Food Science & Applied Microbiology Reports
Vol. 2(1),2023; 1-7
ISSN (Online) 2958-0684
https://finessepublishing.com/fsamr

A Comprehensive Review on the Health-Orientated Aspects of Strawberries

AbdusSamee[a], Muhammad Suhail Ibrahim[a*], Rai Muhammad Amir[a], Ishtiaq Hassan[b], MudasirAli[a], Zunaira Zahoor[a], Arif Ullah Khan[a], Hira Nasir[a]

a. Institute of Food and Nutritional Sciences, PMAS Arid Agriculture University Rawalpindi Shamsabad, Murree Road Rawalpindi
b. Agriculture Department Government of Punjab, Pakistan.

Abstract: Strawberry (Fragaria genus), a heart-shaped sweet fruit, is consumed by human beings due to its delicious taste and fascinating color. It belongs to Rose Family and has different palatable fragrant aromas. Not only strawberry fruit but its leaves are also beneficial for consumers. We can eat them raw, cook, and make tea from them. Strawberry has amazing benefits such as improving vision, maintaining blood sugar levels, and giving relief from high blood pressure. Among colorful fruits, strawberries are popularly consumed in fresh and processed forms such as juices, yogurts, jams, and jellies. This review article shall succinctly summarize the recently explored health benefits of strawberries.
Keywords: Strawberry; History; Health Benefits; Photochemical; Nutrition

1. Introduction

Strawberry was first planted in Brittany, France, in the 1750s as a result of a cross between Fragariavirginiana from eastern North America and Fragariachiloensis, which Amédée-François Frézier brought from Chile in 1714 (Jones and Sherwood 2009). The forest strawberry (Fragariavesca), which was the first strawberry species cultivated in the early 17th century, has been mainly supplanted in commercial production by Fragariaananassa cultivars (Manganaris et al. 2014). Strawberries are a well-known hybrid species of the Fragaria genus, also known as strawberries (Menzel 2019). It is grown all over the world for its fruit. The fruit is famous for its distinct aroma, vibrant red color, juicy texture, and sweetness. It is widely consumed, either fresh or in processed foods like preserves, juice, pies, ice cream, milkshakes, and chocolates. From a botanical standpoint, the strawberry is not a berry. Technically speaking, it is an accessory aggregation fruit, meaning that the fleshy portion comes from the container that houses the ovaries rather than the ovaries of the plant. Each apparent "seed" (achene) is an ovary from a flower that has a seed inside of it (Esau 1977). Strawberry is high in phytochemicals that promote health, as well as vitamins and minerals that are necessary for good health. Strawberries are primarily composed of anthocyanins and ellagic acids, and their consumption has been shown to have a positive effect on nutritional and neurological diseases such as cancer, scurvy, and aging, among others. Strawberries are an excellent source of ascorbic acid (approximately 98% IDR), which aids the human body in developing a strong immune system and demonstrating great resistance to inflammation and free radicals in the body, as well as having a high antioxidant activity(Lee and Kader 2002). Strawberry flavonoids are powerful antioxidants and anti-inflammatory agents that have been shown in prospective cohort studies to reduce cardiovascular disease risk factors. Strawberry supplementation has not been studied in obese populations for its effects on metabolic risk factors.(Basu et al. 2009). Strawberries are high in natural antioxidants and antioxidant enzymes, which protect the body from harmful free radicals and play an important role in human health. As a by-product of normal metabolic and under stressful conditions, Reactive oxygen species (ROS), also known as free radicals, are created. Increased levels of these free radicals, or ROS, can cause oxidative stress, which can cause a variety of biochemical and physiological injuries, including impaired metabolism and cell death. Successful ROS activity prevention will be necessary to reduce morbidity and death from chronic illnesses. Consequently, by consuming more fruits and vegetables, including the

[Received 11 Feb 2023; Accepted 10 Apr 2023; Published (online) 13 Apr 2023]
Finesse Publishing stays neutral regard to jurisdictional claims published maps

Corresponding email:choudhary.mohammad@hotmail.com (Dr Muhammad Suhail Ibrahim)
DOI: 10.61363/fsamr.v2i1.57

strawberries, has been linked to lower rates of cancer, cardio disease (CVDs), and a variety of other human diseases. Strawberry fruit extracts (SFE) have been found to have chemo preventive and chemotherapeutic properties.

2. Health Benefits of Strawberry

Strawberry's heart shape is the first indication that it is healthy for us. These nutritious small packages protect our hearts, increase HDL cholesterol in our blood, lower blood pressure, and provide cancer protection. Strawberries, which are high in vitamins, fiber, and polyphenol antioxidants, have properties such as being sodium-free, fat-free, cholesterol-free, and low-calorie food(Afrin et al. 2016). They are a good source of manganese and potassium and are ranked among the top 20 fruits in terms of antioxidant capacity. One serving of eight strawberries contains more vitamin C than an orange. This is a member of the rose family, but it is not a fruit or berry, but rather the enlarged receptacle of the flower. When selecting berries, look for medium-sized berries that are firm, juicy, and deep red; once picked, they stop growing and ripening. Strawberries, which were first cultivated in Rome, are currently the most consumed fruit worldwide. These red candies are extremely beneficial in the treatment of heart disease (Hannum 2004).

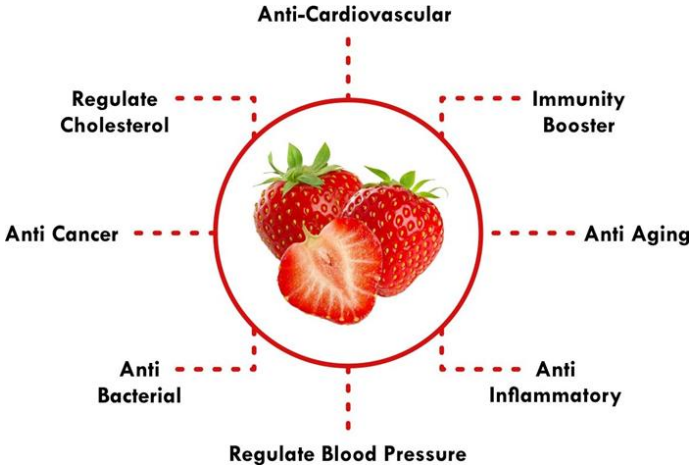

Figure 1: Therapeutic effects of strawberry

2.1 Prevent Heart Damage

Strawberries are the best food to protect your heart from disease due to their high antioxidant and polyphenol content. Strawberries contain an antioxidant named anthocyanins (responsible for their red color), which protect the circulatory system's lining, preventing artery blockage and plaque buildup and thus regulating blood pressure (Agarwal 2013).

2.2 Control Blood Sugar Level

Type 2 diabetes has been demonstrated to benefit from strawberry fruit. It has been demonstrated that using strawberry fruit in various preparations, including those that are consumed whole, cooled, extracted, and even powdered, can help prevent type 2 diabetes and improve insulin sensitivity, blood vessel inflammation, endothelial dysfunction, and blood sugar regulation. (Putri et al. 2020). Because strawberries have a low glycemic index, diabetics are less likely to experience sudden rises in blood sugar after eating them. Fibers found in strawberries help to regulate blood sugar levels as well (Mortensen et al. 2018).

2.3 Prevent Cancer

Strawberries are high in vitamin C and fiber, which are thought to protect against cancers such as esophageal and colon cancer. In line with AICR (American Institute for Cancer Research), the anticancer properties of strawberries may be due to ellagic acid present in abundant amounts, a plant component that can lower the risk of breast, lung, skin, and bladder cancer(Olsson et al. 2006). Ellagic acid has several anti-cancer properties, including the ability to act as an antioxidant, impede the spread of cancerous cells, and kill some types of carcinogens (Zhang et al. 2008).

2.4 Immunity Booster

Strawberries are a good source of vitamin C. Strawberries contains more vitamin C per serving than an orange. Our immune-boosting antibodies are stimulated and amplified by vitamin C, which helps our bodies fight against several sorts of infections (Forbes-Hernandez et al. 2016). South African researchers found that vitamin C supplements raised the levels of immunoglobulin, an antibody, and important immune system component. Strawberries have also been proven to be beneficial for asthma and allergies.

2.5 Regulate Blood Pressure

Anthocyanins, potent antioxidants that relax and open up the lining of blood vessels to relieve circulatory strain, are present in high concentrations in strawberries. (Basu et al. 2010). Independent of other metabolic alterations, strawberries may enhance endothelial function and acute changes in blood pressure in overweight or obese patients with moderate hypercholesterolemia, and thus may be regarded as a particular food or fruit to include in a heart-healthy diet (Xiao et al. 2019).

2.6 Improve Brain Health

Brigham and Women's Hospital conducted an investigation led by Harvard specialists. Also, the Women's Healing Center has discovered that admission complexes of strawberries camwood delays memory decline in older ladies. Strawberry's proximity to flavonoids may have contributed to this benefit. Furthermore, it is possible that a broader admission complex about anthocyanidins aided in slowing memory decay (Keservaniet al. 2016). A significant portion of human brain diseases (including Alzheimer's) Furthermore, (Parkinson's) requires assistance as a result of an increase in the amount of a specific poisonous protein. However, according to research, strawberries have been proven to promote the brain's natural cleaning process, known as autophagy, which reduces protein aggregation (Shukitt-Hale et al. 2008).

2.7 Anti- Inflammation

Strawberries are high in quercetin, and a study led by Tom's perusing the school for Massachusetts found that quercetin consumption, combined with general exercise, may reduce atherosclerosis plaque structuring. Moreover, strawberries have a lot of essential vitamin C that helps to prevent aggravation. This vitamin also helps to alleviate the symptoms of joint inflammation and gout (Schell et al. 2017). High quantities of the c-touchy protein are associated with increased levels of aggravation in the particular figure. Harvard School of Public Health researchers discovered that women who ate at least 16 strawberries a week had a 14% decreased probability of having high levels of this protein (Basu and Lyons, 2012).

2.8 Fight Cholesterol

Pectin, a type of solvent fiber found in strawberries, lowers muscle LDL (bad cholesterol) levels. Pectin is one form of soluble fiber that has been demonstrated to reduce LDL levels (Jenkins et al. 2008). Regarding each dissection being shared collectively a group of 23 healthy participants who had consumed 500 grams of strawberries every day for a month showed results after Tom had finished reading the Italian and Spanish scientists. a drop in LDL concentrations (Alasalvar et al. 2020).

2.9 Weight Loss

Strawberries, according to the Fat Resistance Diet, stimulate the production of the hormones adiponectin and leptin, both of which are fat-burning and metabolic hormones. As a result, your metabolic rate increases and you lose more weight. Strawberries, when combined with a healthy, well-balanced diet and regular exercise, can help you easily reach your weight-loss goal. Anti-inflammatory enzymes can treat internal injuries or even tissue damage, allowing you to exercise and lose weight while remaining healthy. Strawberry, a stunning mitigating food, restores the functionalities of claiming weight-loss hormones (García et al. 2001). The body produces more adiponectin when anthocyanins, the master antioxidants, are present. This hormone promotes digestion while also suppressing cravings. It may also cause the burning of fat (Gol et al. 2013).

2.10Support Healthy Pregnancy

Strawberries contain a lot of folates. According to the USDA, one cup of raw strawberries contains about 40 micrograms of folate. This comes to about 10% of the daily meal recommendation. Studies show that folates are

important for pregnant women because it can help prevent neural tube abnormalities. It is also critical for maternal health. Drinking banana and strawberry juice had a significant effect on increasing hemoglobin levels in pregnant women with anemia (Tulipani et al. 2009).

2.11Maintain Healthy and Strong Teeth

Malic acid, an astringent found in strawberries that helps to prevent tooth discoloration, is also a component of strawberries. Additionally, this fruit can aid with teeth whitening. This technique entails pulverizing the strawberries to a smooth paste before adding baking soda. Brush your teeth with a soft toothbrush after applying the mixture. After 4 minutes, thoroughly rinse your mouth after using toothpaste. But be careful not to overdo it as the fruit's acid can harm your teeth (Benahmed et al. 2022).

2.12.Prevent Aging

The capable antioxidants must be credited once more! These safeguard our health, beginning with oxidative damage. Also, halt the indications of Agincourt (wrinkles, listing skin, fine lines, and so on). In this way, observing and stock arrangement of all instrumentation may be improved (McBride 1999). Strawberries have numerous uses and a vitamin C content that is higher than that of grapefruit or oranges. Free radicals, which have been demonstrated to injure cells, are combated by this supplement. It also breaks down the collagen (resulting previously, fine lines). They would also benefit from claiming lycopene, a cell reinforcement that plays a significant role in preventing agincourt symptoms. Strawberry anthocyanins protect the skin from oxidative stress, slowing maturation (Butnariu 2019).

2.13.Skin Health

Strawberries contain alpha-hydroxy acid, a crucial substance that aids in the removal of dead skin cells and the cleansing of those skin cells during the transformation. (Butnariu 2019). Alpha hydroxy acid medications have been found to have anti-aging qualities, based on a research project carried out at the Hahnemann School of Medicine in Philadelphia, Pennsylvania. Alpha hydroxy corrosive substances were later found to enhance and repair photo-damaged skin in a Japanese investigation (Mintie et al. 2020). Strawberry foods also contain salicylic corrosive. Also mentioned is ellagic acid, which is used to reduce hyper pigmentation. Additionally, there are a few black areas. Salicylic acid is also well known for eliminating dead cells, starting with skin cells. Further skin outbreaks should be avoided by tightening the skin pores (Center–Cleveland et al.2019).

2.14. Strawberry Photochemical

The consumption of photochemical-rich foods, for example, organic products, vegetables, flavors, and a few beverages (Green and Black Tea, for example), is associated with a lower risk of ailments caused by oxidative stress and aggravation, for example, certain cancers, atherosclerosis, and neurodegenerative illnesses (Shi et al. 2015). Furthermore, there has been a recent surge in the utilization of strawberry extracts as fixings in useful foods and plant supplements for their potential human medical advantages. The micronutrients included in strawberries, including folic acid, vitamin C, and minerals, are all good for one's health. Due to their high concentrations of many photochemical and phytonutrients, the majority of which are phenolic write particles, berries may have extra health benefits. Phenolic mixes can range from small monomeric particles to big oligomers and feature a fragrant ring with hydroxyl gathering. Although greater atomic weight oligomers are more insoluble, they are typically found in berry organic compounds in glycosylated forms, which make them more water-soluble. Anthocyanins, flavonol, flavonol, consolidated tannins (proanthocyanidins), hydrolysable tannins, hydroxybenzoic and hydroxycinnamic corrosive subsidiaries, and flavonol are only a few of the phenolic compounds that are known to be present in berry organic products. Berry phenolics offer a variety of natural qualities, including anti-cancer, cancer prevention, relaxing, and cell administrative actions, according to in vitro research. The in vitro organic qualities of berry phytochemicals, however, do not always suggest in vivo natural exercises. As a result, a lot of research institutions are now more interested in doing studies to determine how berry phytochemicals exert their positive benefits in both animal models and humans. Due to their high fiber, potassium, vitamin C, and folates content, strawberries are one of the most popular and widely consumed small and delicate berry natural goods. Strawberries are also well known for their possible medical advantages. Additionally, strawberries contain a lot of phenolics, a phytonutrients that has undergone substantial research at numerous academic institutions (Azzini et al. 2010). Another research facility has a particular focus on the atoms' organic activities, bioavailability, digestion, and tissue circulation. Our team and others have been researching the effects of strawberry phenolic on oxidative stress and inflammatory indicators

Food Science & Applied Microbiology Reports
Vol. 2(1),2023; 1-7
ISSN (Online) 2958-0684
https://finessepublishing.com/fsamr

in both people and animals. The momentum survey is concerned with the photochemical present in organic strawberry products about the impact of strawberry consumption on human well-being, even though some of these investigations in various specialists' research centers are still ongoing. This audit updates the writing since the ongoing survey on the medical advantages of strawberries was released and focuses on more recent in vivo experiments that have been conducted using strawberry-related soil products (Ikram et al.2019). It is crucial to highlight that, as stated in this work, great progress has been made in understanding the bioavailability and digestion of ellagitannins and ellagic corrosive, two key phenolics included in strawberries. To evaluate strawberry phenolic' effects on human health and infections, it is necessary to study their assimilation, digestion, tissue circulation, in vivo organic influences, and components of activity. In actuality, phenolic particle science and science are important when thinking about their organic effects on the human body. As a result, to evaluate strawberries' possible effects on human health and infections, this audit summarizes the in vitro and in vivo investigations that have been done with them. A special focus is placed on the most recent studies (Battino et al. 2020).

2.15.Nutritional value of Strawberry

Strawberries are an abundant source of essential nutrients like Vitamin C, Folic acid, potassium, fiber, etc. If we see the daily recommendation of vitamin C, One bowl of Fresh strawberries has 160% of the Vitamin C required daily for only 50 calories.

One bowl of fresh strawberry or 165 g contains a different variety of nutrients in the following amount (Albregts and Howard 1980).

Figure2: Nutritional profiling of strawberry

This energy center also contains several strong antioxidants, such as anthocyanin, tocopherol, ellagic acid, quercetin, and kaempferol. These all have various functions.

2.16. Diet

We can get fresh strawberries, frozen, freeze-dried, frosted, and in jellies, syrups, and jams. If you buy frozen or dried strawberries, make sure the sugar content is clearly labeled. When purchasing strawberries in the form of jams or jams, opt for all fruit spreads that are free of sugar, sweeteners, and fillers. Here are some suggestions for utilizing this super food more effectively and including more strawberries in your everyday diet.

1 - Cut the strawberry into slices and add them to the chicken until the nutritious salad is ready.

2- We can make our fruit cocktail by putting different fruits like grapes, and pineapple, into the strawberries. If we want more sweetness we can add a small quantity of honey on the top of fruits

3 - Cut the strawberry into slices and add them to flavored yogurt lice. Add almonds for more taste and nutrition

4 -Strawberries can also be shaken with the aid of a food processor. Use fresh syrup for sweets or breakfast items by adding a little water.

5 - Mix the Strawberries into a salad of spinach with dry fruits and cheese.

6 - Make a toast of grain bagel and cover it with light cream cheese and strawberry

7- We make a smoothie from strawberries. Put some frozen strawberries in a freshly prepared banana shake and enjoy the smoothie.

3. Conclusion

In conclusion, numerous studies in cell culture, animal, and human studies indicate that strawberry is an attractive red color, heart-shaped fruit that is highly ranked among berry fruits all over the world. Strawberries have a significant and far-reaching impact on our health. Because these are necessary for our proper growth and development. Strawberry constituents serve different purposes, such as the photochemical constituents, which are mostly Phenols and are found throughout the strawberry matrix and can perform their function in both individual and combined forms. They maintain normal body functioning and protect the body from free radicals. Other advantages of using them include heart protection, skincare, constipation prevention, immune system boost, and so on. Strawberries are a commercially and economically accessible fruit. Further research indicates that strawberries address some of the disease's symptoms and aid in disease prevention. Strawberry fruit is easy to consume, and its leaves are also beneficial to us. It's tender and juicy. Other than eating it raw, there are numerous other ways to consume it. Salads, jams, jellies, syrups, and so on.

Author Contributions: Each author has contributed equally.

Funding: This research received no external funding.

4. References

Afrin, M. Gasparrini, T.Forbes-Hernandez, P. Reboredo-Rodriguez, B. Mezzetti,A. Varela-López, M. Battino, Promising health benefits of the strawberry: a focus on clinical studies, Journal of Agricultural and Food Chemistry. 64(22) (2016) 4435-4449.

Agarwal, Blueberries, cranberries, and Strawberries: Heart healthy fruits, Medical Sciences. 1 (2013) 4-6

Alasalvar, J. Salvadó, E. Ros, Bioactives and health benefits of nuts and dried fruits, Food Chemistry. 314 (2020) 126192.

Albregts, C. Howard, Accumulation of nutrients by strawberry plants and fruit are grown in annual hill culture, Journal of the American Society for Horticultural Science. 105(3) (1980) 386-388.

Azzini, F. Intorre, P. Vitaglione, A. Napolitano, M. Foddai, A. Durazzo, E. Venneria, Absorption of strawberry Phytochemicals and antioxidant status changes in humans, Journal of Berry Research. 1(2) (2010) 8189.

Basu, D. Fu, M. Wilkinson, B. Simmons, M. Wu, N. Betts, T.Lyons, Strawberries decrease atherosclerotic markers in subjects with metabolic syndrome. Nutrition Research. 30(7) (2010) 462-469.

Basu, T. Lyons, Strawberries, blueberries, and cranberries in the metabolic syndrome: clinical perspectives. Journal of Agricultural and Food Chemistry. 60(23) (2012) 5687-5692.

Basu, M. Wilkinson, K. Penugonda, B. Simmons, N. Betts, T. Lyons, Freeze-dried strawberry powder improves lipid profile and lipid per oxidation in women with metabolic syndrome: baseline and post-intervention effects, Nutrition Journal. 8(1) (2009) 43.

Battino, F. Giampieri, D. Cianciosi, J. Ansary, X. Chen, D. Zhang, T. Forbes-Hernández, The roles of strawberry and honey phytochemicals on human health: a possible clue on the molecular mechanisms involved in
the prevention of oxidative stress and inflammation, Phytomedicine.86 (2020)153170.

Benahmed, A. Gasmi, A. Menzel, I. Hrynovets, S. Chirumbolo, M. Shanaida, G. Bjørklund, A review on natural teeth whitening, Journal of Oral Biosciences. 64(1) (2022) 49-58.

Butnariu, Essential Compounds in Skin Health, EC Nutrition, 14 (2019) 50-57.

Esau, Anatomy of Seed Plants. John and Wiley. Inc, San Francisco, California, USA, 1977.

Forbes-Hernandez, M . Gasparrini, S. Afrin, S. Bompadre, B. Mezzetti, J. Quiles, M. Battino, The healthy effects Of strawberry polyphenol: which strategy behind antioxidant capacity, Critical Reviews in Food Science and Nutrition. 56(sup1) (2016) S46-S59.

García, M. Martino, N. Zaritzky, Composite starch-based coatings applied to strawberries (Fragaria ananassa), Food/Nahrung. 45(4) (2001) 267-272.

Gol, P. Patel, T. Rao, Improvement of quality and shelf-life of strawberries with edible coatings enriched with Chitosan, Postharvest Biology and Technology. 85 (2013) 185-195.

Hannum, Potential impact of strawberries on human health: a review of the science, Critical Reviews in Food Science and Nutrition. 44(1) (2004) 1-17.

Hosek, A. Warner-Smith, C. Watson, The body politic and the citizen's mouth: oral health and dental care in Nineteenth-century manhattan, Historical Archaeology, 54 (2020) 1-22.

Ikram, U. Abassi, N. Khalid, Strawberry (fragariaananassaduch): phytochemicals, nutraceutical, and health Benefits: a brief review, World Journal of Biology and Biotechnology. 4(3) (2019) 25-34.
Jenkins, T. Nguyen, C. Kendall, D. Faulkner, B. Bashyam, I. Kim, A. Josse, The effect of strawberries in a Cholesterol-lowering dietary portfolio, Metabolism. 57(12) (2008) 1636-1644.
Jones, J. Sherwood, Delay times between harvesting or collection of food products and consumption for use in Radiological assessments, Journal of Radiological Protection. 29(3) (2009) 377.
Keservani, A. Sharma, R. Kesharwani, Medicinal effect of nutraceutical fruits for the cognition and brain health, Scientifica, 2016 (2016)1-5.
Lau, F. C., Bagchi, M., Zafra-Stone, S., &Bagchi, D. (2009). The benefits of antioxidant-rich fruits on skin health Nutritional Cosmetics (pp. 217-232): Elsevier.
Lee, A. Kader, Preharvest and postharvest factors influencing vitamin C content of horticultural Crops, Postharvest Biology and Technology. 20(3) (2002) 207-220.
Manganaris, V. Goulas, A. Vicente, L. Terry, Berry antioxidants: small fruits providing large benefits, Journal Of the Science of Food and Agriculture. 94(5) (2014) 825-833.
McBride, Can foods forestall aging, Agricultural Research. 47(2) (1999) 14-15.
Menzel, Temperature has a greater effect on fruit growth than defoliation or fruit thinning in strawberries in The subtropics, Agriculture. 9(6) (2019) 127.
Mintie, C. Singh, N. Ahmad, Whole fruit phytochemicals combating skin damage and carcinogenesis, Translational Oncology. 13(2) (2020) 146-156.
Mortensen, C. Spagner, C. Cuparencu, A. Astrup, A. Raben, L. Dragsted, Sea buckthorn decreases and delays Insulin response and improves glycemic profile following a sucrose-containing berry meal: a randomized, controlled, crossover study of Danish sea buckthorn and strawberries in overweight and obese male subjects, European Journal of Nutrition. 57(8) (2018) 2827-2837.
Olsson, C. Andersson, S. Oredsson, R. Berglund, K. Gustavsson, Antioxidant levels and inhibition of cancer cell proliferation in vitro by extracts from organically and conventionally cultivated strawberries, Journal of Agricultural and Food Chemistry. 54(4) (2006) 1248-1255.
Putri, B. Wiboworini, P. Dirgahayu, The effect of strawberry on type 2 diabetes mellitus, International Journal Of Nutritional Science. 5(1) (2020) 2-7.
Schell, R. Scofield, J. Barrett, B. Kurien, N. Betts, T. Lyons, A. Basu, Strawberries improve pain and inflammation
In obese adults with radiographic evidence of knee osteoarthritis, Nutrients. 9(9) (2017) 949.
Shi, S. Clinton, Z.Liu, Y. Wang, K. Riedl, S. Schwartz, T. Chen, Strawberry phytochemicals inhibit azoxymethane/dextran sodium sulfate-induced colorectal carcinogenesis in Crj: CD-1 mice, Nutrients. 7(3) (2015) 1696-1715.
Shukitt-Hale, F. Lau, J. Joseph, Berry fruit supplementation and the aging brain, Journal of Agricultural and Food Chemistry. 56(3) (2008) 636-641.
Tulipani, B.Mezzetti, M. Battino, Impact of strawberries on human health: insight into marginally discussed bioactive compounds for the Mediterranean diet, Public Health Nutrition. 12(9A) (2009) 1656-1662.
Xiao, L. Huang, I.Edirisinghe, B. Burton-Freeman, Effect of strawberry intake for 4 weeks on vascular endothelial function and blood pressure in adults with moderate hypercholesterolemia, Current Developments in Nutrition, 3(1), (2019) P006-128-019.
Zhang, N. Seeram, R. Lee, L. Feng, D. Heber, Isolation and identification of strawberry phenolics with antioxidant and human cancer cell antiproliferative properties, Journal of Agricultural and Food Chemistry. 56(3) (2008) 670-675.