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Measurement of protein percentage of some available foods for orchestrating food security and development sustainability

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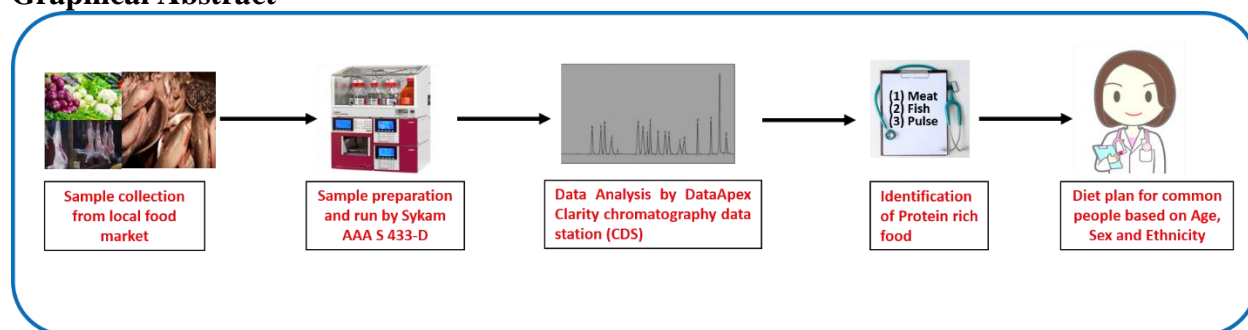
ABSTRACT

Sufficient intake of protein-enriched food is essential for all to maintain a healthy lifestyle. The study targets to find out the Percentage of Protein in some available foods that are consumed daily by people of different incomes and ages. The chromatographic assay was done to explore the percentage of protein content in the food sources. Twenty-two locally available foods were selected for analysis and are prospective for people to consume to meet the protein for our bodies. All foods from animal sources contain a qualitative and quantitative percentage of protein (approximately one-fifth of each consumption), yet some plant-based food remains a low protein content. But pulses can be substantial as an alternative source to animal-based foods due to their availability and digestibility. The study also pointed out the significance of RAS (Recirculating Aquaculture System) as potential fish farming technology in future. In the study, three in-house developed plant-origin foods were analyzed and contained approximately one-third of protein, which is the best option to prepare some food for nourishment. The study aims to recommend some available protein-enriched foods for our people, major selected foods in the study can be optioned based on age, sex, income and physical activity.

Keywords: Percentage of Protein, RAS, Fish, Meat, Pulses, Vegetables etc.

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Graphical Abstract



Introduction

At the beginning of the twenty-first century, Bangladesh faced a rapid demographic and epidemiological transformation due to the rapidly growing population (Biswas *et al.*, 2017). Despite this burden, Bangladesh has gained remarkable progress in declining poverty supported by sustained economic growth such as increasing demand for energy, transport and urbanization. Bangladesh also targets the SDGs (Sustainable Development Goals) in its development objectives and gains extraordinary progress in some crucial sectors (i.e., poverty alleviation, and food security) (Ishtiaque *et al.*, 2020). By 2030, to fulfil the targeted goal of SDGs, a synergistic effort from the government, research organizations, non-government organizations and local stakeholders is required to accomplish ((Streatfield and Karar, 2008), (Ishtiaque *et al.*, 2020)).

Although Bangladesh progressed in SDG goals 02 and 03 over the last ten years, malnutrition rates in the country are among the highest in the world (Ishtiaque *et al.*, 2020). Almost 40% of the population lives in our country below the proper food consumption, lacking enough resources to afford a diet of 2,122 kilocalories (kcal) per person per day, supplemented with another living necessity (Hossain, Naher and Shahabuddin, 2005). The nutritional issues in Bangladesh can be upgraded by maintaining proximal or underlying determinants, such as proper dietary intake, feeding practices, health status and augmenting lifestyle etc. ((Rashid, Smith and Rahman, 2011), (Biswas *et al.*, 2017), (Hossain, Naher and Shahabuddin, 2005)). So, a balanced diet is crucial for everyone, the prioritization should be much for young children and adolescent girls, who require nutrients for growth, and pregnant and lactating women (Rosegrant and Cline, 2003).

Over the last three decades, Bangladesh achieved success in food-grain production, food security and food availability. Yet, progress was mainly possible for cereal production (Bose and Dey, 2007). Not only the majority of people in the rural areas of our country are deficient in total calorie intake, but their everyday diet is mainly prioritized with more than 80% of calories derived from cereals, with inadequate consumption of fat, oil and protein (Rashid, Smith and Rahman, 2011). It is mandated for everyone to increase protein-rich food intake to resolve nutritional issues. Because adequate consumption of protein-enhanced food is essential for maintaining health and cognitive, immune, and renal system functioning (Heck *et al.*, 2010). Previous studies have reported that the daily consumption of food from animal and fish sources, which are rich in protein and micronutrients, is extensively correlated with augmenting nutritional status in humans (Rashid, Smith and Rahman, 2011). A normal diet lacking protein-rich food leads to Protein-Energy Malnutrition (PEM) resulting from an interaction between poor diets and diseases. PEM often impairs the immune system, that's why malnourished children are less able to combat

common diseases, prolong the course of an illness and are susceptible to the adverse impacts of toxic substances, short stature and reduced physical work capacity, and also increased future risk of heart diseases (Faruque *et al.*, 2008).

The role of proper diet quality in reducing the progression of chronic diseases (Non-communicable Chronic Diseases) is becoming important day by day (Gil, de Victoria and Olza, 2015). Since the diversification of daily food consumption is shifting away from the traditional foods of cereals with enhancing incomes as expected and targeted, current food consumption patterns have been shifted to high protein and energy-dense foods ((Mottaleb *et al.*, 2018), (Pingali, 2007)). As protein-rich food consumption is the principal determinant for augmenting the health status of any country, studies should focus on specific food sources that are enriched in proteins and available to all. To solve the issues, we should target Protein status in some available food in our country. Then, People of different ages, sex and incomes can consume various food sources to fill protein requirements daily. So, the study is designed to identify the percentage of protein in some commonly available foods in our country and tried to explore some in-house farmed foods that can be selected for future food consumption regularly.

Materials & Methods:

Sample collection: Daily consumable foods of ordinary people in Bangladesh were enrolled for this study to analyze the portion of protein. The BCSIR laboratory technicians collected every food from plant and animal sources from three different local markets nearby to the BCSIR. In the other cases, RAS fish farmed in the BCSIR RAS facilities. Wheatgrass plants are farmed in a Hydroponics system in BCSIR. Moringa and Jute leaves were collected at three different places nearby BCSIR.

Sample preparation and run: This amino acid analysis was done in the Sykam Auto Amino Acid analyzer (Sykam AAA S 433-D, catalogue number 1120002). The method used for this assay was the chromatographic technique. 250mg of sample dissolved with hydrolysis solution (300 mL of 37% HCL, 200 mL of DI water and 0.5 g phenol to prepare 500 mL of Hydrolysis Solution). Then the samples were kept at 120°C for 24 hours. Following incubation, the samples were filtered on Whatman no. 01 Filter Paper. 1M NaOH & 7.5 M NaOH were required to prepare the samples adjustable to buffer pH. The pH of the sample was between 2.9 to 3.1. After adjusting the pH, the sample was adjusted to 250 mL, and then from this 250 mL sample stock, 100 µL was taken which was then further filtered by a 0.45µM syringe filter. Then, the samples were kept at auto-sampler. The following steps are done by the methods described by (Elmaidomy *et al.*, 2022). In the column, the samples are separated according to their charges and retention time. After getting all the data, one standard solution was running and in comparison, to this standard curve, the amount of protein in the samples was calculated.

Methods for RAS: The RAS facilities were prepared by the following (Ebeling and Timmons, 2012). Briefly, Water passes through the mechanical filter containing a 0.45µM mesh net for solid waste. Then the water passes through the biological filter and UV filter. Finally, water passes through the protein skimmer where the greasy materials are captured and removed. Water pH is always maintained at 6.4 to 7.4. Here 97% of purified oxygen is supplied. One seedling filter is attached

to every tank to capture the tank-wise wastages. After harvesting, the whole system was washed with a hydrogen peroxide solution.

Methods of Hydroponics: It is an advanced methodology for growing plants without soil (Torabi, Mokhtarzadeh and Mahlooji, 2012). Usually, the roots absorb balanced nutrient dissolved in water that meets all the plant developmental requirements. At first, the LEDs in the system reset, and then germinated plantlets were placed in the tower garden/rotary garden filled with the required amount of nutrient solution. The temperature (approximately 20 ± 2 degree Centigrade), pH and LED light intensity with a 12 hours photoperiod were measured every day and kept in the log book. Plants will be grown under controlled conditions until sufficient growth. During the period of plant growth, Nitrogen enriches nutrient solutions provided throughout the growing period. Plant roots are sprayed with a nutrient solution in a 20/30 minutes cycle. Lastly, necessary data is collected before harvesting after that plants undergo maturation.

Statistical Analysis

Data were collected from DataApex Clarity chromatography data station (CDS) software and exported into Microsoft EXCEL 2016 for final analysis.

Results

Food from Animal Sources

1. Meat based foods:

For animal-based protein analysis, three types of Chicken, Beef and Chevon enrolled in this study. Three different types of Chicken meats were analyzed in this study such as Pakistani Chicken or commonly named Cock Chicken (high-yielding breeds and crossbreeds), Deshi chicken (free-ranged chicken, farmed at the smallholder village levels (in-situ) of Bangladesh) and Broiler chicken or farmed Chicken (Poultry). The results are manifested in Table 01. Among the five meat analyses, Beef remains the highest number of proteins, Cock Chicken contains the least percentage of protein. Beef can be considered a good source of Protein and contain approximately 47% higher amount of Protein than Cock Chicken and 15% higher amount of Protein than Broiler chicken, Chevon also contains a similar percentage of protein as Beef. Among Chicken meat analysis, Broiler Chicken consists of the highest percentage of protein followed by Deshi and Cock Chicken. So, approximately one-fifth of proteins of total consumption may be assured by Beef, Chevon and Broiler Chicken to the human body.

2. Fish based foods

Bangladeshi people are always proud of its being very rich in fish diversity due to the abundance of freshwater, coastal and marine fishes ((Thilsted, 2013), (Akter *et al.*, 2019)). In the present study, the six most popular fishes were selected for analysis. Among them, Catla fish remains the highest amount of protein followed by Ruhi and the other four fishes (Table 01). In other cases, Tilapia remains the lowest percentage of protein compared with other fishes. Except for Tilapia, the other five fishes retain more than 15% of protein which can be easily selected for daily consumption food for the protein source. Catla and Ruhi's fish contain a similar amount of protein as Farmed Chicken, yet contain a lower percentage of protein than red meat sources (beef,

chevon). From Table 01, it can be depicted that 11 animal-derived food sources may provide the demanded amount of protein by consumption.

The selective fish in the enrolled study can be the option to fill up the protein requirements of our country. That's why to meet up the proper nutritional requirement, we should increase fish production annually. In Bangladesh, the most cultivated fish species are carp species, tilapia, pangasius, and koi due to the availability of proven production facilities, more resilience to the environment, higher growth rate and bigger size etc. ((Akter *et al.*, 2019) (Monalisa *et al.*, 2013)). The present study proved that the three most cultivated fish in our country (Pangasius, Koi and Tilapia) contained a good percentage of protein. In our country, Cultured fish has become more prominent day by day, to compensate for declining fish production from natural fish sources (Toufique and Belton, 2014). According to the FAO (2012), half of the fish used for direct human consumption remained farmed (Toufique, 2015).

Table 01: Percentage of common Animal based food's protein in our country.

Meat/Fish	Foods from animal sources	Scientific Name	Percentage of Protein
Meat	Pakistani Chicken (Cock Chicken)	<i>Gallus gallus domesticus</i>	15±1.0
	Deshi Chicken (Free ranged Chicken)	<i>Gallus gallus domesticus</i>	17±1.5
	Broiler Chicken (Poultry)	<i>Gallus gallus domesticus</i>	19±1.32
	Beef	<i>Bos taurus</i>	22±2.43
	Chevon	<i>Capra aegagrus hircus</i>	21±1.67
Fish	Ruhi	<i>Labeo rohita</i>	19±0.96
	Catla	<i>Catla catla</i>	19.5±0.75
	Pangasius	<i>Pangasius bocourti</i>	18.2±1.53
	Tilapia	<i>Oreochromis niloticus</i>	13±1.71
	Koi	<i>Anabas cobyus</i>	16±1.45
	Pabda	<i>Ompok pabda</i>	18.6±0.75

Start from Here

Fish farming through Recirculating Aquaculture System (RAS) method: Due to overpopulation and urbanization rapidly, Agricultural land is continuously being converted to other uses day by day that is creating a negative impact on natural resources such as land gets shrinking, augmented environmental pollution and the unexpected impact of climate change, which ultimately forced to create new challenges to the country's agriculture sector and fish farming (Azad, Salam and Azad, 2016). To solve the issues, one effective methodology is the farming of fish in Recirculating Aquaculture Systems (RAS), which are updated land-based aquatic systems where the water is (partially) re-cycled after mechanical and biological treatment in an attempt to reduce the consumption of water and energy and the release of nutrients into the environment (Figure 01). RAS has been initiated in response to the enhanced environmental regulations in nations with

limited access to land and water. RAS offers opportunities in terms of reduced water consumption ((Ebeling and Timmons, 2012), (Zhang *et al.*, 2011)). In the study, the two fishes (Pabda, and Tilapia) were farmed through RAS and enrolled in this study for Protein identification. From the results, it can be found that the Protein percentage was similar for both Pond cultured Pabda and RAS-cultured Pabda (Figure 02). On the other hand, RAS cultured Tilapia contained approximately 19% higher percentage of protein than Pond cultured Tilapia fish (Figure 02). The main limitations of this study were not enrolling Catla, Ruhi, Koi and Pangasius for RAS-based farming and comparison with Pond culture fishes.

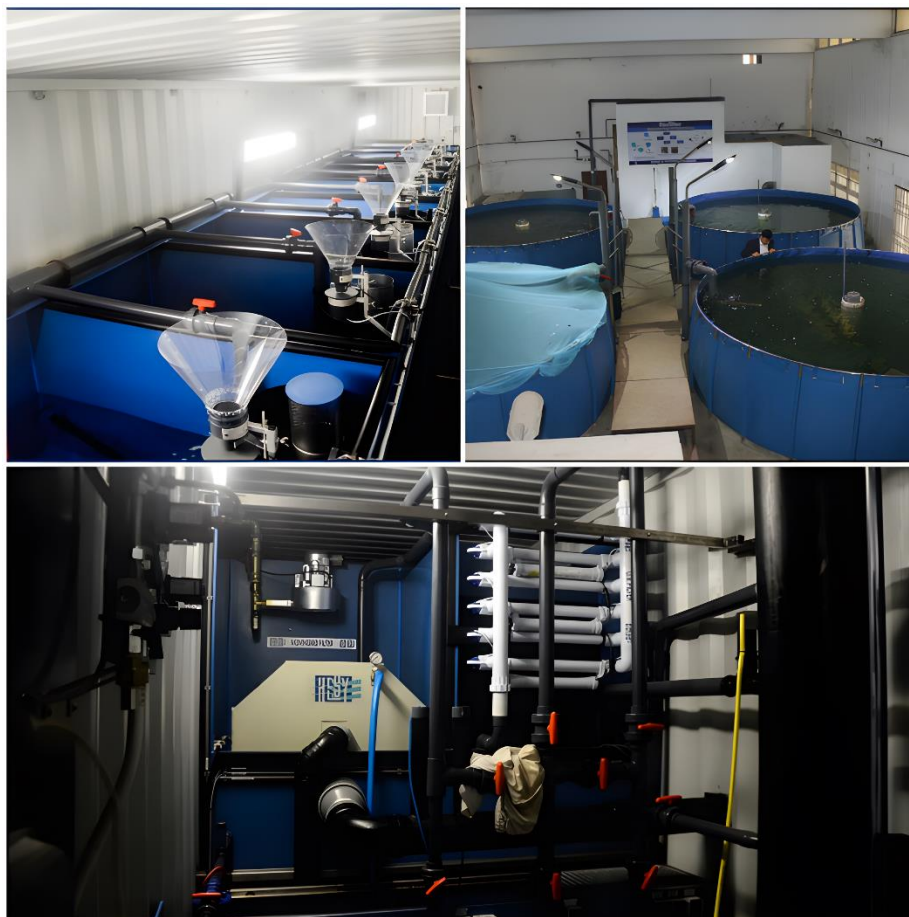


Figure 1: Tank based with four different filters. Each tank, there is an automated feeding system and gravitational cleaning system. In 1000 liter of water 60 to 100kgs of fishes can be grown. A batch of fish culture depending on the species normally it takes 4 to 6 months.

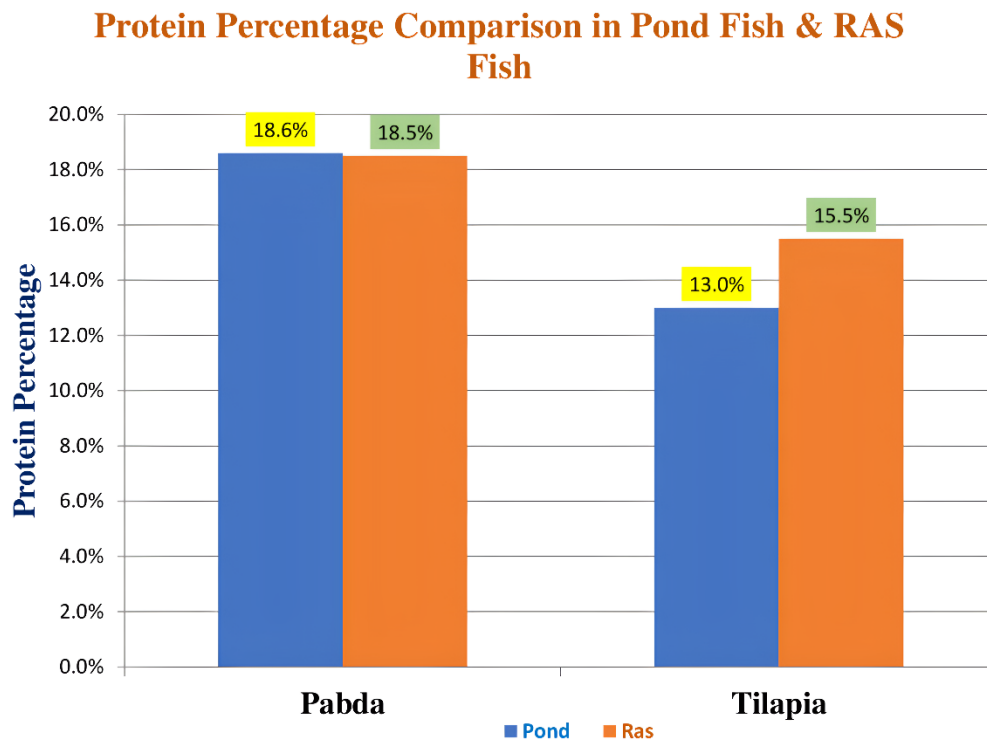


Figure 2: Comparison of protein percentage of Pond cultured and RAS cultured fishes. The development of the aquaculture system is getting popular at the beginning of the twenty-first century and thus, environmental sustainability has become a growing concern (Boyd *et al.*, 2020). From capture fisheries to aquaculture, a Global structural transition in fish supply are essential for poverty alleviation and food security implications (Toufique and Belton, 2014). In addition, A recirculating aquaculture system is potentially used for intensive culture with limited pollutant discharge to the environment, thereby increasing fish production and alleviating land and water usage as well as adverse environmental impacts (Lin, Jing and Lee, 2003). So, The Recirculating Aquaculture System is an established method for fish farming with less water, land and resources. The above findings (Figure 2) can support the notion that RAS cultured fish contain a good percentage of protein although not enough data were reported to monitor the Protein as well as nutritional status of RAS cultured fish (Toufique and Belton, 2014).

Food from Plant Sources

Beside animal-source protein-rich food, the present study also targets to find the protein from plant-based foods. Nowadays, pulses are consumed daily for developing healthy and functional foods in our country because of their fast-cooking properties, and they are also an inexpensive source of protein, carbohydrates, and micronutrients compared to animal origin (Podder *et al.*, 2020). General people in our country consume four pulses mainly. The portion of the protein of the major pulses was analyzed. From Table 02, it can be summarized that every pulse contains a significant amount of protein that can be a good source for meeting the demand for protein by the common people in Bangladesh. Among them, red lentils contain the highest amount of protein followed by yellow lentils, black gram and chickpeas. Red Lentils have approximately 37% higher protein than Chickpeas and 15% higher than Black gram. Red Lentils contain approximately

one-third of protein which are one of the most preferable consumable foods for people of all ages and groups.

Table 02: Protein analysis of Plant sources foods in the study.

Food Category	Pulses Name	Scientific Name	Percentage of Protein
Pulses	Red Lentils	<i>Lens culinaris</i>	30±1.51
	Chickpea	<i>Cicer arietinum</i>	22±0.80
	Black gram	<i>Vigna mungo</i>	26±1.25
	Yellow Lentils	<i>Lens culinaris</i>	28±2.03
Vegetables	Cabbage	<i>Brassica oleracea</i>	13±1.05
	Red amaranth	<i>Amaranthus cruentus</i>	3.7±0.17
	Malabar spinach	<i>Basella alba</i>	2.1±0.12
	Water spinach	<i>Ipomoea aquatica</i>	3.5±0.26
Plant derived Processed Food	Wheatgrass	<i>Thinopyrum intermedium</i>	33±2.08
	Jute Leaves powder	<i>Corchorus olitorius</i>	23±1.01
	Moringa leaves powder	<i>Moringa oleifera</i>	22±1.41

Besides, all pulses provide the demanded amount of protein as well as minerals and nutrients to the people. So, Pulses are a good option for selecting as a protein-rich food for all.

In the present study, four common vegetables were included in the study. The Protein percentage of three leafy vegetables (Red amaranth, Malabar spinach, and Water spinach) is low compared to all foods in the enrolled study. Among the selected vegetables, only Cabbage (13%) can be considered a Protein-source vegetable for consumption. The main limitations are that many vital vegetables consumed daily in our country couldn't be enrolled in the study. In the other cases, three plant-derived processed foods were targeted that were formulated in the BCSIR. these are wheatgrass powder, Jute leaves powder and Moringa leaves powder (Table 02). The study identified that wheatgrass can be consumed as a high protein-rich food as it contained one-third of protein (33%). The processed powder prepared from Jute leaves contains a high percentage of protein (23%). In our country, Jute leaves powder is generally used in aquaculture for farming better quality fish. According to (Rana, Biswas and Salam, 2020) jute leaf powder is widely utilized as a promising substitute for fishmeal for improving the survival capacity of fish. Besides, Moringa is considered a multipurpose nutritious vegetable tree with potential uses. Moringa leaves powder remains a high protein (22%) and is the potential for definitive purposes. Moringa leaves powder can be a good option for reducing blood pressure and cholesterol level ((Gopalakrishnan, Doriya and Kumar, 2016), (Dachana *et al.*, 2010)). So, the three-plant-derived processed food can be the option for choosing as the protein source and also medicinal issues.

From the literature review, wheatgrass, jute leaves powder and moringa leaf powder are potential food for protein supplementation due to their enriched medicinal properties. To construct easy protein supplementation for general people in Bangladesh, this three-lab processed food can be the option for us. As such it can be hypothesized that a plant-based diet higher in proteins and medicinal properties help to combat free radical production generated during exercise and other

circumstances (Lynch, Johnston and Wharton, 2018). So, the three plant-derived processed food can be experimented with for future targets.

Discussion

Proper supplement of protein, a source of amino acids and nitrogen, is required to allow the regular turnover of tissue and functional body proteins. Dietary guidelines from a variety of kinds of literature confirm that adequate dietary protein intake for persons (≥ 19 Years) is between 0.8–0.9 g protein/kg body weight (Phillips, 2012). In the human body, essential amino acids that cannot be synthesized, or not in sufficient amounts to meet physiological functions are fulfilled by consuming protein-rich foods. Proteins of high-quality assurance are essential by their ability to provide amino acids in the right proportion and maintenance of several physiological functions. High-quality and effective protein is required to cover the body's needs for minimizing the potential negative metabolic effects (Elmadfa and Meyer, 2017). So, it is true speculations that foods with high-quality protein are a necessity for leading a healthy life.

Beef and Chevon (Red meat) are consumed more or less by all classes of people. Red meat consumption has been increasing recently in our country due to the enhancement of income, the lifestyle of mass people and the enormous farming of native and breeding cows throughout the country (Islam *et al.*, 2018). In some cases, Chevon cannot be preferable to many people in our country because of their belief that the butcher would be mixed the Chevon with mutton ((Islam *et al.*, 2018), (Rahman, Jang and Yu, 2017)). But, Daily consumption of Red Meat isn't recommended as a protein source because severe adverse effects such as total mortality rates are generally higher in participants who have the intake of red meat regularly. The strongest evidence of a specific adverse effect is the increased risk of colorectal cancer with high intakes of red meats, whereas little or moderate detrimental effect has been observed for Chicken ((Godfray *et al.*, 2018)). Generally, Chickens are the most popular consumable meat followed by chevon and beef (Islam *et al.*, 2018). Chickens are considered the cheapest source of animal protein in the Bangladeshi market and it is bsroadly consumed by all economic, social, religious and demographic groups of people ((Rahman, Jang and Yu, 2017), (Rahman, Jang and Yu, 2017), (Bhuiyan, Bhuiyan and Deb, 2005)). Anyone can consume these five meats food as a Protein source in daily consumption based on Age, Sex, Income and also a family history of non-communicable disease (Godfray *et al.*, 2018). Among them, a protein obtained from food-sourced lean meat (Chicken) facilitates protein synthesis during normal and active growth, repair after extreme physical activity, and repair in elderly individuals for treating sarcopenia ((Neumann *et al.*, 2003), (Schonfeldt HC, Hall N, Pretorius B, 2013), (Paddon-Jones and Rasmussen, 2009)).

Fish is the most commonly consumed animal-origin food in our country, compared to other common foods, such as egg, milk, chicken and meat (beef, lamb and mutton, chevon, and pork) (Akter *et al.*, 2019). Consumption of fish is one of the most crucial consumables in health attributed to the higher portion of protein contains up to 22 of the essential amino acids in a well-balanced ratio, has very low cholesterol in comparison to red meat, and is easily digestible due to its high soft tissue, and omega-3 long-chain polyunsaturated fatty acids ((Abebe Wake *et al.*, 2019), (Akter *et al.*, 2019), (Monalisa *et al.*, 2013)). According to the Bangladesh Institute of Development Studies (BIDS), fish provides about half of the animal source of calories and more than half of the animal source of protein in Bangladesh (Toufique, 2015). That's why the present

study was planned to identify some commonly consumed protein-rich food for Bangladeshi people and it can be interpreted that fish can be the best option for choosing a protein-rich balanced diet. That's why the demand for fish farming augmented due to the growth in daily consumption of fish-based food ((Toufique and Belton, 2014), (Toufique, 2015)). Our result suggested that fish and meat are the main turnovers for taking as food for protein sources. Usually, 50 – 60 grams of protein is essential for healthy adults per normal BMI in our country. From our results, we notion that healthy adults need to consume 250 to 400 g of fish/meat a day (Nahar *et al.*, 2013).

In the Study, RAS methodology was applied for fish farming and the comparison between the RAS farming fish with Pond farming fish explored the notion that RAS methodology can be considered an alternative strategy for fish farming for numerous benefits. RAS is a solution for us to enhance fish farming nationwide with limited resources to develop our economy as well as to fill up SDG goals 02 and 03. We can predict by compiling the current study and works of literature, the RAS methodology should be applied to future poverty reduction and maintaining food security in our country (Zhang *et al.*, 2011).

The high protein content in pulses makes them a significant food source for developing countries and low-income people (Faris, Takruri and Issa, 2013). People consume pulses as a staple food in combination with cereals and depend on this combination to fill their protein requirements. However, pulses have higher protein, folate, iron, magnesium, potassium and zinc content than cereals (Singh, 2017). In low to middle-income countries where protein-rich food is quite hard to obtain in the daily diet, a pulse-cereal combination is often utilized to get good quality protein (Siddiq and Uebersax, 2012). In India, the Dietary Guidelines for the Indian population specified protein-energy malnutrition as a most identified nutrition-related problem, mainly among young children and pulses are identified among the most recommended and selected food types that should be eaten daily (Marinangeli *et al.*, 2017). So, the pulse is a solution for alleviating protein malnutrition in Bangladesh (Khazaei *et al.*, 2019).

Vegetables contain low calories and a negligible amount of energy and are also ideal for humans to satisfy their appetite without consuming many carbohydrates by eating enough vegetables (James and Emmanuel, 2011). Although the percentage of protein is low in vegetables, many people prefer vegetable-based food to maintain health, particularly people who are vegetarian and vegan and also in areas where animal proteins are scarce (Aletor, Oshodi and Ipinmoroti, 2002).

In our country, dietary daily protein consumption is generally filled up from animal-based food such as fish and Meat that are produced annually through farming ((Rahman, Jang and Yu, 2017), (Godfray *et al.*, 2018), (Gil, de Victoria and Olza, 2015)). Research, Investment and Manpower are required for advanced farming with Modern technology to meet the demand. In another case, producing plant protein-based food, with less land, water, advanced technology and, energy is necessary compared to producing animal protein and results in less greenhouse gas emissions aggregation in the environment ((Lynch, Johnston and Wharton, 2018), (Begum, Hossain and D' Haese, 2014), (Mainuddin and Kirby, 2015)).

So, the present study also aimed to develop some protein-rich food which must be cheap and of plant origin. That's why some plant-based foods that were manufactured in BCSIR, had been

enrolled for protein quality analysis. The procedures are cost-effective and can be developed nationwide in any condition. Among the three processed foods, wheatgrass contained the highest protein percentage followed by Jute and Moringa Leaves Powder (Table 2). According to some previous studies, these three plant-derived foods have several health benefits to the human body, so nutritionists can recommend the foods to the country people for numerous health benefits, cost-effective and availability ((Gopalakrishnan, Doriya and Kumar, 2016), (Ghumman, Singh and Kaur, 2017), (Ben Yakoub *et al.*, 2018)).

Conclusion

The study mainly points out to find some common and available protein-rich foods for people in our country. Generally, the majority of our country consumes cereal-based diets rather than protein-rich foods due to price and availability. Low protein intake and higher cereals consumption may impact negatively our bodies with chronic disorders. Moreover, Bangladesh is improving economically and socially synergistically with all odds. Focus is necessary on proper food security, food safety, and food availability for all people to reach the SDG goals in the present decades. The Bangladeshi government is planning for the agriculture, fisheries and livestock sector to upgrade according to the latest technology to ensure proper food for all. For that, we set up the study for proposing common protein-rich foods for the country's people. Foods containing high amounts of proteins are crucial for maintaining health, to explore some common daily consumed foods in our country which will be targeted for mass production in future to complete the demand for protein requirement. According to the results of this study, nutritional profiling using high-quality protein food, specifically meat, fish, pulses, and some processed foods are a fabulous option to increase the amount protein intake of people of all ages. Although the nutritional assessment of the targeted foods is available in the literature, our research of interest was to explore the protein percentage of those foods, which are available in our local markets. The findings of the study must help the nutritionists of our country to design foods for us. But more research is essential for agriculture, livestock production additionally several processed food developments to eradicate the protein deficiency problem of our Bangladeshi people.

Conflict of interest

The authors have not declared any conflict of interests.

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Author's contribution

All authors contributed significantly to this study. Study design and conception were performed by Md. Rakibul Islam, Dip Bhowmik, Md. Rakibul Hasan and Rezaul Karim. Materials preparations and procedural works were performed by Dip Bhowmik, Debrata Karmakar and Yead Morshed Nibir. Data collection and analysis were performed by Dip Bhowmik, Protup Kumer Sarker and Nishat Tasnim. The first draft manuscript was written by Protup Kumer Sarker. Paroma Arefin helped in writing the Manuscript. Md. Rakibul Islam reviewed the Draft. Every author checked and approved the final manuscript.

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