

Survey of changes in dietary preferences in cancer patients in China

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Abstract

Objective The aim of this study was to investigate the changes in dietary preferences in cancer patients in China and to determine the need for encouraging the adherence to a sensible diet among such patients.

Methods A total of 468 cancer patients were interviewed using a self-designed questionnaire focusing on changes in the intake of specific foods. Data were analyzed using SPSS 16.0.

Results Most patients completely avoided roosters and carp (73.1%), condiments (51.9%), and meat of aquatic species (40.4%). All other types of the specific foods were completely avoided by different sub-populations of the patients.

Conclusion In addition to focusing on disease treatment, medical professionals need to help cancer patients overcome barriers associated with the customs of avoiding specific foods encompassed by the term “fawu” and provide them with dietary guidance in order to prevent negative nutritional effects.

Key words: nutrition; cancer; preference changes; “fawu”; dietary guidance

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Malignancies are chronic consumption diseases, and although nutrition plays major roles in many aspects of cancer development and treatment, these are not always fully understood [1]. Appropriate nutrition is extremely important for cancer patients, and good nutritional practices can help them to maintain weight and nutrition stores, thus improving the quality of life.

However, malnutrition is a common problem in cancer patients, 40%–80% of whom suffer from it to varying degrees [2]. The effects of malnutrition on the bone marrow and immune systems led to its recognition as an important contributor to adverse outcomes, including increased morbidity and mortality and decreased quality of life [3–4]. During treatment, patients may therefore be recommended to consume foods that are high in energy, protein, and micronutrients, and to eat smaller amounts more frequently [5].

However, many Chinese believe that cancer patients should avoid eating some specific foods, including condiments, meat of aquatic or terrestrial animals, spices, fungi, fruits and vegetables, and especially chicken and carp. In this particular culture, many cancer patients change their dietary habits and avoid eating some of these specific

foods or reduce their consumption as a result of cultural and customary barriers.

It is unclear how many Chinese cancer patients change their consumption of specific foods and to what extent. Therefore, in this study we surveyed and analyzed changes in dietary preferences in such patients to identify the need for encouraging the consumption of a sensible diet.

Materials and methods

All subjects included in this study were in-hospital patients or outpatient cancer patients in the Oncology or General Surgery Departments of Tongji Hospital, Pu Ai Hospital of Wuhan City, and Wuhan Center Hospital. The following inclusion criteria were used: age ≥ 18 years, regular home health care, absence of psychiatric illnesses, ability to fill out the questionnaire or communicate with the interviewer, and ability to provide informed consent. Patients with special food taboos (such as Muslims), special diets, or those fasting owing to medical indications, the disease itself, or its treatment were excluded. Data were collected via face-to-face interviews conducted by our group. The patients were given information explain-

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Table 1 Clinical characteristics of the patients ($n = 468$)

| Clinical characteristics | Patients | |
|--------------------------------------|----------|-------|
| | <i>n</i> | % |
| Gender | | |
| Male | 251 | 53.63 |
| Female | 217 | 46.37 |
| Age (years) | | |
| ≤ 60 | 345 | 73.72 |
| > 60 | 123 | 26.28 |
| Body mass index (kg/m ²) | | |
| < 18.5 | 68 | 14.53 |
| 18.5–23.9 | 293 | 62.61 |
| > 23.9 | 107 | 22.86 |
| Level of education | | |
| Completed college education | 124 | 26.50 |
| Without college education | 344 | 73.50 |
| Dwellings | | |
| Urban | 339 | 72.44 |
| Suburban or rural | 129 | 27.56 |
| Primary tumor location | | |
| Digestive tract | 95 | 20.30 |
| Others | 373 | 79.70 |

ing the study and asked to participate. All patients were fully informed on changes in consumption of specific foods and how they were classified in our questionnaire. If a patient was unable to complete the questionnaires by him/herself, the investigators read all the listed questions and the corresponding answer options and filled in the questionnaire according to the patient's oral answers. The study was approved by the institutional review board of the Oncology Center, Tongji Hospital, Wuhan, China.

Questionnaire

The questionnaire was constructed to examine changes in the intake of specific foods in cancer patients. The following data were gathered: clinical characteristics of patients (sex, age, body mass index, level of education, geographic location, primary tumor location) and changes in the consumption of the following specific foods: condiments (e.g., fermented bean curd, fermented

glutinous rice, vegetable oil, liqueur, pepper, etc.), meat of aquatic species excluding carp (e.g., hairtail, yellow croaker, pomfret, clam, shrimp, crab, etc.), meat of terrestrial species excluding chicken (e.g., goose, donkey, beef, lamb, dog, etc.), spices (e.g., ginger, garlic, star anise, green onion, etc.), fungi (e.g., mushrooms, agaric, etc.), fruits (e.g., peach, apricot, ginkgo, mango, red bayberry, cherry, lychee, melon, etc.), and vegetables (e.g., bamboo shoots, mustard, pumpkin, spinach, onions, garlic, chives, etc.). Chicken and carp were listed separately from meat of terrestrial and aquatic species because they are widely recognized as specific foods that are not suitable for cancer patients. Changes were recorded using the following scores: "complete avoidance," "reduced frequency," "unchanged," or "increased."

Statistical analysis

Data were analyzed using SPSS 16.0. The characteristics of the study population and the changes in the intake of specific foods were described using simple frequencies. The significance of differences in the intake of specific foods associated with various clinical characteristics was examined using the χ^2 test and logistic regression analysis. Differences were considered significant when corresponding *P* values were ≤ 0.05 .

Results

Between April 2009 and September 2010, we interviewed 489 cancer patients (age: 18–80 years, median age: 52 years), of whom 468 completed the survey, resulting in a response rate of 95.7% (468/489). The clinical characteristics of the included patients are summarized in Table 1.

Changes in the intake of specific foods in cancer patients (Table 2, Fig. 1)

Most patients declared that they had changed specific dietary habits after being diagnosed with cancer. Up to 73.1% of the patients completely avoided chicken and carp, which are widely considered unsuitable for cancer patients, while 17.7% reduced their consumption of these

Table 2 Changes in the intake of specific foods in cancer patients

| The specific foods categories | Completely avoid | | Reduced frequency | | Unchanged or increased | |
|------------------------------------|------------------|------|-------------------|------|------------------------|------|
| | <i>n</i> | % | <i>n</i> | % | <i>n</i> | % |
| Cocks and carps | 342 | 73.1 | 83 | 17.7 | 43 | 9.2 |
| Condiments | 243 | 51.9 | 165 | 35.3 | 60 | 12.8 |
| Aquatic meat (excluding carps) | 189 | 40.4 | 152 | 32.5 | 127 | 27.1 |
| Terrestrial meat (excluding cocks) | 149 | 31.8 | 206 | 44.0 | 113 | 24.2 |
| Cooking accessories | 99 | 21.2 | 247 | 52.8 | 122 | 26.1 |
| Fungi | 53 | 11.3 | 125 | 26.7 | 290 | 62.0 |
| Fruits | 31 | 6.6 | 128 | 27.4 | 309 | 66.0 |
| Vegetables | 29 | 6.2 | 163 | 34.8 | 276 | 59.0 |

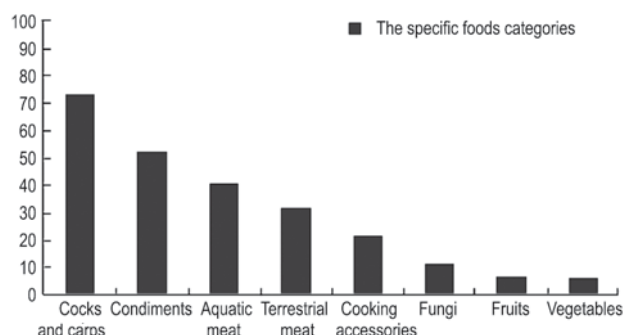


Fig. 1 Complete avoidance of specific foods in cancer patients in China

specific foods. Only 9.2% maintained or increased their level of consumption. Most patients (51.9%) completely avoided condiments, and 35.5% reduced their use. Regarding the meat of aquatic species, 40.4% of the patients avoided it completely and 32.5% reduced its consumption. Few patients (6.6% and 6.2%, respectively) completely avoided fruits and vegetables, and some patients (27.4% and 34.8%, respectively) reduced their consumption.

Analysis of factors related to avoidance of specific foods by cancer patients (Table 3)

Sex, level of education, and geographic location were significantly associated with complete avoidance of some specific foods by the patients ($P < 0.05$). Women and suburban and rural residents were more likely to completely avoid chicken and carp compared to men and urban residents. Women were also more likely to completely avoid meat of terrestrial animals (excluding chicken) compared to men, and patients without college education were more likely to completely avoid fungi compared to patients with a college degree. There was no significant relationship between patients' dietary preferences and age or primary tumor location, as well as between any patient characteristic and specific consumption of other foods.

Discussion

To the best of our knowledge, no studies have investigated changes in dietary preferences in cancer patients in China. The results of this cohort study showed that any specific type of food was either completely avoided or reduced by certain subpopulations of the patients. In particular, foods widely believed to be unsuitable for cancer patients, i.e. chicken and carp, were avoided by most patients irrespectively of sex and geographic location. Even vegetable consumption was completely avoided or reduced in 41% of the patients. Individuals who maintained or increased intake of specific foods were combined because of the small numbers of such patients.

The reason given by many cancer patients for fasting

or reducing consumption of specific foods was that these foods were “fawu,” a term encompassing certain foods that are believed to cause tumor recurrence or metastasis or aggravate pre-existing conditions. Cancer survivors are known to worry about their disease and its recurrence [6–15]. Other patients failed to provide a specific reason and were simply complying with traditional Chinese believes.

Under normal circumstances, most people consume moderate amounts of the specific foods known as “fawu” with no adverse reactions, and there is no evidence to suggest that “fawu” intake should be excluded by cancer patients.

In reality, up to 73.1% of the patients completely avoided chicken and carp, and 31.8% completely avoided meat of terrestrial animals. Meat of terrestrial animals is rich in protein, iron, and vitamins and supplies many of the essential amino acids.

In addition to protein, many types of meat of aquatic species contain fish oil or fatty acids, and some studies have demonstrated that certain aquatic foods are effective at arresting mammary tumour progression or inhibiting metastases formation [16–18]. Nevertheless, 72.9% of the patients completely avoided or reduced their intake of these food items, whereas they should be encouraged to consume them in moderation, except in cases of individuals with asthma or allergies.

Although edible fungi contain protein, carbohydrates, vitamins, trace elements, and minerals, 38% of the patients (especially those without college education) completely avoided or reduced their intake. *In vitro* and clinical experiments have demonstrated that fungi have antineoplastic activity, and their consumption can help to prevent the onset of oncogenesis and restore the cell immunity impaired by radiation and chemotherapy [19–24]. Patients should therefore consume moderate amounts of fungi.

Vegetables and fruits contain multiple vitamins, which play important roles in the prevention and treatment of cancer. Lotan demonstrated that vitamin A and retinoids can influence malignant cell growth in a number of ways [25], while vitamin C can kill some cancer cells but not normal cells and alleviate the general symptoms caused by the damaging effects of ionizing radiation [26–27]. However, vegetables and fruits intake was completely avoided or reduced in 41% and 34% of the patients, respectively. These patients should be encouraged to include some fruits and vegetables in their daily diet.

A better understanding of the changes in dietary preferences in patients diagnosed with cancer will facilitate health guidance aimed at helping such patients to develop a more informed view of dietary needs and thus overcome the customary barriers to consumption of healthy foods. Patients' education regarding the importance of a

Table 3 Relationships between patient characteristics and complete avoidance of some specific foods

| 'Fawu' categories | Demographic characteristics | Patients | | Pvalue ^c | Logistic regression | |
|----------------------------------|-----------------------------|----------|------|---------------------|--|--------|
| | | <i>n</i> | % | | OR ^a (95% CI ^b) | Pvalue |
| Cocks and carps | Gender | | | | | |
| | Male | 171 | 68.1 | 0.01 | 1.00 | – |
| | Female | 171 | 78.8 | | 1.74 (1.14, 2.65) | 0.01 |
| | Age (years) | | | | | |
| | ≤60 | 259 | 75.1 | 0.10 | – | – |
| | >60 | 83 | 67.5 | | – | – |
| | Level of education | | | | | |
| | No college education | 253 | 73.5 | 0.70 | – | – |
| | Completed college education | 89 | 71.8 | | – | – |
| | Dwelling | | | | | |
| Terrestrial meat excluding cocks | Suburban or rural | 103 | 79.8 | 0.04 | 1.00 | – |
| | Urban | 239 | 70.5 | | 0.60 (0.37, 0.98) | 0.04 |
| | Location of cancer | | | | | |
| | Digestive tract | 72 | 75.8 | 0.50 | – | – |
| | Others | 270 | 72.4 | | – | – |
| | Gender | | | | | |
| | Male | 69 | 27.5 | 0.03 | 1.00 | – |
| | Female | 80 | 36.9 | | 1.54 (1.04, 2.28) | 0.03 |
| | Age (years) | | | | | |
| | ≤60 | 116 | 33.6 | 0.17 | – | – |
| Fungi | >60 | 33 | 26.8 | | – | – |
| | Level of education | | | | | |
| | No college education | 111 | 32.3 | 0.74 | – | – |
| | Completed college education | 38 | 30.6 | | – | – |
| | Dwelling | | | | | |
| | Suburban or rural | 42 | 32.6 | 0.84 | – | – |
| | Urban | 107 | 31.6 | | – | – |
| | Location of cancer | | | | | |
| | Digestive tract | 27 | 28.4 | 0.42 | – | – |
| | Others | 122 | 32.7 | | – | – |
| | Gender | | | | | |
| | Male | 30 | 12.0 | 0.65 | – | – |
| | Female | 23 | 10.6 | | – | – |
| | Age (years) | | | | | |
| | ≤60 | 35 | 10.1 | 0.18 | – | – |
| | >60 | 18 | 14.6 | | – | – |
| | Level of education | | | | | |
| | No college education | 49 | 14.2 | 0.001 | 1.00 | – |
| | Completed college education | 4 | 3.2 | | 0.20 (0.07, 0.57) | 0.002 |
| | Dwelling | | | | | |
| | Suburban or rural | 18 | 14.0 | 0.27 | – | – |
| | Urban | 35 | 10.3 | | – | – |
| | Location of cancer | | | | | |
| | Digestive tract | 12 | 12.6 | 0.65 | – | – |
| | Others | 41 | 11.0 | | – | – |

^a Odds ratio; ^b 95% confidence interval; ^c P value calculated by χ^2 test

well-balanced diet will improve their nutritional intake during treatment and, consequently, positively affect their clinical course, outcomes, and quality of life. Meanwhile, enhanced guidance should be provided for specific patient groups, such as women, patients without college education, and suburban or rural patients.

The results of the current study only apply to the ethnic Han population under the influence of Chinese culture. Further studies involving more tumor types and more geographic locations are needed. In addition, there is currently no consensus among Chinese scholars regarding the pathological role of “fawu.”

In conclusion, cancer and its treatment are major concerns for patients, and nutritional intake plays an important role. However, consumption of all types of specific foods encompassed by the term “fawu” is completely avoided or reduced by various subpopulations of cancer patients because of the customary barriers related to their cultural background. Consequently, in addition to focusing on disease treatment, medical professionals should correct patients’ misconceptions and taboos, overcome the customary barriers associated with “fawu” intake, and provide dietary guidance to reduce the chances of negative dietary effects.

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Conflicts of interest

The authors indicated no potential conflicts of interest.

References

- Reeves GK, Pirie K, Beral V, *et al.* Cancer incidence and mortality in relation to body mass index in the Million Women Cancer Society men Study: cohort study. *BMJ*, 2007, 335: 1134.
- Ollenschläger G, Viell B, Thomas W, *et al.* Tumor anorexia: causes, assessment, treatment. *Recent Results Cancer Res*, 1991, 121: 249–259.
- Gabison R, Gibbs M, Uziely B, *et al.* The cachexia assessment scale: development and psychometric properties. *Oncol Nurs Forum*, 2010, 37: 635–640.
- Bapuji SB, Sawatzky JA. Understanding weight loss in patients with colorectal cancer: a human response to illness. *Oncol Nurs Forum*, 2010, 37: 303–310.
- Zeman FJ. *Clinical nutrition and dietetics*. 2nd ed. New York: Macmillan Publishers Ltd., 1991.
- Golden-Kreutz DM, Andersen BL. Depressive symptoms after breast cancer surgery: relationships with global, cancer-related, and life event stress. *Psychooncology*, 2004, 13: 211–220.
- Dunn J, Steginga SK. Young women’s experience of breast cancer: defining young and identifying concerns. *Psychooncology*, 2000, 9: 137–146.
- Andersen BL, Shapiro CL, Farrar WB, *et al.* Psychological responses to cancer recurrence. *Cancer*, 2005, 104: 1540–1547.
- Ashing-Giwa KT, Padilla G, Tejero J, *et al.* Understanding the breast cancer experience of women: a qualitative study of African American, Asian American, Latina and Caucasian cancer survivors. *Psychooncology*, 2004, 13: 408–428.
- Benyamini Y, McClain CS, Leventhal EA, *et al.* Living with the worry of cancer: health perceptions and behaviors of elderly people with self, vicarious, or no history of cancer. *Psychooncology*, 2003, 12: 161–172.
- Lee-Jones C, Humphris G, Dixon R, *et al.* Fear of cancer recurrence – a literature review and proposed cognitive formulation to explain exacerbation of recurrence fears. *Psychooncology*, 1997, 6: 95–105.
- Mullens AB, McCaul KD, Erickson SC, *et al.* Coping after cancer: risk perceptions, worry, and health behaviors among colorectal cancer survivors. *Psychooncology*, 2004, 13: 367–376.
- Stanton AL, Danoff-Burg S, Huggins ME. The first year after breast cancer diagnosis: hope and coping strategies as predictors of adjustment. *Psychooncology*, 2002, 11: 93–102.
- Johnson Vickberg SM. Fears about breast cancer recurrence. *Cancer Pract*, 2001, 9: 237–243.
- Wang JH, Liang W, Chen MY, *et al.* The influence of culture and cancer worry on colon cancer screening among older Chinese-American women. *Ethn Dis*, 2006, 16: 404–411.
- Rose DP, Connolly JM, Rayburn J, *et al.* Influence of diets containing eicosapentaenoic or docosahexaenoic acid on growth and metastasis of breast cancer cells in nude mice. *J Natl Cancer Inst*, 1995, 87: 587–592.
- Rose DP, Connolly JM. Effects of dietary omega-3 fatty acids on human breast cancer growth and metastases in nude mice. *J Natl Cancer Inst*, 1993, 85: 1743–1747.
- Fritsche KL, Johnston PV. Effect of dietary alpha-linolenic acid on growth, metastasis, fatty acid profile and prostaglandin production of two murine mammary adenocarcinomas. *J Nutr*, 1990, 120: 1601–1609.
- Konno S. Potential growth inhibitory effect of maitake D-fraction on canine cancer cells. *Vet Ther*, 2004, 5: 263–271.
- Ooi VE, Liu F. Immunomodulation and anti-cancer activity of polysaccharide-protein complexes. *Curr Med Chem*, 2000, 7: 715–729.
- Yamaguchi Y, Miyahara E, Hihara J. Efficacy and safety of orally administered *Lentinula edodes* mycelia extract for patients undergoing cancer chemotherapy: a pilot study. *Am J Chin Med*, 2011, 39: 451–459.
- Tamura R, Tanebe K, Kawanishi C, *et al.* Effects of lentinan on abnormal ingestive behaviors induced by tumor necrosis factor. *Physiol Behav*, 1997, 61: 399–410.
- Inoue A, Kodama N, Nanba H. Effect of maitake (*Grifola frondosa*) D-fraction on the control of the T lymph node Th-1/Th-2 proportion. *Biol Pharm Bull*, 2002, 25: 536–540.
- Zhang M, Cheung P C, Zhang L. Evaluation of mushroom dietary fiber (nonstarch polysaccharides) from sclerotia of *Pleurotus tuber-regium* (Fries) singer as a potential antitumor agent. *J Agric Food Chem*, 2001, 49: 5059–5062.
- Lotan R. Retinoids and apoptosis: implications for cancer chemoprevention and therapy. *J Natl Cancer Inst*, 1995, 87: 1655–1657.
- Kanter M, Akpolat M. Vitamin C protects against ionizing radiation damage to goblet cells of the ileum in rats. *Acta Histochem*, 2008, 110: 481–490.
- Borek C. Antioxidants and radiation therapy. *J Nutr*, 2004, 134: 3207S–3209S.

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