

PREVALENCE OF PROTEIN SUPPLEMENT USAGE AMONG THE BODY BUILDERS IN FITNESS CENTRES

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Science degree in Clinical Nutrition and Dietetics

by
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**DEPARTMENT OF CLINICAL NUTRITION AND DIETETICS
SCHOOL OF ALLIED HEALTH SCIENCES**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Hannah Grace.R (40736002) who carried out the project entitled "**PREVALENCE OF PROTEIN SUPPLEMENT USAGE AMONG THE BODY BUILDERS IN FITNESS CENTRES**" under my supervision from JUNE 2022 to MAY 2023.

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I.ABSTRACT

Nutritional supplements are usually offered in an untypical form of food, including tablets, capsules, powders or pills. The maintaining strength and healthier body has being an important part of the lifestyle in which body building plays a major role and for maintain the muscle protein helps them. Despite these recommendations, the use of supplements has greatly increased in past years. Taking extra protein sources by means of supplements without the consideration of the certified dietician may lead to risk in life causing of chronic kidney disease in higher population. Despite these recommendations, the use of supplements has greatly increased in past years. In fact nutritional supplements industry is currently an international market worth billions of dollars. Various potential risks were described when using nutritional supplements in high doses or without medical supervision. The aim of the study is to associate the prevalence of supplement usage by body builders under the supervision of Certified Dietician and to analyses the intake of protein supplements among the body builders in different parts of Chennai.

A comparative study was adopted around 112 body building individuals of gender male aged between 15 to 45 years who were willing to participate by filling their respective concern forms. The data were collected by a questionnaire via direct one on one method and online google form method which includes demographic data, anthropometric data and a few questions related to the topic .Examples like types of protein they intake, protein purchase from the market, tested blood sample for plasma protein and Albumin injection for plasma protein.

The statistical analysis includes the comparison between types of protein, consumption of animal based protein and vegan based protein, BMI and grams of protein using One-way Anova test, Welch's Anova test and Brown Forsythe test. As the result it is concluded that there are no more significances from the sample where as it shows a significant that grams of protein taking per day compared with the BMI's has the differences. As checking their percentage in the means of pie-chart shows that body builders in the intake of protein supplements majority did not take the opinion of Certified Dietician. They assume the protein intake should be higher and follow randomly amount or even taking opinion from their fitness circle friends.

II.LIST OF ABBREVIATIONS

ACRONYM	ABBREVIATION
BMI	Body Mass Index
WHR	Waist Hip Ratio
cm	Centimetre
kg	Kilogram
Kg/m ²	Kilogram per meter square
ns	Non-significant
*	Significant

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“BODYBUILDING IS MUCH LIKE ANY OTHER SPORT. TO BE SUCCESSFUL,
YOU MUST DEDICATE YOURSELF 100% TO YOUR TRAINING, DIET AND
MENTAL APPROACH.”

-ARNOLD SCHWARZENEGGER

CHAPTER- 1

INTRODUCTION

Proteins have existed on the earth for billions of years. The primary building blocks of most forms of life, from the simplest bacteria to the most sophisticated life forms. There are billions of different types of protein molecules, all containing different combinations of 20 standard amino acids. (Bandegan A, 2007)

But proteins are also by far the most complicated molecules in the human body, and can contain anywhere from 50-2,000 amino acids including the essential 20. By to date about 10,000 different proteins have been identified in the human genome. There are thought to be nearly one trillion different variations on earth.

Almost half is in the form of skeletal muscle, with another 3-4 pounds in the form of skin and blood. Other from bone and organs (Mamerow M.M., 2014;). In nutritional terms, protein is one of the three primary macronutrients our bodies need to survive.

It is a "macro" nutrient because, like carbohydrates and fats, we consume a significant amount of it and use it for fuel. (Wolfe R.R., 2008) They need a comparatively small amount of vitamins and minerals every day, so they are referred to as "micronutrients."

Protein is contained in various combinations and quantities in every food that we eat even vegetables. (Tang M, 2014) Unlike all these other macro and micronutrients, Human body cannot store it, so have to get it consistently through the foods that's eaten, and or the supplements take. It plays a role in virtually everything that goes on in the body. In blood, it transports oxygen throughout the body.

It builds and repairs tissue (including muscle tissue) and makes enzymes, hormones, and other body chemicals. (Paddon-Jones D, 2009) It is also a fundamental building block of bones, cartilage, organs, skin, blood, hair, and nails

The antibodies in our bodies use to ward off disease and infection are made of protein, as are the enzymes that read the genetic information in our DNA to make new molecules. Messenger protein molecules transmit signals between cells, tissue, and organs, and transport protein molecules carry atoms and small molecules throughout the body. Exercise has a profound effect on muscle growth, which can occur only if muscle protein synthesis exceeds muscle protein breakdown, there must be a positive muscle protein balance. (Berryman C.E. L. H., Protein intake trends and conformity with the Dietary Reference Intakes ., 2001–2014) Resistance exercise improves muscle protein balance, but, in the absence of food intake, the balance remains negative. (Courtney-Martin G, 2016).

The response of muscle protein metabolism to a resistance exercise bout lasts for 24-48 hours, the interaction between protein metabolism and any meals consumed in this period will determine the impact of the diet on muscle hypertrophy. (E, 2016) Amino acid availability is an important regulator of muscle protein metabolism. The interaction of post-exercise metabolic processes and increased amino acid availability maximizes the stimulation of muscle protein synthesis and results in even greater muscle anabolism than when dietary amino acids are not present. Hormones, especially insulin and testosterone, have important roles as regulators of muscle protein synthesis and muscle hypertrophy. (Antonio, 2010)

Following exercise, insulin has only a permissive role on muscle protein synthesis, but it appears to inhibit the increase in muscle protein breakdown. Ingestion of only small amounts of amino acids, combined with carbohydrates, can transiently increase muscle protein anabolism, but it has yet to be determined if these transient responses translate into an appreciable increase in muscle mass over a prolonged training period. (Moore D.R., 2009)

Resistance exercise is a powerful stimulus to augment muscle protein anabolism, as it can improve the balance between muscle protein synthesis and breakdown. However, the intake of food during post-exercise recovery is necessary for hypertrophy to occur. Therefore,” athletes need to ingest protein following exercise to attain a positive protein balance and maximize their skeletal muscle adaptive response”. (Ball roe, 2017)The interaction between exercise and nutrition is not only important for athletes, but is also of important clinical relevance in the elderly. Exercise

interventions combined with specific nutritional modulation provide an effective strategy to counteract or reduce the loss of skeletal muscle mass with aging. (Koopman, 2007)

1.1. Animal and plant based protein sources

Dietary proteins are indispensable to human nutrition. In addition to their tissue building function, they affect body composition and regulate various metabolic pathways, as well as satiety and immune system activity.

Protein use can be examined from a quantitative or qualitative viewpoint. Compare animal- and plant-based protein sources in terms of their effects on human health and the environment. (Jahan-Mihan A., 2011)

It's conclude that the consumption of vegetable protein sources is associated with better health outcomes overall (namely, on the cardiovascular system) than animal-based product use. (Gangadharan A., 2017) The healthier outcomes of vegetable protein sources dovetail with their lower environmental impact, which must be considered when designing an optimal diet. Indeed, the health of the planet cannot be disjointed from the health of the human being.

Future research will clarify the mechanisms of action underlying the health effects of plant-based protein sources when compared with animal sources, fostering better agronomic practices and influencing public health in a direction that will benefit both the planet and its inhabitants. (Ferrari L, 2022 Dec)

1.2. The Benefits of Dietary Protein

Diets that are rich in high-protein foods, in combination with the resistance training, have been shown repeatedly to help athletes add or retain lean mass. Diets that include moderate or high-protein foods have plenty of other advantages. (Antonio, 2010) "It's very difficult to get fat if the only thing that overfeed on is protein. "Most high-protein foods are themselves very low in fat and carbs. Chicken breasts have 2-3 grams of fat per serving, while cottage cheese has only 1-2 grams.

Egg whites and fish are virtually fat-free, and in the case of fish, the fats they contain are often healthy omega-3 fatty acids. High-protein diets can also help in losing

unwanted weight. "Not only will this extra protein help build leaner muscle mass, but it will also diminish the appetite, making less apt to cave in to cravings," (Antonio, 2010).

"It can help lose weight because of its ability to act as a potent thermo genic agent". (Beasley J.M., 2018) That means the body burns more calories digesting protein foods than it takes to digest an identical amount of carbohydrate and fat.

"This translates into 60 grams per day for a 150-pound person. But that doesn't mean that's the target should be aiming for. (Gray-Donald K., 2014) For most active people and athletes, these guidelines are considered by most experts to be too low." "A majority of researchers have been saying for decades that the RDA is well below where it should be even too low for non-active people, let alone active people," says (Douglas Kalman) recommends a baseline intake of 1.4 grams per kilogram of body weight for everyone, or 0.6 grams per pound, for all people. (Paddon-Jones D, 2009) For a 150-pound person that equates to 90 grams per day. Of course getting all of those grams in a single meal would likely leave you with a stomachache.

1.3. Protein Misconceptions and Reality

While the popularity of dietary protein has increased over the past decade or longer, largely because of its role in muscle health, there are still some in the media, clinical practice, and within academia that perpetuate certain risks associated with the protein content of balanced mixed-diets for healthy adults. (Raynor H.A., 2016) Common criticisms of greater protein intakes, or with the types of foods dietary protein is derived from, include the potential for detrimental effects of protein on bone, renal function, low-grade inflammation, cardio metabolic disease, and cancer risk.

These concerns are generally unfounded with regard to the protein content of the diet and are antithetical to contemporary published data. (Murphy K.T., 2013) While these associations have been corrected in the scientific literature, other concerns do warrant thoughtful consideration and should be debated in the context of whole foods rather than just ascribing protein foods to labels of "non-dairy animal," "dairy," and "plant," without consideration of the other nutrients these foods provide and their possible links to health and disease

CHAPTER-2

LITERATURE REVIEW

There are millions of different types of protein molecules, all containing different combinations of 20 standard amino acids. But proteins are also by far the most complicated molecules in the human body, and can contain anywhere from 50-2,000 amino acids including the essential 20. To date, about 10,000 different proteins have been identified in the human genome. There are thought to be nearly one trillion different variations on earth. The body of a 154-pound man contains about 24 pounds of protein. Almost half is in the form of skeletal muscle, with another 3-4 pounds in the form of skin and blood.

Bone and organs make up the rest. In nutritional terms, protein is one of the three primary macronutrients our bodies need to survive. It is a "macro" nutrient because, like carbohydrates and fats, we consume a significant amount of it and use it for fuel. (Stark.M, 2017) We need a comparatively small amount of vitamins and minerals every day, so they are referred to as micronutrients. Protein is contained in various combinations and quantities in every food we eat even vegetables. Unlike all these other macro and micronutrients, body cannot store it, so have to get it consistently through the foods you eat, and/or the supplements taken.

It plays a role in virtually everything that goes on in your body. In your blood, it transports oxygen throughout your body. It builds and repairs tissue (including muscle tissue) and makes enzymes, hormones, and other body chemicals. It is also a fundamental building block of bones, cartilage, organs, skin, blood, hair, and nails.

The antibodies our bodies use to ward off disease and infection are made of protein, as are the enzymes that read the genetic information in our DNA to make new molecules. (Pincus T, 2006) Messenger protein molecules transmit signals between cells, tissue, and organs, and transport protein molecules carry atoms and small molecules throughout the body.

2.1. Foods sources high in protein

The most concentrated forms of dietary protein are animal-based foods like fish, meat, and dairy products. Some of the most popular sources for athletes include lean steak, skinless chicken or turkey breast, tuna, eggs, and cottage cheese or yogurt.

On average, beef steak contains about 23 grams per 3-ounce serving, while the same amount of pork provides 26, and chicken provides about 24. Meat normally contains all nine of the essential amino acids our bodies need to get from food.

Fruits, vegetables, grains, nuts, and seeds contain significant amounts, but individually usually lack one or more of the nine essential amino acids. Experienced vegans and vegetarians make a practice of combining these incomplete protein sources to form what are known as “complete proteins”.

However, as long as you eat a diet with a wide range of vegetable sources, you probably don't need to worry about creating complementary proteins at every meal. High-quality vegetarian sources include quinoa, buckwheat, hempseed, chia seed, soy, Ezekiel bread, mycoprotein (Quorn), rice and beans, seitan, spirulina, many grains or nuts, hummus and pita and, last but far from least, the good old peanut butter sandwich. Even green vegetables like broccoli and asparagus offer a decent amount. Many vegetarians and vegans also use plant-based powders to help ensure they're getting adequate amounts of essential amino, and protein in general.

2.2Types of protein powder

Powders enable people to quickly and easily consume this essential macro, and there are varieties on the market to match almost every dietary preference, food allergy, or flavor inclination. But as (Helms ER, 2014). There are several protein supplement types to choose from, each with their own unique aspects and potential benefits.

Whey concentrate is the most popular form of protein powder, because it's easy to find, mixes well, and gets absorbed quickly. It is usually between 70-80 percent protein, with the rest of the mass coming from carbs, fats, and moisture. It can also be used before or after exercise and as a protein-rich snack between meals. Whey isolate has little to no fats and carbs, and is usually around 85 percent protein. It is absorbed very quickly, making it a good choice immediately before and after physical exercise. It is also usually among the lowest-calorie protein powders

Whey hydro lysate is a supplement that has been partially broken down before they drink it. The body is able to quickly absorb it to immediately start rebuilding damaged muscle tissue. (NK, 2014) Casein is a popular choice for a nighttime protein drink

because the body absorbs it more slowly than whey. Whereas whey gets absorbed in as little as 20 minutes, casein takes more like 3-4 hours.

Milk protein isolate contains both whey and casein proteins, since both of those are present in milk. It is a common ingredient in ready-to-drink proteins, and can help provide the muscles with amino acids both in the short term, and for several hours after intake the drink. Egg protein concentrate is a popular ingredient in blends, because it takes longer than whey protein to digest, but not as long as casein. Many athletes also get their egg protein from liquid egg whites, or of course, eggs. A medium-sized egg contains around 7 grams.

2.3 Protein Powder dairy or even Lactose-Free

While most are made from milk, lactose-free proteins have been developed for people who have milk allergies. Some are made from lactose-free dairy. Others are completely dairy-free, like plant proteins and products made from eggs and beef. Looking for a vegan or vegetarian products, there are more options than ever. Some of the most popular plant proteins include; Soy is unique because it is one of the only complete vegetarian proteins. Soy products are rich in the three branched-chain amino acids which also help your body recover and rebuild after physical activity. It is also high in glutamine, which helps your body recover after exercise, and arginine, which helps dilate blood vessels to get nutrients to your muscles more quickly.

Pea is an increasingly popular option, usually made from yellow split peas. It does not have the same amount of the three BCAAs as whey, but has a more complete amino acid profile than many other vegetarian options. It is a common ingredient in vegetarian blends, but also popular among people with dairy allergies. Brown rice isn't a complete protein, but that doesn't necessarily mean it's not worth taking as long as enough. (Facioni MS, 2020 jun 26) A prominent study found that resistance-trained men who took a hefty 48 grams of rice isolate on training days experienced similar muscle gains to men taking the same amount of whey.

Hemp is an increasingly popular choice because of its high digestibility. Hemp is also higher in fiber than animal-derived powders, which means it can help reduce hunger sensations, and it also contains omega-3 fatty acids. (Chen F, 2019) Blended plant proteins combine different incomplete plant sources to form complete proteins, while also capitalizing on the high amount of nutrients in many plant-based sources. Many

high-quality plant powders include the other ingredients listed here, as well as more exotic plants such as buckwheat, amaranth, and all manner of vegetables. Protein Powder for the Lactose Intolerant

Contrary to popular belief, plants—in proper and simple combination with each other—provide a complete protein profile. Rice, pea, and hemp-based powders are widely available and increasingly popular plant-based protein options. As a result, plant-based protein supplements are increasing their market share as people who want none of the complications of whey-based protein supplements turn to plant-based protein supplement alternatives. These are being avidly investigated and taken up by powdered protein enthusiasts.

2.4. Dietary Protein and Physical Activity

The benefits of consuming protein following resistance exercise training have been well-documented, especially as they relate to muscle hypertrophy and function. (Morton R.W., 2018) A recent meta-analysis showed significant positive associations between coupling resistance exercise with post-exercise protein ingestion and total fat-free mass, strength, as measured by one-repetition maximum, and muscle size, as measured by my fiber cross-sectional area. The type and volume of exercise plays a determining role in muscle protein synthetic responses to post-exercise protein ingestion, as does age and the training experience of the individual. The type of protein consumed also factors into the net anabolic response, given that postprandial muscle protein and whole-body protein kinetic responses to free-form amino acids, isolated intact proteins, and mixed-macronutrient meals all differ. (Trumbo P., 2005) As reflected in sports nutrition recommendations holistic evaluation of varied experimental designs suggests that coupling post-resistance exercise protein ingestion (~20–30 g or 0.25–0.30 g/kg) with habitual protein intakes at ~1.6 g/kg/d promotes favorable muscle adaptations to exercise training.

2.5. Risks of eating too much protein

Consuming high amounts of any nutrient for a long period of time typically comes with risks, as can be the case with protein. Overconsumption may lead to an increased risk of certain health complications, according to research. There are potential benefits trusted Source to a high-protein diet for otherwise healthy people. However, it's important to understand the health concerns related to excess protein

in the body, especially if you follow an excessively high-protein diet for an extended period.

Weight gain high-protein diets may tout weight loss, but this type of weight loss may only be short-term. Excess protein consumed is usually stored as fat, while the surplus of amino acids is excreted. (Katherine Marengo LDN) This can lead to weight gain over time, especially if consume too many calories while trying to increase the protein intake. A 2016 study found that weight gain was significantly associated with diets where protein replaced carbohydrates, but not when it replaced fat.

Bad breath eating large amounts of protein can lead to bad breath, especially if you restrict your carbohydrate intake. In an older registry, 40 percent of participants reported bad breath. (G, 2010) This could be in part because your body goes into a metabolic state called ketosis, which produces chemicals that give off an unpleasant fruity smell. Brushing and flossing won't get rid of the smell. Can double the water intake, brush teeth more often, and chew gum to counter some of this effect.

Constipation in the same study, 44 percent of participants reported constipation. High-protein diets that restrict carbohydrates are typically low in fiber. Increasing your water and fiber intake can help prevent constipation. Tracking the bowel movements may be helpful. (Berryman C.E. L. H., Protein intake trends and conformity with the Dietary Reference Intakes in Analysis of the National Health and Nutrition Examination Survey,, 2001–2014) Diarrhea eating too much dairy or processed food, coupled with a lack of fiber, can cause diarrhea. This is especially true if you're lactose-intolerant or consume protein sources such as fried meat, fish, and poultry. Eat heart-healthy proteins instead.

To avoid diarrhea, drink plenty of water, avoid caffeinated beverages, limit fried foods and excess fat consumption, and increase the fiber intake. Dehydration your body flushes out excess nitrogen with fluids and water. (Devries M.C., 2011) However, a 2006 study concluded that consuming more protein had a minimal impact on hydration. This risk or effect can be minimized by increasing the water intake, especially if an active person. Regardless of protein consumption, it's always important to drink plenty of water throughout the day. Kidney damage while no major source link high protein intake to kidney damage in healthy individuals, excess protein can cause damage in people with preexisting kidney disease. (Berryman

C.E. A. S., 2016) This is because of the excess nitrogen found in the amino acids that make up proteins. (Gul Z, 2014 Dec.5) Damaged kidneys have to work harder to get rid of the extra nitrogen and waste products of protein metabolism.

Separately a 2012 study looked at the effects of low-carbohydrate, high-protein versus low-fat diets on the kidneys. The study found that in healthy obese adults, a low-carbohydrate, high-protein weight-loss diet over two years was not associated with noticeably harmful effects on renal filtration, albuminuria, or fluid and electrolyte balance compared with a low-fat diet. Increased cancer risk source have shown that certain high-protein diets that are particularly high in red meat-based protein are linked to an increased risk of various health issues, including cancer.

Eating more red and/or processed meat is associated trusted Source with colorectal, breast Trusted Source, and prostate cancer. Conversely, eating protein from other sources has been with a decreased risk of cancer. Scientists believe this could be due, in part, to hormones, carcinogenic compounds, and fats found in meat.

Heart disease eating lots of red meat and full-fat dairy foods as part of a high-protein diet may lead to heart disease. This could be related to higher intakes of saturated fat and cholesterol. According to a 2010 study source, eating large amounts of red meat and high-fat dairy was shown to increase the risk of coronary heart disease in women. Eating poultry, fish, and nuts lowered the risk.

Calcium loss diets that are high in protein and meat may cause calcium loss. This is sometimes associated with osteoporosis and poor bone health. A 2013 review of studies found an association between high levels of protein consumption and poor bone health.

CHAPTER-3

METHODOLOGY

Protein builds, maintains, and replaces the tissues in the human body is the main function. As protein plays a major role for building up the muscles that lead to maintaining a healthy lifestyle. It's a more important topic of day today's life especially after the corona issue. Millions of people lost their life and many went through the suffering and overcame it. After once every corona crisis become silent everyone took a turn to make their rest of the life even healthier in a wiser way. Even many focused on maintaining their BMI level, Person who are is less weight according to their BMI focused more on gaining weight by in taking the protein in many ways. By using protein powder, supplements, injection (for one day) and food source. It is used to build muscles and organs, to make hormones and antibodies, to be stored as fat, and to be burned as energy. People who were overweight and obese followed many work out method to maintain their health.

As part of life many are focused on muscle hypertrophy (muscle building). Many do it in interest to make a good physical structure. Nowadays both males and females in between the age of 18 to 35 are more focused of building the muscle to get into sports. The research supports the notion that greater muscular strength can enhance the ability to perform general sport skills such as jumping, sprinting, and change of direction tasks. Further research indicates that stronger athletes produce superior performances during sport specific tasks.

3.1 Specific objective of the study

As the topic is vast, wide and more in deep, we gave more focus on what kind of protein they intake, in which form they intake, how many grams they intake per day, if they focus protein through food what kind food is it. As the main stand question was to know whether muscle builders consulted the Dietician and receive the suggested specific protein and the amount which they have to intake. This survey more focused on city lifestyle people with their busy timing and their rushed workouts. Even asked

question related to prevalence way that do they have any idea how much amount protein can be consumed by a single person per day.

3.2. Design of the study

PHASE I

As referred through many research papers and decide the specific information required for the questioner. Question focus based on protein intake and consultation related on it.

Selected the target groups as both male and female in age group of 18 to 35 can attend the survey.

Should develop the question wording in an easily understandable manner. To understand question easier pictures are added to identify.

Placed the questions into a flowing order like personal information followed by consultation question next food behaviour and finally prevalence idea.

The questionnaire was pre-tested until the mistakes were cleared.

PHASE II

Decided to use both interactive direct survey method by visiting the gyms and collect through online method (Google form) of reaching the target respondents.

At possible way the length of the questionnaire had been precise yet included the important information questions.

Printed survey were directly taken for questioning in the gym in various parts of Chennai, while the Google form question was transferred to known gym members and circulated it .

PHASE III

For each and every questioner form the concern form was added and got their agree answer can processed with the questioner.

Collected information by direct questioner method were entered in Excel worksheet, information details received through Google form were also pasted in a single worksheet to run the data easily for access.

Doubts in questioner had been correct by the email conversation as Email ID was placed along with the Google form.

3.3. Study area

The area of the study took place at Chennai city in four directions was focused east, west, north and south parts. Direct survey was taken in Slam fitness center, Koyembedu, Max fitness studio, Velacherry and Great Indian muscle fitness center, Navalur. Google form results are collected inside Chennai.

3.4. Sample size

The sample size had been decided according to Rao soft software where we have to enter the population and the details with margin of error 5%, confidence level 90%, and population size 200, and response distribution 50% recommended sample size is 120.

3.5. Duration of the study

The study duration lasted from November 2022 to January 2023. The selection of the topic and research based on the topic was done till November. The data was collected in the month of November 2022 and continued for three months. The statistical work and result were concluded by January 2023.

3.6. Tools used for data collection

For data collection used both direct survey method in interview form was taken in gym and fitness centres and Google form method with their concern collected form fitness concentrated peoples.

Anthropometric data

Height was measured using the values marked on the wall by standing straight against the wall. Weight was measured by an analog weighing machine.

Then accordingly BMI (Body Mass Index) was calculated through the formula.

BMI, formerly called the Quetelet index, is a measure for indicating nutritional status in adults. It is defined as a person's weight in kilograms divided by the square of the person's height in metres (kg/m^2).

(For example, an adult who weighs 70 kg and whose height is 1.75 m will have a BMI of 22.9).

$$\text{BMI} = \frac{70(\text{in kg})}{1.75 \times 1.75 (\text{in m})} = 22.9 \text{ kg/m}^2$$

$70 \text{ (kg)} / 1.75^2 \text{ (m}^2\text{)} = 22.9 \text{ BMI}$

Note. BMI is derived from a person's weight in kilograms, divided by height (squared) in centimetres. The recommended levels are adapted from the global WHO recommendation of 18.5–24.9 as a normal BMI

Waist circumference and Hip circumference were measured using a non-stretchable inch tape or measuring tape, then accordingly WHR (Waist Hip Ratio) was calculated using the formula. An important issue in using and interpreting waist circumference or waist–hip ratio is the protocol used to obtain the measurements. Also important is the extent to which the measurement protocol varies across studies, and the potential for standardizing these measurements within a study or survey, when taken by different people.

- The anatomical placement of the measuring tape, its tightness and the type of tape used.
- The subject's posture, phase of respiration, abdominal tension, stomach contents and clothing.

The WHO STEP wise Approach to Surveillance (STEPS) provides a simple standardized method for collecting, analysing and disseminating data in WHO Member countries. The WHO STEPS protocol for measuring waist circumference instructs that the measurement be made at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest.

The United States (US) National Institutes of Health (NIH) protocol provided in the NIH Practical guide to obesity (NHLBI Obesity Education Initiative, 2000) and the protocol used in the US National Health and Nutrition Examination Survey (NHANES) III indicate that the waist circumference measurement should be made at the top of the iliac crest. The NIH also provided a protocol for the measurement of waist

circumference for the Multi-Ethnic Study of Atherosclerosis (MESA) study. This protocol indicates that the waist measurement should be made at the level of the umbilicus or navel. However, published reports indicate that measurements of waist circumference made at the level of the umbilicus may underestimate the true waist circumference. Some studies have assessed the waist circumference at the point of the minimal waist. Hip circumference all the protocols indicates that the hip circumference measurement should be taken around the widest portion of the buttocks.

3.7. Sample method

Random sampling among body building people in fitness centres consuming protein by means of food source or protein supplements or powders and collection of Demographic Data like Age, gender (M/F), do they are educated with the protein intake by an individual (yes/no), along with that other supplements they intake eg: Creatine, multivitamin etc.

3.8. Statistical Analysis

The comparison of Body Mass Index, specific regimen and grams of protein they intake per day were done through One-way Anova test, Welch's Anova test and Brown Forsythe test.

The comparison between types of protein like essential amino acids, Bovine serum albumin, Alpha lactoglobulin, Beta-lactoglobulin and branched chain amino acid, with Body Mass Index, were done through Dunnett's multiple comparisons test.

The comparison between specific regimens like animal based protein and vegan based protein and body mass index was done through Dunn's multiple comparisons test.

Dunnett's T3 multiple comparisons test was used in the comparison with grams of protein intake per day with BMI.

CHAPTER-4

RESULT AND DISCUSSION

4.1. Age of the samples

AGE	NO.OF SUBJECTS
15-25	39
26-35	51
36-45	22

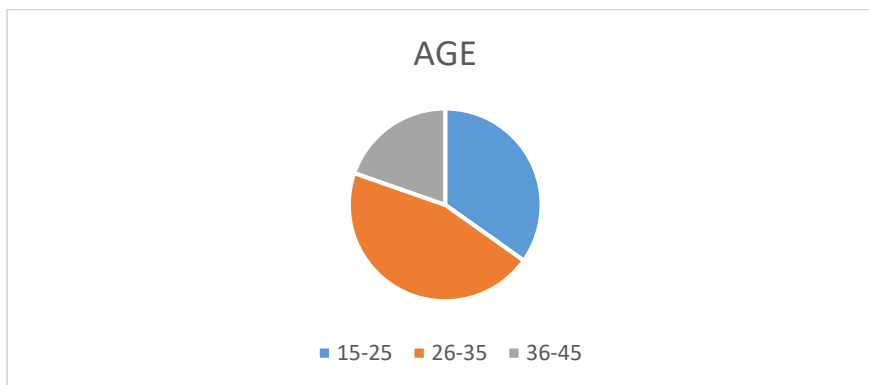


Fig.4.1

Table 4.1 represents the age of the sample in which majority of the sample is in the age between 36-45 years.

4.2 Weight (kg) of the samples

WEIGHT	NO.OF SUBJECT
40-50	8
51-60	18
61-70	44
71-80	25
81-90	11
91-100	3
101-110	3

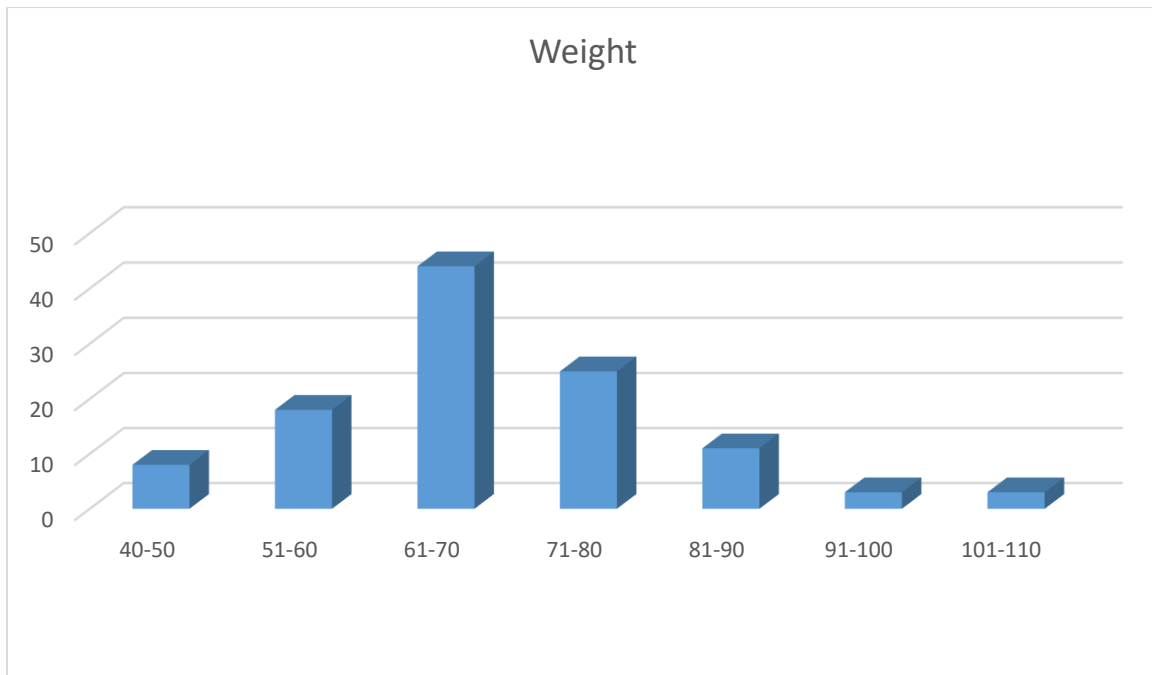


Fig.4.2

Table 4.2 represents the weight of the sample in which majority of the sample weigh between 61-70kg.

4.3 Height (cm) of the samples

HEIGHT	N0.OF SUBJECT
140-150	17
151-160	41
161-170	32
171-180	22

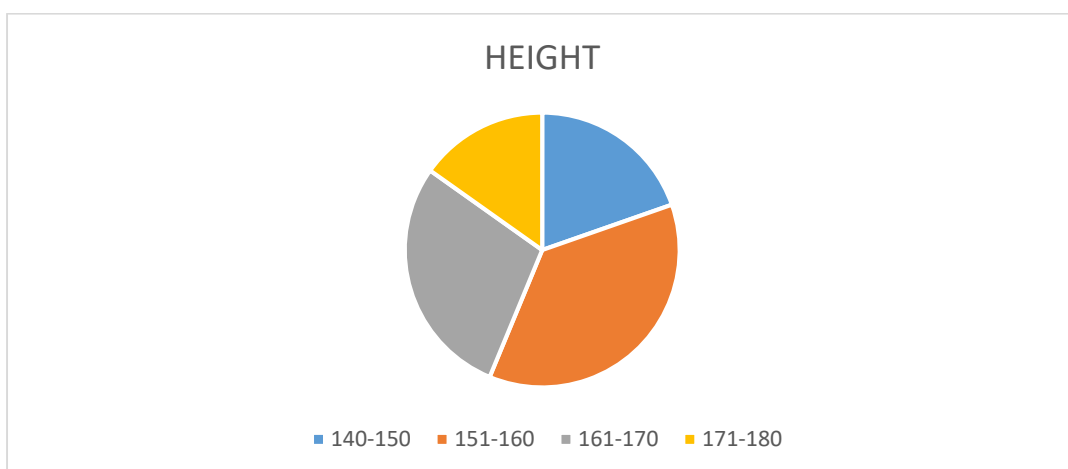


Fig.4.3

Table 4.3 represents the height of the sample in which majority of the sample are seen in 151-160cm than other level of heights.

4.4 (BMI) Body Mass Index (Kg/m²) of the sample

BMI	NO.OF SUBJECTS
15.0 – 20.0	16
21.0 -25.9	65
26.0 – 30.9	23
31.0 – 35.9	5
36.0-40.9	3

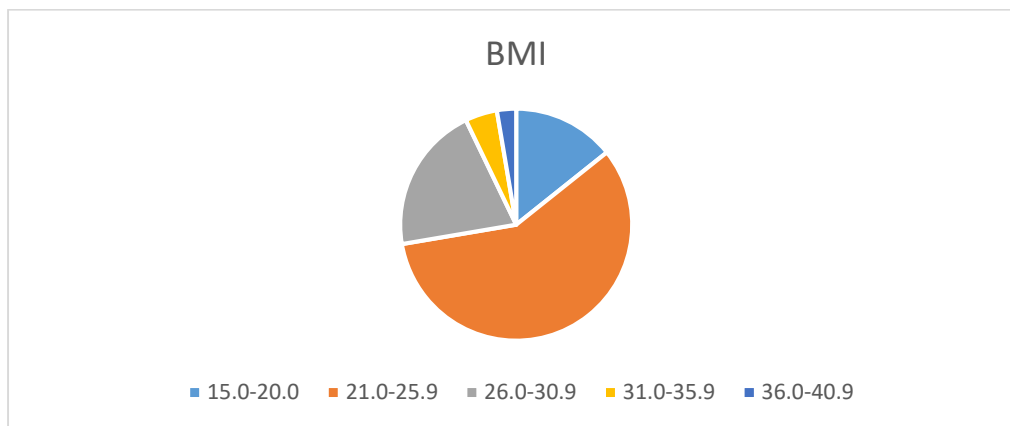


Fig.4.4

Table 4.4 The BMI (Body Mass Index) of the sample in which majority of the sample belongs 21.0 to 25.9 where it shows according to the WHO chart for males they are under healthy weight.

4.5. Waist-Hip ratio of the samples

WHR	NO.OF SUBJECT
0.6-0.7	37
0.71-0.8	67
0.81-0.9	8

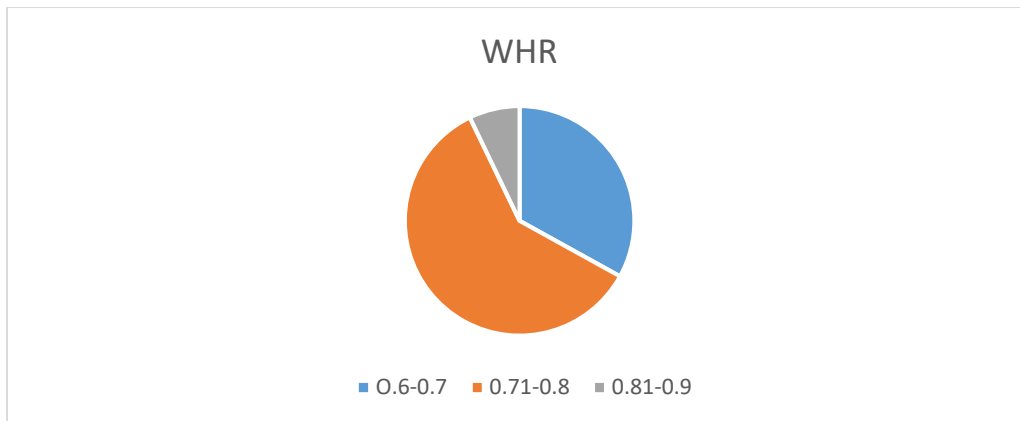


Fig.4.5

Table 4.5 represent the WHR (Waist-hip ratio) of the taken samples in which majority of the samples belongs to 0.71 to 0.8 fall in normal ratio under WHO charts.

4.6 Consulted with a certified nutritionist /Physician for the supplementary protein intake

CONSULTED	NO.OF SUBJECT
Yes	28
No	84

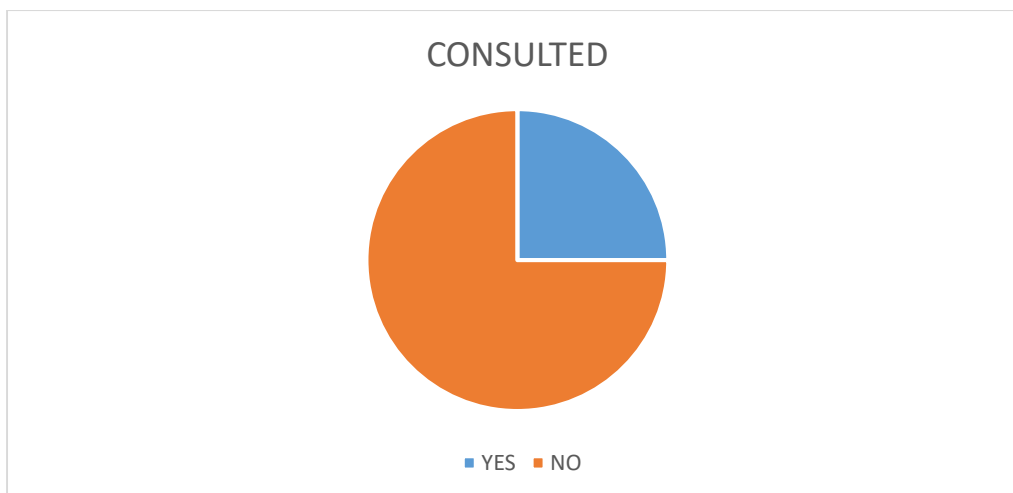


Fig.4.6

Table.4.6 it represent only 28 subjects consulted the certified nutritionist /Physician in which majority of the subjects randomly in taking protein supplements without any proper suggestions.

4.7 The form are you consuming protein

PROTEIN CONSUMED	NO.OF SUBJECT
Tablets	11
Injection	3
Powder	50
Other	48

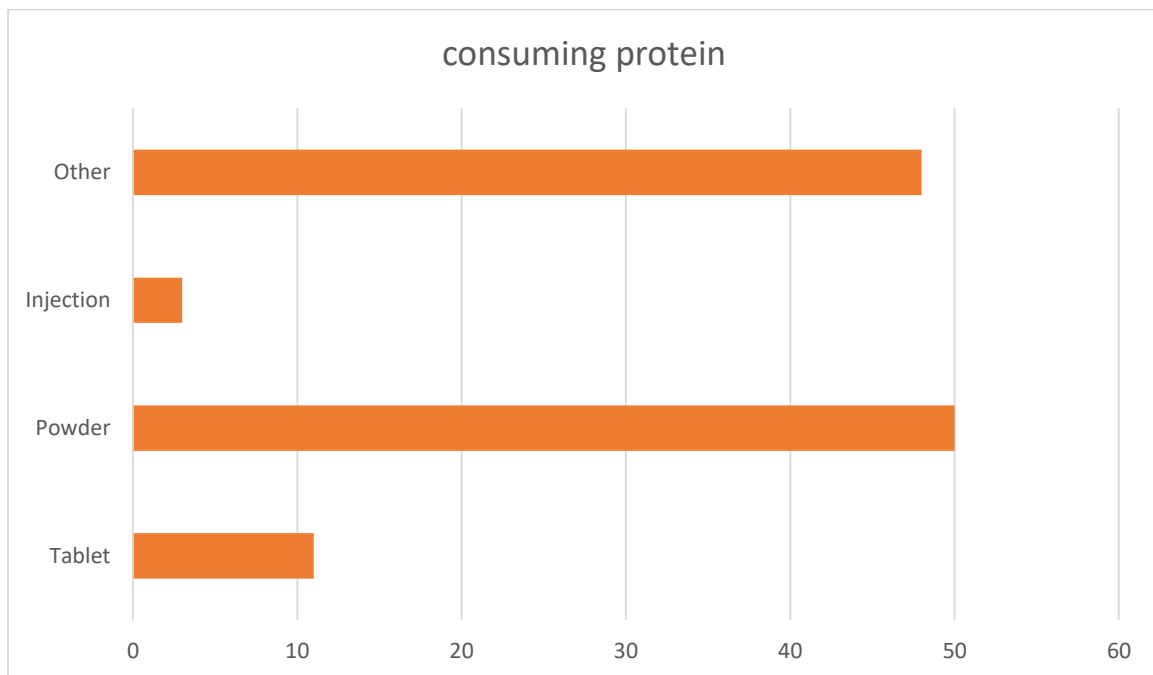


Fig.4.7

Table4.7 represents consuming of protein in form powder is higher comparing with tablets and injections

4.8 The source of protein purchase from the market

SOURCE OF PROTEIN PURCHASE	NO.OF SUBJECT
Pharmacy	13
Online source	19
Only through diet	52
Sport supplement shops	28

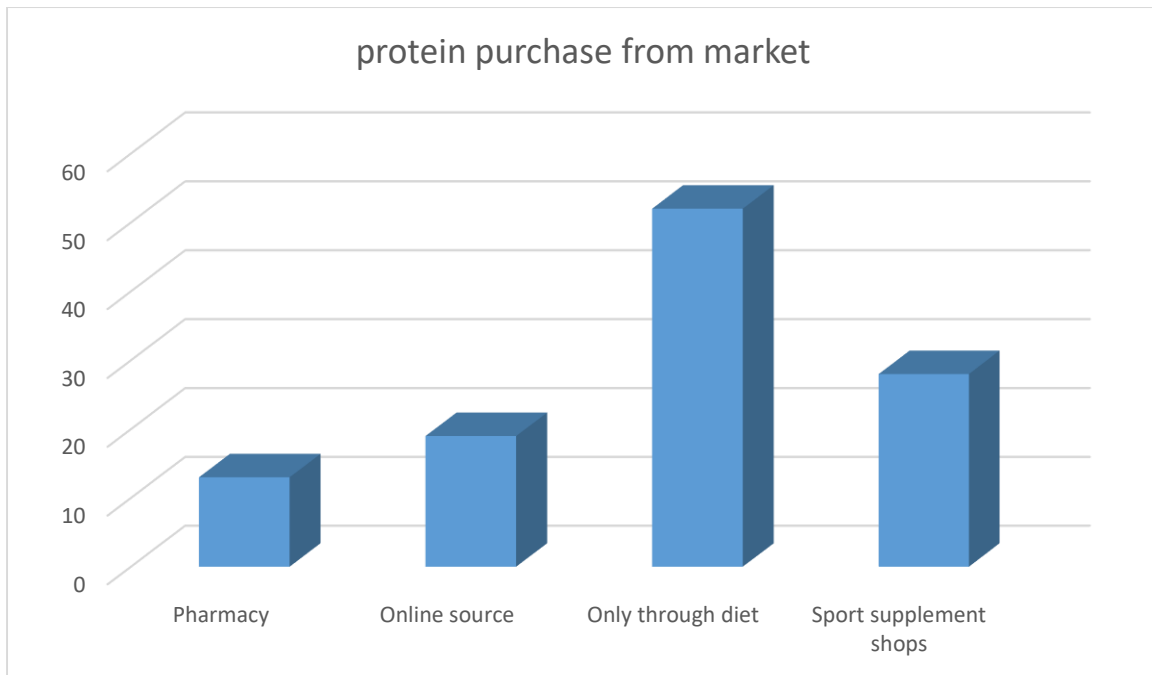


Fig.4.8

Tablet4.8 it represents that majority of protein sources purchases are in more organic way only thought foods like animal based protein and plant based protein.

4.9. Grams of protein consume only through the supplements

GRAMS OF PROTEIN	NO.OF SUBJECT
20-40grams	57
>40grams	29
<20grams	26

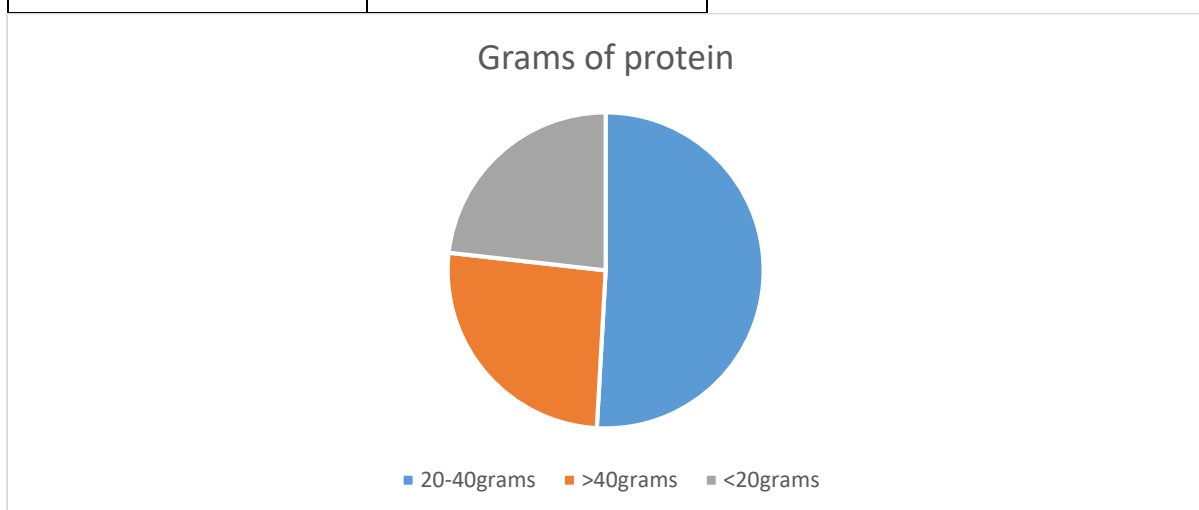


Fig.4.9

Table.4.9 represents that majority of grams of protein consumed 20 -40 grams per day. That's known as normal healthy intake.

4.10. Tested blood sample for plasma protein

TESTED BLOOD SAMPLE	NO. OF SUBJECT
Yes	31
No	81

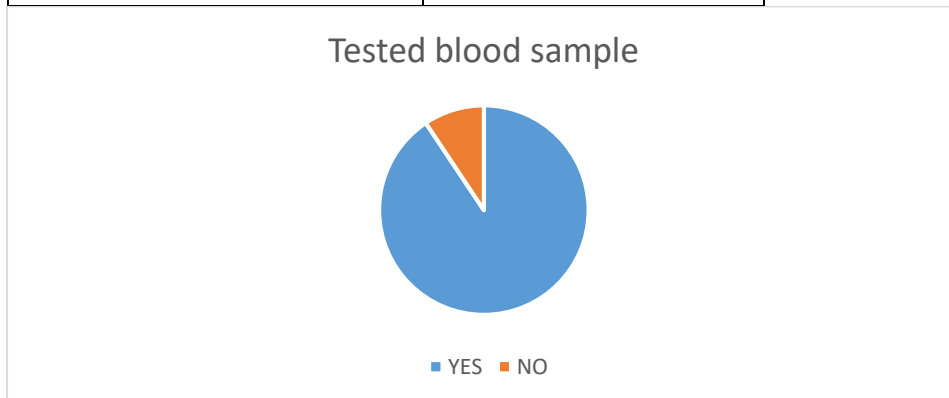


Fig.4.10

Table.4.10 represents that only 31 have tested blood samples where majority have not tested their blood sample for plasma protein.

4.11. Taken Albumin injection for plasma protein

ALBUMIN INJECTION	NO.OF SUBJECT
Yes	12
No	100

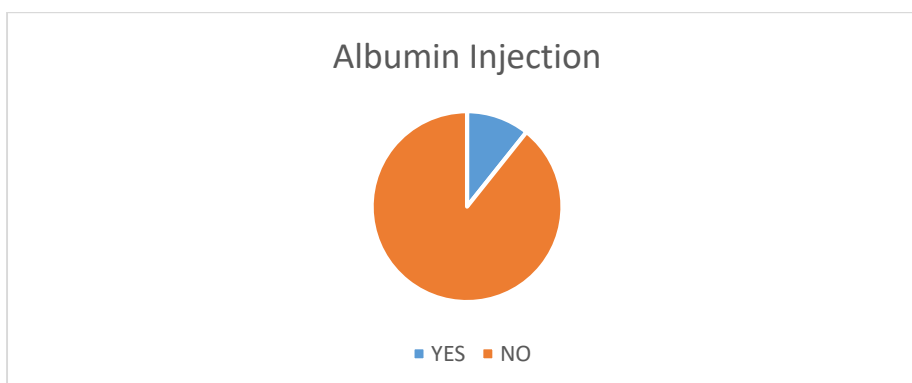


Fig.4.11

Table.4.11 it represents that majority of sample did not take albumin injection. This injections are familiar only in sports fields especially in body building sport. Albumin protein derived from eggs. Very good for improving metabolic functioning capable of making healthier muscles.

4.12. Any specific regimen in the diet for protein

SPECIFIC REGIMEN	NO.OF SUBJECT
Animal based protein	28
Vegan based protein	13
Mixed diet consumption	71

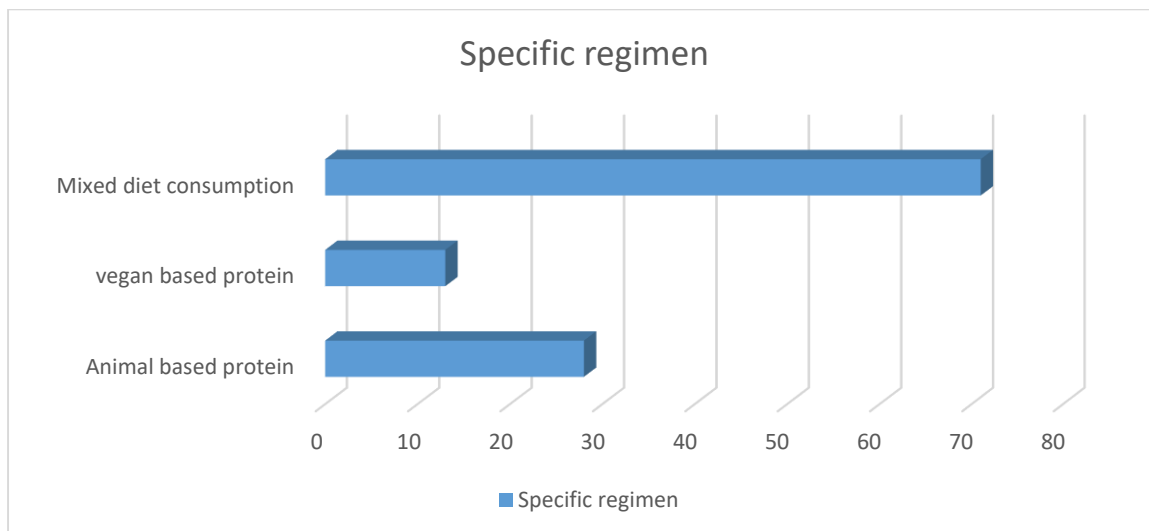


Fig.4.12

Table.4.12 represents that majority of samples consuming mixed diet of both animal based protein and vegan based protein to gain the muscle and fame the beautiful structure.

4.13 If animal based protein; choose the option

OPTION	NO.OF SUBJECT
Eggs	27
Chicken	54
Fish	14
None of the above	17

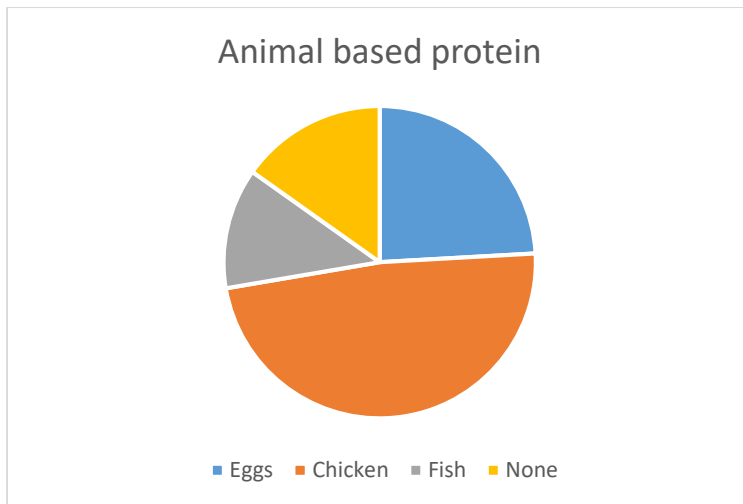


Fig.5.13

Table.4.13 represent that in animal based protein consumption majority of samples intake chicken as the prime source protein rich food.

4.14 If vegan based protein; choose the option

OPTION	NO.OF SUBJECT
Legumes	29
Quinoa	26
Soy milk	31
None of the above	26

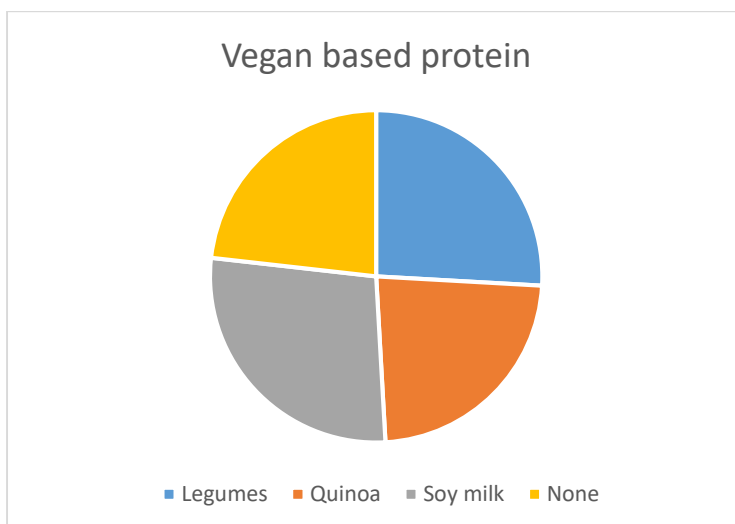


Fig.5.14

Table.4.14 represent that in vegan based protein consumption majority of samples had intake soy milk as their prime protein source in their diet.

4.15. Any other supplements along with protein

SUPPLEMENTS ALONG WITH PROTEIN	NO. OF SUBJECT
Multivitamin	47
Creatinine	29
Multi-mineral	7
L-carnitine	5
HMB	2
Omega 3	19
Citrulline	1
Choline	2

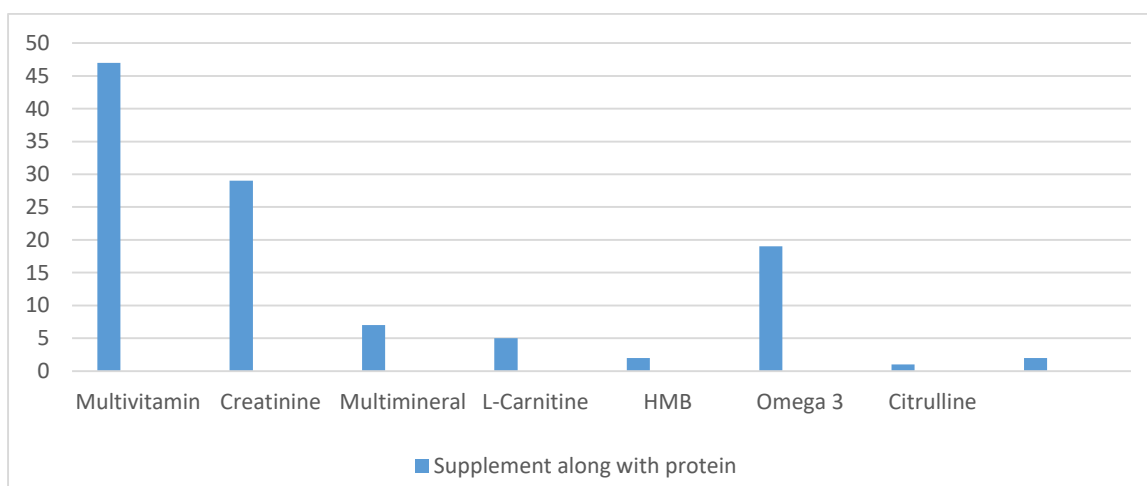


Fig.4.15.

Table 4.15 represent that majority of supplement consuming along with protein is multivitamin comparing with Creatinine, Multimineral, L-Carnitine, HMB, Omega 3, Citrulline and Choline.

4.16 Educated in the protein intake by an individual in a body building sport

EDUCATED	NO.OF SUBJECT
Yes	64
No	48

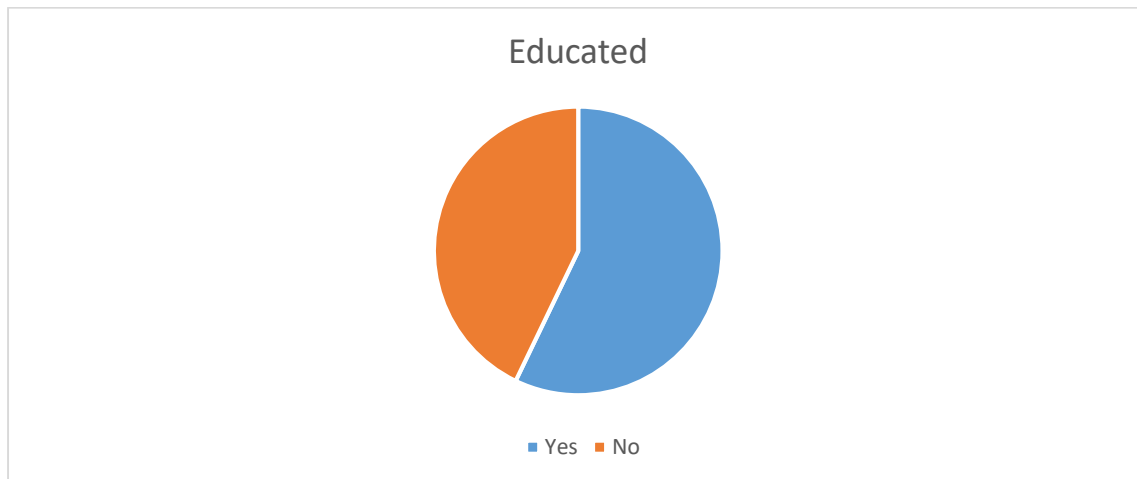


Fig.4.16

Table.4.16 represented that majority of sample has been educated with the protein intake by an individual in a body building sport.

4.17 comparing type's protein with the BMI

Number of families	1						
Alpha	0.05						
Dunnett's multiple comparisons test	Mean Diff,	95,00% CI of diff,	Significant	Summary	Adjusted P Value	A	
Normal Diet vs. Branched chain Amino Acids	- 0.7736	-3,202 to 1,655	No	ns	0.9167	B	Branched chain Amino Acids
Normal Diet vs. Beta-lactoglobulin	- 0.8015	-4,320 to 2,717	No	ns	0.979	C	Beta-lactoglobulin
Normal Diet vs. Alpha-lactoglobulin	- 0.2623	-3,256 to 3,781	No	ns	0.9997	D	Alpha-lactoglobulin

Normal Diet vs. Bovine serum Albumin	-2.688	-7,009 to 1,632	No	ns	0.4148	E	Bovine serum Albumin	
Normal Diet vs. Essential Amino Acids	-2.049	-4,342 to 0,2438	No	ns	0.1004	F	Essential Amino Acids	
Test details	Mean 1	Mean 2	Mean Diff	SE of diff,	n1	n2	q	DF
Normal Diet vs. Branched chain Amino Acids	23.5	24.27	-0.7736	0.9326	44	21	0.8294	105
Normal Diet vs. Beta-lactoglobulin	23.5	24.3	-0.8015	1.352	44	8	0.593	105
Normal Diet vs. Alpha-lactoglobulin	23.5	24.27	-0.7736	0.9326	44	8	0.1941	105
Normal Diet vs. Bovine serum Albumin	23.5	26.19	-2.688	1.659	44	5	1.62	105
Normal Diet vs. Essential Amino Acids	23.5	25.55	-2.049	0.8807	44	25	2.327	105

Table.4.17 comparing the normal diet with essential amino acids, Bovine serum albumin, Alpha lactoglobulin, Beta-lactoglobulin and branched chain amino acid with including their BMI as an important factor. In comparison of Dunnett's multiple comparisons test with Normal Diet vs. Branched chain Amino Acids, Normal Diet vs. Beta-lactoglobulin, Normal Diet vs. Alpha-lactoglobulin, Normal Diet vs. Bovine serum Albumin and Normal Diet vs. Essential Amino Acids. The test is seems to be negative because there are not seen much differences comparing each protein with their BMI's. Where the mean differences slightly various without any big differences. It shows that BMI for each protein has no differences. So, the result is set to be not significant (ns).

4.18 comparing BMI specific regimen of protein diet

Alpha	0.05					
Dunn's multiple comparisons test	Mean rank diff,	Significant	Summary	Adjusted P	Value	A
Animal based protein vs. Vegan based protein	-4.913	No	ns	>0,9999	B	Vegan based protein
Animal based protein vs. Mixed diet consumption	-8.404	No	ns	0.4859	C	Mixed diet consumption
Test details	Mean rank 1	Mean rank 2	Mean rank diff,	n1	n2	Z
Animal based protein vs. Vegan based protein	50.13	55.04	-4.913	28	13	0.4549
Animal based protein vs. Mixed diet consumption	50.13	58.53	-8.404	28	70	1.168

Table.4.18 shows the comparison of specific regimen with the BMI (Body Mass Index). In that according to Dunn's multiple comparisons test with Animal based protein vs. Vegan based protein and Animal based protein vs. mixed diet consumption. This test seems to be negative with the mean rank and mean differences. Where there is no changes with their BMI values. Where the mean differences slightly various without any big differences. This test has been run with the help of one-way anova test and set to be not significant (ns).

4.19.Comparing BMI with the grams of protein intake per day

Number of families	1							
Number of comparisons per family	2							
Alpha	0.1							
Dunnett's T3 multiple comparisons test	Mean Diff,	90,00% CI of diff,	Significant	Summary	Adjusted P Value	A		
40 grams vs. 20-40 grams	1.623	-0,2331 to 3,479	Yes	ns	0.0958	B	40 grams	
> 20 grams vs. 20-40 grams	1.641	-0,2960 to 3,577	No	ns	0.1102	C	> 20 grams	
Test details	Mean 1	Mean 2	Mean Diff,	SE of diff,	n1	n2	t	DF
40 grams vs. 20-40 grams	25.49	23.86	1.623	0.8063	29	56	2.013	50.62
> 20 grams vs. 20-40 grams	25.5	23.86	1.641	0.8465	40	56	1.938	65.26

Table 4.19 comparison of grams of protein with the BMI. In that Dunnett's T3 multiple comparisons test undergone with 40 grams vs. 20-40 grams and > 20 grams vs. 20-40 grams with the BMI values. This test seems to have mean differences in comparing 40 grams vs. 20-40 grams. So the result is set to be significant (*) with the comparison by involving Brown–Forsythe test and Welch's Anova testes.

CHAPTER-5

SUMMARY AND CONCLUSION

The present study was conducted by both online by google form and direct survey was taken in Slam fitness center, Koyembedu, Max fitness studio, Velacherry and Great Indian muscle fitness center, Navalur. Google form results are collected inside Chennai. This study revealed that according to Dunn's multiple comparisons test with Animal based protein vs. Vegan based protein and Animal based protein vs. mixed diet consumption. This test seems to be negative with the mean rank and mean differences. Where there is no changes with their BMI values. Where the mean differences slightly various without any big differences.

This test has been run with the help of one-way anova test and set to be not significant (ns). Comparing the normal diet with essential amino acids, Bovine serum albumin, Alpha lactoglobulin, Beta-lactoglobulin and branched chain amino acid with including their BMI as an important factor. In comparison of Dunnett's multiple comparisons test with Normal Diet vs. Branched chain Amino Acids, Normal Diet vs. Beta-lactoglobulin, Normal Diet vs. Alpha-lactoglobulin, Normal Diet vs. Bovine serum Albumin and Normal Diet vs. Essential Amino Acids. The test is seems to be negative because there are not seen much differences comparing each protein with their BMI's. Where the mean differences slightly various without any big differences. It shows that BMI for each protein has no differences. So, the result is set to be not significant (ns).

The comparison of grams of protein with the BMI. In that Dunnett's T3 multiple comparisons test undergone with 40 grams vs. 20-40 grams and > 20 grams vs. 20-40 grams with the BMI values. This test seems to have mean differences in comparing 40 grams vs. 20-40 grams. So the result is set to be significant (*) with the comparison by involving Brown–Forsythe test and Welch's Anova testes. This shows that there are no much differences comparing it with BMI.

APPENDIX

ONE-WAY ANOVA TEST compares the means of three or more independent groups to determine if there is a statistically significant difference between the corresponding population means. For the results of a one-way ANOVA to be valid, the following assumptions should be met:

1. Normality – Each sample was drawn from a normally distributed population.
2. Equal Variances – The variances of the populations that the samples come from are equal. You can use Bartlett's Test to verify this assumption.
3. Independence – The observations in each group are independent of each other and the observations within groups were obtained by a random sample.

WELCH'S ANOVA TEST compares two means to see if they are equal. It is an alternative to the Classic ANOVA and can be used even if your data violates the assumption of homogeneity of variances. Welch's test in all cases where you have normally distributed data that violates the assumption of homogeneity of variance.

ANOVA are very unstable for these situations, producing Type I error rates that are: Welch's ANOVA is fast becoming the go-to method out of the three. For normal, different-variance, and balanced data (i.e. same-size samples), Welch's has the most power and the lowest type I error rate. However, classic ANOVA still performs the best when data is normal, equal-variance, and is either balanced or unbalanced. In other words, run Welch's if your data has unequal variances, but run a classic ANOVA if it's just an unequal sample size issue.

THE BROWN FORSYTHE TEST is a statistical test for the equality of group variances based on performing an Analysis of Variance (ANOVA) on a transformation of the response variable. When a one-way ANOVA is performed, samples are assumed to have been drawn from distributions with equal variance. If this assumption is not valid, the resulting F-test is invalid. The Brown–Forsythe test statistic is the F statistic resulting from an ordinary one-way analysis of variance on the absolute deviations of the groups or treatments data from their individual medians. A one-way ANOVA is used to determine whether or not there is a significant difference between the means of three or more independent groups.

CONCERN FORM

INFORMATION SHEET

Dear participant,

This 'Participant Information Sheet' will give you details of the study and help you decide whether to participate in the study or not. It sets out why we are doing the study, what your participate would involve, what the benefits and risks to you might be, and what would happen after the study ends. We request you to thoroughly read and understand this form. Any doubt, concern or question can be addressed to 1601hannahgrace@gmail.com and we will be responding to it within a span of 24hours. Upon obtaining the clarification from our side, if you are willing to take part in the study, we request you fill this form and send it back to us within the next two days.

Part 1: General Information

Purpose of the study -This study is intended to enhance certain professional abilities of participants that could help them deal with providing the knowledge about consulting the nutritionist or physician. Participating in the study will provide a space for expressing and processing one's thoughts and feelings about protein intake related to body building. It could enable you to develop some constructive potentials which can be applied in both personal and professional life.

Part 2: Rights, benefits and risks

- Every participant is entitled to withdraw from the study and no negative consequence will be imposed on them for the same.
- The study may provide benefits including but not restricted to mindfulness, conflict resolution, emotional management and communication.
- There is no anticipated risk to the participants, to the best of researcher's knowledge. There may be a few insights and reflections that participants may want to discuss with a professional mentor or coach and the researcher will make appropriate referrals for the same.

INFORMED CONSENT FORM

- I confirm that I have read and understood the Participant Information Sheet and have had the opportunity to ask questions.
- I understand that my identity will not be revealed in any information released to third parties or published.
- I agree not to restrict the use of any data or result that arise from this study provided such a use is only for scientific/ academic purpose(s).
- I agree to take part in the above study.

PREVALENCE OF PROTEIN SUPPLEMENT USAGE AMONG THE BODY BUILDERS IN FITNESS CENTRES

1 Name: _____

2 Height (cm): _____

3 Weight (kg): _____

4 BMI (kg/m²): _____

5 waist circumference (cm): _____

6 Hip circumference (cm): _____

7 Waist hip ratio: _____

8 Phone number: _____

9 Email: _____

10. Have you consulted with a certified nutritionist / Physician for the supplementary Protein intake?

A) No B) Yes

11. Does your certified dietician suggested any specific protein

A) No B) Yes

If yes, name the protein _____

12. In which form are you consuming protein

A) Tablets B) Powder C) Injection D) Food source E) Other

13. What is the source of your protein purchase from the market?

A) Pharmacy B) Online source C) Only through diet (food)

D) Sports Supplement shops

14. How much grams of protein do you consume only through supplements?

A) 20-40grams

B) >40grams

C) <20 grams

15. Have you tested your blood sample for plasma protein?

A) No

B) Yes

If yes, have you taken Albumin injection to increase your plasma protein?

A) No

B) Yes

16. Do you follow any specific regimen in your diet for protein?

A) Animal based protein

B) Vegan based protein

C) Mixed diet consumption

If A; Choose the option

A) Eggs

B) Chicken

C) Fish

If B; Choose the option

A) Legumes

B) Quinoa

C) Soy milk

D) spirulina

17. Do you take any other supplements along with protein?

A) Multivitamin

B) Creatinine

C) Multimineral

D) L-carnitine

E) HMB

F) Omega 3

G) Citrulline

18. Have you been educated with the protein intake by an individual in a body building sport?

A) No

B) Yes

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