Assessment of Chemical Composition and Sensory Parameters in Some Fast Food and Its Analogues Home Made

تقييم التركيب الكيميائي والمعايير الحسية في بعض الوجبات السريعة ومثيلاتها المصنوعة منزليا

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1.Introduction

The food we eat is one of the main concerns of contemporary society, prompted programmers and strategies resolve the main issues affecting food production. This increasing interest may be related to the impact that the products we eat have on our health (Chinea et al., 2021).

Beef, chicken and their products is a major source of our regular daily food which, considered a good source of high-quality protein, minerals and vitamins, especially vitamins B, iron and zinc. It provides major nutritive contributions to our diet relative to the amount of calories it contains and the true role of beef, chicken and their products can only be fully understood by determine their quality (James,2001).
The consumer of the 21st Century is a highly demanding one, exhibiting greater concern about quality and health benefits with respect to products he/she buys (Sajdakowska et al., 2018) so, the demand for high quality food has constantly increased during recent decades, as has the interest in the food quality issue both in response to market pressure and as a reaction to other factors, for example health and environmental concerns (Mascarello et al., 2015).

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Quality is difficult to define precisely, but it refers to the degree of excellence of a food and includes all the characteristics of a food that are significant and that make the food acceptable. Food acceptability is not easy to measure as it is very subjective.In fact, consumers make subjective judgments using one or more of the five senses every time they select or eat any food Even fast food (Vickie and Elizabeth, 2008).

Fast food refers to food that can be prepared and served quickly. Fast foods served at many places such as restaurants. It is popular, especially among children, teenagers and young adults because it is convenient, and tastes good (Dicas, 2019).

Fast food first popularized in the 1970s in the United States, which has today the largest fast food industry in the world. Current approaches suggest that fast food restaurants should be required to clarify nutrition information such as energy and fat content on their menu boards and on product packaging. This is important to help the consumer to make better food choices before purchasing. An adequate, nutritious, and balanced diet is essential to maintain health for one's lifetime. To achieve this healthy diet, fast food consumption should be limited Where the nutritional value of fast food is high in calories because it contain high amount of carbohydrate and fats, unfortunate it has little dietary fiber, protein, vitamins, minerals, or other important forms of nutritional value (Ngozika and Ifeanyi, 2018).

Fast food is often made with cheaper ingredients such as high fat beef, refined grains, and added sugar and fats, instead of nutritious ingredients such as lean proteins, whole grains, fresh fruits, and vegetables. As well as, fast food is also high in Sodium chloride (aka salt) which is used as a preservative and makes food more flavorful and satisfying (Dicas, 2019).

When junk food is consumed very often, the excess fat, simple carbohydrates, and processed sugar found in junk food contributes to an increased risk of obesity, cardiovascular disease, and many other chronic health conditions (Tracey, 2018).The aim of this study was to estimate the quality of some types of home-prepared food and its counterpart served in

restaurants. Products were made, including beef shawarma sandwiches and chicken shawarma.

2.Materials and Methods

2.1.Materials:

Chicken, beef, onions, garlic, bread, sunflower oil, starch, sugar, vinegar, salt, black pepper, mustard seeds, garlic powder, onion powder, turmeric, cumin, dried coriander, ground cloves, Cardamom, ginger powder, paprika and mace,all these materials were purchased from the local market of Assiut city, Egypt. All reagents and chemicals in this study were obtained from ELGamhouria for used Trading Chemicals and Drugs Co., Assiut city, Egypt.

2.2.Methods:

2.2.1.Technological Methods

2.2.1.1.Preparation of chicken Shawarma sandwich

Chicken Shawarma was prepared as method followed by (Aglaia , 2010) Chicken breast, boneless, skinless, cut into 10 cm thickness portions then into small thin slices with 4-5 mm thickness using stainless steel knife, and well mixed with all ingredients Table (1) in bowl then stored at 4°C for 24 hrs.

2.2.1.1.1.Cooking of Chicken Shawarma:

Add 20 gm of oil and 50 gm of colored pepper (green, yellow, red) cut into 5 cm thickness portions then into small thin slices with 4-5 mm and add the Chicken slices until Ripen. Garlic dip spread in the Syrian bread and put the mixture of shawarma, a roll, at 425°F (218 °C) for 6 min on the surface of hot clean grill.

2.2.1.2.Preparation of beef Shawarma sandwich

Beef Shawarma was prepared as method followed by (Abd-El Aziz, 2013). Frozen meat was thawed at room temperature (22 ± 3°C) for 4-5 hrs. dressed by removing their surrounded

fat layers, cut into 10 cm thickness portions then into small thin slices with 4-5 mm thickness using stainless steel knife, then well mixed with all ingredients Table(1) in bowl and stored at 4°C for 24 hrs.

2.2.1.2.1.Cooking of beef Shawarma:

Add 20 gm of oil and 50 gm of colored pepper (green, yellow, red) cut into 5 cm thickness portions then into small thin slices with 4-5 mm ,Then add the beef slices until Ripen, then spread Garlic dip in the Syrian bread and put the mixture of shawarma , a roll , at 425°F (218 °C) for 6 min on the surface of hot clean grill.

Table (1): Raw ingredients of Homemade (HM) Chicken and beef Shawarma sandwiches

Ingredients	Quantity (gm)
Chicken / beef	125gm
chopped onions	20gm
spices blend	3gm
Salt	1gm
vinegar	3gm
Yogurt	50gm

2.2.2.Analytical methods:

2.2.2.1.Chemical composition

Moisture, crude protein, ash and crude fat contents were determined according to official methods (AOAC, 2010), the results were an average of three replicates. Carbohydrate content were calculated by difference according to (Turhan et al., 2005) as follows formula:

% Carbohydrate on dry weight =100- (% Fiber +% protein +% fat+ %ash)

Caloric value (kcal/100g) was calculated as described by (Mohamed, 2005):

Caloric value (kcal/100 gm) = (% carbohydrate x 4) + (% protein x 4) + (% fat x 9).

2.2.2.2.Fatty acid composition

Fatty acid and sterol analysis Fatty acids were analyzed by gas liquid chromatography (GLC) as their methyl esters as per the International Union of Pure and Applied Chemistry (IUPAC, 1992).

For the preparation of methyl esters, about 0.1 g of the sample was treated with 0.5 g of anhydrous sodium sulphate, one pellet of sodium hydroxide and 10 ml of methanol. The sample was heated in a reflux condenser using a water bath for 30 minutes at 708C. 10 ml of hexane was added to the cooled sample which was then poured into 250 ml of distilled water. For analysis, about 0.5 ml of the clear methyl ester layer was injected into the Chrompack gas chromatogram fitted with a flame ionization detector and a 25 m £ 0:5 mm CPSIL wax S2 column. The initial and final oven temperatures were 1508C and 2008C respectively with an oven rise of 58C/minute.

Identification and quantification was done using the Shimadzu system and by comparing with pure external standards. For extraction of fat from samples an extraction mixture of chloroform and methanol (2:1) were used. Sterols in the extracted fat were determined quantitatively by GLC (Packard 439 GC) according to the modified procedure outlined in (IUPAC,1992).

A flame ionization detector with a 20 £ 1=4 £ 2 mm glass column packed with 1 per cent OV1, and a column temperature of 200-2658C was used. The flow rates of the carrier gas were as follows: nitrogen 15 ml/minute, hydrogen 25 ml/minute and air at 250 ml/minute. Identification and quantification was done using the Shimadzu system and by comparing with pure external standards.

2.2.3.Sensory evaluation:

50 persons (specialists of nutrition and food science and ordinary consumers) by hedonic scale ranging from 1 to 10 (1 is

very bad and 10 for excellent) was used for sensory evaluation. The products were placed in white dishes under strong white lighting during evaluation. water was provided to rinse the palate between two tasting sessions (Larmond, 1977).

2.2.4.Statistical analysis:

Data entry and analysis are carried out using SPSS version 26. Differences between the two groups will be assess using Independent-Samples T Test when this difference is significant if P value less than 0.05 (SPSS, 2011).

2.2.5.The cost of commercial made (CM) and Home made (HM) products:

The cost of CM and HM sandwiches (Chicken Shawarma and Beef Shawarma) were approximately calculated. The price of HM sandwiches were lower than those of CM sandwiches , The price of 100g from CM Chicken Shawarma sandwich was 13.15 L.E , while 100g from HM Chicken Shawarma sandwich was 3.00 L.E.The price of 100g from CM Beef Shawarma sandwich was 11.59 L.E , while 100g from HM Beef Shawarma sandwich was 6.80 L.E.

3.Results and discussion

3.1.Chemical composition

Table (2) Statistical analysis gross chemical composition of (CM)[1] and (HM)[2] chicken and beef shawarma sandwiches on (D.W)[3] and (W.W)[4] basis (%) g/100g

Sample (%)	Moisture (%)	Ash (%)	Fat (%)		Protein (%)		Fiber (%)		Carbohydrate (%)		Energy (K/Cal)	
			D.W	W. W	D.W	W. W	D. W	W. W	D. W	W. W	D.W	W. W
Chicken Shawarma sandwich (CM)	52.17**	1.78**	12.18**	5.83	28.80**	13.775	1.1**	0.526	56.14**	26.853	449.38**	214.95
Chicken Shawarma sandwich (HM)	61.3**	0.615**	7.48**	2.89	30.34**	11.74	1.9**	0.735	59.665**	23.097	427.3**	165.36
Beef Shawarma sandwich (CM)	48.07**	2.28	16.64**	8.64	29.35**	15.24	1.5**	0.779	50.23**	26.091	468.08**	243.08
Beef Shawarma sandwich (HM)	53.31**	2.27	4.34**	2.026	31.26**	14.595	2.2**	1.027	59.93**	27.982	403.82**	188.54

[1] commercial made [2] Homemade [3] Dry weight [4] wet weight

*Significant at p< 0.05 **highly significant at p< 0.01

The chemical composition of beef and chicken shawarma sandwich (HM) and (CM) are shown in Table (2) There were highly significant differences (P≤0.01) in moisture, fat, protein, carbohydrate, fiber, Energy KCal between all two types of shawarma sandwiches.Except for the ash, there is no significant difference between the types of beef shawarma sandwiches. There were highly significant differences (P≤0.01) in ash between the types of chicken shawarma sandwiches. shown in Table (2) the moisture of beef and chicken shawarma sandwich (HM) was higher than the moisture of beef and chicken shawarma sandwich (CM).

These differences in the percentage were in agreement with the findings mentioned by (Abdelhai, M. H., et.al.,2015), 56-72%.and (Palear et al.,2003) 70% water in beef shawarma sandwich. This variation in moisture content may be due to the

differences in cooking procedures (Abdelhai, M. H., et al., 2015).

The fat content of beef and chicken shawarma sandwich (HM) was lower than the fat content of beef and chicken shawarma sandwich(CM) because samples were prepared at home used lean beef and fat free chicken so fat content is lower than made in restaurants. The fat content the beef shawarma sandwich and chicken shawarma (HM) was 4.34% and 7.48% while in both types of shawarma (CM) was 16.64% and 12.18% respectively.(Abdelhai et al.,2015) reported 4.76 ± to 10 ±0.15%, and (Palear et al.,2003) found a value of 5% fat in meat.

Fat is an important energy source because of the amount of energy produced can be doubled from that generated by proteins and carbohydrates Fat is an important energy source because of the amount of energy produced from it equal that doubled from that generated by proteins and carbohydrates. The amount of protein was higher in home made shawarma (30.34%,31.26%) than (CM) (28.80%_29.35%).

Whereas, (Palear et al., 2003) was detected the percentage of protein in meat about 19 % and (Hassan ,2005) reported a value of protein in raw beef about 21.2 %. The variation of protein content could be attributed to the type of beef and the additives used (Abdelhai et al.,2015).

The ash content in two type of shawarma (HM) was lower than the ash content of beef and chicken shawarma sandwich (CM) (Abdelhai et al., 2015) reported the ash content ranged between 0.97 ± 0.04 and 3.67 ± 0.1%). This relative increase in ash content in comparison of that of fresh meat may be due to the ingredients used in Shawarma recipe. (Hassan,2005) revealed a value of 0.96% ash in fresh beef, due to cooking method, cooking temperature as well as the amount of ingredients added.

It is noted from the results of Table (2) that when a person eats 100 g of home-made chicken shawarma sandwich, Based on the needs of a normal person who does not suffer from underweight or overweight and average activity, he gets

11.74gm protein Thus, he will be obtained (22.58%) of his daily needs, 0.735gm fiber Thus, he will be obtained (5.25%) of his daily needs ,fat 2.89gmThus, it will be obtained (4.45%) of his daily needs ,23.097gm carbohydrates Thus, he will be obtained (17.77%) of his daily needs

And when eating 100 g of homemade meat shawarma sandwich, he gets 14.595gm protein Thus, he will be obtained (28.35%) of his daily needs, 1.027 % fiber Thus, he will be obtained (7.34%) of his daily needs, 2.026gm fat Thus, he will be obtained (0.311%) of his daily needs, 27.982 gm carbohydrates Thus, he will be obtained (21.52%) of his daily needs home food is less than the calories obtained from eating restaurant food After calculating the calory value of all sandwich ingredients (Hassan,2005) .In finally The amount of calories obtained from eating.

Table (3) Statistical analysis of saturated fatty acids composition of (CM)[1] and (HM)[2] chicken and beef shawarma sandwiches on basis (%) g/100g

Sample	Chicken shawarma sandwich (CM)	Chicken shawarma sandwich (HM)	Beef shawarma sandwich(CM)	Beef shawarma sandwich (HM)
Stearic acid methyl ester	0.222%	-	0.495%*	0.255%*
18-Oxononahexacontanoic acid	0.038%	-	-	-
2- Chloropropionic acid, octadecyl ester	0.849%	-	-	-
lauric acid	0.389%	-	-	-
Palmitic acid methyl ester	0.833%**	0.184%**	-	1.546%
methyl hydroxypalmitate	0.389%	0.270%	-	5.850%
1,3-Dipalmitoyl-glycerol	6.496%	-	-	-
Nonadeca noic acid	15.388%	-	-	-
Octadecanoic acid,2-[(1-oxotertradecyl)oxy]-1,3-propanetriyl ester	24.257%	-	-	3.373%
Hexacontanoic acid, propyl ester	9.211%	-	-	-
Tetradecanoic acid, 2-hydroxy-, methyl ester	0.025%	-	-	-
9,12-Octadecanoic acid	-	7.720%	-	-
oleic acid	-	1.042%	11.353%	-
9-Octadecanoic acid (z)-,9-hexadecenyl ester	-	3.588%	-	-
vaccenic acid	-	0.347%	-	-
Isopropyl linoleate	-	5.687%	-	-
Palmitic acid anhydride	-	1.223%	-	-
2-Chloropropionic acid, hexadecyl ester	-	-	0.799%	0.411%
Methyl 2-bromoisobutyrate	-	-	0.050%	
Glycerine_1_oleate_3_palmitate	-	-		8.713%
t-butyl (9z,12z)-9,12-octadecadienoate	-	-	8.891%	-
Dodecylic acid	-	-	1.905%	-
Icosanedioic acid	-	-	1.511%	-
Methyl 4-Nitroheneicosanoate	-	-	3.218%	-
Nonahexacontanoic acid	-	-	0.308%	-
Nonahexacontanoic acid propyl ester	-	-	0.582%	0.090%
Octadecanoic acid,1,2,3_propanetriyl este	-	-	-	0.179%
Glyceryl tribehenate	-	-	-	0.285%
palmitic acid	-	-	-	0.068%

[1] commercial made [2] Homemade

***Significant at p< 0.05 **highly significant at p< 0.01**

In Table (3) Data of Statistical analysis of saturated fatty acids composition of (CM)[1] and (HM)[2] chicken and beef shawarma sandwich were showen, respectively, the fatty acid composition of chicken shawarma sandwich (CM) and (HM), Gas chromatography (GC) analysis of fatty acid methyl esters from the lipids of sandwiches of chicken and beef shawarma revealed the presence of more than 20 fatty acids . There were highly significant differences (P≤0.01) in saturated fatty acids such as Palmitic acid methyl ester between chicken shawarma sandwich (CM) and (HM), there were significant differences (P≤0.05) in saturated fatty acids such as Stearic acid methyl ester of beef shawarma sandwich (CM) and (HM).The major percentage of saturated fatty acids in the chicken shawarma sandwich (CM) was Nonadeca noic acid, dimethylsilyl ester and1,3-Dipalmitoyl-glycerol which there parentage was 24.257%_15.388% respectively.

This result was in agreement with the finding mentioned by (Paul, 2019) that the Chicken Winglet and Chicken Hot Wings of KFC have higher amount of saturated fatty acids (SFA) which were 28.73% and 25.92% respectively. The amount of saturated fatty acids (SFA) in other products like Chicken Drumst, Chicken Botik, Fiery Grilled Chicken, Chicken Meatballs, and Chicken Nuggets are in between 10.94-19.38%. Saturated fatty acids found in the fast food samples Were palmitic acid, stearic acid, and myristic acid. While the result of percentage of fatty acids of chicken shawarma sandwich (HM) showed the major fatty acids 9,12-Octadecanoic acid was 7.720%. These results revealed that (CM) sandwiches were more dangerous on human health. Because of their higher content of saturated fatty acid. In humans, saturated fat intake increases Low-density cholesterol in comparison with all nutrients except trans fats (Siri-Tarino , et al.,2010)

Because saturated fat also increases low-density lipoprotein (LDL) cholesterol, the total cholesterol (TC) to HDL cholesterol ratio (a risk marker for cardiovascular diseases) is not altered particles are heterogeneous in size, density, and composition. Smaller and denser LDL particles have been strongly associated with atherosclerotic CVD (Krauss, 2010).

Table (4) Statistical analysis of Sensory evaluation of (CM)[1] and (HM)[2] chicken and beef shawarma sandwiches

Sample	Appearance	Taste	Chewing	Odor	Texture	Color	Overall acceptability
Chicken shawarma sandwich (CM)	8.63**	8.43**	8.46**	8.56**	8.5**	8.43**	8.4**
Chicken shawarma sandwich (HM)	9.46.**	9.66**	9.6**	9.66**	9.13**	9.26**	9.53**
Beef shawarma sandwich (CM)	9.13**	8.66**	8.5**	8.63**	8.53**	8.5**	8.3**
Beef shawarma sandwich (HM)	9.4**	9.4**	9.73**	9.6**	9.26**	9.3**	9.63**

[1] commercial made [2] Homemade

*Significant at p< 0.05 **highly significant at p< 0.01

Sensory is important facet in human experience about food. Table (4) shows the values which were appearance, taste, chewing, ordor, texture, color and overall acceptance It was generally observed that the (HM) presented the highest value for all attributes. Regarding the overall acceptance of Sandwich (HM) was different than Sandwich (CM). There were highly significant differences (P≤0.01) in appearance, taste, chewing, ordor,texture ,color and overall acceptance between all two types of sandwiches. Food sensors are the experiences of individuals who use all the senses, namely sight (eyes), hearing (ears), smell (nose), taste (tongue) and touch (skin).Sensory stimulation not only attract consumers but also helps differentiate products from others .It can be attached to the sensory memory and eventually become part of the decision-making process and food selection (Hussain, 2014). (Namkung and Jang ,2008) has identified food presentation and taste as the most influential factors to customer satisfaction (Kivela et al., 2000). consider several aspects of food quality such as taste and food nutrition to study the relationship of food factors to customer satisfaction and attitudes.The sensorial acceptance test was conducted by 50 untrained consumers, including undergraduate students, postgraduate students and staff of

the University of assuit, representing a target public that consumes sandwich of shawarma of chicken or beef at least once perweek.The overall appearance of a product is important for priming consumers and developing expectations prior to consumption. A disconfirmation of expectations occurs when the perceived liking after consumption is below the expected liking, which may occur when the visual cues misrepresent the taste, odor, and flavor of the product(Delwiche, 2004)Thus, it is important to deliver high-quality sensory attributes that are perceived both before and during consumption. The overall appearance of meat analogs should resemble familiar meat products in order to set positive expectations. Other functional ingredients that are used as food additives to improve the texture of meat analogs include thickeners and emulsifiers (Savadkoohi et al.,2014).

Conclusion:-

The whole results recommended that Home made sandwiches were not only cheaper than commercial made sandwiches Regarding of economic cost but also highly nutrient and lower in saturated fatty acids which concerned by heart diseases and obese people.

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تقييم التركيب الكيميائي والمعايير الحسية في بعض الوجبات السريعة ومثيلاتها المعدة منزليًا

الملخص:-

في مجال الصحة العامة ، يُفترض في كثير من الأحيان أن انتشار مطاعم الوجبات السريعة على نطاق واسع هو محدد أساسي لمعدل السمنة والأمراض الأخرى، كشفت العديد من الدراسات أن زيادة المعروض من مطاعم الوجبات السريعة لها تأثير كبير على السمنة وأمراض القلب والضغط والكوليسترول. لذلك، في هذه الدراسة ، تم إنتاج بعض من الوجبات السريعة معده منزليا ، مثل سندويتشات شاورما الدجاج وسندويشات شاورما اللحم.وتم تحليل التركيب الكيميائي والأحماض الدهنية بالاضافة الي اجراء التقييم الحسي لكل من السندويتشات المعدة منزليًا والمعدة بالمطعم، ولوحظ أن كانت هناك زيادة في محتوى البروتين والكربوهيدرات والألياف والرطوبة في السندويشات المعدة منزليا مقارنة بتلك المحضرة في المطعم.وهناك انخفاض في محتوى الدهون والرماد وكمية السعرات الحرارية وكذلك انخفاض في نسبة الأحماض الدهنية المشبعة في السندويشات المعدة منزليا مقارنة بتلك المحضرة في المطعم ، علاوة على ذلك ،وجد أنه هناك زيادة في قبول المستهلك بشكل عام للمنتجات المعدة منزليا عن تلك المقدمة في المطاعم.