

## **A SURVEY OF QUALITY OF USING FRYING OILS IN SOME FAST FOODS RESTAURANTS**

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### **ABSTRACT**

Frying oils were evaluated into two methods .Firstly the chemical evaluation, by determining some physico- chemical characteristics namely specific gravity (SG) , acid value (AV) , Peroxide value (PV) , free fatty acids (FFA%) and fatty acids profile and results indicated that acid value of frying oils samples were 1.34 before frying and reached to 8.36 after frying process in high grade restaurant ,while the Peroxide value being 22.435 before frying but after frying reached 417.39 ml eqv./kg oil Also, frying process showed a high percentage of harmful trans fatty acids in all fried oil sample .

Secondly the survey study consists of two parts, the first part is concerned with the staff who work in fast food restaurants and the second part is concerned with the guests who usually eat some fast foods meals .

Results showed that the age of the staff who worked in fast food restaurants which answered to Less than25 years ,25 to 35 years and36 – 45 more and It's obvious that the gender was male with 100% and the age was between 25-35 with 48.6 % and 36- 45 and more with 50 %., the reasons of using the most common frying oils in this question which answered to price , oil smell, flavor and other reasons.

We have found also, that the gender of the people who eat fried products more than the other are equal with 46 % for males and 46 % for females .and the age of the customers who eat in fast food restaurants which answered to 45.7% were from 20 to 30 years and 30 to 40 and more with 37 % .

Then we have to know if there is stability in the taste of fried product that the customers eat in the restaurant and the result was 42.4 % with yes and 26.1% with no and 31.5 % with sometimes.

Finally , we have to know what are the flaws that the customers have seen before in fried food from their point of view and we have found the biggest flaw was changing the taste with 52.2 % then changing the color with 31.5 % then 16.3 % was for the changing of the smell.

So, it's clear from the results of previous tests and questionnaires we need to focus on the process of frying and Oil Change to avoid the formation of harmful compounds health operations especially trans fatty acids and saturated fatty acids.

This research aimed to study and evaluate the quality of some frying oils which were randomly collected from some fast food restaurants three categories ( international, national and local ) in El-Dakahlia Governorate.

### **INTRODUCTION**

The National Restaurant Association (N R A) defines the fast food industry as " encompassing all meals and snacks prepared outside the home and this definition therefore includes all takeout meals and beverages. It's also known as a quick service restaurant (QSR) within the industry, is a specific type of restaurant characterized both by its fast food cuisine and by minimal table service. Food served in fast food restaurants typically caters to

a "meat-sweet diet" and is offered from a limited menu; is cooked in bulk in advance and kept hot (Talwar ,2003)

Restaurants have been around in some form for most of human civilization. McDonalds, burger king , Taco bell , Hardees and Kentucky are the most famous fast food restaurants in the world , (Talwar, 2003 and Anon.,2000).

Food frying has long been used as a technique to prepare various foods both at home and in industrial food sectors since fried foods developed a much desired texture, flavor and appearance they are consumed in large quantities all over the world . the popularity of fast food is due to the surface texture , crunchiness and flavor. Especially the fast food sector uses frying widely.(Anon.,2000).

Frying oils is a common and popular method of preparing foods because its fast , simple, develops typical flavor of foodstuffs and is very efficient from a culinary point of view . During deep frying oils are repeatedly and often over long Periods of time exposed to temperatures between 130° C and 200° C in the presence of the food that is being fried and in the presence of air and water the properties of frying oil have a principal effect on the quality of deep fried foods and degradation products that accumulate in frying baths worsen technical properties of the oil and spoil the food they also have a negative effect on human health effect on viscosity color and dielectric capacitance and chemical markers namely fatty acids FFA ,anisidine values total polar compounds(TPC), peroxide value and others number of countries food related legislation includes practical instructions and agreed parameters specifying the overall content of degradation products which helps to monitor oil quality during frying the values of 2,5 for fatty free acids 10 for polymer triacyglycerides of all lipids and 25 for total polar compounds are considered to be the upper limits 5 , (Cizkovaet al 2 ., 2011).

**The objectives of the study:**

This study was aimed to evaluate fried oil quality in some fast food restaurants in EL -Dakahlia Governorate.

**in order to achieve these aims :**

- 1- Collect six samples of frying oil used in some fast food restaurants which are situated in EL- Dakahlia Governorate .
- 2- Determination of some physical and chemical properties of fried oils namely acid value (AV) , peroxide value (PV) , smoke point , specific gravity and the FFA free fatty acids.
- 3- Survey Statically analysis of the questionnaires (for the staff and the customers).

## **MATERIALS AND METHODS**

**Materials :**

**Collection of oil samples:**

Total of 6 frying oil samples were collected twice a month from three categories ( high , medium and local)fast food restaurants in El-Dakahlia Governorate, El-mansoura ,Egypt . during October 2013.

**Study design:**

Around 500 ml of fried oil samples collected from Bilqas city and Mansoura city were taken directly from the fryer in-use which contained a removable disk to filtrate the oil ,collected oil were kept in amber colored capped glass and labeled, until the analyses.

**Chemicals :**

All chemicals were purchased from El-Gomhouria pharmaceutical and chemist company , EL-Mansoura city, El Dakahlia Governorate , Egypt.

**Methods:**

**Physical properties:**

Specific gravity, smoke point were determined according to the method described by (A.O.A.C. 2000).

**Chemical properties:**

Acid value(Av) , free fatty acids (FFA)% and Peroxide value (PV) were determined according to AO.AC(2000).

Fatty acids composition : fatty acids methyl esters (FAMs ) of oils were performed according (Radwan1978) ,.At Higher Health Institution ,Alexandria university, Egypt .

**Questionnaires :**

We have performed two types of questionnaires to compare the measured physical and chemical parameters and surveys together. These questionnaires were evaluated by specified staff members in faculty of tourism and hotels in Mansoura and Helwan universities . The first type of questionnaires has been performed for the staff of the restaurants to compare their answers with the chemical and physical results. And the second one is been performed on the guests to evaluate their answers and measuring the quality of the fried products. This statically evaluation has used the Spss program to perform this analysis.

**Statically analysis:**

All obtained results in the questionnaires were statistically analyses using Spss program version (20).

**Quantitative Assessment of Frying Oil Quality...**

The Questionnaire used for Assessment of Frying oils used in Fast Food Restaurants.

This questionnaire aims to control and evaluate all frying oils in fast food restaurants and know the best types of these oils .

**Name of the restaurant ( if he want ):**

**Personal information :**

**1. Personal data**

Gender:  Male.  Female.

Age:  Less than25 years.  25 to 35 years.  36 – 45 (more) .  
position :

Date of the survey: / / 2014

**Q1) which type of oil are you using for frying in your restaurant?**

Type of oil		
a) Sunflower oil (SFO)		
b) Corn oil (CNO)		
c) Palm oil (plo)		
d) mixed oils		
e) Shortening		
f) other oil		

**Q2) What is the reason for using this oil?**

a) Price	
b) oil smell	
c) Flavor (fla)	
d) Other reasons (otr)	

**Q3) How many hours a day do you perform frying?**

- a) 4-6 hours
- b) 6-8 hours
- c) 8-10 hours
- d) 10-12 hours
- e) 12-14 hours

**Q4) After the end of a day, how do you utilize the remaining oil next day?**

- a) Add materials for oil to prolong the period of use.
- b) putting it away and using new one .
- c) other ways .

**Q5) How often do you change your oil?**

- a) Every day
- b) Every two days.
- c) Every week
- d) other duration

**Q6) What do you do with your waste frying oils?**

- a) Pour into the wastewater pipe
- b) Collect and dispose it into trash
- c) Collect and sell to a buyer
- d) Other usage

**Q7) How do you clean your fryer?**

- a) Hot water and soap
- b) Spray cleaner
- c) Other way

**Q8) Do you perform any treatment to extend the usage life of your frying oil?**

- a) yes
- b) no

**Q9) Do you have any knowledge about Food Codex regulations for frying oils?**

- a) yes
- b) no

**10) What are the problems that you face in general in the stages of your use of frying oils in the restaurant?**

- a) High prices
- b) product quality
- c) Lack of stability of oils used in frying process.
- D) other problems

**Quantitative Assessment of Frying Oil Quality...**

The Questionnaire Used for Assessment of Frying in Fast Food Restaurants.

This questionnaire aims to control and evaluate all the frying oils in fast food restaurants and know the best types of these oils..

**Name of the restaurant ( if he want ):**

**Personal information :**

**1. Personal data**

- Gender:  Male.  Female.  
 Age:  Less than10 years.  10 to 20 years.  20 to 30 years .  
 30 to 40 (more).   
 Job :  
 Date of the survey: / / 2014

**Q1) do you always eat fried foods?**

- a)yes                      b) no                      c) sometimes

**Q2) Is there stability in the taste of the fried product you eat here in the restaurant?**

- a)yes                      b) no                      c) sometimes

**Q3) Is there stability in the color of the fried product you eat here in the restaurant?**

- a) yes                      b) no                      c) sometimes

**Q4) for your point of view, does the number of hours of frying affect on the quality of the fried product?**

- a) yes                      b) no                      c) don't know

**Q5) in the case of knowing that the frying oil is being reused many times ,would u have the meal ?**

- a) yes                      b)no

**Q6) what are the flaws that you have ever seen before in the fried foods ?**

- a) Changing of the color                      b) Changing of the taste  
 c) Changing of the smell                      d) Other flaws

**RESULTS AND DISCUSSION**

**-Changes in physico-chemical characteristics in some fried oil samples collected from fast food restaurants before and after frying process:**

All collected fried oil samples were physically and chemically evaluated before and after frying using some characteristics namely smoke point ,specific gravity , acid value(AV) , peroxide value(PV) and Free Fatty acids (FFA%) and all obtained results were tabulated in Table (1) :

Oil Samples	Before frying process (zero time )			After frying process (12-14 hours )		
	1	2	3	4	5	6
Smoke point	160°C/ 11 min.	160° C/ 10.07 min	120°C / 9.00 min.	130 C / 7.5 min.	180 C / 7.23 min	110 C / 7.45 min.
Specific gravity	0.7947	0.7065	0.6476988	0.9124	0.8829	0.8241694
A.V	0.60	1.34	0.64	2.40	8.63	2.13
P.V	78.57	22.435	96	275	217.39	226.53
FFA%	2.215	6.326	2.707	7.755	11.770	6.388

1,4 : fried oil samples from national grade restaurant.

2,5 : fried oil samples from international grade restaurant.

3,6 : fried oil samples from local grade restaurant .

Acid value was used to assess frying oil degradation and it is related to fried food Quality. Also Acid value (AV) was used to measure the formation of acidic compounds in oil during hydrolysis process (Iqbal et al., 2008).

Data presented in Table (1) indicated that acid values were 0.60, 1.34 and 0.64 mgKOH/g.Oil in different fried oil samples 1,2,3 before frying and reached to 2.40, 8.63 and 2.13 after frying in the same samples respectively, the highest value of A.V was 1.34 mg KOH/g. oil in oil sample collected from high grade restaurant before frying and reached to 8.63mg koh/g. after frying these results of acid values after frying may be due to the condition of frying process.

Also being results in the same Table showed the changes in F.F.A% 2.215%, 6.326%, 2.707%, 7.755%, 11.770% and 6.388% respectively in fried oil samples before and after frying process.

While the changes in FFA%. In high, medium and local grade fast food restaurants could be attributed to high temperature up to 185°C which caused the deterioration and hydrolysis of fatty acids (Chen et al., 2013).

#### **Changes in peroxide values (PV<sub>s</sub>):**

Peroxide values was used as an index for the degree of Lipid oxidation and the formation of Hydro peroxides as primary oxidation products (Chavan, 1992). Results in Table (1) also, showed the changes in peroxide values in different frying oils collected from fast food categories restaurants.

Data presented in Table (1) showed that the peroxide values for frying oil in international grade fast food restaurants presented 22.435 and mL eqv. kg oil respectively before frying there were an observed increase in all oil sample after frying reached to 217.39mL eqv./Kg oil.

Also, the same trend of increase was also observed in all frying oil samples which collected from national grade fast food restaurants the values of peroxide being 78.57 before frying and reached to 275 ml eqv./kg oil after frying.

Also, data illustrated in Table (1) proved that the peroxide values in all frying oil samples from local grade restaurants were 96 before frying and reached to 226.53 mL eqv./kg oil after frying.

These increments in PV<sub>s</sub> could be attributed to the formation of hydro peroxides (primary oxidation products) and the direct effect of heat which enhance the oxidation and rancidity process and the presence of air and water during frying treatments which effect on oil degradation.

#### **Changes on fatty acids profile of frying oils used in some food restaurants.**

Changes in fatty acids composition in high temperature specially frying had a negative effect on fatty acids composition in addition oil fatty acids composition is an initial indicator on its nutritional value, it will fact that the increasing of saturated fatty acids in the diet will increase the level of blood cholesterol which related to the direct effect on coronary heart diseases. (Chowdhury et al., 2007).

Results in tables 2,3 and 4 showed the changes on fatty acids profile of different fried oil samples collected from three categories fast food restaurants.

**Table (2):Changes on fatty acids profile of frying oils collected from international grade fast food restaurants before and after frying process:**

<b>Fatty acids</b>	<b>Before</b>	<b>After</b>
<b>Saturated fatty acids</b>		
Caprylic acid (C8:0)	0.099	0.305
Lauric acid (C12:0)	0.527	1.003
Tridecylic acid (C13:0)	0.765	1.319
Myristic acid (C14:0)	3.887	10.782
Pentadecylic acid (C15:0)	0.604	1.725
Palmitic acid (C16:0)	0.016	0.037
Margaric acid (C17:0)	0.289	0.793
Stearic acid (C18:0)	22.899	59.556
Arachidic acid (C20:0)	1.344	1.726
Heneicoylic acid (C21:0)	0.952	ND
Total saturated fatty acid	31.382	77.246
<b>Unsaturated fatty acids</b>		
Myristoleic acid (C14:1)	0.988	1.125
Ginkgolic acid (C15:1)	0.530	0.778
Palmitoleic acid (C 16:1)	0.321	18.519
Oleic acid (C18:1)	66.059	0.025
Linoleic acid (C18:2)	0.010	0.022
Eicosadienoic acid (C20:2)	0.335	1.994
Erussic acid (C 22:1)	0.366	ND
Brassic acid (C22:2)	0.266	ND
Total unsaturated fatty acid	68.509	22.463
Total fatty acids %	99.891	99.709

Data in Table (2) showed the changes in total saturated fatty acids being 31.382 to (77.246) for frying oil which collected from international grade restaurant and the predominant fatty acids being stearic acid (C18:0) followed by Myristic acid (C14:0) being 22.899 and 59.556 and 3.887 and 10.782 respectively in oil before and after frying process.

From the same results in Table ( 2) it could be observed that the changes in unsaturated fatty acid (USFA) being 68.509 and 22.463 these were an observed decrease in the total of USEA after frying these observed changes could be due to the saturation phenomenon which occurred during frying process and converted the unsaturated bonds to saturated bonds in fatty acids.

Concerning to the results in the same Table it could be observed that the concentration of oleic acid (C18:1) was progressively changed from 66.059 to 0.025 before and after frying process.

From the same table also it could be observed that the main unsaturated fatty acid were oleic acid represented before and after frying process.

Finally the changes in fatty acid compositions in frying oil used from national grade fast food restaurants ,Data illustrated that the fatty acids identified in oil before and after frying process at 180°C for 12 hours.

**Table(3) Changes on fatty acids profile of frying oils collected from local grade fast food restaurant:**

<b>Fatty acids</b>	<b>Before</b>	<b>After</b>
<b>a) Saturated fatty acids:</b>		
Caprylic acids (C8:0)	0.096	0.093
Undecylic acid C11:0	0.229	ND
Lauric acid (C12:0)	0.112	0.117
Tridecylic acid (C13:0)	0.582	0.266
Myristic acid (C14:0)	0.970	0.479
Pentadecylic acid (C15:0)	0.331	0.160
Palmitic acid (C16:0)	22.965	3.261
Margaric acid (C17:0)	0.126	1.129
Stearic acid (C18:0)	12.113	57.261
Arachidic acid (C20:0)	0.528	0.457
Heneicoylic acid (C21:0)	0.293	ND
Total saturated fatty acid	38.345	63.223
<b>b) Unsaturated fatty acids:</b>		
Myristoleic acid (C14:1)	0.214	0.425
Ginkgolic acid (C15:1)	0.419	0.221
Palmitoleic acid (C 16:1)	0.137	6.235
Heptadecenoic acid (C17:1)	0.109	0.095
Oleic acid (C18:1)	24.609	13.862
Linoleic acid (C18:2)	8.550	7.381
Eicosadienoic acid (C20:2)	0.390	0.677
Erussic acid (C22:1)	0.824	0.159
Brassic acid (C22:2)	0.602	0.522
Total unsaturated fatty acids	35.859	29.577

**Table(4) Changes on fatty acids profile of frying oils collected from in national fast food restaurants.**

<b>Fatty acids</b>	<b>Before</b>	<b>After</b>
Saturated fatty acids		
Myristic acid (C14:0)	4.581	4.85
Stearic acid (C18:0)	24.124	29.59
Arachidic acid (C20:0)	ND	1.91
Heneicoylic acid(C21:0)	0.696	1.46
Total saturated fatty acid	29.401	37.81
Unsaturated fatty acids		
Myristoleic acid (C14:1)	0.238	3.025
Oleic acid (C18:1)	64.957	15.28
Elaidic acid (C18:1 t)	ND	36.61
Linoelaidic acid (C18:2 t)	ND	7.37
Eicosadienoic acid (C20:2)	4.540	0.44
Total unsaturated fatty acid	69.735	62.725
Total fatty acids	99.136	100.535

ND: Not detected

The total saturated and unsaturated fatty acids constitute about 69.735 and 62.725 respectively. The main saturated fatty acids were myristic acid and stearic acid being 4.581 ,4.850 , 24.124 and 29.59 before and after frying.

From table (4) it could be observed that the main unsaturated fatty acid was oleic acid being 64.957 before frying and 15.289 after frying .

**Table (5) Trans fatty acids of frying oil samples collected from fast food restaurants after frying process 14 hours:**

Fatty acids		oil samples		
		A	B	C
Zero (before frying)	Oleic C18:1	66.05	24.609	64.95
	Lenoleic C18:2	0.01	8.550	0.014
After frying	Oleic C18:1	0.025	13.862	15.28
	Linoleic C18:2	0.022	7.381	0.019
	Eliadic C18:1t	31.455	30.455	36.619
	LinoelaidicC18:2t	7.793	7.763	7.379

**A = oil sample from international grade restaurant**

**B = oil sample from local grade restaurant**

**C = oil sample from national grade restaurant**

Trans fatty acids are types of unsaturated fatty acids which are uncommon in nature but can be created artificially. They appear during hydrogenation process also during exposure oil to high temperature especially frying process. The formation of trans fatty acids during frying is closely related to the process temperature and oil use time. When partially hydrogenated oils are used, the formation of trans fatty acids is generally lower (Martin *et al.*, 2007).

The adverse effect of excess intake of *trans* fatty acids on human health, mainly on cardiovascular system is a growing fatty acids on human health, mainly on cardiovascular system is a growing significant changes in the quality of trans fat while giving the heat treatment.

Data in Table (5) showed different types of trans fatty acids which appeared in frying oils sample .Results mentioned that there were two types only were presented in two blends were oleic acid(C 18:1) and eliadic acid(C 18:1t )Results indicated that there was an observed decrease in oleic acid after frying in all three fried oil samples .The oils were in the legal limit of trans fatty acids had ranged from (0.11:11gm/100gm (Podmore, 2008).So obtained results indicated that all trans fatty acids were progressively increase to 36.619 and 7.793 gm/100gm for Eliadic (c18:1t) and Linoelaidic (C18:2t) respectively ,these results may be due the use of high temperature during frying process which formation trans fatty acids due to the isomerization process .

\*\* second part of evaluation :

**Table (6) Statistical results of questionnaire which has been performed for the staff of the restaurants**

Question number	Selections	Frequency	Percent
Q1	a	70	100%
	b	0	0%
Q2	a	1	1.4%
	b	34	48.6%
	c	35	50%
Q3	a	7	10%
	b	2	2.9%
	c	0	0%
	d	7	10%
	e	54	77.1%
	f	0	0%
Q4	a	47	67.1%
	b	4	5.7%
	c	18	25.7%
	d	1	1.4%
Q5	a	0	0%
	b	1	1.4%
	c	8	11.4%
	d	30	42.9%
	e	31	44.3%
	f	0	0%
Q6	a	5	7.1%
	b	63	90%
	c	2	2.9%
Q7	a	53	75.7%
	b	12	17.1%
	c	5	7.1%
	d	0	0%
Q8	a	11	15.7%
	b	14	20%
	c	45	64.3%
	d	0	0%
Q9	a	53	75.7%
	b	15	21.4%
	c	2	2.9%
Q10	a	16	22.9%
	b	54	77.1%
Q11	a	9	12.9%
	b	61	87.1%
Q12	a	49	70%
	b	6	8.6%
	c	15	21.4%
	d	0	0%

A questionnaire composed of 12 questions has been applied to 70 restaurants and their responses (%) for each selection. It's clear that in

question (1) asks about the age of the staff who work in fast food restaurants which answered to Less than 25 years , 25 to 35 years and 36 – 45 more.

It's obvious that the gender was male with 100% and the age was between 25-35 with 48.6 % and 36- 45 and more with 50 %., It's obvious that the third question aims to know which type of frying oils would be the most common used between these types which answered to sunflower , corn , palm , mixed oils and shortening .

Then , we seek to know the reasons of using the most common frying oils in this question which answered to price , oil smell, flavor and other reasons. -it's clear that most restaurant use shortening more than any other oil with 77.1% for its price with 67.1% and for its flavor with 25.7%.

There were different durations when we asked about how many hours they perform frying which answered to 4-6 hours , 6-8 hours , 8-10 hours , 10-12 hours and 12-14 hours.

We need to know what do they do with the remaining oil if they add materials for oil to prolong the period of use or putting it away and using new one or other ways and we had to know in this question how often they change the frying oils ( every day – every two days –every week or other duration .

I think that we have to know what they do with their waste frying oils if they pour into the wastewater pipe or collect and dispose it into trash or collect it and sell to a buyer or there is other usage .

They mostly perform frying for 8-10 hours and 10 -12 hours daily. they usually dispose the remaining oil as the end of the day and refill their fryer in the next day.

It's interesting that in question five the change frying oil every day with 75.7% but answers in question six indicate that 64.7% collecting the waste and selling it to buyer .

we have discussed here the methods of cleaning their fryers if they use hot water and soap or spray cleaner or other ways. Most restaurants clean their fryers with hot water and soap and don't perform any treatment to extend usage life of the frying oils with 77.1 %.

There was a need here to know if they perform any treatment to extend the usage life of their frying oils or they don't and in this next question we have discovered if they have any knowledge about codex regulations for frying oils or they don't have any information about it.

Finally in the last question we had to ask them about the problems which they face generally in the stages of their use of frying oils in the restaurant and the choices were ( high prices – product quality – lack of stability of oils used in frying process or there were any problems .

Then ,around 87.1 % of them have indicated that they are not beware of the food codex regulations for frying oils, they have indicated too that most of the problems that they face in general in the stages of your frying oils in the restaurants are high prices with 70% and lack of stability of oils used in frying process with 21.4%..

**Table(7) Statistical results of questionnaire which has been performed on the customers :**

Question number	Selections	Frequency	Percent
Q1	a	46	50%
	b	46	50%
Q2	a	4	4.3%
	b	12	13%
	c	42	45.7%
	d	34	37%
Q3	a	38	41.3%
	b	22	23.9%
	c	32	34.8%
Q4	a	39	42.4%
	b	24	26.1%
	c	29	31.5%
Q5	a	36	39.6%
	b	31	34.1%
	c	24	26.4%
Q6	a	28	30.4%
	b	18	19.6%
	c	46	50%
Q7	a	16	17.4%
	b	76	82.6%
Q8	a	29	31.5%
	b	48	52.2%
	c	15	16.3%
	d	0	0%

A questionnaire composed of 8 questions has been applied to 92 persons and their responses (%) for each selection.

At the first , we have to know which type of gender they eat fried products more than the other and we have found that they are equal with 46 % for males and 46 % for females .

It's clear that the second question asks about the age of the customers who eat in fast food restaurants which answered to 45.7% were from 20 to 30 years and 30 to 40 and more with 37 % .

Our third question asks about if the customer eat always fried food and its yes answers was 41.3% and no was with 23.9 % and sometimes was 34.8 %

Then we have to know if there is stability in the taste of fried product that the customers eat in the restaurant and the result was 42.4 % with yes and 26.1% with no and 31.5 % with sometimes.

On the other side we have to know if there is stability in the color of the fried products that he or she eats and we have found that 39.6 % said that yes but 34.1 % said no and on the other side 26.4 said sometimes there is stability in the color .

We had to ask the customers if they think that the number of hours of frying affect on the quality of the fried product and it was 50 % of them don't know if it affects or not and 30.4 % the said yes it affects.

we have asked the customers too if they know that the oil is being reused many times ,would they have the meal . the said no with 82.6 % and 17.4 % with yes .

Finally , we have to know what are the flaws that the customers have seen before in fried food from their point of view and we have found the biggest flaw was changing the taste with 52.2 % then changing the color with 31.5 % then 16.3 % was for the changing of the smell.

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## دراسة لتقييم جودة بعض زيوت التحمير في مطاعم الوجبات السريعة

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يهدف هذا البحث إلى دراسة وتقييم بعض أنواع زيوت القلي التي تم تجميعها بطريقه عشوائية من بعض مطاعم الوجبات السريعة ذو الثلاث فئات (العالمية والمتوسطة والمحلية) وذلك في نطاق محافظة الدقهلية. هذا وقد تم تقييم وتحليل هذه العينات من الزيوت بطريقتين :

الأولي هي تقدير التحليلات الكيميائية والفيزيائية والتي تتمثل في رقم الحموضة و نسبة الأحماض الدهنية والوزن النوعي ورقم البيروكسيد وكانت بعض النتائج علي النحو التالي :

سجل رقم الحموضة في العينة ٢, ٥ في شريحة المطاعم ذو الفئة العالمية قبل وبعد التحمير نلاحظ وجود فروق واضحة جدا فكانت قبل التحمير ١.٣٤ وبعد التحمير ٨.٣٦ , بينما ارتفع رقم البيروكسيد في نفس فئة المطعم بشكل ملحوظ بعد التحمير ليصل إلي ٤١٧.٣٩ ملي مكافي / كجم . زيت حيث كان قبل التحمير ٢٢.٤٣٥ ملي مكافي / كجم . زيت . كما أظهرت عملية التحمير وجود نسبة عالية من أحماض الترانس الضارة في جميع عينات الزيوت .

أما الطريقة الثانية فهي عن طريق استنبينات وتتكون من جزئين: الجزء الأول خاص بالموظفين الذين يعملون في مطاعم الوجبات السريعة ويتعلق الجزء الثاني بالعملاء والزبائن الذين عادة ما يتناولوا الوجبات السريعة .

وكانت أهم النتائج المتحصل عليها أن الغالبية العظمي من العاملين في المطاعم الوجبات السريعة من الذكور وان معدل العمر يتراوح بين ٣٥ و ٤٥ عاما والغالبية العظمي من هذه المطاعم تستخدم الشور تينج في القلي لانخفاض سعره وجودته ونكهته وان معدل ساعات استخدامه تتراوح من ١٢ إلي ١٤ ساعة يوميا .

كما انه تبين أن نسبة الذكور متساوية مع نسبة الإناث في التردد علي مطاعم الوجبات السريعة وان عمرهم يتراوح من ٢٠ إلي ٣٠ عاما في الغالب وان نسبة ٤١ % من الزبائن يتناولوا الأطعمة المقلية باستمرار وان نسبة ٥٣ % تقريبا يروا من وجهة نظرهم أن أكثر مشكلة في الأطعمة المقلية عدم ثبات الطعم ثم يأتي عدم ثبات اللون في المرتبة الثانية .

لذا يتضح من نتائج الاختبارات والاستنبينات السابقة ضرورة الاهتمام بعملية تغيير الزيوت الغذائية المستخدمة في عمليات تحمير الأغذية لتجنب تكوين المركبات الضارة بالصحة .