Nutritional Quality of Partially Processed Chicken Meat Products from Egyptian and Saudi Arabia Markets

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Abstract

Chicken meat are considered as a good source of protein of high biological value which contain most of essential amino-acids with high proportion of unsaturated fatty acids and low cholesterol level besides it contain many vitamins as well as minerals which are important for human body. A total of 150 frozen chicken meat products samples, 800g each within their shelf-life, were randomly collected from commercial markets from Egypt (75 samples) and Saudi Arabian (75 samples) for chemical evaluation. The mean values of fat% in the examined samples of Egyptian and Saudi markets were 16.0% and 4.6% for chicken burger; 15.0% and 11% for nuggets and 11% and 11% for strips respectively. The mean values of moisture % in the examined samples were 67.0% and 81% for chicken burger; 66.0% and 78% for nuggets and 71.0% and 72% for strips respectively. The mean values of protein % in the examined samples were 15% and 17% for chicken burger; 16% and 16% for nuggets and 16% and 17% for strips respectively. The obtained results were compared with the Egyptian slandered and suggestions for improving the chemical quality of chicken products were given.

Introduction

The changes in consumer eating habits have increased the demand for a wide variety of raw, frozen, pre-cooked and further processed chicken items. As a result, poultry industry has continued to seek ways to increase acceptability, shelf-life, and ensure optimum flavor, texture and overall product quality (Sahoo et al., 1996). Chicken meat are good source of protein of high biological value which contain most of essential amino-acids with high proportion of unsaturated fatty acids and low cholesterol level besides it contain many vitamins as well as minerals which are important for human body. Poultry meat is comprised of about 20–23% protein. Comminuted products, such as frankfurters, bologna and sausages typically contain about 17–20% protein, 0–20% fat, and 60–80% water (Smith, 2001). Chicken burgers, nuggets and strips are chicken meat products which create a demanding market due its highly desirable, palatable, and nutritious for all ages. Moreover, they are quick and easy prepared. The chemical composition of chicken meat has a great effect on meat quality properties such as flavor, tenderness and storage stability. Several trials were done to increase the protein content, reduce fat % and to increase the bulk of the product in order to reduce the coast by replacing 20% of chicken meat with soy (Lin et al., 1974).

El-Tahan et al., (2006) stated that the results of examined chicken meat products purchased from local markets in Cairo city were the protein percentage ranged from 15.2% to 15.6% in burger and 13.3 % to 13.4 % in nuggets. The fat percentage ranged from 13.61 % to 15.37 % in burger and 5.83 % to 8.02 % in nuggets, Moisture % ranged from 58.6 to 61.3 in nuggets. 

Egyptian Organization for Standardization and Quality Control (2005) set a chemical stander for chicken products for Egyptian markets as follows: moisture percent not more that 70%, fat percent not more than 15%, protein percent not less than 12%. The first consumer right is to have a product of good chemical quality a. Therefore, the objective of this study is to determine the quality of frozen...
chicken burgers, nuggets and strips that meet expectation of consumer right with comparison between the Egyptian and Saudi Arabian products.

Materials and methods

Collection of Samples: A total of 150 frozen chicken meat products samples, 800g each within their shelf-life, were randomly collected from commercial markets from Egypt (75 samples) and Saudi Arabian (75 samples) for chemical evaluation. These samples were equally collected from Chicken burger, Chicken nuggets and Chicken strips. All samples were prepared and examined according to the technique recommended by AOAC, (2000) as follow: The sample was passed rapidly 3 times through food chopper with opening ≤ 3 mm and then the chopped material was thoroughly mixed.

Determination of Moisture %, Protein % and Fat%: Using “Foss NIR Spectroscopy” (AOAC, 2007.04).

Results and Discussion

The chemical analysis reflects the quality of nutritive values of chicken burger, nuggets and strips which are an important factor for consumer health and acceptability. All samples were examined to estimate their compatibility with the national and Egyptian standards. According to EOS (2005), the chicken burger, nuggets and strips must contain the fat percent not more than 15%, moisture percent not more than 15%, and protein percent not less than 12%.

Fat Percent: The result in table (1) shows that the minimum, maximum and mean values of fat % in the examined samples of Egyptian markets were 12.6%, 18.7%, 16.0% for chicken burger; 11.0%, 17.3 %, 15.0% for nuggets and 9.1%, 12%, 11% for strips respectively. These results are lower than those been recorded by Lukman et al., (2009); Maamoun (2010) for nuggets results, similar to those obtained by Bostian (1985); Modi et al., (2004); Maamoun (2010) for strips results, and higher than those been recorded by Afifi (2000); Mukprasirt et al., (2001); Modi et al., (2004); El-Tahan et al., (2006); Al-Dughaym and Al-Tabari (2010).

Also result in table (2) shows the minimum, maximum and mean values of fat % in the examined samples of Saudi markets were 2.36%, 7.58%, 4.6% for burger; 7.06%, 15.3%, 11.0 % for nuggets and 9.19 %, 13.2%, 11.0 % for strips respectively. These results are lower than those been recorded by El-Khateib et al., (1988); Afifi (2000); Mukprasirt et al., (2001) for burger result; El-Tahan et al., (2006) for burger results; Lukman et al., (2009); Maamoun (2010) for nuggets results, similar to those obtained by Bostian (1985); Modi et al., (2004); Maamoun (2010) for strips results, and higher than those been recorded by Mukprasirt et al., (2001) for nuggets and strips results; El-Tahan et al., (2006) for nugget results; Al-Dughaym and Al-Tabari (2010).

Egyptian chicken burger had fat content (16%) higher than Saudi chicken burger (4.6%). in case of chicken nugget also the Egyptian one (15%) is higher in fat % than the Saudi (11%), while in case of chicken strips the fat % mean value is equal (11%) for both Egyptian and Saudi samples.

The highest frequency distribution of the fat percent in the examined samples of frozen Egyptian chicken burger was 60% which lies within range of significantly (P<0.05) more than 15% and of frozen Saudi chicken burger was 100% which lies within range of less than 15%, also it reveals that the highest frequency distribution of the fat percent in the examined samples of frozen chicken Egyptian and Saudi nugget (68%) and (96%), both lies within range of less than 15%, while in case of frozen Egyptian and Saudi chicken strips (100%) and (92%), both lies within range of less than 13%.

Moisture Percent: The result in table (1) shows that the minimum, maximum and mean values of moisture % in the examined samples of Egyptian markets were 64.9%, 70.0%, 67.0% for burger; 64.3%, 69.5%, 66.0% for nugget and...
These results are lower than those obtained by Hidalgo et al., (2008), similar to those obtained by Bostian (1985); Al- Dughaym and Al-Tabari (2010) and higher than those been recorded by El- Khateib et al., (1988); Afifi (2000); Mukprasirt et al., (2001); Modi et al., (2004); El- Tahan et al., (2006); Lukman et al., (2009); Maamoun (2010).

Also result in table (2) shows that the minimum, maximum and mean values of moisture % in the examined samples of Saudi markets were 77.0%, 83.9%, 81% for burger; 70.2%, 83.3%, 78% for nuggets and 68.4%, 74.6%, 72% for strips respectively. These results are similar to those obtained by Bostian (1985) for strips results; Hidalgo et al., (2008) for strips results and higher than those been recorded by Bostian (1985) for burger and nuggets results; El-Khateib et al., (1988); Afifi (2000); Mukprasirt et al., (2001); Modi et al., (2004); El- Tahan et al., (2006); Hidalgo et al., (2008) for burger and nugget results; Lukman et al., (2009); Al- Dughaym and Al- Tabari (2010); Maamoun (2010).

Egyptian chicken burger had a moisture content (67%) significantly (P<0.05) lower than Saudi (81%), in case of nugget also the Egyptian one (66%) is significantly (P<0.05) lower than Saudi (78%) while in case of strips the moisture % mean value in Egyptian samples (71%) is nearly similar to the Saudi one (72%), the Egyptian chicken burger and nuggets samples results both are confirmed to the (EOS, 2005)

The highest frequency distribution of the moisture percent in the examined samples of frozen chicken Egyptian burger is (96%) which lies within range of less than 70% and for frozen Saudi chicken burger is (100%) which lies within range of significantly (P<0.05) more than 70%, also it reveals that the highest frequency distribution of the moisture percent in the examined samples of frozen chicken Egyptian and Saudi chicken nugget (72%) and (100%) both lies within range of less than 65 %, while in case of frozen Egyptian and Saudi chicken strips (100%) of both lies within range more than 65%.

Protein Percent: The Protein represent the most important class of functional ingredients because they possess a range of dynamic functional properties such as structure formation, color texture ,thickening, emulsification, foaming , elasticity and provide essential amino acids so it fulfill functional and nutritional requirements (Dogan et al., 2005). The result in table (1) shows that the minimum, maximum and mean values of protein % in the examined samples of Egyptian markets, were 13.3%, 16.9%, 15 % for burger; 13.5%, 17.2%, 16% for nugget and 14.4%, 16.9%, 16% for strips respectively.

These results are lower than those been recorded by El- Khatieb et al., (1988); Modi et al., (2004); Maamoun (2010) for strips results, similar to those obtained by Afifi (2000); El-Tahan et al., (2006) for burger results; Lukman et al., (2009); Maamoun (2010) for strips results, and higher than those been recorded by El- Tahan et al., (2006) for nugget results; Al- Dughaym and Al- Tabari (2010); Maamoun (2010) for nugget results.

Also result in table (2) shows that the minimum, maximum and mean values of protein % in the examined samples of Saudi frozen chicken burger, nuggets and strips were 13.8%, 18.7%, 17% for burger; 14.0%, 18.5%, 16.0% for nugget and 13.2%, 18.8%, 17.0% for strips respectively.

These results are lower than those been recorded by El- Khatieb et al., (1988); Modi et al., (2004), similar to those obtained by Lukman et al., (2009); Maamoun (2010) for strips results, and higher than those been recorded by Afifi (2000); El- Tahan et al., (2006) for nugget results.

Egyptian chicken burger had protein content (15%) significantly (P<0.05) lower than Saudi chicken burger (17%), in case of frozen chicken nuggets the protein % mean value is equal
(16%) for both Egyptian and Saudi samples while in case of frozen chicken strips the protein % mean value in Egyptian samples (16%) is near the Saudi one (17%), all these results are confirmed to the (EOS, 2005).

The highest frequency distribution of the protein percent in the examined samples of frozen chicken Egyptian and Saudi burger and nuggets (100%) for all lies within range of more than 12%, while in case of frozen Egyptian and Saudi chicken strips (96%) for both lies within range of more than 15%.

From the results obtained we can concluded that the chicken burger, nuggets and strips showed a wide varieties of chemical composition which affect the nutritive values and reflect the quality of additives. The increased fat uptake and calories values will affect the consumer health; this point must be taken in consideration during formulation of the nuggets with correct frying. The quality of these products significantly can be affected by processing, raw material and ingredient factors either from nutritional value or overall acceptability by consumers.

Therefore strict supervision and periodically inspection of the meat processing factories and products should be carried out to assessment the conformity of the product to the Egyptian standards.

Poultry meat products need careful control to safeguard consumers. However, proper control of the product and maximum safety of the consumer could be achieved if the general recommendations were adopted. The increased fat uptake and the calories values during frying process must be taken in consideration during formulation of them with correct frying time and temperature with respect to the moisture content of burger, nuggets and strips. As the poultry meat products are extensively consumed, therefore, concerned authorities should take an active part in controlling such products by imposing legal regulations and specified chemical standards to ensure a maximum safety to consumers.

References
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الجودة الغذائية للمنتجات للحوم الدجاج
المعالجة جزئياً بالأسواق المصرية والسعودية

بعد لحم الدجاج مصدر جيد للبروتين الهيوازي ذو القيمة البيولوجية العالية والتي تحتوي على الأحماض الأمينية الأساسية والأحماض الدهنية الغير المشبعة بالإضافة إلى أنها تحتوي على العديد من الفيتامينات والمعادن الهامة لجسم الإنسان. لذلك تم فحص عدد 150 عينة من منتجات لحوم الدجاج لمجموعة من الأسواق البريطانية والسعودية من لحم الدجاج المجهز وإعداده على الأحواض اليابانية والصينية. وظهرت النتائج أن متوسط قيمة نسبة الدهون في العينات تحت الدراسة من الأسواق المصرية والسعودية هي 16.0% و 15.5% لحم البوم دجاج و14.0% و13.0% لحم الدجاج على التوالي. وكانت متوسط قيمة نسبة البطين في العينات تحت الدراسة من الأسواق المصرية والسعودية هي 81.0% و 82.0% لحم البوم دجاج و71.0% و70.0% لحم الدجاج على التوالي. وكانت متوسط قيمة نسبة البروتين في العينات تحت الدراسة من الأسواق المصرية والسعودية هي 17.0% و16.2% لحم البوم دجاج و16.0% و15.0% لحوم الدجاج على التوالي. وتُعد مقارنة النتائج المتحصل عليها مع المعايير الفياسية المصرية لتمكين المنتجات، ومأتى الأفراد لتحسين نوعية الجودة الكيميائية للمنتجات للحوم الدجاج المعالجة جزئياً.
### Table (1)

<table>
<thead>
<tr>
<th>Samples</th>
<th>Item</th>
<th>Min.</th>
<th>Max.</th>
<th>Mean</th>
<th>± S.E.</th>
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<tbody>
<tr>
<td>Chicken Burger</td>
<td>Fat %</td>
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<td>17.3</td>
<td>15.0*</td>
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<td>69.5</td>
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<tr>
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<td>12.0</td>
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<tr>
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<td>72.6</td>
<td>71.0*</td>
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<td>Protein %</td>
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<td>16.9</td>
<td>16.0*</td>
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### Table (2)

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<th>Max.</th>
<th>Mean</th>
<th>± S.E.</th>
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</thead>
<tbody>
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<td>Chicken Burger</td>
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<td>7.58</td>
<td>4.6*</td>
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<td>Moisture %</td>
<td>77.0</td>
<td>83.9</td>
<td>81.0*</td>
<td>0.3111</td>
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<tr>
<td></td>
<td>Protein %</td>
<td>13.8</td>
<td>18.7</td>
<td>17.0*</td>
<td>0.2411</td>
</tr>
<tr>
<td>Chicken Nugget</td>
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<td>15.3</td>
<td>11.0*</td>
<td>0.3867</td>
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<tr>
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<td>83.3</td>
<td>78.0*</td>
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<tr>
<td></td>
<td>Protein %</td>
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</table>

* Mean = PPM (W.W.)  
* SE = Stander Error