MEDS Chinese Medicine (2025)
Clausius Scientific Press, Canada

DOI: 10.23977/medcm.2025.070312
ISSN 2616-1753 Vol. 7 Num. 3

Progress in Chinese and Western Medicine Treatment of Meibomian Gland Dysfunction-Related Dry Eye

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Keywords: Meibomian Gland Dysfunction, Dry Eye, Treatment

Abstract: Meibomian Gland Dysfunction (MGD) is the primary cause of evaporative dry eye. The prevalence of MGD-related dry eye has been increasing, with a trend toward younger age groups, which affects patients' physical and mental health. This article aims to systematically review the progress in the treatment of MGD-related dry eye using Chinese and Western medicine over the past five years, and to provide clinical strategies for personalized and effective treatment.

Meibomian Gland Dysfunction (MGD) is a chronic and diffuse meibomian gland disorder caused by multiple factors. It is characterized by obstruction of the terminal meibomian gland ducts, acinar atrophy, and abnormal quality and/or quantity of meibum secretion. Local manifestations of the affected eye include discomfort such as dryness, itching, redness, and pain; in severe cases, it may even cause visual fluctuations and epiphora [1]. Additionally, MGD can lead to ocular surface diseases such as keratitis and conjunctivitis, endangering the health of the ocular surface.MGD induces changes in the composition of the tear film, resulting in evaporative dry eye. With the increased frequency of electronic device use, the incidence of dry eye has been rising, making it a major cause of ophthalmology outpatient visits. Statistics show that the global incidence of dry eye caused by MGD ranges from 46.2% to 86%, while meibomian gland abnormalities account for 65% of dry eye patients in China [2].

1. Etiology and Pathogenesis in Western Medicine

Dry eye is a chronic ocular surface disease caused by multiple factors. According to its etiology,it can be classified into aqueous-deficient, mucin-deficient, and lipid-deficient dry eye, as well as dry eye due to abnormal lacrimal dynamics and mixed dry eye. Meibomian Gland Dysfunction (MGD) is the primary cause of lipid-deficient dry eye, with over 80% of dry eye patients having comorbid MGD [3].

Meibum secreted by the meibomian glands consists of non-polar lipids (such as cholesterol esters, wax esters, and triglycerides) and polar lipids. Non-polar lipids are located on the surface of

the outer lipid layer of the tear film, slowing down tear evaporation, while polar lipids are distributed on the inner surface to stabilize the lipid layer [4].The pathogenesis of MGD remains unclear and controversial. Some studies have suggested that excessive keratinization of the meibomian gland duct epithelium leads to obstruction of the duct terminals, resulting in meibum stasis and cystic dilation in the collecting ducts, as well as blockage of the meibomian gland orifices. The stagnant meibum is prone to inducing an inflammatory response, which exacerbates glandular dysfunction, causes acinar atrophy and glandular dropout [5], and ultimately leads to MGD.Regardless of the cause, damage to the meibomian glands or abnormal meibum secretion will disrupt the lipid layer of the tear film, increasing the evaporation rate, shortening the tear film break-up time, and causing tear film instability—all of which result in lipid-deficient dry eye. The pathogenesis of MGD-related dry eye involves multiple factors, including intrinsic factors such as age, gender, hormones, and blood lipids. Studies have shown that in individuals over 60 years old, the proliferative capacity of meibomian gland acinar cells decreases by 50%, accompanied by acinar atrophy [6], which leads to hyposecretory MGD and subsequent dry eye. The meibomian glands have sex hormone receptor sites: estrogen inhibits meibum production, while androgens have the opposite effect and can also reduce ocular inflammation. Postmenopausal women experience a decrease in androgens, making them more susceptible to MGD-related dry eye [7].Dyslipidemia is associated with MGD-related dry eye, and patients with dyslipidemia have a higher incidence of MGD. This may be related to abnormal lipid metabolism regulated by the PPARG-mediated UCP2/AMPK signaling pathway [8]; other related pathogenic mechanisms require further exploration through experimental research.

2. Etiology and Pathogenesis in Traditional Chinese Medicine (TCM)

In Shenshi Yaohan (The Precious Mirror of Ophthalmology), MGD-related dry eye symptoms are described as “no swelling or redness, but discomfort, gritty sensation, and blurred vision.” Jinkui Qiyue (The Key to the Golden Chamber’s Essentials) notes: “Shenshui Jiangku” (Depletion of Ocular Fluids) refers to dry, dull ocular surface fluids without luster. This condition is particularly hard to identify, and its manifestations are difficult to describe precisely. It arises when fire stagnation steams the ocular lubricants, causing turbid secretions and dull eyes; the essential fluids are on the verge of exhaustion. Even if there is excessive tearing, it fails to moisten the eyes. Upon examination, the eye appears dry, with a luster similar to the saliva of a mayfly.”Zhengzhi Zhunsheng (Standards of Diagnosis and Treatment) records: “The eyes feel dry and uncomfortable, accompanied by blurred vision.” Yinhai Jingwei (Essentials of Ophthalmology) states: “Both eyes are red, with sticky discharge at the canthi, and the conjunctiva is red, swollen, and eroded.” In TCM, MGD-related dry eye falls into the categories of “Baise Zheng” (Dry Eye Syndrome), “Shenshui Jiangku” (Depletion of Ocular Fluids), “Ganse Hunghua” (Dryness and Blurred Vision), and “Jianxuan Chilan” (Eyelid Redness and Erosion) [9].The meibomian glands are part of the eyelids. According to the Five Wheels Theory (a core TCM ophthalmological theory), the eyelids belong to the “Flesh Wheel,” which is internally associated with the Spleen and externally paired with the Stomach (as the Spleen and Stomach are interior-exterior related in TCM meridian theory). The Foot-Yangming Stomach Meridian runs through the meibomian glands, and the Spleen Meridian is its interior counterpart. Whether viewed from the perspective of zang-fu organs (viscera) or meridians, the physiology and pathology of the meibomian glands are closely linked to the Spleen and Stomach.The Spleen governs muscles and is responsible for transportation and transformation. When the Spleen’s transporting function is normal, the eyelids open and close properly, and the meibomian glands remain unobstructed. The Spleen also governs the upward transportation of clear nutrients—by conveying the essence of food and water to the eyes, it

nourishes the eyelids and ensures the meibomian glands secrete lipids normally. The Stomach governs downward conduction of turbid substances; its downward flow coordinates with the Spleen's upward transportation of clarity, forming a pivotal balance of qi movement. When the Spleen and Stomach maintain orderly upward-downward qi flow, the meibomian glands function normally.Lanshi Mizang·Yiyan Ermen (Secret Records of the Orchid Chamber: Otorhinolaryngology and Ophthalmology) states: "The essence of all zang-fu organs is derived from the Spleen and ascends to nourish the eyes... Thus, if the Spleen is deficient, the essence of the five zang organs loses their proper function and cannot nourish the eyes to maintain clear vision." Piwei Lun (Treatise on the Spleen and Stomach) notes: "The nine orifices (including the eyes) are governed by the five zang organs. Only when the five zang organs receive sufficient qi from the Stomach can the orifices function smoothly."Etiological factors such as improper diet, emotional disorders, Spleen-Stomach deficiency due to aging, and prolonged illness impairing the Spleen and Stomach lead to dysfunction in their transportation and transformation, as well as disordered qi ascending-descending. Deficiency of Spleen-Stomach qi prevents the upward transportation of clear yang to nourish the eyelids, resulting in meibomian gland dysfunction. Clinical manifestations include weakness in eyelid opening, inability to sustain visual focus, dry and burning eyes. Deficient qi fails to propel body fluids, leading to fluid stagnation and phlegm accumulation; it also fails to promote blood circulation, causing blood stasis in the eyelids. These pathologies manifest as difficulty in eyelid movement, eyelid swelling, and conjunctival redness.

The Spleen favors dryness and abhors dampness, while the Stomach favors moisture and abhors dryness. Indulgence in greasy, sweet foods leads to internal retention of phlegm-dampness, which impairs the Spleen and disrupts the Stomach. Over time, this transforms into heat and accumulates dampness, resulting in Piwei Shire (damp-heat in the Spleen and Stomach). Such pathological changes cause meibomian gland obstruction, ultimately leading to MGD-related dry eye [10].

"The eyes are the 'official' of the Liver"—the eyes are the orifices of the Liver. The Liver governs dispersion and conveyance, promoting the transportation of qi, blood, and body fluids to the eyes, which enables the eyes to see objects and distinguish colors, and transforms fluids into tears to moisten the eyeballs. If emotional distress leads to stagnation of qi movement, the Liver's function of dispersion and conveyance becomes abnormal, resulting in irregular tear secretion and dryness of the eyeballs.As stated in TCM theory: "When a disease of the Liver is identified, one should know that the Liver may transmit the pathology to the Spleen, and thus the Spleen should be tonified first." When the Liver fails to maintain free flow of qi (liver qi stagnation), the "Liver Wood" (a TCM metaphor for the Liver in the Five Elements theory) counteracts "Spleen Earth" (a metaphor for the Spleen). Liver qi stagnation combined with Spleen deficiency leads to meibomian gland dysfunction, manifested as dryness and a burning sensation in the eyeballs.

Huangdi Neijing (Inner Canon of the Yellow Emperor) states: "At the age of forty-nine (for women), the Ren Meridian becomes deficient, the Taichong Meridian declines, and Tiankui (the substance governing reproductive function and aging) is exhausted... At the age of sixty-four (for men), Tiankui is exhausted, essence is insufficient, and the Kidney's storage function declines."Bihua Yijing (The Physician's Mirror of Pen Blossoms) notes: "When Kidney fluid fails to nourish the Liver (Wood in Five Elements theory) and blood becomes insufficient, one of the symptoms is dry eyes."Deficiency of Liver and Kidney yin (vital essence) occurs when Kidney fluid cannot nourish the Liver (Wood). This leads to inadequate nourishment of the eyelids, abnormal eyelid opening and closing, stagnation of the meibomian glands, and dryness of the eyeballs—manifesting as "Shenshui Jiangku" (Depletion of Ocular Fluids), with dull vision and lack of luster in the eyes.

Zhubing Yuanhou Lun (Treatise on the Causes and Manifestations of Diseases) states: "All zang-fu organs produce body fluids; the fluid that flows to the eyes is tears... The eyes are where the

primary meridians converge and serve as the pathway for upward-moving fluids. When these fluids are exhausted, the eyes become dry."The Lung governs dispersion and regulates the water passageways. When wind-heat invades the eyes and lingers in the Lung collaterals, the Lung's functions of dispersion and downward conduction become disrupted, preventing body fluids from being transported upward to the eyes. Additionally, wind-heat consumes Lung yin (vital essence), and insufficient Lung yin fails to nourish the meibomian glands. These pathological changes result in dry, stagnant sensations in both eyes and redness of the bulbar conjunctiva.Common clinical TCM syndromes of MGD include: Spleen-Stomach qi deficiency, Spleen-Stomach damp-heat, Liver qi stagnation with Spleen deficiency, Liver-Kidney yin deficiency, yin deficiency with dryness-heat, and Lung yin deficiency.

3. Western Medicine Treatment

3.1 Pharmacological Treatment

3.1.1 Artificial Tears

Supplemental treatment with artificial tears can alleviate the discomfort symptoms of MGD-related dry eye. However, due to the lack of lipid components, artificial tears instilled into the eyes evaporate rapidly. Adding lipid components to artificial tears helps prolong the retention time of the medication in the eye, stabilize the tear film lipid layer, and reduce tear evaporation. Additionally, studies have found that lipid-containing eye drops cause minimal interference with visual acuity in patients with MGD-related dry eye; such lipid components include castor oil, mixtures of light mineral oil and standard mineral oil, and mixtures of polar phospholipid surfactants and mineral oil [11]. Further promotion and research and development of these formulations are needed in clinical practice.Autologous serum has been proven to accelerate tear secretion, extend tear film break-up time, reduce corneal epithelial damage, and improve the Ocular Surface Disease Index (OSDI) score. It exhibits higher safety compared to artificial tears [12].

3.1.2 Antibiotics

MGD leads to evaporative dry eye disease (DED), characterized by increased tear evaporation rate, elevated tear film osmolarity, and subsequent reduction in tear film stability. This makes the eye vulnerable to microbial invasion; bacterial intrusion promotes the production of toxic compounds (e.g., lipases, matrix metalloproteinases) and pro-inflammatory molecules. MGD is closely associated with anterior blepharitis: excessive proliferation of Staphylococcus can block meibomian gland ducts, triggering MGD and inducing posterior blepharitis. The mutual interaction between anterior and posterior blepharitis further disrupts meibum secretion, impairs tear film stability, and causes dry eye, forming a vicious cycle.Doxycycline and azithromycin are commonly used to treat MGD-related dry eye. Azithromycin, a macrolide antibiotic, has stronger antibacterial and anti-inflammatory effects and is more effective than doxycycline in treating MGD-related DED. A study on patients with severe MGD found that when topical azithromycin was combined with systemic azithromycin, MGD symptoms improved significantly compared to systemic azithromycin alone [13].Attention should be paid to the side effects of antibiotics: the most common adverse reactions of oral doxycycline for MGD-related dry eye include gastric discomfort, rash, dizziness, and fever. For oral azithromycin, gastrointestinal symptoms are also the most frequent adverse events; topical azithromycin may cause ocular discomfort such as stinging, blurred vision, redness, or eyelid edema. Tetracycline was first used to treat blepharitis in 1951; it has anti-inflammatory and anti-metalloproteinase properties and is effective in treating moderate-to-severe MGD-related

DED [14]. However, its side effects cannot be ignored: oral tetracycline usually causes gastrointestinal discomfort (e.g., abdominal discomfort, nausea, vomiting, anorexia), and long-term use may increase drug resistance.Numerous clinical data indicate that antibiotics yield obvious short-term efficacy in treating MGD-related dry eye. However, antibiotic use has also been shown to trigger local inflammation, disrupt the inherent ocular microbiota, impair innate anti-inflammatory capacity, and exacerbate MGD-related dry eye symptoms, forming a vicious cycle [15]. Therefore, for MGD-related dry eye, selecting appropriate antibiotics and determining optimal antibiotic dosage and treatment duration require further clinical observation and data collection.

3.1.3 Hormonal Agents

Local conjunctival inflammatory markers and pro-inflammatory mediators are significantly increased in MGD patients compared to healthy individuals; thus, anti-inflammation is also an effective therapeutic approach for MGD. Corticosteroids can treat various inflammatory conditions by inhibiting pro-inflammatory cytokines and stabilizing inflammatory cells. For patients with moderate-to-severe MGD-related dry eye, low-dose topical steroids are recommended as a treatment option: their anti-inflammatory properties improve ocular inflammation by suppressing inflammatory cytokines.An innovative eye drop formulation combining 0.2% hyaluronic acid and 0.001% hydrocortisone sodium phosphate has been developed. The latter controls the expression of inflammatory markers, while hyaluronic acid provides moisturizing and lubricating effects. Together, they increase tear secretion, maintain tear film stability, and thereby improve clinical symptoms of DED [16].

3.1.4 Immunosuppressants

Other anti-inflammatory options include immunomodulatory agents, which have minimal effects on intraocular pressure and lens metabolism compared to glucocorticoids. The immunosuppressant cyclosporine A (CsA) is effective in treating moderate-to-severe dry eye and exhibits stable biological safety. CsA inhibits T-cell activation, reduces ocular surface inflammation, increases goblet cell count, and promotes mucin and tear secretion. In the treatment of MGD-related dry eye, studies have found that CsA eye drops alleviate eyelid margin hyperemia and meibomian gland obstruction, and improve meibomian gland function [17].However, the impact of long-term CsA eye drop use on corneal nerves remains controversial, and relevant domestic studies are limited. Therefore, regular corneal nerve examinations should be performed during CsA eye drop treatment.

3.1.5 Fatty Acid Supplementation

Omega-3 polyunsaturated fatty acids (ω-3 PUFAs) affect cellular and intracellular functions of various human organs, promote prostaglandin production, regulate inflammatory cell function, and exert anti-inflammatory effects by reducing cytokine levels and inhibiting cell proliferation [18], thereby relieving and preventing dry eye.Intake of foods rich in ω-3 PUFAs (e.g., linseed oil, fish oil, perilla oil) can improve OSDI scores, tear film break-up time, and meibum grade in patients with MGD-related DED. This is associated with enhanced tear film lipid layer function, reduced tear evaporation, and inhibition of lacrimal gland cell apoptosis. However, some studies suggest that ω-3 PUFA intake may not be effective in treating MGD-related dry eye [19], which may be related to the source and dosage of ω-3 PUFAs.The exact mechanism linking ω-3 PUFA deficiency to MGD-related dry eye remains unclear. However, ω-3 PUFAs are important components of retinal cell membranes and participate in lipid metabolism in the human body. Therefore, it is necessary to guide patients with MGD-related dry eye to supplement an appropriate amount of ω-3 PUFAs

through daily diet.

4. Physical Therapy

4.1 Ocular Cleansing and Hot/Cold Compresses

Patients with MGD-related dry eye can self-administer eye drops or eyelid cleansers to clean the eyelid margin, reduce bacterial colonization, and improve ocular discomfort. Ocular hot and cold compresses are easy to operate: hot compresses soften meibum and temporarily relieve ocular dryness, while cold compresses are more suitable for MGD-related dry eye accompanied by eyelid margin inflammation.

4.2 Intense Pulsed Light (IPL)

Intense Pulsed Light (IPL) is a therapeutic method that uses high-energy, pulsed polychromatic light beams to generate continuous intense composite light acting on skin tissue. With a spectral range of 500–1200 nm, IPL can be absorbed by various pigments in the human body, inducing local thermal effects. It exhibits anti-inflammatory, bactericidal, demodecticidal, and thermocyclic effects.IPL is widely used in dermatology to treat capillary and venous malformations, telangiectasia, and rosacea. Currently, it is also extensively applied in the treatment of MGD-related dry eye to improve meibomian gland function and reduce ocular pain. IPL may activate cells through photobiomodulation (PBM): light (especially in the red and near-infrared ranges) is absorbed by cytochrome C oxidase in mitochondria, stimulating mitochondria to upregulate ATP production and metabolic activity, and promoting key processes such as transcription and translation.PBM enhances antioxidant defense, reduces reactive oxygen species, lowers pro-inflammatory cytokine levels, and even alters macrophage phenotypes. A study found that increasing the distance from the IPL irradiation area to the eye does not reduce meibomian gland secretion function or exacerbate dry eye symptoms during IPL treatment for MGD-related dry eye [20]. PBM photons can increase cell membrane permeability, rebalance the sodium-potassium pump in cell membranes, and eliminate pain signals, thereby inhibiting pain associated with MGD-related dry eye [21]. Additionally, IPL may downregulate the overexpression of melanogenesis-related genes and inhibit UVB-induced cytokine expression [22].The photothermal effect of IPL can also kill bacteria in and around the meibomian glands, inhibit the release of pro-inflammatory factors, and improve meibomian gland function. IPL light waves at a wavelength of 578 nm are selectively absorbed by hemoglobin and converted into thermal energy, raising the temperature of local ocular tissues within a safe range. This helps soften solidified meibum in meibomian gland ducts, promote meibum expression, and unclog the ducts. The thermal effect of IPL can also seal small blood vessels on the meibomian glands, further inhibiting the release of inflammatory mediators, preventing inflammatory responses, and alleviating the condition.The infection rate of Demodex varies among MGD patients of different ages: MGD is more common in men under 40 years old, which is associated with androgen-induced excessive sebum secretion in men. Some studies have found a higher Demodex infection rate in women, possibly related to cosmetic stimulation of mite proliferation. Weiliang Zhang et al. found that Demodex infection is associated with personal hygiene [23, 24]. These uncertain factors require us to consider gender, age, and ocular hygiene in the design of future clinical studies on IPL intervention for Demodex.IPL can inhibit mite growth, alleviate local ocular inflammation in MGD-related dry eye, and reduce meibomian gland duct obstruction. Long-term continuous IPL treatment can effectively stabilize the tear film and improve the quality of life of patients with MGD-related dry eye [25].

4.3 Meibomian Gland Massage

Meibomian gland massage can unclog meibomian gland orifices and improve meibum secretion function. Since MGD-related dry eye is caused by multiple factors, combining massage with other treatments yields better results.Combining meibomian gland massage with heated eye masks can continuously improve the tear film lipid layer and meibomian gland function without causing corneal damage [26]. It should be noted that patients may experience pain or discomfort during the massage due to pressure applied to the meibomian glands.The combination of meibomian gland massage and nebulization therapy is superior to topical antibiotic eye drops in relieving MGD-related dry eye symptoms and improving visual function[27]. Additionally, meibomian gland massage combined with levofloxacin eye drops has obvious advantages in inhibiting aerobic bacteria in patients before ophthalmic surgery [28]; whether this combination can inhibit meibomian gland inflammation in patients with MGD-related dry eye deserves further clinical exploration.Furthermore, Wang Jiahui used helium-neon laser combined with meibomian gland massage to treat MGD-related dry eye. The study found that this combination effectively prolonged tear film break-up time, increased tear secretion, improved corneal epithelial cell damage, enhanced meibomian gland expression capacity, and improved the properties of meibomian gland secretions [29].

4.4 Vector Thermal Pulsation System (LipiFlow)

The vector thermal pulsation system (LipiFlow) first obtained marketing approval in 2011. It uses eyelid heaters to warm the meibomian glands while applying intermittent pulsed pressure (generated between the eye cup and eyelid heater) to the eyelids, synchronizing hot compresses with meibomian gland massage. The 12-minute treatment delivers heat through the inner surface of the eyelids, warming all meibomian glands in the upper eyelid simultaneously. This softens meibomian lipids, unclogs meibomian gland obstructions, and relieves ocular discomfort [30].Studies have indicated that a temperature of 40 ℃ is required to soften meibum; among various ocular heating methods, LipiFlow can raise eyelid temperature to >40 ℃ [31, 32]. In a review of LipiFlow over the past 15 years, Caroline A. pointed out that LipiFlow has long-term efficacy in treating MGD: a single LipiFlow treatment is equivalent to 3 months of daily use of heated eye masks, ocular massage, and blinking exercises. Compared with 14 different treatment methods (plus numerous combinations), LipiFlow has been proven safe and effective [33].

5. Meibomian Gland Probing (MGP)

Meibomian gland probing (MGP) for MGD was first reported in 2010. A probe is inserted into the meibomian gland through the gland orifice and advanced along the duct to unclog obstructions, balance pressure within the meibomian gland duct, and promote gland function recovery [34]. A 1 mm probe can be selected for locating and entering the meibomian gland duct; for deeper obstruction sites, 2–4 mm probes are used.In the treatment of MGD-related dry eye, MGP significantly alleviates symptoms such as dryness, tearing, redness, and photophobia, and improves the tear film lipid layer [35]. MGP can stimulate ductal epithelial cell proliferation and stem cell activation, increase glandular tissue, and improve meibomian gland function, with no complications observed during follow-up [36]. The combination of MGP and IPL exhibits good efficacy in unclogging obstructed meibomian glands and inhibiting meibomian gland inflammation [35]. Staged and stepwise treatment may yield better results for MGD-related dry eye.

6. Traditional Chinese Medicine (TCM) Treatment

6.1 Syndrome Differentiation and Treatment

6.1.1 Spleen-Stomach Qi Deficiency

Yang Yue et al [37]in their study on TCM syndrome factors of MGD, found that the primary disease locations of MGD are the Spleen, Stomach, Liver, and Kidney, while the main pathological natures are dampness, fire, and qi deficiency. The Spleen and Stomach are the "root of postnatal life" (a core TCM concept referring to their role in nutrient absorption). Deficiency of Spleen-Stomach qi impairs their transporting function, preventing qi, blood, and body fluids from ascending to nourish the eyelids. As a result, the eyelids are deprived of nourishment, meibum secretion decreases, and the eyelid meridians become obstructed due to stagnation.Tang Tang proposed that for MGD-related dry eye with Spleen-Stomach qi deficiency—characterized by dry eyes and inability to sustain visual focus—Buzhong Yiqi Tang (Tonifying the Middle and Benefiting Qi Decoction) with modifications is recommended [10]. Zhong Yuan et al. applied Tiaozhong Yiqi Tang (Regulating the Middle and Benefiting Qi Decoction) from Shenshi Yaohan (The Precious Mirror of Ophthalmology) to treat "Baise Zheng" (Dry Eye Syndrome) with Spleen-Stomach qi deficiency, achieving excellent efficacy [38].Spleen-Stomach qi deficiency is a key pathogenesis of MGD-related dry eye. In clinical practice, emphasis is placed on identifying the main syndrome: when Spleen-Stomach qi is replenished, the eyelids regain proper function.

6.1.2 Spleen-Stomach Damp-Heat

Piwei Lun (Treatise on the Spleen and Stomach) states: "Disordered diet, overwork, and internal invasion of 'yin fire' (pathogenic heat) into the Spleen (corresponding to 'Kun Earth' in the Eight Trigrams) prevent grain qi, nutrient qi, clear qi, stomach qi, and primordial qi from ascending to nourish the yang qi of the six fu-organs." Wenre Lun (Treatise on Warm Diseases) notes: "Dampness combines with warmth, steaming and stagnating to obscure the upper body, blocking the clear orifices (including the eyes) and impairing clarity with turbid pathogens."Damp-heat in the Spleen and Stomach obstructs the eyelids, leading to meibomian gland duct blockage and abnormal meibum secretion. Clinical manifestations include dry, dull pain in the eyes and faint redness of the bulbar conjunctiva.Qian Lijun flexibly modified Huazhuo Qushi Tongxin Fang (Decoction for Resolving Turbidity, Dispelling Dampness, and Unblocking the Heart Meridian)—originally developed by Lu Zhizheng—to treat MGD-related dry eye with Spleen-Stomach damp-heat, which improved meibomian gland function and relieved dry eye symptoms [39]. Liu Jing [40] found through experiments that Jinzhi Qingmu Fang (Golden Gardenia Eye-Clearing Decoction) combined with tobramycin and dexamethasone eye ointment alleviated symptoms in patients with MGD-related dry eye and Spleen-Stomach damp-heat, facilitated meibum expression, improved the properties of meibomian gland secretions, and stabilized the tear film.Combining TCM with topical ocular medications offers distinct advantages in treating MGD-related dry eye with Spleen-Stomach damp-heat.

6.1.3 Liver Qi Stagnation with Spleen Deficiency

Huangdi Neijing (Inner Canon of the Yellow Emperor) advocates: "Regulate emotions, live in a stable environment, balance yin and yang, and harmonize hardness and softness—thus pathogenic factors will not invade, and one can live long with clear vision."In modern life, fast-paced rhythms and high stress often lead to emotional distress. Over time, this disrupts the Liver’s function of maintaining free qi flow, causing qi stagnation. The stagnant Liver qi (metaphorically "Liver Wood")

then "overacts" on the Spleen (metaphorically "Spleen Earth"), resulting in dry, burning eyes.Researchers have found that treating MGD-related dry eye with Liver qi stagnation and Spleen deficiency from the perspective of "soothing the Liver and invigorating the Spleen" yields good efficacy in improving meibomian gland function, increasing tear secretion, and stabilizing the tear film [41], thereby enhancing the quality of life of patients with MGD-related dry eye.

6.1.4 Liver-Kidney Yin Deficiency

Longshu Pusa Yan Lun (Bodhisattva Longshu's Treatise on Ophthalmology) records: "If eye disease arises from fatigue... caused by deficient heat in the Liver and diaphragm combined with wind, it should be treated promptly. If the pathogenic root becomes entrenched, it will be difficult to eliminate."The Liver opens into the eyes, and the Kidney stores yin fluid ("Kidney Water"). When Kidney Water fails to nourish the eyes, dry eyes occur. Li Xiong [42] used Qinggan Yangxue Tang (Clearing the Liver and Nourishing Blood Decoction) combined with press needles, which was found to unclog meibomian gland ducts, promote meibum secretion, and reduce ocular surface inflammation. Zheng Mali achieved similar efficacy using oral Qiju Dihuang Tang (Chrysanthemum and Wolfberry Rehmannia Decoction) combined with meibomian gland massage [43].

6.1.5 Lung Yin Deficiency

Yijing Suhui Ji (Collected Reflections on Medical Classics) states: "When qi flows, fluids flow; when qi stagnates, fluids stagnate." The Lung governs dispersion and descent: when Lung qi is abundant, the essence of the five zang and six fu-organs circulates smoothly, transforming into tears to moisten the eyes. Deficiency of Lung qi impairs its dispersing and descending functions, disrupting fluid metabolism. This leads to fluid stagnation, which overflows into the eyelids, causing meibomian gland obstruction and dry, uncomfortable eyes.Clinically, treating MGD-related dry eye based on the syndrome of Lung yin deficiency yields good results. Combining meibomian gland massage with ocular steaming using modified Yangyin Qingfei Tang (Nourishing Yin and Clearing the Lung Decoction) can alleviate ocular dryness and discomfort, and increase tear secretion [44].

6.2 TCM External Treatments

6.2.1 Acupuncture Therapy

Volume 28 of Zhubing Yuanhou Lun (Treatise on the Causes and Manifestations of Diseases) states: "The eyes are the external manifestation of the Liver. They gather the essence of the zang-fu organs and the primary meridians, and serve as the pathway for upward-moving fluids. If grief and sorrow disturb the zang-fu organs internally, the fluid pathways open and tears flow; when these fluids are exhausted, the eyes become dry."Acupuncture for MGD-related dry eye selects periocular acupoints to promote qi and blood circulation, unblock meridians, and relieve eye dryness. Combining periocular acupuncture with the innovative "Fengchi Sanzhen" (Three Fengchi Needles)—developed by Zhu Xintai et al.—helps promote the discharge of meibomian gland secretions and lipids, improving patients' quality of life [45]. Filiform needle pricking of the meibomian glands also helps improve meibomian gland function [46].In treating MGD-related dry eye, acupuncture stimulates the body to release multiple neurotransmitters(e.g,endorphins, serotonin) and immunomodulatory factors, reducing meibomian gland damage caused by inflammation. Additionally, it improves the secretory function of the meibomian glands [47].

6.2.2 TCM Wet Hot Compress

Bencao Gangmu (Compendium of Materia Medica) records: "For eye pain, gritty sensation, and inability to close the eyes: heat a piece of blue cloth and apply it as a compress at regular intervals."TCM wet hot compresses improve MGD-related dry eye symptoms, the properties of meibomian gland secretions, and tear film stability [48]. Based on the patient's specific condition, different TCM herbal compresses are selected for local application, targeting the lesion directly to regulate the metabolic balance of the meibomian glands and restore their normal physiological functions.

7. Conclusion

MGD-related dry eye is a chronic disease caused by multiple factors. In terms of treatment:

Artificial tear eye drops require further modification;

For the use of topical and systemic anti-inflammatory drugs, additional clinical data collection is needed to provide a basis for precise treatment;

Physical therapy devices need continuous improvement, and the optimal timing for MGD treatment with Meibomian Gland Probing (MGP) should be determined;

TCM treatment has irreplaceable advantages in managing MGD-related dry eye.

Based on the patient's specific condition, combining the aforementioned treatment methods to develop precise and personalized diagnosis and treatment strategies is recommended.

Acknowledgements

Guiding Plan Project of Qinghai Provincial Health System in 2023 (No. 2023-wjzdx-30).

Seedling Program of Qinghai Provincial Hospital of Traditional Chinese Medicine (Project No.: QHSZYY-QM-202304).

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