

Nutritional Adequacy and Hygienic Practice in Residential Hall Dining at Dhaka University

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Abstract

Background: The young adult is the foundation of enhancing power of nation and the university students are not exception. Appropriate and sufficient nourishment is essential to construct up better health. Simultaneously, good hygiene is required in every aspect of preparation, serving, consumption and storage of food to maintain this better health. Nutrition and physical growth are integrally related; optimal nutrition is a requisite for achieving full growth potential. The average daily calorie consumption in both male and female adult in developing countries is 1800-2000Kcal/day and in developed countries it is between 3000-3500 Kcal/day. **Methodology:** The aim of the study was to investigate the nutritional adequacy and hygienic practice during cooking and serving at the Dhaka University residential hall cafeteria. Under an observational study, a total of 20 residential hostel cafeterias in DU were selected. The recommended dietary allowances of macronutrient and number of portions from the food groups were adopted from National Institute of Nutrition, Indian Council for Medical Research (ICMR), Hyderabad; 2010. **Result & Discussion:** In the present study, 28 different types of menu were used in 20 residential hall's cafeteria of Dhaka University (DU) in three main meals. At boy's hall cafeteria, among the male residential halls, hall no. 14 had supplied the highest (83.81%) amount of energy from carbohydrate in menu 15 and lowest (64.70%) in menu 4 in hall no. 11. Hall no. 12 in menu 27 supplied the highest (14.65%) amount of energy from protein and lowest (10.15%) in hall no. 17 in menu 15. Hall no. 13 supplied the highest (23.10%) amount of energy from fat and lowest (15.41%) in menu 25 in hall no. 1. On the other hand, in female Halls, hall no. 16 supplied the highest (80.02%) amount of energy from carbohydrate in menu 27 and lowest (65.17%) in menu 4 in hall 18. Number of portion of cereals and pulse groups were found in huge amount than the recommended number of portion both in boys and girls hall. Milk and fruits groups were totally absent in both halls. In addition, in girl's hostel green leafy vegetables were totally absent. In the present study 100% cooking stuffs washed hands after using the toilet and touching garbage. No one washed their hands before touching foods, hair, money or cigarette. This study showed nutritional adequacy is not found in 28 different types of menu. Principles of balanced diet are not followed both in boys and girls halls. Hygienic practices during cooking and serving at the DU residential hall cafeteria are not satisfactory. **Conclusion & Recommendation:** In both male and female hall cafeteria carbohydrate were found to be the main source of energy which was observed higher than the recommended dietary allowances. Protein requirement were fulfilled by every halls cafeteria but as the main source of energy fat were neglected almost all hall cafeteria. In the present study number of portion of cereals and pulse groups are found in huge amount than the recommended number of portion both in boys and girls halls. Milk and fruits groups are totally absent in both hall cafeterias. Number of portion of green leafy vegetables are found nil in the girl's hostel. All cooking stuffs (100%) wash their hands after using the toilet and touching garbage. Specific guidelines should be provided through central committee for residential hall cafeteria of Dhaka University. Further research works in this field are needed with proper time and resource.

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Introduction:

Human being are proceeding themselves to the world of development. Sometimes it makes better result in present but have reverse action in future. The continuing and upcoming century is not only changing the economic, social and cultural conditions in which it has been established, but has also delineated introduce a new age of eating, so that it may justifiably address this age as "the era of community catering". In fact, it does not only changed the quality and quantity of the food but also the way in which we eat it. It is becoming increasingly necessary to eat outside from the home, in one of the common forms of community catering, such as the canteen or cafeteria, frequented more particularly by the younger age groups, where the proper nutrition is not adequate¹.

Late adolescent and early adult and its transitional period is the base of earning peoples for any nation. The average

daily calorie consumption in both male and female adult in developing countries is 1800-2000Kcal/day and in developed countries it is between 3000-3500 Kcal/day². Food is consists of both macronutrients as carbohydrate, protein and fats and micronutrients as vitamins and minerals. Carbohydrate, protein and lipids are the most abundant nutrients of human meal. Minerals and vitamins being present relatively small or even trace amount. Protein, mineral and water all enter the composition of the body tissues. Vitamins and minerals are essential for normal growth and health. Certain of these may be building into or stored in the tissues but the main function is to serve in regulating body processes. They assist in the production of energy from fuel nutrients and other chemical reaction of life. Iron being the composition of hemoglobin and other oxidative enzymes plays an important role in oxidative processes in electron transport chain to produce energy².

Nutritional adequacy means the ratio of intake to recommended intake of energy and other macro and micronutrients³. Proper and adequate nutrition is required to build up good health and proper hygiene is needed in every aspect of preparation, serving and consumption of food to maintain this good health. Simultaneously its regular practice should be followed. Otherwise the disease related to unhygienic food consumption may occur and spread diseases from one to another⁴.

In Bangladesh, a lot of young students have been come from the middle class family and villages for taking their higher degree from Dhaka University and they stay in residential hall. However, Dhaka University has not adequate capacity to provide enough space, manpower for monitoring clean and hygienic environment.

Under this circumstance the present study has been under taken at the Dhaka University residential hall cafeteria, analyzing the nutritional adequacy and hygienic practice during cooking and serving of the residential hall sampled menus.

Rationale and Justification of the Study:

The university students are generally occupied with academic work, games and are under emotional stress which coupled with unbalanced diets result in poor health and nutrition. The study was conduct to explore the nutritional adequacy and hygienic practice during cooking and serving in residential hall dining at Dhaka University. In Bangladesh there has no previous study like this. But it is an important area and the concluded information of this study will be helpful to assess the nutritional adequacy of the highest level of educational institution and hygienic condition of its cafeteria and it will be helpful for making future management plan.

Research Questions

- What are the amounts of nutrient in the supplied diet at the Dhaka University residential halls?
- Is there any difference in the nutrient content of the supplied diet in relation to standard Recommended Dietary Allowance (RDA)?
- Is there adequate amount of the food groups present in the supplied diet?
- What is the standard of the hygienic maintaining during the stages of precooking, during cooking, post cooking and preservation of food (raw and cooked items) at the Dhaka University residential halls?

General Objective

- To investigate the nutritional adequacy and hygienic practice during cooking and serving at the Dhaka University residential hall cafeteria.

Specific Objectives

- To assess the amounts of nutrient in the supplied diet at the Dhaka University residential hall.
- To compare the nutrient content of the supplied diet in relation to standard Recommended Dietary Allowance (RDA).

- To observe the adequacy of food groups of the supplied diet.
- To examine the hygienic practice during cooking and serving of food at the Dhaka University residential halls.

Literature Review:

University and college students are known as important part any country. Their physical and mental wellbeing is important for the quality of the next generation. In public Universities students come from all over the country and these students belong to quite varied types of geographical and socio economical background. The student's community at any place forms a model average of adult population because they are drowning from all regions of the country².

Food is a substance that is eaten, drunk, or else taken into the body to sustain life, provide energy and promote growth. Moreover, food does not only give energy but also helps the brain by giving it fuel that enhances intelligence³. Nutritious food consumed by students therefore makes their brains alert, concentrate better in their studies and produce positive output or outstanding performance besides healthy or physical wellbeing⁴.

The resident students of the university are away from their homes and family members. They stay in the hall and consume food which is supplied by the hall cafeteria. The nutritional status fully depends on the cafeteria-diet. So the adequacy of the diet is very important which can fulfill their dietary requirements. Various studies have been conducted from time to time in many countries of the world on the dietary intake of university resident students who consumed the cafeteria-diet⁵.

Nutritional Adequacy and public health issues:

The consumption and preparation of food also has important social and cultural significance, contributing to the daily enjoyment of life. Public health concerns about dietary practices often must compete with these values as an individual makes food choices. This makes the issues associated with food and nutrition more complex than the medical and public health issues discussed here⁶.

Food provides the energy and nutrients you need to be healthy. Nutrients include proteins, carbohydrates, fats, vitamins, minerals and water.

Adequacy of diet and its features and effects:

Many diets qualify as adequate in that they meet the minimum recommendations for cardiovascular health as delineated by the American Heart Association. An adequate diet that supports your nutritional needs should feature diverse foods, few restrictions, portion control and exercise to help you burn calories.

In a study on 1994 the researchers define a diet must contain essential nutrients, in the quantities of recommended daily allowances. People who follow an unhealthy diet, either by consuming nutrient-empty junk food or by overly restricting the types of food and number of calories they eat can experience low energy, exhaustion, problems with focusing and dry skin. An

adequate diet helps to maintain healthy weight as well as good health¹³.

The dietary requirement for a micronutrient is defined as an intake level which meets specified criteria for adequacy, thereby minimizing risk of nutrient deficit or excess. These criteria cover a gradient of biological effects related to a range of nutrient intakes which, at the extremes, include the intake required to prevent death associated with nutrient deficit or excess¹⁴.

Daily Protein Requirement (DPR):

The recommended RDA value is 65 g for M and 51 g for F, corresponding to 10% of the total DER. The mean daily protein value, supplied by the laboratory, in winter was borderline acceptable for both sexes with an excess of + 42 g/day for M and + 56 g for F. Further, the breakdown of the two protein fractions supplied by the PC was unbalanced with an excess of animal over vegetable protein, so that their ratio A/V was never under 1, 5. The mean laboratory value in summer reveals a daily protein intake much closer to the RDA value of 87 g/day in both sexes, with an excess for the female student of + 36 g/day and for male of + 22 g/day, anyway lower than the winter values. The most interesting point is the more balanced breakdown between animal and vegetable protein, the A/V ratio being close to 1 (7)¹

Daily Lipid Requirement (DLR):

The fat intake recommended by RDA is 25% of the DER, ie 72 g for the male and 57g for the female student. The value in the laboratory on the winter sample was 80 g/day in total lipids, with an excess of + 8 g/day in M and + 23 g/day in F. The breakdown into the three classes of fats present in the daily food intake was balanced.

Daily Carbohydrate Requirement (DCR):

The total daily carbohydrate requirement indicated by RDA is 421 g for Male and 332 for female, equivalent to 65 % of the total daily Kcal requirement of the population under study. The recommendation specifies that 85% of total carbohydrates should be in complex and 15% in simple carbohydrates. In winter our investigation found an average carbohydrate deficiency of - 88 g/day for Male and within the recommended limit for Female. The breakdown into carbohydrate subclasses showed a deficiency of the complex variety of - 91 g/day in Male and of - 15 g/day in Female and an excess of simple carbohydrates of + 3 g/day in Male and of + 16 g/day in Female. In summer the total carbohydrate intake was more deficient, the laboratory value being 289 g/day and so the deficiency became - 132 g/day for Male and a small deficiency emerged for Female, - 43 g/day. The breakdown between complex and simple carbohydrates in summer shown by the computer analysis did not differ significantly from the winter findings¹.

Dietary Intake of University Students of Bangladesh:

The study state that in Bangladesh, high prevalence of malnutrition has been documented in the last two national nutritional surveys and it continues to be one of the major public health problems in the country. Causes

of malnutrition are multiple and complex. It is related to socio-economic conditions, food supply, dietary habit, hygienic practice, sanitation and proper health care¹⁶.

Table 1.3 Portion size for menu plan

Food groups	Portion g	Energy kcal	Protein g	Carbo-hydrate g	Fat g
Cereals and millets	30	100	3.0	20	0.8
Pulses	30	100	6.0	15	0.7
Egg	50	85	7.0	-	7.0
Meat, Chicken or fish	50	100	9	-	7.0
Milk	100	70	3.0	5	3.0
Roots and Tubers	100	80	1.3	19	-
Green leafy vegetables	100	45	3.6	-	0.4
Other vegetables	100	30	1.7	-	0.2
Fruits	100	40	-	10	-
Sugar	5	20	-	5	-
Fats & Oils	5	45	-	-	5

Source: Dietary Guideline for Indians- A manual, 1999, National Institute of Nutrition, ICMR, Hyderabad.

Table 1.4 Balanced diet for adults-sedentary/ moderate/ heavy activity (number of portions)

Food Groups	Portion g	Type of work					
		Sedentary		Moderate		Heavy	
		Man	Woman	Man	Woman	Man	Woman
Cereals and millets	30	14	10	16	12	23	13
Pulses	30	2	2	3	2.5	3	3
Milk	100ml	3	3	3	3	3	3
Roots & tubers	100	2	1	2	1	2	1
Green leafy vegetables	100	1	1	1	1	1	1
Other vegetables	100	1	1	1	1	1	1
Fruits	100	1	1	1	1	1	1
Sugar	5	5	4	8	5	11	9
Fats and Oils (visible)	5	4	4	7	6	11	8

For non-vegetarians substitute one pulse portion with one portion of egg/meat/chicken/fish
For infants introduce egg/meat/chicken/fish around 9 months.

Specific recommendations as compared to a sedentary woman:

Children

1-6 : ½ to ¾ the amount of cereals, pulses and vegetables and extra cup of mild

7-12 : Extra cup of milk

Adolescent girls : Extra cup of milk

Adolescent boys : Diet of sedentary man with extra cup of milk.

Source: Dietary Guideline for Indians- A manual, 1999, National Institute of Nutrition, ICMR, Hyderabad.

Table 1.7 Recommended dietary allowances for an adult man and woman

Nutrient	man			Woman		
	Sedentary	Moderate	Heavy	Sedentary	Moderate	Heavy
Energy kcal.	2425	2875	3800	1875	2225	2925
Protein g.	60	60	60	50	50	50
Calcium mg.	400	400	400	400	400	400
Iron mg.	28	28	28	30	30	30
Vitamin A	-	-	-	-	-	-
Retinol µg.	600	600	600	600	600	600
β carotene µg.	2400	2400	2400	2400	2400	2400
Thiamin mg.	1.2	1.4	1.6	0.9	1.1	1.2
Riboflavin mg.	1.4	1.6	1.9	1.1	1.3	1.5
Niacin mg.	16	18	21	12	14	16
Pyridoxin mg.	2	2	2	2	2	2
Vitamin C mg.	40	40	40	40	40	40
Folic acid µg.	100	100	100	100	100	100
Vitamin B ₁₂ µg.	1	1	1	1	1	1

Home & everyday life hygiene:

Home hygiene pertains to the hygiene practices that prevent or minimize disease and the spreading of disease in home (domestic) and in everyday life settings such as social settings, public transport, the work place, public places etc.

Hygiene in home and everyday life settings plays an important part in preventing spread of infectious diseases.^[5] It includes procedures used in a variety of domestic situations such as hand hygiene, respiratory hygiene, food and water hygiene, general home hygiene (hygiene of environmental sites and surfaces), care of domestic animals, and home healthcare (the care of those who are at greater risk of infection).

Methodology

The aim of the study was to investigate the nutritional adequacy and hygienic practice during cooking and serving at the Dhaka University residential hall cafeteria. Under an observational study, a total of 20 residential hostel cafeterias in DU (male hostel 75% and female hostel 25%) were selected. The daily dietary menu was collected from the authority of the hostel cafeteria. Hygiene practices during cooking and serving were observed by using a checklist. The recommended dietary allowances of macronutrient and number of portions from the food groups were adopted from National Institute of Nutrition, Indian Council for Medical Research (ICMR), Hyderabad; 2010.

Result & Discussion: In the present study, 28 different types of menu were used in 20 residential hall's cafeteria of Dhaka University (DU) in three main meals. At boy's hall cafeteria, among the male residential halls, hall no. 14 had supplied the highest (83.81%) amount of energy from carbohydrate in menu 15 and lowest (64.70%) in menu 4 in hall no. 11. Hall no. 12 in menu 27 supplied the highest (14.65%) amount of energy from protein and lowest (10.15%) in hall no. 17 in menu 15. Hall no. 13 supplied the highest (23.10%) amount of energy from fat and lowest (15.41%) in menu 25 in hall no. 1. On the other hand, in female Halls, hall no. 16 supplied the highest (80.02%) amount of energy from carbohydrate in menu 27 and lowest (65.17%) in menu 4 in hall 18. Hall

6 in menu 5 supplied the highest (14.06%) amount of energy from protein and lowest (10.38%) in hall 20 in menu 11. Contribution of energy from fat was found highest (23.23%) in hall 16 of menu 4 and lowest (15.89%) in hall 20 of menu 6.

Number of portion of cereals and pulse groups were found in huge amount than the recommended number of portion both in boys and girls hall. Milk and fruits groups were totally absent in both halls. In addition, in girl's hostel green leafy vegetables were totally absent. In the present study 100% cooking stuffs washed hands after using the toilet and touching garbage. No one washed their hands before touching foods, hair, money or cigarette. Hall no. 15 and hall no. 20 achieved the highest (63.33%) pre-cooking score and hall no.14 obtained the lowest (40.00%). Hall no. 5 and hall no. 20 scored the highest (62.96%) and hall no. 14 scored the lowest (44.44%) during cooking. In post cooking stage hall no. 20 scored the highest (67.74%) and hall no. 15 scored the lowest (41.94%). During storage stage, hall no. 9 scored the highest (56.67%), hall no. 7 and hall no. 15 scored the lowest (40.00%). In the present study, nutritional adequacy is not found in 28 different types of menu. Principles of balanced diet are not followed both in boys and girls halls. Hygienic practices during cooking and serving at the DU residential hall cafeteria are not satisfactory.

Limitations of the study

- Authority of 20 halls in DU did not have any arrangement regarding monthly or yearly basis menu planning. They had only weekly planning, therefore, it was difficult for us to evaluate nutritional adequacy of the menu.
- Due to shortage of time and resource constraints could not collect 7 days menu from all boys and girls residential halls at DU.
- Hygienic practice of 20 hall's cafeteria could not observed properly due to shortage of time and limited access.

Conclusion & Recommendation: In both male and female hall cafeteria carbohydrate were found to be the main source of energy which was observed higher than the recommended dietary allowances. Protein requirement were fulfilled by every halls cafeteria but as the main source of energy fat were neglected almost all hall cafeteria. In the present study number of portion of cereals and pulse groups are found in huge amount than the recommended number of portion both in boys and girls halls. Milk and fruits groups are totally absent in both hall cafeterias. Number of portion of green leafy vegetables are found nil in the girl's hostel. All cooking stuffs (100%) wash their hands after using the toilet and touching garbage. Hall no. 14 has obtained the lowest score (40.00% and 44.44% respectively) during pre-cooking and cooking. Hall no. 15 achieved the lowest score (41.94% and 40.00% respectively) in post cooking and storage stage.

Specific guidelines should be provided through central committee for residential hall cafeteria of Dhaka University. Awareness should be created among hostel authority about nutritious food and basic food groups so that they may provide balanced diet. Personal and environmental hygiene have to be monitored regularly. Further research works in this field are needed with proper time and resource.

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