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A Study On Unmasking The Chemical Composition Of Oil In Street Kiosks

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Abstract: *Oily foods are being trendy and are consumed by most of the population. Oils used to prepare the food items are being reused to some extent. The use of oil can cause various disease conditions among the individual as there exist some chemical reactions that could spoil the quality of the edible oil used . In this study, the paper focuses on the prevention of continuous usage of edible oil that causes serious chronic health condition that leads to serious health issues .The study focus on the following objectives that are to detect the peroxide value of oil foods collected from street kiosks; to determine the saponification value of oil ; and to detect the iodine value of the oil collected from street kiosks. Initially selection of area is decided. In the study, Coimbatore district is considered as a whole, divided into Coimbatore - North, South, East, West on collecting different sample of reused oils .The analysis was done with titration method.and obtained with various values when compared with standard . On collection of all the required details the data is recorded in the form of a report. Report describes all the required information collected during the analysis on different aspects. On completion of the analysis the aim is to create awareness to the general public required to discard the oils that are being reused.*

Key Words: *Reused oils, free radicals, chronic health conditions, waste, lifestyle.*

1. INTRODUCTION:

In India, the consumption of edible oil is essentially a social phenomena. The Indian Council for Medical Research (ICMR) advises 12kg of edible oils per person per year, or 30g per person per day. Oil is a viscous liquid that is both hydrophobic and lipophilic at room temperature. This broad term includes compound classes with otherwise unrelated chemical structures, qualities, and applications, such as vegetable oils, petrochemical oils, and volatile essential oils (Bansal,2010).

Cooking oil is an essential component in many cuisines around the world, and the global demand for it continues to rise due to population growth, urbanization, and changing dietary habits. The economic impacts of the cooking oil industry are significant, with many countries relying on it as a major export commodity and providing employment opportunities. However, the industry also has negative effects, particularly on small-scale farmers and the environment (Jinfeng et al., 2011).

When compared to other edible oils seeds sesame has the highest oil content among the herbal oil crops, sesame oil is not a commonly used edible oil because of its low global production and inefficient processing technology (Yi et al., 2017).

Most frying procedures for fried meals are carried out at high temperatures (160°-195°C) in the presence of air, metal containers, and moisture, resulting in both thermal and oxidative breakdown of the oil (Bansal ,2010). Frying, including deep-frying, is one of the most favorable and popular methods of food preparation at home and in industries because of the desirable flavor, texture, and color that it produces in foods (Zhang , 2012).

Recycling food oils to save money and reduce waste is common, but its health safety is source of contention.Reused oil changes taste and has associated health risks. Vegetable oil degrades when heated, producing

smoke and odors. Reused oil may smoke and break down with more ease at lower temperatures than virgin oil. This can give food burnt or unpleasant tastes. Recycled oil is darker and more thick than new oil. Fresh and recycled oil vary chemically. Moreover, reused oil can lose nutritional worth and quality due to chemical changes (Neelakantan,2020).

The chemical alterations are accompanied by changes in oil appearance, such as increases in color, density, viscosity, and foaming.A typical method of food preparation is deep frying such as fast food, snack, and frozen pre-fried items. Fried dishes are significantly more popular today in many places and this is evident from the steadily rising number of .In recent years, fast food businesses and vendors have increased. High-temperature deep frying of food produces the welcoming golden colour, crisp texture, and unique flavour (Assiesa , 2004) .

Lipids always has a property to release flavour and other sensory attributes of the foods. Due to slow gastric emptying and intestinal motility, lipids impart the feeling of satiety (Ghobadi,2018).

1.1. OBJECTIVE :

- To detect the peroxide value of oil foods collected from street kiosks;
- To determine the saponification value of oil; and
- To detect the iodine value of the oil collected from street kiosks.

1.2. REVIEW OF LITERATURE :

Oils are an essential product for different cooking techniques .Several types of oils provide essential nutrients for humans and animals. While some people do not see the existing differences among varieties of cooking oils, the majority are aware of the type and health benefits of the oil they use for cooking. On the other hand, animal-based oils such as butter, cheese, and lard are obtained from animal products. Synthetic cooking oils can be pure or sometimes can have aromatic flavors of herbs and spices such as garlic and chili to add flavors and nutrients to foods. The extraction of oils from various plants such as nuts, seeds, olives, legumes, and grains involves mechanical and chemical industrial processes. According to Arleziana *et al*(2018),chemical solvent extraction, expeller pressing, and decanter centrifuge are the three iconic broad categories of oil extraction. Different oils have different smoke points. The smoking point of an oil is the temperature within which an oil starts to burn and produce a burning flavor in the foods being prepared(Zhang *et al.*, 2021). The smoke point of different oils may be high or low depending on how the oil is refined .When oils are heated, they break down into free fatty acids and glycerol. Further, the glycerol component decomposes as heating continues to form another portion called acrolein. The Acrolein portion is the key source of smoke that evolved when oils from heating oils (Azam*etal*.,2019).

Physiochemical composition of fresh oil and its health benefits

Different physical and chemical parameters of edible oil were used to monitor the compositional quality of oils (Cerian*iet al*., 2008). These physicochemical parameters include iodine value(IV), saponification value(SV),viscosity, density and peroxide value(PV).Edible oils are one of the main constituents of the diet used for cooking purposes. Several researchers studied the impact of temperature on the stability, viscosity, peroxide value, and iodine value to assess the quality and functionality of the oil(Farhoosh*etal*.,2008).

Several factors affect the edible oil quality such as agronomic techniques, seasonal conditions ,sanitary state of drupes, ripening stage, harvesting and carriage systems, method and duration of storage, and processing technology .The major factors affecting edible oil quality are temperature, moisture, sunlight, soil fertility, and nutrients. It is possible to determine by different analytical techniques how to assess the quality of edible oil and to avoid possible adulterations(Manorama,1991). During deep frying different reactions depend on some factors such as replenishment of fresh oil, frying condition, original quality of frying oil and decrease in their oxidative stability(Min,2007). Atmospheric oxygen reacts instantly with lipid and other organic compounds of the oil to cause structural degradation in the oil which leads to loss of quality of food and is harmful to human health (Bhattacharya *et al.*, 2008). High OA content and low stearic and erucic acid contents considered to be of a high quality edible oil (Kliem*etal.*, 2011).

Therefore, it is essential to monitor the quality of oil to avoid the use of abused oil due to the health consequences of consuming foods fried in degraded oil, to maintain the quality of fried foods and to minimize the production costs associated with early disposal of the frying medium(Vijayan*etal.*,1996).

Cooking oils occur in different types and are extracted from different plants and animals. Each category of cooking oil is a source of food nutrients and some are used in other production processes. Therefore, each fat and oil bears similar and unique health benefits depending on the content and composition of the oil. Below is a brief discussion of the health benefits of specific oils (Jarvis*etal.*, 2021).

2. MATERIALS:

Methodology is the specific procedure or techniques used to identify, select, process and analyze information about specific topic. Oil consumption pattern has to be checked as there is an emerging health risks due to oil consumption. The aim of the study is to know about oil consumption pattern and to detect various chemical composition of the oil in street kiosks.

2.1 Selection of the sample and sampling technique
2.2 Selection of Area
2.3 Analysis of chemical compositions

2.1 Selection of the samples and Sampling technique

Collection of data on a particular topic for study is termed as Sampling. The subjects were selected based on the purposive sampling method. It is also known as judgement sampling. Sample is selected as per judgement of the researcher.

2.2 Selection of Area

Oil collected from North, South, East, West of Coimbatore has to be ensured regarding convenience in collecting the reused oil samples for analysis.

2.2.1 Area Specification

The areas were selected as Coimbatore North, South, East, West .There used oil samples are collected from each street kiosks of each direction.
Coimbatore North - Kalapatti.
Coimbatore South - Kinathukadavu.
Coimbatore East - Ondipudur.
Coimbatore West -Alanthurai

2.2.2 AreaMap

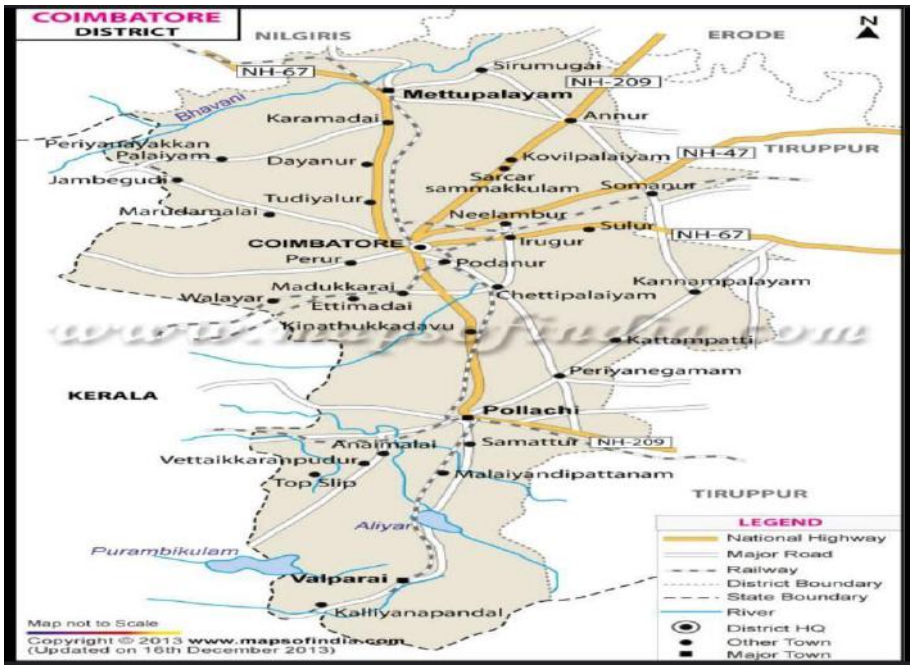


Fig2.1

2.3 Analysis of Chemical Composition

Based on different criteria the chemical composition of the reused oil from the street kiosk is checked (Saponification value ,Iodine value and peroxide value–to be detected).

2.3.1 Determination of Saponification Value

An oil sample requires alkali to be saponified. The graph of the saponification value shows the presence of long-chain fatty acids in the glycerin of the oil samples taken. The increased saponification rate indicates that triglycerides have short fatty acid acyl chains (Ivanovo et al., 2022). The amount of free fatty acids in the food is measured to estimate the saponification rate (Chakrabarty, 2003).

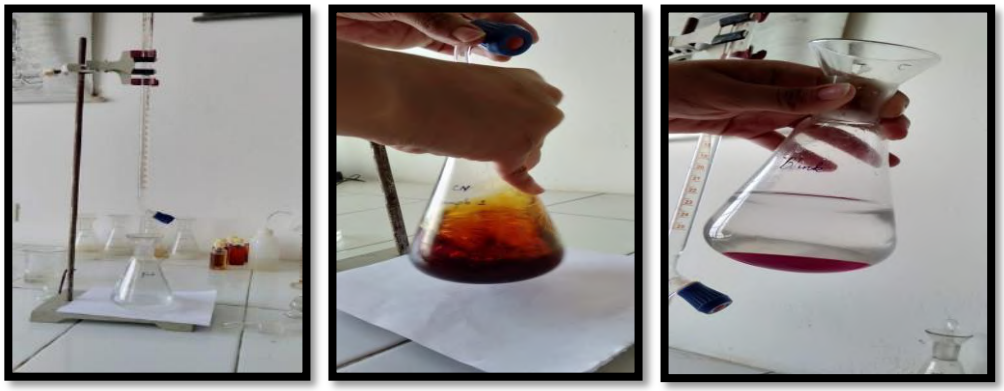
Figure 2.3.1
Analyzing Saponification value using titration method

2.3.2 Determination of Iodine value

Vegetable oils are often chosen over animal fat in terms of nutrition, as research associating health benefits to vegetable oil consumption grows (Parry et al., 2005). The iodine value is the amount of iodine necessary to saturate the fatty acids in 100 grammes of oil or fat. Saturated fats have a greater melting point and tend to be solid at room temperature (Goncalvesetal., 2017).

Figure 2.3.2

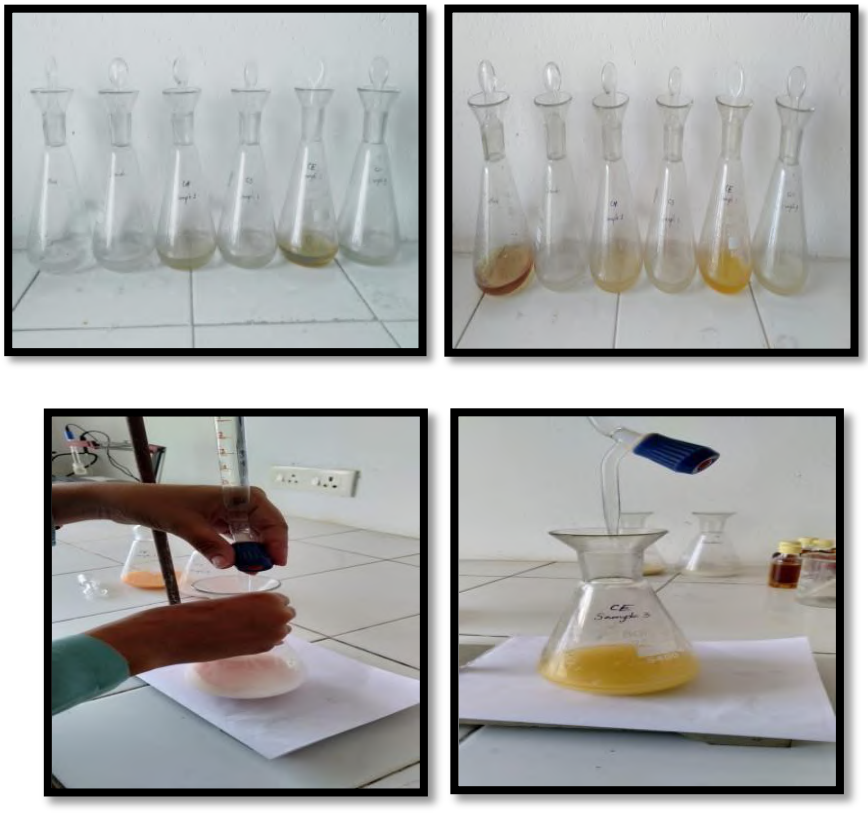
Analyzing Iodine value using titration method



2.3.3 Estimation of Peroxide value

There are various methods on finding peroxide value .At the initial stage of fat and oil deterioration, the reasons for measuring PV is very different because of the different mechanisms underlying the formation of hydro peroxide and FFA from fat and oil . Hydro peroxide is formed by the oxidation of fat and oil, whereas FFA are formed by the hydrolysis of fat and oil.

Figure 2.3.3
Analyzing Peroxide value using titration method



2.3.4 Report preparation

On collection of all the required details the data is recorded in the form of a report. Report describes all the required information collected during the study on analysing the chemical composition of the reused oil collected from the street kiosks.

2.4 Analysis of Chemical Composition

Based on different criteria the chemical composition of the reused oil from the street kiosk is checked (Saponification value, Iodine value and peroxide value– to be detected).The results on chemical analysis done using the reused oils collected from each directions of Coimbatore.

3. RESULT:

In this study, the chemical analysis were done such as testing for peroxide value, iodine value and saponification value of the reused oil collected from the street kiosks along with the standard. The collected reused oils from the street kiosks are analysed for its chemical composition along with the standards.

3.1.1 Determination of Saponification value

Table 3.1.1
Saponification value of the reused oil along with standard

Oil samples	Saponification value
Standard	41.22 ± 0.07
North	61.71 ± 0.05
South	61.71 ± 0.06
East	89.76 ± 0.08
West	53.27 ± 0.07

The degree of saponification of sunflower oil, olive oil, and corn oil after frying increased respectively, compared to the recent study. An increase in SV indicates that the oil should be broken down and discarded or used in soap production instead (Alaital, 2018). However, the standard value is lower than that of samples collected from the east, west, south, and north.

3.1.2 Determination of Iodine value of the oil

Table 3.1.2
Iodine value of the reused oils along with standard

Oil samples	Iodine value
Standard	14.224 ± 0.08
North	15.875 ± 0.07
South	19.685 ± 0.05
East	17.145 ± 0.07
West	24.447 ± 0.06

The degree of Iodine of sunflower oil, olive oil, and corn oil after frying increased respectively, compared to the recent study. The standard value, on the other hand, is lower than that of samples gathered from the north, south, east, and west.

3.1.3 Estimation of Peroxide value

Table 3.1.3
Peroxide value of the reused oils along with standard

Oil samples	Peroxide value
Standard	109.400 ± 0.07
North	173.310 ± 0.08
South	340.715 ± 0.09
East	405.041 ± 0.07
West	201.713 ± 0.06

The degree of Peroxide of sunflower oil, olive oil, and corn oil after frying increased respectively, compared to the recent study(Khaled,2023). The standard value, on the other hand, is lower than that of samples gathered from the north, south, east, and west.

4. CONCLUSION :

The reused oil collected were analysed for different chemical composition the reused oils are checked for Saponification value, Iodine value and Peroxide value. The obtained values are taken into consideration on concluding the values of the reused oil when checked along with the standard oil sample. Each oil sample differs in its value as per the quality attributes of the oil.

On screening various attributes of the reused oil the saponification value, iodine value and peroxide values are seen with different values which varies when compared to the standard sample is higher than the standard. Further study can be on creating awareness on discarding the reused oils , preventing them not be used as cooking oils rather reused those for other purpose that cause no harm on human health.

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