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TCM analysis and strategy for COVID-19 associated loss of smell and taste

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Highlights

In this paper, the authors pointed out that loss of smell and taste could be an early signature of coronavirus disease 2019 (COVID-19). In traditional Chinese medicine impairment of meridians, disturbed Brain-Shen and dysfunction of the Zang-Fu organs are the key pathology of loss of smell and taste by COVID-19. traditional Chinese medicine treatment, including herbal medicine and acupuncture should be provided in time.



Abstract

Coronavirus disease 2019 (COVID-19) is caused by SARS-CoV2 and is still not yet under complete control and no cure is available until this moment. It is still unpredictable to expect vaccination available worldwide in the near future. Early diagnosis hence becomes extremely important. Various papers have proven that early identification of loss of smell and taste is of significance in the diagnosis of this disease. Some patients of COVID-19 may carry on suffering from loss of smell and taste even long after the other symptoms of the infection subside. The aetiology, pathology, and mechanism of loss of smell and taste are discussed in this article, pointing out that impairment of meridians, disturbed Brain-Shen and dysfunction of the Zang-Fu organs are the key pathology of loss of smell and taste by COVID-19. Traditional Chinese medicine resolution with acupuncture and Chinese herbs are therefore demonstrated accordingly, aiming to establish some practical and effective strategies to deal with loss of smell and taste. This unique presentation in the treatment illustrate that even though loss of smell and taste being a single symptom, it requires a profound understanding on the complicated and sophisticated background mechanism of the COVID-19, which is urgently in need of comprehensive treatment in time. Loss of smell and taste by COVID-19 is not only a minor suffering of the infection, but also a very critical part of a fully recovery of COVID-19, it shall not be left untreated.

Keywords: SARS-CoV2, COVID-19, loss of smell, loss of taste, acupuncture, Chinese herbs

Abbreviations:

COVID-19, coronavirus disease 2019; LST, loss of smell and taste; ACE-2, angiotensin-converting enzyme 2; TCM, traditional Chinese medicine; EPFs, exogenic pathogenic factors.

Competing interests:

The authors declare that there is no conflict of interest.

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Background

Coronavirus disease 2019 (COVID-19) is a newly discovered respiratory diseases caused by coronavirus infection. Since the outbreak at the end of 2019, over 10,421,494 cases were confirmed and 508,419 people have lost their lives worldwide (as of 30th June 2020) [1]. Generally recognized, this disease presents in the early stage, with main symptoms that are commonly seen on other flu-like illnesses, such as fever, continuous cough, running or blocked nose and sore throat et al. Being the first country with it mass outbreak of COVID-19, China has gathered most experiences of the disease and has published several editions of national guidelines on diagnosis and treatment. The latest edition, published on 3rd March 2020 by the National Health Commission & State Administration of Traditional Chinese Medicine, states that the main manifestations in early stage include fever, fatigue and dry cough, nasal congestion, runny nose, sore throat, et al. (Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia, Trial version 7, accessed 30th June 2020) [2]. However when COVID-19 starts its global journey from Italy in Europe in March 2020, the loss or change in sense of smell and/or taste, among all the other early symptoms and signs of the infection, is raising more and more awareness as one of the unique early symptoms of the COVID-19 infection. The UK government was the latest one to recognize this, the loss or change of taste and/or smell was added onto the renewed guideline for diagnosis of COVID-19 on 18th May 2020 [3]. In comparison, the USA centers for disease control and prevention already did so early in April [4].

Therefore, from the difference of response among different populations, we can see the understanding of loss of smell and taste (LST) is a new task to both western and Chinese medicine.

Western medicine understanding on loss of smell and taste due by COVID-19

The first clinical study to mention LST related to COVID-19 was from China on late February 2020, in which Mao and colleagues reported a retrospective study to analysis 214 conformed hospitalised COVID-19 patients [5]. Among them, 36.4% of the patients (78 cases) recorded with neurological conditions. In particular, 5.1% (11 patients) reported hyposmia and 5.6% (12 patients) complained of hypogeusia. Compared with other classic major symptoms, fever (61.7), cough (50%), LST was much lower, which didn't catch the notice of other clinicians or researchers and hence did not obtained special attention on the government guidelines in China.

Shortly after, a study from Italy indicated there were 33.9% (20) of 59 hospitalised patients who were

COVID-19 positive reported taste disorders [6].

The systematic review and meta-analysis reported the prevalence of olfactory dysfunction was 52.73% (1,627 cases) and gustatory dysfunction 43.93% (1,390 cases). They concluded that Olfactory and gustatory dysfunction are common symptoms in patients with COVID-19 and may represent early symptoms in the clinical course of infection [7]. Significance of increased awareness of these signs and symptoms is to encourage earlier diagnosis and treatment, as well as to heighten vigilance for viral transmission.

A recently large sample and multi-centre clinical study in Europe has found more than 85% of the laboratory-confirmed COVID-19 patients reported olfactory and gustatory dysfunctions, 85.6% and 88.0% respectively [8].

For investigating the relationship between the anosmia and dysgeusia with COVID-19 infection, American Academy of Otolaryngology-Head and Neck Surgery developed the COVID-19 Anosmia Reporting Tool for Clinicians. The initial findings revealed that anosmia was noted in 73% of patients (out of 237 entries) prior to COVID-19 diagnosis. It is suggested that anosmia may be critical in timely identification of individuals infected with SARS-CoV2 who may be unwittingly transmitting the virus [9].

Spinato and colleagues reported on JAMA 26th May 2020 that 64.6% of patients had altered sense of smell or taste, which is higher than two typical symptoms, dry or productive cough (60.4%) and fever (55.5%) [10].

Another slightly earlier study from the UK, investigated whether LST is specific to COVID-19 in 2,618,862 individuals who used an app-based symptom tracker [11]. Among the 18,401 who had undergone a coronavirus test, the proportion of participants who reported LST was higher in those with a positive test result (4,668 of 7,178 individuals; 65.03%) than in those with a negative test result (2,436 of 11,223 participants; 21.71%). Based on the study, the team published in The Lancet in early June "Quantifying additional COVID-19 symptoms will save lives" which indicates that predictive ability of LST can be higher than fever or persistent cough [12].

In terms of the age, the mean age of sufferers is 36.9 (11.4) [8], 41.25 (12.18) [11] and 52.7 (15.5) [5]. The percentage of female sufferers is higher than men, at 59.3%5, 63.1% [8] and 71.88 % [11]. These figures indicate the middle-age and female are more prone to LST in association with SARS-CoV2 infection.

Although increasing evidences have highlighted the LST could be the strongest predictor for COVID-19 infection [12], the patho-physiological mechanism underlying these symptoms is not clear [13, 14].

There are some reports show an abundance of nasal epithelial cells expressing cellular receptors and proteases needed for viral entry, i.e. angiotensin-converting enzyme 2 (ACE-2) and

transmembrane serine protease 2. One of the most reliable hypotheses lay the importance of the interaction of SARS-CoV2 with the ACE-2 and transmembrane serine protease 2 enzymes. Multiple non-neuronal cell types present in the olfactory epithelium express two host receptors, ACE-2 and TMPRSS2 proteases, expressed in the oral mucosa and olfactory cavity, that facilitate SARS-CoV-2 binding, replication, and accumulation [13]. Based on the hypotheses, drugs potentially to modulate the expression and activity of ACE-2, Angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers such as captopril, are advised to be considered on the management of LST [13].

It was also reported that up to 88% of patients developed anosmia or ageusia, thought to be secondary to invasion of the olfactory bulb by the virus, suggesting brain involvement [15].

LST does not only appear briefly, it is worthwhile to mention, many patients may live with the symptom for an unpredictable longer period. Even after 3 months since Prince Charles came out of the major symptoms of COVID-19, he is still having the “loss of smell and taste and, sort of, still felt he’s still got it now” [16].

Therefore, LST by COVID-19 is not only a minor suffering of the infection, but also a very critical part of a fully recovery of COVID-19, it affects people’s living quality and shall not be left unattended.

Traditional Chinese medicine understanding of loss of smell and taste by COVID-19

Although the actual mechanism of LST in western medicine is not yet clear, traditional Chinese medicine (TCM) thorough logic analysis of pathology over the whole process of SARS-CoV2 infection can provide a good interpretation as well as reliable resolution on treatment of LST.

COVID-19 is believed in TCM to be mainly the invasion by an epidemic evil bearing nature of Cold-Damp, with Toxin into the body, especially at early mild stages. TCM sees the symptoms of LST as a key part of the SARS-CoV2 infection, an exogenous illness. Although it follows the same pattern of normal exogenic pathogenic factors (EPFs), it also has its own pandemic characters, featuring acute onset, dramatic progress in an unexpected speed, skipping or overlapping different stages at the same time so to cause much higher complexity and mortality than other ordinary exogenous diseases.

Dysfunction of meridians

According to the contexts written in various chapters throughout *Huang Di Nei Jing* (an ancient Chinese medical book that has been treated as the fundamental doctrinal source for Chinese medicine for more than two millennia), it is believed that, when EPF invades

the body, the first stage of it’s process is to hit the skin-cutaneous section; if not resolved by the system, it then travels deeper into the collaterals and then channels; furthermore it then enters deeper and finally settles in the Zang-Fu organs. The invasion of EPFs follows the sequence: SKin-cutaneous section-collaterals-3 Yang channels-Stomach and Large Intestine-5 Yin channels and organs. It is generally accepted that the exterior patterns of any illness are on the level between the skin-cutaneous sections and meridians. Because the skin-cutaneous sections, collaterals are all meridian oriented sub-systems, Therefore, the early stage of the COVID-19 infection can all be identified according to the allocation of each individual Yang meridians. At this stage while COVID-19 is moving on its way, there is yet not any symptoms of internal Zang-Fu organs, like with the Lung, of cough or shortness of breath, LST could be one of the early alarming sign, implying the potential for immediate medical care and procedure of preventative methods including home isolation, etc. Ignoring these symptoms could cause further spreading of the virus and deterioration of the disease. Studying the meridian distribution, we can understand that different meridians, including primary and Extraordinary meridians could be involved and sometimes, several meridians could be affected at the same time as shown on Table 1. Therefore dealing with the modulation on Yang meridian systems is a beneficial strategy for treating LST. Once the EPFs enter the Yin channels it then directly affect and impair the Yin organs, such as Lung and Spleen in particular related to LST. we will have the relevant discussion in the section on internal organ impairment.

Disturbance to the Brain-Shen

The Brain, one of the six extraordinary organs, is also called the “sea of marrow”. It states in *Huang Di Nei Jing - Ling Shu (Spiritual Pivot)*, “the Brain is the sea of marrow, its stretches up to the top of the head, and to the point of Fengfu (GV16)”. In chapter 28 of *Ling Shu*, it also says, “when the up-going Qi is insufficient, the Brain is not filled, so suffer the ears from hearing noises, and suffers the head from being bent, and dizzy is the eye vision”. Due to the close connection of Bladder meridian with Du Mai and the Kidney that feeds directly into the Brain, COVID-19 progressing in Bladder meridian may rapidly fall into the Brain via the connection of Du Mai, Ren Mai, Chong Mai, and Kidney meridian in a rather early stage.

The Brain is the place of Shen’s (spirit) activity, which controls memory, concentration, sight, hearing, and smell. As the *Pi Wei Lun (Discussion on Stomach and Spleen)* by Dong-Yuan Li (1249 C.E.) states, “sense of sight, hearing, smelling, touch, and intelligence ll depend on the brain”. Qing-Ren Wang in Qing Dynasty said in his book, *Yi Lin Gai Cuo (Correcting the errors in the forest of medicine)*, an

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Table 1 The impact meridians with loss of smell and taste

Meridian's name	Distribution	Loss of smell and/or taste	Other symptoms
Foot Taiyang Bladder	Starts at the inner corner of both eyes close to the root of nose and frontal sinus, neck, back, leg foot, etc.	Blocked nose, running clear nasal discharges as well as the impaired sense of smell.	Headache between eyebrow, pain on top of head, neck and back pain, cold and tightness of back, legs, disorders of urine function.
Hand Yangming Large Intestine	End on the side of nose wings, close to sphenoid sinus.	Loss of smell and taste.	Diarrhoea, pain across front of neck, abdominal pains, or possible constipation.
Foot Yangming Stomach	Starts on the side of nose wings, close to sphenoid sinus.	Loss of smell and taste.	Pain across forehead, jaw and front of neck, loss of appetite, stomach and abdominal pains.
Yangqiao Mai	Start from the Shenmai point (BL62) of the Taiyang meridian of the lateral heel and run up the back of the lateral malleolus and up to along the posterolateral side of the chest, through the shoulder and lateral neck, finally the corner of the mouth, nose to reach the inner corner of the eye.	Loss of smell and taste.	Stiffness of the body at the lateral aspect.
Lung, Heart, Spleen, Kidney, Liver, Du Mai, Ren Mai, as well as Chong Mai, etc.		Direct or indirect connection with smell and taste.	

ancient Chinese medical book written by Qing-Ren Wang in 1830 C.E.), “the nose communicates with the brain and therefore smell depends on the brain.” [17]. Similarly, Shi-Zhen Li in “*Ben Cao Gang Mu - Xinyi (Flos Magnoliae)*” says, “the nose is through the heaven and the heaven is the head.”

Hence, it is clear in TCM that the Brain is in connection to the senses of sight, hearing, smell and taste. Being an extraordinary organ, Brain nowadays is believed to be the organ to control sight, hearing, smell and taste, and it is also closely interacting with the Zang organs, particularly the Heart and the Kidney in TCM context. A development of Brain's dysfunction is usually a combination of impairment of Brain at its

structure along with disruption of internal organs.

From the vast clinical researches on the COVID-19 infected patients, we now believe impairment of brain, encephalopathy, did happen at a comparatively earlier stage of the infection and may persevere throughout the later and recovery stage. Sufferers reported lack of concentration, poor memory, stress, insomnia, delayed recovery of LST, etc. LST may be a result of impairment of relevant meridians in the beginning of COVID-19 infection, but once the damages progress into brain level, a dedicated treatment for recovering brain's function in TCM is critical for the recovery of LST. However, the quality and speed of the brain recovery also depends on the repair and healing of it

relevant Zang-Fu organs.

In addition, to maintain a good function of the Brain, Spleen-Qi (vital energy) needs to rise to the head to nourish the upper orifices, such as eyes, nose, ears, tongue and mouth. Sufficient Spleen-Qi rise upwards to carry the clear-Yang to irrigate the senses. As “*Huang Di Nei Jing - Su Wen (Simple Questions)*” states, “the Clear-Yang is heaven”, “the Clear-Yang exits through the upper orifices” [18], “the Clear-Yang is effused through the interstice structures [18]”, “the Clear-Yang (Qi) can be effused through them”, “the Clear-Yang transforms to Qi and rises to constitute heaven [18].”

If the Clear-Yang is strong and healthy, the senses of seeing, smelling, hearing and tasting would be acute and clear. Any disorders of ascending, descending, entering and exiting, of Spleen-Qi, blocked by Cold-Damp, the Clear-Yang will not be lifted towards the head, and these may result in impaired senses, including smell and taste.

Impairment of Zang-Fu organs

Invasion of Cold-Damp with Toxin into the meridians always ends in internal Zang-Fu organs, especially in the case of COVID-19. It initially could impair the Lung, Spleen and Sanjiao via meridians, but quickly could fall in further to damage the Heart (pericardium), Liver and Kidney, especially at the severe and critical stage. Therefore, Zang-Fu organs’ dysfunction is an unavoidable procedure in tackling the recovery of COVID-19.

The sense ability of smelling and tasting are all depending on the smooth ascending, descending, entering and exiting of Qi. If Qi is obstructed or disrupted, these senses will not be functioning properly. Since the nose is the opening to the Lung, TCM stresses the importance of the Lung in terms of smelling, which means if Lung-Qi is healthy and strong the nose will be open properly and the sense of smell will be normal and accurate. If Lung-Qi is disrupted the sense of smell may be weak or impaired. The mouth is the opening orifice to the Spleen, and the tongue is the opening orifice to the Heart. If the Qi of the Spleen and Heart are strong, the sense of taste will be normal and acute. If the Qi of the Spleen or Heart is disrupted, the sense of taste may be weak or impaired.

Although each sense of body is mainly allocated to a certain Zang-Fu organ, i.e. vision to the Liver, taste to the Spleen and Heart, smell to the Lung and hearing to the Kidney, TCM also holds that these internal Zang-Fu organs are mutually connected and influenced through meridians systems and Mother-Child 5 element relationships. Moreover, the physiological function of the Heart plays a key role in the sense’s function, for instance, *Huang Di Nei Jing - Su Wen* says, “When the five Qi enter the nose, they are stored by Heart and Lung. When Heart and Lung have a disease, the nose is not free as a result [18].” This text

implies the relation between the function of nose and Lung as well as Heart.

Traditional Chinese medicine treatment for loss of smell and taste

The olfactory nerve is the nerve fibre that passes through the ethmoid epithelium to the olfactory bulb. The olfactory ability is the characteristic of the olfactory cells in the nasal mucosa. Injury of the nasal mucosa, olfactory bulb, olfactory filaments or central nervous system connection may affect the olfactory sense, clinically featuring loss of sense of smell, inversion of sense of smell, or phantom smell. Taste is transmitted by taste buds densely spread on the tongue, called taste bud cells, and then excited by the taste centre of the cerebral cortex, and the entire taste analysis activity is completed by the feedback loop of neuro-humoral system. Therefore a tailored treatment to help reduce the inflammatory reaction caused by cytokine attacks on the nasal mucosal epithelium or taste buds on tongue as well as nerve centres in the Brain can be a great approach to revert or reduce the symptoms of LST from a view of western medicine.

It is hence sensible to develop a TCM strategies for protection and repair on the nasal, lingual and CNS impairment by COVID-19 infection. In TCM terms, it is to eliminate the pathogenic factors, modulate the blockage of relevant meridians and to recover the function of internal organs. In addition, methods to revive the Shen and re-open the Clear orifices should be included. Early relevant involvement of TCM treatment shall be able to play an important role in the success of the LST recovery. However, TCM treatment for LST shall be strictly differentiation oriented, which means symptom-based treatment limited only to LST will fail to achieve sufficient result at a higher expectation. We recommend TCM treatment for LST by COVID-19 shall follow these strategies:

Regulation of internal Zang-Fu organs

LST, mild or severe, is one of the early chief alarming symptoms and signs of COVID-19 in the beginning stage. These early symptoms may appear separately or in combination, with or without symptoms involving the Lung, Spleen and Sanjiao. As the infection deteriorates, the relevant symptoms could take place and even evolve into more severe conditions with involvement of Liver, Heart, and Kidney, etc in those severe and critical cases. On the other hand, while the infection is successfully managed, the body may then enter the recovery stage. In either of the situation, however, Loss of smell and taste, along with other pronounced post-stage symptoms including exhaustion, emotional disturbance, could be one of longest and hardest sufferings persevering throughout the whole process of this pandemic infection.

It must be noted that LSTs is not a life-threatening

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condition, but the following deterioration of COVID-19, which could turn the life upside down within just a few days, can be dangerous. In this sense, to alleviate the smell and taste is not the core target of TCM treatment, but to rescue patient's life needs the urgent attention. The treatment for LST can be carried out throughout all stages of COVID-19 infection, however must be under an overall strategy for treatment of the infection. At an acute and severe circumstance, particular attention for LST may only lead to distraction, if missing the attention to the critical Zang-Fu organ management. Details about treatment for COVID-19 at these stages could refer to *Journal of Chinese Medicine | Issue123 | June 2020 The Treatment of COVID-19 with Chinese Herbal Medicine*.

Although believed to be the key organ related to smell sense and the major organ attacked during the COVID-19 infection, running in a well-coordinated unity of the body, Lung needs some special attention but shall not blind out all the other factors. Therefore a successful treatment for loss of smell will not be completed without looking into restoring lung's function, but a good understanding on the development of relevant pathology is more important than merely aiming at strengthening the Lung. In COVID-19 infection, the acute invasion of Cold-Damp with Toxin to the Lung could disturb the Lung's function of dispersing Qi or furthermore the function of descending Qi. Cough, chest pain with pressure shortness of breath could hence happen along with malfunction of smelling. Therefore dispelling the congested external pathogens, regulating the dispersing and descending function of Lung Qi all play good parts. Points recommended for treatment are: Lung 5 Chize with Lung Yin or Phlegm and mucus complications, Lung 7 Lieque particularly good for nose and throat symptoms, Lung 9 Taiyuan good for Lung deficiency. The Yuan source point of Lung meridian is particularly beneficial if added to tackle severe meridian impairment of Yang meridian, Large intestine. In terms of smelling sense, with Lung and Heart both located in the chest, responsible for smooth Qi and blood circulation. The harmony between Heart and Lung determines a good coordination of Qi and Blood circulation. In this sense, as a result of lung's impairment during the COVID-19 infection, the Heart will be inevitably involved. So the Heart also needs to be assisted next to the Lung.

The same principle applies to the TCM treatment for loss of taste. Spleen is believed to be the key organ related to the taste sense. Spleen Qi assists the lift of Clear-Yang into the sensory orifices on head, therefore strengthening spleen Qi to ensure smooth communication between the Brain and rest of organ-body is very important. Therefore a success in treatment for loss of taste will not be achieved without looking into restoring spleen's function, but a good

understanding on the development of relevant pathology is more important than merely aiming at enforcing the spleen. Resolving damp-cold, strengthening the transforming and transporting function of Spleen Qi, regulating the relevant Qi directions all play major parts here. Points recommended for treatment are: Spleen 9 Yinlingquan for dampness and water retention complications, Spleen 3 Taibai for spleen deficiency, Ren 12 Zhongwan and Ren 17 Qihai for overall Qi deficiency (Table 2). In addition, the invasion of Cold-Damp to the Spleen, under the Five Element relation, being the Child of the Heart-Fire, could cause the aggravation of loss of taste as a further result of disturbed Shen in the Heart. Therefore it is advisable to deal with the Spleen and Heart at the same time.

Waking/Balancing the Brain-Shen and opening the Clear orifices

Brain, located at the top of body, although in the modern era draws more attention as an organ where the Shen, senses consciousness and mental activities, belongs to. In fact in TCM, Brain is in the direct charge of the Heart where the Shen lodges. Heart is the one unavoidable to address when dealing with Shen disturbance in TCM treatment. Heart Shen is the governor of Brain-Shen, also called Yuan Shen (the Primary Shen) as a result of the interaction between Heart and Kidney essence (the origin of marrow). in the TCM picture, different senses like smell, taste, hearing, and vision, not only respectively pertains to different individual organ system, but also forms the different function and activities of the Shen, which is dominated by the Heart.

There are a great deal of acupuncture points and Chinese herbs to regulate the Shen, however, it is not possible to select all of them at same time, and very unwise to select them without a proper differentiation.

Among all the acupoints known for Shen treatment, GV24 Shenting and Extra Yintang are exceptionally useful as they can widely balance the Shen, benefit the Brain, and improve smell and taste at same time. A reducing method is advised to apply. (1) GV24 Shenting could regulate the Shen, benefit the Brain, eliminate Wind-Cold-Damp, and improve the nose and taste. (2) Extra Yintang, located at the midway between the medial ends of the two eyebrows, could treat nasal congestion, sinus problems, balance the Shen, benefit the Brain and relieve the headache.

Both points are on the Governor Vessel, which connects to and benefits the Brain. They also have a very distinct use to help with the emotions during the COVID-19 outbreak.

Other points include Extra Sishengong and GV20. In severe case of LST, GV26 could also be applied with reducing method.

In principle, selection of two of above points, is to be applied in combination with other points to treat

Table 2 Summary of treatment principles and selected points and herbs

Treatment principles	Selected points	Other technique	Herbs
Waking/Balancing the Brain-Shen and opening the Clear orifices.	GV24 Shenting. Ex-Yingtang. Ex-Sishencong GV20 Beihui. GV26 Renzhong.	Scalp acupuncture: Nose-Throat-Mouth-Tongue Area and Sensory Area lower 2/5.	Changpu and Yuanzhi.
Modulation on the circulation and function of meridians.	Du Mai: SI3 + BL62. Ren Mai: LU7 + KI6. Chong Mai SP4 + PC6 Yang Qiao Mai BL62 + SI3.		Chuanxiong and Baizhi.
Aromatic Damp-resolving.			Cangzhu, Huoxiang, Peilan, Baikouren, Caoguo, Caodoukou.
Symptomatic local treatment.	LI20, Extra Bitong, ST4, ST3.		Cangerzi and Xinyihua, Sharen, or Caokouren.

various syndromes of COVID-19, under a holistic strategy to deal with general situations and local complaints, which is always the TCM principle in treating any disease.

Scalp acupuncture is one of the modern micro-system acupuncture techniques which combines Chinese acupuncture needling methods with western medical knowledge on neuroanatomy, physiology, pathology to allocate the mirror areas on scalp to the corresponding zones on cerebral cortex. It is mainly for Brain related conditions, including neurological and psychological conditions. In the treatment of LST, Nose-Throat-Mouth-Tongue Area and Sensory Area lower 2/5 are the two major points/zones to be selected and stimulated to improve the sense of smell and taste.

In view of Chinese herbs to help with the Shen, Changpu (*Rhizoma Anemonis Altaicae*) and Yuanzhi (*Radix Polygalae Tenuifoliae*) are the most important ones, among all the similar function herbs, in order to combine the purpose to activate the Shen, benefit the Brain, and improve smell and taste at same time. (1) Changpu (*Rhizoma Anemonis Altaicae*) has function to awake the Shen and open all the Clear orifices. Besides, it could relieve the depression and improve the emotional states. Due to invasion of Cold-Damp, the meridians and orifice of the nose, mouth and tongue are obstructed by Damp or Turbidity, or mental orifice of heart is blocked during the deterioration of COVID-19. Changpu could be applied in the

prescription to open them and promote the free flow of energy in these orifices. Amount of 10 g to 12 g is commonly prescribed. (2) Yuanzhi (*Radix Polygalae Tenuifoliae*) has function to solve the Phlegm and regulate the Shen, suitable in acute invasion of Cold-Damp, or formation of Phlegm-Heat in the Lung, which blocks the nose or other orifices, resulting in LST. 10 g to 12 g is commonly prescribed.

These two herbs have also good function to improve the emotions and relieve the anxiety and depression during COVID-19.

Modulation on the circulation and function of meridians

Since our body consists of physical Zang-Fu organs and meridian structures. And the infection always starts with attacks and invasion into meridian at the beginning stage. A treatment only targeting at the Zang-Fu organs without regulating the meridians would not be completed to resolve LST.

Same principle applies to the point and herbs selection for meridian regulation, as with those on Shen balancing and Clear orifices opening, careful consideration based on precise differentiation is important.

Regulation of relevant meridians

It is not enough only to look into a symptomatic treatment of LST in COVID-19, because the root

blockage in certain meridians is still left untreated. For instance, if loss of taste is caused by disorder of stomach meridian, and when stomach meridian is not regulated and harmonised in time, the loss of taste will remain persistent. To obtain a clear identification and differentiation of relevant meridians requires a thorough understanding of meridian distribution and relevant symptoms.

In order to improve the Qi and Blood circulation for LST during COVID-19, the combination of Yuan-Source and Luo-Connecting points of the relevant affected meridians should be selected accordingly. Special attention shall be paid to, Lung, Spleen, Stomach, Liver, Heart, Bladder, Kidney and Large Intestine meridians in terms of differentiating the corresponding meridians. Allocation on the relevant meridian is based on their different characteristic clinical manifestations, other than LST. In most cases, impairment of one or two meridians is often seen to cause LST.

Apart from the 12 primary meridians, Involvement of 8 Extraordinary meridians/vessels needs a special attention. This needs a unique technique on point combinations and procedures. Here are the suggestions.

Du Mai. From the crown of the head, the channel descends along the midline of the forehead and nose to its final point, GV26, at the junction of the upper lip and gum. One of its secondary branches ascends together with the Chong Mai and Ren Mai, to pass through the Heart, circles the mouth and the splits to ascend to the lower border of the two eyes. Since Du Mai is the governor of all the Yang meridians, when Du Mai is impaired, there would be headache, dizziness, severe aversion to cold, weak heartbeat, cold hands and feet, blocked nose with LST in COVID-19. SI3 + BL62 should be added to open this meridian.

Ren Mai. Ren Mai is the Sea of Yin in the body, ascending along the midline of the abdomen and ending at CV24 below the lower lip. An internal portion of the channel then winds around the mouth, connecting with GV26 and ascending to ST1 just below the eye. When Ren Mai is impaired, different Zang organs could be disturbed, causing either respiratory, cardiological, or water metabolism and digestive disorders. Pressure at the chest, abdominal pain and distention, poor appetite, weakness, tiredness, somnolence, coldness of body, blockade nose with LST in COVID-19. LU7 + KI6 should be added to open this meridian.

Chong Mai. The fourth branch of Chong Mai from the chest ascends alongside the throat, curves around the lips and terminates below the eye, reaching the end of the Ren Mai. When Chong Mai is impaired, there can be a characteristic manifestation as Qi rushing from the lower abdomen up till the chest, or vomiting, nausea, excessive saliva, or abdominal pain, chest pain, blocked nose with LST in COVID-19. SP4 + PC6

should be added to harmonise this meridian.

Yang Qiao Mai BL62 + SI3. After reaching the points at LI15 and LI16, Yang Qiao Mai then travels to the face and connects with ST4, ST3, ST1 and BL1 where it meets with the BL, GV and Yin Qiao Mai. From here it travels over the head and terminates at GB20. When Yang Qiao Mai is impaired, there can be manifestation of numbness, weakness and spasms at the lateral aspect of the lower limbs, headache, eyes or face pain, LST in COVID-19. BL62 + SI3 should be added to regulate this meridian.

In terms of using Chinese herbs to regulate or harmonise different meridians, there are much less choices than that with acupuncture. But it is still possible to choose some herbs to achieve the effect to improve the sense of smell and taste.

Chuanxiong (*Radix Ligustici Wallichii*). It is the ideal herb to act as a guiding ingredient to lead to the head and Clear orifices, in order to promote the Qi and Blood circulation in the meridians.

Baizhi (*Radix Angelicae Dahuricae*). It enters the Lung, Spleen and Stomach meridians, having a good function to promote Qi circulation in the head. Meanwhile it dispels Wind, Cold and Damp, relieves headache, opens the nasal orifice, and removes the Phlegm in the nose.

Jiegeng (*Radix Platycodi Grandiflori*). It enters the Lung meridian, having function to disperse the Lung-Qi, benefit the throat, eliminate Phlegm, discharge the pus, and open the nasal orifice.

Aromatic Damp-resolving herbs. One of the main pathogenic factors for this pandemic is invasion of Cold-Damp, which disturbs the Lung's function to disperse Lung-Qi or the one to descend the Lung-Qi, and cause dysfunction of the Spleen to transport and transform, as well as impairs the function of Sanjiao in Qi and Water distribution.

Aromatic Damp-resolving herbs are to be applied to revive the function of the Spleen, aiming at symptoms of poor appetite, tiredness, chest tightness, loose stools, or diarrhoea, loss of tastes, greasy coating, and slippery pulse, etc. Cangzhu (*Rhizoma Atractylodis*), Huoxiang (*Herba Agastaches seu Pogostemi*), Peilan (*Herba Eupatorii Fortunei*), Baikouren (*Fructus Amomi Rotundus*), Caoguo (*Fructus Amomi Tsao-Ko*), Caodoukou (*Semen Alpiniae Katsumadai*), etc, are beneficial to use in the herbal prescription to treat COVID-19 with LST. Ideally two to three herbs combined together are used to improve the function of the Spleen and recover the sense of taste at same time. In addition, advice on avoiding eating cold and raw food and drinks as well as those hot or spicy and irritating, like peppers and mustard is also valuable.

Symptomatic local treatment

LI20 and Extra Bitong are considered as the local points, which have the function to open the nose, remove the blockage and improve the sense of smell.

Meanwhile, ST4 is a good point to improve the sense of taste. ST3 could be used to treat both LST. They are punctured with reducing method. However, those points are only considered as the points for a symptomatic treatment and they are combined with the points to solve the fundamental pathology of COVID-19.

When Chinese herbs are concerned, Cangerzi (*Fructus Xanthii Sibirici*) 10 g and Xinyihua (*Flos Magnoliae*) 10 g, which have function to open the nasal orifice and improve the smell, should be added into the herbal prescription to relieve loss of smell. Sha Ren (*Fructus Amomi*) 5 g or Caokouren (*Semen Alpiniae Katsumadai*) 5 g, which have function to resolve Damp and improve the taste, could be chosen and added into the herbal prescription.

Auxiliary techniques

Besides choosing above local points, moxibustion is also encouraged to be applied. It has the effect to dispel External pathogenic factors, eliminate Cold, resolve Damp and promote the Lung to disperse the Qi and the Spleen in transportation and transformation. Direct moxa, indirect moxa with ginger, or moxa cones on the needles are all positive methods to achieve the therapeutic effect of acupuncture.

Meanwhile, electric acupuncture is also advised to be used. Tense and dispersed wave pattern may be applied in order to reduce the local inflammation so as to improve LST.

Conclusion

In all, the success for treatment of LST shall be another good example of TCM philosophy, a precision management of local symptoms with dedicated selection of acu-points and herbal ingredients, based on good understanding on overall view of the fundamental pathology of COVID-19. Loss on either of the two aspects will not help to win the battle in the fight of the pandemic infection. Meridian modulation, Brain-Shen balancing and internal Zang-Fu organ regulation help form a constructive strategy as the core of the success.

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