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SHORT REVIEW

An Attention-Grabbing Review on Stigma Maydis (Corn Silk)

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Abstract

Herbs are one of humanity's oldest known therapeutic needs for long-term health, and they serve as the foundation for modern medicine. There is currently a thirst and demand for healthy diets with added value all around the world. One such important herb that can be found in many different locations is corn silk. The Chinese and Native Americans have used the herb corn silk (Stigma maydis) for generations to treat a wide range of conditions. Many countries around the world, including Turkey, the United States, and France, use it as traditional medicine. Its potential application is highly dependent on the characteristics and mechanisms of action of the plant's bioactive ingredients, such as flavonoids, terpenoids, and other phytochemicals. Pharmacological investigations have shown that this traditional plant has medicinal qualities such as anti-oxidant, anti-depressant, anti-hyperlipidemia, anti-diabetic, anti-inflammatory, neuroprotective toxicity and many more.

Keywords: Anti-hypertension, Botanical Description, Corn Silk, Diabetes, Pharmacological Action

1. Introduction

Corn silk refers to the fine, silky hairs that can be found inside a whole, unbroken cob of corn. Corn silk is a thin, threadlike structure found at the apex of an ear of corn (*Zea mays* L), an annual plant in the Gramineae family[1] (Figure 1). When corn (maize) is processed, a byproduct known as "corn silk" is created (corn). Maize is an important cereal and edible grain that ranks third in global production. It is also a key source of energy. Tassels are the male flowers that generate yellow pollen and corn silk is produced by the female flowers. The silks serve as a female flower's stigma and as the fruit matures the silk elongates beyond the cob, covering the plant's edible portion[2,3]. Light green corn silk matures to red, yellow or brown. Corn silk is a fine, silky thread that is typically grown in warm areas and ranges in length from 10 to 20 centimetres. Traditional medicine has made use of corn's silky hair for centuries in addition to its more well-known kernels. Each silk of corn must be pollinated to produce just one kernel of corn. Multiple investigations have demonstrated that corn silk has medicinal properties, including antioxidant action[4-7], anti-diabetic activity[8,9], antibiotic efficacy against corn earworm[9], and anticancer activity[10]. Evidence from phytochemical analyses[11-15] indicates that corn silk contains a wide range of bioactive compounds, including flavonoids, ferulic acid, saponins, phytosterols, chlorogenic acid, p-coumaric acid, volatile oil, fixed oil, resin, sugars, allantoin, tannin and minerals.

Figure 1. Corn silk.

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Herbal remedies have been used for centuries and their use forms the basis of contemporary medicine[2]. The presence of natural antioxidants, especially phenolic compounds, has many therapeutic effects. In order to prevent diseases associated with oxidative stress, these molecules can scavenge Reactive Oxygen Species (ROS)[16].

2. History

Corn silk is a byproduct of the corn farming (agriculture) industry and can be used as a low-cost plant food. In history, between 1397-1470 (Ming era), Corn Silk (CS) was first recorded as a traditional Chinese classical herb in the classic Materia Medica of South Yunnan by Lan Mao, a Chinese physician. To alleviate the symptom of internal stagnation of fluid dampness, CS is considered a good medicinal plant in Traditional Chinese Medicine (TCM). It is now widely grown all over the world. It is presently cultivated in many different countries. Included among the 10,000 species in the native corn family's 600–700 genera are the cereal grains wheat, oats, barley, and rice[17,18] .

3. Botanical Description

Corn silks are a byproduct of the agro-industrial processing of corn and are currently being studied for their potential health benefits to increase their value as a source of bio-functional chemicals[19]. Corn silks are the long, silky filaments that sprout from the top of both baby corn and corn fruit. The immature stage of the corn plant, known as "baby corn", is harvested after 60 days. It is an unfertilized female flower. However, corn fruit is created from a fertilised female blossom and it takes about four months from planting to harvest. Corn is a versatile crop that can be used in a variety of ways, such as food or feed, fuel, or a source of oil, starch, or ethanol[20]. Maydis stigma is also recognized as a legitimate herbal medicine[21]. Corn Silk (CS) is derived from the stigma of the plant species *Zea mays* Linn (Poaceae/Gramineae). Samples of corn silk were shown to exhibit genetic and phenotypic variances, and these links were then used to identify the geographic regions from which the corn was originally cultivated[22]. Corn varieties with distinct phenotypic profiles have been identified and classified. The most extensively grown and used varieties of corn in the food sector are sweet, waxy, and purple corn[23-25]. In several countries, corn silk has been used medicinally for centuries.

4. Chemical Components of Corn Silk

Corn and its byproducts have several uses in the culinary, agricultural, and healthcare industries. Grain corn is an important source of calories and essential nutrients for optimum health in many countries. Crude fibre accounts for around 87% of the weight of the pericarp and is composed of 67% hemicellulose, 23% cellulose, and 0.1% lignin. The endosperm is rich in carbohydrates (87.6 percent) and protein (8 percent). But the germ is rich in crude fat (33%), protein (18.4%), and minerals. In addition to its high protein (25.58%) and dietary fibre (30.4%) content, baby corn also has relatively high total sugar (10.07 g/100 g) and low crude lipid (3.67%) and ash (3.74%) concentrations[26]. In contrast, there were 5.43 mg/100 g of ascorbic acid in immature corn (0.05 g/g methionine, 2.85 g/g isoleucine, and 0.6756 g/g leucine). In terms of flavonoids, corn silk had the highest concentration. Previous research indicated that the majority of the phytochemicals in corn silk are phenolics, flavonoids and anthraquinones, which were found in greater concentrations in the upper (dark brown) portions of CS than they were in the lower portions of CS[27].

Ultraviolet scanning showed that the majority of corn silk flavonoids were flavones and isoflavones[28], whereas thin-layer chromatography data showed that the majority of corn silk flavonoids were luteolin, formononetin and apigenin. Corn silk samples analysed by LC/MS showed the presence of five chlorogenic acids (CGA). Esters of hydroxycinnamic acids, caffeic or p-coumaric acid, and quinic acid are known collectively as chlorogenic acids[29,30]. Three flavone glycosides were identified in corn silk using LC/MS analysis named 3'-methoxymaysin, maysin, and reduced derivatives of maysin. It was found that maysin and its methoxy derivatives were the most common luteolin analogues. Flavone glycosides, in general, exhibited potent radical scavenging action and so may serve as beneficial dietary antioxidants. The oxidation of quinoidal compounds facilitated the formation of the heterogeneous polymers responsible for the browning reaction and the colour of silk. In the silking and R4 dough stages, chlorophyll a was approximately 55.63 percent and 10.43 percent higher than chlorophyll b in all other corn silks, respectively. "2"-O—L-rhamnosyl-6-Cfucosylluteolin and "2"-O—L-rhamnosyl-6-Cfucosyl-3'-methoxyluteolin have been isolated. Gas Chromatography-Mass Spectrometry

(GC-MS) detected 36 different compounds in a volatile dichloromethane extract of Egyptian CS. More than 99% of the volatile compounds in the extract were terpenoids, the most abundant of which were cis-terpinol and citronellol. In addition to the cinnamic acid molecules, glucose, rhamnose, and minerals were discovered in CS. Silks from both baby corn and mature corn contain minerals like Ca, Mg, K, Na, Cu, Fe, Mn, and Zn. Significant differences were found between the contents of Ca, Mg, K and Na in immature and mature silks. Mature silks had a substantially higher concentration of K and Na than immature silks[31-33], while immature silks had a much higher content of Ca and Mg.

5. Therapeutic Applications of Corn Silk

5.1 Antioxidant Effect

Imbalanced reactive oxygen species lead to Oxidative Stress (OS). Damage to proteins, lipids, and DNA, as well as cell death, have all been linked to persistent OS[34]. Cancer, heart disease, diabetes, kidney disease and accelerated ageing are all connected to excessive levels of free radicals and Reactive Oxygen Species (ROS)[35]. Corn silk contains a high concentration of bioactive compounds found in nature, many of which have powerful antioxidant properties. TPC and TFC levels were shown to be associated with the antioxidant potential of CSEs. Corn silk samples examined for their ability to scavenge DPPH radicals showed an IC50 range of 0.043 to 0.239 mg, consistent with a broad range of antioxidant activity. Corn silks at the silking stage had the highest antioxidant activity with an IC50 value of 0.059 mg (on average)[36,37]. CSEs' reducing potential was determined using the FRAP assay, which relies on the formation of a fluorescent blue Fe^{2+}–TPTZ complex upon the reduction of Fe^{3+}. Quercetin glucoside, p-coumaric acid, ferulic acid, and other phenolics were all implicated and their reducing potential ranged from weak to strong. To emphasize the importance of quercetin, two one-electron transfers with identical redox potentials were used to describe its high oxidizability (or reduction power)[38].

5.2 Anti-inflammatory Effect

When inflammation occurs, it triggers the production of analgesic mediators that work to dull the pain. A wide range of physiological processes is triggered by TNF-α and *E. coli* Lipopolysaccharide (LPS), two key inflammatory mediators[39,40]. Leukocyte adherence to endothelial cells (EAhy 926) is increased when TNF-α or LPS stimulates the synthesis of adhesion molecules such as ICAM-1, ELAM-2 and VCAM-1, leading to inflammation. Interfering with leukocyte attachment or adhesion molecule expression is a crucial component of treatment for many inflammatory diseases. Concentrations of 9–250 g/mL of the ethanolic extract significantly inhibited TNF-α and LPS-induced adhesiveness of endothelial cells to monocytic cells. Extract from CS was also used to examine the mechanisms by which TNF-α, LPS, and PMA induce ICAM-1 expression. ICAM-1 expression was decreased by 50% and 65%, respectively, after 4 and 18 hours after administration of CS extracts[41,42]. Extracts from CS (2 and 4 g/kg body weight) were found to significantly reduce C3 protein levels, therefore blocking inflammatory processes. However, the C4 protein is unaffected by the CS extract dosages. After 24 hours of incubation with corn silk at concentrations of 2.5 g/mL, NF-β activation began to induce cyclooxygenase-2 (COX-2) in murine macrophages[43]. Macrophage surface expression of COX-2-regulated iNOS expression and PGE2 production through EP2 and EP4 receptors. Based on these results, it appears that iNOS and COX-2 are positively regulated via feedback in the treatment of inflammation and improvement of vascular permeability. Individuals who were given aqueous cornsilk extract for 5, 10 or 20 days showed a statistically significant improvement in their UTI symptoms compared to those who received a placebo. This herbal medicine has been used for a long time to treat both chronic and acute UTIs. It is best used in conjunction with other more potent antiseptic herbs to treat bladder infections, which significantly reduces the burning and agony of UTIs[44].

5.3 Antimicrobial Effect

This study set out to investigate the antibacterial properties of corn silk solvent extracts and flavonoids and to compare them to the conventional antibiotic gentamycin. The bactericidal effects of 25 mg/mL extracts of corn silk in petroleum ether (PECS), chloroform (CECS), and methanol (MECS) were tested. *Bacillus cereus*, *Bacillus subtilis*, *Escherichia coli*, *Shigella sonnei*, *Shigella flexneri*, *Proteus vulgaris*, *Proteus mirabilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Enterobacter aerogenes*, *Salmonella typhi*, and *Salmonella paratyphi* were employed to test the extracts for

antibacterial activity. For comparison, use gentamycin at 50 µg/mL. Two flavonoid glycosides were extracted from maize silk and their antibacterial activity was studied. The potential to prevent microbial growth was measured using the agar hole-plate diffusion technique. Eleven out of the twelve microorganisms examined showed some level of susceptibility to PECS, MECS and flavonoids. About 5% of bacteria tested positive for resistance to CECS. Extracts and flavonoids showed no activity against *Escherichia coli* and *Candida albicans*. All of the bacteria tested were susceptible to gentamycin, which was used as a comparison in this study. Extracts and flavonoids were much more sensitive than gentamycin against a wide range of bacteria and yeasts[45,46].

5.4 Effect on Central Nervous System Diseases

The central nervous system is also significantly affected by corn silk extract. Corn silk extracts in petroleum ether, chloroform, and ethyl acetate were tested for their anti-anxiety effects in a variety of animal models. Three different types of animal tests, namely the elevated plus maize test, the mirror chamber test and the hole board test were employed for this research. Five mice from each of the six groups were used in the study, with some of the animals getting doses of petroleum ether, chloroform, and ethyl acetate extract. The anti-fatigue effects of CS were studied in mice by having them swim after they were orally administered 100 and 400 mg/kg of flavonoids CS (FCS) for 14 days. The FCS-treated group improved their swimming times by 39.6 percent (100 mg/kg) and 115.9 percent (400 mg/kg) compared to the control group. Energy expenditure is directly related to the body's endurance capability; therefore, it makes sense that boosting glycogen (a source of energy) in the liver during exercise would be beneficial. During exercise, the FCS treatment group had a 261 percent increase in hepatic glycogen concentration at 100 mg/kg and a 281 percent rise at 400 mg/kg, compared to the control group. These results demonstrated the FCS's anti-fatigue and exercise-enhancing capabilities[47-49]. Mice were subjected to a Forced Swimming Test (FST) and a Tail Suspension Test (TST) 1 hour after being treated with 125, 250, 500, 1,000 or 1,500 mg/kg of CS ethanol extract to test its antidepressant effect. In both the Forced Swimming Test (FST) and the Tail Suspension Test (TST), the extract reduced immobility time in a manner consistent with its antidepressant properties. Extract concentrations of 1,500 mg/kg were as effective as the gold standard (10 mg/kg imipramine) in the FST, producing a period of immobility lasting 57.6 seconds. No deaths were observed up to 4,000 mg/kg, suggesting that CS extract may be a useful natural antidepressant. Recent research has shown that CS has anti-depressant effects in rats with streptozotocin-induced diabetes[50,51]. The results showed that the polysaccharides in CS increased the duration of autonomic activity and improved excitation spirit in a dose-dependent fashion. According to the aforementioned findings, corn silk has an anxiolytic, anti-fatigue and anti-depressant effect.

5.5 Anticancer Effect

5.5.1 Colon Cancer

Research into new sources of bioactive compounds to help prevent colon cancer has increased dramatically in recent years[52]. Cell growth was decreased, mitochondrial membrane potential was lost, Ca^{2+} was released, and cytochrome C from the mitochondria was released into the cytosol after treatment with corn silk extract. Research data shows that at higher concentrations of corn silk extract, cancer cell proliferation was inhibited and apoptosis was increased. B-cell lymphoma 2 was downregulated by corn silk extract, which increased Bax, cytochrome C, caspase-3, and caspase-9. These findings suggest that apoptosis can be caused by corn silk extract through a mitochondria-mediated pathway. Caspases, a group of proteases, are responsible for bringing about apoptosis, or cell death. During the early stages of apoptosis signal transduction, caspase-9 is involved. Caspase-9 is activated after cytochrome c is released from mitochondria and forms a complex with it. Apoptosis can be triggered by activating caspase-9. Among its many roles in the apoptotic process, caspase-3 aids in the condensation of histones, the fragmentation of genetic material, and other nuclear consequences[2]. Apoptosis in LoVo cells was caused by corn silk extract, as demonstrated by this study. On the other hand, corn silk extract in LoVo cells induced nuclear condensation and DNA fragmentation as well as the production of Ca2+ and caspase activation[53,54].

5.5.2 Pancreatic Cancer

The crude polysaccharide S1 extracted from corn silk has been found to suppress pancreatic cancer cell proliferation in both *in vitro* and *in vivo* conditions.

Additional studies demonstrate that S1 can inhibit pancreatic cancer cell motility and invasion, as well as cause apoptosis and cell cycle arrest in the S phase. There is some evidence that S1 blocks the EGFR/PI3K/AKT/CREB signalling pathway, which may explain its effectiveness against pancreatic cancer. In contrast, S1 is remarkably nontoxic in both test tube and animal experiments. In addition, S1 decreases, concentration-dependently, both EGFR and CREB phosphorylation. As a result, the findings support the hypothesis that S1 could be improved into a beneficial dietary supplement for reducing the risk of pancreatic cancer[55].

5.6 Hypoglycemic Effect

Disability and death related to diabetes mellitus have arisen as important public health concerns in both industrialised and developing nations. Systemic weight loss, an acetone-like breath odour, nausea, vomiting, stomach pain, frequent urination, excessive urination of glucose-rich urine, blurred vision, polydipsia and excessive eating are some of the most common symptoms of diabetes. Without optimal management, diabetes can lead to micro- and macro-vascular problems like CVD, neuropathy, retinopathy, and nephropathy[56]. The World Health Organization projects that by 2030, diabetes will overtake AIDS as the sixth greatest cause of mortality worldwide. There has been some recent interest in the potential of herbal remedies for diabetes. Phytoconstituents have been demonstrated to have an anti-diabetic impact in both animal and human experiments, suggesting a role for phytotherapy. Phytochemicals stimulate insulin release from beta cells, boost glucose uptake by tissues and promote pancreatic tissue regeneration[57-59]. Corn silk extract has been shown to significantly reduce hyperglycemia in mice induced with diabetes via alloxan administration. Corn silk extract improves glucose metabolism by repairing damaged β-cells and raising insulin levels. The production of glycogen and the mechanism of gluconeogenesis are unaffected. These findings indicate that corn silk extract may be effective as a hypoglycemic treatment for people with metabolic syndrome[60]. Blood glucose, glycohemoglobin (HbA1c), insulin secretion, and pancreatic beta-cell damage are just a few of the glycemic markers altered by CS extract. Daily therapy with a dose of 100-500 mg/kg body weight of POCS (Polysaccharides of Corn Silk) was found to dramatically reduce blood glucose levels, total cholesterol, and total triglyceride levels in a study involving both *in vivo* mice and diabetic rats. Oral Glucose Tolerance Tests (OGTT) are enhanced by POCS and indicate hypoglycemic effects. Further, an aqueous extract of corn silk has been shown to inhibit the activities of both alpha-amylase and beta-glycosidase *in vitro*[61,62]. α-amylase acts on the 1,4 glycosidic linkages in the starch polysaccharide, causing starch molecules to hydrolyze into small-chain dextrin. Carbohydrate digestion is reduced after alpha-glycosidase inhibition, which reduces glucose absorption[63].

5.7 Anti-hypertensive Effect

When it comes to major, continuing health problems, hypertension ranks at the top globally. Dipeptidylcarboxy peptidase, an Angiotensin-Converting Enzyme (ACE) in the RAAS converts inactive vasoconstrictor angiotensin I into active vasoconstrictor angiotensin II[64]. Reducing ACE activity leads to less angiotensin II being produced, which in turn allows blood vessels to relax and blood pressure to drop. ACE inhibitors, such as captopril and enalapril, are commonly prescribed to treat hypertension[65]. According to a recent meta-analysis and comprehensive randomised controlled trials, the blood pressure-lowering effects of corn silk tea may be enhanced when combined with antihypertensive medications[66]. Potassium-induced natriuretic and diuresis contribute to corn silk's hypotensive effects[66,67]. For the first time, research revealed that corn silk contains the anti-hypertensive peptide (CSBp5). CSBp5, an ACE inhibitory phytopeptide discovered in corn silk, lowered SBP levels in rats. It was shown that CSBp5, an ACE inhibitory peptide, blocked the C-domain of ACE more efficiently than any other inhibitor studied to date. Somatic ACE consists of two catalytic domains that are extremely similar to each other (N and C-domains). Angiotensin II is primarily synthesised in the C-domain[68-70]. Whereas RXP407, a selective inhibitor of the N-domain of ACE, has minimal effect on blood pressure. Finally, it was discovered that after 1 hour of administration of 12 mg/kg, CSBp5 therapy, SBP levels were decreased (injectable: 28.33 ± 12.5 mmHg; oral: 36.78 ± 13.25 mmHg), with an IC50 of (44.11 ± 1.04) μM for ACE inhibition. The anti-hypertensive peptide chemical in corn silk tea was discovered using proteomics and bioinformatics techniques. The IC50 values for the reduction of ACE activity by the thermolysin hydrolyzed zein tripeptide (Leu-Arg-Pro, Leu-Ser-Pro, and Leu-Gln-Pro) ranged from 0.25 to 1.9 uM *in vitro*. In addition, reducing SBP by 14 mmHg 6 hours after oral therapy of

thermolysin hydrolysate of corn silk (5g/kg) is found in SHRs. Results offered supported the traditional utilization of corn silk tea in the treatment of hypertension. Corn silk extract contains an ACE-inhibiting polypeptide, which confirms the findings[71].

5.8 Nephroprotective Effect

Injury to the kidneys to the extent that they can no longer excrete waste products normally is known as renal failure. Common complications of kidney failure include cardiovascular issues, anaemia, osteoporosis and acidosis[72]. Corn silk extract was reported to increase kidney function in rat renal models. Serum creatinine and urea levels, as assessed by blood tests, have improved. Kidney damage was further linked to the extract after histological examination. Corn silk has been explored for its potential as a diuretic agent for the treatment of renal calculus and other urinary tract infections[73,74]. Treatment with corn silk and binahong has been shown to improve kidney function, as evidenced by a lower creatinine and urea blood level, a higher kidney index, and a healthier nephritic histology in previous studies. Furthermore, it found that the medicine decreased lipid peroxidation, which in turn alleviated oxidative stress in the excretory organs by elevating the activity of inhibitor enzymes like SOD and boosting renal function[75]. In two separate experiments, corn silk extract was shown to prevent kidney damage in mice exposed to gentamicin for eight days[76,77].

5.9 Effect on Metabolic Syndrome

Obesity, hypertension, diabetes, elevated triglycerides, and inadequate HDL cholesterol all contribute to "syndrome X", often known as metabolic syndrome. Between 20% and 25% of the adult population may have metabolic syndrome[78,79]. By increasing insulin levels and speeding up the repair of injured cells, corn silk extract influences glycemic metabolism. Neither the process of gluconeogenesis nor the creation of glycogen is affected by this. Hypoglycemic benefits of corn silk extract for persons with metabolic syndrome have been demonstrated in research[80]. Serum glucose, total cholesterol, and total triglyceride levels in diabetic rats were all shown to be considerably decreased after administration of corn silk polysaccharides. Improvements in performance and hypoglycemic effects have been shown when POCS is administered before an Oral Glucose Tolerance Test (OGTT). Compared to the placebo group, Aqueous Extract from Stigma Maydis (AESM) significantly reduced fasting blood glucose, the kidney index, and urine albumin at both moderate and high doses. In renal tissue, AESM suppresses the expression of Transforming Growth Factor 1 (TGF-1) and fibronectin and controls the synthesis and decomposition of the extracellular matrix. Because of this, the renoprotective effects of AESM have been demonstrated and renal degenerative lesions in diabetic rats have been attenuated[81,82]. Corn silk's preventive effect against diabetic nephropathy is attributed to its ability to increase blood flow to the kidneys. Clinical research has also provided strong evidence that potassium plays a significant role in regulating blood pressure[83]. Corn Silk Aqueous Extract (CSAE) may have hypotensive effects due to the high potassium content of the extract.

5.10 Anti-obesity Effect

Obesity has increased rapidly in both developed and developing countries during the past few decades. Because of the epidemic of obesity and its linked diseases, researchers have been curious about the development and distribution of adipose tissue and overall body fat[84]. Many health issues are linked to obesity, which is characterised by an increase in adipose tissue mass. Excessive body fat has been linked to an increased risk of many diseases in numerous studies. Reducing adipogenesis has been linked to a decrease in body fat by reducing both the number and lipid content of adipocytes. Adipocytes expand and multiply during the adipogenesis process[85]. Adipogenesis is the process through which immature adipocytes undergo a series of cell divisions and eventually mature, allowing for changes in the overall number of fat cells. Inhibiting adipogenesis, decreasing lipid accumulation, and inducing apoptosis in adipose cells are thus methods for controlling adipose tissue size[86].

Maysin, the primary flavonoid in corn silk, has been demonstrated to inhibit adipose tissue development in 3T3-L1 preadipocyte cells and C57BL/6 mice. Maysin reduced the protein expression levels of C/EBP-b, C/EBP-a, PPAR-gamma, and aP2 in 3T3-L1 preadipocyte cells, hence inhibiting the accumulation of lipids and the differentiation into adipocytes. By activating caspase and disrupting mitochondria, maysin has been demonstrated to trigger apoptosis in 3T3-L1 preadipocyte cells, which may result in a reduction in adipose tissue mass. Maysin (25 mg/kg body weight) was administered orally and reduced body weight and epididymal fat weight in C57BL/6 mice that had been fed a High-Fat Diet (HFD). Maysin reduced

blood glucose, total cholesterol, LDL cholesterol, and triglyceride levels. For 10 weeks, mice were fed a High-Fat Diet (HFD), and then given corn silk extract and beta-sitosterol to prevent the weight gain associated with being obese. The HFD group was significantly heavier than the control group. When compared to the High-Fat Diet (HFD) group, hematoxylin and eosin staining showed that WAT cells and lipid droplets in liver cells were smaller in size after oral treatment with corn silk extract or beta-sitosterol. Mice fed a HFD had more adipocytes with larger cell sizes in their epididymal adipose tissue than those fed a normal diet. Epididymal fat accumulation and the size of expanded adipocytic cells were both significantly reduced by maysin therapy. These findings support the hypothesis that maysin could be effective as a medication for the treatment of obesity[87].

5.11 Effect on Skin Pigmentation

When it comes to determining skin colour, melanin is the most important factor among carotenoids, haemophiliacs, and bilirubin[88,89]. Corn silk's potential to reduce melanin synthesis was the subject of scientific investigation. Corn silk's ability to inhibit Melan-A cell protein expression and melanin formation was investigated. Melan-A cells treated with corn silk extract at 100 ppm had seen a 37.2% reduction in melanin formation. There was no evidence of cytotoxicity. At the same quantity, arbutin, a positive whitening agent, inhibited melanin formation by just 26.8 percent. While corn silk extract did not affect tyrosinase activity, it did significantly reduce tyrosinase expression in Melan-A cells. For the treatment of hyperpigmentation on the face, corn silk extract was utilised. An improvement in skin tone was observed. Corn silk extract effectively reduced hyperpigmentation without causing any adverse effects on the skin when applied to hyperpigmented facial areas[90].

6. Dosing

When deciding how much corn silk to take, it is important to take several factors into account, such as the user's age, health, and other conditions. At present, there is insufficient data to recommend a safe corn silk dosage. Remember that even with natural remedies, dosage may be of utmost importance. Consult a physician, pharmacist or other healthcare provider to determine the doses of corn silk that are advisable[87].

7. Toxicity Study

Ingesting corn silk at levels found in food is safe for pregnant and breastfeeding women. The stimulation of the uterus by corn silk can cause a miscarriage if used in excess. Lotions containing corn silk may cause a rash, red skin, and itching in people who are allergic to corn (including corn silk, corn pollen, and corn starch). The safety of corn silk for breastfeeding women is not well studied. If you are pregnant or breastfeeding, you should limit your consumption of corn silk. When taken in large quantities, corn silk might make it difficult for the body to promote balanced blood pressure. It would appear that corn silk is safe for most people to use[91].

8. Conclusion

According to the aforementioned research, corn silk is an excellent source of flavonoids. Myasin, a protein linked to weight gain, is also prominent in it. Corn silk polysaccharides were found to significantly lower serum glucose, total cholesterol, and total triglyceride levels. Diuretics derived from corn silk have been used to successfully treat renal calculi and other conditions affecting the urinary system. Corn silk peptide 5 (CSBp5), an ACE inhibitor, lowered serum phosphorus levels in rats. It has been shown that the crude polysaccharide S1, which is derived from corn silk, can inhibit the multiplication of pancreatic cancer cells both *in vitro* and *in vivo*. There is some evidence that corn silk can alleviate stress, boost energy, and elevate mood. Corn silk also has anti-inflammatory and antibacterial properties.

9. Abbreviation

ROS: Reactive Oxygen Species; CS: Corn Silk; TCM: Traditional Chinese Medicine; CGA: Chlorogenic Acids; OS: Oxidative Stress; LPS: Lipopolysaccharide; COX-2 : Cyclooxygenase-2; PECS: Petroleum Extract of Corn Silk; CECS: Chloroform Extract of Corn Silk; MECS: Methanol Extract of Corn Silk; CSAE: Corn Silk Aqueous Extract; OGTT: Oral Glucose Tolerance Tests; FST: Forced Swimming Test; TST: Tail Suspension Test; TGF-1: Transforming Growth Factor 1; ACE: Angiotensin-Converting Enzyme; HFD: High-Fat Diet; CSAE: Corn Silk Aqueous Extract ; CSBp5 : Corn Silk Peptide 5.

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