

Nutrition Survey and Protein Consumption Pattern in North Bengal

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ABSTRACT

This observational cross-sectional nutritional survey was done on 100 patients from the Hills and Dooars of North Bengal. The survey was done to study the contribution of protein, fat, and carbohydrate to the calorie intake of the population of hills and Dooars. The average daily consumption of protein and the number of various food groups comprising the intake of protein of the population of North Bengal were also studied. The mean protein intake in the study population was 72.95 gm/day while the mean fat intake and mean carbohydrate intake were 52.75 gm/day and 283.83 gm/day respectively. The mean calorie intake was 1842.28 Kcal. Protein contributed 16.8% of the total energy intake of the study population that is, the protein energy (PE) ratio was 16.8% while fat contributed 24%. Among males PE ratio was 18.7% while among females it was 15.44%. The energy intake of females was significantly different from that of males. The protein intake was more in males compared to females, as also the fat intake. However, the same was not true for carbohydrates. The calorie intake in our population was substantially lower than the recommendations while the protein intake was quite high. This perhaps may be one of the reasons why in North Bengal a large section of the population suffers from hyperuricemia, gouty arthritis, urinary tract calculi, and chronic kidney diseases.

Keywords: Calorie, Nutrition, Protein.

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INTRODUCTION

Proteins are complex organic nitrogenous compounds needed by the body for body building, repair, and maintenance of osmotic pressure, and the immune mechanism of the body. In the Indian diet they contribute 7–15% of the total calories while fat contributes 10–30% and carbohydrates 65–80%.

Role of Proteins

They have diverse functions. They replace dead or worn-out tissues and work as building blocks of growth. Proteins form a large part of muscle, skin, and hair. Proteins are present in cellular structures. Proteins are necessary for children as they grow and new cells and tissues are formed. Different metabolic processes are catalyzed by enzymes and they are partly or wholly protein. Body composition is regulated by hormones such as insulin which are proteins. Proteins in the form of antibodies are important for immunity. Proteins are required for the transportation of fat and oxygen. Proteins are part of the coagulation cascade and they also provide energy.

Sources of Proteins

For Indians, legumes and pulses are important sources while other sources include cereals, poultry, egg, fish, meat, and milk. Though large amounts of protein are found in nonvegetarian foods, in our country which has a high percentage of vegetarians, legumes, pulses, milk, dry foods, and grains form a large source of protein. Almost 20% protein is present in pulses and thus they may be a very good source of protein in our diets.

To Indians, pulses are its source as meat is to the Western population. Pulses help us to avail the majority of our protein requirement. Hypertension, coronary artery diseases, diabetes, and other non-communicable diseases have come as a bane along with the boon of economic growth. In one WHO study 33% of Indians are hypertensive, 27% dyslipidemic, and 10% diabetic.

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Legumes especially pulses are a common food of Indians and they have been shown to improve blood glucose as well as blood cholesterol. The dietary fiber and protein in pulse contribute to these. They also lead to satiety preventing overeating which may cause weight gain. Since we are eating less pulses but more refined grains and fat, obesity has increased which leads to non-communicable diseases.

AIMS AND OBJECTIVES

- To study the protein consumption pattern in North Bengal.
- To study the contribution of protein, fat and carbohydrates to the calorie intake of the population of Hills and Dooars region of North Bengal.
- To find out any difference in consumption of proteins in males and females in North Bengal.
- To know the average daily consumption of protein in this part of the country.

- To know the number of various food groups comprising the intake of protein of the population of North Bengal.

LITERATURE REVIEW

PV Sukhatme in "Incidence of protein deficiency in relation to different diets in India" concluded that only in 10% of cases protein deficiency occurs due to poor protein intake. In most people, deficiency of proteins is because of insufficient intake of total energy.

Pulses and cereal-based diets usually consumed by the masses are enough to meet a person's need for protein at all ages if the food taken is adequate to satisfy his calorie needs. Therefore, though the protein deficiency incidence if calculated by protein intake alone is 34%, it shoots up to 55% when the inter-relationship between calories and protein is considered.¹

According to Pronab Sen Indians seem to have sacrificed their calorie intake, but have increased their protein consumption substantially.²

But according to National Sample Survey Office's (NSSO) 2011–2012 data, despite our per capita total calorie intake being lower than 2100 calories daily, our urban per capita protein consumption has gone down from over 60 gms to less than 55 gms while our daily fat intake has shot up from 42 gms to over 52.5 gms.³

According to a survey done by Indian Market Research Bureau (IMRB) in 7 major cities, it was seen that 80% of respondents had protein deficiency. Amongst the participants, 59% were non-vegetarians and 91% of the vegetarians had deficiency of proteins.⁴

According to Prof. Jagdish Pai, Executive Director, PFNDAI, the cause for this is a change in lifestyle causing different eating patterns and the huge increase in prices of pulses playing a great part in this deficiency.⁵

According to a paper in Hindu Business Line, pulses in India achieved lower than 40% growth in output in the past 40 years, while its per capita availability declined from 60 gms/day in 1950s to 35 gms/day in 2000s. Our output is around 18.5 million tonnes while we consume around 22 million tonnes. So despite being the highest producer of pulses in the world at about 24% of world production, we need to import about 3.5–4 million tonnes. This has perhaps raised the prices of pulses so poor people find it very hard to meet their protein goals.⁶

However, the NSSO data released in 2014, which provides insight into India's consumption patterns as of 2011–2012 says the top 5% of urban India spends Rs.3000/- per head per month on groceries and eating out on average. This class eats the least amount of cereals, except for derivative cereals, such as noodles and bread and while their intake of meat, milk, egg, and other processed food rises, at the opposite end of the spectrum, the bottom 5% of India spends just about Rs. 400 per capita per month on food and a quarter of this is on cereals.⁷ National Sample Survey Office's data confirm long-standing trends. The share of cereals in Indian household expenditure has reduced from 41 to 18% in rural India and from 23 to 10% in urban India between 1972 and 1973 and 2004. Data from 2004 also shows that Indians were moving away from locally available seasonal vegetables towards high-value vegetable produce such as capsicum, cabbage, cauliflower and broccoli.

Recent data show that the market for non-vegetarian food is expanding rapidly. Reports from the Organisation of Economic Cooperation and Development – Food & Agriculture Organization (OECD–UN FAO). Agricultural Outlook 2014 shows, chicken intake

in India increased at an annual rate of 5.9% between 1992 and 2013.⁸ This makes India the fourth fastest-growing market for chicken while it is also the seventh for fish. As disposable income increases and people have more sedentary jobs, they don't need as many calories as energy said economist Laveesh Bhandari. Accessibility, he says, changes food habits. "With new technology, we are able to market fruits and vegetables better, which is why people are consuming more. The same trend is there now with chicken and eggs".

In the article "Food Consumption in India and the World" by JK Bajaj, it is seen that there is a huge difference in the intake of essential food components in India and the so-called developed region of the world.⁹ Compared to an average individual in these regions and countries of the world, an average Indian takes only about 2/3 of the calories, about 1/2 of proteins, and 1/4 of fats. He derived data from FAO agriculture and food statistics of the year 1990.¹⁰

Our intake is quite low compared to most of our Asian neighbors. And our intake is a little low compared to average even in Africa, where a number of nations are experiencing a phase of acute political and economic instability.

Over the years from 1961–1990 and beyond the intake of eggs, milk and fish have increased considerably while that of pulses has declined. Meat consumption has remained static, while vegetable consumption has increased. Jaggery has decreased while refined sugar is increasingly being consumed.

Somnath Swaminathan, Mario Vaz et al. state that Indian meals obtain almost 60% of their protein from cereals with low digestibility and quality.¹¹

As per data, from R Golait and NC Pradhan, over the period 1987–1988 through 2001–2002 there has been a huge decrease in the intake of all types of cereals in almost every state and in both urban and rural areas with the decrease being highest for the smaller cereal items. There is a switch in likings towards non-cereal foods. Whatever the background causes for these changes, these have caused a marked decreases in calorie intake.¹²

MATERIALS AND METHODS

Study Site

This cross-sectional observational study was carried out on indoor and outdoor patients attending Shanti Swasthalaya & Anusandhan Kendra Multi Speciality Hospital, Siliguri, West Bengal, India.

Study Population

Patient from the hills (Darjeeling, Kurseong, Kalimpong) and Dooars (Jalpaiguri, Coochbehar and Alipurduar).

Selection Criteria

- Age > 15 years
- Sex–M/F
- Vegetarian and non-vegetarian

Exclusion Criteria

- Addiction to alcohol, cocaine, heroin etc.
- Accident and poisoning cases
- Cases of trauma
- Severely debilitated patients undergoing parenteral. nutrition
- Mentally deranged patients.

Sampling: Random.

Duration of Study: 2 months

Study Design

Patients were randomly selected from outdoors and indoors. Identification data were recorded as No outdoor patient (OP)/ Indoor patient (IP). Name, Address (town), Age, Sex (Male/Female), Veg/Nonveg. Height in cms/ft and weight in kgs were recorded.

A questionnaire was presented to each patient and his/her responses were recorded for amounts (servings) in each food group and the frequency of intake. Data were collected from 100 subjects and analyzed.

The statistical average used was the 'Arithmetic mean'. The measure of variation used was 'The Standard Deviation' and the test of significance used was 'The Standard Error of difference between two means'.

RESULTS AND ANALYSIS

Of our 100 patients, 56 were females, and 44 males. The minimum age was 17 years while the maximum was 66 years. The mean age was 31 years. The average age of males was 33 years while it was 30 years for females. The mean protein intake in the Study population was 77.95 gm/day while the mean fat intake and mean carbohydrate intake were 52.75 gm/day and 283.83 gm/day respectively. The mean calorie was 1842.28 Kcal.

Protein contributed 16.8% of the total energy intake of the study population, i.e., protein energy (PE) ratio was 16.8% while fat contributed about 24%. Among males PE ratio was 18.7% while among females it was 15.44 %.

The mean fat intake was 56.75 gm/day for males while for females it was comparatively lower at 49.60 gm/day.

The mean carbohydrate intake for females was 278.97 gm/day which was quite close to that of males at 290 gm/day.

The mean calorie intake of a male was 1920.32 Kcal/day while that of females was 1780.86 Kcal/day.

For a male the standard deviation for energy was 282.63 gm/day suggesting that 95% of the values of energy would be in the range $(1920.32 \pm 2 \times 282.63)$, while for fats it was 17.76 gm/day and for carbohydrates, it was 38.23 gm/day. For protein, it was 74.64 gm/day suggesting wide variation in intake.

For females, the standard deviation for energy was 290.72 gm/day suggesting that the calorie intake of 95% of the study population would be in the range $(1780.86 \pm 2 \times 290.72)$. In females, the standard deviation for fats was 14.18 gm/day while for carbohydrates it was 37.62 gm/day. For protein, it was 19.97 gm/day.

Coming to the test of significance "the standard error of difference between the means of males and females" it was found that for energy intake the actual difference between the means of females and males was 140 that is more than 2 times the standard error of the difference between the means of females and males of 57.66. Thus, there was a significant difference between the calorie intake of females and males. Similarly, the protein intake was significantly more in males compared to females. The same was also true for fat. However, the carbohydrate intake did not stand the test of significance and thus there was no significant difference between the carbohydrate intake of males and females in this study population from North Bengal.

DISCUSSION

In our study protein contributed 16% of the total calories while fat contributed 24% and carbohydrates about 60%. However as per

literature on the Indian diet, they contribute 7–15% of the total calories while fat contributes 10–30% and carbohydrates 65–80%.

The calorie intake in our population was substantially lower than the recommended while the protein intake was quite high. This is in line with the view of Pronab Sen in Economic and Political Weekly 2005. Also, economist Laveesh Bhandari stated that as individual income increases and people have more sedentary work, they don't need as many calories for energy.

But it contradicts the NSSO survey 2011–2012 which stated that our urban per-head protein intake has gone down.

Also, the Market Research Bureau Survey in seven cities found that most were protein deficient. However, that study also found that deficiency was 91% in vegetarians. However, in our study population protein intake was more as perhaps the entire study population was non-vegetarians. Also in North Bengal a large section of the population suffer from hyperuricemia, gout, urinary tract calculi, and chronic kidney diseases.

In our study a large number of patients consumed chicken and fish which is perhaps the trend advocated in Agricultural Outlook, 2014.

Very few of our patients consumed jaggery while refined sugar was consumed by almost all.

The mean intake of proteins, fats and total calories was significantly more in males compared to females. However, there was no significant gap in the carbohydrate consumed by males and females.

LIMITATIONS OF STUDY

- A small sample of only 100 patients.
- Though patients from all parts of North Bengal reported to our clinic, patients from Siliguri were more compared to other areas.
- Large parts of North Bengal esp. Dooars were affected by floods, so their contribution to the study population was less.
- Similarly, the unrest in Darjeeling hills perhaps also skewed our data.
- There may be some changes in food intake due to the bandhs in the hills and the flood situation in the Dooars.
- The flood in the Dooars and the bandhs in the hills may have affected the availability of some food stuff.

CONCLUSION

We have conducted a small observational cross-sectional-questionnaire-based study in North Bengal with a predominantly non-vegetarian population. The calorie intake in our study population was substantially lower than the recommendations while the protein intake was quite high. The mean intake of proteins, fats, and calories was more in males compared to females but there was no significant difference in the intake of carbohydrates. The PE ratio was 16.8 percent. Larger studies are however required to focus on the importance of the dietary habits peculiar to this region and may help in the control of diseases such as hyperuricemia, gout, chronic kidney diseases, urinary tract and biliary tract calculi which are highly prevalent in this region.

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