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**كؤليـذى تةكنيكي تةندروستى**

**بةشينيوتريشنودايةتيَتكس**

**إقليم كوردستان- العراق**

**جامعة جيهان – أربيل**

**كلية التقنيات الصحية**

**قسم التغذية والحِمْيات**

**Kurdistan Region –Iraq**

**Cihan University- Erbil**

**College of Health Technology**

**Department of Nutrition and Dietetics**

**Knowledge and use of protein supplements among adults attending gyms in Erbil City**

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In

Nutrition and Dietetics

**By: Marwa Husam Sanad, Shafaa Hassan Moriah, Rozheen Mohamed Shaker**

**Supervised by:**

**Dr. Salih M. S. Zebari**

Erbil- Kurdistan, Iraq

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بِسْمِ اللَّـهِ الرَّحْمَـٰنِ الرَّحِيمِ

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سورة العلق: الآيات 1-5

**Certification**

I certify that this project was prepared under my supervision at the Department of Nutrition and Dietetics College of Health Technology, Cihan University-Erbil in partial fulfilment of the requirements for the degree of:

**Bachelor of Science**

**In**

**Nutrition and Dietetics**

**Supervisor**

**Dr. Salih M. S. Zebari**

**In view of available recommendations, I forward this project for debate by the examining committee.**

**Dr. Salih M. S. Zebari**

**Head of Department of Nutrition and Dietetics**

**College of Health Technology**

**Cihan University- Erbil**

**Date: 02 /05/ 2023**

**Examination Committee Decision**

**We, the examination committee, certify that we have read this project and have examined the students in its contents and that in our opinion it is adequate as a partial requirement for the degree of:**

**Bachelor of Science**

**In**

**Nutrition and Dietetics**

**Dr. Behnaz Shahrokhisahneh Asst. Prof. Dr. Bashdar Abuzed Sadee**

Department of Nutrition and Dietetics Department of Nutrition and Dietetics

College of Health Technology College of Health Technology

 Cihan University –Erbil Cihan University –Erbil

 **Chairman Member**

**Asst. Prof. Yaseen M. O. Galali Dr. Salih M. S. Zebari**

Department of Nutrition and Dietetics Department of Nutrition and Dietetics

College of Health Technology College of Health Technology

Cihan University –Erbil Cihan University –Erbil

 **Member Supervisor**

**Approved for the department committee of undergraduate studies.**

**Dr. Salih M. S. Zebari**

Head of Department of Nutrition and Dietetics

College of Health Technology

Cihan University –Erbil

**Date: 02/05/2023**

**Dedication**

 We would like to dedicate our work to:

 • Our family members, especially our parents, who supported us and were our support.

 • Every person who helped us in carrying out our work and research from colleagues and professors.

 • All individuals interested in developing themselves with knowledge and knowledge

 With our love and respect

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 To our beloved fathers and brothers, whose enduring love and encouragement has been our driving force, we dedicate this work to you. And to all of those who have supported us in our academic endeavors, we are truly grateful.

 This achievement would not have been possible without the collective effort of everyone who stood by us. Thank you for being a part of our journey.

**ABSTRACT**

Generally, commercial supplants including protein are dietary supplants used in different form of pills, capsules, tables, powder or liquid. Protein supplements in particular are used to increase muscle mass, improve exercise recovery, and improve performance.

This study aims to assess and evaluate the protein supplants usage by participants and their knowledge of using. In this study we collected 300 participants who attended differ gyms in Erbil city during the period of February to April 2023. Data were collected using a questionnaire survey, and analyzed using different statistical analysis tools. with a group of respondents belonging to the period (years of age group) in the current study. The data collection method depends on the raw data.

The results of this study indicated that the main motivation or the main reason for using protein supplements for young people who visit sports clubs in Erbil is to obtain a muscle mass, the results of the research showed that 86.7% of the participants use whey protein and The results of the search showed that their belief on protein supplements it was safe for use by 72.3% and the percentage of people who did not suffer from any diseases due to protein supplements were 76.3% of participants.

The study concluded from our research that the age groups we targeted aim to build muscle and maintain their health, and that large numbers of them have achieved their goal of obtaining what they aspire to from an attractive and harmonious body and suitable muscle mass.

**KEY WORDS: Protein supplants, normal range and dosage, side effects, reasons of using.**

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**ABBREVIATIONS**

SD Standard Division

SPSS Statistical Package for the Social Sciences

FDA Food and Drug Administration (U.S.)

MVM multivitamin-multimineral

**CHAPTER ONE**

**INTRODUCTION**

## **Introduction**

Even though nutritional supplements are dietary supplants used for different purposes and by different age groups, many users have lack of knowledge about the sources, dosage and side effects of those supplements (Talat *et al*., 2023).

For a number of reasons, the usage of supplements is a well-recognized and widespread practice. The major reasons for such use are health, physical beauty, performance, and nutritional considerations. Dietary Supplementations, athletes especially use protein supplements to grow muscle, increase strength, or avoid future ailments and illnesses. Anecdotally, it is known that people who utilize commercial gyms often use supplements to enhance their health or performance. However, little research has been done on the eating habits of gym goers and athletes. Investigations into the precise quantity and frequency of dietary supplement use are still required. This study's major goal is to comprehend the quantity and quality of protein supplements consumed by gym patrons, particularly in Erbil (Bianco, et al. 2014).

Nutrition has always been seen as a critical component of physical fitness and performance. Over the last several decades, a better knowledge of human nutrition and its impact on metabolism has resulted in better regulation of intake and consequent athletic performance. (Bianco, et al. 2011).

The protein supplement industry began in the 1950s, when the first products were introduced to the market. Competitive bodybuilders began using egg protein to increase muscle mass, and whey protein soon followed, and was consumed for muscle building, weight loss, and as a meal replacement. It is quick to prepare and easy to carry. Soy protein and pea protein are next, and nowadays there are a lot of different protein products to choose from on the market. (Parkinson 2016) Due to its ease of use and quick results, the percentage of young people consuming

Protein supplements has increased.

Protein supplements are becoming more popular as consumer knowledge of health and fitness grows. Protein supplements, particularly whey protein, have both positive and negative aspects. The advantages become apparent soon. Protein supplements are becoming more popular as consumer knowledge of health and fitness grows. Protein supplements, particularly whey protein, have both positive and negative aspects. The advantages are immediate, but it also has undesirable side effects that take time to manifest. Short-term side effects include vomiting, bloating, sleep disruption, headache, and so on, while long-term side effects include renal and liver dysfunction, cardiovascular difficulties, and digestive disorders. Protein and amino acid overuse appear to be linked to negative effects such as ketosis, excess body fat, gout, renal overload, dehydration, urinary calcium excretion, and bone mass loss. (DaCosta, et al. 2021)

The goal of this study was to look at the usage of protein supplements alone, as well as to determine dietary behavior among persons who wish to "build up muscles" in Erbil, Kurdistan, Iraq. The goal of this thesis is to investigate the consumption styles and attitudes of young adults aged 18 to 35 years old about protein supplements.

This study will provide insight into consumer behavior, brand and product preferences, and the features they value in protein supplements.

The primary focuses of this research include, for example, the personal underlying causes of protein supplement intake, the type of protein supplementation, whether they believe they are safe, and the variables influencing people's buying decisions.

* 1.
	2. **Justification for this research**

Because of the influencers on social media, youngest people who go to gyms aspire to have a body like a celebrity. This prompts them to take larger doses than the dose specified by the specialist, to get huge muscles in a short time, without knowing the side effects of these supplements. Additionally, source of those supplants sometimes are not well known and to somehow the coaches of many gyms may also have lack of knowledge about using those supplants and they may not be someone professional who took courses on nutrition and supplants usages. For the above reasons, we conducted this research to find out the following as mentioned in the objectives.

* 1. **The objectives of this research were:**
1. To find the Reason for using protein supplements among adults attending gyms.
2. This study aims to determine the percentage of young people who benefited from protein supplements and achieved their goals from taking them.
3. To determine the percentage of young people who believe that protein supplements are safe and if they cause any side effects or diseases after taking them.
4. To determine the percentage of consumers who calculate the amount of protein according to their needs.
5. To find out the percentage of young people who had seen side effects because of their protein supplement usage.

# **CHAPTER TWO**

# **LITERATURE REVIEW**

### **Dietary Supplements**

Dietary supplements are sold for a variety of purposes, including nutritional assistance and health promotion, as well as weight loss and athletic performance improvement. These medications are available in pills, tablets, and liquid form, as well as forms that resemble traditional meals or drinks.

Dietary supplements are items that include one or more of the following substances: vitamins, minerals, herbs, botanicals, amino acids, enzymes, organ tissues, glandular, or metabolites (FDA, 2022). They are taken orally and are available in the shape of a tablet, capsule, soft gel, gel cap, liquid, powder, or food item. food supplements are designed to be used when food consumption alone does not provide adequate micronutrient or macronutrient levels (FDA, 2022). Dietary supplements are classified as multivitamin-multimineral (MVM), single vitamin or mineral (SVM), herbal, protein, fatty acid, and weight reduction products (Bailey, et al, 2011). Other than vitamin insufficiency, they are often used to minimize the risk of particular chronic illnesses such as heart disease and cancer, as part of a healthy lifestyle, and to promote sleep or physical performance (Bailey, et al, 2011).

Dietary supplement items are meant to boost the diet when important nutrients cannot be obtained via food alone (FDA, 2022). They, like medications, are often used to promote health and are typically taken in the form of a tablet or capsule (Saldanha, 2005). They are corresponding to food in that they are subject to the same post-market regulation criteria and include components found naturally in food (Gershwin, et al., 2010).

Supplements are unique in that, unlike food, which is necessary for existence, and pharmaceuticals, which keep many people alive, dietary supplements are not required for survival (Quinones, et al. 2013).

* + 1. **Types of Dietary Supplements**

Vitamins, minerals, botanicals, amino acids, fatty acids, and enzymes are some of the ingredients included in dietary supplements. Products are frequently classified for the demographic for which they are intended, with formulations differing according to age, gender, and physiological state (Bellows, et al., 2014). The alleged health purpose of a dietary supplement often determines the kind of product as well as the components it includes (Dickinson, et al., 2014). Oral dietary supplements can take the shape of tablets, capsules, lozenges, gel caps, chewables, powders, or syrups.

* + - 1. **Multivitamins and Mineral supplements**

MVM supplements are dietary supplements that include three or more vitamin or mineral elements; however, not all products are labeled as such (Yetley, 2007). Multivitamin and mineral generally contain all the important micronutrients and provides the recommended daily allowance (RDA) for a certain age and gender. Many people get their vitamins and minerals through their diet, and using MVM on a regular basis might put you at danger of overdosing (Bellows, et al., 2014).

* + - 1. **Weight loss supplements**

Caffeine, Garcinia camogie, guar gum, probiotics, bitter orange, hoodia gardenia, and other substances are presently included in over 400 weight loss products on the market. Increased energy expenditure, increased satiety, reduced fat synthesis, blocked dietary fat absorption, and modulated carbohydrate metabolism are some of the mechanisms proposed for dietary supplements to aid in weight reduction (Saper, et al. 2004).

A thorough assessment of thirty clinical studies, systematic reviews, and meta-analyses found no compelling evidence for most dietary supplements as weight loss aids (Pittler, et al. 2004).

* + - 1. **Herbal Supplements:**

Herbal supplements are botanical supplements that contain a plant or a plant portion such as seeds, leaves, stems, bark, roots, or flowers. Herbal medicines have been used for medicinal therapy since 2800 B.C. in China and have acquired popularity in Western civilization due to supposed health advantages (Sturluson, 2014). They are frequently associated with enhancing brain function and mood elevation, such as relieving depression, boosting energy, assisting with sleep, and lowering stress (Talbott, 2003).

* + - 1. **Regulation of Dietary supplements:**

Understanding the regulatory procedures for dietary supplements can help nurse practitioners (NPs) educate patients about these items. Patients should be urged to select supplements manufactured by nationally recognized food and medication producers who are members of trade associations. For further product information, NPs and patients can contact the manufacturer directly or visit government websites. (Larsen, et al. 2003).

### **Protein Composition:**

Proteins are the most common organic molecules in biological systems, with the widest diversity of activities of any macromolecule. Proteins might be structural, regulatory, contractile, or protective; they can be poisons or enzymes; or they can be transport, storage, or membrane proteins. A biological system's cells may contain thousands of different proteins, each with a distinct purpose. Their architecture and functions differ substantially. They are, however, always polymers of alpha amino acids organized in a linear sequence and linked by covalent connections (Michaela et al 2015).

Alpha amino acids are the primary building blocks of proteins. They have a carboxylic acid functional group and an amine functional group, as their name indicates. The alpha designation indicates that these two functional groups are separated by a single carbon group. In addition to the amine and the carboxylic acid, the alpha carbon is linked to hydrogen and one more group, the amount and length of which might vary (Michaela et al 2015).

Twenty amino acids are employed as protein building components in living organisms.

Whey protein concentrate was the most frequent source of protein, and the majority of goods had 70-80% protein (Michaela et al 2015).

Because of its amino acid concentration (high-strength, branched-chain, and leucine amino acid content) and speed of digestion, whey protein is one of the finest quality proteins. Whey protein has the capacity to boost muscle protein synthesis significantly. In fact, whey protein has been shown to increase muscle protein synthesis more than casein and soy protein. Because of its amino acid concentration (high-strength, branched-chain, and leucine amino acid content) and speed of digestion, whey protein is one of the finest quality proteins. Whey protein has the capacity to boost muscle protein synthesis significantly. In fact, whey protein has been shown to increase muscle protein synthesis more than casein and soy protein.

 (Michaela et al. 2015)

The composition of protein supplements is variable, consisting of previously undescribed components (Morbeck, et al. 2014).

### **2.3 Mechanism of protein Action**

Weightlifters must adhere to two nutrition-related precepts in order to enhance muscular hypertrophy: 1.2-2.0 g protein/kg-1 of body weight and 44-50 kcal.kg-1 of body weight. Researchers studied the impact of protein supplement timing on several physical changes in weightlifters.

Pre- and post-workout protein supplementation improves physical performance, training session recovery, lean body mass, muscular growth, and strength.

Specific increases, however, vary depending on protein type and quantity. According to studies on milk consumption timing, fat-free milk post-workout was efficient in generating improvements in lean body mass, strength, muscular hypertrophy, and reductions in body fat.

The leucine content of a protein source influences protein synthesis and muscle growth. To enhance maximal protein synthesis, 3-4 g of leucine must be consumed (Matthew et al. 2012).

Following resistance training, an optimum supplement should contain whey protein with at least 3 g of leucine per meal. Carbohydrates or glucose should be eaten with a protein supply, as leucine cannot effectively influence protein synthesis in the absence of insulin. This will be the most effective post-workout in enhancing muscle protein synthesis, resulting in increased muscular growth and strength. (Stark, et al. 2012).

In a 2003 study, it was discovered that adding carbohydrates to a carbohydrate supplement increased plasma glucose and insulin concentrations during prolonged exercise, and that adding protein to a carbohydrate supplement increased insulin response to the carbohydrate supplement. They discovered that combining protein with a carbohydrate supplement improved aerobic endurance performance above and beyond what glucose alone did. (Ivy, et al, 2003).

Whey protein supplementation appears to improve body weight, total fat mass, and several CVD risk factors in overweight and obese individuals, according to the findings of a research. (Wirunsawanya, et al, 2018).

Higher amino acid availability after exercise was demonstrated to rapidly boost muscle protein synthesis in a 2004 study of US Marine Corps recruits, but the long-term effect of post-workout protein supplementation on factors such as health, muscle soreness, and function is unknown. Protein Supplementation Reduced Muscle Soreness Immediately After Workout Post-workout protein supplementation may improve not just muscle protein deposition but also health, muscle pain, and tissue hydration following severe exercise. (Flakoll, et al, 2004).

In a study conducted on a majority of obese subjects, a randomized, double-blind clinical experiment was done to investigate the effect of eating supplemental whey protein (WP), soy protein (SP), and carbohydrate isoform (CHO) on body weight and weight composition.

The supplement was taken twice a day as a drink. Participants were not provided nutritional guidance and were free to eat anything they wanted.

Data on body weight and composition were collected on a monthly basis. Dietary consumption was calculated using a 24-hour meal recall collected every 10 days.

Body weight and composition did not change after 23 weeks between groups ingesting SP and WP or SP and CHO; however, the group consuming white phosphorous had 1.8 kg (P< 0.006) and 2.3 kg (P< 0.005) lower body weight and fat mass, respectively, than the group consuming CHO. There was no difference in lean body mass across the groups. When compared to the other groups, those who consumed WP had a reduced waist circumference (P< 0.05). (David et al. 2011).

Different kinds of dietary protein may promote weight reduction and impact body composition in different ways. Dietary guidelines, particularly those emphasizing the significance of dietary protein in weight loss, should also reflect the therapeutic potential of supplementary WP. (Baer, et al, 2011).

**2.4 Types of Protein**

Protein powders are highly concentrated forms of protein derived from animal or plant sources such as dairy, eggs, rice, or peas.

There are three main types: (Jeewanthi, 2015)

* Protein concentrations are made by extracting protein from entire foods with heat, acid, or enzymes. These generally include 60%-80% protein, with the remaining 20%-40% made up of fat and carbohydrates.
* Protein isolates are created by an extra filtration procedure that eliminates more fat and carbohydrates, concentrating the protein even further. Protein isolate powders typically include 90%-95% protein.
* Protein hydrolysates are created by heating the protein further with acid or enzymes, which destroys the links between amino acids (Jeewanthi, et al. 2015). Protein hydrolysates are more readily absorbed by your body and muscles. (Morgan, et al. 2021).

In the case of whey protein, hydrolysates tend to elevate insulin levels more than other forms. This can help with muscle development after exercise. Some powders contain vitamins and minerals, particularly calcium. (Patel, 2015).

These powders, however, do not help everyone. If your diet is already high in good-quality protein, adding protein powder is unlikely to improve your quality of life. Athletes and those who frequently exercise weights, on the other hand, may discover that using protein powder assists enhance muscle building and fat reduction.

Protein powders can also help people who have difficulty achieving their protein needs through diet alone, such as the elderly, the sick, and certain vegetarians or vegans.

* + 1. **Whey Protein**

Whey protein is derived from milk. During the cheese making process, the liquid separates from the curds. It's abundant in protein, but it also includes lactose, a milk sugar that many individuals struggle to digest. While whey protein concentrate includes some lactose, whey protein isolate has relatively little since most of the milk sugar is lost during processing. (Waskiw-Ford, et al. 2020).

Whey digest fast and has a high concentration of branched-chain amino acids (BCAAs). One of these BCAAs, leucine, is important in facilitating recovery after resistance and endurance exercise.

* + 1. **Casein Protein**

Casein, like whey, is a protein present in milk. Casein, on the other hand, is digested and absorbed much more slowly. When casein reacts with stomach acid, it produces a gel, slowing stomach emptying and delaying amino acid absorption in the circulation.

This results in a more gradual and consistent exposure of your muscles to amino acids, which slows the rate of muscle protein degradation. (Boirie, et al. 1997).

* + 1. **Egg Protein:**

Eggs are a fantastic source of high-quality protein. Eggs have the greatest protein digestibility-corrected amino acid score (PDCAAS) of any whole food, which is used to assess the quality and digestibility of a protein.

Eggs are also one of the finest meals for suppressing hunger and keeping you fuller for extended periods of time, especially when coupled with fiber. (Keogh, et al. 2020).

* + 1. **Pea Protein**

This protein powder is extremely popular among vegetarians, vegans, and people who have dairy or egg allergies or sensitivities. It’s produced with yellow split peas, which are high in fiber. It also contains all nine necessary amino acids; however, methionine levels are low. Pea protein contains a high concentration of BCAAs. (Gorissen, et al. 2018).

* + 1. **Hemp Protein**

Another plant-based supplement that is gaining popularity is hemp protein powder. Despite being linked to cannabis, hemp has only trace levels of the psychotropic component tetrahydrocannabinol (THC). (Cerino, et al. 2021).

Hemp is high in omega-3 fatty acids and a variety of important amino acids. It is not considered a complete protein, however, because it contains relatively low quantities of the amino acids lysine and leucine.

* + 1. **Brown Rice Protein**

Brown rice protein powders have been available for a while, but they are typically thought to be inferior to whey protein for muscle growth. Although rice protein includes all the necessary amino acids, it lacks lysine and is thus not called a complete protein. (Gorissen, et al. 2018).

* + 1. **Mixed Plant Protein:**

Some protein powders feature a plant-based combination that contains all the necessary amino acids. Typically, two or more of the following proteins are combined:

* brown rice
* pea
* hemp
* alfalfa
* chia seeds
* flax seeds
* artichoke
* quinoa

Plant proteins digest more slowly than animal proteins, owing to their high fiber content. Although this may not be a concern for many individuals, it might reduce the amino acids available to your body soon following exercise. (Minevich, 2015).

* 1. **Knowledge, Attitudes, and Use of Protein Supplements:**

This study evaluated protein supplement intake among Saudi females and males, as well as the participants' knowledge and attitudes concerning protein supplement use. Cross-sectional research was done in Riyadh utilizing a previously validated, self-administered online survey. The questionnaire had questions about the prevalence, knowledge, attitudes, and practice of protein supplementation. The participants included 354 individuals (58.2% of whom were female). The findings revealed that over 47% of individuals visited fitness centers, with more men (80.3%) than women (41%). Protein supplements were consumed by over half of the individuals, with males (68.7%) consuming more protein supplements than females (35.6%).

The powdered version was the most popular. Protein supplements were utilized by a larger percentage of gym attendees (67.8%) than non-gym attendees (32.2%). Gaining muscle (56.1%) was the most common reason for using protein supplements, followed by correcting for protein deficit (28.6%), with a substantial gender difference.

It was shown that Saudi male participants are twice as likely as females to go to the gym and use protein supplements. Those who went to the gym consumed more protein supplements than those who did not. (Alhakbany et al. 2022).

**2.6Sportsmen’s Attitude towards Dietary Supplements and Nutrition Knowledge**

The goal of this study was to look at the dietary supplementing practices and nutrition knowledge on sport in a group of gym goers. The threshold for adequate nutrition knowledge in sports was established at 60% accurate answers. Almost half of those polled (46.4%) said they used dietary supplements, specifically multivitamins (31.0%), amino acid tablets (29.5%), minerals (29.1%), and protein powders (28.7%).

Supplements were utilized to build muscle (36.7%) and repair muscle (35.1%). Gym trainers were the most trusted source of knowledge on supplement use, especially among men (84%). The accurate answer rate for nutrition knowledge on sport was 57.1%, while the proportion of respondents with a satisfactory degree of nutrition knowledge on sport was 47.3%. Males (61.5%) and respondents with the greatest educational attainment levels (44.5% and 53%) had the highest percentage of right answers.

This study found that non-professional athletes lack adequate nutrition knowledge, and that the gym environment does not assist the spread of accurate information on the importance of supplementing. Given the importance of nutrition for athletes, it is vital to implement initiatives targeted at enhancing the nutritional understanding of gym users and their coaches. (Finamore et al. 2022).

**2.7 Attitudes towards nutritional supplement use amongst adult**

To explore adult gym consumers' opinions regarding nutritional supplements at commercial gyms in Johannesburg North, South Africa. A cross-sectional quantitative design was used on 364 recruited research participants who attended commercial gymnasiums in Johannesburg North, with a self-administered questionnaire.

One hundred fifty users (41%) stated that they 'always' read the information on the labels about the nutritional qualities, advantages, and negative effects of supplements before using them. Three hundred and three consumers (83%) said that the usage of nutritional supplements in gyms is increasing. The internet is the primary source of information for nutritional supplements for 273 (75%) of respondents, while 292 (80%) identified the necessity for gymnasiums to give instructional programs on nutritional supplement intake. Users of commercial gymnasiums are aware of an increase in nutritional supplement use. Many users were unaware of the possible mislabeling and health risks associated with these supplements. (Creanor, et al. 2017).

**2.8 Intake of Nutritional Supplements among People Exercising in Gyms**

The current study aimed to investigate the incidence of nutritional supplement usage and potential influencing variables among persons exercising in gyms in Beirut. In this cross-sectional study, 512 exercisers between the ages of 20 and 50 were chosen at random from gyms. Nutritional supplements were consumed by 36.3% (95% confidence interval 32.2-40.5) of individuals, regardless of the lack of medical supervision. Gender and age differences in supplement consumption were observed. Men and younger exercisers were shown to be more interested in supplements related to performance development and muscle growth, whilst women and older exercisers were more interested in health-promoting items such as vitamins, minerals, and herbal supplements. (El Khoury, 2012).

**2.9 Protein supplementation in strength:**

It is well known that sportsmen and individuals who frequent commercial gyms utilize supplements on a regular and acceptable basis. When opposed to the United States, less is known about protein supplements among persons who exercise in commercial gyms in Italy.

The goal of this study was to look at protein supplementation, either alone or in combination with other supplements, as well as dietary behavior among frequent fitness center attendees in Palermo, Italy. For the initial investigation, information on resistance training was gathered from 800 frequent fitness center visitors. For the experiment, a unique questionnaire was created. Face-to-face interviews were used to obtain data. 30.1% of respondents utilize nutritional supplements during training because they feel it is the "best way to gain muscle and strength." Whey protein smoothies (50.0%) combined with creatine and amino acids (48.3%) were the most popular among consumers (Bianco, et al. 2011).

**2.10. Prevalence of protein supplement use at gyms**

At the moment, the abuse of all types of sport nutritional supplements has spread to those who attend gyms on a daily basis. Protein Powder Supplements are among these compounds. The goal of this study is to look at the usage of Protein Powder Supplements in 415 people from fitness establishments in Seville, Spain. All subjects were examined using anthropometric measures and completed a previously approved questionnaire, which assessed the validity of the content, application, structure, and presentation. Protein Powder Supplements were utilized by 28% of those polled. Males made up 42.7% of the total, while females made up 3.2%.

The overall number of people who go to the gym and use Protein Powder Supplements far exceeds the RDA of protein for the general population and/or athletes, which can lead to health concerns. (Sanchez-Oliver et al. 2011).

**2.10.1 Patterns of the Use of Protein Supplements:**

Protein supplementation is becoming more popular among gym goers throughout the world. They evaluated the incidence and patterns of protein supplement use among Saudi gym users in this study, comparing variations in protein supplement consumption between medical students and the general population. They also assessed the groups' knowledge and attitudes on the possible risks and dangers of protein supplement usage. This was a 6-month cross-sectional research done in Riyadh, Saudi Arabia. Subjects were recruited at random from big gyms in Riyadh and split into medical students against the general gym-going community.

 Participants completed a self-administered questionnaire on protein supplements. It investigated the incidence and patterns of protein supplementation, as well as the amounts, varieties ingested, and general awareness regarding protein supplementation. (Alhekail et al. 2018).

The research involved 185 people in total, with 39% of them consuming protein supplements. Protein usage did not differ substantially between medical students and the general population (P>0.05). "Whey" protein was the most widely utilized protein supplement among protein supplement users (91% of medical students and 85% of the general population, respectively).

9% of medical students used more than the daily recommended amount (2 g/kg/day), compared to 28% of general population gym goers (P>0.05). (Alhekail et al. 2018).

**2.11. Perception of Dietary Supplements among Gyms:**

Dietary supplements (DSs) are commonly utilized in gymnastics worldwide to promote health, preserve energy, and boost strength. Consumers, on the other hand, should be aware with the necessary understanding regarding the advantages and hazards of these supplements. To assess the perception and prevalence of dietary supplements among Gymnastics users in the city of Nasiriyah..

The study was a pilot descriptive cross-sectional survey of 150 Gymnastics athletes, including boys (n = 75) and ladies (n = 75). The data was statistically examined, with a "p value 0.05" considered statistically significant. The majority of dietary supplement information was obtained from untrustworthy sources. The reason for using DSs varied substantially across men and women and was tied to social and demographic characteristics. (Sakr, et al. 2021).

**2.12. Use of Nutritional Supplements Among Gym Clubs Participants:**

The purpose of this study is to determine the nutritional and dietary supplement intake of gym members in Sulaymaniyah, Iraqi Kurdistan. The findings of this study are based on the replies of one hundred gym members (aged 18 and above) to a self-administered questionnaire. Almost half of those polled said they used nutritional supplements and hormones. Thirty percent of the individuals consumed various protein powders. The majority of dietary supplement consumers had some negative effects.

Fitness supplements are widely used, and many consumers are unaware of the possible implications or hazards of unsupervised practice or unprescribed products. (Mahmood. et al. 2021).

**2.13 Knowledge of the Effect of Synthetic Proteins on The Overall Heal Overall Health**

The study's goal was to measure gym visitors' understanding of the impacts of protein drinks on their health. A descriptive cross-sectional study with a self-administered questionnaire was carried out. Data were gathered in two methods using a self-administered questionnaire. The first strategy was to send Google form links to contacts on social media (WhatsApp, Facebook, Instagram, and Twitter) in both English and Arabic. A questionnaire was also produced and given to four different gyms in Beirut.

The bulk of participants (66.9%) were men. The results reveal that individuals were unaware of the negative consequences of protein shake drinking. Only 61.4% were aware of renal issues, 33.7% were aware of its influence on blood pressure, 38% were aware of its effect on breast augmentation, and only 10% were aware of its effect on fertility. In conclusion, this study offered information on gym visitors' knowledge base about the use of protein shakes. (Al shoufi, et al. 2022).

**2.14 Frequency and Causes of Consuming Sports Supplements**

This study was conducted to explore the frequency and reasons of supplement intake, as well as the negative effects associated with supplement consumption among bodybuilders in Kermanshah City. This cross-sectional study included teens and young adults who were members of fitness facilities in Kermanshah City. Using basic random selection, 244 people were chosen as samples. A four-sectioned questionnaire created by the study team was utilized to collect the necessary data.

Most bodybuilders in the survey (95.3%) utilized supplements. Bodybuilders typically utilize 37 different types of sports supplements. The supplements are ranked as follows: vitamin C, Creatine, vitamin E, multivitamin, and iron. The most common motivations for using sports supplements were to gain muscle, increase energy, and improve athletic performance. There is a substantial difference in knowledge of the psychological and sexual side effects of ingesting sports supplements between male and female athletes (P0.05). In general, athletes have a low degree of comprehension and knowledge about the adverse effects of using sports supplements. (Baharirad, et al. 2019).

The purpose of the paper is to analyze gym members' attitudes, use, reasoning, and influence on commercial supplements. The information was gathered using a questionnaire and an interview. For the current study, a total of 220 respondents in their early adulthood (19-30 years old) were considered. The data collecting approach is based on primary data. Purposive sampling was employed as a sample strategy.

According to the poll, many respondents consumed commercial supplements, the majority of whom were male respondents, for purposes such as maintaining fitness, developing muscle, and decreasing body fat. They felt a greater positive influence than a negative impact. (Talat, et al. 2023).

**2.15 Negative side effects of using protein supplementations:**

Protein powder supplements are now popular. They certainly have advantages; they assist the body in meeting its daily protein requirements. And in a handy manner, at that. However, taking too many protein supplements might be harmful; thus, we wanted to focus a light on the side effects that might follow if there would be an excessive intake of the protein supplementation. These are the most frequent side effects seen with excessive intake:

**2.15.1 Hair Loss**

‘Whey protein’ is also known to boost testosterone levels, which produces a chemical called DHT in the bloodstream. This chemical can often cause hair loss. (Yadav, 2023)

**2.15.2 Can Lead to Acne**

The hormone IGF-1, or insulin-like growth factor, is known to be increased by whey protein. Excess protein consumption can increase sebum production, which can contribute to acne. (Yadav, 2023).

**2.15.3 Digestive System Discomfort**

Excess protein or arginine consumption is known to produce gastro-intestinal discomfort owing to mucosal cell NO production. (Wu, 2016).

**2.15.4 Causes Weight Gain**

Protein supplements, when consumed in excess, can induce weight gain. Unused calories are converted to fat when the training routine does not correspond to the protein intake. This fat accumulates day by day, leading you to gain weight quickly. (Yadav, 2023).

**2.15.5 Kidney Problems**

The effect of high protein diets in kidney stone production has gotten a lot of attention. Excess protein consumption promotes excretion of potentially lithogenic substances including calcium and uric acid. A high protein diet for six weeks was linked to aciduria and urine calcium, and it was stated that this increased the chance of stone formation. (Martin, et al. 2005).

**2.15.6 Hormone Disruption:**

When it comes to soy-based protein supplements, the main concern is hormonal disturbance. Soy is high in important amino acids, but it is also high in phytoestrogen. When consumed, phytoestrogen mimics the estrogen hormone and can throw the endocrine system into a tailspin. Genetically modified soy is utilized in the production of 95% of protein supplements. Glyphosate, a toxin found in genetically engineered soy, is responsible for hormone instability, miscarriage, and even birth abnormalities in babies.

Soy contains daidzein and genistein, which can cause erectile dysfunction, decreased libido, and larger breasts in males. (Yadav, 2023).

**2.15.7 Harm the liver:**

A diet high in protein supplements and low in carbohydrates can induce ketosis, a state in which the body uses fat as its major source of energy. This causes excessive amounts of blood acidity.

High blood acidity is known to affect liver function and can lead to serious liver problems. Excess 'whey protein' consumption without exercise can also cause liver inflammation and raise the risk of significant liver damage. (Yadav, 2023)

**2.15.8 Dehydration:**

According to research, high-protein diets might cause dehydration. This is why those who follow a high-protein diet must drink plenty of water. Protein is essential. It is the foundation of life. However, taking too much of it is not recommended. (Yadav, 2023).

**CHAPTER THREE**

**MATERIALS & METHODOLOGY**

**3.1. Methodology:**

This questionnaire survey study conducted among male athletes attending gyms during the period from February through April 2023, in many gyms in Erbil City.

Usually, those gyms or fitness centers are halls containing several sports equipment and tools used by exercisers and supervised by experienced athlete and/ or coach.

The coach is usually one of the athletes who had previous experience and is responsible for providing the training services to the attendees of these gyms, prescribing the types and doses of the supplements to the gym’s members, and manage all the other administrative aspects. The services that are provided to these athletes include: sports instruments, equipment, information, training courses, and purchasing supplements to gym participants.

An anonymous self-administered questionnaire form had been developed that includes demographic and other factors that show the current situation and attitude of the participants towards protein supplements.

**3.2. Structure of the questionnaire**

The questionnaire used in this study was developed based on a review of the literature and after an in-depth reading of scientific papers (Sulaiman et al. 2013). (Margaret et al. 2008). (Khadije et al. 2022) However, some of the questions were new questions and part of the questions and formed and modified based on the purpose of the study. All questions were directly or indirectly relevant to the objectives of this study, and all choices presented in the multiple questions were kept relevant.

**3.3. Study Design:**

This study was a semi quantitative research with the main aim to investigate of the percentage of protein supplement consumption among male athletes.

The questionnaire is part of a graduation project undertaken by students of the Department of Nutrition and Dietetics, Cihan University-Erbil. This survey aims to investigate knowledge, attitudes and consumption rates of protein supplements among athletes in Erbil - Kurdistan Region of Iraq.

**Inclusion and exclusion criteria:**

* **The Inclusion standard for this study include:**

1. Male between 18-35 years.

2. Who go to gyms.

3. Who consume protein supplements.

* **The Exclusion criteria for this study were as follows:**
1. Male below 18 and over 35 years.
2. Male who do not go to gyms.
3. Men who do not consume protein supplements.
4. Female.

**3.3.1. Setting of the study:**

This study was conducted within the gyms of Erbil City with participants who were aged from 18-35 Years old.

**3.3.2. Sample of the study:**

The sample was selected from the young people who go to gyms in Erbil and consume protein supplements.

**3.3.3. Sample size:**

300 samples of young people who attend sports clubs and consume protein supplements were randomly selected, between the ages of 18-35 years, from 1/3/2023 to 1/4/2023.

**3.4. Tools of data collection:**

The study use questionnaire to collect data and consists of Two Sections:

**Section 1:** Socio-demographic information (7 question) include age group, employment status, weight, height, the level of education.

**Section 2:** It includes 22 questions about the consumption of protein from food and about the use of protein supplements, and questions about awareness about its consumption and side effects, and about the presence of side effects when using it and the purpose of its consumption, and who prompted him to use protein supplements, about exercise and the effort he puts in. And if he has reached his goal or not.

**3.5. Questionnaire details:**

At the start of the questionnaire, all respondents were filled in with brief demographic information based on gender, age groups, education level, income rate, and employee status.  In fact, only male gym-goers aged 18-35 who consumed protein supplements were allowed to contribute as respondents, and thus their opinions were drawn through this study.

The questionnaire paper contained 22 questions, some were open questions, and most were closed questions.

**3.5.1. Pilot test:**

A pilot test was done with ten participants who were professional in survey design and have given us some feedback we received and there were some questions were not clear, and ambiguous, some new questions were added, correction of some questions was done to make the questionnaire as clear as possible for the participants to understand. In addition, few questions were amended and add different options.

**3.5.2. Ethical approval:**

This questionnaire was approved by the Department of Nutrition and Dietetics at the College of Health Technology, Cihan University- Erbil. Privacy and ethnical consent form was considered and the respondents were given a consent (see appendix A) form with the right to participate (or not) in the study without introducing their names.

### **3.6. Statistical Analysis of Data**

The SPSS program, version 24 was used to analyze the results. The results were expressed as mean ± SD (standard deviation) or proportion. Categorical variables were compared using Chi-square (X²) tests. P - Value equal to or less than 0.05 was considered to be statistically significant.

**CHAPTER FOUR**

**RESULTS & DISCUSSION**

**4.1 Data Analysis**

The questionnaire was unloaded and analyzed through the statistical program SPSS, relying on the use of the following statistical tools:

* Median, standard deviation.
* Cronbach's alpha test to determine the stability of the questionnaire items.
* Kolmogorov-Smirnov for testing normality.
* Correlation matrix
* Chi-X2 for test.

**4.2 The demographic analysis and discussion**

The personal characteristics of the respondents according to age group and educational attainment, whether the respondents have a job or not, and the type of their job can be represented through this table:

**Table 4.1: Demographic characteristics and training frequency of the study sample**

|  |  |  |
| --- | --- | --- |
| Items | Frequency | Percentage (%) |
| A) Age18\_2526\_3031\_35 | 15710835**Total :300** | 52.336.011.7**Total :100** |
| B) Level education Less than high SchoolHigh schoolCollege | 2141238**Total :300** | 7.013.779.3**Total: 100** |
| C)Have a jobYes NoStudent | 1756065**Toatal:300** | 58.320.021.7**Total:300** |
| D) type of jobOfficeFieldother | 7936185**Total:300** | 26.312.061.7**Total:100** |
| E)The jobTeacherDriverData entryOther | 81325254**Total :300** | 2.74.38.384.7**Total:100** |

This means that the percentage of respondents by age group was 52.3% for the category (18-25), 36.0% for the category (26-30), and 11.7% for the category (31-35).

The percentage of Level of education was 7.0% for less than high school, 13.7% was High school, and 79.3% was College.

As for the statistical description of those who have a job among the respondents, it was 58.3% for those who have jobs, 20% do not have a job, and 21.7% were student respondents.

The percentage of job type gave a result of 26.3% for Office, 12.0% for Field, and 61.7% for other.

The percentage of respondents' job, 2.7% was Teacher, 4.3% was Driver, 8.3 was Data entry, and 84.7% was Other.

Figure (4.1): Pie chart it shows the ratio of age group.

Figure (4.2): Bar chart it shows the frequency of Level of education

Figure (4.3): Pie chart It shows the ratio of respondents who have a job or not.

Figure (4.4): Pie chart it shows the ratio of Type of job for respondents.

Figure (4.5): Pie chart it shows the ratio of the job for respondents.

Figure (4.6): Pie chart it shows the ratio of the Reached the goals.

 Figure (4.7): Pie chart it shows the brand protein name.

There are many brands of protein supplementation, and There are varying proportions in the use of the types of protein supplements, Most of the Participants used to use a mass protein supplement, so it was the owner of the largest percentage, and it comes after the Olimp and gold protein supplement, and the rest of the brands vary in a few percentages.

**4.3 Reliability statistic test for resolution (consistency)**

In this part, the Cronbach alpha coefficient is found, which is a measure or indicator of the reliability and truth of the test (resolution). The following table shows the value of Cronbach's alpha coefficient:

Table (4.2): The Cronbach coefficient is shown for the questionnaire.

|  |  |
| --- | --- |
| Number of items | Cronbach’s alpha |
| 21 | 0.228 |

We note that Cronbach's coefficient is less than 0.6, which means that there is no consistency in this data, and the reason for the large sample size used in this research may be the problem of showing this result.

**4.4 Test of normality**

We can be known if the data distribution is normal or not by Kolmogorov-Smirnov Test, the test of normality makes us know which test to use to analyze the data Therefore, we put two hypotheses for this test:

H0: the data is distributed normally.

H1: the data isn’t distributed normally.

This test was carried out at a level of significance of 5%, and these results are summarized in the following table:

**Table (4.3) : adults attending gyms in Erbil City Test of normality by Kolmogorov-Smirnov Test**

|  |  |
| --- | --- |
| Vertebrae Questionnaire | Kolmogorov-Smirnov |
| Age groups | 0.000 |
| Weight | 0.007 |
| Height | 0.000 |
| What is your highest level of education? | 0.000 |
| Do you have a job? | 0.000 |
| If you have, what is the type of your job? | 0.000 |
| What is your job? | 0.000 |
| Protein source for you is | 0.000 |
| Do you take protein supplement | 0.000 |
| What do you think about the safety of protein supplements consumption | 0.000 |
| From where have you received information regarding the use of protein supplement | 0.000 |
| What is your goal for protein consumption | 0.000 |
| Where do you usually buy your protein supplement | 0.000 |
| What brands of protein do you use? Please write name | 0.000 |
| What types of Protein do you use | 0.000 |
| How long you have been use protein supplement | 0.000 |
| Do you calculate your protein need regarding your exercise | 0.000 |
| Who calculate your needs | 0.000 |
| Usually, what time do you use Protein | 0.000 |
| How frequently do you have/ consume protein | 0.000 |
| Protein dose/ quantity | 0.000 |
| The amount of water you consume dilly | 0.000 |
| Do the protein supplements increase the amount of exercise you can undergo | 0.000 |
| After protein supplements consuming you feel | 0.000 |
| Does the consumption of protein supplements cause you any diseases | 0.000 |
| What type of exercise does often do | 0.000 |
| You feel that supplements help you | 0.000 |
| Did you Reached your goals | 0.000 |

We note from the following table that the abnormal distribution of all the contents of the questionnaire, which means rejecting the null theory and accepting the alternative theory, this statement confirms the P-value, which is less than the significant level 5%.

**4.5 Analysis using averages:**

We use averages to find out what the respondents' answers ranged from. In this case, we use the median, because the median may be more useful than the mean when there are extreme values in the data set as it is not affected by the extreme values, like our data.

**Table (4.4): adults attending gyms in Erbil City median and standard deviation**.

|  |  |  |
| --- | --- | --- |
| Vertebrae Questionnaire | Median | Std. D |
| Age groups | 18-25 years | 0.690 |
| Weight |  80.00 | 12.481 |
| Height | 175.00 | 8.840 |
| What is your highest level of education? | college | 0.584 |
| Do you have a job? | yes | 0.817 |
| If you have, what is the type of your job? | other | 0.870 |
| What is your job? | Other | 0.660 |
| Protein source for you is | All above | 1.344 |
| Do you take protein supplement | Yes | 0.215 |
| What do you think about the safety of protein supplements consumption | safe | 0.794 |
| From where have you received information regarding the use of protein supplement | Expertise/coach | 0.742 |
| Who recommend you to take protein supplement | Professional coach | 0.745 |
| What is your goal for protein consumption | Muscle building | 0.736 |
| Where do you usually buy your protein supplement | Fitness store | 0.840 |
| What types of Protein do you use? | Whey protein | 0.366 |
| How long you have been use protein supplement | 3-12 month | 0.587 |
| Do you calculate your protein need regarding your exercise | Yes | 0.419 |
| Who calculate your needs | Coach | 0.556 |
| Usually what time do you use Protein | After exercise | 0.584 |
| How frequently do you have/ consume protein | Daily | 0.725 |
| Protein dose/ quantity | 2 scoop | 0.869 |
| The amount of water you consume dilly | 8 cup | 3.619 |
| Do the protein supplements increase the amount of exercise you can undergo | Yes | 1.056 |
| After protein supplements consuming you feel | Non | 1.254 |
| Does the consumption of protein supplements cause you any diseases | Non | 1.070 |
| What type of exercise does often do | Body building | 0.962 |
| You feel that supplements help you | Muscle building | 0.521 |
| Did you Reached your goals | Need more time | 0.896 |

The averages show us the average of typical responses to the survey questions, where this table show of the first question (age groups) was 1, which means that most of the respondents are from the age group 18-25.

For the second question (weight), the median was 80, which is the average weight of the respondents.

**4.5 The Descriptive analysis and discussion**

 Table (4.5) Descriptive analysis data

|  |  |  |
| --- | --- | --- |
| The question  | Frequency  | Percentage  |
| 1-Reached the goalsYes No Need more time  | 9139170 | 30.313.056.7100% |
| 2- protein source for you Meat &ChickenEgg & Dairy productsLegumesAll above  | 86467161 | 28.715.32.353.7100% |
| 3- Their idea of a protein supplement.Safe Not safe No idea  | 2172657 | 72.38.719.0100% |
| 4-Who recommend you to take protein supplement?Family/friendProfessional coachesPhysiciansOthers  | 691882518 | 2362.78.36100% |
| 5-The goal of protein consumption MuscleAttractive lookSport competition Else | 16999266 | 56.3338.72100% |
|  6- Buy protein supplement.PharmacyOnline storeStreet shopFitnessOther | 1425362232 | 4.78.312.074.30.7100% |
| 7-the type of protein supplement Egg proteinWhey protein Other | 21260 19 | 786.76.3100% |
| 8-Duration of using protein supplement.Less than 3 month Between 3-12 month More than 1 year  | 9118326 | 30.3618.7100% |
| 9-the calculation of the protein needed.Calculate Don’t calculate  | 23268 | 77.322.7100% |
| 10-who calculate the need.YourselfCoachApplication | 7619925 | 25.366.38.3100% |
| 11-the time to use protein supplements.Before exercise After exercise During exercise | 9218325 | 30.7618.3100% |
| 12-The Consume protein frequently.Daily Twice a week Weekly Rarely | 20767188 | 6922.362.7100% |
| The protein dose (Scoop).1 Scoop2 Scoop3 Scoop4 Scoop 6 Scoop 8 Scoop  | 56171511711 | 19.757175.70.30.3100% |
| 13-Does protein supplementation increases the amount of exercise.Increase Doesn’t increase Little increase No effect  | 171534333 | 5717.714.311100% |
| 14-symptoms after taking protein supplements.Thirst Headache Abdomen pain NON | 634519173 | 21156.357.7100% |
| 15- Protein causes you diseases.Kidney stones Digestive disordersSensitive Non  | 382031229 | 12.76.74.376.3100% |
| 16- type of exerciseWeight liftingAerobic exerciseBodybuilding Other | 96171789 | 325.759.33100% |
| 17- How protein supplement helps you.Muscle building fill the need no alternative | 2355312 | 78.3 17.7 4100% |
| 18- Where have you received information regarding the use of protein supplement?Academic classExpertise/coachWebsite/social media | 58123119 | 19.341.039.7100% |

This table shows the percentage of who reached goal 30.3%, and percentage of who did not reached the goal 13.0%, and percentage of who need more time 56.7 %.

The average of this question (Protein source), the median was (4), which mean is the most of the respondent are (all above). Which is 53.7% and legumes 2.3%, meat and chicken 28.7%, egg and dairy product 15.3%.

For (Their idea about a protein supplement), the median was (Safe), which mean is the average their idea of a protein supplement respondent. 72.3% safe, 8.7 % not safe, 19 % have no idea.

For (who recommend you to take protein supplement), the median was (professional coaches), which mean is the average recommend to take protein supplement of the respondents.23 % family /friends, 62.7 % professional coaches, 8.3 % physicians, 6% other.

For (the goal for protein consumption) the median was (muscle strengthening and body health), which mean is the average their goal for protein consumption of the respondents. 56.3 % muscle strengthening and body health, 33% for attractive look, 8.7 % for sport, 2% another reason.

For (from where usually buy protein supplement) the median was (Fitness), which mean is the average of the respondents. 4.7 % pharmacy, 8.3 % online store, 12% street shop, 74.3% fitness store, .7% other.

For this question (the type of protein supplement) the median was (Whey protein), which mean is the average of the respondents 86.7%, for (Egg protein) 7% and (another type)) 6.3%.

For this question (Duration of using protein supplement) the median was (3 – 12 months), which mean is the average of the respondents 61%, for less than 3 months 30.3%, for More than 1 year 8.7%.

For this question (the calculation of the protein needed) the median was (Calculate), which mean is the average of the respondents 77.3% and for not Calculate 22.7%.

For this question (who calculate the need) the median was (Coach), which mean is the average of the respondents 66.3%, 25.3% for themselves and 8.3% by Application.

For this question (the time to use protein supplements) the median was (After exercise), which mean is the average of the respondents 61%.

‏For this question ( the time to use protein supplements) the median was (After exercise), which mean is the average of the respondents (61%) ,and Before exercise(30.7%), and During exercise (8.3%) . ‏For this question (The Consume protein frequently.) The median was (Daily), which mean is the average of the respondents (69%), twice a week (30.7%), weekly (6%), rarely (2.7). ‏For this question ( The protein dose (Scoop) ) the median was (2 Scoop), which mean is the average of the respondents (57%) , 2 Scoop (19.7%) , 3 Scoop (17) , 4 Scoop (5.7%) , for Scoop (6,7) it was the same result (0.3%) . ‏For this question (Does protein supplementation increases the amount of exercise.) The median was (Increase), which mean is the average of the respondents (57%), doesn’t increase (17.7%), little increase (14.3%), No effect (11%).

For this question (symptoms after taking protein supplements) the median was (none), which mean is the average of the respondents (57.7%), Thirst (21%), Headache (15%), Abdomen pain (6.3%). ‏For this question ( Protein causes you diseases ) the median was ( non ), which mean is the average of the respondents (76.3%) , Kidney stones (12.7%) , Digestive disorders (6.7%) Sensitive(4.3%) .

 For (How protein supplement helps you.) The median was (Muscle building), which mean is the average of the respondents 78.3‎%‎.

For (type of exercise) the median was (Bodybuilding), which mean is the average of the respondents 59.3%.

For (received information regarding the use of protein supplement) the median was (Expertise/coach), which mean is the average of the respondents 41.0%.

**4.7Testing independent**

We can know if the data is independent or not by chi-square test. The test between the first variable is (How long you have been using protein supplement?), The second variable is (Did you reached your goals?), To see if there was an independent relationship between how long the respondents took the protein and their ability to achieve their goals, or there was no independent relationship, but rather an orthogonal one. Therefore, we put two hypotheses for this test:

H0: The first variable with the second variable is independent.

H1: The first variable with the second variable is dependent.

This test was carried out at a level of significance of 5%, and these results are summarized in the following table:

Table (4.6):adults attending gyms in Erbil City Chi-Square Test and Correlation

|  |  |
| --- | --- |
| Chi-Square Test | P-value |
| Pearson Chi-Square | 0.000 |
| Correlation |  |
| Pearson’s R | 0.000 |
| Spearman Correlation | 0.000 |

The chi-square test shows that there is a relationship between the two variables, which means that we reject the zero theory and accept the alternative theory that confirms the existence of a relationship between the two variables, which means that they are dependent. In other words, this test indicates that the time taken by the respondents was effective in achieving their goal. Since the P-value is below the 5% significance level, and this basis, we rejected the zero theory.

Figure (4.8): Bar chart It shows the relationship between the two variables.

We conclude from this test that most of the respondents were those who took protein from 3 months to 12 months, and most of them needed more time than this to reach their goals. As for the respondents who took the protein for more than a full year, we note that nearly half of the number achieved their goals, and nearly the other half still wanted more time to reach their goal.

Another test, a test between the first variable (What do you think is the safety of consuming protein supplements?), and the second variable (age groups), to see if there is an independent relationship between the age groups and the respondents' belief that protein use is safe or not. So, we developed two hypotheses for this test:

H0: The first variable with the second variable is independent.

H1: The first variable with the second variable is dependent.

This test was carried out at a level of significance of 5%, and these results are summarized in the following table:

Table (4.7): adults attending gyms in Erbil City Chi-Square Test and Correlation

|  |  |
| --- | --- |
| Chi-Square Test | P-value |
| Pearson Chi-Square | 0.570 |
| Correlation |  |
| Pearson’s R | 0.679 |
| Spearman Correlation | 0.801 |

The chi-square test shows that there is no relationship between the two variables, which means that we accept the zero hypothesis and reject the alternative hypothesis, which means that they are independent. In other words, this test indicates that the age group does not influence the respondents' beliefs. Since the P-value is greater than the 5% level of significance, on this basis, we have rejected the zero theory.

Figure (4.9): Bar chart it shows the relationship between the two variables.

We concluded from this test that most of the respondents are in the age group (18-25) and come after (26-30), and most of them believe that the use of protein is safe. We note that a small group of respondents think that the use of protein is unsafe, and most of them belong to the first category (18-25).

Another test, a test between the first variable (What do you think is the safety of taking protein supplements?), and the second variable (What is your highest level of education?), to see if there is an independent relationship between the respondents' educational level and the respondents' belief that protein use is safe or not. So, we developed two hypotheses for this test:

H0: The first variable with the second variable is independent.

H1: The first variable with the second variable is dependent.

This test was carried out at a level of significance of 5%, and these results are summarized in the following table:

Table (4.8): adults attending gyms in Erbil City Chi-Square Test and Correlation

|  |  |
| --- | --- |
| Chi-Square Test | P-value |
| Pearson Chi-Square | 0.005 |
| Correlation |  |
| Pearson’s R | 0.023 |
| Spearman Correlation | 0.218 |

The chi-square test shows that there is a relationship between the two variables, which means that we reject the null hypothesis and accept the alternative hypothesis. In other words, this test indicates that the educational level of the respondents influences the beliefs of the respondents about whether a protein is safe.

Since the P-value is below the 5% significance level, and on this basis, we rejected the zero theory.

Figure (4.10): Bar chart it shows the relationship between the two variables.

We concluded from this test that most of the respondents are in the age group (18-25) and come after (26-30), and most of them believe that the use of protein is safe. We note that a small group of respondents think that the use of protein is unsafe, and most of them belong to the first category (18-25).

**4.8 Research Discussion**

We have reached the end of this research with several results, which we will address through the following points:

The results of the research show that the main motivation or the main reason for using protein supplements for young people who visit sports clubs in Erbil is to obtain a muscle mass by (56.3%), while the result of another research in Saudi Arabia related to protein supplements in 2022 shows that the biggest motivation for consuming protein supplements for young athletes in Saudi Arabia is to correct the protein deficiency (28.6%) (Alhakbany et al. 2022), Table (4.5)

While another study in Jordan conducted 2022 showed that the main goal of using protein supplements to improve public health is 41.3% (Mai et al .2022).

Also, the results of the research showed that 61% of the participants consumed protein supplements after exercise, while 8.3% consumed protein supplements during the exercise compared to the result of a study conducted in Palermo in. That 30.1% of the participants consumed protein supplements during training because they feel that the best way to gain muscle and strength (Bianco, et al. 2011). Table (4.5).

The results of the research showed that 86.7% of the participants use whey protein, because it is the most common and available type and the most recommended coaches. This is similar to studying in Saudi Arabia, Riyadh in the year 2018. Most of the participants used to use whey as one of the pioneers of gyms (Othman et al .2018). Table (4.5).

The result of our search showed that the bulk of participants uses a regularly 69% protein supplements due to the cancer tips and not 77.3% are calculating their daily protein and 66.3% coach from the account their need scientifically (Table 4.5). This is similar to the results of another study in Jordan 2022, where 63.3% of the participants used the protein supplements regularly (Mai et al 2022). And in another result of a study they found that their purposes of taking protein supplements to maintain physical fitness and muscle growth, and reduce body fat (Maria et al. 2023). (Table 4.5), Figure (4.10).

The results of the search showed that their belief on protein supplements it was safe for use by 72.3% and the percentage of people who did not suffer from any diseases due to protein supplements were 76.3% of participants. The results showed the group was between 18 \_25 years believing consumption of security protein supplements, while the age group 26\_30 years have no idea about the safety of protein components and the category 31\_35 were uneven among it is safe and for a lab they have about the safety of supplements The protein has also shown the search results that with a school achievement without the majority did not have an idea of the safety of protein supplements by while school graduates and universities believe a great proportion. This is close to the result of the study of Jordan 2022 it is 59.8% of the participants believe that consumption of protein supplements is safe and does not cause any diseases because most of the participants with collectors are 54.2% (Mai et al.2022).

While the results of another study in Lebanon 2022 showed that the largest part of the male participants were not aware of the negative consequences of drinking protein supplements (Al shoufi et al 2022). (Table 4.5), Figure (4.9)

The study showed that there are no symptoms after using protein supplements at 57.7%, which is similar to a study conducted in Jordan 2022, where the majority of subscribers did not show any symptoms or complications after consumption of protein supplement (Mai et al.2022). (Table 4.5).

The study shows that the majority of respondents get their information about protein supplements from athletic trainers with a percentage of 41%. ...While a study conducted in Johannesburg north showed that the internet is the main source of information regarding protein supplements (x mc creanor et al .2017). (Table 4.5),

And another study in Jordan in 2022 showed 37.4% of the participants, their information was about supplements from the coach in the gym. (Mai et al.2022)

While the results of another study conducted in the city of Nasiriya (2021) in southern Iraq showed that the majority of consumers of protein supplements had their information about protein supplements from unreliable sources (Farouk et al. 2021).

The result of the research showed that most of those who used protein supplements were for a period of 3-12 months, and that those who achieved their goal was because they used protein supplements for a period of 3-12 months on a regular basis. Figure (4.8) (Table 4.5).

**CHAPTER FIVE**

**CONCLUSION, LIMITATION AND FUTURE WORK**

* 1. **Conclusion**

The study concluded from our research that the age groups we targeted aim to build muscle and maintain their health, and that large numbers of them have achieved their goal of obtaining what they aspire to from an attractive and harmonious body and suitable muscle mass.

We also conclude that the participants in the research with certificates have a safe view of protein supplements, as they consult their sports coach when consuming protein supplements, and that the majority do not have any symptoms or health problems when consuming protein supplements.

The largest percentage of the participants were calculating their daily protein requirement, and the sports coach was calculating the majority of the participants and they received information regarding the use of protein supplement from the coach.

In the end, knowledge, the academic and cultural level has positive aspects on the way to use protein supplements in a safe way and to avoid its harms and drawbacks.

## **Limitations of the study**

* The difficulty of obtaining permits from sports clubs in order to allow filling out the questionnaire.
* Most of the people were unable to fill out the questionnaire because of their limited time in the gym.
* Many of the athletes were not fluent in the English language, which made us difficult to fill out the questionnaire
* The lack of research and Arabic sources similar to our research, which made it a challenge for us while working on this study.
* We were unable to fill out more than 300 questionnaires due to time constraints.
* Because of our choice of male class exclusively in the research we had trouble entering the men’s gem.

## **Recommendations**

* We wanted to try and be adventurous in this research because we do not see such a topic in Erbil and we would like to open the opportunity to the speakers, this topic may be a good choice for them and it is possible to choose a topic that opens new ideas and horizons for researchers important for study.
* We hope that future studies include women who are consume protein supplementation and attend the gym.
* Cast studies should include greater numbers of participants from men and women.
* Cast studies should include age group >35 year.

**CHAPTER SIX**

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* *Supplemental Protein in Support of Muscle Mass and Health: Advantage Whey*

*Michaela C. Devries and Stuart M. Phillips 2105.*

**الخلاصه**

نستنتج من بحثنا أن الفئات العمرية التي نستهدفها تهدف إلى بناء العضلات والحفاظ على صحتها ، وأن أعدادًا كبيرة منهم قد حققوا هدفهم في الحصول على ما يطمحون إليه من جسم جذاب ومتناغم وكتلة عضلية مناسبة.

 كما نستنتج أن المشاركين في البحث بشهادات لديهم نظرة آمنة لمكملات البروتين ، حيث يستشيرون مدربهم الرياضي عند تناول مكملات البروتين ، وأن الغالبية لا تظهر عليهم أي أعراض أو مشاكل صحية عند تناول مكملات البروتين.

 كانت النسبة الأكبر من المشاركين تحسب متطلباتهم اليومية من البروتين ، وكان المدرب الرياضي يحسب غالبية المشاركين.

 في النهاية المعرفة والمستوى الأكاديمي والثقافي له جوانب إيجابية في طريقة استخدام مكملات البروتين بطريقة آمنة وتجنب أضرارها وعيوبها.

**پوختە**

ئێمە لە توێژینەوەکەمانەوە دەگەینە ئەو ئەنجامەی کە ئەو گروپە تەمەنانەی کە کردمانە ئامانج ئامانجیان بنیاتنانی ماسولکە و پاراستنی تەندروستی خۆیانە، هەروەها ژمارەیەکی زۆریان ئامانجەکەیان بەدەستهێناوە کە ئاواتەخوازن لە جەستەیەکی سەرنجڕاکێش و هاوسەنگ و بارستەیەکی ماسولکەیی گونجاو

 هەروەها دەگەینە ئەو ئەنجامەی کە بەشداربووانی توێژینەوەکە بە بڕوانامە ڕوانگەیەکی سەلامەتیان هەیە بۆ تەواوکەری پڕۆتین، بەو پێیەی ڕاوێژکاری ڕاهێنەری وەرزشی خۆیان دەکەن لەکاتی خواردنی تەواوکەری پڕۆتین، هەروەها زۆرینەیان هیچ نیشانە و کێشەیەکی تەندروستییان نییە لەکاتی خواردنی تەواوکەری پڕۆتین.

 زۆرترین ڕێژەی بەشداربووان حیسابی پێویستی پرۆتینی ڕۆژانەیان دەکرد، ڕاهێنەری وەرزشیش زۆرینەی بەشداربووانی حیساب دەکرد.

 لە کۆتاییدا زانین، ئاستی ئەکادیمی و کولتووری لایەنی ئەرێنی هەیە لەسەر ڕێگای بەکارهێنانی تەواوکەری پڕۆتین بە شێوەیەکی سەلامەت و بۆ دوورکەوتنەوە لە زیان و کەموکوڕییەکانی.

**CHAPTER SEVEN**

**APPENDIX**

# **7.1.APPENDIX**

**APPENDIX (1)………….**



**زانکۆی جیهان –هەولێر**

**کۆلێژی تەکنيكي تەندروستی**

بةشي نيوتريشن ودايةتيَتكس

**Title of the project:** **Knowledge, attitudes and intake of protein supplements among participants exercising gyms in Erbil City.**

The following questionnaire survey is part of the graduation project conducted by the students of Nutrition and Dietetics Department, Cihan University-Erbil. This survey aimed to investigate the knowledge, attitudes and the consumption rates of protein supplements among Athletes aged )18-35 (in Erbil – Kurdistan Region, Iraqi.

**Participation Consent Form**

The objectives of this study have been explained to me in a language I am comfortable with. I confirm that I have understood the above study and had the opportunity to ask questions. I understand that my participation in the study is voluntary and that I am free to withdraw at any time and without giving any reason and my information will be kept. The information we acquire will only be used for the research purposes and your participation is highly valued. We hope that you answer all questions which may take not longer than 10 minutes of your time.

I fully consent to participate in the above study.

الاستبيان التالي هو جزء من مشروع التخرج الذي أجراه طلاب قسم التغذية والحميات ، جامعة جيهان – أربيل (مروة حسام ، روژين محمد شاكر، شفاء حسن. و تحت إشراف الدكتور صالح مصطفى صالح). يهدف هذا الاستطلاع إلى التحقق من المعرفة والمواقف ومعدلات استهلاك مكملات البروتين بين الرياضيين الذين تتراوح أعمارهم بين 18 و 35 عامًا (في أربيل - إقليم كردستان العراق.

نموذج الموافقة على المشاركة

تم شرح أهداف هذه الدراسة بلغة سهلة ومفهومة. أؤكد أنني فهمت الدراسة أعلاه وأتيحت لي الفرصة لطرح الأسئلة. أفهم أن مشاركتي في الدراسة طوعية وأنني حر في الانسحاب في أي وقت ودون إبداء أي سبب وسيتم الاحتفاظ بمعلوماتي. سيتم استخدام المعلومات التي نحصل عليها فقط للأغراض البحثية ومشاركتك ذات قيمة عالية. نأمل أن تجيب على جميع الأسئلة التي قد لا تستغرق أكثر من 10 دقائق من وقتك.

أوافق تمامًا على المشاركة في الدراسة أعلاه.

Signature of the participant: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature of the investigator: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 إذا كان لديك أي أسئلة حول هذا البحث ، يمكنك مراسلتنا عبر البريد الإلكتروني:

Marwa Husam: mh0701119014@cihanuniversity.edu.iq

Research supervisor Dr. Salih M. Salih : salih.zebary@cihanuniversity.edu.iq

**Section One: Demographical data**

**Note: Please tick (✓) the most appropriates answer inside the box.**

1. Age groups

18-25 26-30 31-35

1. Weight \_\_\_\_\_\_\_kg
2. Height \_\_\_\_\_\_\_Cm
3. What is your highest level of education?

Less than high school High school  College

1. Do you have a job?

Yes No Student

1. If you have, what is the type of your job?

Office  Field  Other\_\_\_\_\_\_\_\_\_

1. What is your job?

 Teacher driver Data entry  Other

**Section Two**

1. Protein source for you is:

Meat & Chicken  Egg & Dairy products  Legumes  All above

1. Do you take protein supplement?

Yes  No

1. What do you think about the safety of protein supplements consumption?

Safe  Not safe  No idea

1. From where have you received information regarding the use of protein supplement?

Academic class  Expertise/coach  Website/ social media

1. Who recommend you to take protein supplement?

Family/friends  Professional Coaches  Physicians/ Academia

Other\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is your goal for protein consumption?

Muscle strengthening and body health  Get a consistent and attractive look  Sport competition  something else

1. Where do you usually buy your protein supplement?

 Pharmacy  Online store  Street shop  Fitness /wellness store)

Other\_\_\_\_\_\_\_\_\_\_

1. What brands of protein do you use? Please write name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What types of Protein do you use?  Egg protein  Whey protein  Other
3. How long you have been use protein supplement?

Less than 3 months  3months to 12months  More than 1 year

1. Do you calculate your protein need regarding your exercise?

Yes  No

1. Who calculate your needs?

Yourself  Coach  Application

1. Usually what time do you use Protein?

  Before exercise  after exercise  during the exercise

1. How frequently do you have/ consume protein?

  Daily  Twice a week  Weekly  Rarely

1. Protein dose/ quantity \_\_\_\_\_\_\_\_\_g or \_\_\_\_\_\_\_\_Scoop
2. The amount of water you consume dilly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Glass/Liter
3. Do the protein supplements increase the amount of exercise you can undergo?

 Yeas  NO  little  don’t know

1. After protein supplements consuming you feel symptoms or complication?

 Thirst  Headache  Abdomen pain  Non

1. Does the consumption of protein supplements cause you any diseases?

 Kidney stones Digestive disorders sensitive Other\_\_\_\_\_\_

1. What type of exercise does often do?

 weight lifting  Aerobic exercise  Bodybuilding  Other\_\_\_\_\_\_\_\_

1. You feel that supplements help you?

Muscle building  Fill my need  No alternative

1. Did you Reached your goals?

 Yes  No  Need more time

**7.2 Correlation matrix**

Table (7.1): Correlation matrix.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | A | W | H | x1 | x2 | x3 | x4 | x5 | x6 | x7 | x8 | x9 | x10 | x11 | x12 | x13 | x14 | x15 | x16 | x17 | x18 | x19 | x20 | x21 | x22 | x23 | x24 | x25 |
| A |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| w | 0.24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| H | 0.17 | 0.37 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x1 | 0.10 | 0.11 | 0.10 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x2 | -0.38 | -0.18 | -0.12 | 0.07 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x3 | -0.35 | -0.13 | -0.07 | -0.20 | 0.54 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x4 | -0.11 | 0.10 | -0.04 | 0.10 | 0.25 | 0.21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x5 | 0.06 | 0.01 | -0.06 | -0.08 | -0.01 | 0.06 | -0.04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x6 | 0.03 | 0.05 | 0.01 | 0.06 | 0.02 | -0.07 | 0.05 | 0.05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x7 | 0.02 | -0.10 | -0.18 | -0.13 | -0.01 | 0.01 | -0.12 | -0.06 | -0.01 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x8 | 0.06 | 0.05 | 0.02 | 0.07 | 0.06 | -0.08 | 0.00 | -0.05 | -0.12 | 0.29 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x9 | 0.00 | 0.04 | 0.05 | 0.02 | -0.08 | 0.00 | 0.07 | -0.02 | 0.17 | -0.02 | -0.05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x10 | -0.09 | -0.08 | -0.01 | 0.10 | 0.14 | 0.03 | -0.01 | -0.13 | 0.07 | 0.14 | 0.13 | 0.05 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x11 | -0.09 | 0.03 | -0.01 | -0.01 | 0.01 | 0.03 | 0.21 | 0.09 | 0.03 | -0.16 | -0.08 | 0.00 | -0.04 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x12 | -0.05 | 0.04 | -0.06 | 0.09 | 0.05 | 0.03 | 0.16 | -0.01 | -0.04 | 0.02 | -0.04 | 0.05 | 0.14 | 0.13 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x13 | 0.15 | 0.08 | 0.15 | 0.15 | -0.16 | -0.24 | -0.05 | 0.14 | -0.01 | -0.21 | -0.14 | 0.02 | -0.03 | 0.00 | 0.01 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| x14 | -0.05 | -0.12 | -0.08 | -0.30 | -0.14 | 0.05 | -0.11 | 0.08 | 0.01 | 0.18 | -0.13 | 0.03 | -0.21 | 0.00 | -0.01 | -0.04 |  |  |  |  |  |  |  |  |  |  |  |  |
| x15 | -0.01 | -0.02 | 0.04 | 0.15 | 0.02 | 0.00 | -0.03 | -0.03 | 0.01 | -0.03 | 0.03 | -0.04 | 0.11 | -0.07 | 0.08 | 0.09 | -0.16 |  |  |  |  |  |  |  |  |  |  |  |
| x16 | 0.00 | -0.07 | 0.09 | 0.11 | -0.04 | -0.04 | -0.02 | 0.04 | 0.02 | -0.01 | 0.07 | 0.06 | 0.04 | -0.04 | 0.20 | 0.22 | -0.07 | 0.12 |  |  |  |  |  |  |  |  |  |  |
| x17 | 0.04 | -0.07 | -0.07 | 0.00 | -0.03 | -0.04 | -0.14 | -0.06 | 0.12 | 0.09 | 0.06 | 0.07 | 0.23 | -0.18 | 0.00 | 0.04 | -0.02 | 0.01 | 0.19 |  |  |  |  |  |  |  |  |  |
| x18 | 0.18 | 0.18 | 0.10 | -0.17 | -0.28 | -0.03 | -0.09 | 0.04 | -0.03 | 0.02 | -0.02 | 0.04 | -0.03 | 0.06 | -0.07 | -0.02 | 0.11 | -0.03 | -0.10 | 0.06 |  |  |  |  |  |  |  |  |
| x19 | 0.21 | 0.18 | 0.17 | 0.08 | -0.09 | -0.25 | 0.03 | 0.06 | 0.01 | 0.01 | 0.14 | 0.02 | 0.02 | 0.00 | 0.05 | 0.14 | -0.17 | -0.01 | -0.01 | -0.09 | 0.08 |  |  |  |  |  |  |  |
| x20 | 0.04 | -0.12 | -0.12 | -0.07 | -0.07 | 0.04 | -0.14 | 0.01 | -0.03 | 0.23 | 0.19 | 0.08 | 0.10 | -0.10 | 0.11 | 0.06 | 0.24 | -0.01 | 0.28 | 0.31 | -0.02 | -0.25 |  |  |  |  |  |  |
| x21 | 0.07 | -0.10 | -0.03 | -0.04 | 0.01 | -0.04 | 0.12 | 0.19 | 0.06 | -0.03 | 0.03 | 0.06 | -0.20 | -0.01 | 0.08 | 0.22 | 0.13 | 0.00 | 0.24 | 0.04 | -0.16 | 0.06 | 0.14 |  |  |  |  |  |
| x22 | 0.10 | -0.15 | -0.08 | -0.03 | -0.05 | -0.14 | -0.01 | 0.24 | -0.02 | -0.07 | 0.00 | -0.01 | -0.10 | 0.05 | 0.14 | 0.25 | 0.08 | -0.01 | 0.24 | -0.04 | -0.14 | 0.21 | 0.12 | 0.35 |  |  |  |  |
| x23 | -0.10 | -0.04 | -0.03 | -0.14 | -0.07 | 0.16 | -0.02 | 0.14 | 0.02 | -0.06 | -0.15 | 0.16 | -0.04 | 0.09 | 0.02 | -0.11 | 0.16 | -0.06 | 0.00 | 0.05 | 0.19 | -0.19 | 0.10 | -0.02 | -0.08 |  |  |  |
| x24 | -0.04 | -0.13 | -0.16 | -0.13 | 0.08 | 0.06 | -0.09 | -0.07 | 0.06 | 0.23 | 0.11 | 0.03 | 0.28 | -0.20 | 0.11 | -0.05 | 0.07 | -0.09 | 0.12 | 0.38 | -0.01 | -0.13 | 0.35 | 0.02 | -0.02 | 0.14 |  |  |
| x25 | -0.23 | -0.09 | -0.15 | -0.02 | 0.10 | 0.03 | 0.09 | -0.04 | 0.02 | 0.07 | 0.16 | -0.06 | -0.03 | 0.13 | 0.08 | -0.22 | 0.07 | -0.05 | -0.19 | -0.08 | -0.07 | -0.07 | -0.09 | -0.03 | -0.08 | 0.03 | -0.14 |  |

This table shows, in general, whether there is a direct or inverse relationship or the absence of any relationship between all the variables for this

Research. The closer the value is to one from the positive side, there is a strong direct relationship, and the closer the value is to one from the

Negative side, there is a strong inverse relationship, and as the value approaches zero, the relationship weakens, and as for the value of zero, it

Indicates the absence of any relation.