Assessing the amount of soybean oil in meals offered in a university restaurant

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Abstract

This study aimed to assess the amount of soybean oil offered in a university restaurant in the city of Belo Horizonte - Minas Gerais, and compare it with the recommendations of the World Health Organization (WHO). Data collection started after the training of the staff. They collected oil from fryers and from the fat of foods, and stored them in different locations (car for transporting food and barrel, respectively). We measured extra soybean oil from fryers used for cooking food and the number of diners. Data were gathered from the control made using the Teknisa® software. The *per capita* value found for soybean oil supply per meal, lunch and dinner, considering the volume of tailings was 15.5 mL and 8.6 mL, respectively, and the average total of 14.96 mL was lower than that recommended by the WHO (16 mL / day). We concluded that the average supply of soybean oil *per capita* is below values considered adequate for one day. However, the value found corresponds to that offered in just one meal (lunch), which may imply extrapolation of the recommended daily intake of that food per day. Thus, the restaurant service should review its procedures for meal preparation.

Key words: Food services. Soybean oil. Health.

Introduction

In Brazil, the last 35 years there was a decrease in the consumption of traditional foods such as rice and beans, while the increase in the consumption of vegetable oils, animal foods, such as meats, sausages and dairy products, soft drinks and biscuits along permanence of excessive sugar consumption and inadequate in fruits and vegetables, characteristics that reveal a pattern inadequate food, diets poor in some micronutrients and fiber and high density energética.[1, 2]

In human nutrition, oils have significant importance, since they are rich in unsaturated fatty acids (oleic acid, linoleic acid and alpha-linolenic acid) and low in saturated fatty acids, and are backers of fat soluble vitamins and energy suppliers.[3-6] In spite of such nutritional qualities, excessive intake of vegetable oils has particularly occurred by means of frying processes[6], in which fast preparation gives food unique characteristics of satiety, aroma, flavor, and palatability.[7]

During the frying process, physical changes occur in oil, among which browning, increased viscosity, reduced smoke point and foaming. As to the chemical changes, there is hydrolysis to form free fatty acids, monoacylglycerol and diacylglycerol; oxidation, resulting in peroxides, hydroperoxides, conjugated dienes, epoxides, hydroxides, and ketones; and decomposition in small fragments.[8]

In addition, oils and fats, under frying conditions, are led to the formation of Cis-Trans Isomers (Geometric Isomers) of oleic, linoleic, and α-linolenic fatty acids.[9] Evidence indicates that a small intake of trans fatty acids can affect the lipoprotein profile, decreasing High density lipoprotein (HDL) and increased low density lipoprotein (LDL) and lipoprotein(a) [Lp(a)].[10] Thus, great consumption of trans fatty acids may be an important risk factor for heart diseases.[11]

Based on recent epidemiological studies, the World Health Organization (WHO) recommends that the maximum consumption of this type of fat should not exceed 1% of total calories.[6] Thus, nutritionists should, as health professionals and while applying their knowledge in units of food and nutrition, plan, organize, direct, supervise, and assess food and nutrition services, besides giving collective assistance and promoting nutritional awareness to healthy or unhealthy individuals in public or private institutions.[12]

Considering such knowledge, the changes in the nutritional status of the population, and the increasing growth of NCD, the aim of this study was to assess the amount of vegetable oil offered in a university restaurant and compare it to that recommended by the WHO.

Material and methods

The university restaurant, where the study was conducted, is located in the city of Belo Horizonte - Minas Gerais, and works through a system of government financial subsidies, with special prices according to each person's socioeconomic position (Level I: students who face great financial difficulties with staying at the university. Level II: students who face medium financial difficulties with staying at the university. And Level III: students who face little financial difficulties with staying at the university). In accordance with Decree n. 004/2005 of UFMG,[13] which requires the user or visitor to be linked to the university.

The restaurant serves more than 6,000 meals per day on average, including breakfast (300 meals), lunch (5,000 meals) and dinner (700 meals). It is open Monday through Friday (except holidays), from 6:45am to 8:10am, then, from 11am to 2pm, and later from 5:30pm to 7pm. And on Saturdays (except holidays), from 11:30am to 1pm. Breakfast menus have salty buns with margarine, coffee, chocolate milk, plain milk, and fruit. And for large meals, there are three options for main course, with different types of meat, salad, dessert, rice, beans and juice. The food distribution system is self-service, except for the main course and the meat, which are served in portions by a restaurant employee. The oil used in the preparation of meals is soybean oil.

The customers are students, employees from the university and from agencies and foundations that support it. During the study period, lunch and dinner were served for 22 and 19 days, respectively, with a total of 99,405 meals, where 91,240 were lunch meals and 8,165 were dinner meals.

Under the supervision of the researchers, nutrition students developed a participatory and dialogic training using entertaining activities for the restaurant staff, where they emphasized the relationship between theoretical and practical grounding on the subject of this study and on the procedures for collecting material.

The 15-minute training was conducted prior to the data collection, with seven cooks and five kitchen helpers. In the training they discussed the objective of the project, the difference between the fat present in the food and the fat that is added to it, the relationship between fats and oils, the role of the nutritionist and health issues, and especially, the importance of collecting vegetable oil from the fryers and fat from food for this study.

In the soybean oil data collection we used a trolley trailer to transport food (450 x 675 x 750 mm) to store oil derived exclusively from fryers, a barrel (200 liters) to store extra fat from other preparation processes (pans and ovens), an acrylic strip of 50 cm and a customized form (with day, type of oil collected, quantity) to record the data. Data collection and analysis were based on an adaptation of the water displacement method for measuring volume.[14]

During data collection, from October 30th to November 30th, 2010, two measurements were made, with the same principles and container. Measurements were made according to the needs of soybean oil replacement in fryers, with no direct intervention of menus prepared during this period.

The collected data refer only to soybean oil from fryers. Other fats, collected from food, were discarded because they were not an adding type of oil. The amount of vegetable oil supplied to the cooking of food and the number of diners in the period (lunch and dinner) were obtained from the control carried out with the aid of the Teknisa TecFood software®, version 4.09.069.

When converted into liters, data provided the volume of discarded oil. Based on these data, we found that for every 18 L of oil there was a mean equivalence of 9.25 cm, and for every 1 liter of oil, the value was 0.51 cm. By calculating the difference, it was possible to find the content of soybean oil used in the preparation of lunch and dinner together. No soybean oil was used in the preparation of breakfast. This result allowed to infer the amount of soybean oil used in the production of preparations *per capita*. The results were compared with recommendations by the WHO.

Results

During the study, 1553.7 liters of oil were made available by the storage department for the preparation of food (lunch and dinner). A volume of 1479.9 liters was used for the preparation of food served at lunch, corresponding to approximately 95% of the total amount (Figure 1).

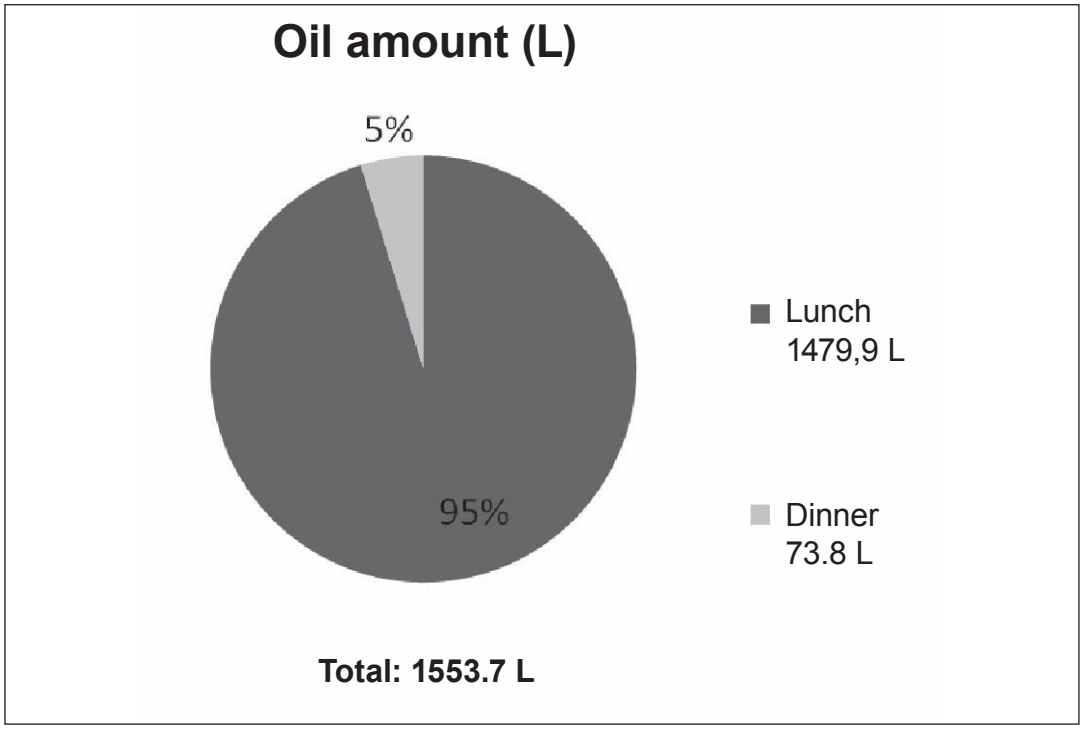

Figure 1. Oil amount used per meal in a university restaurant, in Belo Horizonte - Minas Gerais, Brazil, 2010.

During this period, the total volume of soybean oil discarded from fryers was 66.27 liters (figure 2). Thus, we can estimate by difference that 1487.43 liters of oil were consumed, with 14.96 mL / meal *per capita* for lunch and dinner. Considering the proportion of oil used only for lunch (95%) and dinner (5%), and keeping the same proportion to the volume of discarded oil, the *per capita* value becomes 15.5 mL for lunch and 8.6 ml for dinner (figure 2).

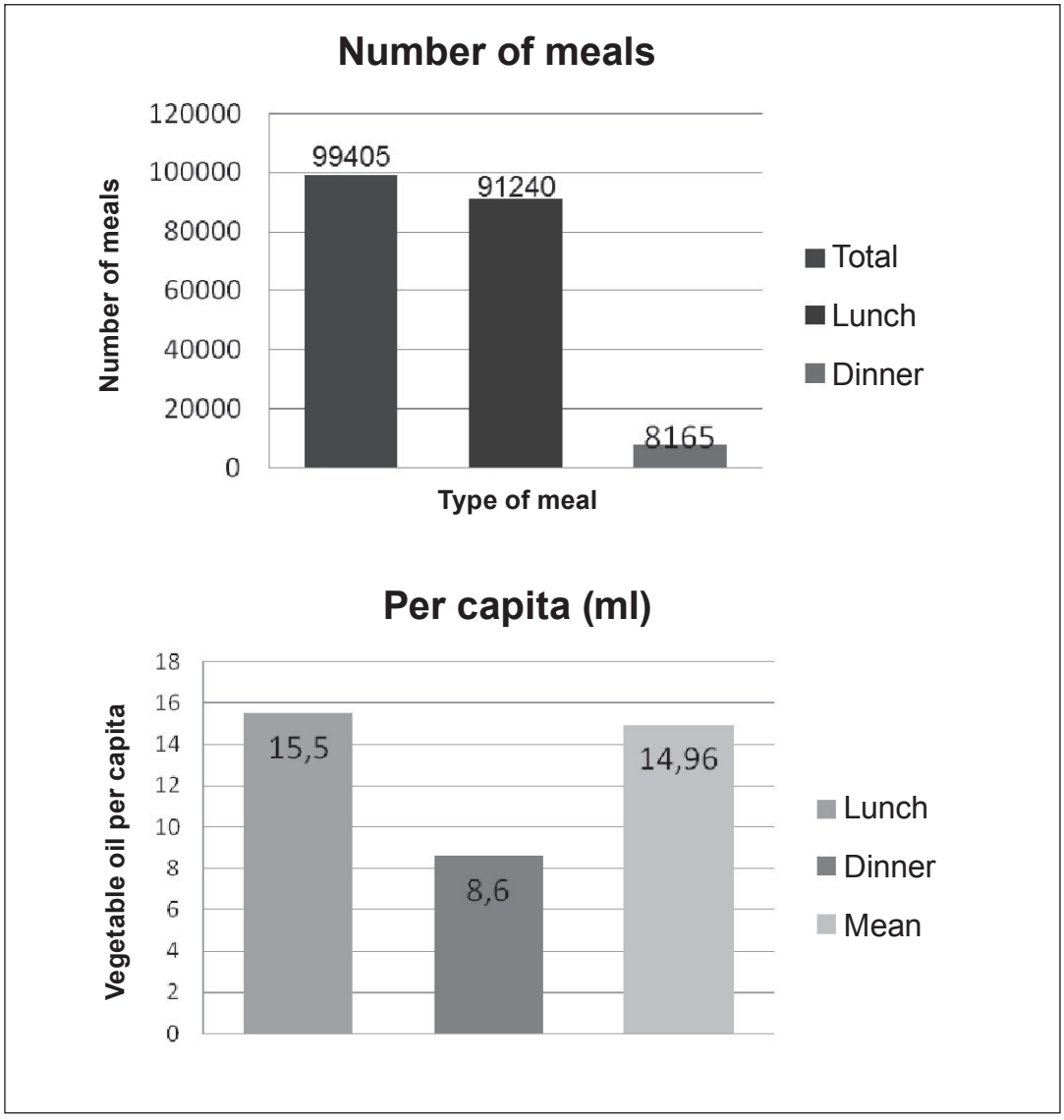

Figure 2- Soybean oil amount used *per capita* in meals served at a university restaurant. Belo Horizonte - Minas Gerais, Brazil, 2010.

Discussion

The number of meals served daily by the university restaurant is generally over 6,000 meals, however, the monthly average of this period was 4,730 meals, because it was the end of the school year and rainy season. For this reason, results can not be replicated to other periods of the year.

The amount of soybean oil offered, considering the mean of both meals (lunch and dinner), can be estimated to 14.96 mL *per capita*. According to the WHO,[15] the intake of oils and fats should not exceed two servings per day, equivalent to 16mL/person (a tablespoon full). Thus, the *per capita* soybean oil consumption amount is close to that recommended by the WHO, if other food intake and fat sources throughout the day are not taken into consideration.

Moreover, considering that, on average, 94% of individuals claim to have at least a major meal / day (lunch or dinner),[16] and that the *per capita* soybean oil amount for lunch on this study is 15.5 mL, the tendency of a daily intake above 16mL/person seems reasonable.

Amorim, Junqueira & Jokl[17] have found that the mean amount of fat *per capita* offered at lunch was 21.6 mL, including margarine, mayonnaise and olive oil. And in a hospital cafeteria, Almeida et al.[18] have found a total of 18.8 ± 3.2 ml of oil per meal, based on the difference between the average monthly amount of oil required from the storekeeper for the production of meals and the average monthly amount of oil discarded for recycling. In both studies, the values found were also greater than those recommended by the WHO.

In order to reduce the consumption of soybean oil, the university restaurant has used alternative methods of cooking, such as hot air, by means of conventional and combined ovens, to avoid frying. This was observed during our study period. Araújo[19] states that the use of fats is essential in some methods, but in most of them, it can be reduced or eliminated by using only hot air.

According to the menu offered at the restaurant, besides soybean oil, they use other sources of fats daily, such as margarine, mayonnaise and olive oil, which were not assessed in this study, but are included in the recommendations of the WHO. Thus, the average *per capita* obtained in this study is undersized compared to the real amount of soybean oil provided by the restaurant to its users.

The standardization of data sheets is a tool to be deployed to ensure the nutritional quality of meals, since it helps to control the energy value offered, particularly with respect to vegetable oil[17]. In the university restaurant, despite the continuing supervision of the nutritionist and the assistant during the preparation of meals, the cooks do not entirely replicate data sheets.

All waste oil resulting from immersion frying processes, as well as fat from baking are collected by a company that has environmental permit for that. This company uses fat residues to produce biodiesel, mass for glass, soap and other biodegradable products.

Conclusion

According to this study, even though the average supply of soybean oil in the university restaurant is below that recommended by the WHO, such value may not represent the actual intake of the consumer, due to other meals consumed throughout the day and other fat sources.

Thus, considering the changes in the nutritional status of the population and the increasing number of non-communicable diseases, there is a need to analyze and permanently adapt the supply of oils and fats in food served at this restaurant.

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Received in: October 10, 2012
Reviewed in: January 25, 2013
Approved in: February 18, 2013