

STUDIES ON THE COMPARISON OF QUALITY OF WINES BETWEEN ALOE VERA LEAVE AND NONI FRUIT

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ABSTRACT

In this research, Aloe vera and Noni fruits were collected from Mandalay Region. The dried samples were tested to study the phytochemical constituents. Furthermore, Aloe vera wine and Noni wine were prepared with sugar and yeast. After 3 months, the physiochemical properties of wines (Aloe vera and Noni) were determined by pH (3.4 and 3.1), alcohol content (6 and 5.3%), Total dissolved solid (TDS) (38 and 90 mgL⁻¹), Total suspended solid (TSS) (22 and 53 mgL⁻¹) and Total solid (TS) (60 and 143 mgL⁻¹) respectively. The reducing sugar content in Aloe vera wine and Noni wine (1.1 and 1.2 gL⁻¹) were determined by using Rebelein Titration method. Vitamin C content of wines were determined by using Iodometric Titration method (0.0316 and 0.064 gL⁻¹). The antioxidant activities of wines were investigated by using DPPH radical scavenging method (107 and 95.031 µL/mL).

Key Words: Aloe vera, Noni, antioxidant activity, alcohol contents, reducing sugar, vitamin C

1 INTRODUCTION

Aloe vera contains many vitamins including A, C, E, folic acid, choline, vitamin B1, B2, B3 (niacin) and B6. Aloe vera has been used as an active ingredient for the production of a large variety of health products. This plant is one of the richest natural sources of health for human being coming. Aloe vera has number of uses and mainly they are used as food preservative and medicine. Commercially, aloe can be found in pills, sprays, ointments, lotions, liquids, drinks, jellies and creams. [1]. Noni fruit itself is a rich source of micronutrients and phytochemicals, such as vitamin C, vitamin E and American in A. [2]. Wine has been considered as safe and healthy drink, besides an important to the diet. Wine represents one of the functional fermented food and consumption of wine has been reported to exhibit protective effect [3]. Regular and moderate wine consumption has been associated with health benefits. Wine drinking may be indicated in healthy people, regular consumption of wine may protect against certain chronic health conditions. A variety of wine constituents have been studied in various disease models. [4]

Botanical Description of Aloe vera

Family name	-	Liliaceae
Common name	-	Aloe vera
Botanical name	-	<i>Aloe vera</i> Linn
English name	-	Aloe
Myanmar name	-	Sha- zaung- let- pat
Part used	-	Leave



Figure 1- Plant of Aloe vera

Botanical Description of Aloe vera

Botanical name	: <i>Morinda citrifolia</i> Linn
Family name	: Rubiaceae
English name	: Noni
Myanmar name	: Ye Yo
Part used	: Fruit



Figure 2- Plant of Noni



Figure 3- Fruits of Noni

2. MATERIAL AND METHODS

2.1 Sample Collection

Aloe vera was collected from Magway Region, Myanmar. Aloe vera was washed with water and gel was cut into small pieces and air dried at room temperature to determine the phytochemical test.

The Noni fruit was collected from the Monywa Township, Sagaing Region, Myanmar. The noni fruit was washed with water. The noni fruits were cut into small pieces and air dried at room temperature to determine the phytochemical test.

2.2 Phytochemical Investigation of Dried Noni Fruit

Phytochemical tests of the dried Aloe vera gel and dried Noni fruit were performed.[5].

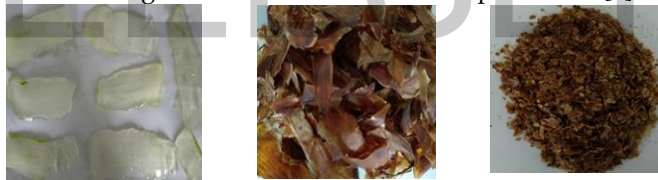


Figure 4- Fresh, dried and powder of Aloe vera gel



Figure 5- Fresh, dried and powder of Noni Fruit

2.3 Determination of Wine

400 g of fresh samples, 800 g of sugar and 4 L of distilled water were placed in pots. The 50 mL of yeast solution (1.00 g/L) was then added and distilled water was added to 4 L. The solution was stirred until all sugar was dissolved. After that the pot was covered and set-up air locks on. The air pipe was imbedded into lime water. After 3 months, physicochemical properties of wine were determined..



Figure 6- Wine pots of Aloe vera gel and Wine pots of Noni fruit

2.4 Determination of Some Physiochemical Properties

Total Dissolved Solid (TDS), Total Suspend Solid (TSS) and Total Solid (TS) from Aloe vera wine were determined from Ministry of Agriculture, Livestock and Irrigation, Department of Fisheries Aquaculture Division Freshwater Aquaculture Research Water and Soil Examination Laboratory. Some physiochemical properties such as pH, alcohol content, total dissolved solid, total suspended solid and total solid of wine were performed.[6]

2.5 Determination of pH of Wine

The pH content of the prepared wine was directly measured by using pH meter. 100 mL of wine is placed in beaker and the pH meter was immersed in this beaker. The pH of the wine was recorded.



Figure 7-pH content of Aloe vera Wine



Figure 8-pH content of Noni Wine

2.6 Determination of Alcohol Content

The alcohol content of the prepared wine was directly measured by using hydrometer. 50 mL of wine was placed into 100 mL of measuring cylinder and alcohol meter was immersed in this wine. The alcohol percent of wine was read.



Figure 9-Alcohol content of Aloe vera Wine



Figure 10-Alcohol content of Noni Wine

2.7 Determination of Reducing Sugar Content Aloe vera Wine and Noni wine by using Rebelein Titration Method

The determination of reducing sugar content in Aloe vera Wine and Noni Wine were performed according to Benedict.

2.8 Ascorbic Acid Content by using Iodometric Titration Method

The vitamin C concentration can be determined in wines by a redox titration using iodine. As the iodine is added during the titration the ascorbic acid is oxidized to dehydro ascorbic acid, while the iodine is reduced to iodide ions. Due to this reaction, the iodine formed is immediately reduced to iodide as long as there is any ascorbic acid present. Once all the ascorbic acid has been oxidized, the excess iodine is free to react with the starch indicator, forming the blue – black color solution. This is the endpoint of the titration.

2.9 Determination of Antioxidant Activities by using DPPH Radical Scavenging Assay Method

The determination of antioxidant activities of Aloe vera wine and Noni Wine were performed. Therefore in this research, 1, 1-diphenyl -2-picryl hydrazyl (DPPH) powder was used as stable free radical. Ascorbic acid was used as standard antioxidant and ethanol (analar grade) was used as solvent. The absorbance was determined at 517 nm wavelength.

3. RESULTS AND DISCUSSION

3.1 Phytochemical Test of Dried Aloe vera gel and Noni fruit

The phytochemical constituents of dried Aloe vera gel and Noni fruits were determined by phytochemical tests.

Table -1 Results of Phytochemical Constituents of Dried Aloe vera gel and Noni fruit

No	Constituents	Extract	Reagents used	Observation	Results	
					Aloe vera gel	Noni fruit
1.	Alkaloid	1 % HCl	(i) Dragendroff's reagent (ii) Wagner's reagent	(i) Orange color solution (ii) Reddish brown color solution	+	+
2.	Flavonoid	95 % ethanol	Conc: HCl, Mg	Pink colour solution	-	-
3.	Steroid	95 % ethanol	Acetic anhydride, conc: H ₂ SO ₄ , CHCl ₃	Green colour solution	+	-
4.	Terpene	95 % ethanol	CHCl ₃ , conc: H ₂ SO ₄	Pink colour ppt	-	-
5.	Polyphenol	95 % ethanol	1 % FeCl ₃ + 1 % K ₃ [Fe(CN) ₆]	Greenish blue colour solution	+	+
6.	Glycoside	water	10 % lead acetate	White ppt	+	+
7.	Phenolic compound	water	10 % FeCl ₃	Greenish blue colour solution	+	+
8.	Reducing sugar	water	Benedict's solution	no brick-red ppt	+	+
9.	Saponin	water	shake	Froth	+	+
10.	Lipophenol	water	NaOH, 0.5 M KOH	Deep colour solution	+	+
11	Tannin	water	10 % FeCl ₃ , dil H ₂ SO ₄	Yellowish brown ppt	+	+

(+) = presence of constituents (-) = absence of constituents

According to this table, the dried gel of Aloe vera consists of alkaloid, glycoside, steroid, reducing sugar, polyphenol, phenolic compound, tannin, saponin and lipophenol. The flavonoid and terpene were absent in the dried Aloe vera gel. Dried noni fruit consist of alkaloid, glycoside, reducing sugar, polyphenol, phenolic compound, tannin, saponin and lipophenol. Steroid, flavonoid, terpene were absence in the noni fruit.

3.2 Determination of Some Physiochemical Properties of Wines (pH, alcohol content, TDS, TSS and TS)

The results of some physiochemical properties of Aloe vera and Noni Wines were shown in table -2.

Table 2-Result of pH, Alcohol Content, TDS, TSS and TS

Wine	pH content	Alcohol Content (%)	Total Dissolved Solid (mg/L)	Total Suspended Solid (mg/L)	Total solid (mg/L)
Aleo vera Wine	3.4	6	38	22	60
Noni Wine	3.1	5.3	90	53	143

3.3 Determination of Reducing Sugar Content of Aloe vera Wine and Noni wine

Table 3- Result of Reducing Sugar Content for Decolorized Aleo vera Wine by using Rebelein Titration Method
 Indicator - Starch

No.	Initial Volume (mL)	Final Volume (mL)	Used Volume (mL)
Rough	0	29	29
1	0	28.2	28.2
2	0	28.2	28.2
3	0	27.9	27.9
Mean Volume			28.2 mL

According to this table, Aloe vera Wine was used 28.2 mL of sodium thiosulfate solution.

Calculation

$$\begin{aligned} \text{Reducing Sugar (g/L)} &= \text{Blank titration} - \text{Sample titration} \\ &= 29.3 - 28.2 \\ &= 1.1 \text{ g/L} \end{aligned}$$

Table 4- Result of Reducing Sugar Content for Decolorized Noni wine by using Rebelein Titration
 Indicator- Starch

No	Initial Volume(cm ³)	Final Volume(cm ³)	UsedVolume(cm ³)
Rough	0	29	29
1	0	28.2	28.1
2	0	28.2	28.1
3	0	27.7	27.7
Mean volume			28.1

According to this table, Noni wine used 28.2 cm³ of sodium thiosulfate solution.

Calculation

$$\begin{aligned} \text{Reducing sugar (g/L)} &= \text{Blank titration} - \text{Sample titration} \\ &= 29.3 - 28.1 \\ &= 1.2 \text{ g/L} \end{aligned}$$

3.4 Determination of Vitamin C Content of Aloe vera Wine and Noni wine

Table 5- Result of Vitamin C Content of Aleo vera Wine with Iodine Solution by Using Iodometric Titration Method
 Indicator - Starch

No.	Initial Volume (mL)	Final Volume (mL)	Used Volume (mL)
Rough	0	2	2
1	0	1.1	1.1
2	0	1.1	1.1
3	0	1	1.2
Mean Volume			1.1 mL

According to the experiment, the amount of ascorbic acid (Vitamin C) in Aloe vera Wine was (0.0316 g/L).

Table 6- Result of Vitamin C content of Noni wine by using Iodometric Titration Method

No	Initial Volume(cm ³)	Final Volume(cm ³)	Used Volume(cm ³)
Rough	0	3	3
1	0	2.8	2.8
2	0	2.4	2.4
3	0	2.4	2.4
Mean volume			2.4

Indicator- Starch

According to this experiment, the amount of ascorbic acid (vitamin C) of noni wine was (0.064 g/L).

3.5 Determination of Antioxidant Activities of Aloe vera Wine and Noni wine

Table 7- Percent Inhibition of Various Concentration of Standard Ascorbic Acid

Sample concentration (µg/mL)	Mean Absorbance	Mean % Inhibition	IC ₅₀ (µg/mL)
DPPH alone	0.648		
200	0.136	79.0	
160	0.157	75.77	
120	0.176	72.83	12 µg/mL
80	0.198	69.44	
60	0.218	66.35	
20	0.392	39.50	

According to this table, IC₅₀ Value of Ascorbic acid was 12 µg/mL.

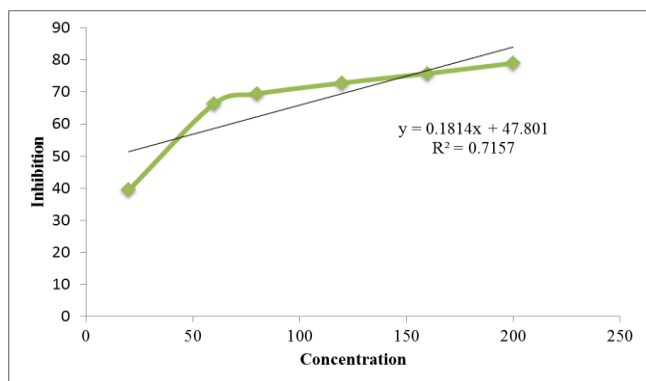


Figure 11:- The Plot of Inhibition Versus Concentration of Ascorbic Acid

Table 8- Percent Inhibition and IC₅₀ Value of Aloe vera Wine

Sample concentration(μl/mL)	Mean Absorbance	Mean % Inhibition	IC ₅₀ (μL/mL)
DPPH alone	0.663		
100	0.347	47.66	
90	0.352	46.90	
80	0.362	45.39	107 μL/mL
70	0.378	42.98	
60	0.402	39.36	

According to this table, IC₅₀ Value of Aloe vera Wine was 107 μl/mL.

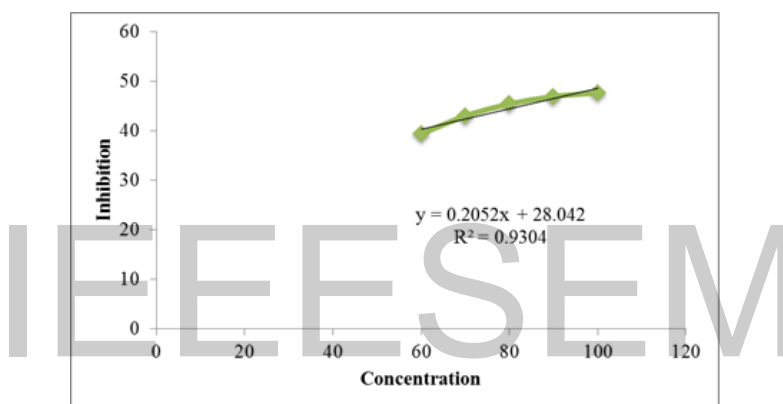


Figure 12- The Plot of Inhibition Versus Concentration of Wine

Table 9- Percent Inhibition and IC₅₀ Value of Noni Wine

Sample concentration	Mean Absorbance	Mean % Inhibition	IC ₅₀ (μL/mL)
DPPH alone	0.663		
100	0.310	53.2	
90	0.350	47.2	
80	0.384	42.1	95.031 μL/mL
70	0.414	37.5	
60	0.423	34.5	

According to this result, IC₅₀ value of Noni Wine was 95.031 μl/mL.

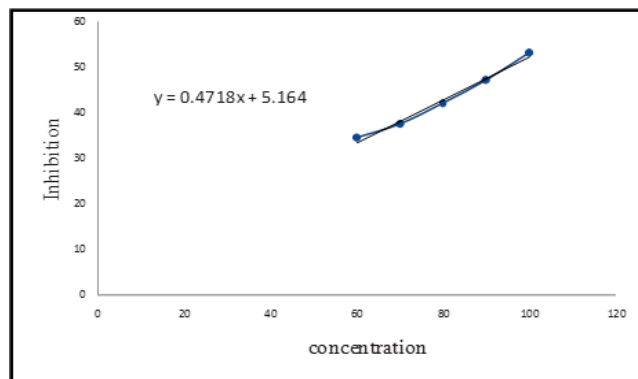


Figure 13- Plot of % Inhibition Versus Concentration for Noni Wine

4. CONCLUSION

Aloe vera was collected from Magway Region, Myanmar. Noni fruit was collected from Monywa Township, Sagaing Region, Myanmar. The phytochemical investigation of dried Aloe vera gel and dried Noni fruits were done. Dried Aloe vera gel consists of alkaloid, steroid, polyphenol, glycoside, phenolic compound, reducing sugar, tannin, saponin and lipophenol respectively. The flavonoid and terpene were absent in the dried aloe vera gel. The dried Noni fruits consist of alkaloids, glycosides, reducing sugar, polyphenols, phenolic compound, tannins, saponins and lipophenols and absent of flavonoids, steroids, flavonoids, and terpenes. Furthermore, wines were made by sugar with yeast. The physiochemical properties such as pH, alcohol content, TDS, TSS and TS were determined. The pH content of Aloe vera wine was 3.4 and Noni wine was 3.1. Alcohol content of Aloe vera wine was 6 % and Noni wine was 5.3%. The reducing sugar content in Aloe vera wine and Noni wine were determined by using Rebelein Titration method. The reducing sugar content of Aloe vera wine was 1.1 g/L and Noni Wine was 1.2 g/L. The vitamin C content in wines was determined by using Iodometric Titration method. The vitamin C content of Aloe vera wine was 0.0316 g/L and Noni Wine was 0.064 respectively. The antioxidant activities of wines were investigated by using DPPH radical scavenging method. The antioxidant activities of Aloe vera wine and Noni Wine were 107 and 95.031 $\mu\text{L/mL}$ respectively. A high intake of antioxidant plays a crucial role in the prevention of several diseases, such as cancer, cardiovascular neurodegenerative and other chronic pathologies. Reducing sugar intake leads to improve mental health and mood, healthy teeth, clearer skin and weight loss. The Vitamin C may include protection against immune system deficiencies, cardiovascular, eye disease and even skin wrinkling. Many wines are made from herbs with perceived medicinal values and such wines have many additional health benefits. So, the ageing of wine is very popular in wine consumers. Wine has been considered as safe and healthy drink, besides an important adjunct to the diet.

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