Usefulness of Abdominal Massage and ST-36 (Zusanli) Acupressure in Improving The Appetite of COVID-19 Patients Treated in a Makeshift Hospital: A Randomized Controlled Trial

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Abstract

Objectives: To investigate the appetite of COVID-19 patients treated in a makeshift hospital and to evaluate the effectiveness of abdominal massage and ST-36 (Zusanli) acupressure in improving their appetite.

Design: Randomized controlled trial.

Methods: This study was performed between February 15 and March 2, 2020, in a sports centre makeshift hospital in Wuhan, China. The appetite of 110 COVID-19 patients was assessed using a mobile app-based Simplified Nutritional Appetite Questionnaire (SNAQ). The experimental and control groups, 55 patients each, were randomized using a prepared randomization checklist. Through video guidance and on-the-spot instruction, patients in the experimental group mastered the methods of abdominal massage and ST-36 (Zusanli) acupressure and implemented the intervention for 7 days by themselves. The appetite of the patients was assessed again after intervention.

Results: In a total of 110 participants, 43 (39.1%) patients suffered from a poor appetite. A positive correlation between poor appetite and older age as well as fever was observed ($p < 0.05$). In the experimental group, the SNAQ scores were significantly increased (14.07 ± 2.46 vs 15.55 ± 1.77 , $p = 0.0004$), and the proportion of patients with a poor appetite was markedly reduced after the intervention (41.8% vs 10.9%, $p = 0.0002$). Compared with the control group, the rate of poor appetite in the experimental group was significantly decreased postintervention (27.3% vs 10.9%, $p = 0.029$).

Conclusion: In COVID-19 patients, a poor appetite may be correlated with older age and fever. Abdominal massage and ST-36 (Zusanli) acupressure are applicable and effective in improving the appetite of COVID-19 patients during isolation treatment.

Trial registration: Chinese clinical trial registry (ChiCTR2000033261), the trial was registered retrospectively.

1. Introduction

During an outbreak of pneumonia in Wuhan, Hubei Province, China, in late December 2019, a novel coronavirus named severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) was identified as the causative pathogen ¹. Since the virus possesses powerful transmissibility, the number of confirmed cases of 2019 novel coronavirus disease (COVID-19) has increased rapidly in China and around the world. COVID-19 has been declared a global pandemic by the WHO ².

The most important strategy for controlling the COVID-19 pandemic is breaking the chain of transmission, which means finding, isolating, testing and treating every patient as early as possible. As the first most seriously affected country, China implemented a series of effective actions to prevent and treat the pandemic. The rates of confirmed cases showed a downward trend, and cured cases increased

rapidly. Makeshift hospitals that were temporarily set up in large venues received the majority of mild individuals for isolation treatment, leading to a considerable reduction in their stress during COVID-19 control.

It is generally believed that nutritional support is one of the indispensable therapies for infectious diseases. Emerging evidence has suggested nutritional status as a relevant factor influencing the outcome of COVID-19 patients³. Because of limited movement areas and psychological anxiety, patients in makeshift hospitals may have gastrointestinal symptoms such as bloating, loss of appetite, constipation, and diarrhoea. These problems may impede nutrients absorption. Furthermore, SARS-CoV-2 can cause gastrointestinal symptoms leading to malnutrition⁴. The prevalence of malnutrition in elderly patients with COVID-19 is high, and nutritional support should be strengthened during treatment⁵. Most COVID-19 patients treated in makeshift hospitals were mild type, and their dietary status was closely related to their nutritional status. Thus, the appetite of these patients deserves our attention.

Abdominal massage and ST-36 (Zusanli) acupressure have been reported to have beneficial effects on appetite improvement and gastrointestinal function in various diseases^{6–10}. However, in the setting of makeshift hospitals, the effect of abdominal massage and ST-36 (Zusanli) acupressure on improving COVID-19 patients' gastrointestinal function remains unknown.

In this study, we evaluated the appetite of 110 mild COVID-19 confirmed patients in a sports centre makeshift hospital using a mobile phone app-based questionnaire survey. The enrolled patients were randomly divided into the experimental and control groups. Abdominal massage and ST-36 (Zusanli) acupressure were applied in the experimental group, and the effect was assessed 7 days after the intervention. The aim of this study was to provide some experience for caring for mild COVID-19 patients during isolation treatment.

2. Methods

2.1 Design

A randomized controlled trial was conducted in the Sports Center makeshift hospital in Wuhan between February 15 and March 2, 2020. This study was based on the CONSORT statement for randomized controlled trials.

2.2 Participants

A total of 120 patients hospitalized in Sports Center Makeshift Hospital in Wuhan between February 15 and March 2, 2020 were recruited after obtaining written informed consent. The inclusion criteria were as follows: (1) patients with a confirmed diagnosis from a positive test for COVID-19 RT-PCR who were aged more than 18 years old; (2) patients who were classified as mild or common clinical types according to the "Diagnosis and Treatment Protocol for Novel Coronavirus Infection-Induced Pneumonia version 5 (trial)"; and (3) patients who were able to skilfully use the mobile phone app. The exclusion criteria

included patients who had severe cognitive impairment, digestive disease and no phone equipment. Four patients were excluded due to a pre-existing digestive disease. A total of 116 patients were randomized into the experimental group (n = 58) or the control group (n = 58) by a computer-generated randomization list. Two patients in the experimental group and three patients in the control group were excluded due to leaving the hospital. One patient in the experimental group quit the study due to intolerance of the intervention. Ultimately, 110 patients were enrolled for the final analysis, with 55 in the experimental group and 55 in the control group.

2.3 Ethical considerations

This study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (approval number: 2020-SR-149) and was registered in the Chinese clinical trial registry (ChiCTR2000033261).

2.4 Data collection

A self-designed questionnaire was used to collect demographic data, including sex, age, educational background, marital status and fever.

The Simplified Nutritional Appetite Questionnaire (SNAQ), which was adopted in this study to evaluate the patients' appetite, includes 4 questions as follows: 1. My appetite is (A. Very poor/B. Poor/C. Average/D. Good/E. Very good); 2. When I eat (A. I feel full after eating only a few mouthfuls/B. I feel full after eating about a third of a meal/C. I feel full after eating over half of a meal/D. I feel full after eating most of a meal/E. I hardly ever feel full); 3. Food tastes (A. Very bad/B. Bad/C. Average/D. Good/E. Very good); 4. Normally I eat (A. Less than one meal a day/B. One meal a day/C. Two meals a day/D. Three meals a day/E. More than three meals a day). For each question, the answer scales were A = 1, B = 2, C = 3, D = 4, and E = 5. Participants selected the correct answer that best fit their current status. The total SNAQ scores range from 4 to 20. Patients with a SNAQ score < 14 were identified to have a poor appetite¹¹.

The SNAQ was structured using a mobile app called "Sojump", and the QR code of the questionnaire was pushed to patients via WeChat. Participants were asked to complete the questionnaire on the third day of hospital admission. After 7 days of intervention, the participants' appetite was assessed using the SNAQ again. The whole survey process was conducted by the front-line nurses who were providing care for the COVID-19 patients.

2.5 Intervention

The procedure of abdominal massage adopted in this study is in accordance with a previous study¹². The abdominal massage movement pattern consisted of four basic strokes (stroking, effleurage, kneading and vibration) that were applied in a clockwise direction over the intestines through the abdominal wall.

ST-36 (Zusanli) is bilaterally located approximately four fingers breadth from the lower border of the patella and lateral to the tibia. After locating the ST-36 (Zusanli) point, the patient was asked to press on it once per second with their thumb five times and then to rest for two seconds. The cycle was repeated for three minutes. A 1-1.5 cm depth should be reached for each press. The procedure was repeated on the contralateral leg.

2.6 Validity and reliability

The patients who met our inclusion criteria were randomly divided into the experimental group or control group based on a computer-generated list.

To enhance the validity of the intervention, in the experimental group, a 5-minute video-guided training session that was recorded by a nutritional specialist nurse was pushed to participants via WeChat. The patients were instructed to perform abdominal massage and ST-36 (Zusanli) acupressure during the first three days after hospitalization by front-line nurses. Following the training, the participants applied abdominal massage and ST-36 (Zusanli) acupressure by themselves three times a day for one week. In the control group, the patients received regular treatment and nursing.

2.7 Data analysis

The statistical analysis was completed using SPSS statistical software (SPSS 20.0 package). Continuous data are reported by mean $\pm$ SD. Categorical variables are shown as absolute numbers and percentages (n, %). The Wilcoxon marked rank test was used to analyse the numerical and percentage distribution data. $p < 0.05$ was defined as the limit of significance.

3. Results

3.1 Demographic and clinical characteristics

A total of 110 patients were enrolled for final analysis in this study. Basic demographic information was collected at the beginning of hospitalization. The distribution of the participants in terms of their demographic characteristics is shown in Table 1. The mean age of the participants was 46.9 ± 12.45 years, 48.2% (n = 53) were female, 75.5% (n = 83) were married, 34.5% (n = 38) were university graduates, and 27.3% (n = 30) had fever symptoms.

Table 1
Characteristics of the study population.

Variables	n (%)
Mean of ages	46.9 ± 12.45
Gender	
Male	57 (51.8%)
Female	53 (48.2%)
Education status	
University graduate	38 (34.5%)
Without university degree	72 (65.5%)
Marriage status	
Single	27 (24.5%)
Married	83 (75.5%)
Fever or not	
Fever	30 (27.3%)
Not fever	80 (72.7%)

The SNAQ scores of the participants were collected on the third day of hospitalization as a baseline. As shown in Table 2, 39.1% (n = 43) of patients were considered to have a poor appetite according to the SNAQ scores (score < 14). First, we analysed the correlation between the baseline SNAQ scores and sex, age and fever. Our data suggested that older patients and patients with fever were more likely to have a poor appetite ($p < 0.05$). No statistically positive association was observed between a poor appetite and sex.

Table 2
Related factors of SNAQ scores.

Variables	SNAQ scores			
	< 14 (n = 43)		≥ 14 (n = 67)	
Age	$\bar{x} \pm SD$	$\bar{x} \pm SD$	t	p
	50.37±11.91	44.67±12.37	2.392	0.0185
Gender	n (%)	n (%)	χ^2	p
Male	19 (44.2)	38 (56.7)	1.647	0.1994
Female	24 (55.8)	29 (43.3)		
Fever or not	n (%)	n (%)		
Yes	18 (41.9)	12 (17.9)	7.574	0.0059
No	25 (58.1)	55 (82.1)		

The patients' characteristics are summarized in Table 3. All of the variables were analysed with an independent t-test or the chi-square test, and no differences were observed between the two groups.

Table 3
Comparison of characteristics between the experimental and the control group.

Variables	Experimental (n = 55)		Control (n = 55)			
Age	Min-Max	$\bar{x} \pm SD$	Min-Max	$\bar{x} \pm SD$	t	P
	22–67	45.67 $\pm$ 13.27	27–66	48.13 $\pm$ 11.57	1.04	0.30
	n	%	n	%	χ^2	P
Gender						
Male	27	49.1%	30	54.5%	0.33	0.57
Female	28	50.9%	25	45.5%		
Education status						
University	16	29.1%	22	40%	1.45	0.23
Under university	39	70.9%	33	60%		
Marriage status						
Single	12	21.8%	15	27.3%	0.44	0.51
Married	43	78.2%	40	72.7%		
Fever or not						
Fever	16	29.1%	14	25.5%	0.18	0.66
Not fever	39	70.9%	41	74.5%		
SNAQ score						
< 14	23	41.8%	20	36.4%	0.34	0.56
≥ 14	32	58.2%	35	63.6%		

3.2 Effect of abdominal massage and ST-36 (Zusanli) acupressure on improving the appetite of COVID-19 patients

To assess the effects of abdominal massage and ST-36 (Zusanli) acupressure, we collected the SNAQ scores again after 7 days of intervention. As shown in Tables 4 and 5, in the experimental group, the SNAQ scores significantly increased (14.07 ± 2.46 vs 15.55 ± 1.77 , $p = 0.0004$), and the proportion of patients with a poor appetite statistically decreased after the intervention (41.8% vs 10.9% , $p = 0.0002$), while no differences were noted in the control group between baseline and postintervention. Furthermore,

the SNAQ scores postintervention in the experimental group were significantly higher than those in the control group (15.55 ± 1.77 vs 14.42 ± 2.59 , $p = 0.0087$). Importantly, compared with the control group, the proportion of patients with a poor appetite obviously decreased in the experimental group after 7 days of intervention (27.3% vs 10.9%, $p = 0.029$). Our results suggest that abdominal massage and ST-36 (Zusanli) acupressure are beneficial for improving the appetite of mild COVID-19 patients.

Table 4
SNAQ score.

Groups	SNAQ score		t	p
	Pre-test	Post-test		
	$\bar{x} \pm SD$	$\bar{x} \pm SD$		
Experimental	14.07 ± 2.46	15.55 ± 1.77	3.62	0.0004
Control	14.04 ± 2.58	14.42 ± 2.59	0.77	0.4425
t	0.06	2.671		
p	0.9504	0.0087		

Table 5
Proportion of patients with poor appetite.

Groups	SNAQ score < 14		χ^2	p
	Pre-test	Post-test		
	n (%)	n (%)		
Experimental	23 (41.8)	6 (10.9)	13.5	0.0002
Control	20 (36.4)	15 (27.3)	1.05	0.3067
χ^2	0.3436	4.767		
p	0.5577	0.029		

4. Discussion

Since SARS-CoV-2 possesses powerful pathogenicity and transmissibility, the COVID-19 outbreak has become a global public health problem. It is known that the immune response is weakened by inadequate nutrition¹³; thus, adequate nutrition intake deserves attention during COVID-19 treatment. Patients who are confirmed to be infected with the novel coronavirus should be isolated, leading to mental anxiety and poor appetite. In this study, we investigated appetite in 110 COVID-19 patients who were cared for in a

sport centre makeshift hospital and assessed the effect of abdominal massage and ST-36 (Zusanli) acupressure on improving their appetite. Our results indicated that the proportion of COVID-19 patients with a poor appetite was at a relatively high level compared with other studies in which appetite was also evaluated using SNAQ ¹⁴⁻¹⁶. Our intervention effectively improved their appetite during isolation treatment. To the best of our knowledge, this is the first study focusing on the appetite of COVID-19 patients, especially in the context of makeshift hospitals.

There are a few instruments for assessing appetite in different studies, such as The Functional Assessment of Anorexia/Cachexia Therapy (FACCT), Memorial Symptom Assessment Scale (MSAS) and Appetite, Hunger Feelings, and Sensory Perception (AHSP). However, it takes a long time to complete these measurements, and some of them are designed for cancer patients. In a makeshift hospital, hundreds of patients would be hospitalized in a short period, and complex questionnaires are not applicable. The SNAQ is a brief test that was developed in 2005 by the Council for Nutritional Strategies in Long Term Care in institutionalized and community-dwelling adults ¹⁷. It has been applied in various diseases to estimate the loss of appetite and the risk of weight loss ¹⁸. A recent study reported the usefulness of SNAQ in Chinese patients with liver cirrhosis ¹¹.

In this study, we evaluated the appetite of COVID-19 patients using a mobile app-based SNAQ. We found that a considerable proportion of COVID-19 patients treated in makeshift hospitals suffered from a poor appetite. The reasons may be as follows: 1. COVID-19 is not only a respiratory symptom but also affects the digestive system; 2. Psychological problems such as anxiety and fear may result in worse gastrointestinal function; 3. Reduced access to the habitual diet and a lack of exercise could be considered objective factors.

This inspired us to consider how to improve the appetite of these patients. Abdominal massage and ST-36 (Zusanli) acupressure are both nonpharmacological and noninvasive methods that can increase gastric and bowel motility ^{9,11}. Moreover, these two methods are easy to master and conduct by patients themselves. To standardize the intervention process, an instructional video was recorded by a nutritional specialist nurse. In addition to training with the video, participants were guided by front-line nurses before the beginning of the formal intervention. Encouragingly, most participants confirmed the effectiveness of the video. Most importantly, our intervention played a beneficial role in improving their appetite.

Our study has a number of limitations. First, it was a single-centre study, and there might be some bias in patients' selection. Thus, further multi-centre studies will be helpful. In addition, psychological changes during treatment might influence patients' digestive function, such as appetite. There was a psychotherapist on our treatment team, and psychological guidance was provided to all of the patients. However, psychological factors were not considered in our data.

5. Conclusion

In conclusion, our results suggest that COVID-19 patients treated in makeshift hospitals are likely to suffer from a poor appetite for various reasons. Abdominal massage and ST-36 (Zusanli) acupressure are applicable and effective methods for improving appetite. Since COVID-19 has become a global pandemic, we hope that our study may provide some experiences for treating and caring for COVID-19 patients.

Declarations

Contribution of authors

Fang Li and **Lei Wang**: Conceptualization, Data curation, Formal analysis. **Lei Wang**: Software, Visualization, Writing, Investigation, Project administration. **Hui Yuan**: Data curation, Methodology, Validation, Writing-review & editing. **Jifang Peng, Hairong Liu, Yan Jia, Cui Yao** and **Yufan Lin**: Formal analysis, Investigation, Project administration.

Conflicts of Interest

The authors declare no conflict of interest.

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Availability of data and materials

The datasets used or analyzed in the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

This study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (approval number: 2020-SR-149) on 16 February 2020. All participants were provided written informed consent before enrolment. This study is designed in accordance with the principles of the Declaration of Helsinki.

Consent for publication

Not applicable.

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