



A Review on Next Gen Protein: Whey Protein

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Abstract:-

Whey is one of two proteins found in cow's milk, accounting for about 20% of the overall protein content. Casein is the other protein, accounting for around 80% of the total protein content. Whey proteins are a group of individual proteins or fractions that separate from casein during the cheese-making process. High quality proteins and rich amino acids (AA) profile is a characteristic feature of whey protein. Essential Amino Acids (EAAS) and Branched chain amino acids (BAAS) are vital constituents of Whey Protein. Not just muscle building but antimicrobial, antiviral properties, and enhance immune defense and bone health, and improve antioxidative activity, and help protect against cancer and cardiovascular disease. The review discusses the types, side effects and applications of whey protein in human health.

Keyword:-

Whey Protein, Amino Acids, Essential Amino Acids, Whey Isolate, Whey Concentrate.

Introduction:-

Proteins are chemical substances made up of a linear chain of amino acids folded into a globular shape. There are total of 20 amino acids. The amino acids' distinct properties are determined by the 20 various R groups. Casein and whey protein are two proteins found in milk. Whey protein is more soluble and has a higher quality grade than casein^(1,2). Whey has the highest biological value (BV) of any protein source and is highly bioavailable. It contains 20 amino acids, including all nine necessary amino acids, as well as a substantial and well-balanced supply of sulphur amino acids, which are important antioxidants and precursors to the potent intracellular antioxidant glutathione, as well as in one-carbon metabolism. Supplementing with whey protein provides a number of well-documented advantages. This review will explain the types of proteins in whey as health benefits of the whey protein^(3,4,5).

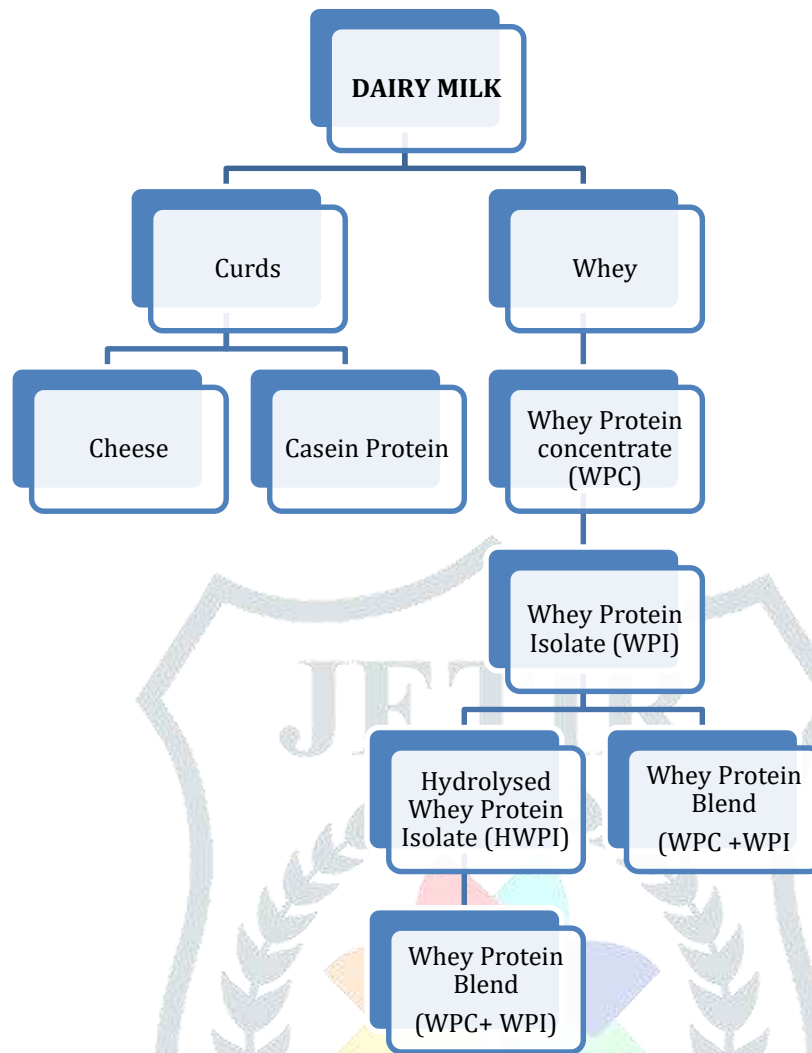


Fig:- 01 Dairy Product containing Whey Protein

Types of whey Protein

Whey protein powder comes in a variety of forms and is used not only to build muscles but also to keep the body working and forming. If you don't get enough amino acids, your body will feel weak. Amino acids aid in the formation of tissues such as muscles, hair, and skin. Additionally, if you believe you are not receiving enough protein from your meals, you may consider taking supplements.⁽⁶⁾

Whey protein is an versatile protein that contains all of the amino acids your body requires. Another advantage of whey protein is its capacity to aid the body in the healing of muscles that have been damaged as a result of strenuous activity. Despite the fact that whey protein comes in a variety of forms, it all aids your body in muscle repair and strengthening. Whey protein can be divided into three kinds depending on how it is produced.⁽⁷⁾

1. Whey Protein Concentrate (WPC)

The protein content of whey protein concentrate can range from 26 to 88 percent. Whey protein concentrate is typically listed on the label of whey protein powder supplements sold in health and nutrition stores. The protein content of this form of whey protein is usually about 80%. Lactose (4-8%), fat, minerals, and moisture make up the balance of the product.

WPC has a higher nutrient density and contains concentrated protein. Because of the way it's produced, it has a higher nutritional density than other varieties of whey. WPC protein content is typically about 80 percent, however it can range from 26 to 89 percent. In processed food products, the ones with a lower amount of whey are used. Only the ones with a larger percentage are used as food. Lactose content in a WPC ranges from 4 to 8%.⁽⁸⁾

One thing to remember is that because WPC is created by concentrating milk, it may contain hormones that were given to the animals from which the milk was obtained. Since a result, it should be considered before taking it, as it may have some negative consequences.

2. Whey Protein Isolate (WPI)

It is the purest form of whey protein, with 90% or more protein, minimum lactose (1%), and nearly no fat, but it is also the most expensive. Isolates are defatted and lactose-free, although they are typically deficient in bioactive substances.⁽⁹⁾

The whey protein isolate, which is easily digested, is the second kind of whey protein. Whey protein isolate (WPI) is the purest form of whey protein available, with 90-95 percent protein. Because it contains little or no lactose, it is an useful protein source for people who are lactose intolerant. WPIS also have a low fat content. The pricing of a WPI will be slightly more than that of a WPC due to the product's purity and increased protein content. Carbohydrates and lactose are routinely removed from this protein, making it easier to consume for persons who are lactose intolerant. A lot of fat and fat-soluble vitamins are also eliminated, in addition to the carbohydrates. Whey protein isolate has a protein content of 90-95 percent.⁽¹⁰⁾

Other types of whey protein isolate are

1. Micro Filtered undenatured isolate
2. Undenatured WPI
3. WPI bars

3. Whey Protein Hydrolysate

Whey protein is broken down into peptides, which are shorter strands of protein. As a result, this form of whey protein is more easily absorbed by the body, potentially lowering the risk of allergic responses. Infant formulas, sports and medical nutrition products frequently contain hydrolyzed whey protein. The nutritional quality of whey protein is not affected by hydrolysis. This form of whey protein is designed to absorb fast in the body. Although whey is easily digested, the whey protein hydrolysate accelerates digestion by breaking down the protein into smaller chains known as peptides.

This sort of whey may have a harsh flavour due to the processing procedures. This is why protein is the most expensive because it undergoes the greatest processing. The body must hydrolyze the protein if it is not hydrolyzed during the hydrolysis process. This whey protein also contains insulin, but not glucose, to speed up the digestion process. This protein can be found in sports, newborn formula, and other medical nutrition products. The protein content of this type of whey is between 80 and 90 percent⁽¹¹⁾

Protein Content in Whey

Whey Composition

Whey includes 95% of its original water, the majority of lactose, 20% of milk protein, and traces of fat. About half of the residual milk solids are absorbed into cheese.

Product	Protein Concentrations (%)	Lactose (%)	Fat (%)	Applications
Whey Powder	11-14.5	63-75	1-1.5	Use in bread and bakery
Whey protein concentrate	25-89 (most commonly available as 80%)	4-52	1-9 (as protein concentration increases, fat, lactose and mineral content decrease)	Protein beverages and bars, bakery.
Whey protein isolate	90-95	0.5-1	0.5-1	Protein supplementation
Hydrolyzed whey protein concentrate	>80 (hydrolysis used to cleave peptide bonds)	<8	<10 (varies with protein concentrations)	Used in sports nutrition products
Hydrolyzed whey protein isolate	>90	0.5-1	0.5-1	Highly digestible form .

Table No:- 01 Conc. of protein, fat, lactose in whey protein

Is Soy Protein better than Whey Protein?

Soy Protein	Whey Protein
1. Soy protein comes from soybeans which are legumes (a source of carbohydrates)	1. Whey protein is made up of natural sources as a Dairy by product
2. Soy protein does not provide an excellent source of glutathione	2. Whey protein provides an excellent source of glutathione
3. Does not contain plenty of amino acids	3. Contains plenty of amino acids
4. Is the best for those women who are vegetarian and for body building	4. Is not the best source for the vegetarians

Table No:- 02 difference between soy protein and whey protein

Amino Acids Present in Why Protein

Protein is made up of amino acids. A robust amino acid profile is typical of a high-quality whey protein supplement. It should also contain a significant amount of branched chain amino acids (BCCAs).^(12,13)

1. L-Arginine

It's a semi-essential amino acid that helps the body's immunity while also promoting healthy muscle growth. L arginine also aids in fat and cholesterol regulation.

2. L-Aspartic Acid

This amino acid is responsible for establishing a healthy metabolism and is frequently utilised as a tiredness cure. It also aids in the production of energy at the cellular level.

3. L-Alanine

It's a non-essential amino acid that's mostly found in ducts. It's known for its ability to support intense training and aid in muscle growth. It also helps to maintain a healthy immune system and avoids cardiovascular disease.

4. L-Cysteine

L-Cysteine is broken down into taurine and glutathione when it enters the human body. While taurine is helpful for liver detoxification and heart health, glutathione is an antioxidant that aids in brain function.

5. L-Glutamic Acid

L-Glutamic acid is a commonly used supplement that is one of the best supplements for energy generation. It is, in fact, needed by the human body more than any other amino acid.

6. L-Histidine

Histidine is an amino acid that has a wide range of applications in medicine. It plays a critical role in the transportation of oxygen within RBCs since it is a building block for haemoglobin.

7. L-Glycine

This is the amino acid that is good for your whole body. L-Glycine is an essential amino acid in your whey protein powder, as it promotes quick muscle building, improves digestion, and promotes restful sleep.

8. L-Isoleucine

First and foremost, L-Isoleucine is a branched-chain amino acid (BCAA). In order to obtain energy, isoleucine is broken down in muscle tissues. It also aids anabolism and is essential for protein synthesis.

9. L-Leucine

Leucine, like isoleucine, is not created by our bodies and must be received through dietary sources. Leucine has the highest proportion of all three BCAAs in your muscles. The amino acid leucine has been shown to promote muscular building and fat reduction.

10. L-Methionine

L-Methionine aids in the regulation of many vital bodily functions. It boosts metabolism and accelerates fat reduction. Methionine is used in medicine to prevent liver damage caused by Tylenol toxicity.

11. L-Lysine

L-Lysine not only aids in the efficient absorption of calcium, but it also aids in the reduction of anxiety and the promotion of excellent mental health.

12. L-Phenylalanine

It is an important amino acid that has traditionally been used to treat depression and chronic pain. Aside from that, Phenylalanine may help with memory and concentration.

13. L-Proline

The body needs L-proline to maintain muscles and joints flexible. Proline and Lysine combine to make a collagen-producing molecule that aids in the treatment of osteoarthritis and chronic back pain. Furthermore, a decrease in Proline levels in the body may induce catabolism and, as a result, muscle loss.

14. L-Serine

Glycine is used to make serine. It is most known for its capacity to boost physical health, improve mood, reduce anxiety, strengthen the immune system, and increase the body's ability to absorb creatine.

15. L-Threonine

One should be aware that your body requires L Threonine to synthesise the amino acids glycine and serine. Threonine, coupled with aspartic acid, aids in the digestion of lipids and fatty acids by the liver cells.

Threonine is also responsible for the synthesis of antibodies, which support the human body's healthy immunity.

16. L-Tryptophan

It is an important amino acid that aids in the production of protein and the brain neurotransmitter serotonin. Serotonin is a neurotransmitter that controls your mood and sleep. Insomnia, anxiety, and sadness are all treated with tryptophan. Additionally, tryptophan has been found in multiple studies to boost athletic performance.

17. L-Tyrosine

Tyrosine is an amino acid that can be used for a variety of purposes. It not only aids in the reduction of stress and the symptoms of depression, but it also aids in the development of strong muscles. Furthermore, tyrosine relieves fatigue and may help with memory.

18. L-Valine

Every bodybuilder and athlete needs this branched chain amino acid. The amino acid L valine is essential for providing energy to the muscles. It also improves endurance and aids in the growth and regeneration of muscle tissues after a rigorous workout. In addition, L-Valine is necessary for the proper functioning of the central nervous system.^(14,15,16)

Top 10 Whey Protein Brands In World ^(17,18)

1. Optimum nutrition, glanbia
2. Transparent labs.
3. MuscleTech, America.
4. BSN(Bio Engineered Supplement & Nutrition)Glanbia
5. Dymatize
6. MusclePharma, Colorado

7. CytoSport, California, America.
- 8 .MHP(Maximum Human Performance).
9. Gaspari Nutrition.
10. Universal Nutrition, USA.

Top 10 Whey Protein Brands In India^(19,21)

1. 1.BSN SYNTHA-6 Whey protein powder
2. Optimum Nutrition (ON) 100% Whey protein standard
3. MuscleBlaze Raw Whey Protein
4. AS-IT-IS Nutrition Whey protein Concentration 80%
5. Isopure Low Carb Whey Protein
6. Dymatize Nutrition Elite Whey Protein Powder.
7. MuscleTech Nitrotech Performance Series
8. Sinew Nutrition Instantised Whey Protein Concentrate
9. Ultimate Nutrition Prostar 100% Whey Protein.
10. MuscleBlazeMuscleBlaze Beginner's Whey Protein 79% supplement.

Most Selling Brand Products^(22,23)

1. NakPro Platinum Whey Isolate Unflavored.
2. MyProtein Whey Isolate Unflavored.
3. Ultimate Nutrition - Iso Sensation Whey Chocolate.
4. NakPro Gold Whey Unflavored.
5. MBMB Muscle Blaze Whey Isolate Unflavored.
6. Abbzorb Whey Isolate Unflavored.
7. RealWhey Whey Unflavored.
8. Nutrabay Whey Isolate Unflavored.
9. Muscle Pharm Combat Whey Isolate Chocolate.
10. My Protein Whey Unflavored.

Applications of whey protein:- (24,25,26,27)

1. Muscle Building

Protein supplements are utilised by both young and old persons on a daily basis. The majority of these individuals are everyday exercisers who train out and stretch their muscles extensively. Protein aids in the re-building of muscles, and so plays an important part in making the human body stronger.

2. Blood Pressure

Angiotensin converting enzyme, a kidney-secreted enzyme, has also been associated to hypertension (ACE). The rennin-angiotensin system, which regulates peripheral blood pressure, has been linked to ACE in clinical studies. Blood pressure can be brought under control by blocking the effects of ACE. Lactokinins, which are whey peptides, have recently been discovered to be weak ACE inhibitors.

3. Anticarcinogenic properties

Due to sickness and a lack of appetite, cancer patients receiving radiation or chemotherapy sometimes struggle to satisfy their daily nutritional requirements. Whey protein is a great protein for cancer patients since it is easy to digest and mild on the system. Some malignancies may be protected by whey proteins and peptides, as well as other whey components. Lactoferrin or β -LG supplementation improves protection against the development of potential tumour precursors. Intestinal tumours are less likely to grow when whey protein is consumed.

4. Weight Management

It enhances body composition and slims the waistline. The researchers discovered that people who ate whey protein lost weight and had less body fat. Whey protein is the most effective protein for fat loss on low-calorie diets.

5. Bone Health

In healthy adult men, milk basic protein increases bone growth and inhibits bone resorption. The whey protein fraction contains milk basic protein. The intake of 300 mg of milk basic protein raises serum osteocalcin levels.

Discussion

In this review we have studied about the whey protein and its vital constituents. It is known that the current market of whey protein manufactures 3 main types of whey protein such as whey protein concentration, whey protein isolate and whey protein hydrolysate. Almost 20 amino acids are present in the whey protein which help in carrying out vital processes in our body. It is also found that at an average around 75% of protein is made available into the whey protein supplementation. Fascinatingly today's world's top brands of whey protein such as optimum nutrition and BSN claim that whey protein not just helps in muscle recovery but also has vital role in our body

for various functions, i.e., controlling blood pressure, anti-carcinogenic properties, helps in weight management as well as keeps our bone health on point. It is also clear that whey protein is natural and has very minimum side effects²⁸ that too when taken in excess amount than required. So today's generation of fast pace learning and high energy exertion will find it difficult to manage with the regular sources of protein, but with whey protein which is also a next gen protein there would be very minimum tiredness among them.

Conclusion

Whey protein is a high-quality, natural protein derived from cow's milk. It contains all of the essential amino acids that the body requires on a regular basis. It has little to no fat, lactose, or cholesterol in its purest form, as WPI. Whey protein has a high PDCAAS (a measure of protein bioavailability) and is digested more quickly than other proteins like as-sein. Whey can be found in three different forms: WPCs, WPIs, and WPHs.

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