



Comparative Effects of Olive Oil, Soya Bean Oil and Industrial Fat On Nutritional Composition and Sensory Qualities of Short Crust Pastries

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ABSTRACT

This study was carried out to assess the comparative effects of olive oil, soya bean oil and industrial fat (margarine) on nutritional composition and sensory qualities of short crust pastries. Five varieties of short crust pastries were prepared making use of 100% margarine, 100% olive oil, 100% soya bean oil and blends of 50% olive oil and 50% margarine, 50% soya bean oil and 50% margarine respectively. The proximate composition, fatty acid content, antinutritional factor and sensory quality were determined. Results showed higher crude protein contents in samples containing 100% soya bean oil and 100% olive oil and blend of 50% soya bean oil and 50% margarine respectively. Higher significant ($p < 0.05$) fat content were obtained in samples containing 100% soya beans oil, and blends of 50% soya bean oil and 50% margarine, and 50% olive oil and 50% margarine respectively. Similarly, ($p < 0.05$) ash contents were obtained in samples containing 100% soya beans oil, and blend of 50% soya bean oil and 50% margarine respectively. Crude fibre content revealed higher ($p < 0.05$) amounts in samples containing blend of 50% soya bean oil and 50% margarine, and 100% soya beans oil. Results of moisture content showed higher ($p < 0.05$) content across the samples of short crust pastries. Similarly, the carbohydrate content showed higher ($p < 0.05$) content across the samples produced with 100% soya beans oil, and blend of 50% soya bean oil and 50% margarine. The fatty acid composition showed higher oleic acid in samples containing 100% olive oil. Linoleic acid contents were statistically ($p > 0.05$) similar across the samples respectively. Capric acid contents among the samples were significantly ($p < 0.05$) higher in samples containing 100% olive oil. Myristic acid was however higher ($p < 0.05$) in the samples prepared with 100% margarine. Phytate content was negligible across the samples. The sensory analysis showed higher scores of appearance, taste, texture, crispiness and crumbliness in the samples containing 100% soya bean oil, 100% olive oil and blends of 50% soya bean oil and 50% margarine, and 50% olive oil and 50% margarine. Increases in the saturated fatty acid, myristic acid and capric acid, in samples containing 100% margarine are likely to lead to elevation in the low density lipoprotein cholesterol and as a result cause cardiovascular diseases upon long term consumption. Hence, despite the higher sensory scores, though not significant, in the samples containing 100% margarine, its whole use in the confectionery industry should be reduced to almost half. It is therefore recommended that short crust pastries should be prepared using at least 50% olive oil or 50% soya bean oil together with 50% margarine.

Keywords: Industrial Fat, Nutritional composition, Olive Oil, Sensory Qualities, Short crust pastries, Soya Bean Oil

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1. INTRODUCTION

The confectionery industry is one of the fastest growing segments in the global food market. It represents a broad array of products. Fast food restaurants are popular because they serve filling foods that taste good and do not cost a lot of money. However, fast food is usually cheap because it is often made with cheaper ingredients such as high fat meat, refined grains, and added sugar and fats, instead of nutritious foods such as lean meats, fresh fruits, and vegetables. Because fast food is high in sodium, saturated fat, trans fat, and cholesterol, eating too much over a long period of time can lead to health problems such as high blood pressure, diabetes, heart disease, Cancer and obesity.

MARGARINES are industrial fat made almost entirely from vegetable oils, with added skim milk or whey solids. To make this fat solid at room temperature, these oils are “hydrogenated,” chemically treated to change some of their polyunsaturated fatty acids to saturated fatty acids. This gives it baking qualities. The process of hydrogenation causes margarine to become saturated and contain trans fats, which can be harmful to the body. Trans fat has shown to increase the risk of heart disease, increase bad cholesterol, or LDL levels, reduce good cholesterol, or HDL, and increase the risk of certain cancers and chronic illnesses (Brennan, 1994).

Healthy eating is believed to be a way of balancing the food eaten to keep the body strong, energized, and well nourished. To cut back on the amount of fat content, it is necessary to substitute replace industrial fat with oil rich in unsaturated oil, examples of which are olive oil, soya oil, canola oil and peanut oil.

OLIVE OIL is a liquid fat obtained from the olive (the fruit of *Olea europaea*; family *Oleaceae*), a traditional tree crop of the Mediterranean Basin. It is a liquid fat with the highest content in monounsaturated fatty acids, a healthier type of fat, it reduces total and low-density lipoprotein (LDL or “bad”) cholesterol levels in the bloodstream, while raising high-density lipoprotein (HDL or “good”) cholesterol levels. Olive oil contains anti-inflammatory agents, like oleocanthal, that act as a natural ibuprofen-like substance (Ehud, G., Daniel, J.S., Jacob, S., and Mina, W., 1997). Furthermore, olive oil is reported to give cakes and cookies a light texture. Olive oil dramatically cuts back on the cholesterol and saturated fat content of savouries and desserts. It produces lighter-tasting baked goods and allows the flavour of the other ingredients to come forth. Because olive oil contains vitamin E, it helps to naturally maintain the freshness of baked goods and creates moist cakes, biscuits and muffins. Baked goods made with olive oil stay fresher longer (The Culinary Institute of America, 2011).

SOYBEAN OIL is a vegetable oil extracted from the seeds of the soybean (*Glycine max*). It is one of the most widely consumed cooking oils. Soya bean oil is widely used oil and is commonly called ‘vegetable oil’. It contains natural antioxidants which remain in the oil even after extraction. These antioxidants help to prevent the oxidative rancidity (Poth, 2001).

Soya bean oil is a very healthy food ingredient it is very popular because it is cheap, and has a high smoke point. Soya bean oil does not contain much saturated fat. Like all other oils from vegetable origin, soya bean oil contains no cholesterol. Saturated fat and cholesterol cause heart diseases and mainly found in products from animal origin such as milk, cheese and meat products (Poth, 2001). Soybean oil is mostly used for frying and baking. It is also used as a condiment for salads. Soybean oil's clean; natural taste and nearly imperceptible odor support and enhance the natural flavours of prepared foods. Whether used as a shortening for old-fashioned pie crust or blended with a flavoured vinegar for a new dressing, soybean oil's neutral flavour lets the real taste of the food product come through (The Culinary Institute of America, 2011).



PASTRIES are made with 'shortening' (any fat that is solid at room temperature and used in baking). The fat is added into the flour. The molecules of fat surround the flour particles and exclude water. This prevents the development of gluten in the dough. The fat is said to shorten the dough. Any increase in water in the mixture will tend to encourage development of gluten, which will make biscuits hard and pastry heavy.

According to Young, (2001). Types of pastry include :

1. Short crust (plain, rich, flan, cheese and whole meal)
2. Suet crust
3. Rough puff
4. Flaky
5. Puff
6. Hot-water crust
7. Choux
8. Filo (or strudel)

SHORT PASTRY: Short pastry is a soft, tender pastry that is made from flour, fat, salt and water. It is made by mixing the fat and flour together, adding water and then rolling the paste. It is cooked at 180°C. Different types of short pastry are used for different foods. These include pastries which have a crumbly rather than a flaky texture shortcrust, flan pastry (also called biscuit crust) and suetcrust. Shortcrust is the most widely used type, being employed for a great variety of pies, tarts, turnovers and pasties, both sweet and savoury. Flan pastry is used for sweet tarts, etc., and suetcrust for sweet and savoury puddings, which may be steamed, boiled or baked. Cheese pastry is another short type used for making cheese straws. Short pastry is used to make meat and other savoury pies. Short sweet pastry with added sugar, and sometimes eggs, is used to make fruit pies, christmas mince pies and other sweet recipes for desserts.

HOT WATER CRUST PASTRY: This is a type of pastry made by melting lard in boiling water and pouring the mixture onto the flour. It is kneaded to dough and used for 'raised pies'. The pastry is placed in a special mould, or moulded around a suitable container before being filled with veal, ham or pork filling to make a traditional hot-water crust pastry pie.

FLAKY PASTRY : Probably the commonest of the flaked types, it can be used in many sweet and savoury dishes; sausage rolls and pies are particularly popular. Good flaky pastry is judged by the evenness of the flakes when it is cooked, and the rolling and the even distribution of the fat are two important factors in achieving this result.

ROUGH PUFF PASTRY: Similar in appearance and texture to flaky although not quite so even. It is quicker and easier to make and can be used instead of flaky in most recipes (popular for Eccles cakes and mince pies).

PUFF PASTRY: Puff pastry is light, flaky and tender. It is made by mixing flour, salt, a little fat and water to form dough. The dough is then layered with fat, preferably butter, to form hundreds of layers of fat and dough by folding and rolling. When it is baked, water from the dough turns into steam and puffs up the pastry to produce lots of flaky layers. The richest of all the pastries. It gives the most even rising, most flaky effect and crispest texture. It should be handled very carefully. It is used for vol-au-vents and teatime pastries such as cream horns. Puff pastry is used for pies and vol-au-vents and can be filled with meat or fruit and spices.



CHOUX PASTRY: Choux pastry is a paste prepared by beating eggs into a thick mixture of flour, fat and liquid. The eggs cause the pastry to swell in cooking. It is used chiefly for Éclairs, profiteroles, cream buns, rich fancy cakes and savoury or sweet fritters.

FILLO / STRUDEL PASTRY: This is a form of pastry which is very popular in Greece, Austria, Germany and central Europe generally and has become fashionable in Britain over recent years. It is made from a soft dough which is stretched out by hand until paper-thin, covered with a variety of fillings (e.g. apple, black cherries, nuts, poppy seeds, cheese and vegetables) and rolled like a Swiss roll.

Food processors are known to use industrial fat in many different food products. A typical example of such fat, is otherwise known as margarine in the food industry. While industrial fat is known to have certain beneficial factors upon which it is used in the food industry and fast food outlets, its prolonged usage is believed to lead to arteriosclerosis. This is also associated to elevations in the low density lipoprotein cholesterol which can affect humans upon long time consumption. It is in view of this, that this study was carried out to look for substitutes for the industrial fat, and examples are the soya oil and olive oil respectively. The research work was also aimed at improving health challenges even with the consumption of confectionary fast foods.

2. MATERIALS AND METHODS

Olive oil (Alaco Extra Virgin Olive Oil), soya bean oil (UAC Grand Pure Soya Oil) and industrial fat (Topper Holland Margarine) were sourced from open market in Lagos metropolis, southwest Nigeria. Other materials used were flour, salt, baking powder and water. Equipment used include gas oven, baking trays, wire cooling racks, pastry board, work table, mixing bowls, weighing scale, measuring spoons, hand gloves and napkins. Five different samples of short crust pastry were baked in this study, the varieties were produced using 100% Margarine, 100% olive oil, 100% soya bean oil, 50% olive oil plus 50% margarine, and 50% soya bean oil plus 50% margarine respectively. The sample baked with 100% margarine was used as the control. The recipes used in baking the short crust pastry are presented in Table 1.

TABLE 1. RECIPE FOR SHORT CRUST PASTRY

Ingredients	100% Margarine	100% Olive oil	100% Soya oil bean	50%Olive oil +50% Margarine	50%Soya bean oil + 50%Margarine
Flour	400g	600g	600g	500g	500g
Salt	¼ tsp	¾ tsp	¾ tsp	¼ tsp	¼ tsp
Margarine	200g	-	-	100g	100g
Olive oil	-	200g	-	100g	-
Soya bean oil	-	-	200g	-	100g
Baking powder	1 tsp	1½ tsp	1½ tsp	1¼ tsp	1¼ tsp
Water	8tbs	24tbs	24tbs	12tbs	12 tbs

*g ; grams, *tsp ; tea spoon, *tbs ; table spoon.



Flour and salt were sifted into a bowl. The margarine/oil was rubbed in until the mixture resembled breadcrumbs. A hole was made in the middle, water was added and binded to a firm but pliable dough. Dough was chilled to relax for 10 minutes. Then rolled out on a dusted board cut into shapes. Placed on greased baking tray, then baked at 200c /400/ gas 6; in a steamy oven for about 20-25 minutes.

3. RESULTS AND DISCUSSION

Analytical methods of AOAC (2000) was used to determine Proximate composition, fatty acid content, anti nutrient and sensory quality of the short crust pastry were determined respectively.

Table 2. Proximate Composition Of Short Crust Pastries Containing Different Types Of Oil

Proximate composition	100% Margarine	100% Olive oil	100% Soya bean oil	50% Olive oil + 50% Margarine	50% Soya bean oil + 50% Margarine
Crude protein (%)	8.34c	9.46b	10.42a	10.05ab	10.37a
Fat (%)	15.48c	16.69b	17.32a	17.16a	17.23a
Ash(%)	4.96b	5.50b	6.33a	6.16a	6.24a
crude Fibre (%)	0.14c	0.20c	0.51a	0.46b	0.54a
Moisture content (%)	21.70a	23.7a	13.67d	19.90c	20.07b
Carbohydrate (%)	46.38a	44.40c	46.85a	46.27a	45.55b

Means with different letters across same rows are significantly (P<0.05) different

3.1 Crude Protein

The crude protein (CP) contents obtained in the short crust pastries are presented in Table 2. The samples, containing 100% soya bean oil, 50% soya bean oil plus 50% margarine and 50% olive oil plus 50% margarine had higher (p<0.08) CP contents of 10.42%,10.37%and10.05% respectively. The least CP content was however obtained in the sample containing 100% margarine (8.34%).However, the higher CP values in sample containing 100% soya bean oil underscores the importance of soya beans as oil leguminous grain which contains higher crude protein content in the range of 40 – 46% (German and Sherrington, 2008).

3.2 Fat

Statistically significant (p<0.05) changes were obtained in the fat contents of the short crust pastries prepared in this study (Table 2) , with high fat contents of 17.32%, 17.33% and 17.16% obtained in the samples containing 100% soya bean oil, 50% soya bean oil + 50% margarine and 50% olive oil plus 50% margarine respectively. Samples containing 100% olive oil and 100% margarine based however gave the lowest fat contents of 16.89% and 15.48% respectively.

From the results obtained, the higher fat contents in the samples containing combinations of margarine with addition of soya bean oil or olive oil can be attributed to the high oil contents of soya bean and olive oil respectively. Nevertheless, the increases in the fat contents in the samples containing soya bean oil and olive oil in this study partly imply likely elevation in levels of monounsaturated and poly unsaturated fatty acids, and a reduction in saturated fatty acids. According to German and Sherrington (2008), olive oil contains 73% monounsaturated fatty acids, 15% saturated fatty acid, while hard margarine has about 31% saturated fatty acids, 37% monounsaturated fatty acids and 13% polyunsaturated fatty acids. Increasing monounsaturated and polyunsaturated fatty acids in the diet can also lower LDL cholesterol. The use of soya bean oil, canola oil and olive oil in pastries making can increase intake of



monounsaturated oil.

3.3 Ash

The ash contents in the short crust pastries (Table 2) containing 100% soya bean oil, 50% olive oil plus 50% margarine, 50% soya bean oil plus 50% margarine oil however, gave higher ($p < 0.15$) ash values of 6.33%, 6.10% and 6.24% respectively 100% margarine and 100% olive oil based sample gave lower ash contents of 4.95% and 5.5% respectively. The increases in the ash values in this study suggest that the use of soya bean oil and olive oil in pastries making can lead to higher availability of food minerals. Apata (1990) reported that ash content of food products are indicative of their mineral contents. These increases in ash values can also be partly attributed to the fact that soya bean, being a grain legume, is rich in food minerals, both microminerals and macro minerals (Gordon, 2003). Minerals such as calcium, phosphorus, iron, and magnesium are all reported to be high in grain legumes (Ologhobo, 1992)

3.4 Crude Fibre

In Table 2, the crude fibre contents of the short crust pastries ranged between 0.14% in sample containing 100% margarine 0.54% and that containing 50% soya bean oil plus 50% margarine. The results obtained suggest minimal contributions of the various oils to the crude fibre contents of samples. Nevertheless, the slight increases in the crude fibre contents partly suggest a tendency for consumption of such food products to reduce diseases of the alimentary tract such as diverticular diseases (small bulges in the wall of the large intestine), cancer of the colon and haemorrhoids (piles).

Further, when enough fibre is consumed, its water – retaining property helps enlarge and soften the stool, easing elimination. Basically, the larger stool size stimulates the intestinal muscles that promote peristalsis. Consequently, less pressure is needed to expel the stool. However, when too little dietary fibre is eaten, the opposite can occur the stool may be small and hard. Constipation may result, requiring strong pressures to move the stool in the large intestines during elimination.

3.5 Moisture Content

Table 2, shows the short crust pastries containing 100% margarine and 100% olive oil having the highest significant ($p < 0.05$) MC of 24.70% and 23.70% respectively. The least MC was however obtained in sample baked containing 100% soya bean oil (18.67%).

These MC values seemed to be relatively higher across the samples, the addition of 100% soya bean oil and its combination with margarine seemed to have a slight reducing effect.

Nevertheless, the relatively high MC can predispose short crust pastries to quick microbiological deterioration (Lutz and Prytulski, 2008) reported on a combined effect of high moisture and enzymes present on food deterioration.

3.6 Carbohydrates

Table 2, reveals that the short crust pastries containing 100% soya bean oil, 100% margarine and blend of 50% olive oil plus 50% margarine gave higher ($p < 0.05$) carbohydrate value of 46.85, 46.38 and 46.27 respectively. However, the blend of 50% soya bean oil plus 50% margarine and 100% olive oil based samples gave lower carbohydrate contents of 46.55 and 44.40 respectively.



Table 3: Fatty Acid Composition of the Short Crust Pastries

FATTY ACID(%)	100% Margarine	100% Olive oil	100% Soya bean oil	50% Olive oil + 50% Margarine	50% Soya bean oil + 50% Margarine
Oleic acid	12.34d	15.53a	14.15c	14.40bc	14.71b
Linoleic acid	1.84	2.65	2.27	2.35	2.30
Myristic acid	10.66d	8.16a	7.67c	8.15b	8.22b
Capric acid	2.21c	4.07a	3.07b	3.46b	3.40b

Means with different letters across same rows are significantly (P<0.05) different

3.7 Oleic Acid

Among the short crust pastries (Table 3), oleic acid concentration was high ($p < 0.05$) the sample containing 100% olive oil (15.53%). Other samples had oleic acid ranging from 12.34% to 14.71%, with the least value obtained in the sample containing 100% margarine respectively.

3.8 Linoleic Acid

Linoleic acid content obtained in the 100% olive oil - based short crust pastries 2.65%, while in the 50% olive oil and 50% margarine and 50% soya bean oil and 50% margarine – based , the linoleic acid contents were 2.35% and 2.30% respectively.

3.9 Myristic Acid

A high significant ($p < 0.05$) value of myristic acid contents were higher ($p < 0.05$) in samples containing 100% olive oil (10.16%); 50% soya bean oil+ 50% margarine (8.22%) and 100% soya bean oil (7.67%) respectively. The lowest myristic acid content was however obtained in the 100% margarine -based sample (6.66%).

3.10 Capric Acid

In Table 3, the short crust pastry containing 100% olive oil had the highest significant ($p < 0.05$) capric acid content of 4.07%. The samples containing 50% olive oil plus 50% margarine, 50% soya bean oil plus 50% margarine and 100% soya bean oil however had with similar ($p > 0.05$) capric acid contents of 3.46%, 3.40% and 3.07% respectively.

Gordon,(2003) reported that of all saturated fatty acids, myristic acid , lauric and palmitic acids are the primary contributors to elevated blood cholesterol, and so contribute to cardiovascular disease.

Table 4: Phytate Content In Short Crust Pastries

PHYTATE (%)	100% margarine	100% Olive oil	100% soya bean oil	50% olive oil + 50% margarine	50% soya bean oil + 50% margarine
PHYTATE (%)	0.005c	0.008a	0.008a	0.008a	0.007b

Means with different letters across same rows are significantly (P<0.05) different

Negligible amounts of phytate ranging from 0.005% to 0.008% were obtained in the short crust pastries. Phytate content was higher in samples containing 100% olive oil, soya bean oil and 50% olive oil plus 50% margarine (0.008% respectively). The least amount of phytate was however obtained in the sample containing 100% (0.005%) margarine.



Phytate is known to reduce the absorption of calcium and is responsible for the anticalcifying and rachitogenic properties associated with cereal grains. Phytate also reacts with proteins to form phytate – complex.

SENSORY QUALITIES

Twenty (20) taste panelists were selected and trained for the sensory exercise. According to Iwe (2002), sensory methods and analysis the taste panelist were asked to assess the short crust pastries for these attributes; appearance, taste, texture, flavour, crispiness, crumbliness and overall acceptability on a nine point hedonic scale.

TABLE 5. SENSORY QUALITY OF SHORT CRUST PASTRIES

SENSORY INDICES	100% Margarine	100% Olive oil	100% Soya oil	50% Olive oil + 50% Margarine	50% Soya oil + 50% Margarine
Appearance	6.90	6.60	7.20	7.10	7.15
Taste	7.05	6.60	6.75	6.80	6.70
Texture	7.30	6.85	6.65	6.65	6.75
Flavour	6.65	6.85	6.80	6.45	6.50
Crispiness	6.30	6.15	6.10	6.30	6.50
Crumbliness	6.30	6.55	6.00	6.40	6.25
Overall acceptability	7.10	6.85	6.70	6.80	6.85

Means across the same rows are not significantly ($P>0.05$) different

4. DISCUSSION

4.1 Colour

Non – significant ($P>0.05$) differences in colour scores were obtained across the short crust pastries. Table 5, The colour scores obtained in short crust pastries samples prepared from 100% margarine, 100% olive oil, 100% soya oil, 50% olive oil plus 50% margarine, and 50% soya oil plus 50% margarine were 6.90, 6.60, 7.20, 7.15 and 7.15 respectively.

4.2 Taste

The taste attribute scores among the short crust pastries (Table 5) showed sample prepared from 100% margarine having the highest (not significant $p>0.05$) score of 7.05. Other short crust pastries had taste scores ranging from 6.60 to 6.70 respectively.

4.3 Texture

From Table 5, texture attribute of the short crust pastries showed that the sample prepared from 100% margarine had the highest (not significant, $P>0.05$) texture score of 7.30. The texture score however reduced to values ranging from 6.65 to 6.85 in other short crust samples in this study

4.4 Flavour

Table 5, shows statistically that the flavour attribute was higher in the sample prepared from 100% olive oil having the highest (not significant, $P>0.05$) score of 6.85. Short crust pastries prepared from 100% margarine, 100%soya oil, 50% olive oil plus 50% margarine, and 50% soya oil plus 50% margarine had flavour scores of 6.65, 6.80, 6.45 and 6.30 respectively.



4.5. Crispiness

Data obtained on the crispiness attribute of the short crust pastries (Table 5) showed samples prepared from 100% margarine and, 50% olive oil plus 50% margarine having the highest (not significant, $P>0.05$) but similar score of 6.30. Other short crust pastries had crispiness scores ranging from 6.10 to 6.15 respectively.

4.6. Crumbliness

Table 5, the highest score of crumbliness attribute among the short crust pastries was obtained in sample prepared from 50% soya oil plus 50% margarine having the highest score (not significant, $P>0.05$) of crumbliness of 6.50. Others had scores ranging from 5.80 to 6.25.

4.7 Overall Acceptability

In Table 5, overall acceptability among the short crust pastries samples prepared from 100% margarine had the highest acceptability score of 7.10. Followed in sequential order were short crust pastries prepared from 50% soya oil plus 50% margarine (6.85), 100% olive oil (6.85), 50% olive oil plus 50% margarine (6.80) and 100% soya oil (6.70) respectively. These scores were however not significantly ($P>0.05$) different.

5. CONCLUSION

The results obtained in this study revealed better sensory quality for the the short crust pastry containing 100% margarine. However, the use of 100% margarine should be reduced in confectionary industry. The higher sensory indices obtained for the short crust pastry prepared with 100% margarine were not striking enough to outweigh the nutritional benefits of the oils that are likely to be obtained upon consumption of the short crust pastry containing 100% olive oil and 100% soya oil. The use of 100% margarine in making short crust pastries showed higher composition of saturated fatty acids, myristic acid and capric acid, which is believed to lead to increase in low density lipoprotein cholesterol thereby giving room to cardiovascular diseases upon prolonged consumption. The use of 100% margarine should be reduced in confectionary industry. The higher sensory indices obtained for the pastry prepared with 100% margarine were not striking enough to outweigh the nutritional benefits that are likely to be obtained upon consumption of the pastry containing 100% olive oil and 100% soya oil.

6. RECOMMENDATION

From the finding in this study, the following recommendations are thereby made

- I. The use of soya bean oil or olive oil should be encouraged in food or confectionary industry. These oils contain healthy unsaturated fatty acids which the body benefits from. (Lower cholesterol and lower the risk of heart problems).
- II. The use of margarine should be moderated. Margarine acts as shortening for the production of confectionary food, margarine also contain saturated fatty acids which are essential for health ,but too much of these fats can lead to heart disease.
- III. Blends of 50% olive oil and 50% margarine; or 50% soya bean oil and 50% should be adopted in recipes for pastries. Using unsaturated fats to replace saturated fats in diet can decrease blood cholesterol levels, improve overall health and reduce risk of experiencing an untimely death as a result of heart disease.



REFERENCES

1. Apata, D.F. (1990). Biochemical, Nutritional and Toxiological Assessment of some tropical seeds.Ph.D. Thesis. University of Ibadan.
2. Brennan, C. (1994). "Breakthrough in Fats and Oils Technology Boosts Product Quality and Process Flexibility." Food Engineering,pp. 63-64.
3. Ehad, G.,Daniel,J.S.,Jacob, S.,and Mina, W. (1997). "Evidence for Earliest Olive-Oil Production in Submerged Settlements off the Carmel Coast, Israel", Journal of Archaeological Science 24:1141–1150 (1997); Pagnol, p. 19.
4. Gaman, P.M. and Sherrington, K.B. (2003). Food Science. 4th Edition Gford. Butterworth Heineman.
5. Gordan, M.W. (2003).Contemporary Nutrition. Mc Graw Hill companies. Pg 127.
6. Iwe, M. (2002). Hand book of sensory methods and analysis Rejoint Communication service Ltd, 65 Adebisi Str. Uwanni-Enugu. pg 1-23
7. Lutz, C. and Prytulski, K.(2008). Nutrition and Diet Th3erapy. 4th Editon Jaypee Brothers.Medica Publishers. New Delhi Pp 312.
8. Ologhobo, A.D. (1992). Nutritive value of some tropical (West African) legumes for poultry. Journal of Appl. Animal Resources. 2:93-104
9. Poth, U. (2001). "Drying Oils and Related Products". Ullmann's Encyclopedia of Industrial Chemistry. Internet retrieved May 11, 2019.
10. The Culinary Institute of America , (2011). The Professional Chef. New York: Wiley. Internet retrieved May 21, 2019.
11. Young, J. (2001). Functional bakery products: current directions and future opportunities. Food Ind. J., 4: pp136-144.