Benefits of Silk (all supported by published scientific research)
(http://www.mulberrytreesilk.com/blog/benefits-of-silk)

1. Silk is a natural fibre.
   - Silk is 97% natural protein and contains 18 amino acids (see following pages for further details). Its protein naturally contains antibacterial and anti-fungal properties.
   - Silk allows the skin to breathe and is a natural moisture and heat regulator.
   - Silk naturally repels dust mites, mould and mildew.
   - Silk is naturally hypoallergenic and can help ease conditions like eczema, sensitive skin, allergic rash, shingles, psoriasis, etc.
   - Silk is naturally fire retardant.
   - Silk is an environmentally sustainable and biodegradable natural fibre.

2. Natural silk is like the “the second skin”.
The structure and the content of amino acids in silk proteins are very similar to the skin of the human body. Silk fibres, in the form of sutures, have been used for centuries. It can be completely integrated into the human body without triggering immune reactions. It is also edible.

   In the formation of silk filaments, the cocoon shell is composed of two proteins: fibroin as the core and it is held together by a gum-like protein called sericin. “The sericin in the silk is an antioxidant protein. The protective effect of sericin was evident in terms of significant reduction in tumour incidences and tumour multiplicity. The results suggest that sericin possesses a photo protective effect against UVB-induced acute damage and tumour promotion by reducing oxidative stress”

   “Sericin has a unique affinity with other proteins which allows it to bind very effectively to the keratin of the skin and hair to form a multifunctional protective film that is moisturizing, protective anti-wrinkle film, leaving the skin with a smooth, silky feeling and substantiates several appropriate cosmetic effects. Its versatility makes Sericin a very valuable natural ingredient for a wide range of cosmetic products”.

   “It is clear that regeneration of the epidermis and dermis of the wound beds covered with silk film was faster…Therefore, silk film offers advantages over other dressings and may be clinically useful for wound treatment.”

These characteristics have the power to protect and care for the skin, and promote an overall healthy skin. There isn’t any other natural fibre that can dare to match silk.

Recently regenerated silk solutions have been used to form a variety of biomaterials, such as gels, sponges and films, for medical applications.
3. Silk has high antioxidant and antibacterial activity
The mulberry leaves that the silk worms feed upon are super rich in antioxidants. Tests at the Massachusetts-based Brunswick Laboratories show mulberries contain up to 79 per cent more antioxidants – which aid cellular repair in the body – than known super-fruits such as blueberries, blackberries and cranberries.

Studies have provided evidence for an antioxidant action of the silk protein sericin by showing that sericin suppressed in vitro lipid peroxidation. Furthermore, sericin was found to inhibit tyrosinase activity. These results suggest that sericin may be a valuable natural ingredient for food and cosmetic industries.

The protein is also used as a coating material for natural and artificial fibres, which can prevent abrasive skin injuries, the development of rashes and also enhance antibacterial qualities for products such as diapers, diaper liners and wound dressings. It can even be used in the treatment of polluted air.

4. Silk prevents “bed hair” and sleeping wrinkles.
Unlike cotton, silk does not absorb natural moisture from your face and hair. Cotton causes too much friction, disrupting hair follicles as we move in our sleep and this eventually contributes to hair breakage and loss. Silk pillowcases will help keep your hairstyle.

Silk is made up from strings of amino acids and this is the same pH as your skin. Studies show amino acids can counter the effects of aging, especially in facial skin and can help calm the nervous system – Silk also contains natural cellular albumen, which helps speed up the metabolism of skin cells thus helping to reduce signs of aging.

In 1987, Dr. Samuel J. Stegman described “Sleep Creases”. His discovery was confirmed by James E. Fulton MD, PhD and Farnaz Gaminchi MD in 1999, who pointed out that “There is a correlation between the location of the underlying SMAS or aberrant scar tissue and sleep lines. Sleep wrinkles are accentuated by pillow contact...”. Silk is a smoother material than cotton and linen and thus minimises night creases or “sleep lines”.

Swiss scientists published research showing that sericin, the protein in silk, can adhere to the keratin (protein) in skin and hair resulting in a perceptible “homogeneous protective film”. This means silk can form a barrier layer, helping retain moisture and possibly having a plumping, anti-wrinkle effect.

5. Silk is naturally hypoallergenic by repelling dust mites and resisting mould and mildew.
“House dust mites often cause allergic reactions. Dust mite faeces contain at least 15 proteins that also act as allergens. These mites and/or their droppings may cause allergic reactions to 500 million people worldwide and be responsible for triggering reactions in 50% to 80% of asthmatics.” Silk has been shown above to repel Dust Mites and their faeces due to the small pore size and anti-acarid properties of the silk proteins. Silk pillowcases, by repelling these allergens, will reduce asthmatic reaction.
To make sure the survival of the silk moths, silk cocoons are very robust and with complex structures impede natural enemies. Cocoon silk has anti-bacterial and anti-fungal actions. Mould and mildew are allergens often found in everyday households.

6. Clinical studies have proven that silk can help ease conditions such as:
   - Eczema or atopic dermatitis
   - Asthma
   - Sensitive skin
   - Allergic rash
   - shingles
   - psoriasis
   - post-chemotherapy sensitive skin
   - physiological skin flora

7. Silk is a natural heat and moisture regulator.
The high hydroxy amino acid content of Sericin (approx. 46%) is of particular importance for the water-binding capacity which regulates the skin’s moisture content. Fibroin has many superior properties. It absorbs and dissipates moisture well, allows air to pass freely, has a unique lustre, blocks ultraviolet rays, is water resistant and neutralises acids.
Silk is a poor conductor of heat, keeping you cool in the summer and warm in the winter.

8. Silk is a naturally fire retardant material
   “Silk burns slowly and is difficult to ignite, and may self-extinguish”. When it is on fire, silk does not fuse with skin like polyester does, which makes it a brilliant choice as underwear and bedding. So it is highly recommended for children.

18 Amino Acids found in Mulberry Silk
(not in the order of percentage)

1. Glycocoll, glycine
   A non-essential amino acid. It is found primarily in gelatine and silk fibroin and used therapeutically as a nutrient. It is also a fast inhibitory neurotransmitter. Helps trigger the release of oxygen to the energy requiring cell-making process; Important in the manufacturing of hormones responsible for a strong immune system.

2. Leucine
   An essential amino acid. It works with the amino acids isoleucine and valine to repair muscles, regulate blood sugar, and provide the body with energy. It also increases production of growth hormones, and helps burn visceral fat.

3. Methionine
   An essential amino acid that helps the body process and eliminate fat. It contains sulphur, a substance that is required for the production of the body’s most abundant natural antioxidant, glutathione. The body also needs plenty of methionine to produce two other sulphur-containing amino acids, cysteine and taurine, which help the body eliminate toxins, build strong, healthy tissues, and promote cardiovascular health.
4. Tyrosine
A non-essential amino acid
Tyrosine has a special role by virtue of the phenol functionality. It occurs in proteins that are part of signal transduction processes. It functions as a receiver of phosphate groups that are transferred by way of protein kinases (so-called receptor tyrosine kinases). Phosphorylation of the hydroxyl group changes the activity of the target protein.

5. Histidine
An essential amino acid. Histidine plays a very important role in the growth and repair of tissues in the body. One major role of histidine in the body is in preserving the integrity of the myelin sheaths that protect and insulate the nerve cells. At the same time, this amino acid is also required for the bio-synthesis red and white blood cells. Additional functions of histidine include, protecting the body from damage caused by radiation. Histidine also aids the body in the detoxification process regarding the presence of heavy metals.

6. Threonine
An essential amino acid that promotes normal growth by helping to maintain the proper protein balance in the body. Threonine also supports cardiovascular, liver, central nervous, and immune system function. Threonine is needed to create glycine and serine, two amino acids that are necessary for the production of collagen, elastin, and muscle tissue. Threonine helps keep connective tissues and muscles throughout the body strong and elastic, including the heart, where it is found in significant amounts. It also helps build strong bones and tooth enamel, and may speed wound healing or recovery from injury.

7. Alanine
A nonessential amino acid found in many food protein sources as well as in the body. It is degraded in the liver to produce important bio molecules such as pyruvate and glutamate. Its carbon skeleton also can be used as an energy source.

8. Isoleucine
An essential amino acid participates in haemoglobin synthesis, as well as in the regulation of blood sugar and energy levels. Isoleucine also aids in preventing the muscle wasting. This amino acid is known to promote the tissue repair after injury or surgery by increasing muscle protein content in human bodies suffering from the muscle protein loss. Finally, Isoleucine is converted to blood sugar in the liver, i.e., it can help in maintaining normal blood glucose levels.

9. Tryptophan
An essential amino acid. It’s well-known for its role in the production of nervous system messengers, especially those related to relaxation, restfulness, healthy sleep and a stable mood. It helps to make niacin and serotonin.

10. Cysteine
A non-essential amino acid. Being a key constituent of glutathione, this amino acid supports a lot of vital physiological functions. For example, glutathione, made from Cysteine, Glutamic acid, and Glycine, can be found in all tissues of the human body. In the meantime, the antioxidant activity of this component is attributed particularly to the presence of Cysteine in the compound.

11. Lysine
An essential amino acid. It plays a major role in calcium absorption, as well as in helping building muscle protein. Besides, Lysine aids in recovering from surgery or traumas and helps your body produce hormones, enzymes, and antibodies. This amino acid was also proved to depress the central nervous system while having antiseizure properties.
12. **Aspartic acid**
A non-essential amino acid and widely distributed in proteins, though it is proved to play a major role in the energy cycle of your body. Besides, Aspartic acid also participates in the ornithine cycle, in transamination reactions, as well as in the formation of pyrimidines, purines, carnosine, and anserine. This amino acid is necessary for stamina, brain and neural health. Some time ago, Aspartic acid was found to be very important in the functioning of RNA and DNA, as well as in the production of immunoglobulin and antibody synthesis. Aspartic acid is believed to help your body promote a robust metabolism. From time to time it is used to treat depression and fatigue. This amino acid plays a key role in the citric acid cycle (also known as Krebs cycle), within which a number of other amino acids and biochemical’s are formed.

13. **Valine**
An essential amino acid important for smooth nervous system and cognitive functioning. Valine is important for everyday body functions and for maintaining muscles. Valine provides numerous benefits like improvement in insomnia and nervousness. Besides, it is also proved to help alleviate disorders of the muscles, and to be an effective appetite suppressant. This amino acid also greatly improves the regulation of the immune system.

14. **Phenylalanine**
An essential amino acid, also acting as a building block for proteins. Phenylalanine is a precursor of Tyrosine, combined with which it leads to the formation of adrenaline. In turn, adrenaline is converted into a brain chemical utilized to produce noradrenaline responsible for promoting mental alertness and memory, and also for the elevation of mood and for the suppression of appetite.

15. **Proline**
A non-essential amino acid. In fact, Proline is an essential component of collagen, and therefore is vital for proper functioning of joints and tendons. Besides, this amino acid helps maintain and strengthen heart muscles. It is essential for maintaining the appropriate pressure levels throughout the body, as well as for the long-distance transportation of blood around the circulatory system.

16. **Serine**
A non-essential amino acid which is important to overall good health, both physical and mental. This amino acid is particularly essential for proper functioning of your brain and of your central nervous system. Serine is also known for assisting in production of immunoglobulin’s and antibodies for a healthy immune system, as well as for helping in the absorption of creatine that helps build and maintain the muscles.

17. **Glutamic acid**
A non-essential amino acid. Glutamic acid is recognized as a major excitatory neurotransmitter in the human brain and in the spinal cord, transformed into Glutamine or Gamma-Aminobutyric Acid. Being one of the few nutrients able to pass through the blood-brain barrier, Glutamic acid is human brain’s primary ‘food’ and its conversion into Glutamine is the only way our brain employs in order to be detoxified. It has some essential antioxidant properties.

18. **Arginine**
A non-essential amino acid. It plays an important role in the cell division and in the immune functioning. In addition, it helps healing wounds, release hormones, and remove ammonia from your body. This amino acid is proved to be a precursor of nitric oxide, which causes a blood vessel relaxation. Therefore, through the nitric oxide (NO) it becomes a mediator in different biological systems. In addition, Arginine is an intermediate in the urea cycle, cleaved into ornithine and urea.