ASSESSMENT OF DIETARY PATTERN IN ASSOCIATION WITH NON-COMMUNICABLE DISEASE RISK FACTORS AMONG MIDDLE ADOLESCENTS IN RAWALPINDI

Maryam Zahid, Hafsa Khalil, Usman Iqbal, Sehrish Mumtaz, Mawara Hassan, Shanzah Khan*

Armed Forces Institute of Cardiology/National Institute of Heart Disease/National University of Medical Sciences (NUMS) Rawalpindi Pakistan, *Foundation University Medical College, Islamabad Pakistan

ABSTRACT

Objective: To assess the dietary pattern in association with non-communicable disease risk factors among middle age adolescents in Rawalpindi.

Study Design: Descriptive cross-sectional study.

Place and Duration of Study: City School (Rawal Campus), Rawalpindi and Allied School (Ghauri town campus), Rawalpindi, from Jun to Jul 2021.

Methodology: The self-administered questionnaire used in this study included numerous questions related to the socio-demographic background of students and a short food frequency questionnaire (FFQ) to assess the usual dietary intake of adolescents. Students were selected through Simple Random sampling. Data was entered and analyzed using SPSS-23.

Results: A total of 145 students mean age 16.2 ± 1.92 years participated in this this study out of which 97 (66.9%) were male and 48 (33.1%) were female. Out of 66 (45.5%) students were from Allied School and 79 (54.4%) students were from City School, Rawalpindi participated this study. In this 60% of the participants were had normal body mass index (18.5-24.9), 4 (2.8%) students consume alcohol and 2 (1.4%) were smoker. Most of the participants were active 88 (62%). The dietary patterns of young adolescents determines that choices of most of the food items were not according to the standard guidelines

Conclusion: This research have highlighted the visible shift in dietary intake among adolescent of Rawalpindi. This shift will have major implications for the double burden of malnutrition that currently exists and will contribute to the rising prevalence of NCDs.

Keywords: Dietary pattern, Non communicable disease risk factors, Middle adolescents.

How to Cite This Article: *Zahid M, Khalil H, Iqbal U, Mumtaz S, Hassan M, Khan S. Assessment of Dietary Pattern in Association with Non-Communicable Disease Risk Factors Among Middle Adolescents in Rawalpindi. Pak Armed Forces Med J 2022; 72 (Suppl-1): S44-48.*

INTRODUCTION

Non-communicable diseases (NCDs) include diabetes, hypertension, cancers, mental health disorders, arthritis, injuries and accidents.[1,2] In Pakistan, NCDs are among the top 10 causes of morbidity and mortality, and it is estimated that NCDs and injuries cause 77% of age-standardized deaths.[3] Diabetes, hypertension, cancers and other NCDs are common in Pakistan. Food, diet and nutritional status are important determinants of NCD. Poor dietary quality, in particular high salt intake, high saturated and trans-fatty acid intake, and low fruit and vegetable consumption coupled with sedentary lifestyle and stressful environment are some risk factors of Cardio metabolic syndrome development.[4] The role of diet in the etiology of most NCDs is extremely important and considered a modiable risk factor for NCDs.[5] Limited data exist in the Pakistan with regards to the local dietary patterns and their associations with NCD in adolescence. Every year, 15 million NCDs are related to premature deaths, and 85% of those deaths occur in low, and middle-income countries.[6,7]

Furthermore, several studies have identified the coexistence of multiple risk factors for NCDs, such as low fruit and vegetable consumption, physical inactivity, smoking, alcohol use, sedentary behavior, being overweight or obesity during adolescence.[8] All of these risk factors are modifiable, and studies have demonstrated that practicing a healthy lifestyle such as consuming healthy food, engaging in regular physical activity, and avoiding tobacco could prevent 80% of cardiovascular disease and type 2 diabetes, and 40% of cancers.[9] So, in order to reduce the burden of NCDs, prevention strategies should begin during adolescence.[10]

METHODOLOGY

This cross-sectional study was carried out in selected schools of Rawalpindi, from June to July 2021. The sample size is estimated to be 150.

The self-administered questionnaire used in this study included numerous questions related to the socio-demographic background of students and a short food frequency questionnaire (FFQ) to assess the usual dietary intake of adolescents. The FFQ is composed of

Correspondence: Ms Maryam Zahid, Clinical Dietitian, Armed Forces Institute of Cardiology/NIHD, Rawalpindi Pakistan

22 questions covering different food categories. The FFQ used in this study is adapted from the questionnaire earlier administered in the Lebanese population[11] and the CDC Global School Health Survey.[12]

A dietitian approached teacher/principal and explained the objectives of the study to them. Teacher distributed the questionnaire among the students. Students who expressed interest and provided their oral consent were handed a self-administered anonymous questionnaire that includes questions related to socio-demographic, anthropometric, dietary, and lifestyle behaviors.[12] On average, the questionnaire was completed by participants within approximately ten minutes. At the end of the process, the completed questionnaires were returned to dietitian and were send for data entry.

The study started after presenting research proposal and obtaining ethical approval from Ethical Review Committee of Armed Forces Institute of Cardiology and National Institute of Heart disease.

While conducting this study, informed consent from all participants will be taken verbally. Participation was voluntary and individuals were informed that they can withdraw at any time and that all data will be treated confidentially. Subjects were assured of anonymity and confidentiality.

The objective of study was to assess the dietary pattern in association with non-communicable disease risk factors among middle adolescents in Rawalpindi.

Inclusion Criteria: Students between the age group of 15-17 years of age will be included in research.

Exclusin Criteria: The students who are unwilling to participate and who will be pregnant (for females), on any form of medication, acutely ill or with known chronic diseases will be excluded from research (Table-I).

RESULTS

A total of 145 students mean age 16.2 ± 1.92 years participated in this this study out of which 97 (66.9%) were male and 48 (33.1%) were female. Out of 66 (45.5%) students were from Allied School and 79 (54.4%) students were from City School, Rawalpindi participated this study. In 60% of the participants were had normal BMI (18.5-24.9), 4 (2.8%) students consume alcohol and 2 (1.4%) were smoker. Most of the participants were active 88 (62%), few were having sedentary 31 (21.8%) lifestyle and 23 (16.2%) were very active in their lifestyle (Figure-1).

The dietary patterns of young adolescents determines that choices of most of the food items were not according to the standard guidelines; as recommended vegetables intake is 5-5 ½ serving daily and only 26 (17.9%) participants were taking vegetables daily while majority 44 (30.3%) take vegetables <2 times a week. Most of the participants were taking 42 (29%) were taking Banaspati ghee on daily basis. In fact, its recommended consumption is <1% (not recommended as it has high trans-fat contents). Cereals/grains consumption is very low as 66 (45.5%) take cereals/grains <2 times a week. Fifty seven (39.3%) respondents take meat/beef /mutton 3-6 times per week while recommended intake is 2-2 ½ serving per week. Furthermost 43 (29.7%) never took olive oil in their life, while recommended intake is 2-table spoon/day.

Table-I: Standard intake of Food Items[7,9,11,13].

Vegetables: 5-5 ½ serving daily
Fruits: 2 serving daily (1 serve means 1 fruit or 1.5 cup)
Fruit Juices: 1-2 cup per day
Whole Milk /Skim Milk / Low Fat Milk: 2-3 serving (1 serve means 1cup) per day
Banaspati Ghee: less than 1% (not recommended as it has high trans-fat contents)
Cereals/Grains: 6-7 serving daily (1 serve means, 1 slice of bread, ½ cup of rice,½ cup pasta and 2/3rd cup of wheat flakes and 3-4 chappati).
Meat /Beef, Mutton: 2-2 ½ serving per week (1 serve means 1-2 oz.)
Processed Meat: 1-2 serving per week (1 serve means less then 70g as it is high in fat and sodium)
Fish and Seafood: 8 oz. per week (1 serve means 4 oz)
Olive Oil: 2 tbsp per day (1 serve means, 1 tbsp or 14g daily)
Nuts: 4 serving per week (1 serve means 30g)
Carbonated Drinks: less than 2-3 cup/week
Hot Beverage: caffeinate intake less then 100mg (1 serve means. 1 cup of coffee, 1-2 cup of tea)
Fast Food Burger, Pizza: less than once a week
Fried Potatoes: not recommended (you may take it as cheat meal after 20 days)
Sweets cake, ICE-Cream and Chocolates: 3 or fewer a week

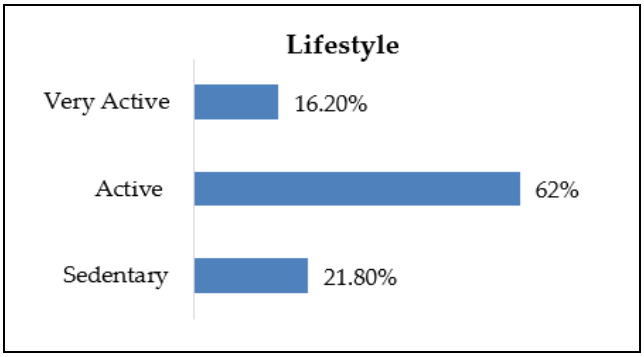

Figure-1: Lifestyle of study participants.

The recommended dose of nuts is 4 serving per week but 58 (40%) participants take <2 times a week. Intake of fried food is very high 59 (40.7%) of the

participants take fried foods once or twice a week as shown in Table-II.

Table-II: Comparison of food consumption with standard guidelines.

Standard	Study Results	Standard	Study Results
Vegetables: 5-5 ½ serving daily	Never= 16 (11%) <2 times a wk= 44 (30.3%) 3-6 times a wk= 31 (21.4%) Daily= 26 (17.9%) I don't know= 13 (9%) I don't remember= 13 (9%)	Fish and Seafood: 8 oz. per week (1 serve means 4 oz)	Never= 41 (28.3%) <2 times a wk= 53 (36.6%) 3-6 times a wk= 8 (5.5%) Daily= 5 (3.4%) I don't know= 15 (10.3%) I don't remember= 19 (13.1%)
Fruits: 2 serving daily (1 serve means 1 fruit or 1.5 cup)	Never = 6 (4.1%) <2 times a wk= 32 (22.1%) 3-6 times a wk= 42 (29%) Daily= 55 (37.9%) I don't know= 1 (0.7%) I don't remember= 7 (4.8%)	Olive Oil: 2 tbsp per day (1 serve means 1tbsp or 14g daily)	Never= 43 (29.7%) <2 times a wk= 26 (17.9%) 3-6 times a wk= 15 (10.3%) Daily= 27 (18.6%) I don't know= 25 (17.2%) I don't remember= 9 (6.2%)
Fruit Juices: 1-2 cup per day	Never= 18 (12.4%) <2 times a wk= 50 (34.5%) 3-6 times a wk= 31 (21.4%) Daily= 33 (22.8%) I don't know= 6 (4.1%) I don't remember= 5 (3.4%)	Nuts: 4 serving per week (1 serve means 30g)	Never= 19 (13.1%) <2 times a wk= 58 (40%) 3-6 times a wk= 24 (16.6%) Daily= 13 (9%) I don't know= 15 (10.3%) I don't remember= 16 (11%)
Whole milk/skim milk/low fat Milk: 2-3 serving (1 serve means 1cup) per day	Never= 24 (16.6%) <2 times a wk= 37 (25.5%) 3-6 times a wk= 20 (13.8%) Daily= 50 (34.5%) I don't know= 06 (4.1%) I don't remember= 7 (4.8%)	Carbonated Drinks: Less than 2-3 cup/ week	Never= 22 (15.2%) <2 times a wk= 48 (33.1%) 3-6 times a wk= 32 (22.1%) Daily= 28 (19.3%) I don't know= 6 (4.1%) I don't remember= 8 (5.5%)
Banaspati Ghee: less than 1% (not recommended as it has high trans-fat contents)	Never= 36 (24.8%) <2 times a wk= 26 (17.9%) 3-6 times a wk= 15 (10.3%) Daily= 42 (29%) I don't know= 13 (9%) I don't remember= 11 (7.6%)	Hot Beverage: Caffeinate intake less then 100 mg (1 serve means 1 cup of coffee, 1-2 cup of tea)	Never= 18 (12.4%) <2 times a wk= 28 (19.3%) 3-6 times a wk= 19 (13.1%) Daily= 68 (46.9%) I don't know= 5 (3.4%) I don't remember= 6 (4.1%)
Cereals/Grains: 6-7 serving daily (1serve Means1slice of bread, ½ cup of rice,½ cup pasta and 2/3rd cup of wheat flakes and 3-4 chappati).	Never= 20 (13.8%) <2 times a wk= 66 (45.5%) 3-6 times a wk= 26 (17.9%) Daily= 8 (5.5%) I don't know= 13 (9%) I don't remember= 11 (7.6%)	Fast Food Burger, Pizza: Less than once a week	Never= 16 (11%) <2 times a wk= 74 (51%) 3-6 times a wk= 31 (21.4%) Daily= 9 (6.2%) I don't know= 10 (6.9%) I don't remember= 5 (3.4%)
Meat /Beef, Mutton: 2-2 ½ serving per week (1 serve means 1-2 oz.)	Never= 6 (4.1%) <2 times a wk= 50 (34.5%) 3-6 times a wk= 57 (39.3%) Daily= 15 (10.3%) I don't know= 9 (6.2%) I don't remember= 6 (4.1%)	Fried Foods: Not recommended (you may take it as cheat meal after 20 days)	Never= 17 (11.7%) <2 times a wk= 59 (40.7%) 3-6 times a wk= 38 (26.2%) Daily= 17 (11.7%) I don't know= 5 (3.4%) I don't remember= 9 (6.2%)
Processed Meat: 1-2 serving per week (1 serve means less then 70g as it is high in fat and sodium)	Never= 27 (18.6%) <2 times a wk= 55 (37.9%) 3-6 times a wk= 27 (18.6%) Daily= 19 (13.1%) I don't know= 8 (5.5%) I don't remember= 6 (4.1%)	Sweets Cake, Ice-Cream and Chocolates: 3 or fewer a week	Never= 9 (6.2%) <2 times a wk= 52 (35.9%) 3-6 times a wk= 37 (25.5%) Daily= 34 (23.4%) I don't know= 7 (4.8%) I don't remember= 5 (3.4%)

Study participants who follow the standard recommended food choices in their daily routine consume fruits on daily basis i.e,. 55 (37.9%), 50 (34.5%) take milk regularly, 55 (37.9%) take processed meat <2 times a week, 53 (36.6%) consume fish/seafood once a week, 48 (33.1%) take carbonated drinks <2 times a week, 68 (46.9%) take hot beverages on daily basis (1-2 cups), 74 (51%) consume fast foods once a week and 59 (40.7%) take fried foods <2 times a week as shown in Figure-2.

DISCUSSION

Non-communicable diseases (NCDs) kill 41 million people each year, equivalent to 71% of all deaths globally.[13] Relations have been found between NCDs risk factors and dietary intakes, such as fat, protein, sugar and fiber. However, investigating a single food

or nutrient is unable to account for potential synergistic effects among them.[13] Dietary patterns represent a broader picture of food and nutrient consumption and thus may be more predictive of health outcomes than individual foods and nutrients.[14]

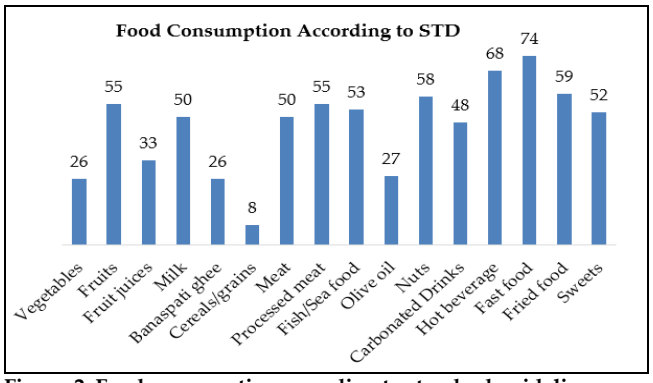

Figure-2: Food consumption according to standard guidelines.

In many low- and middle-income countries (LMICs) the double burden of malnutrition is high among adolescent, leading to poor health outcomes for the adolescent herself and sustained intergenerational effects. According to Keats *et al*, 37% of the adolescent girls consumed vegetables[15] whereas in this study majority of this study respondents took vegetables <2 times a week. In the same study Keats *et al*., reported 44% adolescent girls consumed fruits and in our study one-third of the study population consumed fruits daily.

According to American Heart Association,[16] four serving per week are required by average adult but in our study majority of the participants consumed nuts <2 times a week. According to Nimptsch *et al*., milk intake of adolescents in high school was primarily from (25th, 75th percentile) 1.43 (2.57, 0.86) servings per day 17 whereas in our study majority of the respondents consumed one serving of milk daily.

According to a cross-sectional national "Global School-Based Student Health Survey (GSHS)" data from 36173 adolescents across six Southeast Asian countries revealed 38.8% participants had consumed carbonated soft drinks <1/day, 19.9% consumed once a day and 17.5% ≥2 times/day,[18] whereas in this study majority of the adolescents consumed carbonated drinks <2 times a week.

The outcomes of this study have important consequences for public health policymakers. The NCD risk factors that are reported in this study are modifiable.[19] The government should develop school-based policies to educate adolescents on healthy lifestyles, comprising intake of adequate fruit and vegetables, increasing physical activity, avoiding tobacco use, and not having an unhealthy diet.[20] Besides, stakeholders and others should take the essential steps to raise awareness about the importance of these NCD risk factors not only among adolescents, but also in their parents.[21]

CONCLUSION

This research have highlighted the visible shift in dietary intake among adolescent of Rawalpindi. This shift will have major implications for the double burden of malnutrition that currently exists and will contribute to the rising prevalence of NCDs. We will require evidence-based, impactful nutrition interventions that can help to combat this. Further there is a need for better, more consistently measured, and representative data from all over the Pakistan. As such, we recommend the development of standardized indicators and measurement tools that can be used to benchmark and track progress. There is a critical and urgent need to address the current data limitations, such that future nutrition-related policies and programs would be better informed.

Conflict of Interest: None.

Author's Contribution

MZ: Principal investigation, HK: Data analysis & resulst, UZ, SM, MH: Data collection, SK: Report writing.

REFERENCES

1. World Health Organization. Media centre. Noncommunicable diseases. Fact Sheet. Updated June 2017. [Internet] Available at: www.who.int/mediacentre/factsheets/fs355/en/ (Accessed 15 January 2018).
2. Jafar TH, Haaland BA, Rahman A, Razzak JA, Bilger M, Naghavi M, et al. Non-communicable diseases and injuries in Pakistan: strategic priorities. Lancet; 381(9885): 2281-90.
3. Lozano R, Naghavi M, Foreman K, Lim S, Shibuya K, Aboyans V, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the global burden of disease study 2010. Lancet 2012; 380(9859): 2095-128.
4. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, et al. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. Lancet 2010; 376: 1775-1784.
5. Naicker A, Venter CS, MacIntyre UE, Ellis S. Dietary quality and patterns and non-communicable disease risk of an Indian community in KwaZulu-Natal. J Health Popul Nutr 2015; 33: 22.
6. Salameh P, Jomaa L, Issa C, Farhat G, Salamé J, Zeidan N, Baldi I. Lebanese national conference for health in university research group. Assessment of dietary intake patterns and their Correlates among University Students in Lebanon. Frontiers in Public Health 2014; 2: 185.
7. Non communicable diseases. Fact Sheet. 2020 [Internet]. Available from: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases. (Assessed 2020, 27 January]
8. Center for Disease Control. Global School Based Student Health Survey. 2010 [Internet] Avaiable at: https://www.cdc.gov/gshs/index.htm.
9. Joshi R, Alim M, Maulik PK. A contemporary picture of the burden of death and disability in Indian adolescents: Data from

the Global Burden of Disease Study. Int J Epidemiol 2017; 46(6): 2036-2043.
10. Van-Dam RM. Non communicable diseases. WHO Int 2021. New approaches to the study of dietary patterns. Br J Nutr 2005; 93(5): 573–574.
11. Teh CH, Teh MW, Lim KH. Clustering of lifestyle risk behaviours and its determinants among school-going adolescents in a middle-income country: a cross-sectional study. BMC Public Health 2019; 19(1): 1177.
12. Pengpid S, Peltzer K. Behavioral risk factors of non-communicable diseases among nationally representative sample of school-going adolescents in Indonesia. Int J Gen Med 2019; 12: 387-394.
13. Razzaque A, Nahar L, and Islam MS. Sociodemographic differentials of selected noncommunicable diseases risk factors among adults in matlab, bangladesh: findings from a WHO STEPS Survey. Asia Pac J Public Health 2011; 23(2): 183-191.
14. Hu FB. Dietary pattern analysis: a new direction in nutritional epidemiology. Curr Opin Lipidol 2002; 13(1): 3-9.
15. Keats EC, Rappaport AI, Shah S, Oh C, Jain R. The dietary intake and practices of adolescent girls in low- and mid-dle-income countries: a systematic review. Nutrients 2018; 10(12): 1978.
16. Mayo Clinic. Nuts and your heart: Eating nuts for heart health. 2021 [Internet]. Available at: https://www.mayoclinic.org/diseases-conditions/heart-disease/in-depth/nuts/art-20046635.
17. Nimptsch K, Lee DH, Zhang X. Dairy intake during adolescence and risk of colorectal adenoma later in life. Br J Cancer 2021; 124: 1160–1168.
18. Pengpid S, Peltzer K. High carbonated soft drink intake is associated with health risk behavior and poor mental health among school-going adolescents in six southeast asian countries. Int J Environm Res Public Health 2020; 17(1): 132.
19. Salwa M, Atiqul Haque M, Khalequzzaman M. Towards reducing behavioral risk factors of non-communicable diseases among adolescents: Protocol for a school-based health education program in Bangladesh. BMC Public Health 2019; 19(1): 1002.
20. Kurshed AAM, Rana MM, Khan S. Dietary intake, physical activities and nutritional status of adolescent girls in an urban population of Bangladesh. Ibrahim Med Coll J 1970; 4(2): 78–82.
21. MCH Services Unit, Directorate General of Family Planning. 2017–2030. 2016 [Internet] Available from: http://etoolkits.dghs.gov.bd/toolkits/bangladesh-program-managers/national-strategy-adolescent-health-2017-2030.