

The Analysis of Oral Nutrition Support Needs in Chinese Postoperative Gastric Cancer Patients: Based on Information From Internet

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Research Article

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Abstract

Purpose: The study aimed to explore oral nutrition support needs in Chinese gastric cancer patients after gastrectomy by analyzing patients question on the internet.

Methods: We searched Baidu website for diet question relating to stomach cancer undergoing gastrectomy. Content analysis was used to analyze the data material, Natural language processing & information retrieval sharing platform was used to analyze the sentiment tendency and sentiment attributes of all questions.

Results: A total of 1420 diet-related questions were posed during the time before discharge and after gastrectomy several years. About 83.87% of all questions were about what and how to eat after gastric cancer. The results of emotional orientation of oral nutrition problems in patients after gastrectomy was generally positive (positive vs negative score: 1758 VS -1531), but the emotional orientation of diet and symptom problems was generally negative (positive vs negative score: 256.5 VS -410). The oral nutritional requirement of gastric cancer patient included oral nutrition-related solutions provided by professional staff, dietary and prognosis information, food metabolism information, dietary information, oral nutritional supplements information, symptom support, nutrition monitor, psychological support, and exercise information.

Conclusions: The dietary problems of patients with gastric cancer after surgery mainly involve how to eat, the causes of diet-related symptoms and treatment methods. Patients and their caregivers need professional person to support their nutrition need, and the nutrition need include dietary and prognosis information, food metabolism information, dietary information, oral nutritional supplements information, symptom support, nutrition monitor, psychological support, and exercise information. The study clarified the specific needs of oral nutrition for patients after gastric cancer surgery, laying a foundation for the formulation of intervention programs.

Introduction

Gastric cancer (GC) is the fifth most common cancer in world, and it was estimated to 1,033,701 new cases occurred in 2018[3]. According to cancer data released by the National Cancer Center of China in 2019, there were about 403,000 new cases and 291,000 deaths of GC in 2015 in China, ranking third in both incidence and mortality[34]. So, GC cancer still has been being one of the key work of cancer prevention and control in China. Gastrectomy with proper perigastric lymphadenectomy remains the cornerstone of radical resection of potentially curable GC. Most GC patients after gastrectomy usually are accompanying the problem of gastrointestinal function recovery or insufficient dietary intake, and the nutritional status is significantly worse than admission[27].

Due to the change of digestive tract, GC patients after gastrectomy often face the problem of lack of nutrition knowledge[15]. Huang et. al. survived 326 GC patients perioperative nutrition knowledge and found that the awareness rate of general nutrition knowledge, professional nutrition knowledge was

78.5% and 17.5%, respectively[10]. Some studies have confirmed the nutritional problems faced by GC patients and their caregivers, including malnutrition, malabsorption, weight loss, nausea, vomiting, anorexia, dysphagia, as well as anxiety, fear, and dissatisfaction caused by nutritional problems[26, 28, 29]. Ying et.al. investigated diet and nutritional status of 70 cases at 4-6 weeks after GC resection, and found that how to eat, what to eat, and uncomfortable feelings after diet were still prevalent problems faced by GC patients after surgery[27]. However, there are few studies systematically investigating the dietary needs of GC patients after surgery or their caregivers after discharge.

Up to June 2020, there were 940 million Chinese Internet users, and the number of the search engine and online medical users were 766 million and 276 million, respectively[5]. In the era of widespread internet, cancer patients and their caregivers increasingly turn to the internet website for health information[32]. Health and medical treatment has been the most popular science theme in 2018 in China[7]. About 64.3% of people reported checking the Internet for health information when they had an acute symptom[1]. A survey on the behavioral characteristics of outpatients' Internet health information query showed that 96.2% of patients turned to the Internet for relevant information when they, their family members, or friends were unwell[9]. Even when there were medical staff, there were still 30.3% GC patient caregivers choosing to obtain information online or mobile application[24]. Therefore, it is possible to understand the characteristics of information needs of a certain group of people through searching and analyzing related information on a certain topic in the Internet.

Providing continuity care services based on patient need is the embodiment of patient-centered care model. Therefore, the study aimed to explore oral nutrition support needs in Chinese gastric cancer patients after gastrectomy by analyzing patients question on the internet.

Subjects And Methods

Study population

Stomach cancer patients after gastrectomy and their caregivers

Data collection

Using "stomach cancer", "gastrectomy", "diet" as keywords to search "https://www.baidu.com" from November 7, 2019 to November 10, 2019. Then, a total of 15,800,000 records were found, and 381 questions about oral nutrition after gastrectomy were taken from the first 76 webpages, due to the restriction of presentation of webpages (**Supplementary Table 1**). Further search with the keywords of "stomach cancer", "gastrectomy", and "diet" were performed on the websites with the frequency of questions more than 10 in the initial search, including <http://www.39.net/>, <https://www.120ask.com/>, <https://muzhi.baidu.com/>, <https://zhidao.baidu.com/>, <https://iask.sina.com.cn/>, and <https://www.xywy.com/>.

The questions analyzed in this study had been made available publicly by being published openly on the Internet. Because of the impossibility of obtaining informed consent from all users who asked the

questions, and most of which did not use their actual name. So, no data identifying the emitters of the users were analyzed in order to protect the privacy of the emitters.

Data inclusion

Initially, the 2 main authors included dietary related questions on the internet counselled by GC patients after gastrectomy at home or the patients going to be discharged from the hospital, or their caregivers. If the questions could not be categorized as being discharged from hospital or at home after gastrectomy, they are still considered to be included in the following analysis. All the questions were copied in the excel and reordered in the ascending way. Duplicated questions were excluded. Then, data cleansing was conducted by the researchers (Qiuju Tian, Liyuan Qin), including removing unrelated symbol (e.g. @, ~, +, etc.), and correcting the wrong spelling according to the meaning.

Data analysis

The first 200 questions were categorized on the purpose of the questions by the two main researchers to form approximate categories. Subsequently, the other questions were classified to corresponding categories or a new category if necessary. Conflicting results were discussed until the two researchers reached a consensus. Subsequently, the type and frequency of the questions were evaluated. Then, the two researchers independently performed the coding process, and final themes were agreed by all authors.

The sentiment analysis of the extracted questions was performed by using Natural language processing & information retrieval sharing platform (NLPIR). Two technologies are used in NLPIR sentiment analysis module, the first one is the automatic recognition of emotional words and the automatic calculation of weights, using the co-occurrence relationship and the strategy of Bootstrapping, repeated iterations, to survive new emotional words and weights. The second is based on the deep neural network to expand the calculation of emotional words, and the synthesis is the final results[33]. We use the emotional analysis function module of NLPIR to analyze the emotional tendency and emotional attributes of various problem in this research. Among them, the emotional tendency score is divided into positive and negative sides, and the final emotional tendency score is the sum of the positive and negative scores. Emotional attributes include good, happiness, fright, anger, evil, sorrow, and fear.

Results

After collecting and removing the duplicates of the 381 questions originally searched and the questions fully searched by each website, a total of 1420 questions were included according to the inclusion criteria. We found that the time of dietary questions involved the planned discharge from the hospital to several years after gastrectomy. For example, "my mom feels pretty good after gastrectomy, she will be discharged from the hospital tomorrow, I want to make some food that will help recovery, but I have no idea about it. What should she eat after stomach surgery?", "Two days after discharge after gastrectomy, she vomited three times this afternoon, could she drink the peptide enteral nutrient solution on an empty

stomach?”, “Is it okay to eat apple at night before going to bed after eleven months after gastrectomy”, and “Stomach reflux often occurs after 5 years after the operation, what’s more, I eat less now than in previous year, I do not know if it is a bad phenomenon.”. And the long-term questions after gastrectomy were mostly included in the short-term questions after gastrectomy.

Five types of questions can be classified according to the purpose of the question. They are ① general dietary questions after gastrectomy, including what to eat, how to eat, and misunderstandings in diet, etc., accounting for 83.87%. ② the cause and treatment of diet-related symptoms, accounting for 12.04%. ③ oral nutritional supplements (ONS), including how to choose ONS, what is the effect of ONS, how to eat, whether there are adverse reactions, accounting for 3.45%. ④ the relationship between diet and prognosis, accounted for 0.56%. ⑤ the relationship between diet and activities, etc., accounting for 0.07% **(Supplementary Table 2)**.

In the classification of diet-related symptoms, the seven most common symptoms asked by patients in home patients after gastrectomy were vomiting, poor appetite, dysphagia, abdominal pain, bloating, hiccup/belching, reflux, accounted for 81.13% (Table 1).

Table 1
The classification of diet-related symptoms in GC patients after surgery

Symptoms	Frequency(%)
Vomiting	42(19.81)
Poor appetite	30(14.15)
Dysphagia	26(12.26)
Abdominal pain	25(11.79)
Bloating	17(8.02)
Hiccup/belching	11(5.19)
Reflux	11(5.19)
Body weight loss	10(4.72)
Diarrhea	8(3.77)
Nausea	8(3.77)
Fatigue	6(2.83)
Constipation	5(2.36)
Grumbling belly	4(1.89)
Taste change	3(1.42)
Foaming at the mouth	2(0.94)
Chest distress	1(0.47)
Short of breath	1(0.47)
Sleepy	1(0.47)
Dry mouth	1(0.47)

Patient queries concerned 9 categories relevant to professional knowledge providers, dietary and prognosis information, food metabolism information, dietary information, ONS information, symptom support, nutrition monitor, psychological support, and exercise information (Table 2).

Table 2

Themes, subthemes and code of oral nutrition home nursing needs in Chinese gastric cancer patients after gastrectomy

Themes	Subthemes	Code
Professional knowledge providers	Gain information from experienced person	Query experienced person
	Gain information from professional	Professional answers questions
Dietary and prognosis information	Relationship in dietary and prognosis	What sequela can occur if gastric patients eat too full or spy/overnight/expired food after operation? Death?
Food metabolism information	Knowledge of diet metabolism after digestive tract reconstruction	How do food store, where do the food enter, and how do people digest the food after gastrectomy?
Dietary information	What to eat	What do patients eat commonly after gastrectomy
		What do patients choose to eat after complications/symptoms/comorbidities appear
		Whether something can be eat after gastrectomy
	How to eat	Dietary transition method
		Food processing method
		Frequency and amount of diet
ONS information	ONS selection	Nutrition product which is more suitable for gastric cancer patients after (total) gastrectomy, or GC patients with weak physical condition
	effect of ONS	The effect of Ensure
	Taking method	Is it ok to take enteric nutrient solution on an empty stomach
	Adverse reactions	Diarrhea / Vomit
Symptom support	Cause of symptoms	The cause of vomit / hiccup / reflux / grumbling belly / dysphagia / abdominal pain / body weight loss / diarrhea / taste change / foaming at the mouth / bloating / poor appetite / short of breath / chest distress
	Deal with symptoms during diet or after surgery and treatment	Deal with body weight loss / choke / bloating / hiccup / taste change / poor appetite / diarrhea / vomit / abdominal pain / nausea / constipation / sleepy / fatigue / dry mouth

Themes	Subthemes	Code
Nutrition monitor	Nutrition assessment	Body weight / dietary amount
	nutritional evaluation	Whether the energy intake is up to standard
Psychological support	Anxious and fear because of complication or symptom	Die soon / please help me / a symbol for failure operation
Exercise information	Exercise time	Time to start exercise after eating

Emotional tendency analysis

In the emotional tendency analysis of oral nutrition problems in home patients after gastrectomy, the positive score of all dietary problems was 1758, while the negative score was -1531, and the final emotional score was 227 (Figure 1), indicating that the overall emotional tendency of dietary problems after gastrectomy is positive.

Specifically, in the diet-related symptom category, the final emotional score was -153.5, with positive score 256.5 and negative score -410. In the ONS category, the final emotional score was -9, with positive score 47 and negative score -56. The final emotional score was 389.5 in what to eat and how to eat category, with positive score 1391.5 and negative score -1002 (Figure 2).

We further analyzed what to eat and how to eat categories, and found that the final emotional score of general diet was -351.5, with positive score 975.5 and negative score -624. In the category of diet choice after complications/symptoms/comorbidities, the final emotional score was -2, with positive score 110 and negative score -112. While the final emotional score of whether some food can be eaten category was 26, with the positive score 269 and negative score -243 (Figure 3).

Emotional attributes analysis

The positive emotional attribute mainly focuses on goodness, under which the ratio of general diet after gastrectomy accounted for the highest, 0.44. Among the negative emotional attribute, badness accounted for the highest proportion, in which the ratio of diet-related symptoms was the highest at 0.43. In addition, we found that the diet after complications/symptoms/comorbidities and diet-related symptoms questions with negative attribute were more than 50% (Figure 4).

Discussion

We evaluated oral nutrition home nursing needs in Chinese gastric cancer patients after gastrectomy in this study. To this end, we collected and assessed the postoperative oral nutrition questions by GC patients or their caregivers from the Internet. Our data show that postoperative oral nutrition questions presented from pre-operation to several years after gastrectomy. Most of the questions were about what to eat and how to eat after gastrectomy. The cause and treatment of diet-related symptoms were also paid attention to by patients and their caregivers, including vomiting, difficulty swallowing, abdominal pain, bloating, snoring, reflux, et.al. In addition, symptoms often induced a negative emotional state for the patients and their caregivers. The oral nutritional home nursing needs of gastric cancer patient included oral nutrition-related solutions provided by professional staff, symptom support, ONS information, nutrition monitor, psychological support, dietary and prognosis information, and exercise information.

The results are similar to a previous study in which patients experienced temporal, uncovered, improved, and unchanged problems in quality of life after 3 and 12 months of gastrectomy, specifically, fatigue, digestive symptoms such as diarrhea, dysphagia, and eating restrictions were the representative unrecovered problems, persisting at 12 months after surgery[11]. Also in agreement with other studies, patients undergone consistently eating restrictions, nausea, vomiting, dysphagia, reflux, and dry mouth during the two or more postoperative years[12, 22, 23]. For long-term survivors, eating restrictions still existed in total gastrectomy GC patients[14]. The results underscore health care providers should initiate oral nutritional education earlier and make sure that patient have acquired relevant knowledge and skills, in order to deal with subsequent problems and save medical resources. On the other hand, healthcare givers should also pay attention to long-term survivor with oral nutrition question in patients after gastrectomy.

We found that most of the questions were about what to eat and how to eat after gastrectomy, accounted for 83.87%. This finding is in accordance with some study, which analyzed 3 unique cases studies using content analysis, and found that learn to eat again post-surgery was by far the largest theme in the interviews[8]. Ying et.al investigated 70 GC patients diet and nutritional status from 4 to 6 weeks after gastrectomy, also found that what to eat and how to eat after surgery was main questions presented by GC patients, including what is appropriate/unsuitable to eat, the amount of food intake per meal, the nature of diet, number of meals per day, and food cooking method [27]. In addition, similar to other studies[6, 23, 25], our data show that the more frequently questions presented also include the causes and treatment of oral nutrition related symptoms, as well as the choice of ONS. Symptoms mainly focus on vomiting, poor appetite, dysphagia, and abdominal pain. An article systematically reviewed the symptoms commonly experienced by gastric cancer patients, including abdominal pain, nausea, vomiting, diarrhea, constipation, reflux, dysphagia, loss of appetite, fatigue, body weight loss, depression and anxiety[18]. In our study, we found that patient usually do not know why these symptoms occur, and how to deal with them when they happen, which often induced a negative emotional state for the patients and their caregivers. This result is similar to the study of Tong et al., which confirmed that diet-related symptoms often lead to distress, poorer quality of life and physical condition[30]. The results suggest that healthcare givers should tell patients what to eat, how to eat, the causes and treatment of diet-related

symptoms, and the use of ONS, when making home nutrition care plan for gastric cancer patients after surgery.

We concluded that the oral nutritional home nursing needs of gastric cancer patient included oral nutrition-related solutions provided by professional staff, dietary and prognosis information, food metabolism information, dietary information, ONS information, symptom support, nutrition monitor, psychological support, and exercise information. Some patients and their caregivers in our study clearly stated that they demand professional to answer their questions. GC patients after gastrectomy are unable to cope with problems outside the hospital, and are deeply troubled by physical, psychological, family and social problems. Therefore, they hope to obtain professional nursing, knowledge about disease, information on family and social support after discharge from the hospital, so do family care givers[4, 17, 19, 31]. A study in home found that 92.3%(72/78) of patient hope to receive transitional care from hospital they were discharged from or community institution guided by the hospital, and dietary information were one of the most prevalent demand[16]. Similarly, Li et.al. found that GC patient family caregivers they found that GC patient family caregivers were in heavy burden, especially in psychological burden, and they were in direly need of diet and nutrition knowledge, followed by knowledge of disease, rehabilitation, medicine, and psychological and social health support[17]. In addition, we found that although some patients or their family caregivers judge nutrition status by the amount of food, food form (liquid, semi-liquid, general food), body weight loss, weakness, or hemoglobin according to their questions, most of them were not aware of the concept of energy, protein, other nutrients goal attainment, or nutrient calculation tool. Both ESEPN and CSPEN guideline recommend energy requirement should be assumed to be similar to healthy subjects and generally ranging between 25-30 kCal/kg/day, if not measured individually, and protein intake should be above 1 g/kg/day, if possible up to 1.5 g/kg/day[2]. The results suggest that patients and their family caregivers should be informed of the concept of nutrient goal attainment and self-calculation tool.

The negative emotions of anxiety and depression in GC patients after gastrectomy are lower than before gastrectomy[20]. Similarly, the results of our study showed that the overall emotional propensity scores for oral nutrition problems in home GC patients after surgery are positive. However, we found that in the categories of diet-related symptoms questions and how to eat in patients with comorbidities questions, the emotional propensity scores were all negative. In addition, in the specific questions of the patients or their caregivers, it is semantically shown that in sufficient oral intake, diet-related symptoms, etc., can cause helplessness, anxiety, panic, and other psychology in patients and their families after GC surgery, especially when the problem can not be resolved for a long time. Similarly, some scholars found that new problems, such as nutrition problems will cause distress, not only on the physical symptoms, but also on social and emotional level, which will lead to negative emotion[19] and decrease quality of life[13]. Psychological support helps GC patients recover after surgery[21]. So, for GC patients with diet-related problems occurring after surgery, psychological support should be added while managing the symptoms.

Our study has several limitations. First, some of the oral nutrition questions from the internet cannot be determined whether they were presented by patients or their caregivers, so the needs of patient and their

caregiver cannot be distinguished in this study. Secondly, as some questions may not be presented on the internet, there may be some oral dietary demands that have not been discovered, limited by research methods.

The dietary problems of patients with gastric cancer after surgery mainly involve how to eat and what to eat, followed by the causes of diet-related symptoms and treatment methods. Patients and their caregivers need professional person to support their nutrition need, and the nutrition need include dietary and prognosis information, food metabolism information, dietary information, ONS information, symptom support, nutrition monitor, psychological support, and exercise information. The study clarified the specific needs of oral nutrition for patients after gastric cancer surgery, laying a foundation for the formulation of intervention programs.

Declarations

Funding

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Competing Interests

Author Qiuju Tian received research support from Shanghai Municipal Science and Technology Commission. Author Beiwen Wu received research support from Shanghai Jiao Tong University School of Medicine. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. Both author Liyuan Qin and Weiyi Zhu have no relevant financial or non-financial interests to disclose.

Availability of data and material

All data generated or analyzed in this study are available from the corresponding author on reasonable request.

Code availability

Code in this study are available from the corresponding author on reasonable request.

Authors' Contribution

The authors' responsibilities were as follows: Qiuju Tian: designed the study, performed the data collected, data analysis, and wrote the manuscript; Liyuan Qin: data analysis; Weiyi Zhu: data analysis, and edited the manuscript; Beiwen Wu: advised analysis, edited the manuscript, and the primary responsibility for the final content. All authors: read and approved the final manuscript.

Ethics approval

Not applicable

Consent to participate

Not applicable

Consent for publication

Not applicable

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Figures

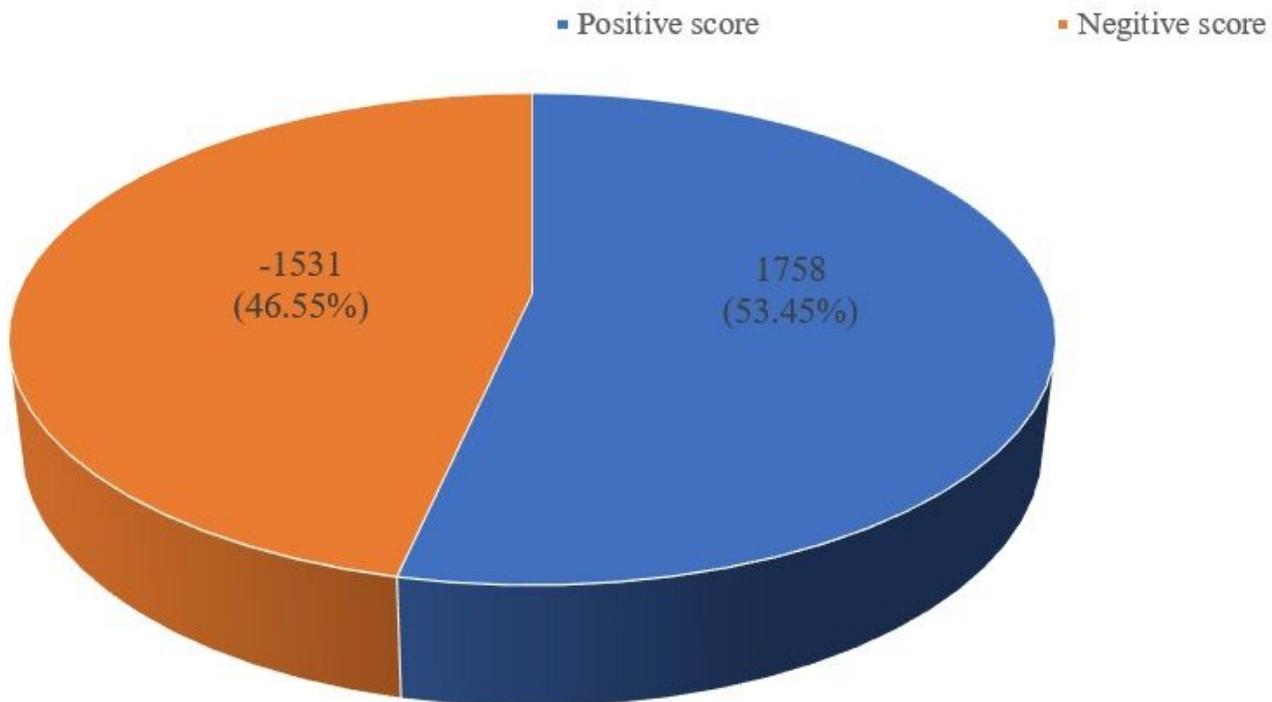


Figure 1

The emotional tendency analysis of all dietary questions.

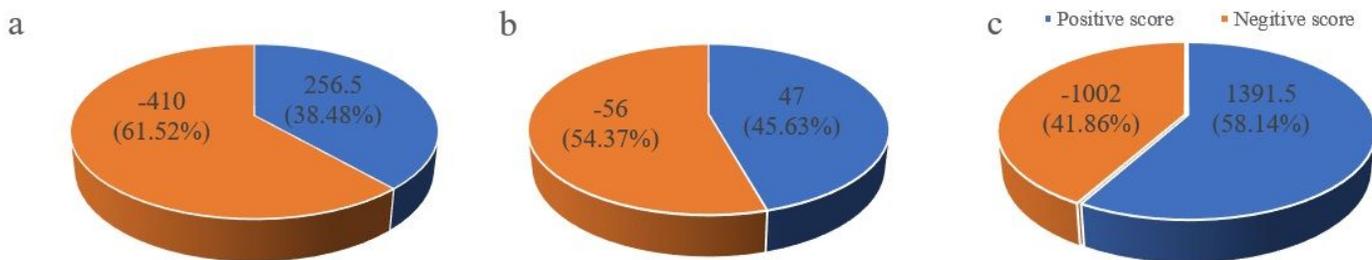


Figure 2

The specific emotional tendency analysis of all dietary questions.

a: diet-related symptom questions; b: ONS questions; c: What to eat and how to eat questions.

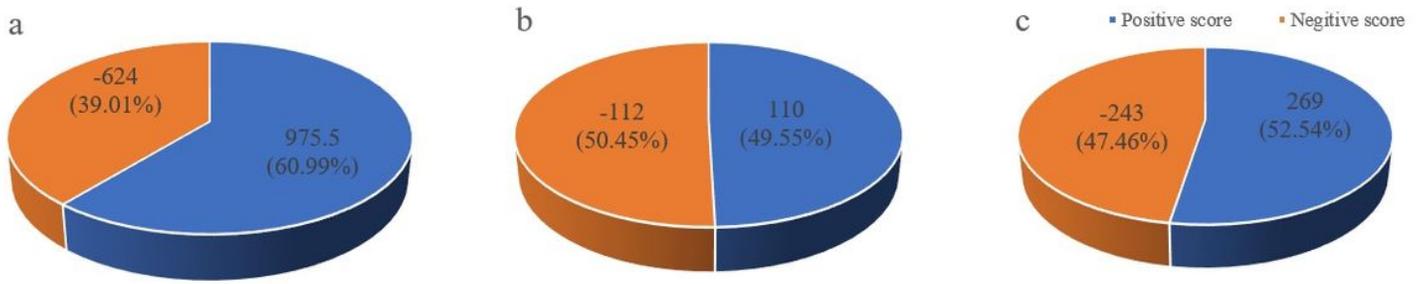


Figure 3

The specific emotional tendency analysis of what to eat and how to eat questions.

a: What do patients eat commonly after gastrectomy; b: Diet choice after complications/symptoms/comorbidities; c: Whether some food can be eaten

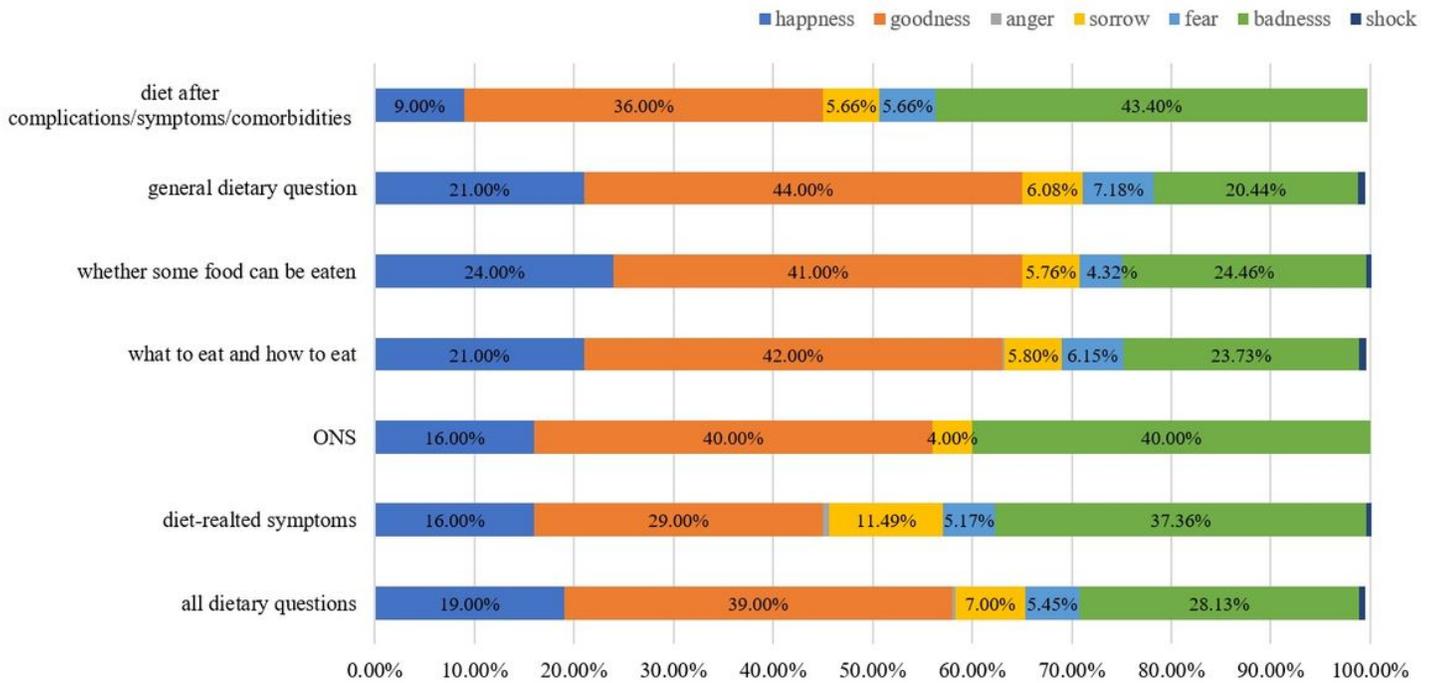


Figure 4

The emotional attributes analysis of dietary question.

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