

A STUDY ON HEALTH BENEFITS OF WHEY PROTEINS

¹Jangale Rohini Shankar and ²Ghanendra Kumar Bansal

¹C.H.M.E. Society's, Dr. Moonje Institute Of Management & Computer Studies, Nashik, India

²Durga Prasad Baljeet Singh Post Graduate College, Anoopshahr, India

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ABSTRACT

Whey is a term that generally refers the translucent liquid part of the milk which remains in the process of cheese manufacturing. Proteins are the nitrogen-containing substances which are formed by the amino acids. Whey proteins are separated and also purified by using various techniques to obtain different concentrations of whey proteins. Whey protein provides high level of branched and essential chain amino acids. In addition to these, whey protein is rich in minerals and vitamins. This protein provides various advantages to the individuals of different applications like sports, cancer treatment, athletes, etc.

Index Terms— Whey protein, whey protein concentrate, whey protein isolate and whey protein powders

I. INTRODUCTION TO WHEY PROTEINS

Whey proteins are easily and quickly digested. Whey protein is one of the 2 proteins of cow's milk. Whey proteins refer to the individual protein which is separated out from the casein while cheese-making. These proteins are purified into different concentrations based on the end composition desired [8]. The content of the whey protein may vary in carbohydrates, fat, immunoglobulins, lactose and minerals. Whey proteins are loaded with EAAs (Essential Amino Acids) including three BCAAs (Branched Chain Amino Acids) and also they contain subcomponents of micro fractions which provide the benefits of elemental nitrogen and amino acids. Whey protein is the one which is most useful for sports nutrition. In addition to these, whey products are evident in salad dressings, infant formulas, emulsifiers, baked goods and medical nutritional formulas [3].

II. VARIETIES OF WHEY PROTEIN

There are three main types of whey protein which is

obtained from various processing techniques that is used to separate whey protein. They are

- Whey powder,
- Whey concentrate and
- Whey isolate.

The following figure illustrates the making process of whey proteins.

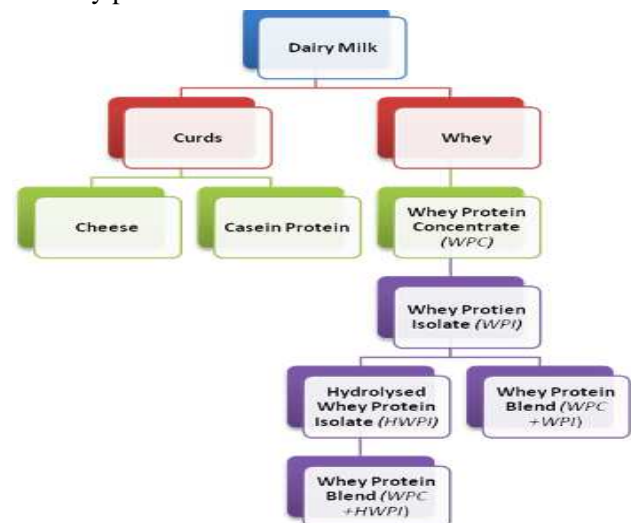


Figure1: Making of Whey Proteins

Source: Barzel, U.S. and Massey, L.K. (1998): Excess dietary protein can adversely affect bone. Journal of Nutrition 128, 1051-1053

a) WHEY PROTEIN POWDER:

Whey protein powder has several applications throughout the food industry. Whey protein powder is seen in the food products for confectionery, dairy, beef, snack and bakery products. Whey powder has many different varieties including acid whey, demineralized whey, sweet whey, and reduced forms. The reduced and demineralized forms are mostly used in the products rather than in the sports supplements.

The following table provides the composition of Whey Proteins:

| Typical Whey Protein Ingredient Composition | | | |
|---------------------------------------------|--------------|--------------------------|----------------------|
| Whey Components | Whey Powder | Whey Protein Concentrate | Whey Protein Isolate |
| Protein | 11% to 14.5% | 25% to 89% | 90% + |
| Lactose | 63% to 75% | 10% to 55% | 0.5% |
| Milk fat | 1% to 1.5% | 2% to 10% | 0.5% |

Table1: Composition (%) of whey protein forms

Source: Geiser M (2003): The wonders of whey protein, NSCA’s Performance Training Journal 2, 13-15

b) WHEY PROTEIN CONCENTRATE:

The process of whey concentrate will remove the ash, lactose, some minerals and water. In addition to these, when comparing with whey isolates, whey concentrate contains more biologically active proteins and components which make them very attractive supplement for the sports and athlete [1].

Benefits of whey protein concentrate:

- Great for muscle and body building
- High in amino acids

c) WHEY PROTEIN ISOLATE:

Whey isolates are the purest protein. Whey protein isolates may contain the protein concentrations about 90% or higher than that. During the process of whey protein isolates removes the lactose and fat [5].

- Benefits of whey protein isolate:
- Lactose free and fat free
- More protein per serving
- Excellent amino acid profile
- Ideal for both fat loss and muscle building

The following figure illustrates the whey proteins that available.

| Product Description | Protein Concentration | Fat, Lactose, Mineral Content |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Whey Protein Isolate | <ul style="list-style-type: none"> • 90-95% | <ul style="list-style-type: none"> • Negligible |
| Whey Protein Concentrate | <ul style="list-style-type: none"> • May range from 25-89% • Most commonly available as 80% | <ul style="list-style-type: none"> • Some fat /lactose /minerals which decrease as protein concentration increases |
| Hydrolyzed Whey Protein | <ul style="list-style-type: none"> • Variable • Hydrolysis used to cleave peptide bonds, creating smaller peptide fractions • Reduces allergic potential compared with non-hydrolyzed | <ul style="list-style-type: none"> • Varies with protein concentration |
| Undenatured Whey Concentrate | <ul style="list-style-type: none"> • Variable • Usually ranges from 25-89% • Processed to preserve native protein structures: typically has higher amounts of immunoglobulins and lactoferrin | <ul style="list-style-type: none"> • Some fat /lactose /minerals which decrease as protein concentration increases |

Table2: Commercially Available Whey Proteins

Source: Marshall K (2004): Therapeutic Applications of Whey, Alternative Medicine Review, 9 (2): 136-156

III. BENEFITS OF WHEY PROTEIN

Whey protein is considered as an excellent protein for the choice of individuals of all ages for healthy diet and also to improve and maintain their health. Traditionally, Whey protein was only used by most of the athletes and bodybuilders to promote the muscle growth [2]. But from past few years, whey protein is being used in some other applications. Some applications that using whey proteins are: cancer treatment, wound healing, infant health and weight loss.

According to Hoffman and Falvo [4], additional benefits of Whey protein may include: Whey protein helps to increase the serotonin activity and helps to promote restful sleep [10]; Whey protein helps enhance energy levels; it helps to decrease the stress; it helps to keep the metabolic rate high; it helps to reduce body fat and build the lean body mass; and it helps to improve the memory loss under stress. In addition to these, some of the top benefits of whey protein may include: it provides immunity support, increase muscle mass, boost metabolism, and helps to improve overall health [7].

Whey proteins promote:

- Muscle strength
- Improved immune system
- Muscle synthesis
- Performance / endurance
- More favorable body composition
- Recovery

IV. WHEY PROTEIN CHARACTERISTICS

As part of a growing wellness and health trend, food manufacturers are boosting their products with excess of protein content. Whey protein is a part of products from food and beverage manufacturers, which provides excellent protein supplement [9].

a. WHEY PROTEIN INGREDIENT COMPOSITION:

Whey protein ingredients may include WPI (whey protein isolates) and WPC (whey protein concentrates) that ranges in protein from

25% to 90% protein. α -lactalbumin and beta-lactoglobulin are predominant whey proteins and it ranges up to 70% of the total protein. The characteristics of both WPI and WPC are account for physical properties of the whey protein ingredient.

The following table illustrates the composition of whey protein

| Whey Protein | WPC % | WPI % |
|-------------------------|----------|--------------|
| α -lactalbumin | 12 to 16 | 14 to 15 |
| β -lactoglobulin | 50 to 60 | 44 to 69 |
| Glycomacropeptide (GMP) | 15 to 21 | 2 to 20 |
| Serum albumin | 3 to 5 | 1 to 3 |
| Immunoglobulins | 5 to 8 | 2 to 3 |
| Lactoferrin | <1 | Not reported |

Table3: Whey Protein Composition

Source: Foegeding EA, Luck P, Vardhanabhati B.(2011): Encyclopedia of Dairy Sciences, 2nd ed, Elsevier Ltd, 2011, Whey Protein Products.

b. WHEY PROTEIN FUNCTIONALITY

Whey protein ingredients are the multi-functional ingredients which provide the properties such as water binding, foaming, gelation, solubility, emulsification and viscosity for the foods [14]. Solubility is one of the most important functions because good solubility is necessary for all the functional properties. One of the great challenges for the whey protein is maintaining the solubility while heat processing. Most of the foods are heat processed and the whey proteins are susceptible to the changes while heating, such as the denaturation.

V. WHEY PROTEIN APPLICATIONS

Whey proteins are used in various industries for the supplement of food and beverages. Whey proteins are used for medicine purposes and also to improve the overall health.

i. CANCER

Cancer patients are undergoing chemotherapy or radiation may have difficulty in meeting their nutritional requirements and this is because of lack of appetite. So, this may lead to muscle loss, weight loss and protein calorie malnutrition. Here, the use of whey protein provides excellent protein choice for the cancer patients [13]. In addition to these, it helps them very easy to digest.

ii. DIABETES

Today, most of the people are affected by Type 2 diabetes and it is one of the growing health problems over the world. It becomes a concern for teenagers and children. Healthy nutrition practices may play a role in managing and helping the type-2 diabetes. Here, whey protein is the high biological, a high quality and value protein which is good choice for the people who has diabetics. Whey protein helps to control the blood glucose levels and also provides additional beneficial for weight management which is a concern for type-2 diabetics [6].

iii. CARDIOVASCULAR HEALTH:

Heart disease is considered as one of the most leading disease which causes death for both men and women. It is essential to maintain health and nutrition diet and also regular exercise to maintain the healthy cardiovascular system [12]. In this way, whey protein is a part of that nutritious diet, which keeps a person healthy. High blood pressure (Hypertension) is one of the leading heart diseases and it may cause stroke. Whey protein helps to fight against the hypertension. Elevated cholesterol is one of the factors that is associated with the heart disease. Here, whey protein helps to reduce cholesterol.

VI. CONCLUSION

It is concluded that whey protein is the one which provide various benefits to the individuals in different applications. Whey protein helps the

athlete and sports person to maintain their energy level, muscle and body building. This study also concludes that whey protein helps to the medicine industry in various ways such as cancer, wound healing, stress adaptation, gastrointestinal support, osteoporosis, cardiovascular disease and HIV. Whey protein is considered as one of the ultimate sources of protein. It is clearly understood that, whey protein is complex food function which helps in various potential therapeutic applications.

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