MEDDOCS Open Access Publisher

ISSN: 2639-4391

Annals of Epidemiology & Public Health

Open Access | Case Report

Salt Consumption and Hypertension and in Young Adult Girls

***Rita Patil*[1]*; Supriya Khedkar*[2]**

[1]*Associate Professor, Maniben Nanavati Women's College, SNDT Women's University, Mumbai, India.*

[2]*Dietitian, D Y Patil Hospital and Research Centre, Pune, India.*

***Corresponding Author(s): Rita Patil**

Associate Professor, Maniben Nanavati Women's College, SNDT Women's University, Mumbai, India.

Email: drritapatil@gmail.com

Received: Apr 12, 2022

Accepted: Jul 25, 2022

Published Online: Jul 27, 2022

Journal: Annals of Epidemiology and Public health

Publisher: MedDocs Publishers LLC

Online edition: http://meddocsonline.org/

Keywords: Hypertension; Salty foods; Obesity; Physical activity.

Abstract

The prevalence of hypertension is increasing in Indian adolescents and young adults. The increase in prevalence is attributed to factors like changed dietary habits (consumption of processed food) and a sedentary lifestyle. Hypertension which develops in childhood/ adolescence persists in adulthood. This study was conducted to determine salt consumption and hypertension in girls between 18-20 years of age. The study included 120 girls from different colleges in Mumbai. Blood pressure was measured using a digital sphygmomanometer. A FFQ was used to determine the salty food consumption of participants. Seventy-nine girls had normal blood pressure whereas 41 girls were hypertensive. The highest mean consumption of sodium through salty foods was found in stage I hypertension subjects (266.54 ± 312.33g) compared to elevated and stage II hypertension girls. Sedentary activity was reported by 92% subjects. The present study suggests that healthy diets and physical activity are important to reduce the risk of hypertension in young girls.

Introduction

Hypertension is the most common cardiovascular disorder and now it is a major health problem in developing countries [1]. Hypertension may have its origin in childhood and adolescence but due to the absence of signs and symptoms, it might go undetected [2]. Childhood obesity has evolved as a major public health problem and it increases the risk of hypertension [3]. In Asian adolescents, Hypertension has been associated with obesity [4]. Fast food intake, sugar added drinks, and limited outdoor activities have been significantly associated with obesity and increase risk of chronic disease among adolescents. In the past two decades, dietary habits have changed due to easy availability, attractive advertisements, luring marketing strategies, offers of freebies, peer pressure etc. Physical inactivity and exercise are important for young adults, particularly those with hypertension [5]. The rise in non-communicable diseases in the 21st century is associated with sedentary lifestyles [6]. WHO has recommended that adults in the age group of 18-64 should do 30 minutes of physical activity five times per week to prevent non communicable diseases (2010) [7]. Sodium is an important mineral in this condition. Increased sodium consumption leads to vasoconstriction and increased resistance for normal blood circulation in the body. Unknowingly salt consumption has in-

Cite this article: Patil R, Khedkar S. Salt Consumption and Hypertension and in Young Adult Girls. A Epidemiol Public Health. 2022; 5(2): 1084.

creased in all age group. The reasons vary with availability of processed foods (salty) which are cheaper than healthy foods, use of preservatives, attractive appearance and taste. Soups, sauces, ketchups, pickles, noodles, chips, salty fried Indian snacks are some examples of sodium containing foods. Excessive sodium intake is associated with elevated blood pressure and it is a risk factor for cardiovascular diseases [8].

Methodology

This was a cross sectional study of 120 adult girls (18-20 years) selected from various colleges of Mumbai**.** The study aimed to determine salt consumption and blood pressure in adult girls. Girls who had completed 18 years but did not exceed 20 years of age were included in the study**.** Participants already identified with hypertension were excluded from the study. A detailed purpose of study was explained before asking any question to participants and their consent was obtained.

Height, weight was measured and BMI was calculated. A questionnaire was used to record general information, blood pressure measurement and physical activity details. The information about physical activity was collected by including various questions of physical activity in daily life and to identify participants to be sedentary, moderate or of heavy activity. The physical activity questionnaire of WHO was taken as a guideline to create the physical activity questionnaire for this study. A FFQ (food frequency questionnaire) recorded frequency and portions of salty foods consumed. The FFQ consisted of a list of food items in descending order of their sodium content. They included soups, noodles, pasta, spread, salty fried Indian snacks, chips, sauces etc. According to the portion size reported sodium value was calculated by using the nutritive value given on the label of the product. The participants were also asked about addition of extra salt in their food.

Blood pressure was recorded in the upper right arm in sitting position to the nearest 2 mmHg using a digital sphygmomanometer. Three measurements were taken at an interval of five minutes each and mean of the three readings was obtained for both systolic and diastolic blood pressure. The BP was classified using the guideline given by the American College of Cardiology and American Heart Association Task Force [9].

SPSS version 20 was used to conduct appropriate statistical tests. The study was approved by Inter System Biomedical Ethics Committee (ISBEC/NR-24/KM-SU/2018).

Results

In the study 49 participants were 19 years old and others were 20 years old. The mean anthropometric measurements of the girls were height 156.64 cm, weight 49.90 kg and BMI was 20.33kg/m^2. Out of 120 girls, 44 (36.7%) girls had normal BMI, 44 (36.7%) girls were in underweight category and 23.3% and 4% girls were overweight and obese respectively. Amongst all the participants, 41 girls were hypertensive with the rest having normal blood pressure. Highest weight was observed in students who had stage I hypertension (55.18 ± 10.73) and the lowest weight was observed in girls with normal blood pressure. High BMI was found in stage I hypertension group (21.65 ± 3.36). The BMI in normal BP group was 19.99 ± 3.50 kg/m^2. The difference in BMI between the two groups was not significant (p= 0.30). The mean systolic blood pressure was 113.76 ±13.14 mmHg and diastolic pressure was 73.26 mmHg. Out of the 41 who had hypertension, 18 girls had stage I hypertension, 12 had stage II hypertension and others were in the elevated group.

Girls were found to be consuming a lot of salty foods. The list of salty foods included pickles, pizza, burger, cheese, mayonnaise, salted peanut, salted fried peas, other salted nuts (almond pista), popcorn, Cheeselings, French fries, soya chips, corn chips, wheat puffs and salted biscuits (monacco, krackjack). The mean weekly consumption of these foods was highest compared to other foods (260.78 ± 282.30 gm). Mean consumption of noodles was observed to be frequent. The most commonly eaten noodles were Schezwan, chicken cup, Manchurian, Maggi noodles and veg Hakka noodles. The mean consumption of noodles was 97.88 ± 140.19 gram. They also reported to be consuming a lot of Indian salty snacks (namkeens). The most commonly eaten fried Indian snacks were fried green gram pulse, potato crisps, crispy snacks made with legumes and salted multigrain flours, wheat, millet flakes etc. The mean consumption of these was 84.53 ± 108.23 gram.

Chips were consumed by most students either daily or twice in week. The varieties of chips in the FFQ included magic Masala, tomato tango, cheese flavor, sour cream and onion, cheddar cheese, classic salty etc and the mean consumption for these was 80.85 ± 133.51gm. Soups were reported to be consumed lowest by the participants. Most of them consumed soups only once in week or once in 15 days. The mean consumption was 7.37 ± 16.58 grams. Table 1 shows the salty food consumption of the girls.

Table 1: Consumption of Processed Foods.

Food Items	Mean ± SD
Soups	7.37 ± 16.58
Noodles	97.88 ± 140.19
Pasta	41.31 ± 284.88
Salty Spread	25.51 ± 47.28
Namkeen (salty snacks)	84.53 ± 108.23
Chips	80.85 ± 133.51
Sauces	39.63 ± 57.90
Other Salty foods	260.78 ± 282.30

The highest mean consumption of salty foods was in stage I HT subjects girls (266.54 ± 312.33g) compared to elevated and stage II HT girls (102.95 ± 136.46g). In 79 girls who had normal BP, the mean consumption of salty food was (262.01 ± 286.87 g). The highest noodle consumption was found in elevated BP group (128.6 ± 148.39 g) and it was lowest in stage II hypertension (51.25 ± 50.77g). In stage I hypertensive and normal BP group the mean consumption of noodles was almost similar.

The highest mean consumption of chips was found in elevated BP subjects (123.86 ±198.01g) compared to stage I and stage II HT subjects. In 79 girls who had normal BP, the mean chips consumption was (72.64 ± 108.05 g).

For pasta, the highest consumption was seen in girls with stage I HT (184.27 ± 732.85 g). There was no significant difference between consumption of pasta and BP categories (p= 0.14). The mean consumption of spreads was more in stage II HT group (45.35 ± 95.82 g) compared to stage I and elevated BP group. Even in the normal BP group, the consumption of spreads was 20.96 ± 32.58 g and it was higher than elevated BP group. The consumption of sauces was higher in 18 girls in stage I HT. The total consumption of sauces in normal BP group was (34.51 ± 55.08g) which was higher than elevated and stage II HT subjects.

For soup the highest mean consumption was found in elevated BP group compared to stage I hypertension. In stage II hypertension mean soup consumption was lower compared to stage I and elevated BP group. The girls with normal BP reported the mean consumption of soup to be 5.15 ± 6.42 g. The differences in consumption of any of the foods in hypertension categories were not significant.

Only 29 girls said that they had the habit of adding extra salt during meals. However quantity of added salt is not known. Their replies were that only one pinch was added to food. The 9.1% girls who added extra salt in diet were in elevated blood pressure category. There were 44.4% girls in stage I hypertension category and 25% girls were in stage II hypertension category (χ^2= 0.127, p= 0.138). There were 78.5% girls in the normal BP category who did not add extra salt during meal**.** Table 2 shows the consumption of different foods in blood pressure categories.

Table 2: Mean Consumption of Different Foods in Category of Blood Pressure.

Food Items (Amount in grams)	Normal Blood Pressure (n=79)	Elevated Blood Pressure (n=11)	Stage I Hypertension (n=18)	Stage II Hypertension (n=12)	F, p
Soup	5.15 ± 6.42	18.63 ± 42.31	10.83 ± 21.77	6.25 ± 10.89	2.52, 0.06
Noodles	100.1 ± 150.18	128.6 ±148.39	100.27 ±131.47	51.25 ± 50.77	0.62, 0.60
Pasta	16.60 ± 31.31	19.27 ± 40.79	184.27 ±732.85	9.7917 ± 11.60	1.81, 0.14
Spreads	20.96 ± 32.58	13.31 ± 14.86	39.72 ± 63.43	45.35 ± 95.82	1.76, 0.15
Salty snacks	89.6 ± 108.51	48.18 ± 75.07	72.01 ± 105.95	102.95 ± 136.46	0.66 ,0.57
Chips	72.64 ± 108.05	123.86 ±198.01	94.30 ± 198.61	75.32 ± 103.83	0.54, 0.65
Sauces	34.51 ± 55.08	29.77 ± 32.56	73.47 ± 83.18	31.60 ± 29.35	2.53, 0.06
Other salty Foods	262.01 ±286.87	244.6 ± 292.37	266.54 ± 312.33	258.79 ± 223.16	0.01, 0.99

When the sodium content was calculated, the mean sodium consumption through the processed food was highest in elevated BP group (4715.67 ± 4890.41mg) compared to stage I HT and stage II hypertension. The mean consumption of sodium in normal BP subjects was (3264.23 ± 2771.97 mg). However, there was no significant correlation between sodium intake and systolic BP (p= 0.628) and diastolic BP (p= 0.735) BP.

In the study all participants were sedentary. Physical activity of participants was compared in hypertension categories. Only stage II HT group had 8.3% participants each with moderate and heavy physical activity. Physical activity can affect the blood pressure but there was no significant difference between physical activity and hypertension category.

Discussion

The eating habits of adolescents and adults are changing day by day. Changes are seen with a higher consumption of fat, sugar and salt [10]. Most of the adolescents skip breakfast with excuses like lack of time and study time. They consume fried food and processed foods when not at home. With the arrival of various food apps like swiggy, uber eats, zomato; ordering food has become easy [11]. Processed food may be expensive but its taste attracts all age groups and thus the consumption of these foods has increased replacing homemade meals, fruits and vegetables [12]. Processed food contains higher amount of sugar, fats and salt and the frequent consumption of these can lead to weight gain. Snack foods are also a contributing factor for hypertension as foods like chips, noodles, pasta, ketchups, sauces are high in salt and sodium [13]. Television advertisements influence unhealthy dietary practices among children, including diets which are high in fat, sodium or added sugar. Consumption of diet high in sugar, saturated fat and sodium content in children can lead to early development of obesity, hypertension [14]. With nuclear families and working parents eating out is common. Restaurants, road side food stalls and cafeterias do not provide nutritious food and thus young persons may suffer from different life-style disorders.

The WHO has recommended that adults should consume < 2500mg of sodium per day. Some have a habit of adding extra salt in meals while some unknowingly consume high salt due to the intake of processed foods. Chips, noodles and salty savory food items are favorites with youth. Sodium found in processed food is much higher in amounts such as bread, bacon, cheese, puff, popcorn and sauces [15].

Excessive sodium intake is associated with elevated blood pressure and it is a risk factor for cardiovascular diseases [8]. A study conducted by Radhika et al., (2007) [16] in Urban South Indian population reported significantly higher prevalence of hypertension in youth with highest salt intake. Both systolic and diastolic pressure increased with higher total salt consumption. Ravi et al., (2016) [17] studied the prevalence of hypertension and sodium intake. Based on the 24 hour dietary recall, they calculated total daily sodium intake and found that with women with higher mean sodium intake had higher systolic and diastolic blood pressure. Singh et al., (2016) [18] also observed a significant association between high salt intake >10g/d with hypertension in their study in Andhra Pradesh.

Kini et al., in 2016 [19] observed that consumption of salty foods and addition of extra salt in meals was significantly associated with prehypertension. In their study prevalence of pre-hypertension and hypertension among the study group was 45.2% and 3% respectively. Similar results were reported by Tripathy et al., (2017) [20]. They reported total salt intake to be ≥5 g/d in hypertensive subjects and prevalence of pre hypertension of 40.8%. In today's youth processed food consumption is more common than the older age groups. Easy availability of fast food, convenience of cooking, its taste, low cost, marketing strategies and peer pressure have been the causes of the popularity of processed foods. These foods have caused obesity and other disorders in children and youth [21].

Our study observed girls to be eating a lot of salty foods. Similarly, a study reported 32% girls to be consuming Indian salty snacks (namkeen) daily; 25.66 % consuming other salty foods and 11.33% girls were eating chips very often [22]. Campagnoli

et al., (2012) [23] reported their study of students from various universities. Forty six percent students had blood pressure above normal and most of them had a salt intake higher than 5 to 14 g/day. A study conducted by He et al., (2007) [24] observed that with increase in age there was increase in salt intake and at 18 years they found the salt intake to be was 6.8 ± 0.2 g/d. Also, salt intake was significantly associated with systolic blood pressure.

High sodium level is a risk factor for hypertension. Sodium affects renin-angiotensin system in kidney which produces vasoconstriction in arterioles and lead to development of HT [25]. A study conducted in Mumbai by Tadvi et al., (2016) [26] reported a significant association between salt intake and hypertension. Similarly, Singh et al., (2016) [18] observed significant association between high salt intake (>10g/day) and hypertension. He et al., (2007) [24] in Britain observed that as age increases there was an increase in salt intake and at 18 years they noticed that salt intake was 6.8 g/day which was significantly associated with systolic blood pressure. Dangroo et al., (2014) [27] conducted a study in Kashmir and reported that salt intake was highest in stage two hypertension group (10.30 gm/day), followed by stage one group (7.94 gm/day) and pre-hypertension group (7.58 gm/day). An adequate and appropriate dietary intake is required in adolescents and adults to provide nutrients for proper growth and development and also for long term health [28].

In this study, no significant correlation was found between physical activity with systolic (p=0.252) and diastolic blood pressure (p=0.492). Similarly, Papathanasiou et al., (2015) [29] reported that 44.4% participants had low physical activity, 45% had moderate physical activity and 10.6% had high physical activity. However, there was no significant correlation between physical activity and hypertension.

In the study 92.5% had sedentary activity, 6.7% moderate activity and only 0.8% reported heavy physical activity. Other studies too have reported inactivity in young adults [30,31,32]. Prevalence of obesity has increased because of sedentary lifestyle. Most of the participants in the present study had a sedentary lifestyle. This may be due to various reasons- study burden, spending more hours with mobile and laptop.

Parikh et al., (2011) [33] reported their study where no person with heavy activity was hypertensive. In 2016, Bendhari et al., observed a significant difference of prevalence of hypertension in participants with different activity levels [34]. Prevalence was highest in sedentary activity (36.45%) followed with moderate activity (10.32%) and it was lowest in participants with heavy activity (8.65%). Another study Kini et al., (2016) [19] observed that 62.6% young adults who were pre-hypertensive were from the sedentary activity category, 29% were pre-hypertensive from moderate activity category and 8.4% were pre-hypertensive from heavy activity category.

Regular physical activity is necessary for fitness and good health. WHO has recommended that at least 30 minutes of daily physical activity in adults will help to prevent non- communicable diseases. Now day's adults are spending there more time in sitting positions in front of laptop, television and mobile so physical activity has reduced. Increased technology such as escalators present in malls, offices, elevators at home individuals avoid staircase. For transportation many individuals use car, train, bike, auto and bus rather than walking and cycling even for small distances. This sedentary lifestyle contributes to obesity, high blood pressure, cardiovascular disease etc. Physical activity is important for a healthy life among all age groups. Involving in moderate activity such as jogging, brisk walking, bicycling will help to prevent hypertension in children and youth.

Conclusion

Dietary assessments of girls using a food frequency questionnaire (FFQ) found that they were consuming a lot of salty foods. Healthy diet and exercise are important to reduce the risk of obesity and hypertension in young adults. Healthy diets include a variety of whole grains, fruits, pulses, legumes, vegetables and nuts. All are these rich in vitamins and minerals and provide necessary nutrients for growth and development of the body. While healthy and nutritious foods should be consumed, processed (high sodium, high sugar and high fat) foods should be avoided. Increasing physical activity will help to reduce weight and regular exercise will make the heart strong and reduce possibility of blood pressure. Encouraging an active and healthy life in adolescents is necessary.

References

1. Todkar SS, Tapare VS, Gujarathi VV. Period Prevalence and Sociographic Factors of Hypertension in Rural Maharashtra. Indian J Community Med. 2009; 34: 183-187
2. Kumar S, Ray S, Roy D, Gangly K, Dutta S,. et al. Exercise and eating habits among urban adolescents: a cross-sectional study in Kolkata, India. Public Health. 2017; 17: 468.
3. Kar S, Khandelwal B. Fast foods and physical inactivity are risk factors for obesity and hypertension among adolescent school children in east district of Sikkim, India. Journal of Natural Science, Biology and Medicine. 2015; 6.
4. Goel R, Misra A, Agarwal SK, Naval V. Correlates of hypertension among urban Asian Indian adolescents Arch Dis Child. 2010; 95: 992–997.
5. Gupta R, Gupta S. Strategies for initial management of hypertension. Indian Journal of Medicine Research. 2010; 132: 531-542
6. Banerjee A, Khatri S. A study of physical activity habits of young adults. Indian Journal of Community Medicine. 2010; 5: 450-451.
7. World Health Organization. (2010). https://www.who.int/dietphysicalactivity/global-PA-recs-2010.pdf
8. Dhemla S, Varma K. Salt intake in India – an alarming situation. International Journal of Food, Agriculture and Veterinary Science. 2015; 5: 1-10
9. Whelton PK, Carey RM, Aronow WS. et al. Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Hypertension. 2018; 71.
10. Naseem S, Masoodi FA, Sherazi A, Bhat AB. et al. Food habits and risk factors associated with obesity in adolescents of district Anantnag of Kashmir valley. Saudi Journal of Pathology and Microbiology. 2016; 1: 14-18.
11. Patil R, Shah H, Deshpande A. Use of Smartphones and Snacking by Young Adults. Wesleyan Journal of Research. 2020; 13: 96-104.
12. Song YJ, Joung H, Engelhardt K, Yoo SY, Paik YH. Traditional versus modified dietary patterns and their influence on adolescents' nutritional profile. British Journal of Nutrition. 2005; 93: 943–949.

13. Ashakiran and Depti R. Fast Foods and their Impact on Health. Journal of Krishna Institute of Medical Sciences University. 2012; 1: 8-15

14. Kaushik JS, Narang M, Parakh A. Fast Food Consumption in Children. Indian Pediatrics. 2011; 48.

15. World Health Organization. Guideline: Sodium intake for adults and children. Geneva, World Health Organization. 2012.

16. Radhika G, Sathya RM, Sudha V, Ganesan A, Mohan V. Dietary Salt Intake and Hypertension in an Urban South Indian Population (CURSE-53). JAPI.55. 2007.

17. Ravi S, Odilia I, Harivanzan V, Vasudevan P. et al. Annals of Global Health. 2016; 82: 234-248.

18. Singh M, Singamsetty B, Kandati J. An epidemiological study of prevalence of hypertension and its risk factors in a rural community of Nellore, Andhra Pradesh, India. International Journal of community Medicine and public health. 2016; 3: 3408-3414.

19. Kini S, Kamath VG, Kulkarni MM, Kamath A, Shivalli S. Pre-Hypertension among Young Adults (20–30Years) in Coastal Villages of Udupi District in Southern India: An Alarming Scenario. PLoSOne. 2016; 11.

20. Tripathy JP, Thakur JS, Jeet G, Chawla S, Jain S. Alarmingly high prevalence of hypertension and pre-hypertension in North India results from a large cross-sectional STEPS survey: PLoS One. 2017; 12.

21. Dhobale RV, Kumbhar SG, Gore AD, Waghachavare VB, Kadam YR, et al. A study of food fads and overweight in adolescents from an urban area. International Journal of Community Medicine and Public Health. 2016; 3: 813-817.

22. Mithra P, Unnikrishnan B, Thapar R, Kumar, Nithin et al. Snacking Behaviour and Its Determinants among College-Going Students in Coastal South India. Journal of Nutrition and Metabolism. 2018; (1): 1-6.

23. Campagnoli T, Gonzalez L, Cruz FS. Salt intake and blood pressure in the university of Asuncion Paraguay youths: a preliminary study. J Bras Nefrol. 2012; 34: 361-368.

24. He JF, Marrero NM, Macgregor GA. Salt and blood Pressure in children and adolescents. J Hum Hypertens. 2008; 22: 4-11.

25. Takashaki H, Yoshika M, Komiyama Y. et al. The central mechanism underlying hypertension: a review of the roles of sodium ions, epithelial sodium channels, the renin–angiotensin–aldosterone system, oxidative stress and endogenous digitalis in the brain. Hypertens Res. 2011; 34: 1147–1160.

26. Tadvi AY, Bandi JR. Study of prevalence of hypertension in young adult population of age group 20 to 40 years in an urban slum of Mumbai, Maharashtra, India. International Journal of Community Medicine and Public Health. 2016; 3: 3325-3331.

27. Dangroo S, Hamid S, Kousar J, Hamid S, Rashid AF. Relationship of hypertension and daily consumption of salt and edible oil in Kashmiri population. Journal of Medical Science and Clinical Research. 2014; 2: 359-372.

28. Mukherjee R, Chaturvedi S. A study of the dietary habits of school children in Pune city, Maharashtra, India. International Journal of Community Medicine and Public Health. 2017; 4: 593-597.

29. Papathanasiou G, Zerva E, Zacharis J, Papandreou M. et al. Association of high blood pressure with body mass index, smoking and physical activity in healthy young adults. The Open Cardiovascular Medicine Journal. 2015; 9: 5-17

30. Rouf A, Rasool M, Khan MS, Sheikh MS. Physical inactivity and its association with hypertension in adult female population of Srinagar, India: a Community-Based Cross-Sectional Study. National Journal of Community Medicine. 2018; 9: 693-699

31. Rajappan R, Selvaganapathy K, Liew L. Physical activity level among university students: a cross sectional survey. International Journal of Physiotherapy and Research. 2015; 3: 1336-43.

32. Tsioufis C, Kyvelou S, Tsiachris D. et al. Relation between physical activity and blood pressure levels in young Greek adolescents: The Leontio Lyceum Study .European Journal of Public Health. 2010; 21: 63–68

33. Parikh S, Choksi J, Bula DV. The study of epidemiology and determinents of hypertension in urban health training centre. Gujarat Medical Journal. 2011; 66.

34. Bendhari ML, Korade RS, Haralkar SJ. Study of prevalence and risk factors of hypertension in adults in an urban slum area of western Maharashtra, India. International Journal of Community Medicine and Public Health. 2016; 3: 2812-2816.