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Review Article

Analysis of the influence of the psychology changes of fear induced by the COVID-19 epidemic on the body ☆

COVID-19疫情诱发的恐惧心理变化对机体影响的情况分析

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ABSTRACT

In this paper, the theory of " Fear injury kidney " in traditional Chinese medicine is systematically reviewed, and it is found that long-term or excessive psychological changes of fear are likely to damage kidney *qi* and kidney essence. On this basis, the psychological studies of patients, medical staff and the public during the COVID-19 epidemic in China were analyzed, and fear psychology was found to be prevalent among all kinds of people. Modern researches on “Fear injury kidney" have also found that long-term or excessive fear could cause changes in the neuro-endocrine-immune system, which can induce diseases or susceptibility to some diseases. Therefore, during or after the prevalence of COVID-19, different groups of people may have emotional reactions such as stress and fear, which should be paid long-term attention, and the influence of fear on the body cannot be ignored. According to the change rule of psychological state under stress reaction, we should actively respond to and take psychological crisis intervention measures in time to reduce the harm of psychological stress to the body.

The COVID-19 epidemic has spread to more than 200 countries and regions worldwide, and many countries in the world have entered the first-level response to public health emergencies. The increasing number of confirmed and suspected cases, as well as news reports on the development of the epidemic, have brought people different degrees of psychological pressure, fear, nervousness and other stress reactions. on January 26th, 2020, the National Health Commission of China promulgated *the guiding principles of Emergency Psychological Crisis Intervention in the Epidemic Situation of Pneumonia Infected by Novel Coronavirus*. It put forward the scheme of real-time research, classified intervention and orderly serviceto actively deal with the anxiety and psychological stress problems of patients, medical staff and the public that may be caused by the epidemic, so as to reduce the psychological interference and possible psychological harm caused by the epidemic. In the COVID-19 diagnosis and treatment plan formulated by medical and health departments at all levels in China, there is also a special emphasis on strengthening psychological counseling for patients' anxiety and fear. According to Chinese medicine, the five emotions injure the internal organs, and the kidney is in fear. Modern research has found that if the "fear" stress response is not relieved for a long time, it will affect the body's nervous system, thus inducing sleep disorder, or will affect vascular endothelial function resulting in the occurrence or recurrence of hypertension and cardiovascular and cerebrovascular diseases, or even it affects the body's specific and non-specific immune functions, induces the decline of immunity, and is susceptible to diseased such as COVID-19 and tumors [1–5] . This article intends to systematically discuss the understanding of fear in traditional Chinese medicine, psychological harm caused by COVID-19 epidemic to people and the impact of psychological change of fear on body formation. The purpose is to provide guidance for the clinical construction of diagnosis and treatment system to protect the body from fear.

The understanding of " fear injury kidney " in TCM

According to TCM, the kidney is in fear, while too much will hurt the internal organs. Fear of injuring the kidney is mainly manifested in two aspects: injure the kidney essence and injure the kidney *qi*. First of all, in terms of fear of injuring the kidney

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essence, *Sùwèn (《素问》Plain Questions)* said: " The kidney controls water, it receives and stores *jing* (Essence) from *Zang-fu* Organs." It is suggested that the essence of the five viscera is sealed by the kidney. If the kidney essence is damaged and the sealing is not solid, physiological or pathological changes will occur. *Língshū (《灵枢》The Spiritual Pivot)* said: "Constant fear without relief will damages essence and damage of essence will cause weakness of bones, exhaustion of *yang qi* and habitual seminal emission." It shows that too much fear or long-term fear will lead to kidney essence damage, and then lead to bone soreness, syncope cold and so on. The kidney stores essence and produces marrow in the main bone, which plays a role in promoting growth and development. If the kidney essence is deficient, the bone marrow metaplasia will become passive and the bone will be unnourished. Children are prone to bone dysplasia, five kinds of retardations and five kinds of flaccidity, etc. Adults are prone to sore waist, sore knees and weak feet, etc. The elderly people are prone to bone fragility and osteoporosis, easy to fracture and so on. The brain is the sea of marrow, *The Spiritual Pivot* said:“ When the sea of marrow is insufficient, it will cause dizziness, tinnitus, aching legs, diminution of vision, blurred vision, lassitude and somnolence.” It shows that if the kidney essence is insufficient, the mind will be empty, mostly manifested as tinnitus, deafness, forgetfulness, dull spirit, malaise and so on. In addition, *The Spiritual Pivot* said: "Constant fear and anxiety damage the spirit and the damage of the spirit will lead to excessive loss of essence". In clinical practice, it can also be seen that the kidney essence is injured by panic, resulting in the loss of the spirit, and then there are wild words, laughter, endless acts and so on. Secondly, in terms of fear of injuring the kidney *qi, Plain Questions* said: "I hear that all diseases are born in *qi*, anger leads to *qi*, joy leads to slow *qi*, sadness leads to *qi* dissipation, and fear leads to *qi* deficiency." It shows that excessive fear will lead to the release of *qi*, resulting in symptoms such as slippery semen, incontinence and so on. It is also mentioned:" Fear leads to loss of essence which then results in obstruction of upper energizer, consequently leading to return of *qi* and distension of lower energizer. That is why it is said that *qi* sinks. "This suggests that excessive fear will cause the *qi* to drain too, and diseases caused by the imbalance of *qi* movement in the upper energizer will occur in clinical practice. In addition, the kidney stores the essence of the five internal organs, while the lung is the mother of the kidney and the liver is the son of the kidney. If panic occurs and other reasons deplete the essence of the kidney, and if the kidney deficiency, the internal organs will lose nourishment, resulting in various abnormalities in the heart, liver, spleen, lung and other viscera. On the contrary, as we all know, illness of mother viscera affecting the child one and illness of child viscera affecting the mother one, other visceral diseases can also affect the kidney. It prevents the kidney from storing essence and aggravate fear. It is suggested that kidney disease can interact with other internal organs disease.

The occurrence of fear in the COVID-19 epidemic

Due to the COVID-19 epidemic has a long incubation period and is highly infectious, the population is generally characterized by a lack of specific preventive drugs and methods, asymptomatic COVID-19 and double positive COVID-19 occur. All of these have brought panic to people and caused people to have psychological problems in varying degrees. The secondary major psychological crisis caused by this epidemic is attracting the attention of many researchers.

Psychological status of patients

In this epidemic, some studies have found that when patients are diagnosed as suspected cases, most patients will fall into a psychological state of crisis, often with abnormal emotional excitement, shock, denial, anger, and do not cooperate with treatment work; while when patients are in isolation treatment, there is an increased sense of fear of the disease, accompanied by anxiety and depression [6]. Critically ill patients show a state of extreme anxiety because of respiratory distress and difficulty in expression, and often feel panic, despair and a sense of near death [7]. In previous studies, questionnaires were used to analyze the mental health status and influencing factors of COVID-19 diagnosed patients and isolated visitors. It was found that the number of COVID-19 diagnosed patients and isolated visitors who felt anxiety/tension was the most, 47.46% and 64.29% respectively, and the number of people who felt desperate was the least, 1.69% and 5.36% respectively [8]. In another study, 148 patients with COVID-19 were investigated with self-rating anxiety scale and self-rating depression scale. The results showed that the incidence of anxiety was 21.63% and the incidence of depression was 50.00% [9].

Psychological status of medical staff

In the COVID-19 epidemic, medical workers risk being infected by the virus at any time, and suffer from a variety of physical and mental distress in the rescue process, mainly manifested as physical reactions such as physical decline, dizziness and dyspnea, accompanied by psychological changes such as fear, anxiety, depression, fear and so on. First of all, there are studies on the psychological status of medical staff in the epidemic situation. The symptom checklist 90 (SCL-90) was used to analyze the psychological status of the medical staff in the designated hospitals in Wuhan City, Hubei Province. It was found that, compared with the Chinese adult norm [10], the average scores of SCL-90 of the medical staff in the front line of COVID-19 's epidemic situation has significant differences in somatization, anxiety and phobia [11]. In another study, combined with the methods of filling in the scale and online investigation, the mental health status of 224 front-line medical workers in Wuhan during the prevention and control of COVID-19 epidemic situation were investigated. It was found that 29.9% of the medical staff in Wuhan had anxiety [12]. Another study used a questionnaire to investigate the psychological status of 168 anti-epidemic front-line health care workers, and found that there were varying degrees of anxiety, fear, helplessness and other psychological stress reactions among anti-epidemic front-line health care workers. 73.2% of the health care workers will have anxiety. Among them, 13.1% of the health care workers are often anxious, while 10.7% of the health care workers often have fear [13]. In addition, there are special studies on the psychological status of nurses. The symptom checklist 90 (SCL-90) was used in a study [14] to investigate and analyze the psychology of 41 clinical front-line support nurses who took part in the fight against COVID-19. It was found that 35 (85.37%) had adverse emotional reactions, of which 21 had terrorist emotional reactions, accounting for 51.22%, indicating that most clinical front-line nurses had psychological stress reactions. In another study [15], self-made general data questionnaire, self-rating anxiety scale (SAS), self-rating depression scale (SDS) and stress scale (PSS-10) were randomly distributed to the front-line nurses supporting Wuhan for investigation. The results showed that the incidence of anxiety and depression of 44 nurses supporting Wuhan were 31.8% and 45.5% respectively.

Psychological status of the general public

Panic, disappointment, fear, irritability, over-optimism and sadness are all possible psychological conditions of the general public. People with weaker physique think they are more likely to be infected, so they are more likely to develop anxiety, depression and fear. Excessive anxiety and fear caused by a sense of threat can lead to physical symptoms, such as headaches and physical fatigue. This symptoms are similar to COVID-19, which can make people

unsettling and increase bad mood. In the process of self-isolation, it is easy to cause depression, sadness, despair, panic and fear, and even extreme fatigue, low spirits, hard to think and concentrate every day. A study [16] conducted a telephone interview with 217 randomly selected residents. The self-made "simple questionnaire on the basic knowledge of COVID-19″ was used to evaluate the residents' cognition of COVID-19. The generalized anxiety scale (GAD-7) and the patient health questionnaire depressive symptom group scale (PHD-9) were used to evaluate the anxiety and depression state of the residents. It was found that the anxiety detection rate was 7.83%. The detection rate of depression was 5.53%. Another study [17] conducted a questionnaire survey on 599 women who received assisted pregnancy treatment. It was found that fear was the main manifestation of mental state during the COVID-19 epidemic period. Urban women with high education level and good family economic conditions have the most serious fear.

Modern research on the influence of fear factors on the body

Fear is a strongly repressed emotional experience when people are faced with dangerous situations and are powerless to get rid of it, and it is one of the most widely studied emotions [18]. With the increase of modern mental and psychological diseases, the incidence of phobia is increasing year by year. The psychological pressure caused by excessive panic will destroy the balance of *yin* and *yang*, which may not only make the old disease recur, but also promote the emergence of new symptoms. More and more studies have found that long-term fear can induce anxiety, hypochondria, depression and other emotions. By affecting the neuro-endocrine-immune system, it has an impact on human growth and development, reproductive function, urinary function, respiratory function, digestive system, mental and emotional activities and other aspects [19–20].

Fear affects human nerves - Endocrine system

The "kidney" of traditional Chinese medicine is related to the neuro-endocrine system [21], and the functional state of the kidney is closely related to the neuroendocrine system [22]. Some studies have suggested that "kidney deficiency syndrome" is related to the functional changes of hypothalamus-pituitary-adrenal axis, which further affects the endocrine function of the body [23]. Some studies have found that the value of urinary-17 hydroxycorticosteroids in patients with kidney *yang* deficiency syndrome is significantly lower than normal, and it is preliminarily inferred that adrenocortical metabolic disorder may be a link in the mechanism of kidney *yang* deficiency in traditional Chinese medicine [24]. Another study repeated urine-17 hydroxyl examination in patients with kidney-*yang* deficiency every year for seven years, which confirmed the above conclusion [25]. In addition, ACTH test was used to observe the process of adrenocortical hormone synthesis and catabolism. It was established that the main link in the pathogenesis of kidney-*yang* deficiency was the dysfunction of pituitary-adrenocortical system. In another study, through ACTH test, Su-4885 test and circadian rhythm determination of blood 11-hydroxycorticosterol, it is proved that the syndrome of kidney-*yang* deficiency is the dysfunction of hypothalamus-pituitary-adrenocortical axis in different degrees and different links [26]. Therefore, fear can affect the human neuroendocrine system by affecting the "kidney" function of traditional Chinese medicine.

Fear impact body's immune system

In recent years, with the help of clinical and animal studies, the effect of fear on the immune function of the body has been explored. First, in terms of clinical research, some studies found that erythrocyte immune function and complement CRA function decreased in patients with kidney deficiency, indicating that patients with kidney deficiency would have different degrees of specific immune dysfunction [27]. 51Cr release method was used to detect the activity of NK cells in peripheral blood of 61 patients with kidney deficiency, the results showed that the activity of natural killer cells in plasma of patients with kidney deficiency was strongly inhibited [28] .In addition, the changes of T cell subsets in the elderly were analyzed, and it was found that CD^{3+} and CD^{4+} were significantly decreased, CD^{8+} was significantly increased, CD^{4+}/CD^{8+} was significantly decreased, and T cell immune function was decreased in the elderly, especially in the elderly with kidney deficiency[29]. A series of monoclonal antibodies OKT were used to detect T lymphocyte subsets in peripheral blood of 57 elderly patients with kidney deficiency syndrome. It was found that T cell subsets were significantly decreased in T3 and T4, while T8 was significantly increased. It was confirmed that there was cellular immune dysfunction in kidney deficiency syndrome [30]. By measuring the activity and sensitivity of interleukin-2 (IL-2) in the blood of patients with kidney deficiency, it was found that the activity and sensitivity of IL-2 in patients with kidney deficiency decreased significantly [31]. Secondly, in animal research, the natural model of " fear injury kidney " was made by using cats to intimidate mice, and it was observed that the weight of thymus and spleen decreased [32], indicating that kidney deficiency can lead to the atrophy of immune organs. Other studies also found that the ultrastructure of spleen and thymus in animals with kidney *yang* deficiency were obviously destroyed [33].

In summary, the kidney deficiency syndrome caused by " fear injury kidney " can not only affect the immune function of the body through the neuroendocrine system, but also directly affect the immune function of the body, involving the specific and non-specific immune function of the body. In this epidemic, the immune system is the body's key line of defense against the virus. Studies have shown that most of the patients admitted to COVID-19 have lymphocytopenia [34]. People with low immune system are the high-risk groups of COVID-19 this time [3]. Long-term fear may make the body more likely to be infected with COVID-19.

Discussion

In the face of public health emergencies, it is a normal psychological stress response for people to show moderate worry and fear. It can enable people to quickly raise their awareness of self-prevention, strengthen prevention ability and defensive measures. However, excessive worry will also cause people bad emotions such as anxiety, fear, pessimism and depression, which will affect the human body psychologically or physically and lead to dysfunction of the body [35]. In this paper, we analyzed the previous research on the psychological factors of all kinds of people during COVID-19 period, and found that the secondary psychological changes caused by this epidemic situation have been paid more attention to, and the questionnaire survey scheme is often used in the research. Based on the diagnosis and isolation of patients, there were a large proportion of anxiety and depression, and excessive fear, sadness, helplessness and mood swings, etc. For medical staff, high-intensity work and heavy treatment tasks, lack of release of stress will make medical staff enter a state of psychological stress, resulting in their own anxiety, depression, panic, sleep disorders and so on. The general public are more prone to panic, disappointment, fear, irritability and so on. COVID-19 has brought varying degrees of psychological impact on diagnosed and suspected patients, health care workers and the public, which will not only cause physical discomfort, but also emotional stress reactions. Long-term or excessive fear of psychological changes can easily damage the kidney *qi* and kidney essence, resulting in changes in

the neuroendocrine-immune system, and then induce disease or some disease susceptibility. There are many ways to reduce anxiety and fear in modern medicine, such as medicine, relaxation training, self-suggestion, cognitive behavior and dialectical cognitive behavioral therapy and so on. TCM intervention measures are based on traditional Chinese medicine concepts such as "unity of man and nature" and "integration of body and spirit". They have great advantages in regulating emotional changes, including traditional Chinese medicine, acupuncture and *tuina*, TCM behavioral therapy, TCM emotional therapy and so on. When treating fear with acupuncture, especially for cases with fear of injuring the kidney essence, sìshéncōng (四神聪EX-HN1) , shéntíng (神庭DU24) , xīnshū (心俞BL15) , dǎnshū胆俞 (BL19) , shènshū肾俞 (BL23) , zhìshì志室 (BL25) and xìmén (郄门PC4) are chosen [50]. The five-tone therapy of traditional Chinese medicine and the guiding method of traditional Chinese medicine are worth considering in treating the fear induced by the epidemic because of their fewer side effects and simplicity.

At present, the following problems still deserve attention: first, many surveys during COVID-19 showed that front-line health care workers, staff, patients, middle-aged, elderly people and parturients are the groups that psychological survey researchers pay more attention to. Among many negative emotions, more attention is paid to anxiety and depression, while less attention is paid to negative psychological problems such as panic and fear, which is related to the use of scales related to anxiety and depression in previous surveys, such as generalized anxiety scale (GAD-7), health questionnaire depression symptom group scale (PHQ-9) and so on. Second, anxiety is the worry about the expected danger, panic is the manifestation of the acute escalation of anxiety, and panic is the spread of anxiety in the group [34]. However, in many investigations during or after the epidemic, the attention to the fear of the subjects is not enough.

Internationally, there are dozens of psychological scales to evaluate an individual's fear of many different things, including: 1) scales to assess fear of specific disease, such as carcinoma disease [36] or Alzheimer's disease [37]; 2) there are specific vulnerable groups' fear of specific events, such as Parkinson's fear of falling [38], cancer patients pair fear of cancer recurrence [39], fear of childbirth in pregnant women [40], Surgical Fear Questionnaire, (SFQ) [41]; 3) Fear of progression(FOP) [42], Fear of progression questionnaire short form (FOP-Q-SF);4) Fear of specific events, such as acrophobia [43], flying phobia [44] etc.; 5) Measures of more general fear, such as social phobia [45], evaluation of fear [46], fear of public speaking [47], fear of offense crime [48], etc. In this epidemic of COVID-19, 717 Iranians were selected as subjects in a study. Based on the existing fear scale, combined with expert evaluation and participant interview, they were evaluated with classical experimental theory and Rasch model, and the COVID-19 fear scale (FCV-19S) was established [49]. For COVID-19 fear scale selection and development, except readability and comprehensibility of entries in addition to being essential, it should also have good reliability, validity and high feasibility, so as to facilitate a wide range of clinical applications.

A correct understanding of the disease and nursing care offer, and a comprehensive understanding of the relevant prevention and treatment measures, are of great significance for the prevention and treatment of psychological problems caused by the COVID-19 epidemic. In the rescue of the emergency response to this major public health emergencies, the construction of mental health during the epidemic should be strengthened, and the psychological problems of different groups of people should be highly concerned, especially the psychological state of the people in the areas with serious epidemic and the frontline personnel fighting against the epidemic. The psychological problems involved in this epidemic still need to be paid continuous attention for a long time after the end of the epidemic, and it is necessary to formulate a reasonable screening program. In addition to the psychological and emotional assessment of anxiety and depression, we should pay special attention to the assessment of fear, so that early diagnosis and timely intervention can be done to reduce the psychological damage and follow-up psychosocial problems caused by the epidemic.

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