

Daoist theories and techniques of longevity and their influence on traditional Chinese medicine

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Bi-Sheng Peng contributed to raise of the question, collection, and analysis of the research literatures, drafting of the paper. The author have read and approved the final version of manuscript.

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Abbreviations

TCM, traditional Chinese medicine.

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Abstract

Traditional Chinese medicine (TCM) has rich theories and techniques for health maintenance. Its cultural tradition of emphasizing health maintenance is not only related to its medical function of treating injuries and diseases and prolonging life span but also closely related to Daoism, which is the fundamental religious tenet of pursuing immortality in Chinese culture. As this paper reviews, the fanatical Daoist religious culture of pursuing immortality has influenced the formation of a medical culture in TCM that cares about longevity and values health and wellness. However, this health and wellness culture is more practical – it replaces immortality with longevity as the goal. The Daoist religious concept of longevity is preserved in the basic principles and ethical values of health care: it emphasizes the harmony and consistency of the spirit and the body. It turns a lifestyle of maintaining physical and spiritual health into the pursuit of an ideal state of life. As for the specific Daoist health techniques, there are various cases of inheritance, change or abandonment: TCM inherited most of the drugs and prescriptions from the Daoist longevity techniques based on natural medicines taking and formed a popular health culture of medicinal and dietary supplements; TCM also developed internal health techniques such as internal elixir and breathing practice from Daoist internal health maintenance techniques for physical health care and disease treatment; TCM did not completely accept recipe techniques such as inedia and sex manual from Daoism because they contradicted with its secularization concept, but their general value orientation of lightness and low desire also influenced its concept of health care.

Keywords: Daoism; traditional Chinese medicine; longevity; wellness

Background

The Inner Canon of the Yellow Emperor (228 B.C.E.–8 C.E.), the foundational work of traditional Chinese medicine (TCM), opens with a dialogue on human aging between the legendary ancient wise king Huang Di and his minister Qi Bo. Huang Di expresses his concern about the short life span of humans, and Qi Bo responds with various medical and religious techniques to maximize longevity [1]. This dialogue reflects TCM's deep interest in the issue of human longevity and its extensive exploration of related topics. Much of TCM's theory and practice of longevity derives from Daoism, China's predominant indigenous religion. Daoism, along with Confucianism and Buddhism, is one of the most important representatives of traditional Chinese culture. It emerged in the late Eastern Han Dynasty (25–220 C.E.), and its ultimate religious goal was the pursuit of immortality. It teaches that people can achieve immortality and transform into divine beings, or immortals, through the use of elixirs or self-cultivation. Because of the close connection between TCM and Daoism, most of Daoism's theories and methods on longevity were incorporated into TCM, changing from an illusory religious goal to a more realistic medical goal – from seeking immortality to pursuing a long and healthy life.

Daoism and TCM's exploration of the universal problem of longevity and their summation of many individual experiences in fighting aging can provide many valuable inspirations and references for modern medical research on aging. For example, regarding the issue of the limit of life span, Daoism and TCM both recognize and put forward a more primitive concept of natural life span. However, while modern life science has given us a deeper understanding, we have recognized that there is an important connection between the limit of individual life and the shortening of the telomeres of cells in the process of replication. Another example is that taking certain natural herbs was an important method for Daoism and TCM in their search for longevity. Today, drug experts are still searching for active ingredients in plant and animal medicines that can combat aging. The drug databases in Daoism and TCM are essential repositories for our search for relevant drugs. Furthermore, Daoism and TCM use physical self-cultivation as an important way to combat aging, and there is increasing evidence that human inner cultivation (including meditation and [traditional qigong exercises \(Qigong is a traditional Chinese method of health care, health maintenance and disease elimination. It is a physical and mental exercise method that aims at strengthening the body, preventing and curing diseases, prolonging the life of the body and developing the potential by means of the adjustment of breathing, the adjustment of physical activities and the adjustment of consciousness \(adjusting the breath, body and mind\)\)](#)) can indeed have a significant impact on human immunity and body functions. This related research area is undoubtedly a valuable research area that is less touched by modern medicine but has the potential for breakthroughs. In addition, Daoism and TCM, for example, treat a disciplined life and a moderate diet as the basis of health maintenance, which is still the general recommendations of modern medicine for maintaining health and delaying aging. In conclusion, the issue of longevity is not only a concern of ancient religion and TCM but also a concern of modern medicine as well. While ancient Chinese Daoism and TCM used religious and traditional medical theories to understand various attempts by individuals to try to break the spell of aging, modern medicine digs into the analysis of the underlying mechanisms of human aging and proposes corresponding countermeasures. On the issue of longevity, we must use science to explore the way forward, but the groping in the dark once also left valuable experience accumulation and thought enlightenment for scientific exploration today.

Daoist religious theories on longevity

Life and death are the ultimate questions that all need to face. Many religions have been born based on the answer to this question. Some religions, such as Christianity and Buddhism, have solved this

question by distinguishing between the soul and the body, for example by claiming that the body can decay while the soul can go to heaven, hell or the next cycle of life after death. Ancient Chinese Daoism, on the other hand, is different in that its ultimate religious goal is to pursue the immortality of the body. The creation of the Daoist concept of physical immortality is very closely related to the [Daoist \(Daoist is usually a legal priest with official certification in Daoism\) cosmology of Qi \(Qi is considered to be the force that informs and animates all things in Daoism\) ontology](#). Many of the Daoist techniques of immortality are inspired by and explained by the theory of Qi.

The relationship between the physical body and the spirit

In terms of basic philosophy, Daoism shares a set of cosmology based on Qi with TCM: "Qi refers to the matter, which may be intangible, liquid, or solid – of which everything is composed. It contains the vitality it needs to maintain its physical form and characteristic activity and to grow." [2]. As a religion, Daoism also has spiritual concepts such as ghosts or spirits, but these concepts are generally subordinated to Qi; ghosts and spirits are considered to be ultimately composed of Qi and also be forms of Qi.

In dualistic religions, such as Buddhism and Christianity, the body and the soul are considered to be completely different things, and the soul can exist independently of the body. The ancient Chinese philosophical view of Qi-monism; on the other hand, denied to a certain extent the possibility of mere immortality of the soul: if the material body were lost, the soul would have nothing to live on. As Joseph Needham commented, "Essentially what has to be demonstrated is that it was in Chinese culture, and in Chinese culture alone, that the eschatological conditions were right for the origin of real belief in the existence and efficacy of macrobiogens, chemical and physiological elixirs of material immortality." [3]. Therefore, the longevity preached by early Daoism was the longevity of both the body and the spirit (after the Song Dynasty (960–1279 C.E.), due to the failure of the early Daoist religious practices of physical longevity and the influence of Buddhist concepts, the Daoist idea of longevity also gradually shifted to the longevity of the soul. In the Daoist theory of longevity, the physical body and the spirit have an equally important role, which is why many Daoist longevity techniques claim to pursue the unity of the physical body and the spirit to achieve the joint perfection of both. Most of the Daoist longevity techniques are devoted to developing the human physical body, which achieves consistency with the theme of medicine; this is why Daoism and Chinese medicine can have a strong connection.

The forms of life

The religious characteristics of Daoism focus on the concept of immortal, who gained an infinite life through Daoist religious techniques. This religious concept is also associated with the cosmology of Qi because all things, including the immortals, are made of Qi, so different species have the potential to change with each other. In *Zhuangzi* (770–476 B.C.E.), a Daoist classic from the Warring States period (770–476 B.C.E.), the state of existence of an immortal is envisioned: "there is a Holy Man living on faraway Ku-she mountain, with skin like ice or snow, and gentle and shy like a young girl. He doesn't eat the five grains, but sucks the wind, drinks the dew, climbs up on the clouds and mist, rides a flying dragon, and wanders beyond the four seas." [4]. In addition, there is also the practice of religious immortality techniques to achieve certain achievements of "True Man" (Daoists call people who have cultivated their nature or attained the Tao of truth): "the True Man of ancient times slept without dreaming and woke without care; he ate without savoring, and his breath came from deep inside. The True Man breathes with his heels; the mass of men breath with their throats." [4]. These express the speculation about the attainment of the state of immortality.

The natural tendency of aging and its reversal

Another important Daoist theory on immortality is based on the consideration of the natural law of aging. The religious goal of Daoism is essentially to achieve a reversal of the laws of aging, and how to

realize this possibility, in theory, is the first thing Daoism needs to consider. Daoism refers to the natural course of life as “Shun” (obedience) which is the process of birth, growth, aging and finally death, which occurs in a natural state, while the pursuit of immortality is called “Ni” (reverse aging), which is the reversal of the aging trend of life, recovery from an aging state to the full bloom of the life, Daoism believes that this reversal can be achieved through special religious techniques.

The idea of reversing the natural laws of life in Daoism is also closely related to the Daoist cosmology of Qi. Daoism believes that the universe begins with the “Dao”, the mother of the world, and then evolves through the elements of “Yin” (things and movements that are outward, upward, exuberant, light, clear, functional, etc. with Yang attributes) and “Yang” (things or movements that have an inner, downward, inhibiting, heavy, shapely, etc. aspect with yin properties) and then to the “five elements” (the five basic substances of wood, fire, earth, gold and water and their changes in motion) then to form all things. Under such a cosmology, a very similar concept of body development was developed in Daoism, which believed that the human body was nurtured by the intersection of “Yang” and “Yin” from the parents, and then developed into the “five organs” representing the “five elements”, and then developed into a complete human body [5]. This was a commonly accepted view of the body in ancient China when embryology was lacking. Daoism believes that there is a possibility of reversing the trend of growth and development of the human body, for example, by taking the elixir or by practicing the Nei Dan (inner elixir); both reverse the evolutionary process of the universe through a symbolic way.

Daoist religious techniques on longevity

Based on the above theory of longevity, various techniques of longevity have been developed in Daoism. In general, the main techniques of Daoism for longevity went through three main stages of development, from the early techniques of taking natural medicine to the later external elixir techniques, and then to the last internal elixir techniques. In addition, some relatively minor longevity techniques, such as breathing exercises, inedia, and sex manuals, were also popular to some extent at different stages of Daoism and were often used as auxiliary techniques to the above three longevity techniques.

Natural medicines

In the early days of Daoism, the primary technique of immortality was the taking of natural medicines – some legendary medicine that grows on immortal mountains and can make people live forever after taking it. During the Qin (221–207 B.C.E.) and Han Dynasties (202 B.C.E.–8 C.E.), in the pursuit of immortality, the kings in power organized several large-scale expeditions into the sea to seek immortality herbals. As the legendary immortality medicines were difficult to obtain, in practice, the Daoists took a lot of herbals such as *Polygonati*, *Calamus*, *Sesamum*, *Pine seeds* and nutrient-rich herbs, but also took a small amount of metal, ore-type medicines such as Gold, Silver, Vermilion or Jade, the Daoist priests believe that long-term use of such drugs can achieve long life or longevity.

If analyzed the ideological basis, the Daoist technique of taking natural medicine may be based on a more primitive thinking of diet and medicine as described by James George Frazer: the idea that the properties in certain supernatural medicines can be absorbed by means of eating, thus transforming the human body to immortality. Ge Hong (283–363 C.E.), who was both a Daoist and a physician, gave the following logical reasoning in his *Inner Chapter of Baopu Zi* (317 C.E.): “the grains can support human survival, if a person eats foods, he will live, but if he didn’t eat any foods, he would die, not to mention the divine medicines, which benefit people ten thousand times more than grains?” and “if some medicines can bring back to life from diseases and injuries, why can’t the divine medicines make humans immortal?” [6, 7] It is believed that people can maintain life by eating ordinary food and restoring health by taking ordinary medicine; therefore, if one can find supernatural medicine, it is

possible to prolong life of people and achieve so-called immortality.

External elixir

After a period of decline in popularity, the technique of taking natural medicines was gradually replaced by a religious technique known as external Elixir, starting from the Three Kingdoms (220–280 C.E.) and Jin Dynasty (266–420 C.E.). The main reason for this was probably the failure of natural medicines: on the one hand, the search for the “immortality herbs” failed – the Daoists went to the sea in search of “immortality herbs” but did not reach the abode of the gods, only the realm of mortal existence; on the other hand, the extensive practice of taking natural medicines did not produce reliable cases of immortality. Thus, based on some of the early techniques of taking metal or ore-type medicines, the external elixir technique was formed by combining Daoism’s cosmology.

The operation of external elixir is the repeated firing of minerals or metals (the most commonly used materials are Cinnabar, Lead, and Mercury) in a special way (usually requiring specific instruments, time, and rituals), which Daoists believe produces “golden elixir” – an artificial gold that allows a person to live forever after taking it. The theory of external elixir is related to the two Daoist theories of immortality we mentioned earlier: first, it is believed that a person who eats this artificial gold elixir can absorb the non-decaying nature of the gold in it, thus transforming his or her body so that it will not decay either; second, in the Daoist theory, the process of making external elixir actually reversely imitates the generation process of the universe by purifying the “Yin” and “Yang” of the minerals and eventually returns them to the Dao, the origin of the universe, and Daoism believes that taking such symbols of sacred elixir can give people longevity. In terms of the raw materials used, Daoist external elixirs mainly use metal and mineral medicines, such as mercury, tansa, lead, alum stone, realgar, orpiment, arsenic, copper, and stone gall. There are also non-metallic medicines in some elixir formulas, such as the plant medicine “lacquer” used in the “Thirty-six Waters” and the animal medicine “carp gall” used in the “Second Divine Elixir”. Early Daoism believed that these metals and mineral medicines contained the elements of Yin and Yang needed to refine the golden elixir.

Inner elixir

Due to its greater inclusion of Daoist cosmological philosophy, external elixir was extremely popular for some time, but after a longer period of popularity, it was gradually replaced by a new technique of immortality called internal elixir, whose decline was also due to the failure of the religious practice. By the Tang Dynasty (618–907 C.E.), many kings and ministers were involved in the external elixir because of their pursuit of immortality, and the flaws of external elixir became evident: because the materials used to make external elixirs were mainly metals and minerals, the elixirs it produced contained a large number of heavy metal elements, and after a large amount of consumption, serious symptoms of heavy metal poisoning, even life-threatening, would occur, which in Daoism is called “Poison of Elixir”. A historian of the Qing dynasty (1636–1912 C.E.), Zhao Yi (1727–1814 C.E.), listed seven emperors as well as a large number of ministers who died directly or indirectly as a result of taking elixirs in his *Notes of the Twenty-second History* [8]. The failure of such a large-scale practice of external elixir triggered a rethinking and reform of its theory and techniques of longevity, and a new technique of longevity, internal elixir, gradually replaced external elixir as the main technique of longevity in Daoism.

Methodologically, the inner elixir is a synthesis of breathing exercise techniques, emphasizing the interplay of breathing rhythms, physical movements, and mental attention. Unlike the breathing exercise, the inner elixir contains more theoretical features of Daoist cosmology and vitalism. According to Daoist theory, the inner elixir is “to use the human body as a container, to use the Qi in the body as medicine, then use one spirit to burn and refine, so that Qi can form a sacred elixir”, stripped of the appearance of religious terms, it is actually to regulate the human mental state through specific breathing

rhythms and consciousness activities, to perceive and control the inner activities of the human body in an introspective way, and to achieve the change of physical body [9]. In terms of technical means, the inner elixir is based on meditation, which is completely different from the external elixir of making metal and mineral into a “golden elixir”, but in terms of a theoretical system, the inner elixir is the inheritance of the external elixir, which is a reverse simulation of the process of cosmogenesis in the form of human body activities rather than metal smelting. Therefore, inner elixir refers to the traditional concepts of life theory, such as “Jing (in a broad sense, essence is all tangible essence in the human body, including Qi, blood, fluids and water and grain essence), Qi, and Shen (1. the outward manifestation of the normal life activities of the human body; 2. the divine activity of man, including the coordinated control of all physiological activities and spiritual consciousness thinking activities (i.e., the divine))” to replace the “external medicine” of metals and minerals in external elixir. From the late Tang and Five Dynasties (907–960 C.E.) until the Ming (1368–1644 C.E.) and Qing Dynasties, the internal elixir was the main and most popular Daoist technique for longevity.

Breathing exercise

Breathing exercise is also an essential Daoist technique for longevity, which was widely used in Daoism for self-cultivation before the development of the inner elixir, and gradually integrated into the inner elixir. Breathing Exercises usually include body movements and breathing exercises; the former is known as the “Daoyin”, the latter is known as the “Tuna”. “Daoyin” is a traditional health care gymnastic exercise based on the stretching of the limbs, which is usually practiced with a specific breathing rhythm and breathing pattern, and also emphasizes the sensation of “Qi” running through the body – the “Tuna”. The practice of breathing exercises also emerged very early, as described in Zhuangzi: “to pant, to puff, to hail, to sip, to spit out the old breath and draw in the new, practicing bear-hangings and bird-stretchings, longevity his only concern.” [10]. and in the Han tomb of Mawangdui, there are also excavations of *Daoyin Diagrams*, more than forty in total, in addition to a jade artifact known as *Xingqi Peiyu Inscription*, which describes more completely the method and process of “Xingqi”.

The formation of “Daoyin” and “Xingqi” may have been a result of noticing the importance of breathing and movement in sustaining life. For example, the practice of “Tuna” emphasizes the coordination of external breathing with internal breathing, which in Chinese “Tuna” means “inhaling new air and exhaling old air”. As for “Daoyin”, Hua Tuo (145–208 C.E.), a famous doctor during the Three Kingdoms period (he is generally believed to have been a Daoist as well), made a famous statement on the importance of body movement for health: “the human body needs movement, but not too much. Body movement helps digest food and blood flow, thus reducing the incidence of disease. Just like a door shaft is always in motion, so it is not infested with worms.” [11]. Hua Tuo put forward the basic maintenance guideline of combining work and rest, and this principle has also had an important influence on the theory of health care in TCM.

Inedia

Inedia is called “Bigu” in Chinese, which literally means “avoiding cereals”, which usually means to achieve through a certain degree of fasting or replacing cereal and meat diets with some herbs. The inedia emerged very early, for example, in the Zhuangzi, which describes one of the criteria of the legendary immortals – not eating grains – probably to show that immortals have a different state of existence from humans. There are also theories that different foods will have an impact on people’s endowment and longevity, such as the *Huainanzi* (179–122 B.C.E), which was written in the Western Han Dynasty, which states: “Those who eat meat are brave, just like tigers, leopards and eagles. Those who eat Qi is a divine and longevity, as immortal Song and Qiao. Those who eat grain are wise but die young, and those who do not eat will not die but are divine.” [12]. In Daoism, there are two main ways of Inedia, one is to fast for a short period of time and

supplement it with the practice of exhalation, which is also known as “Qi-eating”; the other is to forbid the eating of grains and meat for a longer period of time, and to replace it with certain herbs, such as *Polygonati*, *Calamus*, *Sesamum*, etc. In this regard, there is a certain overlap with the technique of natural medicines taking.

Sex manual

“Fang Zhong” (sex manual) is a very special Daoist technique for longevity. The Chinese word for “Fang Zhong” means “in the room”, suggesting that this kind of Daoist technique is a more private activity for people. The “Fang Zhong” is a special form of health care that uses sexual activity as a form of cultivation. It is also a primitive technique for longevity that appeared earlier, and 191 books on the “Fang Zhong” were recorded as early as in the *Book of Han* (80 B.C.E.) [13]. This technique was inherited by Daoism after the emergence of Daoism, which was an essential religious ritual when Zhang Daoling (34–156 C.E.) founded the religion in the Sichuan region at the beginning, but as Daoism was influenced by the Confucian ethics, such rituals, which were contrary to Confucian ethics, were gradually banned and became a secret technique of longevity in some Daoist sects. In general, there are three different views on sexual activity in Daoism. One is the endorsement of the “Fang Zhong” as a technique for longevity. In these sects, Daoist cosmology is also used to explain the “Fang Zhong”, claiming that everything in heaven and earth is distinguished into “Yin” and “Yang” and that the movement of “Yin” and “Yang” is the basic movement of the universe, thus claiming that longevity is achieved through sexual activity between men and women in a special way. The second is the opposite concept, which believes that the goal of cultivation is to gradually reduce the “Yin” part of the human body and gradually transform the body to the “Yang” characteristics, thus claiming that abstinence from sexual activity is necessary for immortality; in addition, there is also a more secular view, which believes that sexual activity is necessary for the reproduction of life and therefore moderate sexual activity is beneficial to health. But this view also emphasizes that Jing (essence) is the basis of Qi and that sexual activity must be moderated. Because of its contradiction to the general ethical values of ancient Chinese society, the practice of “Fang Zhong” was only secretly passed down in certain sects; the concept of abstinence was accepted by most of the inner elixir sects, and for some of the more secular sects, the third view was maintained.

The influence of Daoist theories and techniques of longevity on traditional Chinese medicine

Daoism’s religious purpose of pursuing longevity and TCM’s medical function of treating diseases and prolonging life can be naturally unified, so TCM and Daoism have always maintained a high degree of correlation: they are identical in origin, and there is also a partial overlap of functions and personnel in development. First, there is a general consensus among researchers in the history of TCM that “medicine and witchcraft have the same origin”, and scholars generally agree that Daoism and TCM share a common origin, both originating from the medical and witchcraft crossed cultures of the early civilization. As late as the Han Dynasty in China, the historical book *Book of Han* still classified medical and religious books into one category, collectively called “Fangji” (a term that later became a synonym for TCM), and stated that “Fangji are the tools of prolonging one’s life.” [14]. It was also from about the Han Dynasty period that ancient TCM and religion gradually became independent and developed separately: on the one hand, with the completion of the classical ancient texts of TCM, such as the *Inner Canon of the Yellow Emperor* and the *Treatise on Febrile Diseases* by Zhang Zhongjing (150–215 C.E.), the medical part of ancient witchcraft culture gradually developed and completed into the classical system of TCM; on the other hand, with the formal founding of Daoism churches in Sichuan at the end of the Han Dynasty, most of the religious content was merged into Daoism. Second, in terms of composition, although Daoism TCM had their own independence, the connection between

them was not completely isolated. Many ancient Chinese doctors and Daoists had overlapping identities, and important figures in the history of Chinese medicine, such as Ge Hong, Tao Hongjing, and Sun Simiao (541–682 C.E.), all had dual backgrounds as both doctors and Daoists. When they wrote their medical books, they inevitably included many Daoist concepts and techniques, which had a continuous influence on later TCM. Thus, for more than a thousand years, TCM and Daoism have maintained a close relationship and interaction, and many of the concepts and techniques developed by Daoism in pursuit of the religious goal of immortality have been introduced into TCM and have had a profound influence on it.

In terms of specific techniques, Daoism has profoundly influenced TCM and contributed to the formation and development of the system of health maintenance techniques in TCM. In the aforementioned review, we can see that most of the techniques of Daoism for longevity, such as natural medicines taking and breathing exercises, had already appeared before the Han Dynasty and were partly inherited into TCM after the separation of Daoism and traditional medicine, while other techniques such as external elixir and internal elixir, which were developed after the formation of Daoism, also entered into TCM through the close connection and exchange between Daoism and TCM, forming the corresponding system of health maintenance. The main difference between the two is that in Daoism, these techniques are used to pursue immortality, while in TCM are used for longevity and health. However, due to different concepts, purposes, and ethical judgments, different Daoist longevity techniques have been absorbed, changed, or abandoned in different forms by TCM.

Clinical application and research of anti-aging technology of taking natural medicine

TCM has universally absorbed Daoist natural medicine-taking techniques. The Daoist technique of natural medicine taking is the most influential in TCM. The formation of the traditional medicine system includes an important contribution of the Daoist technique of taking medicine. In one of my articles, I discussed that one of the predecessor sects of Daoism, the “Fang Xian Dao”, was closely related to the formation of *Shennong’s Classic of Materia Medica* (25–220 C.E.), the oldest and most important Chinese herbal book, in which the description of the efficacy of many herbs and the classification of herb classes clearly show the religious traces of the pursuit of longevity [15]. In addition, the Daoist technique of natural medicine taking had a wide impact on the medical theory of drugs and the theory of health care in TCM. Around the time of the Northern and Southern Dynasties (420–589 C.E.), the drug theorist Xu Zhicai (505–572 C.E.), proposed the theory of “ten doses” of medicine, among which was the theory of “tonic”, which believed that the human body would suffer from “Qi” or “blood” due to various reasons, such as food or disease. Therefore, it is necessary to take corresponding “tonic” medicines or prescriptions to restore the health of the body and prolong the life span of people. This is closely related to the early Daoist technique of medicine taking, which is believed some herbs can replenish human Qi, blood and vitality, thus prolonging human life. Many of the drugs and prescriptions in TCM that have “tonic” effects are remnants of the Daoist technique of taking the corresponding drugs. To this day, in some parts of China, there is still a tradition of taking medicinal food in winter, which is believed to reduce the occurrence of diseases and delay aging, showing the long-term and widespread influence of this concept of medicinal health [16].

These herbs recorded in Daoist texts for consumption have become an important source of material for modern Chinese medicine in the search for anti-aging drugs. According to Zhang Min’s statistics, the herbs that are used more frequently in Daoist as well as TCM prescriptions with the primary purpose of longevity include *Poria*, *Achyranthes* root, *Rehmannia* root, *Prepared Rehmannia* root, *Goji Berry*, *Ginseng*, *Dodder seed*, *Cistanche* stem, *Chinese Yam*, *Asparagus* root, *Schisandra Fruit*, *Eucommia Bark*. Most of these drugs have anti-aging ingredients and mechanisms to varying degrees. For example, the most frequently used drug in anti-aging remedies, *Poria*, the active

ingredients of *Poria* exhibit multiple anti-aging mechanisms: 1. the aqueous extract of *Fuling* has important effects on the function of mitochondria and microtubule structure of nerve cells; 2. it can down-regulate the function of loric acid at the level of gene transcription; 3. it has the effect of scavenging free radicals [17]. According to Hou Anji et al.’s research, *Poria cocos* polysaccharides contained in *Poria*, can significantly reduce the level of free radicals in animals, improve the vitality of free scavenging enzymes in animals, improve animal cold tolerance and fatigue resistance, showing a good anti-aging effect [18]. A study by Wang, Cheng et al. showed that the polysaccharide components and triterpenoids in *Poria* have effective antioxidant activity [19, 20]. Lee et al. found that pachymic acid can be an effective compound for inducing autophagy to slow down aging by regulating proteins associated with autophagy [21]. Another example is that for ginseng, a drug widely used in Daoism and Chinese medicine for health and longevity, corresponding studies have also shown its effective anti-aging effects. According to a comprehensive review of the anti-aging effects and mechanisms of ginseng by Hong-Rong Li et al., it was shown that various components of ginseng have anti-aging effects, which can prolong the life span of aging animal models and delay the aging of neural, skin, immune, urinary, reproductive, circulatory, endocrine and motor systems. Its anti-aging mechanisms mainly include anti-aging of cells, anti-oxidative stress, inhibition of telomere shortening, maintenance of mitochondrial homeostasis, etc. [22]. Through the summary of the anti-aging mechanism of natural medicines in Chinese medicine by Meng-Ru Li, Chen He, and Xin-Min Wang, it can be seen that natural herbs generally act to delay aging by regulating the body’s immunity, eliminating free radicals, and improving cardiovascular function in many ways, which also indicates that the technique of taking natural medicines in Daoism, as well as traditional medicine, can indeed achieve the effect of delaying aging to some extent [23–25].

Clinical application and research of Daoist external elixir techniques

TCM presents a generally critical attitude toward the external elixir in Daoism, but uses some of its drugs in the treatment of some diseases in a limited way. Although the external elixir was once almost dominant in Daoist techniques of immortality, due to its natural methodological flaws, the external elixir contained a large amount of heavy metal elements that could cause serious harm or even death if taken in large quantities over a long period of time. Therefore, many pragmatic ancient Chinese doctors were aware of the dangers of taking such elixirs, only a small number of Daoist external elixirs have made their way into Chinese medicine as remedies for certain diseases. In addition, according to Qiu You, Zhu Jianping and others, the form of traditional Chinese medical concoction theory and method is also very closely related to the techniques of Daoist priests who burned and refined external elixirs [26].

Daoist external elixir techniques have had a significant impact on Chinese medicine, and many of the elixir formulas from Daoist external elixirs have been introduced into Chinese medicine as medicines to treat diseases. For example, the famous Chinese medicine “Zi Xue Dan” is derived from the Daoist sutra “*Taiqing Shibi Ji*” written by Qing Xiazi in the Sui Dynasty (581–619 C.E.), which is said to be “the best remedy for foot fungus, internal and external fever, sores in the mouth, detoxification of all herbs and minerals medicine” [27]. Due to the prevalence of heavy metal elements, Daoist external elixirs are more often used in actual clinical practice for the external treatment of skin diseases, such as in the treatment of skin diseases, malaria, and parasitic diseases [28]. Also, when plagues are prevalent, elixirs are often burned, or soaked in water sources, believing that this will disinfect the environment and reduce plague epidemics [29]. In recent studies, it has also been noted that some Daoist external elixirs have shown some effectiveness in cancer treatment [30, 31]. In addition, the Daoist external elixir “Sheng Dan” has been very widely used in the treatment of osteomyelitis and has shown significant efficacy [32]. Arsenic, one of the products of Daoist external elixir techniques, was applied to the treatment of leukemia with very

obvious results [33]. However, as far as the theory and technique of longevity are concerned, the theory and technique of elixir of longevity have been criticized by many famous physicians, and Sun Simiao, a famous physician of the Tang Dynasty, claimed that “those who have knowledge of this formula must burn it and not keep it” [34]. In general, Wai Dan has had limited influence on Chinese medicine in terms of longevity techniques, and the corresponding clinical research is also lacking.

Clinical application and research of Daoist self-cultivation techniques

Daoism’s religious techniques of internal elixir and breathing exercises have been integrated into the TCM system of health care. In TCM, religious internal alchemy techniques have been used to treat diseases for a long time, for example, Tao Hongjing (456–536 C.E.) claimed in his book “*The Book of Nourishing Life*” that different ways of such as inhalation, exhalation, or blowing could treat diseases of the heart or lungs [35]. When the Daoist internal elixir technique unified the various internal health care, it had a great influence on TCM, and a corresponding system of internal alchemy methods for health maintenance was developed within the TCM, which preached self-cultivation of the body to avoid diseases and maintain a long and healthy life. Compared to the widespread of prescriptions, self-cultivation methods with more religious characteristics of a secret transmission, usually passing on among some medical families or medical teachers and disciples. During the Ming and Qing Dynasties, some physicians skilled in internal health techniques began to borrow the Daoist theory of internal alchemy to explain the developmental changes of the human embryo and the interactions of the human internal organs, which were used to explain the occurrence and treatment of disease. In addition, the use of internal cultivation methods in conjunction with drugs for the treatment of health maintenance was developed, leaving behind many methods of internal cultivation and health maintenance specifically aimed at treating certain diseases [36].

The ancient Chinese cultivation techniques represented by Daoism’s inner alchemy have been widely introduced into clinical medical treatment and self-care. In the wave of “qigong fever” in China at the end of the last century, a large number of specific cultivation methods in ancient Daoist literature were sorted out and used for symptomatic treatment of various modern diseases. According to statistics, the number of people participating in “qigong” exercises reached as high as 60 million at one time, and there were more than 100 kinds of exercises used for practice [37]. And worldwide, mindfulness meditation and yoga similar to Daoist self-cultivation are also widely applied to self-care. There is a lack of research on the mechanism of Daoist internal alchemy in China; what can be found in Xu Zhengde and Wei Shengmin’s discussion on traditional cultivation techniques in theory and technology [38][39]. While in the world, similar self-cultivation methods such as positive thinking, meditation, and yoga have been studied, which can bring some reference to the mechanism of Daoist internal alchemy. Davidson, Cook & Robinson et al. provided some discussion on the application of acupuncture, massage and qigong techniques in health care, and Cassidy studied the widespread use of TCM emotional care and health care in the United States [40–43].

Jacobs et al.’s study showed that meditators showed greater immune cell telomerase activity, Bethany E. Kok et al. believed that meditation-driven changes in self-regulatory capacity might be a mechanism of action driving positive effects open monitoring practices on immune system functioning [44, 45]. Fredrickson et al.’s study showed that meditative practices might act on cardiovascular functioning by increasing likelihood positive emotional experiences promoting feelings social closeness which is associated with faster cardiovascular recovery from stress decreased likelihood cardiovascular disease [46, 47]. Vishal Jindal et al. summarized research on meditation mechanism, believing Meditation is a complex process involving change cognition memory social emotional control causes improvement various cardiovascular neurological autoimmune

renal pathologies, and through various brain function activity-related mechanisms it improves cognition memory emotional social behavior increase tolerance various stressors life [48]. In addition, empirical studies of these wellness techniques are gradually being conducted, such as Hai Qi et al. studied the role of the brain in the control of humoral immune processes and provided some explanation for the mechanism of traditional self-cultivation such as meditation and qigong [49].

In the 21st century, self-cultivation techniques, mainly in the form of Dao Yin have received support from the Chinese government under the name of “Fitness Qigong”, and related research is more adequate. Corresponding clinical efficacy studies have also been widely carried out. Cui Yongsheng et al.’s study on the guidance technique “Five Animals Play” showed that after three months of practice, middle-aged and elderly women’s blood pressure, pulse, waist-to-hip ratio, grip strength, vital capacity and other physiological indicators have significant positive changes; at the same time, long-term exercise also had a significant positive impact on the psychological health status of the experimenters [50]. Wu Jingmei tested peripheral blood T cell subsets of middle-aged and elderly people (50–69 years old) who practiced “Five Animals Play” for three months, indicating that immune function has been improved well for middle-aged and elderly people who participated in practice, especially female experimenters [51]. Gao Liang et al.’s experimental study confirmed that after participating in health qigong intervention for six months, the average intelligence level of middle-aged and elderly people was younger by 2.45 years, and their aging degree decreased [52]. The general conclusion is that long-term practice of traditional guidance and meditation techniques can enhance various functions of the body, effectively delay the aging process, especially for middle-aged and elderly people.

Clinical application and research of Daoist inedia and sex manual techniques

TCM has selectively absorbed some of the concepts of Daoism’s inedia and sex manual and incorporated them into TCM of daily health care. As a religious practice, some of the Daoist longevity practices deviate from the secular concept. For example, the Daoist inedia either requires complete fasting or taking drugs instead of grains; while the Daoist “Fang Zhong” technique uses sexual activities for religious practice or in some sects, requires complete prohibition of sexual acts. These practices are unacceptable to TCM, which has secularization as its basic character. TCM is generally critical of such Daoist longevity techniques, but it is inevitably influenced by them in its concept of health care. In TCM, daily maintenance plays a vital role in the theory of health care, and living and resting, eating habits and even sexual life are all important considerations. For example, in terms of diet, although there is no requirement of fasting, TCM also promotes a light diet, emphasizing the consumption of fruits and vegetables and avoiding the consumption of large amounts of meat as much as possible. In terms of sexual life, although it does not deny human sexuality, it still emphasizes the traditional idea of “abstaining from sex and preserving essence”, which requires a restrained approach and emphasizes the influence of weather and environment [53].

A series of fasting studies using animals as experimental subjects provide references for us to understand the possible physiological mechanisms of Daoist abstaining from grains techniques. For example, HY Cohen et al.’s study published in Science showed that caloric restriction could extend life-span by inducing SIRT1 (SIRT1 stands for sirtuin (silent mating type information regulation 2 homolog) 1 (S. cerevisiae), which is an enzyme located primarily in the cell nucleus that deacetylates transcription factors that contribute to cellular regulation (reaction to stressors, longevity)) expression and promoting the long-term survival of irreplaceable cells [54]. JJ DiNicolantonio et al.’s study, showed that autophagy-induced degradation of Notch1, achieved through intermittent fasting, may promote beta cell neogenesis, which will have important implications for reversing type 2 diabetes [55]. Zhou Bing et al. found through mouse studies that pathways transcriptionally correlated with diet-modulated life-span

and physiological changes were enriched for lifespan-modifying genes; therefore, transcriptional changes resulting from dietary interventions can effectively reflect causal factors in aging and identify previously unknown or under-appreciated longevity pathways, such as the peroxisome pathway [56].

Summary

The most important religious goal of Daoism is the pursuit of physical immortality, so systematic theories and techniques of longevity were developed. These theories of immortality include discussions on the relationship between the physical body and the spirit, the forms of life, the natural tendency of aging and its reversal, and the techniques of immortality, including medicine, external elixir, internal elixir, breathing exercise, inedia, and sex manual. Due to the close connection between Daoism and TCM, Daoist concepts and techniques of longevity have had a profound and extensive influence on TCM, inspiring the cultural tradition of TCM that attaches importance to health and wellness and promoting the formation of a system of longevity theories and techniques in TCM, which still have considerable reference and research value for contemporary medical research on aging.

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