Chemical evaluation of locally produced chicken burger

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Abstract

Sixty chicken burger samples were collected from different markets (20 each of brand of commercial chicken burger), all samples were examined for chemical composition to estimate their compatibility with the Egyptian standards **(ES, 1995)**. The total volatile base nitrogen (TVB-N) and thiobarbituric acid (TBA) values were estimated as an indictor of the degree of products freshness**.** The results revealed that the mean values of protein, fat, moisture, ash, total Volatile Base Nitrogen (TVB-N) and Thiobarbituric acid (TBA) for chicken burger samples from the first brand were 15.77 ± 0.050 %, 18 ± 0.052%, 65.21 ± 0.134%, 3.13 ± 0.016%, 15.02 ± 0.104mg100/g and 0.251 ± 0.006mgMD/kg respectively and for samples from the second brand, they were 13.76 ± 0.04%, 16.8 ± 0.05%, 64.95 ± 0.17%, 3.10 ± 0.015%, 13.11 ± 0.09mg100/g and 0.219 ± 0.005mgMD/kg respectively. While for the samples from the third brand, they were 12.54 ± 0.016%, 15.6 ± 0.013%, 67.50 ± 0.068%, 2.70 ± 0.014%, 13.25 ± 0.104 mg100/g and 0.412 ± 0.006mg MD/kg respectively. All these results were within the permissible limits recommended by **ES (1995)** except the fat % which exceed the permissible limits.

Key words: *chicken burger , Thiobarbituric acid, total volatile base nitrogen.*

Introduction

The first consumer right is to have a product of good quality and not constituting any health hazard. Poultry meat products are highly desirable, palatable, digestible and nutritious for all ages. In addition, they are low in price in comparison to beef and mutton.

Good quality products are those that meet some need or expectation of consumers and are safe and wholesome as well. Further processing of poultry meat involves conversion of raw poultry carcasses into value added products e.g .reconstructed products, cold cuts or breaded products. Advantages of further processing of poultry meat are improving juiciness and flavor, shelf life and water holding capacity **(Sahoo, *et al*., 1996).**

Poultry meat occupies a unique place in human diet due to its specific nutritional characteristics. It is particularly suited for further processing due to its bland flavor, which can be enhanced by condiments and can be used readily in traditional ethnic dishes. The utilization of poultry meat has increased in various snack foods.

Egypt has achieved rapid growth in the food industry sector. Of special interest currently is the significant development of value-added chicken products dominating the chill and frozen section of retail outlets, supermarkets and fast food chains of restaurants. The most popular meat product in Egypt today is the burger. Chicken burger products are easily made from spiced ground chicken / poultry meat mixes. The mixture for the burgers is portioned into the desired weight and shaped using a hand-held moulding device.

Various brands of burgers are available in the market with different prices and qualities. The quality of burger may be varied due to the different raw materials and ingredients used and not forgetting the processing methods complied.

Substitution of some ingredients with other non-meat ingredients has been practiced among processed meat industries. This replacement is done due to the several reasons such as for quality, health or economic purposes. As an example, the replacement of ingredients from animal origin with that of plants has been applied in food industries **(Egbert and Payne, 2009).**

Many other non-meat components are added in locally produced burgers. These include textured vegetable protein, bread crumbs, starch, fat, soya bean, egg powder, potatoes, groundnuts, gluten and caseinate. Local burgers also include additives, (phosphates, monosodium glutamate, salts, artificial flavors, soy sauce, sugar and nitrate), spices, (chilli, curry, paprika, coriander, garlic, onion, tumeric, ginger and others) colours and food preservatives. The lower protein content is due to substitution with non meat components mentioned earlier, since chicken (meat proteins) are relatively more expensive than non-meat components (**Babji and Yusof 1995).**.

Chicken burgers are good in quality because chicken emulsion has significantly high pH, protein and emulsion stability. Appearance, flavor and overall acceptability of chicken burgers were also good **(Anand *et al*.. 1991).** Flavor intensity, juiciness and tenderness of meat are directly related with fat content.

The present work aimed to examine the market Chicken burgers to assure its quality in the aspects of consumer acceptability, degree of freshness and nutritive value.

Material and Methods

Sixty chicken burger samples were collected from different markets (20 each of the production of a known brand). All samples were examined for chemical composition to be estimating their compatibility with the Egyptian standards. The total volatile base nitrogen (TVB-N) and thiobarbituric acid (TBA) values were estimated as an indictor of the degree of products freshness. Samples were analyzed in accordance to the methods of **AOAC (2003)** as follows :-

Determination of protein % (AOAC, 2003): The total protein % was carried out using block digestion method by Kjeldahl .

Determination of Fat % (AOAC, 2003): The fat % was determined using Soxhlet apparatus.

Determination of moisture % (AOAC, 2003): The moisture % was determined using hot air oven at 100^0C for four hours till obtaining two successive fixed weight.

Determination of ash % (AOAC, 2003): The ash % was determined using muffle furnece at 550^0C for four hours till obtaining two successive fixed weight.

Determination of thiobarbituric acid value (TBA) The 2-thiobarbituric acid (TBA) values of chicken burger were measured using the distillation method described by **Tarladgis *et al*. (1960)**.The optical density (O.D.) was measured using Spectrophotometer.

Determination of Total Volatile base nitrogen (TVB-N): The TVB-N **was** determined according to the **Egyptian standards 63-9 .2006 /**

All determinations were performed in duplicate. The reported results were calculated mean values.

RESULTS AND DISCUSSION

From the results obtained in table (1), it is cleared that the mean values of protein % in chicken burger from the 1st.,2nd. and 3rd. brands were 15.77±0.050 %,13.76±0.04% and 12.54±0.016% respectively. These results were within the permissible limits recommended by **ES (1995)** (not less than 12%),this data is comparable with the previous work reported by **Babji *et al*. (2000)**where protein content of local brands chicken burgers ranged from 12.67-15.66%, Nearly similar results were obtained by **Fath El-Bab and Sayed (2009)** and **Ramadhan *et al*. (2011)** while higher results were obtained by **El-Khateib *et al*. (1988).** However, many of the protein sources used in commercial burger's ingredients used presently are partially substituted with non-meat protein source. Besides the pricing reason which is less costly, nonmeat protein sources such as egg, whey protein, and texturized soy protein, are able to improve the flavour and texture of burgers by increasing the fat and moisture binding ability **(Gujral *et al*., 2002; Rentfrow *et al*., 2004; Kassem and Emara, 2010).**

Smith (2001) stated that poultry meat is comprised of about 20-23% protein , while the fat content of leg meat is higher than that of breast

and the moisture content of breast muscle is higher than that of leg .

The mean values of fat % in chicken burger from the 1st., 2nd.and 3rd. brands were 18±0.052%, 16.8±0.05% and 15.6±0.013% respectively. These results were higher than the permissible limits recommended by **ES (1995)** (not more than 15%), lower results were obtained by **Fath El-Bab and Sayed (2009)** and **Ramadhan *et al.* (2011).**These results may attributed to the addition of the skin during the manufacture of the burger.

The mean values of moisture % in chicken burger from the 1st. 2nd. and 3rd. brands were 65.21±0.134%, 64.95±0.17% and 67.50±0.068% respectively. These results were within the permissible limits recommended by **ES (1995)** (not more than 70%) Nearly similar results were obtained by **El-Khateib *et al.* (1988), Fath El-Bab and Sayed (2009)** and **Ramadhan *et al.* (2011).**

The mean values of Ash % in chicken burger from the 1st., 2nd.and 3rd. brands were 3.13±0.016%, 3.10±0.015%, 2.70±0.014% respectively. These results were higher than the permissible limits recommended by **ES (1995)** (not more than 2.5%) Ashes are sum of the total minerals presented in food such as sodium, phosphorus and iron, that can be contributed by the meat as raw material, salt and spices added (**Fernández-López *et al.*, 2006)**, the high percentage of ash obtained in this study may be due to addition of excess spices. These results were higher than that obtained by **AL-Dughaym *et al.*,(2004)**and **Ramadhan *et al.* (2011).**

The mean values of the total volatile base nitrogen (TVB-N) in chicken burger from the 1st. 2nd. and 3rd. brands were 15.02±0.104mg100/g, 13.11±0.09mg100/g and 13.25±0.104 mg100/g respectively. These results were within the permissible limits recommended by **ES (1995)** (not more than 20 mg100/g) Nearly similar results were obtained by **El-Khateib *et al.* (1988), AL-Dughaym *et al.*,(2004)** and **Fath El-Bab and Sayed (2009).**

The mean values of the Thiobarbituric acid (TBA) in chicken burger from the 1st. 2nd. and 3rd. brands were 0.251±0.006mgMD/kg, 0.219±0.005mgMD/kg and 0.412±0.006mg MD/kg respectively. All these results were within the permissible limits recommended by **ES (1995)** (not more than 0.9 mgMD/kg). Nearly similar results were obtained by **El-Khateib *et al.* (1988), AL-Dughaym *et al.*, (2004)** and **Fath El-Bab and Sayed (2009).**

Development of off–flavors known as rancidity is due to lipid oxidation (**Owens, 2001**), which could be determined by sensory evaluation and measuring the degradation products as TBA (**Cheng and Ockerman 1998; Mulla 2002**). Many researchers reported a significant increase of TBA values due to prolongation of storage time (**Cheng and Ockerman, 1998 and Sun *et al*, 2001).**

Table (1) the chemical analysis of chicken burger, n= 20 for each brand.

		Pro-tein%	Fat %	Mois-ture%	Ash%	TVB-N	TBA value
brand 1	Min.	14	16.3	61	2.7	10.75	0.101
	Max.	17.5	19.4	70	3.8	18	0.510
	Mean	15.77	18	65.21	3.13	15.02	0.251
	±SE.	0.050	0.052	0.134	0.016	0.104	0.006
brand 2	Min.	12	15	58	2.6	9.7	0.027
	Max.	15.5	19	70	3.7	17	0.452
	Mean	13.76	16.8	64.95	3.10	13.11	0.219
	±SE.	0.04	0.05	0.17	0.015	0.09	0.005
brand 3	Min.	12	15	64.99	2.2	9.6	0.165
	Max.	13.52	15.98	70	3.3	17.42	0.476
	Mean	12.54	15.6	67.50	2.70	13.25	0.412
	±SE.	0.016	0.013	0.068	0.014	0.104	0.006

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التقييم الكيميائى لبيرجر الدجاج المنتج محليا

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الملخص العربى

تم تجميع عدد 60 عينة من بيرجر الدجاج من المحلات المختلفة (كل20 عينة من انتاج شركة محددة) وقد تم فحص كل العينات كيميائيا لتحديد مدى مطابقتها للمواصفة القياسية المصرية (ES,1995 No.2910)،وقد تم فحص العينات لتقدير نسبة النيتروجين الكلى المتصاعد وحمض الثيوباربيتيورك وذلك لتحديد اذا كانت العينات حديثة الانتاج ام لا.وكانت النتائج كالتالى متوسط نسبة البروتين،الدهن،الرطوبة،الرماد،النيتروجين الكلى المتصاعد وحمض الثيوباربيتيوريك فى العينات من انتاج الشركة الاولى كالاتى% 15.77 ± 0.050، 18 ± 0.052%، 65.21 ± 0.134%، 3.13 ± 0.016%، 15.02 ± 0.104mg/100g وMD/kg 0.006mg ± 0.251 على التوالى . ونتائج المنتج من الشركة الثانية كالاتى 13.76 ± 0.04%، 16.8 ± 0.05%، 64.95 ± 0.17%، 13.11 ± 0.09mg/ 100g، 3.10 ± 0.015% ، 0.219 ± 0.005mgMD/kg على التوالى ومن الشركة الثالثة كانت النتائج كالاتى 12.54 ± 0.016%، 15.6 ± 0.013% ، 13.25 ± 0.412 ± 0.006mg MD/kg ، 67.50 ± 0.068% ، 2.70 ± 0.014% ، 0.104 mg/100g

ووجد ان كل النتائج فى الحدود المسموح بها طبقا للمواصفة القياسية المصرية فيما عدا نسبة الدهن كانت اعلى من الحدود المسموح بها.