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The Effect of Ginger Powder on Quality Attributes of some Fruit Nectars

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ABSTRACT

This study aims to investigate the effect of ginger powder (0.1% and 0.3%w/v) on quality attributes of fresh Mango, guava, and orange nectar. The antimicrobial activity, Physico - chemical properties were evaluated for prepared nectar during storage period up to 12 months. The resulted data indicated that, Vitamin C was significantly increase in prepared orange and mango nectar (22.86mg/100ml, 22.14 mg/100ml, respectively). Poly phenols content showed significant increase between the control samples and all prepared nectar. Flavonoids content increased significantly of 0.3% ginger powder in prepared orange, guava, mango nectar, guava (2.9 mgQE/100ml, 2.03 mgQE/100ml, and 2.21mgQE/100 ml, respectively). All herbs positively inhibited the growth of pathogenic microorganisms with specific emphasis for the ginger powder. The findings of the current study recommend possible use of ginger powder up to 0.3% as natural sources of antioxidants and preservatives to extend the nectar shelf life to provide consumers with save healthy fresh nectar.

Keywords: ginger, mango nectar, guava nectar, orange nectar, antioxidants activity, antimicrobial effect

INTRODUCTION

Attention of the scientific community worldwide is shifting toward spices and herbs to harness their natural food preservative. (Kapoor *et.al.* 2012). Ginger considered an ideal candidate for beverages development (Tanaka *et.al.,*2015). Ginger (*Zingiber Officinale*) is largely used for functional beverages because some pungent constituents and other zingiberaceous plants have potent antioxidant properties (Gunathilake and Rupasinghe, 2014). This study aims to evaluate the effect of Ginger Powder on quality attributes of guava, orange and mango nectars.

Nectars have high percent of consumption from all age stages so we choice this kind of food to promote it by ginger to present a natural healthy product to consumers. Fruit beverages are increasingly gaining popularity throughout the world due to their high nutritive and therapeutic value, which can further be improved by blending two or more fruit juices (Kumar,2012).

Egypt is a leading country in surrounding area in exporting fruits, fruit products and some kinds of herbs as chamomile and mint. Egyptian exports of juices and concentrates revealed to 79.5million dollar at 2017 according to exporting council of food industries.

Chosen nectars in the study were due to its availability and also fruits which made of it during different seasons and are underutilizing fruits in fruit nectar production.

Mango fruits have a strong aroma with intense peel coloration, characterized by attractive fragrance and high nutritional value, because it has high amounts of β- carotene, vitamin C, minerals like calcium, iron and phosphorous (Lakhanpal and Vaidya. 2013). B-carotene is the main compound with pro-vitamin A activity.

In an experiment to produce a new product from orange beverages, some Chemical composition of Orange juice were determined as protein content and its value was0.4g/100ml, ash content was0.2g/100ml and dry matter was12.1g/100ml (Sady *et.al.*, 2013).

Guava nectar consists of 45.5% moisture, 0.4%ash, 2.4% crude fiber, 3.5% crude protein, 0.2% crude fat and 45.4% soluble carbohydrate (Tanwar *et.al*., 2014). Guava fruit contains 74–87% moisture, 13–26% dry matter including 0.5–1% ash, 0.4–0.7% fat and 0.8–1.5% protein (Saroja, 2015).

MATERIALS AND METHODS

Materials

Plant material

Roots of ginger (Zingiber officinale var. Roscoe) were purchased from Harraz market, Cairo, Egypt in July, 2017. Fresh and fully ripened mango (Mangifera indica cv. Timor), guava (Psidium guajava L. cv. Mamora), and orange (Citrus sinensis Valencia) fruits were collected in July, 2017 from local market in Damietta and transported to the Department of Food Industries, Faculty of Agriculture, Damietta University. Fruits were stored in a refrigerator at 8°C prior to further use. Sugar were purchased from local markert.

Chemicals:

All solvents and chemicals analytical grade were purchased from sigma Aldrich Company, Egypt.

Cultivation media

Potato dextrose medium, nutrient agar, and Macconkey medium were purchased from Sigma Aldrich, Cairo, Egypt.

Methods

Preparation of ginger powder:

Ginger roots were manually separated and dried in open air oven at 105^{o} C for three days till stability of three followed weights, it milled into fine flour using a Wonder mill. The flour was sieved using a 300 µm screen and stored in an airtight container in a freezer at −18°C prior to further use.

Fruits pulp preparation

Fruits were washed thoroughly with clean running water and peeled off. The pulp was separated from the stone, seeds or peels with the help of a stainless steel knife and mixed in a blender (TOSHIBA) for 10 minutes to obtain fine pulp.

Fruits nectar preparation:

Mango, orange and guava fruit nectars were prepared according to Egyptian standard (Eos, 2013) brief, pure nectar was extracted from raw fruits by squeezing in cheese cloth without adding any water and used amounts were as followed: orange and guava nectar (25%w/v) to obtain the final concentrate 13^{o}Brix but it was in mango (15%w/v) to obtain the final concentrate 15^{o}Brix then, sugar was added by (97.5gm /L) in orange and guava nectar) but it was in mango (100gm/L). Finally, water was added to adjust the final volume to one liter Table1. No preservations or

vitamin C was added. These procedures were carried out at first of August, 2017.

Table 1. The ingredients of prepared fresh nectar

Component Fruit	Fruit pulp gm/L	Water ml/L	Sugar gm/L
Mango	150	650	100
Guava	250	647.5	97.5
Orange	250	647.5	97.5

Pasteurization treatment of prepared nectar and storage conditions

Fruits nectar was mixed with ginger powder in different proportions 0.1% and 0.3%. All prepared nectars were heated at 85^{o}C for 25secs, then hot filling in glass bottles, capped and placed in a water bath at 95°C for 20 min, in order to destroy spoilage microorganisms. Glass bottles were cooled to room temperature by cold water bath. The bottles with pasteurized nectar were stored in the room temperature to subsequent further analyses (Andabati and Muyonga, 2014).

Analytical methods

Moisture, fat, crude protein, crude fibers, and ash contents determined according to the AOAC (A.O.A.C, 2012). Total carbohydrates were calculated by differences.

Phytochemical analysis

Determination of total phenolic content

The total phenolic content of the row materials and (tamarind and herbs-enriched nectars) was determined, using the Folin-Ciocalteu colorimetric method (ELhefnawy,2016) with some modifications. In brief, 100 µL of the diluted sample (1: 10 of sample to water v/v) was pipetted into a test tube covered with aluminum foil and topped up to 0.5 mL with double distilled water. 0.25 mL of Folin–Ciocalteu reagent (1 N) was added followed by 1.25 mL of sodium carbonate (20% w/v) and the mixture homogenized using a vortex. The mixture was then incubated at room temperature for 30 min to allow for color development. Absorbance of blue color was measured at 750 nm at spectrophotometer against DEMSO (die methyl sulphoxide) as the blank. The total phenolic content was determined using the standard Gallic acid calibration curve with varying concentrations (0.02– 0.125) mg/mL). The total phenolic content was expressed as milligram Gallic acid equivalent (GAE)/100 mL or/gm of the row materials and (tamarind and herbs-enriched nectars.

Determination of flavonoids

Flavonoids content to row materials and (tamarind and herbs-enriched nectars) were determined using the modified method of (Ivanisova *et. al*.,2015) with some modifications brief, 100µL of sample was mixed with 100µL of 10% (w/v) distilled water solution of aluminum chloride, 100µL of 1 M potassium acetate, 1.4ml of methanol and 2.8 mL of distilled water. After 30 min. in darkness the absorbance at 415 nm was measured using the spectrophotometer. Quercetin (0.1-0.5 ml was used as the standard (0.01gm/100ml) and the results were expressed in µg/100ml quercetin equivalents.

Determination of Vitamin C

Vitamin C was determined by 2, 6-dichlorophenylindophenol method, brief 10 mL of row materials and (tamarind and herbs-enriched nectars sample was dissolved in 3% HPO3 to make volume 100 mL. The filtrate was titrated with standard dye solution (sodium salt of 2, 6-dichlorophenylindophenolandsodiumbicarbonatein distilled water), three drops of phenol phetalene (phth) was added and titration after this to get end-point Kadam *et.al*,2012. The ascorbic acid content was calculated using the formula,

mg of ascorbic acid/100 mL of row nectars =

$$\frac{(T*D*V*100)}{(W1*W2)}$$

Where:

T is the volume of dye solution used
D is the dye factor
V is the volume made up
W*1* and W*2* are the weight of filtrate and weight of nectar sample taken for estimation.

Microbiological determinations

Samples preparation

One ml of the all samples were suspended in 9.0 ml sterilized tap water and homogenized using a vortex (VM-300 power: 220 VAC, 50Hz, 0.16A/Made in Taiwan-Associated with Cannich, Inc. U.S.A.) for 5 min., the obtained solution was diluted from 10^{-1} to 10^{-3}. One ml of the three dilutions was put into three Petri dishes, and then suitable melted media poured and mixed well then left to solidify. These Petri dishes were then incubated at the suitable temptation for suitable period (Shalata.2017).

Total bacterial count

One ml of each suitable dilutions was transferred into three Petri dishes under aseptic condition. Approximately 15ml of nutrient agar medium was poured in each plate, mixed will and then left to hardness. All Petri dishes placed into incubator at 30°C for 3 days. Results were monitored through counting the colonies developed (APHA.,1992).

Coliform bacteria count

One ml of each suitable dilution were transferred into three Petri dishes under aseptic condition. Approximately 15ml of Macconkey agar medium was poured in each plate, mixed will and then left to hardness.

All Petri dishes placed into incubator at 30°C for 3 days. Results were monitored through counting the colonies developed (APHA.,1992).

Statistical analysis

The results were expressed as mean values. Differences between blends were assessed by t-test analysis of variance using COSTAT (coHort software version 6.303). $P<0.05$ was considered statistically significant. ANOVA analyses found significant differences between treatments, Duncan test was conducted to detect differences between individual treatment level means, the small and capital letters were used(El-hefnawy,2016).

RESULTS AND DISCUSSION

Proximate chemical analysis

The proximate chemical composition presented in (Table 2), the results showed that ginger powder contained fat 5.19%, protein 9.51%, ash 5.18%, fibers 5.40%, and carbohydrate 64.46%. This results are in agreement with Abd-ELwahed, (2006); Adel and Prakash (2010); Shahid and Hussain, (2012). The fat content of orange nectar was 3.20, protein 0.68%, ash 0.18%, fibers 0.40%, and carbohydrate 7.84%. The results of fresh mango nectar were as follow: fat, protein, ash, crude fibers and total

carbohydrate content were 0.78%, 4.90%, 0.80%, 0.70% and 7.14%, respectively. Chemical composition of fresh guava nectar was fat, protein, ash, crude fibers and carbohydrate content 1.30%, 2.55%, 0.90%, 1.72% and 6.80% respectively, moisture, ash and carbohydrate. These results are comparable with previous studies carbral *et al. (*2007)*;* Kapoor *et al.* (2012); Sady *et al. (*2013); Flores *et al. (*2014).

Table 2. Proximate chemical composition of raw materials at dry basis

Factor (%)	Ginger	Orange Nectar	Mango Nectar	Guava Nectar
Fat	5.19±0.82	3.20±0.42	0.78±0.10	1.30±0.02
Protein	9.51±0.16	0.68±0.02	4.90±0.30	2.55±0.32
Ash	5.18±0.33	0.18±0.01	0.80±0.01	0.90±0.04
Fibers	5.40±0.41	0.40±0.02	0.70±0.01	1.72±0.09
Carbohydrate	64.46±1.22	7.84±0.20	7.14±0.30	6.80±0.24

Values are shown as mean± standard deviations, n

Determination of active compounds in ginger powder

The active compounds of dry ginger powder were as shown in (Table 3).

Table 3. Active compounds in ginger powder on dry basis

Factor	Ginger Powder
Vitamin C	9.45 mg/100gm
Carotenoids	95.00 mg/100gm
Poly Phenols	18.55 mg/100gm
Flavonoids	6.00 mg/100gm
DPPH	52.40%

Values are shown as mean± standard deviations, n

Vitamin C, carotenoids content, Flavonoids content, and poly phenols were 9.45; 95.00; 6.00; 18.55 mg/100gm; respectively. The scavenging activity of ginger powder extract on DPPH radicals was 52.40 as %inhibition of free radicals of DPPH. These results were in agreement with Ghasemzadeh *et al*, 2010; Adel and Prakash. 2010; Mošovskáa *et al*, 2015.

Effect of adding ginger powder during storage period up to 12 months on chemical composition of prepared fresh nectars.

As shown in Figure 1, the values of protein, fat, ash, fibers, and carbohydrates of all prepared nectar samples showed no significant differences during storage period up to 12 months. However, there were significant differences in ash and fibers content in nectar samples supplemented with 0.3% ginger powder. These results were in agreement with Akhtar *et al*. 2010.

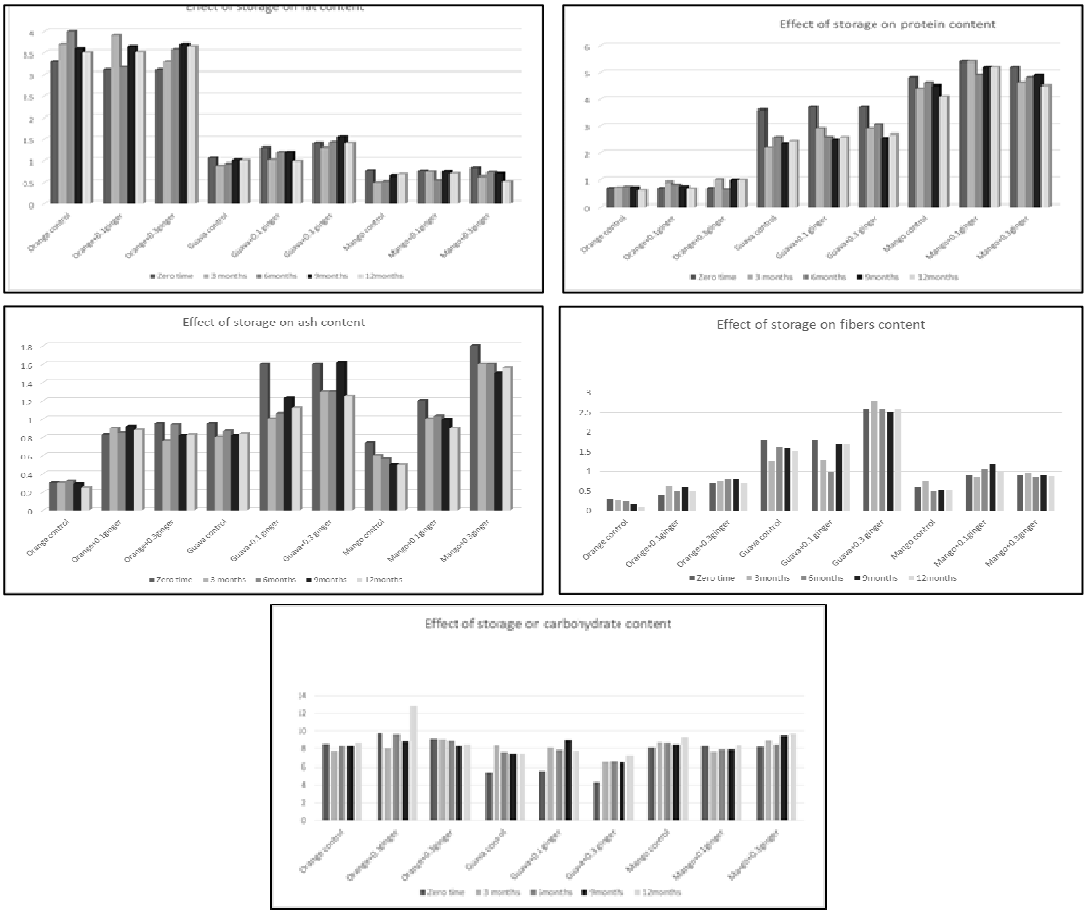

Figure1. Effect of adding ginger powder on chemical composition of selected fresh nectar during storage period up to 12 months.

Minerals content of prepared fresh nectars

In orange nectar samples, calcium, Potassium, and phosphorus content were 209.7, 1816.9, 240.33 ppm; respectively in pure orange nectar at zero time (Figure.2). Calcium content in pure guava nectar was 105.3 ppm at zero time and decreased to 47.5 ppm after 12 months. Potassium content was 318.21 ppm and increased to 455.9 ppm after 12 months. Phosphorus content was 27.37 ppm in pure guava and still stable after 12 months of storage. Ca, K, and P minerals were 59.91, 116.04 and 10.26 ppm, respectively in pure mango nectar at zero time. These results were in agreement with Jahan *et al.*2011, Akhter *et al*.2012, Dehelean and Magdas.2013.

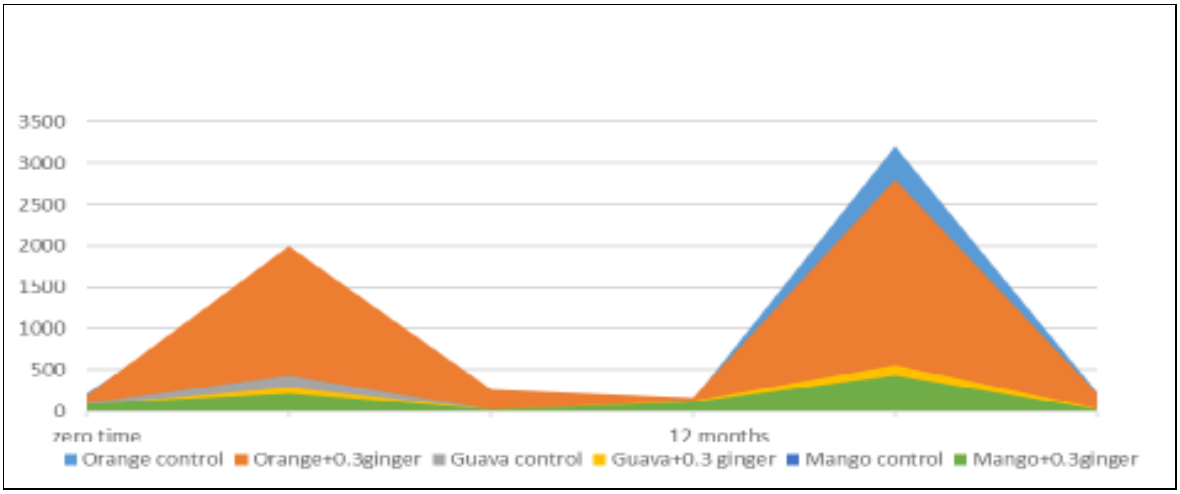

Figure 2. Effect of storage period on minerals

Active compounds in prepared nectars

Vitamin C assay

From Table (4) it is shown that vitamin C was 16.6, 24 and 20 mg/100ml at orange, guava and mango drinks, respectively. These data were in agreement with Ben-Mussa and EL-Sharaa.2014; Boonpangrak, *et al.,*2015 (Table 4). In guava nectars, G2 was the highest content in vitamin C (25mg/100ml) on zero time among all sample particularly after 3 months of storage when the effect of herbs began, storage also had a significant effect at degradation of vitamin C. M1 was the highest blend amount in vitamin C in mango blends it reached to 22.36 mg/100ml and this was a significant difference between it and control sample and storage period had also a significant effect on degradation of vitamin C. It is viewed that there was a significant increase in addition percent 0.3%, this increase came from the vitamin C in ginger powders and this will be increase the antioxidant properties of nectars. We can also say that vitamin C was stable to first 9 months of storage and decreased after this period and began to degradation, this is normal phenomenon at vitamin C because of light and temperature exposure.

Table 4. Effect of storage period on vitamin C content (mg/100ml)

Sample	Zero Time	3months	6months	9months	12 Months	Mean
OC	16.6 ^{ba}	20 ^{ea}	18.1 ^{da}	17.5 ^{da}	17.2 ^{da}	17.9^{e}
O1	21 ^{aba}	21.8 ^{cdea}	21.5 ^{ca}	21.2 ^{bcda}	18.4 ^{cdb}	20.8^{cd}
O2	21 ^{aba}	22 ^{cdea}	21.6 ^{ca}	21.8 ^{bca}	20.5 ^{bca}	21.3^{cd}
GC	24 ^{aba}	15 ^{fb}	13.8 ^{ebc}	12.1 ^{ecd}	10.5 ^{ed}	15^{f}
G1	24.4 ^{aba}	25 ^{bcda}	25 ^{ba}	24.9 ^{aba}	21.3 ^{abcb}	24.1^{b}
G2	25 ^{aba}	25.6 ^{bca}	24.8 ^{ba}	25 ^{bca}	23.4 ^{aa}	24.1^{b}
MC	20 ^{aba}	16 ^{fb}	13.8 ^{ec}	12.4 ^{ec}	12.3 ^{ec}	14.9^{f}
M1	22.4 ^{aba}	21 ^{cdea}	21.02 ^{ca}	20.6 ^{cda}	18.4 ^{cda}	20.7^{cd}
M2	22.1 ^{abbc}	23^{cde}	25.4 ^{bab}	24.2 ^{aa}	21 ^{bcc}	23.8^{b}

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

Small litters reveal to differences through storage periods, capital litters reveal to differences between ginger concentrates. Means in a column or row which are not followed by litters are significantly differed($p<0.05$).

Effect of storage period on carotenoids content in prepared nectars

Carotenoids content was 17.3, 11 and 140.3 µg/ml at orange, guava and mango, respectively, results were determined and presented in Table 5. G2 were the highest blend amounts in carotenoids in guava blends it reached to 30 µg/ml and this was a significant difference between it and control sample. M2 were the highest blend amounts in carotenoids in mango blends it reached to 150.4 µg/ml and this was a significant difference between it and control sample140.3µg/ml. We can say that storage period had a significant effect on degradation of carotenoids and carotenoids content was stable to first 9 months of storage and decreased significantly after this period. These data were in agreement with Esteve *et al*.,2009; Tanwar. *et al*.,2014; Silva, *et al*.,2017.

Table 5. Effect of storage period on carotenoids content (µg/ml).

Samples	Zero time	3months	6months	9months	12 months	Mean
OC	17.3 ^{Ba}	10 ^{Ea}	11.9 ^{Ia}	16.2 ^{Ga}	11.2 ^{Fa}	13^{h}
O1	17.7 ^{Ba}	15.8 ^{Ea}	12.3 ^{Ia}	10 ^{Ga}	5.6 ^{Fa}	12^{h}
O2	20.4 ^{Bc}	12.5 ^{DEa}	5.2 ^{Ib}	26 ^{Gc}	20 ^{Fc}	12^{h}
GC	11 ^{Ba}	10 ^{DEa}	3 ^{Ib}	1 ^{Gc}	0 ^{Fd}	5^{h}
G1	10 ^{Bd}	15.4 ^{Dec}	18.6 ^{Gab}	20 ^{Fa}	16.5 ^{Ebc}	16.1^{g}
G2	30 ^{Bb}	33.45 ^{CDb}	37.5 ^{Fa}	39.5 ^{Ea}	32.1 ^{Db}	34.5^{f}
MC	140.3 ^{Aa}	120 ^{Bab}	111.5 ^{Cb}	98.4 ^{Bb}	75.2 ^{Bc}	109.08^{c}
M1	149 ^{Aa}	160 ^{Aa}	123.8 ^{Ba}	80 ^{Cb}	70.2 ^{Bb}	116.8^{b}
M2	150.4 ^{Aa}	160 ^{Aa}	110.3 ^{Cb}	45 ^{Ec}	38.2 ^{Dc}	100.78^{d}

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

Small litters reveal to differences through storage periods, capital litters reveal to differences between ginger concentrates. Means in a column or row which are not followed by litters are significantly differed($p<0.05$).

Effect of storage period on polyphenols content

Addition of ginger powder 0.3% had significant effect ($p > 0.05\%$) on polyphenols content of prepared nectars and results viewed at Table 6. Polyphenols content was 25, 24.7 and 8.2 mg GAE/ 100 mL at control samples of orange, guava and mango, respectively. There was a significant difference between control samples and samples supplemented with 0.3%ginger. O2 was the highest value in polyphenols content in orange blends it reached to 28.9 mg GAE/100ml and this was a significant difference between it and control sample. G2 was the highest blend amount in polyphenols in guava blends it reached to 33.3 mg GAE/100ml this was a significant difference between it and control sample24.7 mg GAE/100ml. We can say that polyphenols content was reduced with the beginning of storage and there was significant difference between the same samples by the end of storage this due to polyphenols influenced by temperature so it is not stable. This behavior will be reflex at the antioxidant activity of different blends. The decrease percent in polyphenols content resulted from addition ginger powder which have good content of poly phenol constituents. also, all prepared nectars during storage up to 12 months, decreased significantly $p>0.05\%$ in the polyphenols content. These data were in agreement with (Stella *et al*., 2011; Zabidah. *et al*.,2011; Natukunda, *et al*.,2016.)

Table 6. Effect of storage period (12 months) on polyphenols content (mg GAE/100ml).

Samples	Zero time	3months	6months	9months	12months	Mean
OC	25 ^{BCa}	16.2 ^{Cb}	15.6 ^{ABb}	14.5 ^{Abc}	11.9 ^{CDc}	16.7^{cde}
O1	26.1 ^{BCa}	16.4 ^{BCb}	16.4 ^{Ab}	14.3 ^{Abc}	13 ^{BCc}	17.2^{bcd}
O2	28.9 ^{Ba}	17.3^{BCb}	15.9 ^{Abc}	14.5 ^{Acd}	13.2 ^{BCd}	17.9^{bc}
GC	24.7 ^{BCa}	16.6 ^{BCb}	14.8 ^{Abc}	13.4 ^{Ad}	12.6 ^{BCd}	16.4^{de}
G1	28.5 ^{BCa}	18.7 ^{ABb}	15.2 ^{Abc}	14^{Ac}	12.8 ^{BCc}	17.8^{bc}
G2	33.3 ^{ABCa}	19.9 ^{Ab}	17.1 ^{Ac}	14.6 ^{Ac}	12.9 ^{BCd}	19.7^{a}
MC	8.2 ^{Fa}	7.4 ^{Eab}	6.9 ^{Db}	6.3 ^{Ab}	5.2 ^{Fc}	6.9^{h}
M1	10.04 ^{EFb}	11.45^{Dab}	12.07 ^{Ca}	12.9 ^{Aa}	11.1^{CDab}	11.5^{g}
M2	13 ^{Eab}	12.9 ^{Dab}	13 ^{BCab}	13.8 ^{Aa}	10.8 ^{Db}	12.7^{f}

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

Microbiological effect

Total count of bacteria: The effect of storage period on microbiological examination of fruit and prepared nectars during storage period up to 12 months (Table 7). O1 has the highest effect at orange blends of dismiss to aerobic bacteria from growing and still saved this attribute through storage period. G2 has the highest effect at guava blends of dismiss to aerobic bacteria from growing and still saved this attribute through storage period. It can be observed that the highest count was in control samples, there were 300,300 and 866.6 CFU/ml for orange, guava and mango, respectively, at zero time and increased significantly to 520 CFU/ml, 1500 CFU/ml and 2500 CFU/ml. These counts were increased significantly during storage, however ginger powders reduced these grows because it has high antimicrobial effect. So we can say these additions play as preservative factor.

Coliform bacteria

As shown in Table8, the growth of coliform bacteria in control samples compared with other prepared samples with ginger powder during storage period up to 12 months, that effect may be due to the high antimicrobial activity of ginger powder. So we can say these additions play as preservative factor. These trend of results are agreement with (Nwachukwu and Ezejiaku.2014).

Yeast and mold

As shown in Table 9, there was not any growths of yeast or mold in any prepared nectars and the highest count was in all control samples (200 CFU/ml) for orange, guava and mango, respectively, these counts were increased significantly at the end of storage, however addition of ginger powder prevented these grows.

Table 7. The effect of storage period at total count at bacteria expressed as (CFU/ml)

Sample	Zero Time	3months	6months	9months	12 Months	Mean
OC	300 ^{Cab}	300 ^{Cab}	280 ^{CDb}	400 ^{Ca}	520 ^{EFa}	304.6^{d}
O1	Nil	Nil	Nil	Nil	Nil	0^{g}
O2	Nil	100 ^{CDa}	100 ^{CDa}	Nil	66 ^{Ga}	53.3^{fg}
GC	300 ^{b}	200 ^{CDb}	180 ^{CDb}	246 ^{CDb}	1500 ^{Aa}	460.8^{c}
G1	166 ^{Da}	100 ^{CDa}	100 ^{CDa}	100 ^{DEa}	200 ^{FGa}	133.2^{f}
G2	Nil	Nil	Nil	Nil	Nil	0^{g}
MC	866.6 ^{Ae}	1200 ^{Ad}	1500 ^{Ac}	2000 ^{Ab}	2500 ^{Aa}	1613.3^{a}
M1	166 ^{Db}	570 ^{Ba}	580 ^{Ba}	650 ^{Ba}	720 ^{CDa}	537.2^{b}
M2	540 ^{Bb}	300 ^{Cc}	220 ^{Cc}	250 ^{CDc}	800 ^{Ca}	422^{c}

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

Table 8. The effect of storage period at coliform bacteria expressed as (CFU/ml)

Sample	Zero time	3months	6months	9months	12 months	Mean
OC	Nil	Nil	Nil	Nil	100Aa	20^{a}
O1	Nil	Nil	Nil	Nil	Nil	Nil
O2	Nil	Nil	Nil	Nil	Nil	Nil
GC	Nil	Nil	Nil	Nil	100^{Aa}	20^{a}
G1	Nil	Nil	Nil	Nil	Nil	Nil
G2	Nil	Nil	Nil	Nil	Nil	Nil
MC	Nil	Nil	Nil	Nil	100Aa	20^{a}
M1	Nil	Nil	Nil	Nil	Nil	Nil
M2	Nil	Nil	Nil	Nil	Nil	Nil

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

Small litters reveal to differences through storage periods, capital litters reveal to differences between ginger concentrates. Means in a column or row which are not followed by litters are significantly differed($p<0.05$).

Table 9. Effect of storage period at yeast and mold count expressed as (CFU/ml)

Sample	Zero time	3months	6months	9months	12 months	Mean
OC	Nil	Nil	Nil	Nil	200aa	40^{b}
O1	Nil	Nil	Nil	Nil	Nil	Nil
O2	Nil	Nil	Nil	Nil	Nil	Nil
GC	Nil	Nil	Nil	100ab	200aa	48^{ab}
G1	Nil	Nil	Nil	Nil	Nil	Nil
G2	Nil	Nil	Nil	Nil	Nil	Nil
MC	Nil	Nil	Nil	100ab	200aa	60^{a}
M1	Nil	Nil	Nil	Nil	Nil	Nil
M2	Nil	Nil	Nil	Nil	Nil	Nil

OC: orange control nectar; O1: orange nectar+0.1% ginger powder; O2: orange nectar+0.3% ginger powder; GC: guava control nectar; G1: guava nectar+0.1% ginger powder; G2: guava nectar+0.3% ginger powder; MC: mango control nectar; M1: mango nectar+0.1% ginger powder; M2: mango nectar+0.3% ginger powder.

CONCLUSION

This study was conducted on some popular fresh fruit nectars that have been wide consuming between all ages, and studied the effect of storage period up to 12 months). These nectars can be produced commercially and distributed in the markets under the same name as their components or changed to commercial names, if this is will be useful for increasing their distribution to consumers.

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تأثير إضافة بودر الزنجبيل على خصائص الجودة لنكتاربعض الفواكه

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تهدف هذه الدراسة إلى دراسة تأثير مسحوق الزنجبيل (0.1 ٪ و 0.3 ٪ وزن / حجم) على خصائص الجودة لكل من نكتار المانجو والجوافة والبرتقال. وقد تم تقييم النشاط المضاد للميكروبات ، الخصائص الفيزيائية الكيميائية للنكتار المحضرالمدعم خلال فترة تخزينية وصلت حتى 12 شهرا.أشارت النتائج إلى أن فيتامين (ج) ازداد بشكل كبير في كلا من نكتار البرتقال والمانجو (21 ملجم / 100 مل ، 22.14 ملغم / 100 مل على التوالي). كما أظهر محتوى البولي فينولات زيادة كبيرة بين عينات الكنترول (الغير مضاف لها بودر الزنجبيل) وعينات النكتارالمحضرة.وقد ادت اضافة بودر الزنجبيل الى زيادة معنويه في البولي فينولات والفلافونيدات بشكل ملحوظ عند إضافة مسحوق الزنجبيل 0.3 ٪عند اعداد نكتار البرتقال،المانجو والجوافه وكانت على التوالي. 2.9) (2.21mgQE/100ml ,2.03 mgQE/100ml كذلك تبين من الدراسة أن الأعشاب قيد الدراسة تثبط بشكل إيجابي نموالكائنات الدقيقة المسببة للأمراض بشكل خاص على مسحوق الزنجبيل تركيز 0.3% . وقد خلصت الدراسة الى أن إضافة بودر الزنجبيل بنسبة 0.3% كان له تأثير مثبط على نشاط الميكروبات ،وتوصي نتائج الدراسة الحالية باستخدام محتمل لمسحوق الزنجبيل بنسبة تصل إلى 0.3٪ كمصادرطبيعية لمضادات الأكسدة والمواد الحافظة لاطالة فترة صلاحية النكتار وتزويد المستهلكين بنكتار طازج صحي خالي من المواد الحافظة الصناعية.