oven-dried sample used in moisture determination was weighed in triplicate and placed in the pre-heated, cooled and weighed crucible and then reweighed. The crucible was covered with its lid, the number noted and then placed in a cold muffle furnace. The temperature was allowed to rise to 500°C and the ashing carried on three hours at this temperature. The crucible was removed from the furnace, allowed to cool in a desiccator and reweighed.

$$\text{Ash (\%)} = \text{Ma/Ms} \times 100$$

Where Ma = Mass of ash (g)

Ms = Mass of sample used (g)

Crude Protein Determination: Crude protein was done by determining the total organic nitrogen using the macro-Kjeldhal method. This involved digestion, distillation and titration. One gram of the sample was weighed in triplicate and placed in digestion flasks. Few granules of anti-bumps and 3.0g of copper catalyst mixture (96% anhydrous sodium sulphate, 3.5% copper sulphate and 0.5% Selenium dioxide) were added to each of the flasks. Digestion commenced by adding 20 cm³ of concentrated sulphuric acid and heating on a heating mantle. At the end of digestion, the digest was filtered and made up to 100 cm³ with distilled water. Into a round bottom flask was added 20 cm³ of the diluted digest and used in the distillation step. Boric acid and methyl red indicator were used during the distillation process. Into the flask was injected 30 cm³ of 40% sodium hydroxide and distillation of the ammonia formed continued until colour changed to yellow. The boric acid mixture was then titrated with 0.1N HCL to colourless end point and the titre noted. Total organic nitrogen was then calculated. The value calculated multiplied by 6.25 gives percentage crude protein.

Determination of Crude Lipid: This was done using Soxhlet type of the direct solvent extraction method. The solvent used was petroleum ether (boiling range 40°C - 60°C).

Total Carbohydrate: This was done by estimating the difference. The sum of the percentages of all other proximate components was subtracted from 100.

Total carbohydrate (%) = 100 - (% moisture + % crude protein + % crude fat + % ash)

Phytochemical analysis

Qualitative analyses of the constituents of the plant extracts were carried out according to the method of Okwu [8] and Sofowora [9].

Saponins

Ten grams of medicagemgem was put into separate test tubes and half filled with water. This was shaken for a few minutes. Stability of foam of foam for 5 minutes indicated the presence of saponins.

Tannins

Five grams of medicagemgem was weighed into test tubes and 100ml of dilute HCl dissolved with 250 ml of 10% ferric chloride (FeCl₃). The filtrate obtained was treated with 0.1% FeCl₃. Presence of blue black precipitate gave an indication that tannins were present.

Alkaloids

Five grams of medicagemgem was weighed into test tubes and 100ml of dilute HCl was added to each test tube and boiled for 5 minutes. The filtrate obtained was used for alkaloids test by the addition of few drops of Dragendorffs reagents (Bismuth potassium iodide solution). The formation of a precipitate gave indication of the presence of alkaloids.

Anthraquinone

The filtrate obtained after the detection of alkaloids was used for this test. Fifty millilitres of chloroform was added to the filtrate and shaken. The chloroform layer was taken and equal volume of ammonia was added. This was shaken and pinkish colouration was taken as an indication of the presence of anthraquinone.

Cardiac Glycosides

Medicagemgem boiled with hydrochloride acid (HCl) produced a filtrate that was added to 50 ml of chloroform. This was shaken and the chloroform layer was taken into two tubes. The contents of the tubes were shaken and the chloroform layer was taken into two test tubes. The contents of the tubes were evaporated to dryness in a water bath. To the dried extract of one of the tubes was added 2 - 3 drops 10% FeCl₃ and 20 ml of acetic acid. Concentrated H₂SO₄ was added drop-wise along the side of the test-tube. Formation of brown ring gave an indication of the presence of hexose sugars.

To the second dried extract was added 2 - 3 drops of 2% 2,4-dinitrobenzoic acid to dissolve the extract. A few drops of 5% NaOH were added. Any reddish colouration is an indication of the presence of cardiac glycosides.

Test for flavonoids: Four millilitres of medicagemgem was taken and 2 mL of 50% methanol was added. The solution was warmed and metal magnesium was added. This was followed by 5 - 6 drops of concentrated Hydrochloric acid. Red colouration confirms the presence of flavonoids

Test for Terpenes: Sulphuric acid test.

Medicagemgem was dissolved in 3 mL of chloroform. This was then evaporated to dryness and 2 mL of concentrated Sulphuric acid was added and heated for 3 minutes. A greyish colour indicated the presence of terpenes

Aqueous and Methanolic Extraction for Susceptibility Tests

The aqueous and methanolic extraction of the ingredients was obtained using the method described by Deepa [10]. Using 150 mL of respective solvent, 30 grams of medicagemgem was ground to a paste in mortar and pestle and was filtered twice through Whatman filter

paper. The filtrate was collected in a beaker and was subjected to evaporation in a rotary evaporator for 10 minutes at 100°C (for aqueous extraction) and 60°C for methanolic extraction. The extracts were diluted appropriately before use.

Determination of antimicrobial properties of extract

Standardization of Inoculum

This was done using the method described by the Antimicrobial Susceptibility Testing of the American Society of Microbiology (2005). Colonies of each microorganism used were inoculated into 5 ml Nutrient Broth (pathogens) and MRS broth (*Lactobacilli* sp.) and incubated at 37°C for 18 - 24 hours.

Preparation of the Paper Disc

The paper disc used for susceptibility test was prepared by aseptically perforating a sterile filter paper using a metal perforator. The perforator made a disc of 3 mm in diameter where the extracts of different concentrations were used for susceptibility test. The various discs produced were autoclaved to achieve sterility.

Antibacterial Susceptibility Test for Pathogen

The antibacterial tests of the sample extracts were carried out against *Staphylococcus aureus* ATCC 6538, *Escherichia coli* ATCC 25922, *Bacillus subtilis* KZN, *Pseudomonas aeruginosa* ATCC 10031, *Lactobacillus delbrueckii*, *L. acidophilus* and *L. plantarum* using the paper disk diffusion inhibition test by Sharma [11].

Determination of Minimum Inhibitory Concentration (MIC)

The MIC of the extracts against the test organisms was determined using the broth dilution method as described by Akinoyemi, *et al* [12].

Sub-acute toxicity of extract

A total of 20 male albino rats weighing 61 - 70g, were housed in the experimental cages under hygienic conditions, with proper aeration at 25 ± 2°C, and a relative humidity of 45 - 50%. Using a modified method of Cruz, *et al.* [13], the rats were randomly assigned into 4 groups A, B, C, and D with 5 rats each and fed on standard rat diet (10g/100g body weight) twice daily and tap water *ad libitum*. Groups A, B, C and D received distilled water, aqueous extract at the doses of 100, 300 and 500 mg/kg respectively. The extract was administered orally by means of bulb steel needle for 28 days. Prior to commencement of administration, the rats were allowed to stabilize in the Animal House with standard 12-hour light-dark cycle, for a period of 7 days. The animals were weighed before and after the treatment. All studies on animal experimentation were conducted in accordance with the Animal Care Regulations and Standards approved by the Institute for Laboratory Animal Research (ILAR, 1996).

Results

Dilution factor	SDA (CFU/0.1 ml)	MCA (CFU/0.1 ml)	PCA (CFU/0.1 ml)	MRS (CFU/0.1 ml)
10 ⁻²	0	0	0	0
10 ⁻³	0	0	0	0
10 ⁻⁴	0	0	0	0

Table 2: Microbiological Quality Assessment of Medicagemgem.

0: No Growth of Bacteria or Fungi; SDA: Sabouraud Dextrose Agar; MCA: MacConkey Agar; PCA: Plate Count Agar; MRS: de Mann Rogosa and Sharpe agar.

Parameter	Values
Crude protein	2.75 ± 0.32%
Fat	0.59 ± 0.50%
Moisture	5.76 ± 0.29%
Fibre	2.51 ± 0.50%
Ash	1.49 ± .42%
Energy	3191.512 Kcal/Kg
NFE	86.90 ± 0.32%

Table 3: Proximate analysis of ‘medicagemgem’.

NFE: Nitrogen Free Extracts. The values are expressed as mean ± standard deviation.

Compounds	Methanolic Extract	Aqueous Extract
Alkaloids	++	+
Flavonoids	+	+
Saponins	+	+
Terpenes	+	+
Steroids	+	+
Tannins	++	+
Glycosides	+	+

Table 4: Phytochemical analysis of ‘medicagemgem’.

+: Present in Moderate; ++: Present in High Quantity

Microorganisms	Aqueous Extract (µg/ml)	Methanolic Extract (µg/ml)	Gentamycin (µg/ml)
<i>E. coli</i> ATCC 25922	31.25 ^b	31.25 ^b	15.63 ^a
<i>P. aeruginosa</i> ATCC 10031	62.50 ^b	62.50 ^b	31.25 ^a
<i>B. subtilis</i> KZN	125.0 ^b	125.0 ^b	15.63 ^a
<i>S. aureus</i> ATCC 6538	62.50 ^b	62.50 ^b	15.63 ^a
<i>L. acidophilus</i>	125.00 ^b	125.00 ^b	31.25 ^a
<i>L. delbrueckii</i>	250.00 ^b	250.00 ^b	62.25 ^a
<i>L. plantarum</i>	250.00 ^b	250.00 ^b	31.25 ^a

Table 5: Minimum Inhibitory Concentration of Medicagemgem and gentamycin against the test microorganisms.

Extract Concentration mg/kg	Average Weight Day 1	Average Weight Day 29	Weight Gained (grams)
Control	63.40 ± 2.898 ^a	86.81 ± 3.404 ^a	23.40 ± 1.190 ^a
100	61.48 ± 2.951 ^a	75.36 ± 6.216 ^b	13.88 ± 4.376 ^b
300	65.99 ± 5.491 ^a	80.65 ± 7.071 ^b	14.66 ± 2.360 ^b
500	63.47 ± 3.963 ^a	76.44 ± 2.848 ^b	12.97 ± 3.661 ^b

Table 6: Effect of Medicagemgem on the weight of the rats administered with 100, 300 and 500 mg/kg body weight for 28 days.

The values are expressed as mean ± standard deviation (n = 5). Values with the same superscript are not significantly different at p < 0.05.

Extract Concentrations (mg/kg)	PCV (%)	AST (U/L)	ALT (U/L)	ALP (U/L)	BIL (mg/dL)	CRT (mg/dL)	URE (mg/dL)
Control	47.40 ± 3.219 ^a	85.70 ± 16.271 ^a	23.58 ± 5.463 ^a	80.24 ± 3.373 ^a	0.56 ± 0.024 ^b	1.24 ± 0.172 ^a	20.66 ± 1.820 ^a
100	49.40 ± 2.786 ^a	97.97 ± 6.228 ^a	21.36 ± 4.614 ^a	85.76 ± 6.681 ^a	0.52 ± 0.058 ^b	1.08 ± 0.193 ^a	24.04 ± 2.308 ^a
300	49.20 ± 3.929 ^a	112.26 ± 21.586 ^b	18.28 ± 2.566 ^a	86.26 ± 6.420 ^a	0.44 ± 0.024 ^a	1.06 ± 0.060 ^a	19.24 ± 2.327 ^a
500	51.40 ± 1.327 ^a	85.08 ± 7.989 ^a	17.26 ± 1.898 ^a	81.34 ± 5.609 ^a	0.54 ± 0.025 ^b	1.12 ± 0.058 ^a	19.58 ± 2.694 ^a

Table 7: Effect of Medicagemgem on Haematology and Liver enzymes of Rats administered with 100, 300 and 500 mg/kg body weight for 28 days.

The values are expressed as mean ± standard deviation (n = 5). Values with the same superscript are not significantly different at p < 0.05.

PCV: Packed Cell Volume; ALT: Alanine Aminotransferase; ALP: Alkaline Phosphatase; AST: Aspartate Aminotransferase; BIL: Bilirubin; CRT: Creatinine; URE: Urea.

Discussion

Food is indispensable. However, food can serve as a vehicle for the transmission of foodborne illnesses. The product called “medicagemgem” produced and sold in Togo has not been approved by the Nigerian food regulatory body, called the National Agency for Food, Drug, Administration and Control. Both intrinsic and extrinsic form of pathogens in this product has not been verified and there has been no endorsement from the country of production. The presence of food borne pathogen pose health hazard all over the world.

Microbial food contamination is on the increase in emerging pathogens such as *E. coli*, 0157: H7, *Campylobacter* species, *Yersinia enterocolitica* and *Salmonella enteritidis*. Data generated from “medicagemgem” showed that there were no growth of bacteria and fungi on all cultured plates, this may be due in part to “medicagemgem” low water activity. Labiza, *et al.* [14] found that food products with low water activity not only have very long extreme shelf life, also prevents the growth of microorganisms. The moisture content of “medicagemgem” from the proximate analysis is far below the water needed by most food borne microorganisms to thrive. The water activity observed in the present study, is 5.76% which according to reports of FDA (2011) is below the level (9.70 - 9.87%) required for microorganisms in food products to thrive. This explains why there was no growth of bacteria or fungi on the microbiological growth media used for this study. This therefore presents “medicagemgem” as a pathogenic and non pathogenic-free food product. In addition, the absence of growth might be due to the antimicrobial property of the synergistic effect of ginger, garlic and olive leave extract, which has also been reported by Islam, *et al.* (2014) where the antimicrobial effects of combined extracts of ginger and garlic were strong on *Staphylococcus* sp, *E. coli*, and *Yersini* sp. but less effective on the microorganism when used individually.

Secondly, the presence of phytochemicals such as alkaloids, flavonoids, saponins, terpenes, steroids, tannins and cardiac glycosides in both the aqueous and methanolic extracts of “medicagemgem” presents the product as highly beneficial to health. This is because these bioactive non-nutrient plant compounds, have potential effects as antioxidants, anti-estrogens, anti-inflammatory, immunomodulatory, and anticarcinogenics (Artabandhu and Nira, 2012). The metabolic products of some phytochemicals have been known to have inhibitory effects on pathogenic bacteria. These metabolites also act as pre-biotics, stimulating the growth of beneficial bacteria. Phytochemicals from plant extracts such as found in “medicagemgem”, are of great importance to clinical microbiologists as antimicrobial agents. There is the likelihood that these phytochemicals have found their way into the arsenal of antimicrobial drugs which are being prescribed by physicians as several are already being tested in humans [15]. Of particular interest in this study are the tannins and alkaloids which were present in the methanolic extracts of the product, in higher quantities as compared with other phytochemicals. Tannins are astringent being able to precipitate gelatin from solution. It has been suggested that the consumption of tannin-containing beverages, especially green teas and red wines, can cure or prevent a variety of illnesses [16]. Alkaloids on the other hand are heterocyclic nitrogenous compounds. A type of glycoalkaloids one of which is solamargine, extracted from the berries of *Solanum khasianum* were found effective against HIV infection and some intestinal infections associated with

AIDS (Sethi, 1979; McDevitt, *et al.* 1996; Mandez, *et al.* 1997). Alongside their microbiocidal effects against microorganisms such as the *Giardia* and *Entamoeba* species, the major antidiarrheal effect of alkaloids is most likely due to their effects on transit time in the small intestine (Ghoshal, *et al.* 1996). This property of “medicagemgem” hereby discussed presents the product as containing useful components for future drug development.

Also, the antibacterial effect of “medicagemgem” as compared with standard antimicrobial agent, gentamycin against typed cultures such as *Pseudomonas aeruginosa* ATCC 10031, *Bacillus subtilis* KZN, *Staphylococcus aureus* ATCC 6538, *Lactobacillus acidophilus*, *L. delbrueckii* and *L. plantarum*, revealed the greater potency of the extracts of “medicagemgem” over gentamycin. This presents “medicagemgem” as a medication with active components which are effective on some infections.

The toxicological effects of medicagemgem studied, showed that the product had a positive effect on weight reduction as there was a significant difference observed between control and treated rats. The global epidemic of obesity has become a major public health issue over the world. Obesity increases the risk of numerous chronic diseases, including type – 2 diabetes mellitus, cardiovascular diseases, osteoarthritis and certain types of cancers and overall is associated with elevated morbidity and mortality (Racette, 2003) Smith (2012). Of particular interest and relatedness to this study, is atherosclerosis to which obesity is a leading and can be fatal. Atherosclerosis is a disease condition resulting from the narrowing of coronary arteries which supplies blood to the heart. The coronary arteries become more flexible under this condition due to the buildup of plaque, formed when too much fat has been deposited on the linings of the arteries. This condition leads to various cardiovascular abnormalities and malfunctions. Although, the preferred intervention for obesity management is dietary modulation and physical activities [17], this study shows that medicagemgem which is a formulation from natural products, can effectively combat obesity and as such it can be deduced that certain herbal medicines may also help to achieve weight loss and therefore reduce the risk of obesity [18].

Numerous medications have been associated with elevated levels of liver enzymes (transaminases) in blood [19]. Liver function tests measures levels of proteins and liver enzymes. There is a high correlation between these compounds and hepatocellular carcinoma (HCC) which is mostly occurs in people with severe liver damage due to alcohol or drug abuse [19]. A rise in the liver enzymes in the blood is therefore indicative of a malfunction of the organ. HCC is also known as hepatoma and is the most common type of liver cancer accounting for over 75% of all liver cancers. The condition develops in the hepatocytes and can spread from the liver to other parts of the body such as the pancreas, intestines and stomach. The present study assessed the presence of liver enzymes between the control and treated rats and a $P < 0.05$ indicating no significant difference shows that “medicagemgem” as a medication, has no adverse effects on the liver [20].

Conclusion

“Medicagemgem” is safe and can be used as both nutritional and antimicrobial food supplement at the doses studied.

Bibliography

1. WHO, 2008. Food Safety and Nutrition During Pregnancy and Infant Feeding. INFOSAN Information No (2014).
2. USFDA. Bad Bug Book. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook (2014).
3. Yahaya A., *et al.* “Assessment of heavy metal content in the surface water of Oke-Afa canal Isolo. Lagos, Nigeria”. *Archives of Applied Science Research* 4.6 (2012): 2322-2326.
4. Yahaya O., *et al.* “Combine Antimicrobial Effect of Ginger and Honey on Some Human Pathogens”. *British Journal of Pharmacology and Toxicology* 3.5 (2012): 237-239.
5. Yalemwork E., *et al.* “Synergetic antimicrobial effects of mixtures of Ethiopian honeys and ginger powder extracts on standard and resistant clinical bacteria isolates”. *Evidence Based Complementary and Alternative Medicine* (2014).

6. Omoya FO and Akharaiyi FC. “Mixture of honey and ginger extract for antibacterial assessment on some clinical isolates”. *International Journal of Pharmaceutical and Biochemical Research* 2.5 (2011): 127-132.
7. Gheldof N., *et al.* “Identification and quantification of antioxidant components of honeys from various floral sources”. *Journal of Agricultural Food Chemistry* 50.21 (2002): 5870-5877.
8. Okwu DE. “Evaluation of the chemical composition of indigenous spices and flavouring Agents”. *Global Journal of Pure and Applied Science* 7.3 (2005): 455- 459.
9. Sofowara A. “Medicinal plants and Traditional medicine in Africa”. Spectrum Books Ltd, Ibadan, Nigeria (1993): 289.
10. Deepa PR., *et al.* “Phytochemical properties and antimicrobial activities of leaf, bark, fruit extracts and silver nanoparticles of *Samadera indica* Gaertner”. *European Journal of Biotechnology and Biosciences* 3.12 (2015): 30-37.
11. Sharma S., *et al.* “Yeast Nop2 and Rcm1 methylate c2870 and c2278 of the 25s rRNA, respectively”. *Nucleic Acids Research* 41.19 (2013): 9062-9076.
12. Akinyemi KO., *et al.* “Screening of crude extracts of six medicinal plants used in South-West Nigerian unorthodox medicine for anti-methicillin resistant *Staphylococcus aureus* activity”. *BMC Complementary and Alternative Medicine* 5 (2005): 6.
13. Cruz ALD., *et al.* “Stereological estimation of the surface area and oxygen diffusing capacity of the respiratory stomach of the air-breathing armored catfish *Pterygoplichthys anisitsi* (Teleostei: Loricariidae)”. *Journal of Morphology* 270.5 (2009): 601-614.
14. Labuza TP, *et al.* “Stability of Intermediate Moisture Foods. 1. Lipid Oxidation”. *Journal of Food Science* 37.1 (1972): 154-159.
15. Majorie MC. “Plant Products as Antimicrobial Agents”. *Clinical Microbiology Reviews* 12.4 (1999): 564-582.
16. Scortichini M and Pia Rossi M. “Preliminary in vitro evaluation of the antimicrobial activity of terpenes and terpenoids towards *Erwinia amylovora* (Burrill) Winslow *et al.*”. *Journal of Applied Bacteriology* 71.2 (1991): 109-112.
17. Mahan L and Escott-Stump S. “Krause’s Food & Nutrition Therapy”. Canada : Saunders Elsevier (2012).
18. Hasani- Ranjbar S., *et al.* “A Systemic Review of Anti- Obesity Medicinal Plants- An Update”. *Journal of Diabetes and Metabolic Disorder* 12.1 (2013): 28.
19. Robert T., *et al.* “HDACs link the DNA damage response, processing of double-strand breaks and autophagy”. *Nature* 471.7336 (2011): 74-79.
20. Sahoo A and Soren NM. “Phytochemicals and Gut Microbial Populations in Non-ruminants”. In: Patra A. (eds) *Dietary Phytochemicals and Microbes*. Springer, Dordrecht (2012): 371- 389.

Volume 12 Issue 3 October 2017

© All rights reserved by Oluwafemi Flora., et al.