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Studies on the Buffering Capacity of some Fermented Milk Consumed in Sohag Governorate.

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ABSTRACT

In this study twelve samples of fermented milk product 6 Zabadi (three from farmhouse and three manufactured at industrial level Juhayna, Danone and Dina dairy companies). Also 6 Rayeb milk (three from farmhouse and the others from three above mentioned companies). The samples were obtained from local grocery shops in Sohag city. Chemical composition for all samples was determined. Also in vitro acid-buffering capacity (BC) was determined using a ١٠ % (dry matter) aqueous suspension titrated with 0.1N HCL until the pH reach 2 and then back titrated to pH 10 by addition 0.1N NaoH. The average resultant BC values were higher in farmhouse Rayeb milk 2.46 in comparison with 1.987 for Rayeb produced by industrial companies. Moreover the average Bc values for Zabadi produced by industrial companies was higher 1.992 than that obtained farmhouse house 1.693. The BC values for commercial antacids Rrnnie and Glycodal were 1.908 and 1.187 respectively.

INTRODUCTION

Fermented milk products are produced and consumed in all countries of the world. in terms of overall composition, fermented milk for example yoghurt is similar to milk (Ibrahim *et al*, 1989, Abou- Dawood *et al*,1993). In Egypt yoghurt which is called "Zabadi" is the most predominant fermented milk. The nutritive value of yoghurt is based on the use of milk as the principal ingredient and subsequent changes that occur as a result of lactic acid fermentation (Ibrahim *et al*, 1989). Yoghurt could be considered a good source of protein, minerals and some vitamin especially soluble vitamins (Sahani and Chandan, 1979). yoghurt is among the food that have been reported to exhibit buffering capacity, which is related to the sum of individual activities of different acid-base groups in substances such as phosphate, citrate, lactate, carbonate, propionate, acetate, amino acid and proteins (walstra&Jenness, 1984, Banon&Hargy, 1992, Le Great&Brule, 1993, Lucey et. al. 1993, Kailasapathy *et al*, 1996, Salaun *et al*,2005) . Many countries a considerable increase in consumption of fermented milk products could be observed during the recent years. All antacid are basic compounds that react with gastric acid to form water and salt chemical antacid whether mild alkaline or their salts are widely used to prevent the burning sensation that most people suffer from it after consuming meal (Stoelting, 2006). However antacid reported to have side effect like most other drugs. The buffering capacity of milk products is an important physico-chemical characteristics that corresponds to the ability of the product to be acidified or alkalinized, because of lacking information concerning the buffer capacity especially some products consume in sohag city, so this present study was undertaken to:-

1- Study the buffer capacity of Zabadi and Rayeb milk produced by farmhouse and a commercial products made by modern methods as well as the effect of chemical composition of their products on the buffering capacity
2- Further application of some fermented milk as antacid substances instead of using chemical drugs.

MATERIALS AND METHODS

All the chemical used in this study were of analytical grade- pyrex glars were used throughout.

Source of Samples

Six products of Zabadi (three of them were from farmhouse and the others from Juahyna, Danone and Dina companies). Six products of Rayeb milk (three of them from farmhouse and the others from the above mentioned above). These samples were collected from different local market places in Sohag governorate.

Chemical analysis-:

Moisture, fat, protein and ash content were determined according to A.O.A.C (2000), pH values were measured by using digital PH meter model (Orion pH meter) - Na, K, Ca and P were determined as described by Abd El-Kareem (1997).

Preparation of samples for titration and titratable acidity:-

Samples were prepared for titration and titrtable acidity as described by (Al-Dabbas *et al*. 2011). 5 grams on dry weight bases from each samples was suspended to 50 ml with distilled water and well stirred to yield a homogenized suspension. The sample was divided into two portions the first portion was titrated by gradual addition of 2ml standard 0.1N Hcl until PH value reduced to pH 2, the normal PH of the stomach. The total values of acid added to each samples were recorded separately alter an equilibration period min, followed the addition of acid. The second portion was titrated by gradual addition of 2ml standard 0.1N NaoH until the pH reach value 10.

Assay of acid buffering capacity (B.C):-

Evaluation of buffering capacity consist of adding base or acid solutions and following the PH, on our protocols we used acidification and then alkalization alone. For each samples ,the BC value was determined mathematically formula given by Vanslyke(1992) :-

$$\frac{\Delta B}{\Delta pH} = \frac{(\text{total volume of acid or base added}) \times (\text{normality of acid or base})}{\text{pH unit change produced}}$$

This ratio expresses the relationship between the increments of acid or base added and changes in pH.

RESULTS AND DISCUSSION

Table (1) Show the chemical composition of samples collected from Sohag market. It was shown that there is no difference between Zabadi Baladi samples for PH values. titratable acidity ranged from 0.81-1.04% for the three samples.

No big difference for pH values of Zabadi Juhyna, Danone and Dina were found, there values ranged from 4.62-4.96. Also the same case for titratable acidity (0.79 - 1.06%). in comparison between samples of farmhouse Rayeb milk and three dairy companies, it was shown that pH values for Rayeb farmhouse milk (4.17 - 4. 37) was lower than the formers (4.62-4.68) while the titratable acidity was 0.77 - 0.91% for Three dairy companies but titratable acidity for Rayeb farmhouse milk ranged from (0.99-1.01%). Also data presented in Table (1) showed that total chemical composition for three samples of Baladi Zabadi were ranged from 9.84 - 14.92 % while there values for three dairy ranged from 12.96-14.57%. As ranged to samples for both two samples for Rayeb milk, it was shown that total solid ranged from 11.46-13.30% and 10.55-11.91% for baladi and three dairies respectively. Ash content ranged from 0.63-.92% for Zabadi Baladi while the values for Juhayna , Danone and Dina were 0.75-0.95% .It was shown that there values for Rayeb milk manufactured from farmhouse and dairies were lower than that their Zabadi, there values were 0.62 - 0.77% for the six samples of milk. Fat content in zabadi Baladi was 4.38 - 5.25%, while there values for three dairies 3.6 - 3.75%. Big difference between samples for % fat was shown in Rayeb farmhouse milk (0.90 - 3.45%) while these values for three dairies samples were similar (4.35- 4.80%).

Fig (1-5) and Table (2) represent the acid titration until the pH 2 and the alkali titration pH 10 by adding 0.1N HCL and 0.1N NaoH respectively. The total volume of 0.1N Hcl to reach pH 2 was ranged between 36-40, 40-44, 52-56 and 40-44 ml for three samples of Zabadi Baladi, zabadi from daires, Rayeb farmhouse and Rayeb from three dairies respectively, while the consumed amount of alkali 0.1N NaoH to reach 10 was ranged between 54 - 56, 55 - 58, 60 - 62 and 52 - 58 ml for the same samples respectively. As ranged to antacid tablets it was shown that, the total number of 0.1N Hcl to reach 2 was (44ml), while the other sample was 56 ml. the obtained differences between samples attributed to reflect interaction that occurred between food components and the added acid or alkali which lead to the ionization and solublization of different acid - base constituents Al- Dabbas, *et al* (2011). According to the data obtained by (singh, *et al* 1997 and Al- Dabbas, *et al* (2011) reported that the variation in each samples protein resulted from different denaturation methods and the environment of protein which makes some ionizable groups become accessible for titration within a protein after a change in pH or denaturation also contributes in different hysteresis cuvees. The hysteresis pattern of samples resulted from the differences in solublization properties of colloidal calcium phosphate and to the acidic amino acid present in casein and whey proteins upon pH changes resulted from acid or base addition.

Table 1. chemical composition of samples collected from sohag governorate.

sample	pH	acidity	TS	Ash	fat	TP	Na Mg /100g	K Mg /100g	Ca Mg /100g	P Mg /100g
Zabadi Baladi (1)	4.52	1.04	14.92	0.92	4.38	4.04	---	-----	------	-------
Zabadi Baladi (2)	4.54	0.81	12.20	0.70	5.70	2.54	31.3	71.2	108.0	190
Zabadi Baladi (3)	4.55	0.86	9.84	0.63	5.25	3.58	-----	----	----	------
Zabadi Juhyana	4.96	0.79	13.20	0.75	3.75	3.15	16.5	33.9	80.9	170
Zabadi Danone	4.79	0.86	12.96	0.76	3.75	2.73	---	----	---	-----
Zabadi Dina	4.62	1.06	14.57	0.95	3.60	3.84	----	-----	-----	------
Rayeb farmhouse (1)	4.25	1.00	11.80	0.77	1.88	4.39	----	----	----	------
Rayeb farmhouse (2)	4.37	1.01	11.46	0.77	3.45	4.39	41.3	84.7	110.8	200
Rayeb farmhouse (3)	4.17	0.99	13.30	0.73	0.90	4.93	----	-----	-----	----
Rayeb Juhyna	4.62	0.91	11.91	0.66	4.35	1.94	---	----	----	------
Rayeb Danone	4.60	0.77	10.55	0.62	4.80	1.86	17.7	53.9	94.1	195
Rayeb Dina	4.68	0.78	11.07	0.66	4.73	2.76	----	----	----	-----

Table 2. Initial pH, titratable acidity, and alkalinity and acid buffering capacity for samples.

Type Product	pH	acidity as lactic acid %	Total volume 0.1N HCL	Total volume 0.1NaoH	Acid Buffering capacity (BC)
Zabadi Baladi (1)	4.31	1.04	36	56	1.702
Zabadi Baladi (2)	3.35	0.81	40	54	1.702
Zabadi Baladi (3)	4.15	0.86	36	54	1.674
Zabadi Juhyana	4.24	0.79	40	55	1.762
Zabadi Danone	4.11	0.86	44	58	2.037
Zabadi Dina	4.00	1.06	44	58	2.178
Rayeb farmhouse (1)	4.30	1.00	52	62	2.332
Rayeb farmhouse (2)	4.25	1.01	56	62	2.522
Rayeb farmhouse (3)	4.25	0.99	56	60	2.511
Rayeb Juhyana	4.10	0.91	44	58	2.085
Rayeb Danone	4.15	0.77	40	54	1.970
Rayeb Dina	4.09	0.78	40	52	1.970
Antacid Tablet					
Rrnnie	9.87	-----	144	-----	1.908
Glycodal	8.05	------	56	---	1.187

Buffering capacity:-

Results obtained in Table (2) also showed the BC for all samples of fermented Milk products. High values of BC (2.332- 2.522) was found in Rayeb farmhouse milk, while the lowest BC value (1.674-1.702) in Zabadi Baladi milk. Also data in the same table showed that, the average BC values for three dairies zabadi and Rayeb milk were similar (1.992 and 1.987). The obtained values are agreement with results obtained by Al- Dabbas, *et al* (2011). They found that Bc for liquid milk was 1.93 ± 0.07. The average protein and ash content in Rayeb farmhouse samples were 4.42 and 0.76% respectively (Table 1). The data are an agreement with result obtained by Al- Dabbas, *et al* (2011), who found that high protein content in some a relatively high BC due to the buffering capacity effect of amino acid groups present and to the formation of certain network which reduces dry matter. It was shown that BC in all our data were lower than results obtained by (Al-Dabbas, *et al* 2011). They found that BC for yoghurt made from Jordan was 3.08 ± 0.01. The same authors explained the increasing of BC of yoghurt that the considerable amount of lactic acid, casein and inorganic phosphate which increase their buffering capacity. From the foregoing discussion it could be concluded that dairy products especially fermented milk used to prevent and cure the burning sensation that some people suffer instead of antacid substance which reported to have side effect like most other drugs.

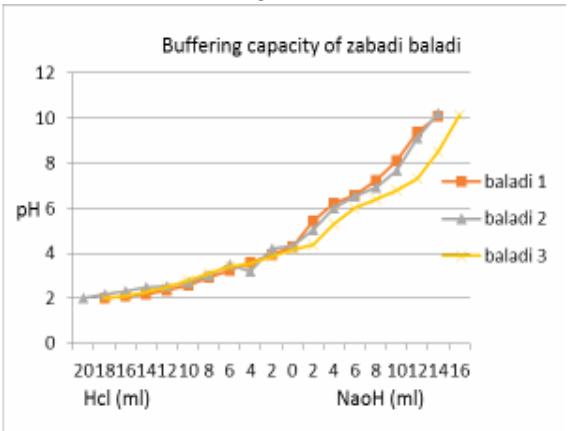

Fig. 1.

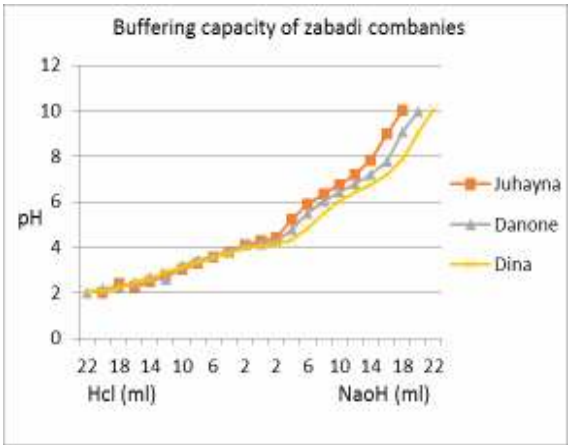

Fig. 2.

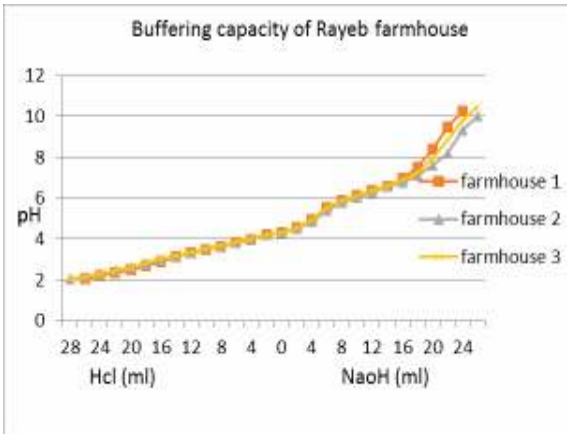

Fig. 3.

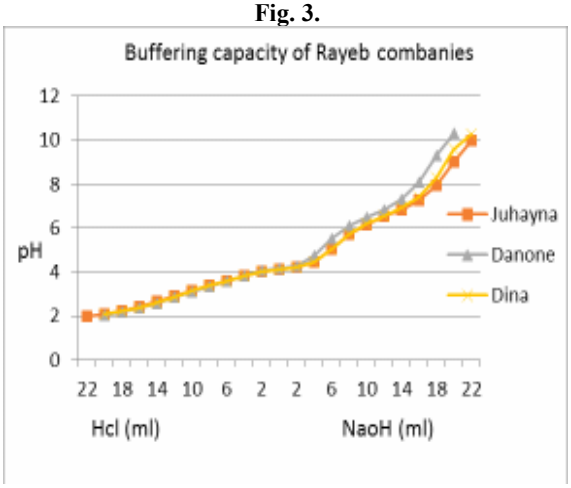

Fig. 4.

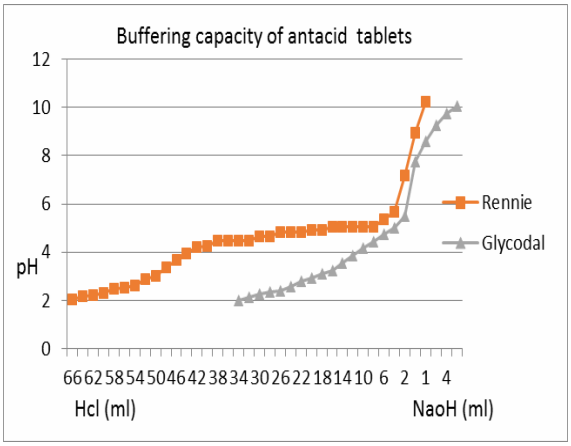

Fig. 5.

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دراسات علي القدرة التنظيمية لبعض الالبان المتخمرة المستهلكة في محافظة سوهاج.

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في هذه الدراسة تم استخدام اثني عشرة عينة من الالبان المتخمرة ٦ عينات زبادي (ثلاثة من الزبادي البلدية وثلاثة تم انتاجها علي المستوي الصناعي لشركات الالبان جهينة – دانون – مزارع دينا وكذلك ٦ عينات لبن رايب (ثلاثة من المنازل الريفية وثلاثة من شركات الالبان المذكورة سابقا وقد تم الحصول علي العينات من محلات البقالة المحلية في مدينة سوهاج). تم تقدير التركيب الكيماوي لجميع العينات وكذالك القدرة التنظيمية باستخدام ١٠ % مادة جافة كمعلق مائي بالمعايرة باستخدام ٠.١ عياري من حمض الهيدروكلوريك للوصول الي الرقم الهيدروجيني ٢ وكذالك بالمعايرة باستخدام ٠.١ عياري من هيدروكسيد الصوديوم للوصول الي الرقم الهيدروجيني ١٠ . كانت متوسط نتائج القدرة التنظيمية اعلي في اللبن الرايب المتحصل علية من المنازل الريفية ٢.٤٦ مقارنة بقيمة اللبن الرايب المصنع بواسطة شركات الالبان ١.٩٨٧ وعلاوة علي ذلك كان متوسط القدرة التنظيمية للزبادي المنتج علي مستوي الشركات اعلي ١.٩٩٢ مقارنة بالبلدي ١.٦٩٣. وقد كانت القدرة التنظيمية لمضادات الحموضة التجارية رينا وجليكودال ١.٩٠٨ و١.١٨٧ علي التوالي.