PREVALENCE OF OIL AND GHEE CONSUMPTION IN GENERAL POPULATION; A CROSS-SECTIONAL SURVEY

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ABSTRACT

Objective: To determine the frequency of daily oil, butter and ghee consumption in general population.
Study Design: Descriptive cross-sectional study.
Place and Duration of Study: A multi-center community-based survey conducted at AFIC, AFIO, AFIRI and PEMH hospital of Rawalpindi, Pakistan.
Methodology: It was a descriptive cross-sectional study using a self-administered questionnaire. Non-probability consecutive sampling technique was used. Healthy individuals (attendants of patients visiting these hospitals) of both genders and willing to participate were included and participants having any disability, bed ridden and seriously ill were excluded. Participants underwent a physical examination, anthropometry and blood pressure determination. Lab investigations were performed by hospital laboratory which included blood sugar fasting/ random, blood pressure and lipid profile.
Results: A total of 700 respondents participated in the study; the mean age of our study population was 43.62 ± 14.80. The gender distribution consisted of 259 (40.4%) males and 382 (59.6%) females. Majority of the participants were from Punjab (74%). Family history of the co-morbids was found higher for HTN (28%), diabetes (19.50%), CHD (17.1%), Obesity (9.70%) and for hypercholestremia (5.70%). Trigycerides were measured to be out of range i.e., 183.19 ± 93.38 while it should be less than 150mg/dL and Blood Sugar Fasting was 109.51 ± 54.68 mg/dl. According to our finding, average family members per house hold were found to be 7. Monthly mean consumption of oil per house hold was found 5.49 ± 5.39 ltr while monthly mean consumption of ghee per house hold was found to be 1.830 ± 4.87 Kg.
Conclusion: The findings facilitate quantitative assessment of consumption of dietary fats attributable to dietary factors and in future can be used to inform national and global efforts to alter diet, reduce disease, and improve population health.

Keywords: Ghee, Oil, Butter, Population.

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INTRODUCTION

Cooking oils/fats are known as edible oils from vegetable or animal origin and used for cuisine or salad preparation worldwide. To meet consumption needs, global vegetable oil production was closed to 198 million metric tons in 2018-2019. For animal or artificial cooking fats, 187.1 million Americans used margarine or margarine spread while butter consumption in the USA reached 5.8 pounds per capita in 2019.[1] Growing controversy focused on the role of cooking oils/fats in the incidence of various chronic disorders including cardiovascular disease (CVD) events. Importantly, the well-known functions of saturated fatty acids (SFAs), monounsaturated fatty acids (MUFAs), or polyunsaturated fatty acids (PUFAs) could not apparently translate to cardiometabolic health effects of cooking oils/fats.[2] Vegetable cooking oils are regarded as the healthier choice as they contain more unsaturated fatty acids than animal oils. Canola oil and corn oil may ameliorate blood lipid profile and protect against CVD risk factors,[3,4] whereas butter raises total and LDL cholesterol levels.[5] Canola oil- or olive oil-enriched diet could improve glycemic control in patients with type 2 diabetes.[6,7] However, only a few studies have provided weak evidence of cooking oil/fat consumption in relation to all-cause and cardiometabolic mortality.[8,9]

Ghee or ghrita is anhydrous milk fat that is obtained by heat clarification and desiccation of milk fats usuallyderived from cow milk or buffalo milk or mixed milk in India.[10] Ghee contains about 65% saturated fatty acids (SFAs), 32% monounsaturated fatty acids (MUFAs)[11] and about 3-6% polyunsaturated fatty acids (PUFAs).[11]

As demonstrated by the Global Burden of Diseases Study's capstone papers,[12] and as highlighted throughout the reports from the United Nations high level meeting on non-communicable disease prevention and control (http://www.who.int/nmh/events/un_ncd_summit2011/en/), diet is one of the fundamental risk factors for health, disease, and disability in

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the world. Indeed, given that trends in metabolic risk factors such as blood pressure, cholesterol, glucose, and body mass index are being largely driven by nutrition, suboptimal diet is the single leading modifiable cause of poor health in the world, exceeding the burdens due to tobacco and excess alcohol consumption combined.[12]

Among non-communicable diseases (NCDs), cardiovascular Disease (CVD) including Coronary Heart Disease (CHD) is the leading cause of death in India.[13] Coronary Artery Disease (CAD) risk rises progressively with increases in serum cholesterol level and saturated fat intake.[14]

Type-2 diabetes (T2D) has become a public health problem of broad concern, affecting 425 million (8.8% of adults) people worldwide.[15] Evidence showing the importance of strategies of long-term lifestyle modifications, including dietary changes, decreasing oil consumption for the prevention of T2D has recently raised extensive interest.[16]

In this study, we have assessed the consumption of typical cooking oils/fats, including butter, margarine, corn oil, canola oil, and olive oil, socio-Demographics, family history of co-morbids, regional anthropometry, blood pressure, blood profile including blood sugar random, lipid profile, personal history (smoking, physical activity, drug history) and Food frequency questions related to type of fat consumed and mode of cooking.

METHODOLOGY

This is a multi-center community-based survey conducted at AFIC, AFIO, AFIRI and PEMH hospital of Rawalpindi, Pakistan, from June to August 2021. It was a descriptive cross-sectional study using a self-administered questionnaire. Non-probability convenience sampling technique was used

Inclusion Criteria: Healthy individuals (attendants of patients visiting these hospitals) of both genders and willing to participate were included.

Exclusion Criteria: Participants having any disability, bed ridden and seriously ill were excluded.

Before obtaining relevant information, all the participants consented to participate with written informed consent. The study protocol was approved by the Institutional Ethics Review Board of Armed Forces Institute of Cardiology/National Institute of Heart Disease/National University of Medical Sciences (NUMS) Rawalpindi Pakistan & NIHD Rawalpindi. Data was collected using self-administered questionnaire which was modified from Foscolou, Alexandra *et al*.[1] Data was cleaned from any discrepancies and errors. Data collection tool was comprised of:

- Socio-Demographic variables
- History of co-morbids
- Family history of co-morbids
- Blood pressure
- Blood profile (blood sugar, lipid profile)
- Food frequency questionnaire

Lab investigations were performed by hospital laboratory which included blood sugar fasting/random, blood pressure and lipid profile. While anthropometric measurements were performed by our designated research team.

On initial examination, participant underwent a physical examination, anthropometry and blood pressure determination. Blood pressure measurements were made on the left arm of the seated participants with a mercury-column sphygmomanometer and an appropriately sized cuff. Serum total and HDL cholesterol levels were determined with standardized enzymatic methods. Cigarette smoking status and physical activity was ascertained by self-report.

Data analysis was performed on SPSS-24. Descriptive statistics was used for percentages/frequencies and mean ± SD of the data variables. Pearson's Chi-square test and independent sample t-test was used to find association. A *p*-value of <0.05 was considered significant by taking 95% margin of error.

RESULTS

A total of 700 respondents participated in the study; the mean age of our study population was 43.62 ± 14.80 yrs. The gender distribution consisted of 259 (40.4%) males and 382 (59.6%) females. It was a multi-centered community-based survey. Family history of the co-morbids was found higher for HTN (28%), diabetes (19.50%), CHD (17.1%), Obesity (9.70%) and for hypercholestremia (5.70%) figure.

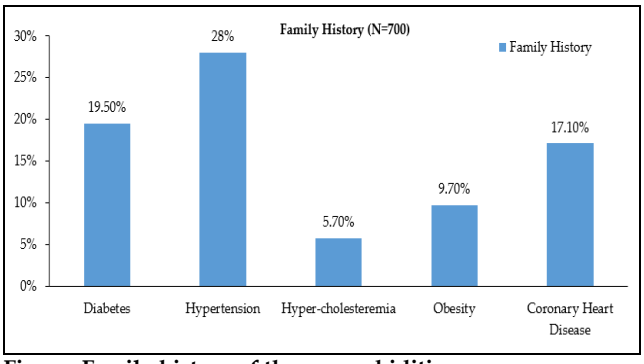

Figure: Family history of the co-morbidities.

In lipid profile of the participants, only trigycerides were measured to be out of range i.e., 183.19 ± 93.38 mg/dL while it should be <150mg/dL another most important variable of interest was observed Blood Sugar Fasting (mg/dl) i.e., 109.51 ± 54.68 whereas it should be between 90-110 mg/dL as shown in Table-I.

Table-I: Demographic characteristics of study population (n=700).

Variable	Mean ± S.D
Age (years)	43.62 ± 14.80
Weight in kg	69.70 ± 16.388
Height in inches	65.22 ± 25.47
Blood Sugar Fasting (mg/dl)	109.51 ± 54.68
Cholesterol (mg/dL)	163.28 ± 47.76
HDL (mg/dL)	46.95 ± 28.73
LDL (mg/dL)	112.26 ± 63.34
Triglycerides (mg/dL)	183.19 ± 93.38

In our study, average family members per house hold were found to be 7. Monthly mean consumption of oil per house hold was found 5.49 ± 5.39 ltr, while monthly mean consumption of ghee per house hold was found to be 1.830 ± 4.87 Kg as shown in Table-II.

Table-II: Type of fats consumed per month.

Variables	Mean ± SD
Oil (liters)	5.49 ± 5.39
Ghee (kg)	1.830 ± 4.87
Salted Butter (kg)	0.064 ± 0.38
Un-salted Butter (kg)	0.146 ± 0.94
Margarine (kg)	0.020 ± 0.18
Olive Oil (kg)	0.60 ± 1.05

According to food frequency questionnaire, 273 (39%) use oil for cooking twice a day while 99 (14.1%) use ghee for cooking twice a day. Low usage of butter (both salted 94.1% and unsalted 93.1%) for cooking was observed in our study as shown in Table-III. Preferred mode of cooking was found to be curry making 248 (35.4%) twice a day, while 136 (19.4%) used deep frying as a mode of cooking on daily basis. (Table-IV). Out of 32 (4.6%) study participants consume junk food on daily basis.

DISCUSSION

This systematic investigation of individual-level dietary assessments across the country provides quantitative estimates of the national level consumption of major dietary fats and oils by region, city, age, and sex. Moreover, frequency of mode of cooking, frequency and type of food consumed are also measured at national level. Since suboptimal diet is the single leading cause of death and disability in the world today[17] these findings are highly relevant and of crucial interest to the global scientific community, health professionals, policy makers, and the public.

At a national level, mean consumption of saturated fat (5.43 ± 5.31; guideline<10) shown in table-IV and dietary cholesterol (163.28 ± 47.76 mg/day; guideline <300 mg/day) table-I were in line with current recommendations or optimal intakes. Reductions of saturated fat and dietary cholesterol have been longstanding public health priorities.[18]

In 2010, national saturated fat and cholesterol intakes met recommended intakes in countries representing about 60% and 88% of the global adult population, respectively, suggesting that this public health focus has been relatively successful. Lowest intakes were identified in South and East Asia, South America, and certain Caribbean nations. Such low intakes would be beneficial for coronary heart disease, especially

Table-III: Frequency of fats consumed (n=700).

Type of Fat Consumed	>3 times/ day, n (%)	Twice a day n (%)	Once a day, n(%)	Once a week, n (%)	Twice a week, n (%)	Occasionally n (%)	None n (%)
Oil	105 (15)	273 (39)	128 (18.3)	4 (0.6)	-	1 (0.1)	189 (27)
Ghee	21 (3)	99 (14.1)	124 (17.7)	7 (1.0)	2 (0.3)	14 (2.0)	433 (61.9)
Salted Butter	1 (0.1)	-	23 (3.3)	-	4 (0.6)	13 (1.9)	659 (94.1)
Un-salted Butter	1 (0.1)	1 (0.1)	24 (3.4)	4 (0.6)	-	18 (2.6)	652 (93.1)
Margarine	-	3 (0.4)	1 (0.1)	3 (0.4)	1 (0.1)	6 (0.9)	686 (98)
Olive Oil	3 (0.4)	9 (1.3)	22 (3.1)	15 (2.1)	1 (0.1)	25 (3.7)	625 (89.3)

Table-IV: Frequency of preferred mode of cooking (n=700).

Preferred Mode of Cooking	>3 times/ day, n (%)	Twice a day n (%)	Once a day, n(%)	Once a week, n (%)	Twice a week, n (%)	Occasionally n (%)	None n (%)
Baking (Bakery Items)	1 (0.1)	7 (1.0)	19 (2.7)	27 (3.9)	8 (1.1)	49 (7.0)	589 (84.1)
Boiling	-	14 (2.0)	26 (3.7)	13 (1.9)	8 (1.1)	43 (6.2)	596 (85.1)
Sautee/with little Oil	5 (0.7)	27 (3.9)	89 (12.7)	2 (0.3)	2 (.3)	31 (4.4)	544 (77.7)
Air Frying	-	2 (0.3)	6 (0.9)	6 (0.9)	2 (0.3)	8 (1.1)	676 (96.6)
Shallow Frying	2 (0.3)	17 (2.4)	16 (2.3)	23 (3.3)	8 (1.1)	132 (19)	501 (71.6)
Deep Frying	11 (1.6)	136 (19.4)	30 (4.3)	26 (3.7)	9 (1.3)	208 (29.8)	279 (39.9)
Curry	48 (6.9)	248 (35.4)	143 (20.4)	23 (3.3)	2 (0.3)	53 (7.6)	183 (26.1)

when accompanied by reciprocal increases in polyunsaturated fat intake[19] although very low saturated fat intake may increase risk of other outcomes, such as hemorrhagic stroke.[20] These findings are similar to our study as frequency of fat consumed is in accordance with guidelines.

Many researches had already reported the beneficial properties of ghee in the form of decrease in total cholesterol, LDL, VLDL, and triglycerides; decreased liver total cholesterol, triglycerides, and cholesterol esters. In animal study, on rats also showed no effect of 5% and 10% ghee-supplemented diets on cholesterol and triglycerides. When the ghee level in foodstuffs was <10%, it did not increase liver microsomal lipid peroxidation or liver microsomal lipid peroxide levels .[21] These findings are opposite to our study results as use if ghee was seen on second number after oil plus we can observe increased levels of triglycerides in Table-IV

Interestingly, intakes of most dietary fats and oils were similar by sex, both regionally and within countries. Our findings highlight the need for expanded systematic surveillance of key dietary habits globally and especially in regions with sparse data, including consideration of instrument representativeness, validity, and comparability. Our results also underscore the need for improved food composition databases in many countries. To maximise practicality and data retrieval from diverse global contacts, we focused on dietary fats and oils with probable or convincing evidence of aetiological effects on chronic diseases (for example, we did not gather data on monounsaturated fats, which have differing relations with risk when derived from animal versus plant sources.[22]

CONCLUSION

The findings facilitate quantitative assessment of consumption of dietary fats attributable to dietary factors and in future can be used to inform national and global efforts to alter diet, reduce disease, and improve population health.

Conflict of Interest: None.

Author's Contribution

FP: Design, Conception, HK: Synopsis design, RJ: Manuscript writing, AK, JK: Data collection, MI: Concept, AH: Intellectual contribution, AHS: Design & concept, ZAS: Data collection, AI: Intellectual contribution.

REFERENCES

1. Statista. Consumption of vegetable oils worldwide from 2013/14 to 2018/2019, by oil type. (in million metric tons). 2021 [Internet]. Available at: https://www.statista.com/statistics/263937/ vegetable -oils-global-consumption/
2. Forouhi NG, Krauss RM, Taubes G, Willett W. Dietary fat and cardiometabolic health: evidence, controversies, and consensus for guidance. Br Med J 2018; 361: k2139.
3. Schwingshackl L, Bogensberger B, Benčič A, Knüppel S, Boeing H. Effects of oils and solid fats on blood lipids: a systematic review and network meta-analysis. J Lipid Res 2018; 59(9): 1771-1782.
4. Jenkins DJA, Kendall CWC, Vuksan V, Faulkner D, Augustin LSA, Mitchell S, et al. Effect of lowering the glycemic load with canola oil on glycemic control and cardiovascular risk factors: a randomized controlled trial. Diabetes Care 2014; 37(7): 1806–1814.
5. Engel S, Tholstrup T. Butter increased total and LDL cholesterol compared with olive oil but resulted in higher HDL cholesterol compared with a habitual diet. Am J Clin Nutr 2015; 102(2): 309–315.
6. Schwingshackl L, Lampousi AM, Portillo MP, Romaguera D, Hoffmann G, Boeing H. Olive oil in the prevention and management of type 2 diabetes mellitus: a systematic review and meta-analysis of cohort studies and intervention trials. Nutr Diab 2017; 7(4): e262.
7. Pimpin L, Wu JHY, Haskelberg H, Del Gobbo L, Mozaffarian D. Is butter back? A systematic review and meta-analysis of butter consumption and risk of cardiovascular disease, diabetes, and total mortality. Plos One 2016; 11(6): e0158118.
8. Guasch-Ferré M, Hu FB, Martínez-González MA, Fitó M, Bulló M, Estruch R, et al. Olive oil intake and risk of cardiovascular disease and mortality in the PREDIMED Study. BMC Med 2014; 12(1): 78.
9. Guasch-Ferre M, Zong G, Willett Walter C, Zock P, Wanders Anne J, Hu Frank B, et al. Associations of monounsaturated fatty acids from plant and animal sources with total and causespecific mortality in two US prospective cohort studies. Circ Res 2019; 124(8): 1266–1275.
10. Sserunjogi ML, Abrahamsen RK. A review paper: current knowledge of ghee and related products. Int Dairy J 1998; 8(8): 677-88.
11. Ghafoorunissa. Dietary lipids and heart disease–the Indian context. National Med J India 1994; 7(6): 270–76.
12. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2013; 380: 2224-60.
13. Mukherjee AK. India's health - today and tomorrow. J Indian Med Assoc 1995; 93(8): 312-315.
14. Siri-Tarino PW, Sun Q, Hu FB, Krauss RM. Saturated fatty acids and risk of coronary heart disease: modulation by replacement nutrients. Curr Atheroscler Rep 2010; 12(6): 384-90.
15. International Diabetes Federation. IDF diabetes atlas. 8th ed. Brussels (Belgium:): International Diabetes Federation; 2017.
16. Ley SH, Hamdy O, Mohan V, Hu FB. Prevention and management of type 2 diabetes: dietary components and nutritional strategies. Lancet 2014; 383(9933): 1999-2007.
17. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet 2013; 380: 2224-2260.
18. Micha R, Mozaffarian D. Saturated fat and cardiometabolic risk factors, coronary heart disease, stroke, and diabetes: a fresh look at the evidence. Lipids 2010; 45: 893-905.
19. Mozaffarian D, Micha R, Wallace S. Effects on coronary heart disease of increasing polyunsaturated fat in place of saturated fat: a systematic review and meta-analysis of randomized cont-rolled trials. PLoS Med 2010; 7: e1000252.
20. Ding EL, Mozaffarian D. Optimal dietary habits for the preven-tion of stroke. Semin Neurol 2006; 26: 11-23.
21. Sharma H. The effect of ghee (clarified butter) on serum lipid levels and microsomal lipid peroxidation. Ayu 2010; 31(2): 134-140.
22. Schwingshackl L, Hoffmann G. Monounsaturated fatty acids and risk of cardiovascular disease: synopsis of the evidence available from systematic reviews and meta-analyses. Nutrients 2012; 4: 1989-2007.