

# Observation of the effects of moxibustion on acute and chronic radiation enteritis in cervical patients

**Xiaoxin Wu**

Graduate student of grade 2017,Guangzhou University of Chinese Medicine

**Cheng Xiao**

N03 department of oncology,ShunDe Hospital of Guangzhou University of Chinese Medicine(ShunDe District Hospital of Chinese Medicine of Foshan City

**Gong Li**

Radiation Oncology Department,Guangzhou University of Chinese Medicine Second Affiliated Hospital(Guangdong Provincial Hospital of Chinese medicine)

**Shenghong Qiu**

Radiation Oncology Department,Guangzhou University of Chinese Medicine Second Affiliated Hospital(Guangdong Provincial Hospital of Chinese)

**Lei Gao** (✉ [gzgaolei@126.com](mailto:gzgaolei@126.com))

Guangzhou University of Chinese Medicine Second Affiliated Hospital <https://orcid.org/0000-0002-4239-7718>

---

## Research

**Keywords:** cervical cancer, moxibustion, radiation, acute radiation enteritis, chronic radiation enteritis

**Posted Date:** April 21st, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-23227/v1>

**License:**  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

## Background

The present prospective, observational study evaluated the safety and efficacy of moxibustion in preventing acute and chronic radiation enteritis post-radiation in patients with cervical cancer.

## Methods

Between March 2015 and October 2018, 90 patients with stage I-IV cervical cancer were treated with radiation at the Guangzhou University of Chinese Medicine Second Affiliated Hospital (Guangdong Provincial Hospital of Chinese Medicine). The patients were randomly divided into a moxibustion group and a control group. The moxibustion group received moxibustion on Guānyuán (RN4), Qìhǎi (RN6), Shénquē (RN8) and Tiānshū (ST25) during radiation. The control group received radiotherapy only. We observed and compared the occurrence of acute radiation enteritis (ARE) between the two groups of patients during radiotherapy. Then, the patients were followed-up 1-1.5-year after radiation, and we observed and compared the occurrence of chronic radiation enteritis (CRE) between the two groups.

## Results

The incidence of ARE was significantly lower in the moxibustion group (10.9%) than the control group (36.4%;  $P < 0.05$ ). At follow-up post-radiotherapy, the incidence of CRE was significantly reduced (15.2%) in the moxibustion group compared with the control group (35.7%;  $P < 0.05$ ).

## Conclusions

Moxibustion significantly improved physical function and reduce the gastrointestinal response caused by radiotherapy, thus the occurrence of acute and chronic radiation enteritis was reduced. These results can improve the therapeutic effect of radiation and improve the patient's quality of life.

## Trial registration

Prospective clinical trial for the effects of moxibustion on acute and chronic radiation enteritis in cervical patients. ChiCTR2000029650. Registered: February 9, 2020-Retrospectively registered.

## Background

At present, Cervical cancer is the most common malignancy of the female genital tract worldwide, it is a life-threatening health problem, accounting for the death of nearly 270,000 women worldwide each year [1–2]. Radiation therapy (RT) is one of the major treatment modalities, that can prolong the life of patients and is important for the treatment of cervical cancer, but the side effects of radiotherapy should not be ignored. Gastrointestinal (GI), genitourinary (GU), and hematological complications are among the most common undesirable side effects for patients treated with radiation [3]. Radiation enteritis is a

common intestinal complication, which can involve the small intestine, colon, and rectum [3, 4]. Radiation enteritis can be divided into acute and chronic according to the size, duration, and onset of the radiation dose to the intestine. Acute radiation enteritis (ARE) usually occurs during radiotherapy or within the first 90 days after treatment. Radioactive damage is a common side effect of radiotherapy and can occur years after treatment, being a feared complication of radiotherapy. Some patients with severe radiation enteritis need to discontinue treatment, which has a negative impact on the treatment effect of patients and has been proven to be associated with decreased local control and overall survival in cervical cancer [4]. Therefore, reducing enteritis caused by radiotherapy is one of the key components that will ensure the successful completion of pelvic radiotherapy. In traditional Chinese medicine (TCM), Qi is the basic constituent that maintains life activities, and blood is the medium of nourishment and lubrication for these activities. Tumor consumes Qi, blood, and body fluids in the human body. Hence, the general pathogenesis of a tumor results in a deficiency in the body [5]. Therefore, tumor treatments should tonify qi and blood to promote blood circulation to encourage formation of collaterals. Moxibustion is a type of TCM treatment that is becoming widespread, with 67% of Korean Oriental Medicine doctors prescribing moxibustion [6]; additionally, over 15,000 general practitioners in the UK are likely use moxibustion on a regular basis [7]. Moxibustion can reduce inflammation, repair the gastrointestinal mucosa, and increase the gastrointestinal hypomotility. Clinical research indicates that moxibustion can act to eliminate swelling and reduce mass size, activate blood circulation, resolve stasis, disperse nodules, and invigorate the Qi, thereby alleviating the side effects of surgery and radiotherapy. Its mechanism may include regulating inflammatory cytokine release, increasing the gastric mucosal blood flow [8]. In the meridian theory of TCM, Guānyuán is the Mu point of the small intestine, in the lower abdomen, on the anterior midline, three inches below the navel. Guānyuán has a strong effect that can invigorate the kidney and nourish the Yang. Guānyuán can be used to treat stroke, irregular menstruation, abdominal pain, diarrhea, dysentery, etc. Qìhǎi belongs to Ren Meridian, on the lower abdomen, at the anterior midline, 1.5 inches below the navel. Qìhǎi is an important health acupoint that can replenish qi and help Yang, regulate meridians, and consolidate essence, which can be used to treat abdominal distention, defecation, and diarrhea. Shénquē belongs to Ren Meridian, located in the navel; it can restore yang for resuscitation. Tiānshū belongs to the stomach meridian and is the Mu point of the large intestine. Tiānshū is important for the regulation of the enteric function and regulates the Qi of the whole body. Moxibustion on these acupoints, because of their function of supplementing Qi and activating blood circulation, can accelerate the intestinal peristalsis, evenly distribute radiation, and promote the self-repair of damaged intestinal tract to reduce the incidence of ARE and chronic radiation enteritis (CRE).

The present prospective, observational study evaluated the ability of moxibustion to promote intestinal peristalsis and reduce intestinal adverse reactions to prevent the occurrence of enteritis after radiotherapy.

## Methods

### Patients

A total of 90 patients with pathologically confirmed cervical cancer (FIGO: stage I–IV) were included in our study [9]. Patients were enrolled in the present study between March 2015 and October 2018, and ranged from 29 to 80 years old. All patients received radiation in the Guangzhou University of Chinese Medicine Second Affiliated Hospital (Guangdong Provincial Hospital of Chinese Medicine). The present study was approved by the local ethics review boards. Patients were excluded from our study if they were diagnosed with distant metastasis, pregnant, had a diagnosed mental disorder, had gastrointestinal disorders, presented with an active serious infection, severe complications, or uncontrolled infection.

## **Treatment**

Patients with cervical cancer were enrolled in the clinical trial. They were randomly divided into a moxibustion group (46cases) and a control group (44cases) according to their order of admission. There was no significant difference between the moxibustion group and the control group in terms of age, EDQ2, FIGO stage, pathologic types, operation, or chemotherapy ( $P>0.05$ ). During radiotherapy, the control group did not receive moxibustion. The moxibustion group received moxibustion on the Guānyuán (RN4), Qìhǎi (RN6), Shénquē (RN8), and Tiānshū (ST25) for 30 min/day, from Monday to Sunday.

## **Moxibustion procedure**

All patients in the moxibustion group underwent the following steps during radiotherapy:

Step 1: Ignited two 5-cm long smokeless moxa sticks and placed them in the moxibustion box (to promote combustion, the bottom structure of the box was a wire mesh).

Step 2: The patient laid on a bed, exposed their abdomen, and a cloth was placed on the corresponding acupoints to prevent skin from scalding. Then, the moxibustion box was placed at the corresponding position (Fig. 1) for 30 min/day and kept warm during moxibustion.

Step 3: Treatment-related complications were recorded. In the present study, intestinal reactions of 90 patients were graded according to the toxicity criteria of the Radiation Therapy Oncology Group (RTOG) [10]. We observed and compared the occurrence of radiation enteritis between the two groups of patients. Data were collected from the medical records and follow-up records of patients.

## **Radiotherapy**

All patients were treated with radiation, according to the principle of RTOG [10], the radiation treatment consisted of whole pelvic irradiation with a total dose of 4500–5,000 cGy/25 times at 1.8–2.0 Gy/fraction. The target volume for radiotherapy was defined to include the tumor, sufficient vaginal margin from the gross disease (at least 3 cm), the pelvic lymph nodes, and the para-aortic lymph nodes. The superior border was placed at the upper region of the of L4 interspace, and the inferior border was at the inferior margin of the obturator foramen.

Patients requiring radical radiotherapy underwent CT-guided adaptive brachytherapy (IGABT) after radiotherapy, by using a remote after-loading system (microSelectron, Nucletron, the Netherlands) that employed an  $^{192}\text{Ir}$  source with intraoperative planning, including real-time dynamic dose calculation after pelvic irradiation containing 600 cGy/each time. After radiotherapy, the patients were given adjuvant chemotherapy comprising paclitaxel 135 mg/m<sup>2</sup>+cisplatin 75 mg/m<sup>2</sup>. Patients undergoing postoperative adjuvant radiotherapy received radical operation, and those with positive surgical margin received treatment with CT-based IGABT after radiotherapy.

Patients with evidence of concurrent chemotherapy received cisplatin 40 mg/week during radiotherapy. To ensure the continuity of radiation, when myelosuppression  $\geq$  grade 2 was detected, concurrent chemotherapy was delayed. We reevaluated toxicity after one week. Concurrent chemotherapy was withheld until the white blood cell count, hemoglobin concentration, and platelet count recovered to more than  $4 \times 10^9$  /L, more than 90 g/L, and more than  $75 \times 10^9$ /L, respectively. The patients were followed periodically by study group members. Acute intestinal reactions were graded according to the toxicity criteria of the RTOG [10]. The occurrence time and frequency of diarrhea and the bowel function after complete treatment in patients were evaluated and recorded from the first date of treatment to the date of death or last documented follow-up visit.

### **Statistical analysis**

The mean  $\pm$  standard deviation and independent sample t-test were used according to the age of normal distribution. The median quartile and non-parametric rank sum test were used for EDQ2, which did not conform to normal distribution. The classification indexes were tested by constituent ratio and chi-square test. In our analysis the significant level of the index was used as the independent variable and enteritis was used as the dependent variable. Therefore, we determined the influencing factors of enteritis using the dual logistics regression model. Statistical analysis was performed by using statistical software SPSS for Windows version 23.0 (SPSS, Chicago, IL). A P-value of  $< 0.05$  was considered statistically significant.

## **Results**

A total of 90 patients were enrolled in the present study between March 2015 and October 2018. Patients were diagnosed with cervical cancer (FIGO 2009 stage I-IV) and treated with radiotherapy at the Guangzhou University of Chinese Medicine Second Affiliated Hospital (Guangdong Provincial Hospital of Chinese Medicine). These patients were randomly assigned to either the moxibustion group or control groups. Baseline demographic and clinical characteristics of study patients are listed in Table 1. Overall, baseline characteristics (n = 90) were well balanced between the moxibustion group and the control group. The mean age of the patients was 55.65 years old. There were no substantial differences between the moxibustion group and control group in terms of age, EDQ2, FIGO stage, pathologic types, operation, or chemotherapy (P = 0.605, 0.204, 0.715, 0.495, 0.715, and 0.144, respectively). These results indicated that the moxibustion and control groups demonstrated no significant specificity and were comparable.

As shown in Table 2, 89.1% patients in the moxibustion group suffered a mild enteritis reaction (level 0–1) during radiotherapy, and 10.9% patients suffered a moderate enteritis reaction (level 2–3). However, 63.6% of patients in the control group suffered a mild enteritis reaction (level 0–1), and 36.4% of patients suffered a moderate enteritis reaction (level 2–3). The incidence and severity of ARE in the moxibustion group was significantly lower than the control group ( $P = 0.004$ ). These results show that moxibustion can significantly reduce the incidence of ARE. Meanwhile, 26% of patients in the moxibustion group exhibited tenesmus, whereas 47.7% observed tenesmus in the control group ( $P = 0.01$ ). Stool frequency of the patients in the moxibustion group was less than three times a day (54.3%) but was 3–5 times a day in the control group ( $P = 0.03$ ). The stool was soft in the moxibustion group (71.8%), whereas in 40.9% of the control patients it was thin ( $P = 0.002$ ). The number of patients with difficult defecation was lower in the moxibustion group than the control group ( $P = 0.047$ ). Severe intestinal reactions such as bleeding did not occur during radiotherapy.

As shown in Table 3, 84.8% of patients in the moxibustion group suffered a mild enteritis reaction (level 0–1), whereas 15.2% of patients suffered a moderate enteritis reaction (level 2–3) 1 to 1.5-year post-radiotherapy. However, 64.3% of patients in the control group suffered a mild enteritis reaction (level 0–1), and 35.7% of patients suffered a moderate enteritis reaction (level 2–3) 0.5 to 1-year post-radiotherapy. ARE incidence and severity in the moxibustion group was significantly lower than the control group ( $P = 0.027$ ). A total of 15.2% of patients that received moxibustion had tenesmus compared with 26.2% in the control group 1 to 1.5-year post-radiotherapy ( $P = 0.202$ ). All moxibustion group patients survived 0.5 to 1-year post-radiotherapy, and two deaths were reported in the control group. The stool frequency of the patients in the moxibustion group was less than three times a day (78.3%) 1 to 1.5-year post-radiotherapy, but was 3–5 times a day in the control group (40.5%;  $P < 0.001$ ). The majority of the moxibustion patient's stool was soft (76.1%) 0.5 to 1-year post-radiotherapy, whereas the control patient's stool was thin (42.9%;  $P = 0.002$ ). We observed no significant difference in stool bleeding between the two groups ( $P = 0.176$ ). As shown in Fig. 2, patients with severe enteritis are more likely to suffer from tenesmus, an increase in stool frequency, loose stool, and difficult defecation. Compared with the intestinal mucosa of normal patients, the enteroscope from radiation enteritis patients usually shows mucosal hyperemia (Fig. 2). Approximately 40–75% of patients that received abdominal or pelvic radiation therapy suffered from side effects concerning the lower gastrointestinal tract, such as diarrhea, abdominal, tenesmus, blood stool, etc.

## Discussion

Cervical cancer is one of the most frequently occurring cancers among women worldwide [2, 11]. Radiotherapy plays an important role in the treatment of cervical cancer. It is not only used for local elimination of early cervical cancer before operation and adjuvant treatment after operation, but also the main method for treatment of advanced cervical cancer. Radiation enteritis is one of the most common side effects of radiation used to treat abdominal or pelvic malignancies, which seriously affects the

patient's quality of life. Several studies have shown that the dose of radiotherapy is positively correlated with the side effects of radiotherapy. The larger the dose of radiotherapy, the more severe the intestinal reactions experienced by patients [12–14]. The occurrence of ARE is related to the damage of intestinal microvessels and intestinal parietal cells caused by radiation, which causes an inflammatory reaction. The cascade effect from the inflammatory reaction further aggravates the injury of the intestinal wall cells and causes inflammatory edema, necrosis and subsequent fibrosis of local intestinal mucosa, including nausea, vomiting, abdominal pain, and diarrhea [15, 16]. Radiation enteritis seriously affects patient's quality of life and treatment effect. Therefore, reducing the occurrence and increasing the treatment of ARE and CRE has attracted more attention from the clinical community.

Relevant research has been conducted to reduce the incidence of radiation enteritis. Some studies have shown that compared with 3D conformal radiation therapy (3DCRT), intensity-modulated radiation therapy (IMRT) can reduce the volume of high-dose radiation received by the small bowel, thereby theoretically reducing the incidence of GI obstruction [17–19]. At present, the main treatments for radiation enteritis include using anti-diarrhea medicine, retention enema with dexamethasone, montmorillonite, and gentamicin. For patients with poor nutritional status, oral feedings should be encouraged, preferentially with frequent intake of small portions of liquid/low-residue foods with a moderate content of fat and fiber. In addition, hyperbaric oxygen (HPO), salicylic acid, sucralfate, sodium pentosan polysulfate, and laser photocoagulation are treatments used for symptoms like diarrhea, abdominal pain, and intestinal bleeding in patients with ARE [20–25]. Experiments have proven that retention enema using Chinese herbs produces a better therapeutic effect on radiation enteritis. However, the current research mainly focuses on treatment and lacks the related research to reduce the occurrence of enteritis from the root.

The meridian is regarded as a network of passages, through which energy circulates and along which the acupuncture points are distributed. Acupoints mainly refer to special points on the meridian line of the human body, and many diseases can be treated by stimulating corresponding acupoints with acupuncture, massage, acupressure, and/or moxibustion. The Ren meridian is one of the eight extra-meridians in TCM and dominates the yin of the whole body; it is therefore also referred to as the sea of yin meridians. This meridian regulates Qi and blood of the Yin channel. The Ren Meridian runs along the anterior midline of the human body, and is used mainly to treat diseases of the head, face, chest, and gastrointestinal system. Guānyuán (RN4), Qihǎi (RN6), and Shénquē belong to the Ren Meridian and all are located in the abdomen. Thus, moxibustion on these acupoints can regulate the digestive system, improve intestinal immune function, and strengthen the body. The Mu point refers to some specific acupoints where the Qi of the viscera gathers in the chest and abdomen. Tiānshū, belonging to the stomach meridian, is a Mu point of the large intestine, and is an important acupoint for the regulation of enteric function; it also regulates the Qi of the whole body.

In the concept of TCM, radiotherapy is characterized by heat, which harms the intestinal tissue by causing a thermal reaction, thereby leading to intestinal reactions such as abdominal pain, diarrhea, defecation difficulties, tenesmus, and hematochezia. Moxibustion is one of the traditional Chinese

medicine treatments that also belongs to heat, and heat is a form of Yang. Yang has the function of warming tissues and organs, maintains physiological functions and strengthens the body, and provides energy for the body to maintain normal life activities. *Artemisia argyi* leaves have the attribute of pure Yang, thus the two Yang's cooperate with each other, which can play the role of supporting Yang to strengthen the body. Therefore, moxibustion functions to warm Yang and tonify Qi. In TCM, Qi is the basic constituent that maintains life activities, and blood is the medium of nourishment and lubrication for these activities. Patients with tumors often show deficiency of Qi and blood. Previous clinical studies have shown that by promoting Qi and blood circulation to remove meridian obstructions, moxibustion can promote intestinal movement, facilitate excretion and digestion and accelerate the self-repair of the damaged intestinal tract [26, 27]. Therefore, moxibustion can reduce inflammation, repair gastrointestinal mucosa, and decrease gastrointestinal hypomotility, which can alleviate the side effects of surgery and radiotherapy. It has been used for the treatment of acute abdominal pain, vomiting, diarrhea, and dysentery [28].

The principal aim of our study was to reduce intestinal response to radiotherapy, and to test whether moxibustion reduced the incidence of ARE and CRE. High-dose exposure areas of the gastrointestinal system play a crucial role in the incidence of ARE and CRE. Thus, we tried to reduce the same area of the intestinal tract exposed to a high dose of radiation field, and increased the area the low dose radiation exposure, to reduce serious intestinal reactions. We also demonstrated that moxibustion can effectively reduce the acute and chronic gastrointestinal reactions of patients. Through the warming effect of moxibustion, an increase of intestinal peristalsis was noted, which could change the radiation field in the intestinal tract each time during radiation and reduce the same area of the intestinal tract exposed to a high dose of radiation by promoting intestinal movement. This will lead to a wider range of low-dose areas but will remain within the acceptable dose range, evenly distributing the radiation dose in the intestine to reduce the severity of damage to intestinal tissue, thereby increasing the efficacy of and reducing the side effects of radiation to ensure continuity of treatment. At the same time, moxibustion can reduce inflammation, repair the gastrointestinal mucosa, decrease gastrointestinal hypomotility, and promote the self-repair of damaged tissue. Our results show that the intestinal response of the moxibustion group was less than that of the control group. Severe intestinal reactions such as bleeding did not occur in either group during radiotherapy, which demonstrated that high-quality radiotherapy and brachytherapy could reduce the occurrence of severe gastrointestinal complications. According to the results of a multivariate analysis, combining moxibustion during radiation could significantly reduce the incidence of ARE and CRE and ensure continuity of treatment, to significantly improve patients' quality of life.

Overall, moxibustion is a safe and non-invasive treatment, with a low-cost and simple operation process and is easily accepted and tolerated by patients. It has been used by medical institutions in many countries and has achieved good clinical effects. However, the procedure of moxibustion could have some disadvantages. Potential side effects could occur during treatment such as skin burn and itching [29, 30]; these risk factors are not yet fully described and are estimated to be very low. Therefore, we consider that moxibustion is a treatment worthy of wider clinical promotion.

However, the present study, had limitations. Due to its prospective study design, we had a rather small number of patients. Large sample prospective clinical trials are required to elucidate the long-term effectiveness of moxibustion interventions, to design an appropriate moxibustion model, and to include more objective outcomes to confirm the benefits of moxibustion interventions.

## Conclusion

The warming effects of moxibustion therapy can change the radiation field in the intestinal tract each time during radiation and reduce the same area of the intestinal tract exposed to a high dose of radiation by promoting intestinal movement. We found that by applying moxibustion to the moxibustion group during radiotherapy, the incidence of ARE was reduced. In the follow-up period after radiotherapy, the incidence of CRE in patients was also significantly lower than that in the control group. This suggests that suitable precautions taken to reduce ARE during radiotherapy may also have the possibility to reduce the incidence of CRE.

## Abbreviations

ARE

Acute radiation enteritis

CRE

Chronic radiation enteritis

TCM

Traditional Chinese medicine

FIGO

The International Federation of Gynecology and Obstetrics

GI

Gastrointestinal

GU

Genitourinary

RT

Radiation therapy

IGABT

Image-guided adaptive brachytherapy

IMRT

Intensity modulated radiation therapy

3DCRT

3D conformal radiation therapy

WBC

White blood cell

RTOG

## **Declarations**

### **Acknowledgements**

We would like to thank Qingzhen Nan of Nanfang Hospital for the useful suggestions provided during the course of the study.

### **Consent**

Written informed consent was obtained from each patient for the publication of this manuscript and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

### **Authors' contributions**

XXW was a major contributor in drafting this manuscript. XXW and GL conducted data analysis and prepared Figures 1 and 2 and Tables 1, 2, and 3. SHQ and LG conducted project administration and data curation. CX verified statistical methods and data. XXW provided software and technical support. All authors read and approved the final version of the manuscript.

### **Funding**

The authors state that this work has not received any funding.

### **Availability of data and materials**

All data analyzed during this study are included in this published article.

Additional data are available from the corresponding author by reasonable request.

### **Ethics approval and consent to participate**

The Ethics Committee of Guangdong Provincial Hospital of Chinese Medicine approved this study and the committee's number is B2015-042-02.

### **Consent for publication**

Not applicable.

### **Competing interests**

The authors declare that they have no competing interests.

## Author details

<sup>1</sup>Graduate student of grade 2017, Guangzhou University of Chinese Medicine, No.232, Waihuandong Road, University Town, Panyu District, Guangzhou, Guangdong, China.

<sup>2</sup>NO 3 department of oncology, ShunDe Hospital of Guangzhou University of Chinese Medicine (ShunDe District Hospital of Chinese Medicine of Foshan City), Address: No.12 Jinsha Avenue, Daliang, Shunde District, Foshan, Guangdong, China.

<sup>3</sup>Radiation Oncology Department, Guangzhou University of Chinese Medicine Second Affiliated Hospital (Guangdong Provincial Hospital of Chinese Medicine), No.55, Neihuanxi Road, University Town, Panyu District, Guangzhou, Guangdong, China.

## References

[1] Wang XJ, X Y, Ma ZB, et al. The expression and prognostic value of protein tyrosine kinase 6 in early-stage cervical squamous cell cancer. *Chin J Cancer*. 2016; 35:54-62.

[2] World Health Organization. Sexual and reproductive health. Comprehensive cervical cancer prevention and control—a healthier future for girls and women. WHO guidance note.

[http://apps.who.int/iris/bitstream/10665/78128/3/9789241505147\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/78128/3/9789241505147_eng.pdf). Accessed 5 Dec 2018.

[3] Du X L, Tao J, Sheng X G, et al. Intensity-modulated radiation therapy for advanced cervical cancer: A comparison of dosimetric and clinical outcomes with conventional radiotherapy. *Gynecol Oncol*. 2012;125:151.

[4] Li XJ, Xiao C, Kong YL, et al. Rectal wall dose-volume effect of pre- or post KUSHEN Ningjiaos relationship with 3Dbrachytherapy in cervical cancer patients. *Radiation Oncology*. 2019; 14:149-158.

[5] Li Y, Qian WH, Lu Y, Zheng SZ, Wang AY, Wang YY. Treatment principle and method of traditional Chinese medicine and tumor micro environment. *J Tradit Chin Med*. 2011;52(21):1801–4.

[6] Han CH, Shin MS, Shin SH, Kang KW, Park SH, Choi SM. Telephone survey for grasping clinical actual state of moxibustion therapeutics in Korea. *J Meridian Acupoint* 2007; 24:17-31.

[7] Wheeler J, Coppock B, Chen C. Does the burning of moxa (*Artemisia vulgaris*) in traditional Chinese medicine constitute a health hazard? *Acupunct Med* 2009; 27:16-20.

[8] Hou XF, Ni GX. Research progress of malignant tumor treated with moxibustion. *World J Integrat Tradit Western Med*. 2014;9(01):101-4.

[9] PECORELLI S. Revised FIGO staging for carcinoma of the vulva, cervix, and endometrium. *Int J Gynaecol Obstet*. 2009;105(2):103-104.

- [10] COX J D, STETZ J, PAJAK T F. Toxicity criteria of the Radiation Therapy Oncology Group (RTOG) and the European Organization for Research and Treatment of Cancer (EORTC). *Int J Radiat Oncol Biol Phys.* 1995,31(5):1341-1346
- [11] Siegel R, Ward E, Brawley O, et al. Cancer statistics. The impact of eliminating socioeconomic and racial disparities on premature cancer deaths. *CA Cancer J Clin.*2011,61(4):212-236.
- [12] VAZ A F, PINTO-NETO A M, CONDE D M, et al. Quality of life and acute toxicity of radiotherapy in women with gynecologic cancer: a prospective longitudinal study. *Arch Gynecol Obstet.*2008,278(3):215-223
- [13] KIRWAN J M, SYMONDS P, GREEN J A, et al. A systematic review of acute and late toxicity of concomitant chemoradiation for cervical cancer. *Radiother Oncol.* 2003,68(3):217-226
- [14] HAFIZ A, ABBASI A N, ALI N, et al. Frequency and severity of acute toxicity of pelvic radiotherapy for gynecological cancer. *J Coll Physicians Surg Pak.*2015,25(11):802-806
- [15] CITRIN D, COTRIM A P, HYODO F, et al. Radioprotectors and mitigators of radiation-induced normal tissue injury. *Oncologist*,2010,15(4):360 -371
- [16] PARIS F, FUKS Z, KANG A, et al. Endothelial apoptosis as the primary lesion initiating intestinal radiation damage in mice. *Science*, 2001,293(5528):293-297
- [17] Peters WA III, Liu PY, Barrett RJ II et al. Concurrent chemotherapy and pelvic radiation therapy compared with pelvic radiation therapy alone as adjuvant therapy after radical surgery in high-risk early-stage cancer of the cervix. *J Clin Oncol* 2000;18: 1606-13.
- [18] Ryu SY, Park SI, Nam BH et al. Is adjuvant chemoradiotherapy overtreatment in cervical cancer patients with intermediate risk factors? *Int J Radiat Oncol Biol Phys* 2011;79: 794-9.
- [19] K Tsuchida, N Murakami, T Kato. Postoperative pelvic intensity-modulated radiation therapy reduced the incidence of late gastrointestinal complications for uterine cervical cancer patients. *J Radiat Res.* 2019 Oct 23;60(5):650-657.
- [20] Kochhar R, Sriram PV, Sharpa SC, et al. Natural history of late radiation proctosigmoiditis treated with topical sucralfate suspension. *DigDis Sci* 1999, 44(5): 973-978.
- [21] Seo GS. Chronic hemorrhagic radiation proctitis treated by sucralfate enema. *Korean J Gastroentero, I.* 2006, 47(5): 335-336.
- [22] Delia P, Sansotta G, Donato V, et al. Use of probiotics for prevention of radiation-induced diarrhea. *World J Gastroenterol.*2007, 13(6): 912-915.

- [23] Marshall GT, Thirlby RC, Bredfeldt JE, et al. Treatment of gastrointestinal radiation injury with hyperbaric oxygen. *Undersea Hyperb Med.*2007,34(1): 35-42
- [24] Clarke RE, Tenorio LM, Hussey JR, et al. Hyperbaric oxygen treatment of chronic refractory radiation proctitis: a randomized and controlled double-blind crossover trial with long-term follow-up. *Int J Radiat Oncol Biol Phys*, 2008, 72(1): 134-143.
- [25] Dall'Era MA, Hampson NB, Hsi RA, Madsen B, Corman JM. Hyperbaric oxygen therapy for radiation induced proctopathy in men treated for prostate cancer. *J Urol*, 2006, 176(1): 87-90.
- [26] Q. Zhang, J. Yue, B. Golianu, Z. Sun, Y. Lu, Updated systematic review and meta-analysis of acupuncture for chronic knee pain, *Acupunct. Med.* 35 (6) (2017)392-403, <https://doi.org/10.1136/acupmed-2016-011306>. Epub 2017 Nov 8.
- [27] X.P. Zhu, P.W. Fu, Long-term treatment effect of acupuncture on cervical spondylosis, *Chin. J. Gerontol.* 6 (11) (2011) 918-921.
- [28] Hong-Yuan Wang et al. Moxibustion therapy in Chinese patients with ankylosing spondylitis: A randomized controlled pilot trial. *European Journal of Integrative Medicine* 31 (2019) 100952.
- [29] Mitchell M, Allen K. An exploratory study of women's experiences and key stakeholders views of moxibustion for cephalic version in breech presentation. *Complement Ther Clin Pract* 2008; 14:264–72.
- [30] Feng Z, An J. Case of moxibustion allergy. *Chin Acupunct Moxibustion.* 2005;25:899.

## Tables

Table 1. Baseline Demographic and Clinical Characteristics of the Study Patients					
		Moxibustion group (n=46)	Control group (n=44)	T/Z/x <sup>2</sup>	P
	Age	56.83±10.12	55.75± 9.54	0.519	0.605
Stage	I	9 (19.6%)	9 (20.5%)	-0.365	0.715
	II	16 (34.8%)	16 (36.4%)		
	III	8 (17.4%)	9 (20.5%)		
	IV	13 (28.3%)	10 (22.7%)		
Pathology Types	Squamous cell carcinoma	44 (95.7%)	44 (100%)	-	0.495△
	Adenocarcinoma	2 (4.3%)	0 (0%)		
Operation	Non	36 (78.3%)	33 (75%)	0.134	0.715
	Yes	10 (21.7%)	11 (25%)		
EDQ2	84.25	36(78.2%)	33(75%)	-1.271	0.204
	44.25-50.4	10(21.8%)	11(25%)		
chemotherapy	Non	16 (34.8%)	22 (50%)	2.135	0.144
	Yes	30 (65.2%)	22 (50%)		

Abbreviations: EDQ2: Equivalent Dose in 2 Gy/f.

		Acute radiation enteritis		T/Z/x <sup>2</sup>	P
		Moxibustion group	Control group		
Level	Level 0-1	41 (89.1%)	28 (63.6%)	8.171	0.004
	Level 2-3	5 (10.9%)	16 (36.4%)		
Tenesmus	Non	34(74%)	23 (52.3%)	6.489	0.011
	Yes	12 (26%)	21(47.7%)		
Stool frequency	≤3times / day	25(54.3%)	12 (27.2%)	778	0.03
	3-4times / day	13(28.3%)	20 (45.6%)		
	≥5 times / day	9(19.6 %)	12(27.2%)		
Stool properties	Dry	2 (4.3%)	1(2.3%)	677.5	0.002
	Soft	33 (71.8%)	18(40.9%)		
	Thin	11 (23.9%)	25 (56.8%)		
Difficult Defecation	Non	41 (89.1%)	32(72.7%)	3.949	0.047
	Yes	5 (10.9%)	12 (27.3%)		
Bleeding	Non	46 (100%)	44 (100%)	-	-
	Yes	0(0%)	0 (0%)		

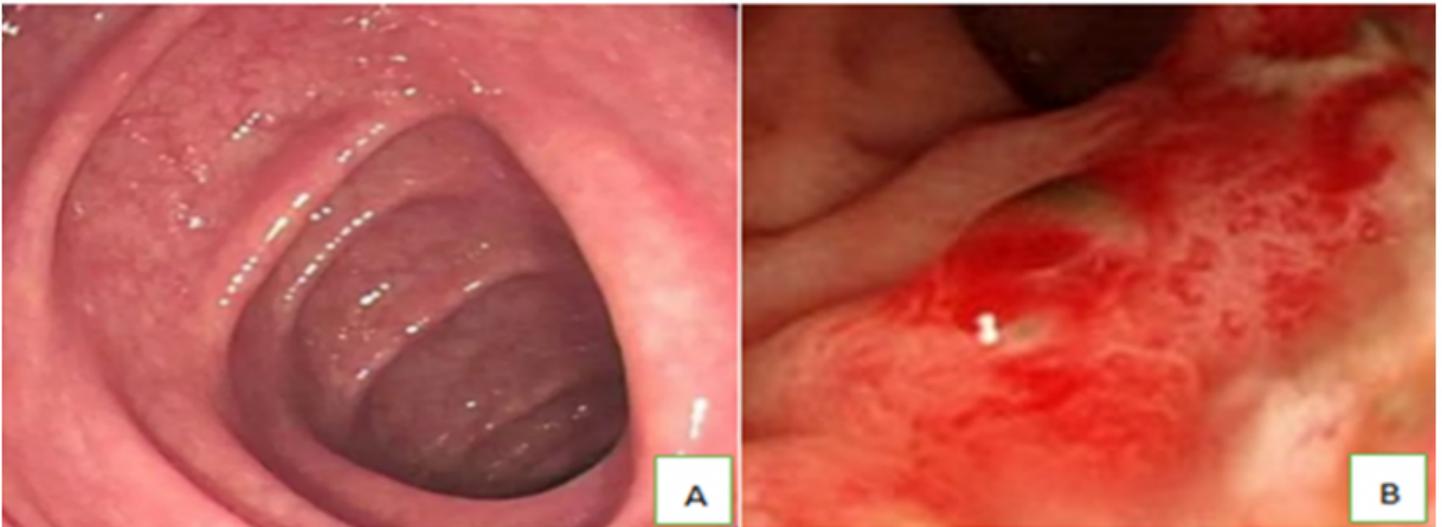
		Chronic radiation enteritis		T/Z/x <sup>2</sup>	P
		Moxibustion group	Control group		
Level	Level 0-1	39 (84.8%)	27 (64.3%)	4.919	0.027
	Level 2-3	7 (15.2%)	15 (35.7%)		
Tenesmus	Non	39(84.8%)	31(73.8%)	1.625	0.202
	Yes	7(15.2%)	11(26.2%)		
Death	Survival	46(100%)	42(95.5%)	-	-
	Death	0(0%)	2(4.5%)		
Stool frequency	≤3times / day	36(78.3%)	16(38.1%)	585	<0.001
	3-4times / day	6(13%)	17(40.5%)		
	≥5 times / day	4(8.7%)	9(21.4%)		
Stool properties	Dry	4(8.7%)	3(7.1%)	646.5	0.002
	Soft	35(76.1%)	18(42.9%)		
	Thin	7(15.2%)	21(50%)		
Difficult defecation	Non	43(7%)	33(78.6%)	4.143	0.042
	Yes	3(93%)	9(21.4%)		
Bleeding	Non	41(89.1%)	33(78.6%)	1.83	0.176
	Yes	5(10.9%)	9(21.4%)		

## Figures



**Figure 1**

Schematic diagram of moxibustion



**Figure 2**

Colonoscopy of normal intestinal mucosa (A) and radiation enteritis (B)