Original Research Article

Phytochemical Screening and Antioxidant Properties of Coagulants and Soft cheese Produced from Goat milk using Different Biocoagulants of Plant Origin

Abstract

This study was carried out to assess the phytochemical constituents and antioxidant properties of coagulants and soft cheese produced from goat milk. Different biocoagulants such as *Calotropis procera, Carica papaya*, lemon juice and steep water from cereals (maize, millet, and sorghum) were used. The results of phytochemical screening revealed that flavonoids, alkaloids, phenols and reducing sugars are present in all the cheese samples while saponins, tannins and cardiac glycosides were absent. ~~However,~~ steroids and glycosides are present only in cheese coagulated with steep water from millet, while terpenoids are present only in cheese coagulated with steep water from maize. Cheese coagulated with lemon juice had the highest phenol content (19.88 mg/g) while cheese coagulated with steep water from millet and *Calotropis procera* had the highest flavonoids (0.20 mg/g) and alkaloids content (13.42 mg/g). The result of the antioxidant properties revealed that *Carica papaya* had the highest ferric reducing property and displayed better DPPH scavenging activity (14.94 mg GAE/g extract and 10.82%, respectively) when compared with other coagulants. Cheese coagulated with lemon juice displayed the highest ferric reducing property (10.31mg GAE/g sample) while cheese coagulated with *Carica papaya* displayed better DPPH scavenging activity (1.93%) when compared with other cheese samples. Cheese produced from goat milk coagulated with lemon

Comment [érdo1]: Is this unit correct? Is this the result of FRAP? Please review this sentence.

juice and *Carica papaya* may be incorporated into the daily diet because of its phenolic content which can improve the health status of the consumers. It also possesses some natural antioxidant compounds, which can effectively scavenge free radicals.

Keywords: Phytochemical, antioxidants, soft cheese, goat milk

1. Introduction

Wara (soft cheese) is an unripened cheese consumed in several parts of Western Africa. Conventionally, it is prepared by coagulating the fresh milk with the leaf extract of Sodom apple (*Calotropis procera*). Other coagulants such as lemon juice and *Carica papaya* can also be used. Medicinal plants such as *Calotropis procera* and *Carica papaya* are the oldest form of healthcare known to mankind (Ali, 2015) and have been used for centuries as remedies for human and animal diseases as they contain phytochemicals of therapeutic value. They exerted many pharmacological effects such as antimicrobial, anti-inflammatory, analgesic, anticancer, anti-angiogenic, immunological, antidiabetic, cardiovascular, gastroprotective, hepatic protective, renal protective, antidiarrheal, antioxidant, anticonvulsant, enhancement of wound healing effect. The addition of rennet or coagulating agents has been greatly used in the coagulation of milk for the production of cheese (Chikpah *et al*., 2014).

Comment [érdo2]: Add reference to this sentence.

Comment [érdo3]: This sentence does not conclude the paragraph, neither has a connection to the next one. I suggest moving it to the beginning of the paragraph, and finish the paragraph with the antioxidant subject, in order to connect with the following one.

Antioxidant compounds are able to donate electrons to reactive radicals, reducing them into more stable and unreactive species (Gulcin *et al.,* 2003). The reducing ability of a compound generally depends on the presence of reductants (Duh *et al*., 1999) which have been exhibiting antioxidative potential by breaking the free radical chain and donating a hydrogen atom (Gordon, 1990). Goat has been referred as the "poor man's cow'' due to his great

contribution to the health and nutrition of the landless and rural poor (Dresch, 1988). Goat milk differs from cow or human milk in having better digestibility, alkalinity and buffering capacity (Park, 1994). Goat's milk contains vitamins, minerals, trace elements, electrolytes, enzymes, proteins, and fatty acids that are easily assimilated by the body.

Comment [érdo4]: Again, this subject has no connection to the latter.

Goat's milk has a similarity to human milk that is unmatched in cow milk and also has several medicinal values. Therefore awareness about advantage of consumption of goats milk should be popularized so that production and utilization of goat's milk could be enhanced (Kumar *et al*., 2012). However, the different coagulants used which are of plant origin might have impacted their constituents into the soft cheese. It is imperative to ~~carry out~~assess phytochemical and antioxidant properties of coagulants and the soft cheese produced from goat milk. Therefore, the objective of this study ~~is~~ was to determine the phytochemical and antioxidant properties of coagulants and soft cheese produced from goat milk.

Comment [érdo5]: Both sentences are stating the same information. Maintain only the objective to the work in once sentence.

2. Materials and Methods

2.1 Collection of Milk

Comment [érdo6]: I suggest: sampling

The raw milk sample was collected from sheeps at Aba Baba Medinat, a Fulani farm settlement along Afao road, Ado-Ekiti, Nigeria. It was collected aseptically and subsequently transferred to the laboratory for analysis.

Comment [érdo7]: Under what conditions? Refrigerated.

2.2 Collection of coagulants

The leaves of *Carica papaya* and *Calotropis procera* were collected from Erifun community around The Federal Polytechnic, Ado-Ekiti, Nigeria. Authentication of the Plants were done at

the Department of Plant Science and Biotechnology, Ekiti State University, Ado-Ekiti, Nigeria. The voucher specimens of UHAE 2018/022 for *Carica papaya* and UHAE 2018/023 for *Calotropis procera* have been deposited at the University herbarium. Other biocoagulants like lemon fruits were purchased from Oba market, a local market in Ado Ekiti Metropolis, Nigeria, West Africa. Steep water (effluent from pap produced from maize, sorghum, millet) ~~were~~ was produced by steeping the grains in water for 3 days after which it was milled and later steeped again for 2 days in the laboratory. The steep water was then collected ~~for~~ to be used as biocoagulants.

Comment [érdo8]: This sentence is confusing. Please rewrite it.

Comment [érdo9]: Under what conditions this water was kept prior to its use in the experiment?

2.3 Production of West African cheese

The milk was stirred gently during the heating process with a wooden spoon. About 4 m~~l~~Ls of the leaf extract of *Calotropis procera, Carica papaya,* lemon juice, steep water were added to the warm milk and the mixture was heated for the second time with intermittent stirring to about 45-50^{o}C and was kept at this temperature until coagulation was achieved and the heating was stopped after the separation of curd and whey. The sign of coagulation was observed within ~~the range of~~ 10-15 min. It was transferred into a small, previously sterilized, rafia basket to facilitate whey drainage and characteristic shape~~.~~, ~~-~~when the cheese was firm enough it was removed from the rafia basket and placed inside a covered plastic container for analysis.

Comment [érdo10]: Temperature? How long?

Comment [érdo11]: All of the coagulants were added together?

Comment [érdo12]: Of what? Cheese?

Comment [érdo13]: Refrigerated?

2.4 ~~—~~Phytochemical screening of soft cheese sample

Basic p~~P~~hytochemical analyses were carried out to determine the bioactive compounds present in the sample.

2.4.1 Preparation of samples

Two grams (2 g) of cheese sample ~~was~~ were carefully weighed into 250 mL conical flask and 50 mL of distilled water was added to ~~the sample~~it. It was mixed and stoppered with a rubber band and then placed in a water bath for 2 h~~rs~~ at 37 ^{o}C, after which it was removed to cool down. The content was filtered with the use of Whattman filter paper No 1 and the filtrate was kept for analysis.

Comment [érdo14]: Under what conditions?

2.4.2 Test for Tannins

Comment [érdo15]: I suggest detailing better the methodology as the reference cited is not an easy access one.

The dried cheese sample ~~were~~ was stirred in distilled water and filtered. Ferric chloride (0.1%) reagent was added to the filtrate. A blue black or blue green precipitate was taken as preliminary evidence for the presence of tannin (Trease and Evans, 2004).

Comment [érdo16]: How much of sample and how much of water?

Comment [érdo17]: How much of reagent and how much of extract?

2.4.3 Test for Alkaloids

Soft cheese sample (0.5 g) was added to 5 mL of 10% (v/v) HCl in test tubes and put in a water bath for 2 min~~s~~, after which the mixture was filtered. The ~~filterate~~filtrate (1 mL) was treated with 3 drops of Dragendrof's reagent in order to separate portions. The presence of alkaloids was confirmed by the production of reddish brown ~~colouration~~coloration (Trease and Evans, 2004).

Comment [érdo18]: Which portions?

Comment [érdo19]: Was this color visually identified? Or was it identified through an equipment?

2.4.4 Test for steroids

~~Two millimeters (~~An aliquot of 2 mL~~)~~ of acetic anhydride was added to 0.5 g of each cheese sample with addition of 2 mL of H_2SO_4. A ~~colour~~color change from violet to blue or green indicates the presence of steroids (Trease and Evans, 2004).

Comment [érdo20]: Was this color visually identified? Or was it identified through an equipment?

2.4.5 Test for Saponins

The ability of saponins to produce frothing in aqueous solution was used as screening test for the ~~saponins~~se substances. The cheese sample (0~~O~~.5 g) was boiled with distilled water in a water bath and shaken vigorously for stable persistent froth. The frothing was mixed with three drops of olive oil and shaken vigorously for the formation of emulsion (Sofowora, 1993).

2.4.6 Test for Flavonoids

An aliquot of 10 mL ~~Ten millilitre~~ of ethyl acetate was heated with the sample in a water bath for ~~thirty minutes~~30 min. The mixture was filtered and 4m~~L~~l of each ~~filterate~~filtrate was shaken with ~~one millilitre (~~1 m~~L~~) of dilute ammonia solution in a conical flask. A yellow ~~colouration~~coloration indicates the presence of flavonoids (Harborne, 1998).

2.4.7 Test for Cardiac G~~g~~lycosides

A. Legal test: The sample was dissolved in pyridine and few drops of 20% sodium nitro preside together with few drops of 20% sodium hydroxide (NaOH) were added. A ~~colour~~color change from violet to blue to green indicates the presence of glycosides (Trease and Evans, 2004).

B. Lieberman's test: ~~Two millilitre~~2 mL of a~~A~~cetic a~~A~~nhydride was used to dissolve 0.2 g of the food sample. The mixture was cooled in ice. Sulphuric acid was then carefully added. A ~~colour~~color change from violet to blue to green indicates the presence of a steroidal nucleus (i.e aglycone portion of cardiac glycosides) (Trease and Evans, 2004).

2.4.8 Terpenoid test

Comment [érdo21]: Temperature

Comment [érdo22]: Rpm?

Comment [érdo23]: Was the froth separated from the solution and then mixed? Make your methodologies reproducible.

Comment [érdo24]: How long? RPM?

Comment [érdo25]: How MUCH? Is this sample the extract?

Comment [érdo26]: ?

~~Two millilitre (~~2 mL~~)~~ of chloroform was used to dissolve 0.2 g of the sample. Sulphuric acid was carefully added which form a lower layer. A reddish brown ~~colour~~color at the interface indicates the presence of terpenoids.

2.5 Quantitative phytochemical screening

A. Determination of total phenolic content

The extract of the sample (100 mg) was weighed accurately and dissolved in 100 mL of triple distilled water (TDW). This solution (1 mL) was transferred to a test tube, then 0.5 mL ~~2N~~ of the Folin Ciocalteu's reagent (2 mol/L) and 1.5 mL ~~20%~~ of Na_2CO_3 20% solution was added, and ultimately, the volume was made up to 8 mL~~l~~ with TDW followed by vigorous shaking and finally allowed to stand for 2 h ~~ours~~ after which the absorbance was taken at 765 nm. These data were used to estimate the total phenolic content using a standard calibration curve obtained from various diluted concentrations of ~~garlic~~gallic acid (Singleton *et al*., 1999).

Comment [érdo27]: What do you mean? Did you prepare another extract? Explain how.

Comment [érdo28]: SPECIFY THE DILUTIONS, HOW MANY POINTS?

B. Determination of total Flavonoids

The method is based on the formation of the flavonoids – aluminum complex which has a maximum ~~n~~ absorptivity ~~maximum~~ at 415 nm. 100 µL of the cheese sample in methanol (10 mg/mL) was mixed with 100 µL of 20 % aluminum trichloride in methanol and a drop of acetic acid, and then diluted with methanol to 5 mL. The absorption at 415 nm was read after 40 min~~utes~~. Blank samples were prepared from 100 mL of plant extracts and a drop of acetic acid, and then diluted to 5mL~~l~~ with methanol. The absorption of standard ~~ruotine~~routine solution

Comment [érdo29]: What do you mean by cheese sample? Are you sure it is volume (µL)?

Comment [érdo30]: Is it 2 or 20%? If you made modifications to the methodology you should state that.

Comment [érdo31]: Which extract?

(0.5 mg/mL) in methanol was measured under the same conditions. All determinations were carried out in triplicates (Meda *et al*., 2005).

C. Determination of total Alkaloids

Soft cheese sample (5 g) was weighed into a 250 mL beaker and 200 mL of 10% acetic acid in ethanol was added and covered, and allowed to stand for 4 h. This was filtered and the extract was concentrated on a water bath to one-quarter of the original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitation was complete. The whole solution was allowed to settle and the precipitate was collected and washed with dilute ammonium hydroxide and then filtered. The residue is the alkaloid, which was dried and weighed (Harborne, 1998).

2.6 Determination of Aantioxidant ~~activity~~ Capacity

~~The antioxidants tests were carried out on the samples as listed below:~~

A. Ferric Reducing Antioxidant Power Assay (FRAP)

The reducing power of the samples was determined by assessing the ability of the soft cheese sample to reduce $FeCl_3$ solution ~~as described~~ according to the method described by Kong *et al*. (2012). A 2.5 mL aliquot of each cheese sample was mixed with 2.5 mL of 200 mM sodium phosphate buffer (pH 6.6) and 2.5 mL 1% potassium ferricyanide. The mixture was incubated at 50 ^{o}C for 20 min, then 2.5 mL 10% trichloroacetic acid was added. This mixture was centrifuged at 650 rpm for 10 min. The supernatant~~s~~ ~~were~~ was collected and 5 mL aliquot of each sample was mixed with an equal volume of water and 1 mL 0.1% ferric chloride. The

Comment [érdo32]: What about the other assays? Werent they carried in triplicates?

Comment [érdo33]: Please, cite the original methodology. Meda et al. only reproduced the methodology of other authors. Further, this methodology is adapted, you should state this, once it is not as the original one.

Comment [érdo34]: Temperature?

Comment [érdo35]: How?

Comment [érdo36]: Which concentration? Which volume was used to washing?

Comment [érdo37]: Temperature? Time?

Comment [érdo38]: This assay is not properly described. please revise the methodology and cite proper references.

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Comment [érdo39]: Please cite the original reference. The authors only modified this methodology. And yours is different from the modification carried by Kong et al.

absorbance was measured at 700 nm. The ferric reducing antioxidant property of soft cheese sample was estimated as mg gal~~r~~lic acid equivalent (GAE)/ g ~~sample in triplicate~~.

B. Scavenging effect on 1,-1-diphenyl-2-picrylhydrazyl (DPPH)

The DPPH free radical scavenging ability of the sample ~~on DPPH~~ was determined using the method~~s~~ of Gyamfi *et al*. (1999). Soft cheese samples of different concentrations were mixed with 1.0 mL~~l~~ of 0.4 mM DPPH in methanol (5.0 mL). The mixture was incubated at room temperature for 30 min in dark. The control contains only DPPH solution in methanol instead of sample while methanol served as the blank. Absorbance was noted at 517 nm by using UV-visible spectrophotometer. The capacity of scavenging free radicals was calculated as:

Scavenging activity (%) = [Ab - (As-Abs)] / Ab x 100

Where, Ab is absorbance of blank, Abs is the absorbance of sample + blank, and As is the absorbance of sample.

Sample concentration causing 50% inhibition (IC_{50}) was calculated from the graph, plotting the % inhibition against sample concentration.

2.7 Statistical Analysis

Statistical analyses were carried out and data were obtained using SPSS program (Statistical Package for social Sciences version 16). Significant differences between means were calculated by one-way Analysis of Variance (ANOVA) using Duncan's multiple range test (DMRT) in order to evaluate differences among means ~~was used to separate means (Omotosho *et al*., 2011)~~.

Comment [érdo40]: I don't believe this is correct.

Comment [érdo41]: Your methodology does not match the authors cited. Please cite proper references, and state the modifications carried if it is the case.

Comment [érdo42]: How much?

Comment [érdo43]: ?

3.0 Results

3.1 Qualitative phytochemical properties of biocoagulants used for the production of soft cheese.

Table 1 shows the qQualitative pPhytochemical properties of soft cheese produced from goat milk using different biocoagulants and it was observed that flavonoids, alkaloids, phenols and reducing sugar were present in all the cheese samples produced from goat milk coagulated with all the six coagulants, while saponins, tannins and cardiac glycosides were absent in all the samples analysed. Terpenoids, steroids, and glycosides were present only in cheese samples coagulated with steep water from maize, millet and millet, respectively.

Table 1. Qualitative phytochemical screening of soft cheese produced from goat milk using different coagulants.

Samples	Saponins	Flavonoids	Tannins	Alkaloids	Terpenoids	Steroids	Phenols	Glycosides	Cardiac Glycosides	Reducing sugars
GCPR	-	+	-	+	-	-	+	-	-	+
GCP	-	+	-	+	-	-	+	-	-	+
GLJ	-	+	-	+	-	-	+	-	-	+
GSO	-	+	-	+	-	-	+	-	-	+
GMI	-	+	-	+	-	+	+	+	-	+
GMA	-	+	-	+	+	-	+	-	-	+

Keys: **GSO –** goat milk coagulated with steep water from sorghum**, GMA -** goat milk coagulated with steep water from maize, **GMI -** goat milk coagulated with steep water from millet, **GLJ -** goat milk coagulated with steep water from lemon juice, **GCPR -** goat milk coagulated with *Calotropis procera*, **GCP -** goat milk coagulated with *Carica papaya*. ~~Tannins, Alkaloids, Terpenoids, Steroids, Flavonoids, Glycosides, Cardiac glycosides and Reducing sugars~~

3.2 Quantitative phytochemical properties of biocoagulants used for the production of wara.

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Comment [érdo44]: Rewrite the sentence in order not to repeat the term (millet)

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Table 2 shows the qQuantitative phytochemical screening of cheese produced from goat milk using different biocoagulants. Goat milk coagulated with lemon juice had the highest phenol ~~value of 19.88mg/g~~content.~~,~~ Cheese coagulated with steep water from millet had the highest flavonoids ~~value~~ content ~~of 0.20mg/g~~ and cheese coagulated with *Calotropis procera* had the highest alkaloids content ~~value of 13.42mg/g~~. W~~w~~hile, the lowest phenol ~~had a lowest value of~~content (15.39 mg/g) was found for ~~15.39mg/g in~~ the goat milk coagulated with *Calotropis procera*; the lowest~~,~~ flavonoid content (~~had a lowest value of~~ 0.06 mg/g) was observed ~~in~~ for the goat milk coagulated with lemon juice, and ~~Alkaloids had a lowest value of~~concerning the alkaloids, the lowest content (7.64 mg/g) was ~~7.64mg/g in~~for the goat milk coagulated with millet steep water ~~from millet~~.

Table 2.~~:~~ Quantitative phytochemical screening of soft cheese produced from goat milk using different biocoagulants

~~SAMPLES~~Biocoagulants	Phenols (mg/g)	Flavonoids (mg/g)	Alkaloids (mg/g)
GCPR	15.39± 0.14f	0.16±0.01a	13.42±0.01a
GCP	17.18± 0.16d	0.08 ±0.01c	9.23±0.01e
GLJ	19.88±0.01a	0.06±0.01d	9.78± 0.01d
GSO	17.87±0.02cc	0.09 ±0.00c	10.82± 0.00c

Comment [érdo45]: SPECIFY THE ACID EQUIVALENT, for exemple: mg GAE/ g
Where, GAE stands for gallic acid equivalent.
The same should be done for flavonoids and alkaloids

GMI	16.35±0.09e	0.20±0.01a	7.64±0.01f
GMA	18.57± 0.02b	0.09± 0.01c	11.83± 0.02b

KEY: G- goat milk, SO- sorghum, MA- maize, MI- millet, LJ- lemon juice, CPR- *Calotropis procera,* CP- *Carica papaya*. Values are means ± standar deviation ~~of replicate~~ (n=3)., ~~M~~means with different letters within a column are significantly different. ($P < 0.05$)

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3.3 FRAP assay ~~of the samples~~

The ~~ferric reducing antioxidant power (~~FRAP~~)~~ of the biocoagulants and soft cheese produced ~~from goat milk using different~~ biocoagulants is presented in Figures 1 and 2, respectively. The values obtained for FRAP ranged from 1.43 to 14.94 mg GAE/g ~~extract~~ for biocoagulants, and from 7.74 to 10.31 mg ~~Garlic Acid Equivalent~~GAE/g ~~(mg GAE/g sample)~~ for the soft cheese samples ~~respectively~~.

Comment [érdo46]: Please, make sure this is correct.

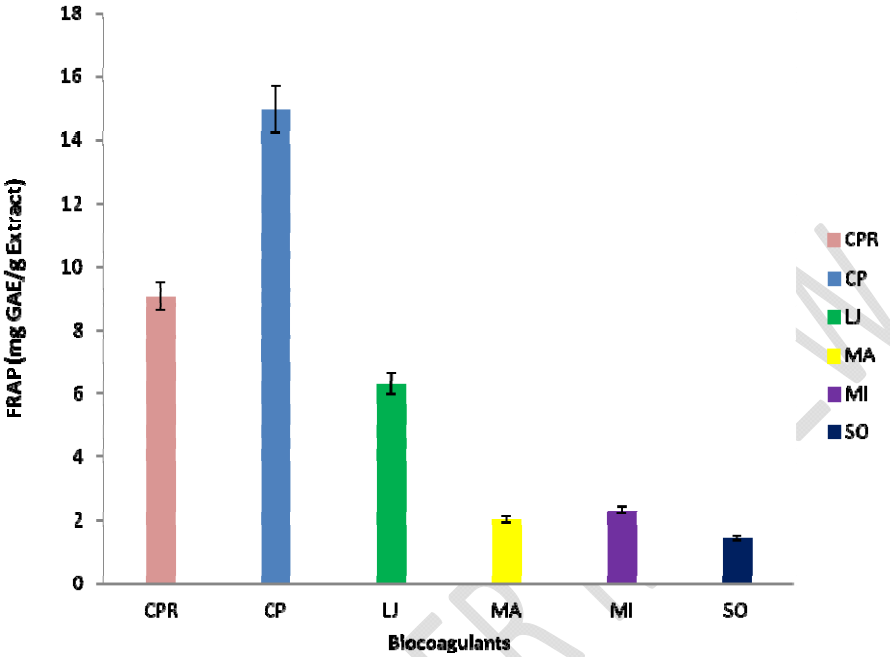
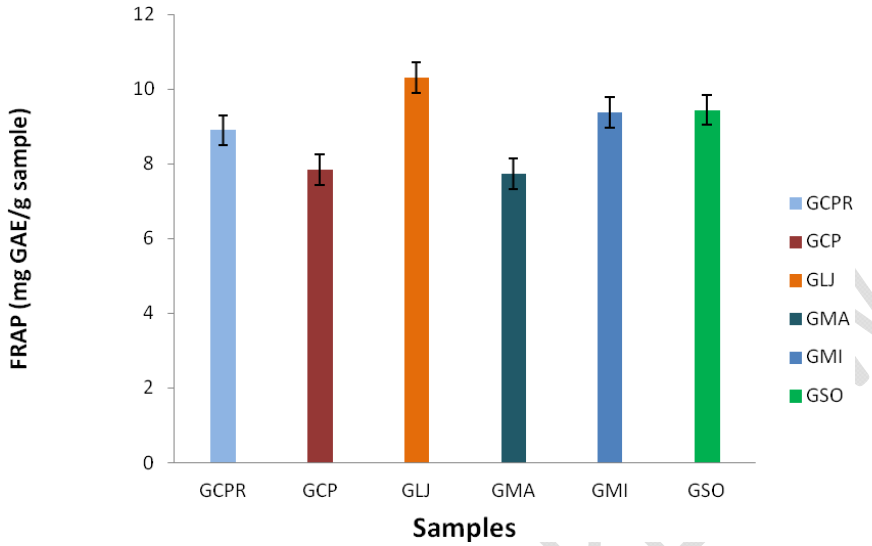


Fig 1: Ferric reducing antioxidant power of biocoagulants used in the production of local cheese

Comment [érdo47]: Please, remove the lateral legend, once it is repetitive. Explain each of the initials.



227

228 Fig 2: Ferric reducing antioxidant power of local cheese produced from goat milk using

229 different b~~B~~iocoagulants

230 3.4 DPPH scavenging activity ~~of the samples~~

231 The scavenging ~~activities~~ activity of the biocoagulants and soft cheese samples against DPPH

232 free radical~~s~~ are presented in Figures 3 and 4, respectively. The scavenging activity of

233 biocoagulants against DPPH ranged from 1.37 to 10.82%, while the results for ~~value of~~ soft

234 cheese from goat milk ~~against free radicals~~ ranged from 1.56 to~~-~~ 1.93%.

235

Comment [érdo48]: Please, remove the lateral legend, once it is repetitive. Explain each of the initials.

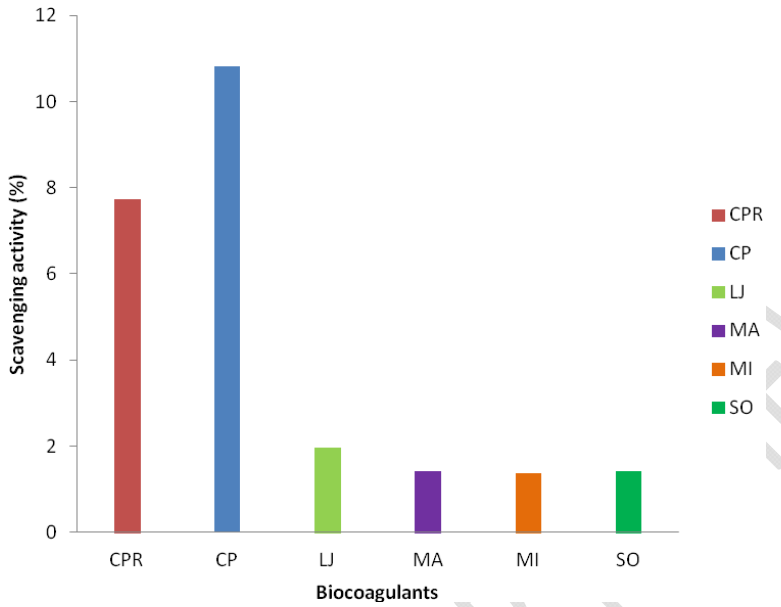


Fig 3: Scavenging activity of biocoagulants used in the production of local cheese on DPPH free radical

Comment [érdo49]: Please, remove the lateral legend, once it is repetitive. Explain each of the initials.

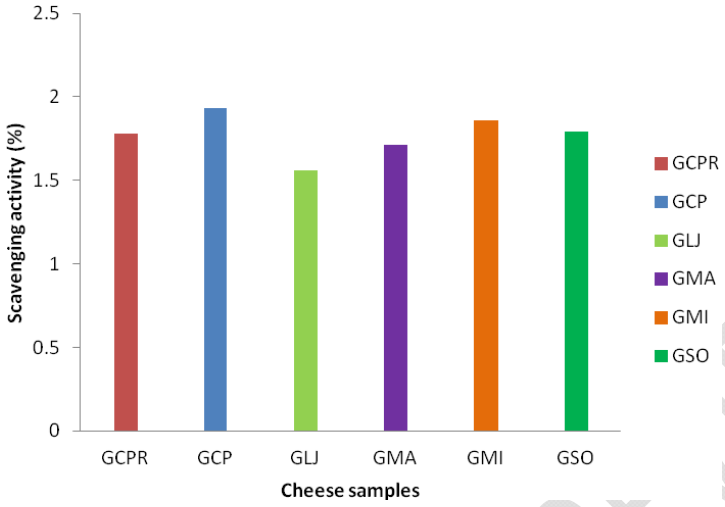


Fig 4: Scavenging activity of local cheese produced from goat milk using different biocoagulants on DPPH free radical

Comment [érdo50]: Please, remove the lateral legend, once it is repetitive. Explain each of the initials.

4.0 Discussion

The result of the qualitative phytochemical screening of soft cheese produced from goat milk using different coagulants (Table 1) revealeds that phenols, alkaloids, flavonoids and reducing sugar were present in all the cheese samples. However, saponins, tannins and cardiac glycosides were absent in all the samples while, terpenoids, steroids and glycosides were present in cheese coagulated with steep water from maize and millet. The presence of phenols indicates that the cheese may be able to achieve multiple activities, such as like antioxidant, anticarcinogenic, anti-inflammatory, e.t.c. (Asha *et al*., 2011). Alkaloids are the most significant compounds that play a metabolic role in the living systems and are involved in the protective function in animals. Steroidal alkaloids are medicinally evolved. Alkaloids are the most efficient

Comment [érdo51]: These are results already presented in the previous topic. Do not repeat.

253 therapeutically significant plant substance. Pure isolated alkaloids and the synthetic derivatives
254 are used as basic medicinal agents because of their analgesic, antispasmodic and bacterial
255 properties (Stray, 1998). Flavonoids have been used against the cancer causing tumors and it
256 inhibits the promotion of growth and progression of tumors (Stevens *et al*., 1992). Phenols and
257 phenolic compounds have been extensively used in disinfection and remains the standard with
258 which other bactericides are compared (Akinyeye *et al.,* 2014).

259 The presence of these phytochemical constituents, such as aAlkaloids, flavonoids,
260 phenols and reducing sugars makes of the cheese a good source of beneficial bioactive
261 compounds that can improve the health status of the consumers. Flavonoids can function as
262 direct antioxidants and free radical scavengers, and have the capacity to modulate enzymatic
263 activities and inhibit cell proliferation (Duthie and Crozier, 2000). The amount of
264 phytochemicals found in the cheese samples was quantitatively determined by standard
265 procedures (Table 2). The highest phenol content (19.88 mg/g) was found in milk coagulated
266 with lemon juice, the highest flavonoids (0.20mg/g) was found in milk coagulated with steep
267 water from millet and the highest alkaloids (13.42mg/g) was found in milk coagulated with
268 *Calotropis procera*. High phenolic content recorded is similar to the work of Oboh (2006) who
269 also reported high phenolic content in sheep milk. The highest alkaloids recorded in soft cheese
270 produced from *Calotropis procera* might be due to the fact that *Calotropis procera* contains
271 bioactive compounds such as alkaloids, which might have been introduced into the cheese
272 sample during processing (Ali, 2015).

Comment [érdo52]: Add more recent references

Comment [érdo53]: Too many sentences, which are repetitive. Reformulate in order to be more objective.

Comment [érdo54]: Again, you are repeating what you have already said in the results section.

The value obtained for FRAP (Figures 1 and 2) ranged from 1.43-14.94 for biocoagulants and 7.74-10.31 mg ~~Garlic Acid Equivalent~~GAE/g ~~sample (mg GAE/g sample)~~ for soft cheese produced from goat milk. Extract from *Carica papaya* (14.94 mg GAE/g ~~extract~~) and soft cheese produced with lemon juice (10.31 mg GAE/g ~~sample~~) showed the highest ferric reducing property when compared with others (~~at~~ $p < 0.0$~~0~~5). It has been reported that the antioxidant activity of plant material was well correlated with the content of their phenolic compounds (Velioglu *et al*., 1998). The ability of the biocoagulants and the soft cheese samples to scavenge ~~for~~ DPPH radicals is presented in Figures 3 and 4, respectively. Soft cheese samples and the biocoagulants used for soft cheese processing displayed concentration dependent DPPH scavenging activity. In this study, the scavenging activity of biocoagulants used for soft cheese processing ranged from 1.37-10.82% while that of soft cheese samples ranged from 1.56-1.93%. *Carica papaya* displayed better DPPH scavenging activity (10.82%) when compared with other coagulants (1.37%, 1.41%, 1.42%, 1.97%, 7.72%) while soft cheese coagulated with *Carica papaya* displayed better DPPH scavenging activity (1.93%) when compared with other samples (1.56%, 1.71%, 1.78%, 1.79%, 1.86%). Coagulants such as *Carica papaya* have been reported to be a rich ~~source of~~ antioxidant sources~~s~~ due to the presence of phenolic group and carotenoids ~~in them~~ which can scavenge free radicals (Aravind *et al*., 2013 and Usman *et al*., 2012). The results showed that the soft cheese and the biocoagulants possess ~~some~~ natural antioxidant compounds, which can effectively scavenge free radicals.

5.~~0~~ Conclusions

Comment [érdo55]: Repetitive, as stated above.

Comment [érdo56]: I suggest adding other references

Comment [érdo57]: Extracts?

Comment [érdo58]: Reformulate this sentence.

Comment [érdo59]: These are results, and not discussion.

Comment [érdo60]: These numbers refer to which coagulants?

Comment [érdo61]: These numbers refer to which coagulants?

The results of qualitative phytochemical screening revealeds that the soft cheese produced from goat milk using different biocoagulants contain phenols, alkaloids, flavonoids and reducing sugar. While saponins, tannins, and cardiac glycosides were absent in all the cheese samples. Goat milk coagulated with lemon juice has presented the highest phenol content; cheese coagulated with millet steep water from millet coagulated cheese hads the highest flavonoid content, while *Calotropis procera* coagulated cheese has had the highest alkaloids content. The addition of the biocoagulants increaseds the bioactive content of the cheese samples. The results of the antioxidant properties of the biocoagulants revealed that *Carica papaya* displayed better DPPH scavenging activity when compared with other samples, and soft cheese extract produced from goat milk coagulated with *Carica papaya* can was able to scavenge free radical better than other samples.

Comment [érdo62]: Extracts?

Conflicts of interest: We declare that we have no conflicts of interest.

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