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Significance of PUFA and blending impact on physiochemical and nutritional properties of edible oil: A review

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Abstract

Oil blending can be regarded as a modern way of natural enhancement. This technique brings out excellent results in the modification of positive traits. The object of the present review article is to illustrate the importance of balanced dietary polyunsaturated fatty acids (PUFA). The ideal dietary ratios of omega-6 to omega-3 essential fatty acids emphasize naturally modifying the edible oils through blending. In this natural modification, no chemical or practically complex procedures were adopted, i.e., Hydrogenation, interesterification, and fractionation. Careful oil blending can also provide the exact or nearly the same ratios of PUFA as recommended by Global health-related organizations. This review article will discuss the possible issues related to the quality of edible oils, which directly influence health, storage, and cooking attributes. It will also highlight their natural solutions by blending with many different oil mixtures linked to the superior chemical, physical, and nutritional functions of PUFA, mainly omega-3 and omega-6. Moreover, the discussion highlights blending outcomes and provides details about the mechanism, global intake recommendations, and the importance of this innovative technique in achieving milestones in the future of food technology.

Keywords: Blending, PUFA, nutritional attributes, hydrogenation, Food technology, omega-3

Highlights

- Role of polyunsaturated fatty acids (PUFAs) on human health
- methods and techniques about the quality of the oil
- The quality of edible oils, which directly influence health, storage, and cooking attributes
- Blending outcomes and provide details about the mechanism,

1. INTRODUCTION

Fats and oils are the third most essential macromolecules after protein and carbohydrates. Many studies have been conducted to identify the best mixture of oils, which gives the desired physiochemical properties. Different kinds of oils with varying health benefits can be blended to maximize their physical, physiochemical attributes, making them more nutritious and resistant to oxidation. Past studies have signified that in many countries, the consumption of polyunsaturated fatty acids (PUFAs) by children, adults, and adolescents is far less than what is recommended by food and agriculture organizations/world health organizations. It is recommended to consume essential fatty acids, more importantly, polyunsaturated fats, due to their vast health benefits. The term primary means that the body needs its consistent supply through foods vital to maintaining the proper body functions. Vegetable oils are more health-friendly as compared to animal fat because of their lower cholesterol levels. Past studies have demonstrated that consuming the approved levels of essential fatty acids should be focused on in meals.

This article aims to bring valuable aspects of oil blending into more prominence way. Previous studies primarily focused on making the oil more resistant; many oils were blended with positive results in their newly formed physical and physiochemical attributes but rarely focused on meeting international standards of approved ratios of essential fatty acids. Some edible oils have minimal application due to their inferior chemical, nutritional, and physicochemical attributes. The properties of oils are modified mainly by using the four main methods usually practiced in the food industries, interesterification, fractionation, hydrogenation, and blending, to boost their quality traits (Nor Aini, & Noor Lida, 2005).

The consumption of saturated fats in daily diet is the leading cause of coronary heart diseases. The research has signified that consuming higher levels of unsaturated and polyunsaturated fatty acids can play a fundamental role in preventing the human body from coronary heart diseases (Ramsden, et al., 2013). Talking about the significance of consuming healthy ratios of omega-3 and omega-6, (Lands, 1992; Okuyama, 2001) also found that a suitable ratio of omega-3 and omega-6 consumed by human beings daily is the key to good cardiovascular health, besides that, the total ratios of omega-3 and omega-6 directly influence the inflammatory and homeostatic processes of bodies. Any change in the ratios directly influences the metabolic and inflammation rate of the body (Tribole, 2007). Whereas the presence of n3 polyunsaturated fatty acids (PUFA), including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are the signs of favorable health outcomes. The focus should always be on the consumption of a balanced fatty acid diet. Omega-3 fatty acids are shown direct influence and contain anti-inflammatory traits and antioxidant properties, while omega-6 fatty acids are linked with pro-inflammatory features, so consuming a high omega-3/omega-6 ratio can harm

health in many ways (Simopoulos, 2011). Fish oil is observed as one of the ideal and well-known sources of omega-3. Epidermal studies have proved that dietary consumption of omega-3 through fish sources has an inverse corelation with the prevalence of depression (Hibbeln, 1998; Smith, et al., 2014) hence omega-3 fatty acid has sound protective effects.

In the developing population, the regular human diet consists of a ratio of omega-3 /omega-6 as 1:1, western diets have approximately a ratio of 15:1, this shows that the diets have insufficient dietary consumption of omega-3 and much higher dietary intake of omega-6 (Simopoulos, 2008), sticking to a western diet can lead to widespread symptoms of depression (Jacka, et al., 2004). Depression is regarded as the leading concern being faced by the modern world, and it has direct links with mood disorders. Case-control studies have demonstrated that people with depression possess much low levels of omega-3 and much higher levels of omega-6 fatty acids than healthy controls (Lin, et al., 2010). Another significant issue is the oxidation and rancidity of edible oils. Edible oils which contain excessive amounts of unsaturated and polyunsaturated fatty acids such as omega-3, omega-6, or omega-9 are more prone to oxidative rancidity, and oil blending can be a powerful solution. Research proved that virgin olive oil could be made thermally more stable if blended with palm oil when the total composition of olive oil is not more than 20% (Leonardis & Macciola, 2012).

1.1. Importance of the polyunsaturated fatty acids

The polyunsaturated fatty acid category is regarded as the integral category of fatty acids, including omega-3, omega-6, and omega-9 fatty acid, with especially omega-3 and omega-6 are believed to play fundamental roles in the development and maintenance of human bodies. Omega-3 and omega-6 fatty acids belong to a fatty acid category that humans cannot produce and should be served through diet (Borup, 2012). Many symptoms could occur when the body faces an insufficient or irregular supply of these essential fatty acids. Hence, these polyunsaturated fatty acids are regarded as essential factors from the medical point of view. Linoleic acid 18:2 omega-6 and alpha-linoleic acid 18:3 omega-3 are the primary fatty acids belonging to the category of long-chained fatty acids. Linoleic acid (LA) can be metabolized to specific widely essential LC-PUFA arachidonic acid (AA) 20:4 omega-6 fatty acid through a complex chain of desaturation and elongation reactions. The names are given according to the location of the first double bond from the methyl end of the molecule (Simopoulos, 2011).

In contrast, Alpha-linoleic acid (ALA) can be converted to eicosapentaenoic acid (EPA) 20:5 omega-3 and docosahexaenoic acid (DHA) 22:6 omega-3 fatty acid (Haag, 2003). The same desaturases and elongases cause the transformation of Linoleic acid (LA) and Alpha linoleic acid, and in this reaction, the delta-5 and delta-6 desaturases are major rate-limiting enzymes (Cho, et al.,1999; Cho, et al., 1999). On the other hand, these enzymes possess a higher affinity for omega-3 derivatives than omega-6 derivatives (Simopoulos, 2009; Emken, et al., 1994). This process creates competition among Linoleic acid and Alpha Linoleic acid to convert to LC-Polyunsaturated fatty acids. Their long-chained derivatives play essential roles; most importantly, the health benefits of EPA and DHA have great importance because these materials are known as omega-3 fatty acids functionality. EPA is known to have sound effects on blood circulation, and it is helpful against blood cholesterol (LDL).

In comparison, DHA is a component that consists of the optic nerve and brain tissue. It is regarded to have good effects on brain functionality. In fatty acids, omega-3 fatty acids are well known for their anti-inflammatory effects, anti-arrhythmic effect, and anti-thrombotic effect, while omega -6 fatty acids have the potential to cause inflammations and forming thrombus. Universal dietary recommendations for EPA and DHA from some public health-related organizations can be seen in Table 1.

Table-1: Universal EPA and DHA recommended intakes (reviewed on 16th April 2014)

Organization / Institute	Type	People	Recommended intake
World Health Organization (WHO) (WHO/FAO, 2002)	Authoritative Body	General adults	n-3 PUFAS: 1-2% of energy/day
Food and Agriculture Organization of the United Nations (FAO) (FAO, 2010)	Authoritative Body	0-6 Months 6-24 months 2-4 months 4-6 months 6-10ears Pregnant/breastfeeding Women	DHA: 0.1- 018%E DHA: 10-12 mg/kg body weight EPA+DHA: 100-150 mg EPA+DHA: 150-200 mg EPA+DHA: 200-250 mg EPA+DHA: 0.3 g/day of which at least should be 0.2 g/day
International Society for the Study of Fatty Acids and Lipids (ISSFAL)	Skilled Scientific Organization	General adults for the cardiovascular health (Report, 2004) Pregnant/Lactating Women (Koletzko, et al., 2007)	At least 500 mg/day of EPA+DHA DHA: 200 mg/day
NATO Workshop on w3 and w6 Fatty Acids (Simopoulos, 1989)	Workshop	General Adults	300-400 mg EPA+DHA /day
World Association of Perinatal Medicine (Koletzko, et al., 2008)	Working Group	Pregnant and Lactating Women Newborns, if breastfeeding can't be done	200 mg DHA/day 0.2-0.5% weight total fat
World Gastroenterology Organization (WGO, 2008)	Skilled Scientific Organization	General Adults	3-5 servings/week of fish

1.2. Importance of oil blending

Vegetable oils with various physical and chemical attributes can be blended together to make a new mixture with desired physical and chemical traits. Using an unmixed, pure oil might have some deficiencies in oxidative and nutritional parameters; for instance, using pure olive, sesame, and safflower oil has specific deficiencies in linolenic acid (w3). Similarly, soybean and canola oil have sufficient amounts of linolenic acid, but oxidative stability is low. The oxidative stability of palm oil is high, with much lower essential fatty acids and a relatively high percentage of saturated fatty acids. Meanwhile, it is also allowed to use an oil combination of one commonly used edible oil with a conventional oil to get the desired results. For example, Oil extracted from rice bran is well known for meeting industrial demands by controlling costs (Choudhary, 2015).

Consequently, using a mixture of oils possessing different characteristics can be much more beneficial to health and stability. In recent years, the western diet has changed remarkably, with a massive reduction in the dietary consumption of omega-3 polyunsaturated fatty acid and an increase in the dietary consumption of omega-6 fatty acid (Simopoulos, 2009). This gave rise to an average ratio of omega-3 to omega-6 fatty acid as 15-20:1 in a regular western diet (Simopoulos, 2009; Logan, 2003), which is a sign of health problems prevailing in the population. This consumed ratio differs sharply from ideal ratios recommended by the panel of lipid experts (Simopoulos, et al., 1999). There is a need to bring changes to this ratio to keep a healthy and well-balanced life. Total fatty acids of the edible oils cannot fulfill the international standard patterns because consumable oil's total fatty acid profile changes from oil to oil. It is controlled by the total saturated fatty acids, monounsaturated fatty acids, and polyunsaturated fatty acids (Siddique, et al., 2010). The latest research and information showed that high fats affect cardiovascular status, which is ultimately controlled by fatty acid profile and P:S (polyunsaturated and saturated fatty acids) ratio. Both of them are adjusted by the fatty acids Rao, 1994). The significant aspects of blending are finding the best edible oil combination and then blending them to improve the deficient traits and developing a nutritionally superior oil that matches the recommended ratios of the fatty acids and its reliable influence on the shelf lives.

1.3. Effects of blending on physical properties

Combining ideal fats/oils with a blend of properties offers a brand new oil with advanced functional attributes and properties inside the final product. For example, few oils, when cooled, undergo color change and crystallize. There is no single oil that possesses the ideal traits of nutritional, sensory, oxidative resistance. Hence there is an excellent need to produce a brand new oil that possesses superiority in these properties; that's when oil blending finds its importance in many food industries to purchase the oil with improved nutritional and physiochemical properties (Hashempour-Baltork, et al., 2016). Research shows that mixing certain oils with better and more unsaturated oils produces an extra

stable and clean blend, which is much more stable than individual oils when stored (Roiaini, et al., 2015). Mixing fat/oils leads to desirable adjustments in the triacylglycerol profile.

Consequently, it leads to desirable modifications in the physical parameters of oils, including cloud point, solid fats contents, improvement in sensory profile, smoke point viscosity, and density (Bakhtiary, 2014; Roiaini, et al., 2015; Serjouie. et al., 2010). Most consumers tend to choose a product having better sensory properties than worrying about the nutritional properties (Bakhtiary, 2014). Oil blending has many critical functions in the sensory parameters of the end product. Specific chemical reactions occur in edible oils when they undergo fryings, such as oxidation, hydrolysis, thermal decomposition, and isomerization. These reactions directly affect the sensory attributes of the foods stuff. These chemical reactions may have adverse effects that increase when the oil is fried (Sadoudi, et al., 2014). Thus, selecting the best possible oil blend is significant to limit these kinds of reactions, which deteriorate the oil quality. The combination should be made that ensures the best nutritional and stability traits are imparted into the end product.

The odor profile can also be changed through oil mixing (Ravi, et al., 2005). Organoleptic acceptability tests on various oil mixtures have concluded that blending different oils can normalize the overall properties of individual oil and helps in giving off the desired product. For instance, sesame oil possesses a high antioxidant profile while the sensory profile is weak. Hence this oil is good for health, but frying traits are poor, which can be hazardous to health in the longer run. When palm oil is mixed, this problem finds its solution enriches the aroma, flavor, crispness, and frying attributes. It is also known to blend sesame and palm oil to get better quality and health-friendly potato chips due to their better frying quality (Abdulkarim, et al., 2010; Bakhtiary, 2014). The study showed that even after five weeks of storage, the least flavor change and stability were observed when taro chips were fried in an oil blend of groundnut and palm oil (Emmanuel-Ikpeme, et al., 2007).

The color of the product directly affects the customer's acceptability. Naturally, every oil possesses a unique color that ranges from light to bright color. Bright colors are intense, while light colors are regarded as weak colors. Blending different kinds of oils can modify this color and normalizes it. Apart from this, the deposition of many oxidative compounds can cause an increase in color contrast and the brightening of oils. The past research has demonstrated that mixing a combination of oils that possess excellent stability will brighten color when the oil is subjected to deep-frying (Serjouie, et al., 2010; Wang, et al., 2016). When oils are subjected to heating, at some point, they produce smoke. Oils having high smoke points are best used for frying as compared to oils having lower smoke points. At this temperature, oil gives off smoke and produces many carcinogenic compounds that are health-hazardous. It is believed that the smoke point of the oils taken for cooking and frying must not be lesser than 170°C, and after repeated use, this temperature should not change by more than 50°C.

Mixing oils with a high balance and accurate nutritional profile is an excellent technique to decrease the levels of oxidation and viscosity. Mixing palm oil with rice bran oil, which incorporates high degrees of oryzanol and sitosterol, regarded as strong antioxidants, can reduce and sometimes inhibit the oxidation levels of formulated oil and reduce the viscosity increase when oils are used for deep frying (Valantina, et al., 2014). One good idea of producing edible oils with excellent stability and smoke point without hydrogenation and developing trans fatty acids is through blending. For instance, the blend of palm oil and sesame oil offers a perfect and stable oil that maintains its quality even after being fried many times with just a minor increase in viscosity. It is because palm oil has abundant saturated fatty acids, while sesame oil is rich in natural antioxidants, mainly sesamin and sesamol (Serjouie, et al., 2010). Through blending, a new mixture with viable viscosity can be produced because the added chemicals and blended oils will be free from each other (Siddique, et al., 2010)

1.4. Effects of blending on chemical properties

Oil blending is a natural technique of enrichment of edible oils. Different kinds of oils can be mixed together, which adds to the product's quality with respect to sensory and nutritional value, ultimately satisfying the consumer's demands (Chopra, 2004). Blending a variety of oils has direct effects on the overall fatty acid percentage. It is a common source of enriching the blend with health-promoting levels of natural antioxidants and bioactive lipids, which ultimately define the oil's superior nutritional and stability profile (Aladedunye & Przybylski, 2013). Overall, ratios of fatty acids can be altered by blending a suitable oil mixture; hence, it is regarded as a natural source of enrichment of saturated fatty acids without using the process of hydrogenation, which has harmful health effects because of the production of trans fatty acids (Padmavathy, et al., 2001). For instance, a blend of palm olein and canola oil has higher levels of tocopherols and an adequate ratio of fatty acid. This blend is beneficial during the frying of potatoes (Al-Khusaibi, et al., 2012). This technique is beneficial from the health point of view also, and it can affect any population in longer terms. Proper choice of oils in the blend influences the resistance of the blend against oxidation, which imparts a bad odor because of the formation of free fatty acids. Careful choice of oils for blending should be practiced; a suitable mixture of oils will give

a superior end product. The blend stability is directly affected by heat treatment. For instance, extra virgin oil is prone to heat treatment because of its sensitive nature; hence, if the oil blend contains more than 20% of this oil, the stability will be less (De Leonardis, & Macciola, 2012). Apart from that, oxidative stability is linked with heat treatment and related to the other components of the blend. For instance, if cold-pressed black cumin oil is blended with sunflower oil, it will have no effects on the overall fatty acid profile, but it will improve the oxidative stability of the blend. It is because the reason that the new combination has enhanced levels of thymoquinone and tocopherols (Kiralan, et al., 2017). Antioxidants present in the new blend will prevent the blend against oxidation. A detailed literature search revealed the mechanism of blending. It was stated that the blending of oils would have no changes in the chemical composition, and the physiochemical properties would remain stable (Chu & Kung, 1998).

Several uncommon oils used in blending can also be efficiently used as an economical and new practice to achieve good results. For instance, it has a low cost compared to other common edible oils and has an excellent tendency to replace common edible oils (Choudhary, 2015). The blending of several oils produces a brand new mixture and provides an economically cheap source of abundant fatty acids. According to many foods regulating authorities, many oils lack several essential fatty acids, and the ratios are also not ideal. Careful blending of these oils produces a nutritionally superior oil and produces a more resistant product to oxidation, which can be kept longer. Oxidation stability is regarded as one of the critical traits of any edible oil. For instance, rice bran oil is known for its high stability against oxidation, so this oil is most commonly used as salad and frying oil (Sohail, et al., 2017). The research work stated that making a mixture of soybean oil with 50-75% rice bran oil produces a blend that is not only resistant against oxidative rancidity but also hinders the hydrolytic activities during the frying process and storage such fried foods (Chotimarkorn & Silalai, 2008). Many other oils that are not commonly consumed have sound functional effects and many positive health-related effects in the blending process, e.g., mustard oil, moringa oleifera oil, coriander oil, camellia oil, black cumin oil, and garden cress oil (Anwar, et al., 2007; Gulla & Waghray, 2011; Mohamed, et al., 2014; Umesha & Naidu, 2012; Wang, et al., 2016).

1.5. Effects of blending on the nutritional properties

Not even a single edible oil is known to have optimal nutritional, oxidative stability, and sensory properties, therefore blending of vegetable oils using the best combination of oils is known as a unique technique in food industries to obtain a brand new oil mixture with enriched nutritional and the storage properties (Hashempour-Baltork, et al., 2016). The World health organization added three fundamental parameters for the nutritional assessment of oils: 1) Total antioxidants in oil, 2) ideal ratios of fatty acids, i.e., saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, 3) ratio of total essential fatty acids. World Health Organization has recommended a ratio of 1:1::5:1 for saturated: mono-poly-unsaturated fatty acids and 1:5-10 alpha-linolenic acid (omega-3): linoleic acid (omega-6) in the dietary intake (WHO, 2008, pp. 1-14). Because no specific oil has all the health-promoting requirements and perfect fatty acid combination, blending edible oils is an effective technique to enrich their fatty acid makeup and the physicochemical attributes (Choudhary, 2015). In recent years, the consumption and the usage of vegetable oils have grown by many folds since globalization, and growing awareness of consumers towards healthier dietary fat consumption and its health benefits that include fighting against cardiovascular and neurological diseases have played its role. Growing awareness has increased vegetable consumption, i.e., consumption of olive oil rose from 1.7 million tons in 199-1991 to 3.1 million tons in 2013-2014 across the globe (Cicerale, et al., 2016). Human beings cannot synthesize the essential fatty acids and, therefore, must be taken through diet. That's why many health organizations, including WHO, have given it much importance, primarily focusing on the ratios of essential fatty acids consumed by the population. These essential fatty acids play their roles in many health, maintaining activities, and fighting against many diseases. For instance, omega 3 and omega 6 essential fatty acids play many vital roles in maintaining healthy growth, fighting against cancer, preventing the body from cardiovascular diseases, and improving the immunity status. Omega 3 and omega 6 fatty acids are essential in our diet due to their beneficial effects against some diseases and led to the prevention and treatment of many diseases (Tortosa-Caparros, et al., 2016). Both these two (omega 3 and omega 6) essential fatty acids groups are capable of developing eicosanoid-signaling molecules (thromboxanes, prostacyclins, prostaglandins, and leukotrienes); without omega 3 fatty acids, the omega 6 eicosaniods are generally regarded as pro-inflammatory and have the tendency to cause not only high blood pressure but also capable of causing obesity, cardiovascular diseases, and arthritis. Hence, the proper balance in the ratios of essential fatty acids in the diet can control the eicosanoid functions. That's why a proper and well-balanced vegetable oil in terms of essential fatty acids comes into focus.

Cardiovascular diseases are directly or indirectly linked with the population's diet and significant issues of the modern world. Oils encompass an extensive variety of fatty acids. The various effects of oils having vast verities of saturated fatty acids and unsaturated fatty acids on cardiovascular diseases are well demonstrated. Consumption of palm

oil has a high amount of palmitic acid tends to raise the chances of cardiovascular diseases, as reported by the center of science in the public interest (Resource Library, 2005). A limited quantity of palmitic acid and saturated fatty acids should be consumed, as suggested by the world health organization (WHO, 2003). Effects of different fatty acids on health are well documented; they also affect the serum cholesterol level depending on the various types of the fatty acids; for instance, lauric acid, myristic acid, and palmitic acid are well studied. Among these, stearic acid shows only a small effect which can be neglected (Mensink, et al., 2003).

On the other hand, lauric acid shows a rise in serum cholesterol levels and HDL -C levels, and stearic acid was metabolized at an excellent speed to OA in vivo (Mensink, et al., 2003). There was a clinical trial completed consisting of a period of 3 weeks. In this trial, 59 people were picked and given high myristic acid-containing oil, palm oil, and high OA sunflower. During the three weeks of trials, the blood levels were tested, the total cholesterol referred to as (TC) 5.19, 4.96 and 4.52mmol/L, LDL-C 3.09, 2.98, and 2.6 mmol/L and HDL-C 0.56,0.54 and 0.62 mmol/L were observed. One of the notable facts was observed in another clinical trial that soybean oil was superior to corn oil and olive oils in decreasing the serum cholesterol level in a four-week trial because of the high percentages of polyunsaturated fatty acids present on soybean oil (Zock, et al., 1994).

Similarly, tests were conducted on rats, an apparent reduction in the low-density lipoprotein (LDL) cholesterol and serum triglyceride concentrations was seen when the blend of linseed oil and groundnut oil was used. Test results have shown that this blend has an excellent ability to be used as a brand new oil having a rich profile of omega-3 fatty acids (Sharma & Lokesh, 2013). Certain oils have sound antiproliferative and anti-inflammatory effects; for instance, sesame oils are known for their anti-inflammatory and antiproliferative effects on tumor cells, which are generally caused by tochopherol homologues Vitamin E (Rangkadilok, et al., 2010; Williamson, et al., 2008). Apart from that, this oil possesses many unbelievable health effects, but the oil is expensive, and thus, minimal usage is made in the food industries. It finds its solution through blending (sesame oil) with comparatively less stable oil such as soybean or sunflower. The newly formed blend will have improved stability and shelf life and be economically cheap and easily accessible (Bardhan, et al., 2014; Choudhury, et al., 1995). Healthy vegetable oil contains tocopherols, regarded as natural oxidants; these natural antioxidants stop the oxidation of fats and oils by trapping all the free radicals. These antioxidants are essential in providing stability and better shelf life during heating and frying (Tabee, et al., 2008).

Many oils tend to have positive health effects. For instance, bioactive lipids (phenolics and tocopherols) are richly present in oils extracted without using any chemical through cold pressing. Apart from that, certain antioxidative phenolic compounds have excellent efficiency in trapping free radicals, ultimately promoting health (Prescha, et al., 2014). Blend making and formation of an oil mixture depend on the application of the product, and through blending, a lot of brand new oils can be made, having enrichments in different attributes. The research on the high-linoleic sunflower oil showed that high linoleic sunflower's oxidative stability could be improved by blending with varying percentages of cold-pressed oils (Azadmard-Damirchi & Dutta, 2008). Many oils produce similar kinds of health benefits and sound effects on the levels of high-density lipoprotein (HDL) and Low-density lipoprotein (LDL), and blood triacylglycerol level (Choudhury, et al.,1995).

Similarly, many other combinations can also be experimented to enhance many valuable attributes. Economic values can also be considered while making a blend. Expensive oils can be blended with certain cheap oils to bring the cost down. Apart from that, a carefully studied blend of cheap oils can also be made superior in terms of nutritional and physiochemical profiles, which will be cost-effective and healthy from a national point of view. Olive and palm oil blend makes a new mixture with excellent nutritional, economic, and technological properties (Azadmard-Damirchi & Dutta, 2008). Generally, the blending of vegetable oil comes into play when enhanced nutritional and functional features are desired in the food industry (Chen, et al., 2007).

2. CONCLUSIONS

Daily consumption of balanced omega-3 to omega-6 is key to good health; higher omega 6 to omega 3 ratios lead to many health concerns, including inflammations. Ideal PUFA ratios in the diet promote and maintain a healthy life and play a fundamental role in mood changes and prevention against many cardiovascular diseases. The importance of oil blending in terms of improving storage stabilities and optimizing fatty acid compositions has always been regarded as a powerful solution. It is a natural and healthy technique to improve inferior oils' nutritional, physical, and chemical properties. The blending of oils enhances their physical attributes, including color, odor, viscosity, and chemical attributes include improvement in PUFA profile and resistance against oxidation. Blending improves the fatty acid attributes of the oils and maximizes many other important traits related to safety and shelf life. New blends have better storage lives and are more resistant to oxidation than pure oils. Many global health organizations have proposed different ratios of PUFA according to different classes of people, while very little attention has been given to this. Balancing the total amount of essential fatty acids and bringing the ratios to the recommended levels is needed to provide a balanced health-

promoting oil. Oils with low amounts of polyunsaturated fats (omega-3, omega-6, and omega-9) can be blended with specific oils to maximize the overall fatty acid profile of the nutritionally inferior oil. The primary aim of oil blending is to change the oil's fatty acid profile, which directly affects human health. Polyunsaturated fatty acids, especially Omega-3 and omega-6 fatty acids, have vast health benefits. Many public health-related organizations have recommended different ratios of these fatty acids obtained through the oil blending technique. Consuming such fatty acid ratios will prevent high cholesterol and heart diseases. Modern research has shown that a healthy omega-3 and omega-6 ratio is essential for better growth and prevention against inflammation, obesity, and many other health-related problems. Economically expensive oils can be blended with cheaper ones to bring down the prices and make them easily accessible for the consumer. New oils blends must have continuously experimented in search of perfection in the positive traits of oils. The blending technique is crucial from the consumption point of view and vital for continuous development and research point of view in food technology.

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Conflict of interest
It is declared that there is no conflict of interest among Authors

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