



# Salt intake behavior among the undergraduate students of Bangladesh University of Health Sciences

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**Background:** Excessive salt intake contributes to increased risk of noncommunicable diseases, which could vary between countries and between population groups within a country. Specific population-based data are necessary to design a pragmatic intervention strategy. The present study was designed to find out the salt intake knowledge, attitudes and behavior among the Bangladeshi undergraduate students.

**Methods:** This was a cross-sectional study conducted among 147 undergraduate students of Bangladesh University of Health Sciences (BUHS), Dhaka. Data were collected using pretested self-administered questionnaire adapted from World Health Organization (WHO) STEPS questionnaire of salt intake. Additionally, amount of added salt intake while taking a meal was assessed using a teaspoon (5 g).

**Results:** Nearly one-third (29.9%) of the respondents reported taking added salt while taking a meal. The median added salt intake was 3.0 g/day with no significant difference between sexes. Foods from street vendors, chips and crackers were their main sources of salt intake in the form of processed foods. Majority of the students (93.2%) had knowledge regarding the adverse effects of excess salt on health, but 72.8% of them avoided processed food to restrict their salt intake.

**Conclusions:** Added salt while taking a meal and salty processed food intake are common practices among the BUHS undergraduate student although many of them are trying to reduce salt intake. Targeted interventions are necessary especially to reduce the added salt intake while taking a meal.

**Keywords:** Salt intake; university students; noncommunicable diseases; young adults; knowledge; attitude; behavior; Bangladesh

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## Introduction

Excessive salt (sodium chloride) intake contributes to increased risk of noncommunicable diseases like hypertension and associated cardiovascular complications (1,2). Thirty percent of the cases of hypertension and related diseases, as well as 1.65 million annual deaths from cardiovascular events, are attributed by high dietary salt (3,4).

The majority of the adult population around the world consume salt in average higher than the World Health Organization (WHO) recommended level (<5 g per day), and in Asian countries, it is two times higher (>11.7 g/day) (3). The South East Asian countries like India, Thailand, Nepal, Sri Lanka, Indonesia, Vietnam, and Malaysia, all have high salt intake (5-18). The main sources of excess salt intake among these countries are both salt containing food cooked at home and foods eaten out of home (19-24). Young people like university students, consume excess salt (>10 g/day) from processed foods and instantly cooked meals both at home and at the hostel (22,23).

The situation is not better in Bangladesh. Sixty to seventy-two percent Bangladeshi people consume salt higher than the recommended dietary intake (25), though this is a little lower (66.3%) among the health professionals (academicians as well as clinicians) (24).

The overall perception of salt intake among the general population is also very low. Only 38.8% of the general population considers about lowering their salt intake (26) including those living in the coastal areas (27). Despite being aware of the consequences of extra salt intake, 64.3% of the undergraduate students of Dhaka add extra salt while taking a meal (28). Given benefits of dietary salt reduction (29), it is important to examine salt intake behavior among the young people. This study has been conducted as a series of dietary salt studies (3,24,30), conducted by the Department of Noncommunicable Diseases of Bangladesh University of Health Sciences (BUHS) in order to assess the salt intake behavior of the BUHS family members to help designing a customized salt reduction strategy. In this study we focused on the undergraduate students of the BUHS to get a clear picture regarding the current salt intake knowledge, attitudes and behavior, in order to promote a healthy dietary behavior among them. We present the following article in accordance with the STROBE reporting checklist (available at <http://dx.doi.org/10.21037/jxym-20-47>).

## Methods

### *Study settings*

A cross-sectional study was conducted among the undergraduate students of BUHS from January to February, 2019. We chose BUHS purposively as it is only the private health sciences related university in Bangladesh. It is a non-profit private medical university of Bangladesh situated in the north-eastern part of Dhaka city. BUHS can attract students from all walks of life because of relatively low fees. It conducts programs under four faculties for both undergraduate and postgraduate students in its own campus. The students spend a considerable amount of time in the campus for academic activities. They frequently visit the cafeteria in the campus premise and food junctions in the adjacent areas for breakfast, mid-day snacks and lunch.

### *Study subjects*

The undergraduate students of all departments (Biochemistry & Molecular Biology; Microbiology and Immunology; Community Nutrition; Health Promotion & Health Education; Reproductive & Child Health; Occupational and Environmental Health; Epidemiology and Biostatistics; Radiology & Imaging Technology; Applied Laboratory Sciences) of Bangladesh University of Health Sciences were considered as the study population. The total number of undergraduate students was 511 excluding foreign and discontinued students during the study period. If anyone was unwilling to participate, absent or discontinued during the data collection period were excluded from the study. The foreign students were excluded due to having a different cultural background including food habits compared to the Bangladeshi students. Thus, selecting the Bangladeshi students only gave a coherent picture on their salt intake behavior. Purposive sampling technique was used in this study. The estimated sample size was 209, considering 64.3% (28) prevalence of salt intake behavior among the undergraduate medical and nonmedical student in Bangladesh. Nevertheless, due to the examination and semester break, finally data could be collected from only 147 students.

### *Data collection*

Data were collected using a self-administered structured questionnaire adopted from the dietary salt module of the WHO STEP-wise approach to Surveillance (STEPS)

**Table 1** Demographic characteristics of the undergraduate students of Bangladesh University of Health Sciences

Variable	Men (n=73)	Women (n=74)	Both (n=147)
Age in years, mean (SD)	23.2 ( $\pm$ 3.4)	21.3 ( $\pm$ 2.4)	22.3 ( $\pm$ 3.2)
Place of residence, n (%)			
Home	40 (54.8)	56 (75.7)	96 (65.3)
Hostel	33 (45.2)	18 (24.3)	51 (31.7)

SD, standard deviation.

**Table 2** Amount of daily added salt intake while taking a meal\* among the undergraduate students of Bangladesh University of Health Sciences (n=44)

Variable	Men	Women	Both
Mean $\pm$ standard deviation	2.9 $\pm$ 3.3	2.8 $\pm$ 2.1	2.8 $\pm$ 2.7
Median (interquartile range)	3.0 (2.5, 4.0)	3.0 (2.0, 4.0)	3.0 (2.0, 4.0)

\*, estimated by the teaspoon measurement, where 1 teaspoon =5 g.

instrument version 3.1. A validated Bengali version of this module was used in this study which was taken from the published studies conducted by the Department of Noncommunicable Diseases, BUHS (30).

A list of undergraduate students and class routine were collected from the registrar office of BUHS. Permission was taken from all the heads of the departments. All faculty members were informed about the study. Following the class routine, questionnaire was distributed to the students at the end of the lecture sessions with a brief explanation. A demonstration was done how to respond for the question on amount of added salt while taking a meal. A flat full spoon was considered to have 5 g of salt (30). Students were asked to drop the completed questionnaire into a drop-box.

The questionnaire also had questions on use of salt during preparing food, consumption of processed food containing a high level of salt, perceptions regarding effects of extra salt on health and activities focusing on its control, using table salt or salty sauce etc. The key variables were arranged into three groups like, knowledge (e.g., perception towards consequence of excess salt consumption, importance of lowering salt consumption), attitude (e.g., perception towards the amount of consuming salt) and practice (e.g., consumption of add salt).

### Data processing and analysis

The completed questionnaires were reviewed for consistency for cleaning. Then the data were entered in an

Excel sheet and logical checks were done by running sorting and frequency distribution. Finally, data were analyzed using the Statistical Product and Service Solutions (SPSS) version 22.0 for Windows (SPSS, Inc., Chicago, IL, USA). Descriptive (frequency, percentage, mean and standard deviation) analysis was done as appropriate for categorical and quantitative variables. Chi-square test was performed to compare the categories setting  $\alpha$  level at 0.05.

This cross-sectional study was conducted in accordance with the Declaration of Helsinki (as revised in 2013) and no invasive procedure was involved. As it was a class room activity of the students of the Department of Noncommunicable Disease (NCD) of BUHS, the verbal permission was taken from the all respective head of the departments as well as from the Chairman of the Ethical Review Committee of the Bangladesh University of Health Sciences and informed consent was taken from all the participants.

### Results

There were 73 men and 74 women (total =147). Their mean age was 22.3 years (SD, 3.2), where average age of men 23.2 $\pm$ 3.4 years and women 21.3 $\pm$ 2.4 years. More than six out of ten (65.3%) respondents resided at home, and the rest were staying at hostel (Table 1).

The median amount of daily added salt intake was 3.0 g and the difference between sexes was negligible (Table 2). However, this difference was not statistically significant.

**Table 3** Knowledge and attitudes of undergraduate students of Bangladesh University of Health Sciences towards salt intake (n=147)

Variables	Men (%)	Women (%)	Both (%)	P value
Knowledge regarding health effect of daily consumption of salt				
Yes	30.1	29.7	29.9	0.39
Perception towards the amount of consuming salt				
Too much	1.4	6.8	4.1	0.40
Just the right amount	52.1	52.7	52.4	
Too little	8.2	8.1	8.2	
Far too little	31.5	29.7	30.6	
Don't know	6.8	2.7	4.8	
Perception towards too much salt could cause serious health problem				
Yes	91.8	94.6	93.2	0.19
No	2.7	5.4	4.1	
Don't know	4.1	0.0	2.0	
How important lowering the salt				
Very important	68.5	55.4	61.9	0.13
Somewhat important	19.2	32.4	25.9	
Not at all important	2.7	6.8	4.8	
Don't know	9.6	5.4	7.5	

Nearly one-third (29.9%) of the respondents had knowledge regarding health effect of dietary salt intake and 87.8% perceived that dietary salt reduction was important (Table 3). More than half (52.4%) thought that they were taking the right amount of salt or less. Only 4.1% perceived that they consume too much dietary salt. An overwhelming majority (93.2%) responded positively when they were asked if they knew about the health problems that excess salt consumption can create (Table 3).

The frequency of adding salt to the meal during eating appeared to be low. A similar pattern was also observed regarding adding salty sauce or tasting salt during cooking meal or meal preparation. More than two-third of the respondents (70.7% including always, often and sometimes) consumed processed foods containing high level of salt. Chips and crackers (29.9%) were the top choices among this category. Street vendors (53.7%) followed by the university cafeteria (18.7%) were the two commonest sources of processed foods with a high salt level (Table 4).

More than seven out of ten (72.8%) of the students were avoiding processed food as their control activity of salt

intake habit. Avoidance of eating outside or buying foods with low salt/sodium content, were observed in more than half of the students' responses. Looking at the salt/sodium content label on food items was found in 41.5% of the respondents (Table 5).

## Discussion

The present study explored the added salt intake, knowledge, attitudes and behavior among the undergraduate students of BUHS. Majority had relevant knowledge but added salt and salty processed food intake was high indeed. Only some of them were trying to reduce salt intake.

The proportion of students taking salt during the meal is lower than the previously reported study by Mondal *et al.* for a similar age group (28). The possible reasons for lower consumption could be the different awareness programs on salts and hypertension by the University as well as monitoring of the canteen by the faculty members.

The prevalence of excess salt intake is also much less than the rest of the Bangladeshi population (94%) (25). The

**Table 4** Salt intake practice among the undergraduate students of Bangladesh University of Health Sciences (n=147)

Variables	Men (%)	Women (%)	Both (%)	P value
The practice of added salt intake during meal				
Always	0.0	6.8	3.4	0.05
Often	8.2	2.7	5.4	
Sometimes	12.3	8.1	10.2	
Rarely	9.6	12.2	10.9	
Never	69.9	70.3	70.1	
Use of sauce or tasting salt during cooking				
Always	8.2	2.7	5.4	0.29
Often	4.1	6.8	5.4	
Sometimes	12.3	24.3	18.4	
Rarely	35.2	27.0	30.6	
Never	32.9	32.4	32.7	
Don't know	8.2	6.8	7.5	
The practice of high salt containing processed foods intake				
Always	1.4	4.1	2.7	0.28
Often	15.1	17.6	16.3	
Sometimes	46.6	56.8	51.7	
Rarely	30.1	16.2	23.1	
Never	6.8	5.4	6.1	
Types of high salt containing foods consumed				
Chips/crackers	39.7	20.3	29.9	0.22
Prickles	13.7	24.3	19.0	
Fries	17.8	16.2	17.0	
Cheese	12.3	14.9	13.6	
Processed meat items	9.6	13.5	11.6	
Processed fish items	1.4	5.4	3.4	
Instant noodles	2.7	2.7	2.7	
Fast food items	1.4	2.7	2.0	
Salted nuts	1.4	0.0	0.7	
Source of salty processed foods				
Street vendor	53.4	54.1	53.7	0.74
University cafeteria	17.8	18.9	18.7	
Fast food restaurants	15.1	16.2	15.6	
Shop near university	5.5	1.4	3.4	
Shop near the place of residence	8.2	9.5	8.8	

**Table 5** Regular activities to control salt intake among the undergraduate students of Bangladesh University of Health Sciences (n=147)

Variables	Men (%)	Women (%)	Both (%)	P value
Avoid/minimize consumption of processed foods	74.0	71.6	72.8	0.45
Using spices other than salt when cooking	42.5	32.4	37.4	0.14
Avoiding eating out	68.5	64.9	66.7	0.39
Looking at the salt or sodium content on food labels	43.8	39.2	41.5	0.34
Buying low salt/sodium alternatives	52.1	51.4	51.7	0.53
Any other actions	16.4	20.3	18.4	0.35

median daily added salt intake while taking a meal alone (3 g) was 60% of the WHO recommended intake (<5 g) (31). Presumably their total salt intake was much higher than this limit.

The prevalence of salt consumption can vary from population to population (adult *vs.* younger; doctor *vs.* nurses; students *vs.* faculties; urban *vs.* rural) and country to country. The reason for variation could be, some methodological issues related to measuring the salt consumption like subjective (asking question) or objective (24-hour urine, or spot urine examination) measurements. Moreover, different cultural issues, cooking practices and different canteen or cafeteria based dietary habits may be another possible reason for consumption variation.

More than half of the respondents in the current study thought that they consumed the right amount of salt. This figure is higher than the students of similar age in another study but less than nurses working in a hospital nearby (3,28). A common theme across different studies including this one revealed that the majority of respondents were aware of the health hazards related to excess salt consumption. The awareness on the necessity of reducing dietary salt consumption is moderate among the students. An interesting finding was the low frequency of added salt during meal while other study reported it as a more common phenomenon (28). The use of salty sauce was shown to be of similar pattern where consumption seemed to be low. A high percentage of respondents had a habit of occasionally consuming processed food with salt content. This figure is higher than previously conducted studies which may be due to increase in the convenient source of these foods available in street vendors or university cafeteria (23,30).

Avoiding processed food was the principal activity for these students to lower salt consumption. This is quite higher than the students of a similar age who were using

a similar strategy to do the same (28). An encouraging number was observed regarding purchasing food with low sodium content or consulting the food label to check the sodium content.

Only one out of three respondents had the knowledge regarding the health effect of daily salt consumption and interestingly there were no difference between men and women. Lowering the salt intake during meal has not been very different between men and women. Significant difference has been observed between men and women regarding practice of added salt intake during meal. To the best of our knowledge no local study has been reported these data among the men and women students in Bangladesh. But above-mentioned study (28) reported among the medical and nonmedical students which is also reported significant.

This study had also some limitations that the amount of salt intake was for added salt only. We could not measure 24-hour urine examination because it needed lab procedures and high cost was involved. The findings of the study cannot be generalized for all undergraduate students of Bangladesh as this study was conducted among only health sciences students, but we got some idea regarding rest of the students in the country. Our response rate was low (70.3%). Therefore, the analysis suffers from a threat of validity especially for the subgroups, which should be interpreted cautiously. This study has laid down a good foundation for future studies.

## Conclusions

The findings in the present study denote that young students are more aware of the health hazards of consuming excess salt, and try to restrict their salt intake. In spite of this, the habit of consuming processed food is fairly common among the students. This is an area of concern

as processed food is a source of significant amount to daily extra salt intake. The University Authority should restrict the selling of high salt containing processed food in the university canteen and facilitate keeping healthy food items.

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### Footnote

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at <http://dx.doi.org/10.21037/jxym-20-47>

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