

A Survey of the Body's Response to Clinical Exposure to Moxa Smoke

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ABSTRACT: Aim: By observing the responses of participants to exposure to moxa smoke, the safety of clinical application of moxibustion was assessed. Methods: Individuals who had been exposed to moxa smoke for over one month and met the inclusion criteria filled out a questionnaire survey administered by multiple professionals in order to determine the body's response to exposure to moxa smoke. Results: Symptoms detected at frequencies higher than 10% were mainly observed in the eyes and throat: In the throat area, the frequency of dry throat was the highest (16.7%); in the eye area, the frequency of dry eye was the highest (16.4%); in the respiratory system, the frequency of coughing was the highest (10.7%); in the nose area, the frequency of itchy nose was the highest (9.7%); in the skin, the frequency of local dry skin and flushing was the highest (8.7%). Symptoms detected at frequencies lower than 10% included eye pain, sore throat, headache and sneezing. Conclusion: After exposure to moxa smoke, the body's responses were most notable in areas with exposed mucous membranes, such as the eyes, nose, and throat.

KEYWORD: moxa smoke; body's response; assessment; survey

1 INTRODUCTION

Moxibustion therapy is an important part of clinical therapeutics in traditional Chinese medicine (TCM). It has a long history and has played an extensive role in clinical practice in China, exhibiting efficacy that sometimes cannot be achieved with acupuncture or Chinese herbal medicine. The field of modern research into moxibustion has fully absorbed and learned from new ideas, new theories, and new technologies in the life sciences. Moxibustion has shown observable results in immunity adjustment, anti-aging, and preventive health care. The results of research on the relationship between moxibustion and diseases associated with the immune system have been recognized by the medical community worldwide. However, as human society progresses and as concern for the environment increases, people have started to question the safety of moxa smoke produced by burning moxa during moxibustion. This has brought new challenges to the development and promotion of moxibustion. Currently there is no definite regarding whether moxa smoke from moxibustion poses adverse effects on healthcare workers and patients subjected to long-term exposure. The safety of moxa smoke remains to be addressed in the research on moxibustion, and

relevant studies are essential to the development and application of moxibustion.

Here, acupuncture practitioners and patients with long-term exposure to moxa smoke were surveyed using a specifically designed questionnaire. The body's responses after exposure to moxa smoke were systematically examined, taking into account the number of years of exposure and the duration of daily exposure. Through regression and other statistical methods, relevant factors associated with the reaction symptoms were analyzed in order to provide a preliminary reference for the safety of moxa smoke.

2 STUDY METHODS

2.1 *Survey participants*

Subjects who had received or used moxibustion treatment for over one month were enrolled in the survey. From August 2010 to June 2013, using random sampling method, a total of 402 patients, who received moxibustion treatment in the clinical offices with areas of 10–20 m² in the Affiliated Yueyang Hospital of Integrated Chinese and Western Medicine of Shanghai University of Traditional Chinese Medicine, Longhua Hospital and the medical clinics of Shanghai Institute of

Acupuncture and Meridian, were included in the survey.

2.2 Survey methods and content

2.2.1 Survey methods

The questionnaire items included the patient's gender, age, ethnicity, hobbies, food allergies, reason for exposure to moxibustion, time and frequency of moxibustion treatment, duration of each moxibustion treatment, and subjective feelings after moxibustion.

2.2.2 Survey content

(1) General personal information: including gender and age; (2) information on practicing or exposure to moxibustion: time engaged in practicing or receiving moxibustion, duration of exposure per week, frequency; (3) body's responses after exposure to moxa smoke: (i) responses in the eye area, such as tearing, dry eyes, eye strain, eye irritation, eye itchiness and redness, photophobia, and eye pain; (ii) responses in the nasopharyngeal area, such as dry throat, itchy throat, dry nose, itchy nose, throat discomfort, nasal irritation, sore throat, sneezing, runny nose, stuffy nose, and dulled sense of smell; (iii) responses in the respiratory system, such as cough, expectoration, hoarseness and shortness of breath; (iv) responses in the nervous system, such as headache, dizziness, lack of energy, and memory loss; (v) other reactions such as dry skin, itchy skin, and skin swelling.

2.3 Criteria

2.3.1 Inclusion criteria

(1) Continuous exposure to moxibustion lasting longer than two months; (2) willingness to participate in the study; (3) understanding of the scales and questionnaire used in this study.

2.3.2 Exclusion criteria

(1) Those who did not meet the inclusion criteria; (2) asthma, tuberculosis, and other lung diseases before moxibustion; (3) systemic diseases (or related conditions), such as infection, fever, past surgery, or external environmental factors causing adverse reactions; (4) the person lacked the skills of good understanding and communication.

2.3.3 Exit criteria

(1) Failure to cooperate during the survey; (2) failure to fill out at least 70% of the questions in the questionnaire.

3 SURVEY RESULTS

3.1 General information

A total of 402 completed copies of the questionnaire were included in the analysis. The age of the respondents ranged 18–80 years old, with a mean age of 48.43 ± 15.57 years; there were 136 men (33.83%) and 266 women (66.17%). There were 56 acupuncture/moxibustion practitioners, accounting for 13.93% of all respondents (24 men, 42.86%; 32 females, 57.14%), and 346 patients receiving moxibustion treatment, accounting for 86.07% of all respondents (111 males, 32.08%; 235 females, 67.92%). The duration of the career as an acupuncture/moxibustion professional ranged from 24–240 months, with a mean of 90.14 ± 70.675 months. For the patients, the duration of receiving moxibustion treatment ranged from one month to 30 years, with a mean of 19.14 ± 31.185 months.

3.2 Frequencies of various responses after exposure to moxa smoke

3.2.1 The numbers of respondents with eye reactions and the corresponding proportions

As shown in Figure 1, among the 402 respondents, there were 66 cases of dry eyes (16.4%), 56 cases of tearing (13.9%), 52 cases of eye irritation (12.9%), 42 cases of eye strain (10.4%), 20 cases of eye pain (5.0%), 13 cases of itchiness and redness (3.2%), and 11 cases of photophobia (2.7%). Among the symptoms in the eye area, the four with the highest frequencies were dry eyes, tearing, eye irritation, and eye strain.

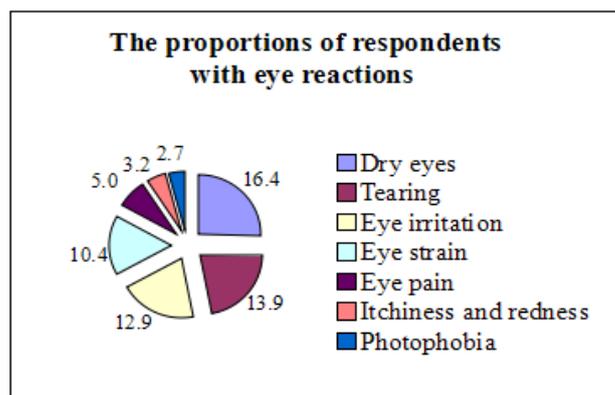


Figure 1 The proportions of respondents with eye reactions

3.2.2 The numbers of respondents with nasopharyngeal reactions and the corresponding proportions

As shown in Figure 2, among the 402 respondents, there were 67 cases of dry throat (16.7%), 47 cases of itchy throat (11.7%), 39 cases of itchy nose (9.7%), 38 cases of throat discomfort (9.5%), 26 cases of dry nose (6.5%), 34 cases of nasal irritation (8.5%), 21 cases of sore throat (5.2%), 21 cases of

sneezing (5.2%), 8 cases of runny nose (2.0%), 6 cases of stuffy nose (1.5%), and 4 cases of dulled sense of smell (1.0%). Among the symptoms in the nasopharyngeal area, the four with the highest frequencies were dry throat, itchy throat, itchy nose, and throat discomfort.

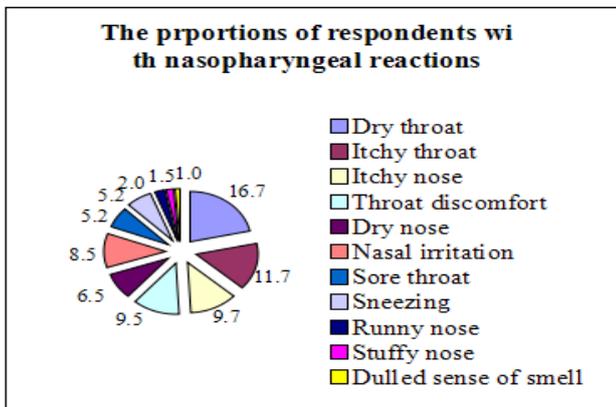


Figure 2 The proportions of respondents with nasopharyngeal reactions

3.2.3 The numbers of respondents with respiratory reactions and the corresponding proportions

As shown in Figure 3, among the 402 respondents, there were 43 cases of coughing (10.7%), 11 cases of expectoration (2.7%), 5 cases of hoarseness (1.2%), and 4 cases of shortness of breath (1.0%). Among the respiratory symptoms, the two with the highest frequencies were coughing and expectoration.

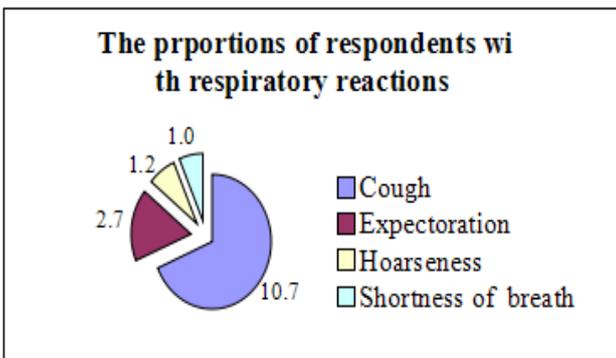


Figure 3 The proportions of respondents with respiratory reactions

3.2.4 The numbers of respondents with nervous system reactions and the corresponding proportions

As shown in Figure 4, among the 402 respondents, there were 20 cases of (5.0%) headache; 16 cases of fatigue and lack of energy (4.0%), 12 cases of dizziness (3.0%), 6 cases of insomnia and neurasthenia (1.5%), 4 cases of inattention (1.0%), and 3 cases of memory loss (0.7%). Among the symptoms in the nervous system, the two with the highest frequencies were headache, fatigue and lack of energy, and dizziness.

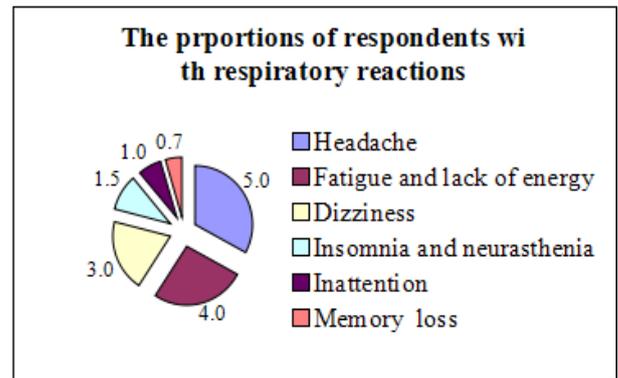


Figure 4 The proportions of respondents with nervous system reactions

3.2.5 The numbers of respondents with skin and limb joint reactions and the corresponding proportions

As shown in Figure 5, among the 402 respondents, there were 34 cases of mild dry skin (8.5%), 35 cases of local dry skin and flushing (8.7%), 9 cases of local skin itchiness and swelling (2.2%); 5 cases of shoulder or lower back discomfort or pain (1.2%); 5 cases of joint or muscle aches (1.2%), and 3 cases of large areas of skin itchiness and swelling (0.7%). Among the symptoms in the skin and limb joints, the three with the highest frequencies were mild dry skin, local dry skin and skin redness, and local skin itchiness and swelling.

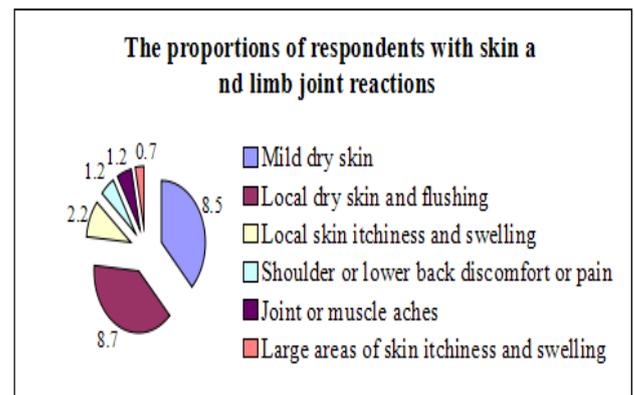


Figure 5 The proportions of respondents with skin and limb joint reactions

3.2.6 Frequency distribution of various responses after exposure to moxa smoke

As illustrated in Figure 6, after exposure to moxa smoke, among the 402 respondents symptoms with frequencies higher than 10% mainly occurred in the eye area and the throat area; in the throat area, the frequency of dry throat was the highest (16.7%); in the eye area, the frequency of dry eye was the highest (16.4%); in the respiratory system, the frequency of coughing was the highest (10.7%); in the nose area, the frequency of itchy nose was the highest (9.7%); in the skin, the frequency of local dry skin and flushing was highest (8.7%). Symptoms of frequency lower than 10% included eye pain, sore

throat, headache, and sneezing. These results suggest that, after exposure to moxa smoke, reactions were most pronounced in areas with exposed mucous membranes, such as the eyes, nose, and throat.

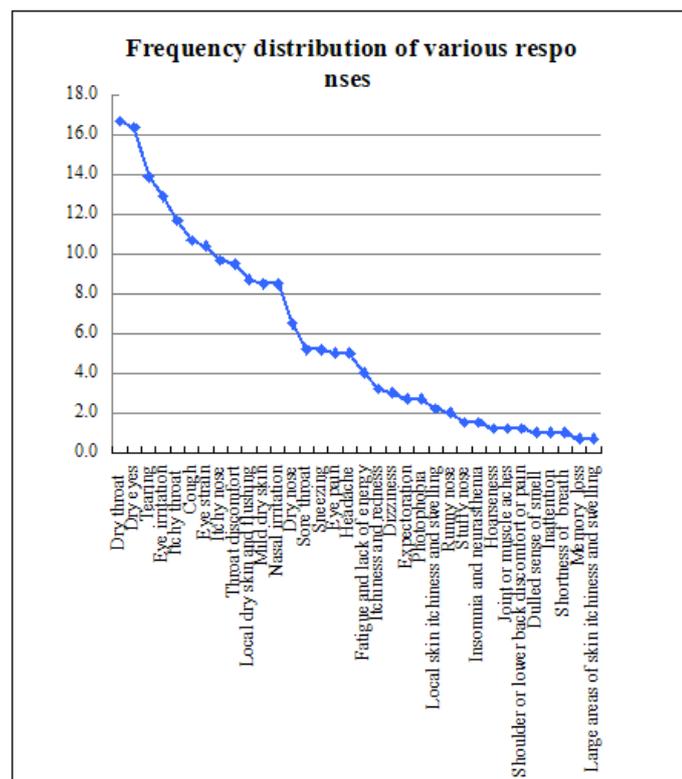


Figure 6 The frequency distribution of various responses

4 ANALYSIS AND DISCUSSION

Moxa smoke has been used in clinical treatment by Chinese physicians since ancient times. Traditional moxibustion is believed to warm the meridian, drive Qi flow and blood circulation, benefit Qi, and prevent diseases. New technologies and new ideas in modern life sciences have facilitated progress toward understanding of the mechanisms of moxibustion. Yang proposed that near-infrared ray produced by moxibustion could stimulate the hydrogen bonds of the biological molecules in acupuncture points, generating stimulated coherent resonance absorption effect and transferring energy required by cells in the human body via the nerve-humor system [1]. Results have also shown that moxa smoke has an antibacterial effect, and the longer the moxibustion time, the better the antibacterial effect [2]. Zhou et al. used four methods, ultraviolet light, air sterilizers, moxa leaves+Atractylodes lancea, and moxa leaves, and for air disinfection in tissue culture rooms [3]. The results showed that the air disinfection effects of the air sterilizer group and the moxa leaves+Atractylodes lancea group were satisfactory, and the sterilization rates reached the basic standard for controlling bacterial content in culture rooms. In practical applications, results showed that, when the

two methods were applied alternately, the effect was even better.

Currently, studies of moxa smoke have focused primarily on the products of varying types of combustion and their chemical composition and on the effects of moxa smoke. Regarding component analysis, Jin et al. identified 26 components in the products of moxibustion [5]. Among these, benzaldehyde, phenol, o-methylphenol, p-methylphenol, 2, 3-dihydro-benzofuran, caryophyllene, and dianthin have been reported in other studies. However, Jin et al. did not detect naphthalene, ethylbenzene, or benzeneacetonitrile as reported in previous studies [5]. Regarding the clinical effects of moxibustion, one viewpoint is that the moxa smoke can sterilize and disinfect the area, and can inhibit and kill multiple bacteria and pathogenic skin fungi to varying degrees [6–8]. Meanwhile moxa smoke acupuncture can also inhibit certain viruses [9]. Moxa smoke shows certain treatment effect on surgical infection as well [10]. The ancient medical book Compendium of Materia Medica records that moxa smoke shows satisfactory effects in treating eye swelling and scabies. Wei et al. used three external therapies, external auditory canal drug application, moxa smoke application to the ear, and combined drug application and moxa smoke, in the treatment of ear fungal disease [11]. Results showed that the moxa smoke method and the combined method had a higher cure rate than the conventional external therapeutic method. Another viewpoint, however, is that moxa smoke has certain side effects on the human body. After combustion, the moxa leaves produce aromatic substances, including benzaldehyde, tar, phenol, niaouli alcohol, and 2,4-dimethyl phenol [12–14]. These substances all show certain toxicity, and can produce toxic side effects on multiple systems in the body [15]. In animal experiments, Chen reported that moxa smoke stimulation at different concentrations lasting different number of days could affect endothelin-1 (ET-1) and thromboxane A2 (TXA2) contents and the expressions of matrix metalloproteinase 9 (MMP-9), tissue inhibitor of metalloproteinase-1 (TIMP-1), and vascular cell adhesion molecule 1 (VCAM-1) in rats, especially long moxa smoke stimulations [16]. Wei found that moxa smoke could cause the lung tissue of mice to produce congestion, edema, bleeding and other symptoms [17]. As the concentration elevated and time prolonged, the pathological phenomena occurred earlier in time, and the damage was more severe; in addition, the tissue was found to repair itself after the damage.

In short, the chemical composition of moxa smoke is complex and varies depending on the degree of combustion. The effects of moxa smoke are extensive, complicated, and two-sided. Moxa smoke can be used for health protection and

treatment; however, some of the chemical components of moxa smoke may have neurotoxic or carcinogenic effects. Animal studies have indicated that the impact of moxa smoke on the body is closely associated with its concentration and time of exposure.

In addition, the present survey showed that some people had mild adverse reactions after exposure to moxa smoke. The main symptoms mostly occurred in the respiratory tract and body surface areas with exposed mucous membranes. Ranking the reaction symptoms using their occurrence frequencies from high to low, those with frequencies higher than 10% mainly included dry throat (67/402,16.7%), dry eyes (66/402,16.4%), tearing (56/402,13.9%), eye irritation (52/402,12.9%), itchy throat (47/402,11.7%), coughing (43/402,10.7%), and eye strain (42/402,10.4%). The frequencies of adverse reactions occurring in the nervous system, joints, and muscles were relatively low. In recent years, there have been a small number of reports [18–24] on allergic reaction to moxibustion. The allergy symptoms were similar to those of hay fever, e.g., itchy throat, swollen tonsils, itchy Eustachian tubes, eye pain, and obvious lethargy [25]. The present survey found no allergy, possibly because of the relatively limited scope of the investigation and the small sample size.

The frequencies of adverse reaction differed between medical workers and patients and between men and women. Results showed that, for reactions with frequencies over 10%, the frequencies ranged 30–70% in both medical workers and patients, and both men and women. For example, for dry throat, acupuncture and moxibustion practitioners with dry throat accounted for 40.3% of the total, and patients with dry throat accounted for 59.7% of the total; males with dry throat accounted for 31.3% of all males, and females with dry throat accounted for 68.7% of all females. The proportion of practitioners with itchy throats and that of patients with itchy throats were 40.4% and 59.6%, respectively; the proportion of men with itchy throats and that of women with itchy throats were 42.6% and 57.4%, respectively. The proportion of practitioners with eye strain and that of patients with eye strain were 44.2% and 55.8%, respectively; and this proportion was 50.0% among males and 50.0% in females. These results suggest that whether the participant is a medical worker or a patient, and whether the patient is male or female, does not substantially affect the occurrence of various reactions.

During combustion, moxa produces rather heavy smoke. In addition, the relatively closed clinic office environment and inadequate exhaustion make it impossible to control the discharge of fumes. The odors and the smoke may not only cause physiological responses in health care workers and patients but also easily attached themselves to

clothing, which can be an unpleasant inconvenience. During combustion the moxa stripe produces ashes, which may burn the patient. However, clinical practices and studies have both demonstrated that through a variety of different impacts, moxibustion has irreplaceable advantages over pure acupuncture in warming and clearing the meridian, driving Qi flow and blood circulation, and preventing disease. As studies of moxibustion and moxa stripe production processes have progressed and with improvements in medical infrastructure, the status of moxibustion therapy in modern disease treatment and prevention may gradually increase in the future.

5 ACKNOWLEDGMENTS

Authors thank for support of the National Basic Research Program of China (973 program, No: 2009CB522900), Shanghai Health System of Outstanding Young Talent Cultivation Program (No.XYQ2011068), National Natural Science Foundation of China (No.81102637), Scientific research project of Shanghai Municipal Health Bureau (No.20134239).

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