

To Explore the Mechanism of Action of Face Needles

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Abstract: *With the increasing demand for beauty in society, Western medicine beauty technology is gradually limited due to potential adverse reactions, and acupuncture beauty has attracted much attention because of its safety. Based on a two-year clinical follow-up practice, combined with Professor Hui Jianrong's acupuncture theory, this study systematically explores the mechanism of action of facial acupuncture. This paper analyzes from the perspectives of traditional Chinese medicine and Western medicine: at the theoretical level of traditional Chinese medicine, based on the theory of yin and yang, qi and blood and Tibetan elephant theory, it is explained that the face needle realizes overall intervention by regulating the balance of qi and blood yin and yang and the function of the organs and meridians; At the level of Western medicine mechanism, from the perspectives of promoting minimally invasive tissue repair, regulating estrogen secretion, and optimizing local tissue metabolism, the biological basis of facial acupuncture to improve the skin microenvironment and delay aging is revealed. This study aims to provide a theoretical basis for the scientific connotation and clinical application of facial acupuncture therapy, and promote its standardized development in the field of aesthetic medicine.*

Keywords: Face needle, Mechanism of action, Qi and blood yin and yang, Organs and meridians, Minimally invasive repair, Estrogen, Local tissue metabolism.

1. Introduction

Facial acupuncture refers to the acupuncture method of treating diseases through acupuncture of specific acupuncture points on the face, which is developed on the basis of inheriting traditional Chinese medicine and acupuncture therapy [1]. Traditional Chinese medicine observation refers to a diagnosis method in which doctors use visual observation of the patient's systemic and local manifestations, tongue image and excretion to collect information on the patient's condition. In facial examination, observation is mainly to identify the characteristics of facial color, morphological changes and specific areas to achieve disease localization and characterization; Acupuncture therapy is a therapy guided by the theory of traditional Chinese medicine, studying meridians, acupoints and acupuncture methods, and exploring the use of acupuncture to prevent and treat diseases. Based on the meridian qi convergence characteristics of "Yang meridians meet on the face" in the "Huangdi Neijing", the corresponding acupuncture points are selected through color and shape differentiation, and the use of microneedles to implement local stimulation to promote the circulation of qi and blood throughout the body, forming an integrated diagnosis and treatment model of "face and whole body", showing unique advantages in the clinical application of freckle removal, anti-wrinkle, stroke and visceral diseases. Facial acupuncture has become an indispensable part of acupuncture therapy after the practice and arrangement of modern and modern doctors. Compared with the early acupuncture of specific acupuncture points, the current facial acupuncture methods are more diverse. The author's supervisor, Professor Hui Jianrong, is good at using the perimeter acupuncture method to treat melasma, the flat acupuncture method along the skin to relieve wrinkles, and the oblique acupuncture method to improve facial laxity and other facial disfigurement diseases. Its effect not only follows the principle of "meeting of all yangs", but also takes advantage of the vigorous qi and blood of Yangming, and can also regulate the twelve cortexes of the face to adjust the qi

mechanism of the whole body.

Our country as early as the "Huangdi Neijing" period, doctors have found that the face is not only a key part of the treatment of local diseases, but also an important hub for regulating the yin and yang of the whole body. The discussion of "each of the five colors has its own organs, and each has its own disease" in the "Huangdi Neijing", created a precedent for facial color diagnosis in traditional Chinese medicine and laid the foundation for the diagnosis of "outside and inside". The record of "The Qi of the Five Organs is read on the face, I already know", shows that the subtleties of the five organs are on the face, so that they are formed on the outside and become the mirror of the internal organs. The theory of "what is inside must be formed" in the "Neijing" "thoroughly clarifies the principle of internal internal and external appearance, and the corresponding internal organs and faces." Based on these theories, ancient physicians developed a unique facial acupuncture therapy, which can not only directly treat local diseases such as melasma and wrinkles and other disfigured diseases by stimulating specific areas of the face, but also regulate the functions of the corresponding organs through the conduction of the meridian system, so as to achieve the therapeutic effect of "adjusting the external and treating the inside". This kind of "face acupuncture therapy" fully embodies the characteristics of traditional Chinese medicine's "overall concept" and "syndrome differentiation and treatment", and is still widely used in clinical practice and has achieved significant curative effects.

2. Mechanism of Action

2.1 Mechanism of Action of Traditional Chinese Medicine

2.1.1 Yin-Yang theory

Yin-Yang theory is an ancient philosophical theory that studies the connotation of yin and yang and its laws of movement and change, and is used to explain the occurrence,

development and change of all things in the universe. Anything can be divided into yin and yang, and the substances and functions that have the propulsive, warming, and stimulating effects on the body belong to yang, while the substances and functions that have the effect of condensing, moisturizing, and controlling the body belong to yin [2]. In the theory of traditional Chinese medicine, the human face is not only closely related to the internal organs, qi and blood, but also can be finely divided according to the theory of yin and yang. Specifically, the tip of the nose is the dividing line, the area above the tip of the nose belongs to yang, and the area below the tip of the nose belongs to yin. This is because the characteristics of Yang Qi are light and clear upward, while the characteristics of Yin Qi are heavy turbidity downward, so the forehead, eyebrows and other areas on the upper part of the face are mostly connected to the Yang meridian, reflecting the rise and fall of Yang Qi; The lower jaw, mouth and other areas are related to yin, reflecting the rise and fall of yin energy. In addition, yin and yang can also be divided according to the inside and outside: the outer areas of the face, such as the ears and cheeks, belong to yang, because these parts are mostly related to the circulation of the yang meridian, such as the foot Shaoyang gallbladder meridian runs around the ear, and the foot yangming stomach meridian is distributed on both cheeks; The inner canthus of the eye, nasolabial folds, mouth and other inner areas belong to yin, because these parts are mostly related to the yin meridian or organ function, such as the inner canthus is related to the liver, the liver meridian is the yin meridian, and the state of the inner canthus can reflect the rise and fall of the liver yin; The state of the nasolabial folds can reflect the strength of the spleen and stomach function, especially the rise and fall of the spleen and yin. This division of yin and yang reflects the overall concept of traditional Chinese medicine of “correspondence between the upper and lower and the combination of internal and external”. As the “Suwen Yin and Yang Response Theory” says, “The clear yang comes out of the upper orifice, and the turbid yin comes out of the lower orifice; Qingyang develops pores, and turbid yin goes to the five organs; The clear yang fills the limbs, and the turbid yin returns to the six bowels. It is pointed out that the Qing Yang Qi has the characteristics of light and clear ascendant, which can rise to the head and face, nourish the five features and seven orifices, and manifest as external signs such as luster, rosyess, and full demeanor of the face. As one of the “upper orifices”, the face is an important part of the convergence of Qingyang qi, and its state directly reflects the rise and fall of Qingyang. if the clear yang is sufficient, the face color is bright and the expression is radiant; If the clear yang is insufficient, the complexion may be dull, pale or chlorosis.

2.1.2 Qi and blood theory

Qi is a very fine substance with strong vitality in the human body, and is the basic substance that constitutes and maintains human life activities [3]. Blood is a red liquid substance that is rich in nutrients and moisturizing in the veins, and is also one of the basic substances that constitute the human body and maintain human life activities. The “Qi and Blood Theory” was formed in the “Huangdi Neijing”, which elaborated on the concept, source, and physiological functions of qi and blood. “Lingshu • Jue Qi” [4] states: “The upper jiao develops, promotes the taste of grains, smokes the skin and fills the body,

and the hair is like mist and dew, which is called qi” and “the middle jiao is affected by qi and takes juice, and the change and red is blood”. “Lingshu • Ying Health Association” says: “People receive qi from the grain, the grain enters the stomach, and transmits to the lungs, and the five organs and six bowels all receive qi, and the clear one is the ying, and the turbid one is the guard, the ying is in the veins, and the wei is outside the veins.” “The middle jiao is also in the stomach, and after the upper jiao, this qi receiver secretes dregs, evaporates body fluids, transforms its subtleties, and flows up to the veins, and then turns into blood to serve the body.” It is believed that qi and blood are subtle substances that follow the pulse, and have the function of nourishing the limbs, head and face, and irrigating the internal organs. The normal movement of qi and blood is the basis for maintaining human vital activities, and the two complement each other and jointly maintain the metabolism of various tissues of the human body. Qi is the leader of blood, blood is the mother of qi, qi circulation leads to blood circulation, and stagnation of qi causes blood to stagnate. Under the promoted action of qi, blood can follow through the meridians, nourishing the internal organs, limbs, head and face; At the same time, blood provides the material basis for the metaplasia of qi, and the two are interdependent and jointly promote the functional activities of various organs. “Lingshu Evil Qi Organ Disease” records that “twelve meridians, three hundred and sixty-five collaterals, their blood and qi are all on the face and go through the hollow orifice.” “Jingyue Quanshu Head and Facial Disease Syndrome” says that “the head and face are the meeting of all yangs and the gathering of qi and blood.” The head and face are important parts of qi and blood convergence, because they are the “meeting of the yangs”, and they are the place where qi and blood flow into the twelve meridians and three hundred and sixty-five meridians of the human body. The rise and fall of qi and blood can be intuitively reflected through the color, shape, function, etc. of the head and face.

2.1.3 Tibetan elephant theory

Tibetan images mainly refer to the internal organs and their external physiological and pathological signs, as well as the anatomical images of the internal organs and their corresponding natural phenomena. “Analogue Sutra and Tibetan Elephant Class” says: “Elephant is also an image. It is hidden inside, and the form is seen outside, so it is called a hidden image.” It can be seen that “hidden” refers to the organs hidden in the body; “Elephant” mainly refers to the physiological and pathological phenomena that appear externally. According to the physiological function characteristics of the organs and their morphological structure, traditional Chinese medicine divides the human organs into three categories: five organs, six bowels and qi constant organs. “Suwen Stinging Fever” records that “for those with liver fever, the left cheek is red first; If you have heart fever, your face will be red first; In cases of spleen fever, the nose is red first; In patients with lung fever, the right cheek is red first; In patients with kidney heat, the cheeks will first turn red. The fever of different organs will appear in specific areas of the face, and the face is not only the external manifestation of the internal organs, but also an important area closely connected to the internal organs. This correspondence between the viscera and the facial area reflects the overall concept of “internal and external correspondence” in traditional Chinese

medicine. “Lingshu Five Colors” says that “the five colors are separated in their own parts, and their ups and downs are observed to know the depth of shallowness; Observe its marsh and death to see the success or failure; Observe its scattering to know the distance; Look up and down to determine the location of the disease. Judging the location and depth of visceral diseases through the changes of the five colors of the face is one of the important contents of traditional Chinese medicine “looking”, and “looking at color” profoundly embodies the theoretical idea of “what is inside must be outside”. The essence of the five organs is injected into the face through the meridians, making the face a “mirror” that reflects the functional state of the organs. By observing the changes in blue, red, yellow, white and black on the face, the cold and heat deficiency and reality, the depth of the disease and the prognosis can be judged. “Lingshu Five Readings and Five Envoys” says: “The nose is the official of the lungs; The eyes are the organs of the liver; The lips are the organs of the spleen; The tongue is the organ of the heart; The ear is the function of the kidneys. “Suwen Jinkuizhen Remarks” says that “oriental blue, entering the liver, opening the eyes..... The southern part is red, entering the heart and opening the tongue..... The center is yellow, entering the spleen and opening the mouth..... The western part is white, entering the lungs and opening the nose..... The northern color is black, entering the kidneys and opening the ears. It further expounds the correspondence between the five organs and the facial features of the head and face, revealing the overall view of the human body and the outside world. This theory of “the five organs open the five senses” is not only the core of the Tibetan elephant theory of traditional Chinese medicine, but also forms a unique diagnostic system of “inspecting the organs with the orifice” in clinical diagnosis and treatment.

2.2 Western Medicine Writers Use Mechanisms

2.2.1 Promotes minimally invasive injury repair

Facial needle stimulation is a precise and controllable minimally invasive intervention technology for skin tissue, which penetrates the basal layer of the epidermis to the dermal papillary layer at a specific angle through a 0.2-0.3mm ultra-fine needle, forming about 20-50µm microchannels and triggering the skin tissue to enter the programmed proliferation and repair period. During the human skin hyperplasia and repair period, endothelial cell and fibroblast proliferation promote the generation of new blood vessels and the synthesis of new extracellular matrix, and the old matrix is degraded by proteases [5]. Endothelial cells respond to vascular growth factor signals through a series of key cellular activities, including protease degradation of the extracellular matrix, differentiation and migration of tip cells, cell proliferation, lumen formation, pericyte attraction, deposition of extracellular matrix, and maturation of blood vessels, culminating in the formation of new functional blood vessels [6]. Myofibroblasts are activated fibroblasts capable of producing a large number of extracellular matrix components and exerting contractile pressure on the stroma, co-mediating the generation and remodeling of the fibrotic matrix together with fibroblasts [7]. The extracellular matrix is a complex network composed of a variety of proteins and sugars, including structural proteins, glycoproteins, glycosaminopolyprotein, and cellular matrix proteins [8]. The

extracellular matrix plays a key regulatory function, and growth factors are stored in it in a latent form, which can cooperate with the protease system to activate and release biological effects when tissue damage occurs, thereby inducing the directional migration of epithelial cells and initiating the process of epithelialization. Keratinocyte terminal differentiation promotes epidermal barrier function reconstruction, while matrix components undergo dynamic remodeling mediated by myofibroblasts. These cells promote the densification of the collagen network and drive wound contracture by contracting the microfilament structure attached to the extracellular matrix. With the synthesis and secretion of new matrix components, matrix density and mechanical stability were significantly enhanced. The programmed cell death mechanism provides space for fibroblasts to proliferate, improves mechanical stress tolerance by strengthening the extracellular matrix network architecture, and finally realizes the morphological stabilization of skin folds.

2.2.2 Promote estrogen secretion

Estrogen is a group of C18 steroid hormones, including estrone, estradiol, and estriol [9]. Estrogen regulates genes involved in sebaceous gland growth and inhibits sebaceous secretion by inhibiting pituitary gland function, reducing androgen levels produced by the ovaries and adrenal glands [10]. In addition, estrogen can act on estrogen receptors on skin keratinocytes, affecting the proliferation and differentiation of skin and immune cells, and inhibiting local inflammatory responses [11]. Estrogen can exert cosmetic effects by maintaining the physiological functions of skin and hair tissue, and its mechanism of action includes promoting the biosynthesis of skin collagen and inhibiting its degradation and metabolism, thereby improving the thickness of the epidermis and the elastic matrix of the dermis. In addition, this hormone activates the hyaluronic acid synthase system in fibroblasts, significantly increasing the water content of the stratum corneum by increasing the content of hyaluronic acid in the epidermis, thereby enhancing the skin's water retention performance. On the contrary, insufficient estrogen levels will lead to a significantly lower synthesis rate of elastic fibers and collagen in skin tissues than the decomposition rate, leading to degeneration of dermal matrix structure, and clinical manifestations such as skin laxity, wrinkle formation, pigmentation abnormalities and hair follicle cycle disorders. Studies have shown that [12] acupuncture mainly delays skin aging by regulating acupuncture points and stimulating hormones, neurotransmitters, and cytokines released by the hypothalamic-pituitary-adrenal gland and hypothalamic-pituitary-ovarian axis. Among them, the hormones involved are mainly estrogen and progesterone, estrogen occupies a dominant position in physiological regulation, and acupuncture intervention effectively enhances ovarian estrogen biosynthesis by activating the hypothalamic-pituitary-ovarian axis functional pathway. In this process, immune function optimization synergistically inhibits skin aging-related pathological changes, and its molecular mechanism involves regulating collagen metabolism pathways and reducing oxidative stress damage.

2.2.3 Promotes local tissue metabolism

Human tissue metabolism is a multi-dimensional, dynamically balanced complex system, the core content of which includes cellular metabolism, energy metabolism, blood circulation, inflammatory response, etc. In acupuncture, the regulation of inflammatory response and cellular metabolism dominates, and acupuncture can improve facial hemodynamics and microcirculation, thereby accelerating the metabolism of inflammatory factors and reducing the level of inflammatory response. Face needle stimulation reduces the release of pro-inflammatory factors such as TNF- α and IL-1 β by inhibiting the NF- κ B signaling pathway, promoting the polarization of macrophages to the M2 anti-inflammatory phenotype, thereby relieving local redness, swelling, heat and pain in diseases such as facial neuritis and acne [13]. Guo Wei [14] compared the efficacy of acupuncture and traditional Chinese medicine in the treatment of acne and found that acupuncture could significantly reduce serum IL-6 and TNF- α levels, which was better than that of Western medicine control. Zhou Xin [15] et al. observed the clinical efficacy of acupuncture combined with spleen clearing and dehumidification decoction in the treatment of damp-heat acne, and found that the total effective rate of acupuncture group after treatment was 90.9%, and the skin lesion score, serum interleukin-6 and interleukin levels were significantly lower than those before treatment, and the differences were statistically significant. Studies [16] have shown that acupuncture facial acupuncture points may regulate the balance of the oxidation-oxidation system through a dual pathway: on the one hand, mitochondria, as the main place for reactive oxygen species production, electron leakage in the respiratory chain electron transport process will produce reactive oxygen species; On the other hand, there is also an oxidative defense system in the mitochondria that can scavenge free radicals, promoting the expression of endogenous antioxidant enzymes such as superoxide dismutase and glutathione peroxidase, thereby effectively scavenging free radicals and alleviating lipid peroxidation reactions. It is worth noting that the synergistic regulation of the AMPK pathway may further block the cascade amplification effect of ROS by inhibiting NADPH oxidase activity [17]. Compared with systemic drug intervention, the acupuncture can accurately adjust the metabolic microenvironment of the lesion area through targeted stimulation at local acupoints, avoiding the risk of systemic metabolic imbalance, and reflecting the theoretical characteristics of "direct access to the disease".

3. Summary

As an important branch of acupuncture in traditional Chinese medicine, facial acupuncture regulates the yin and yang of the whole body qi and blood by stimulating specific acupuncture points on the face, reflecting the core ideas of "overall concept" and "syndrome differentiation and treatment" of traditional Chinese medicine. Its mechanism of action is based on the theory of yin and yang, qi and blood and Tibetan elephants, and the facial area is closely related to the organs and meridians, and the diagnosis and treatment of diseases are realized through "outside and inside". Modern research has shown that facial needles promote local tissue repair through minimally invasive stimulation, activate fibroblast proliferation and collagen remodeling, and improve skin microcirculation and metabolism. At the same time, it

regulates the hypothalamic-pituitary-ovarian axis, increases estrogen levels, and delays skin aging. In addition, facial acupuncture can inhibit inflammatory pathways such as NF- κ B, reduce the release of pro-inflammatory factors, and have significant efficacy in disfigurement diseases such as acne and melasma. Clinical practice has confirmed that the face needle has both local and systemic regulatory effects, which is a model of the combination of traditional theory and modern medicine, and provides an important basis for the innovative development of external treatment methods of traditional Chinese medicine.

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