ปัจจัยที่สัมพันธ์กับประสบการณ์การมีอาการในคนไข้โรคมะเร็งระบบทางเดินอาหารที่ได้รับเคมีบำบัดหลังผ่าตัด
Factors Related to Symptom Experience among Patients with Gastrointestinal Cancer Receiving Post-operative Chemotherapy

นิพนธ์ต้นฉบับ

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Original Article

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บทคัดย่อ

วัตถุประสงค์: เพื่ออธิบายประสบการณ์การมีอาการและทดสอบความสัมพันธ์ของประสบการณ์ฯ กับเพศ ปริมาณยาออกซิลิพลาตินสะสม พฤติกรรมการดูแลตนเอง และการสนับสนุนทางสังคมกับประสบการณ์การมีอาการในผู้ป่วยมะเร็งทางเดินอาหารที่ได้รับเคมีบำบัดภายหลังการผ่าตัด **วิธีการศึกษา:** การศึกษาเชิงความสัมพันธ์มีกลุ่มตัวอย่างเป็นผู้ป่วยมะเร็งทางเดินอาหารที่รับการรักษาต่อเนื่องที่แผนกศัลยกรรมทางเดินอาหาร The Second Affiliated Hospital of Wenzhou Medical University in China จำนวน 111 คน จากการสุ่มตัวอย่างแบบง่าย รวบรวมข้อมูลโดยใช้แบบสอบถาม 1) ข้อมูลส่วนบุคคล 2) แบบสอบถามประสบการณ์การมีอาการ 3) แบบประเมินการสนับสนุนทางสังคม 4) แบบสอบถามพฤติกรรมการดูแลตนเอง ทดสอบความสัมพันธ์ด้วยสัมประสิทธิ์สหสัมพันธ์ของเพียร์สันและพอยท์ไบซีเรียล **ผลการศึกษา:** กลุ่มตัวอย่างรายงานประสบการณ์ฯ 2 - 25 อาการต่อคน (เฉลี่ย 9.8 ± 5.22) อาการที่พบมากที่สุด ได้แก่ ชามือและเท้า (81.7%) หมดพลังงาน (78.3%) คลื่นไส้ (73.3%) ไม่อยากอาหาร (71.7%) เปลี่ยนแปลงการรับรสชาติอาหาร (56.7%) และอาการเหล่านี้มีความถี่ ความรุนแรง ความทุกข์ทรมานมากกว่าอาการอื่น ๆ เพศหญิง และปริมาณสะสมของยาออกซิลิพลาติน (P-value < 0.05 และ < 0.01 ทั้งหมด) สัมพันธ์ทางบวกกับประสบการณ์ฯ ในมิติความถี่ ความรุนแรงและความทุกข์ทรมานอย่างมีนัยสำคัญทางสถิติ พฤติกรรมการดูแลตนเองและการสนับสนุนทางสังคมสัมพันธ์ทางลบกับประสบการณ์ฯ ในมิติความถี่ ความรุนแรงและความทุกข์ทรมานอย่างมีนัยสำคัญทางสถิติ (P-value < 0.01 ทั้งหมด) อายุไม่สัมพันธ์กับประสบการณ์ฯ ในทุกมิติ **สรุป:** ผู้ป่วยมะเร็งทางเดินอาหารที่รับเคมีบำบัดหลังผ่าตัดมีประสบการณ์อาการ 2 - 25 อาการต่อคน เพศหญิงและปริมาณสะสมของยาออกซิลิพลาตินสัมพันธ์ทางบวก ส่วนพฤติกรรมการดูแลตนเองและการสนับสนุนทางสังคมสัมพันธ์ทางลบกับประสบการณ์ ควรส่งเสริมการสนับสนุนทางสังคมและพฤติกรรมการดูแลตนเองเพื่อให้ผู้ป่วยมีอาการลดลง

คำสำคัญ: มะเร็งระบบทางเดินอาหาร; ประสบการณ์การมีอาการ; ปริมาณยาเคมีบำบัดสะสม; พฤติกรรมการดูแลตนเอง; การสนับสนุนทางสังคม

Abstract

Objective: To determine symptom experience and its relationships with age, gender, cumulative dose of oxaliplatin, social support, and self-care behavior among patients with gastrointestinal (GI) cancer having chemotherapy after surgery. **Methods:** This correlational research used a simple random sampling to recruit 120 participants. Research instruments consisted of 1) demographic questionnaire, 2) The Memorial Symptom Assessment Scale (MSAS), 3) The Multidimensional Scale of Perceived Social Support, and 4) The Appraisal of Self-Care Agency Scale-Revised scale. Associations were tested using Pearson's product-moment correlation and Point biserial correlation. **Result**: Participants reported experiencing 2 to 25 symptoms (mean of 9.8 ± 5.22). The top five reported symptoms were numbness/tingling in hands/feet (81.7%), followed by lack of energy (78.3%), nausea (73.3%), lack of appetite (71.7%), and change in the way food tastes (56.7%). The five symptoms were reported with more frequency, severity, and distress than other symptoms. Female sex and cumulative dose of oxaliplatin had a positive correlation with symptom frequency, severity, and distress (P-value < 0.05 and < 0.01, respectively). Self-care behavior and social support had a statistically significant negative correlation with symptom frequency, severity, and distress (P-value < 0.01 for all). Age had no statistical correlations with any symptoms. **Conclusion:** Cancer patients receiving chemotherapy after surgery experienced 2 – 5 symptoms. Female and cumulative oxaliplatin dose had positive correlations and self-care behavior and social support had negative correlations with the experience. Self-care behavior and social support should be promoted to alleviate symptom experience.

Keywords: gastrointestinal cancer; symptom experience; cumulative chemotherapy dose; self-care behavior; social support

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Introduction

In Wenzhou, China, gastrointestinal (GI) cancers account for nearly 50 percent of both morbidity and mortality, especially for stomach cancer and colorectal cancer. The high incidence of gastric cancer and colorectal cancer may be related to Wenzhou people's lifestyle and dietary habits. Pickles and marinated seafood are the traditional food in Wenzhou.[1] Furthermore, Chinese people prefer to eat together in the family, which increases the risk of transmission

of helicobacter pylori, which is the main cause of gastric cancer.[2]

In China, more than 80% of GI cancer patients were already in stage II - IV at the time of their first diagnosis. The treatment of this group is mainly surgery, supplemented by chemotherapy, immunotherapy, traditional Chinese medicine, and other supportive therapies, to reduce the recurrence rate and increase the survival rate.[3] Thirty to forty percent of colorectal cancer patients have recurrence or metastasis after the operation, and the 7-year overall survival rate of patients with oxaliplatin combined with capecitabine chemotherapy can increase to 73%.[4] However, in China, 50% to 70% of patients with gastric cancer will relapse after the radical operation, and the 5-year survival rate is only 40%. Moreover, through oxaliplatin combined with capecitabine chemotherapy, 74% of gastric cancer patients can achieve three-year disease-free survival.[5] Receiving full-dose chemotherapy can affect the efficacy, recurrence rate, and survival rate of patients.[6]

Although GI cancer surgery and chemotherapy can improve the survival rate of the patient, they also have varying degrees of adverse effects on the patient's physical function, psychological status, family relationships, social interaction, and economic status.[7] Patients with GI cancer may experience pain, nausea, diarrhea, constipation, anxiety, fatigue, and other symptoms after surgery.[8] A previous study showed that chemotherapy-related symptoms adversely affected treatment compliance.[9] Moreover, symptom burden during chemotherapy is one factor that influences full-dose chemotherapy.[10]

Based on the theory of unpleasant symptoms (TOUS)[11], experienced symptoms are the central focus of the model, conceived as indicators of change in the individual's health status, which often occurs multiple times and concomitantly. Symptom experience can occur in isolation or lead to another symptom, and each symptom is conceptualized as a multidimensional experience considering the timing, frequency of occurrence, intensity, distress, and quality. Multiple factors contribute to symptom experience, categorized into physiologic, psychological, and situational components.[11] Symptom experiences of GI cancer persons were very complex. There were many factors related to symptom experiences, including age, gender, cancer stage, chemotherapy regimens, chemotherapy cycles, education level, financial status, family income, health literacy[12,13], the power of self-care[14], and social support.[9]

The relationship between age and symptom experience among postoperative GI cancer patients undergoing chemotherapy remains unclear. Some study findings suggest a positive association between age and symptom distress.[12] Moreover, younger patients with cancer undergoing chemotherapy experience more significant symptomatic distress than older adults.[13] Other study findings show no association.[14] These adverse effects appear more severe in older patients than in younger adults, which are known to be attributed to underlying diseases and changes in pharmacokinetics and pharmacodynamics based on aging.[15] Thus, this present study aimed to examine whether age is associated with symptom experience.

A study in postoperative colorectal cancer patients found that female was associated with more severe worrying, lack of energy, and nausea.[16] Another study also showed that female patients with colorectal cancer undergoing postsurgical adjuvant chemotherapy had significantly higher symptom severity and symptom interference scores than male patients.[17] Similar findings suggest that female patients are more likely to have adverse reactions to chemotherapy or more inclined to report the uncomfortable symptoms of chemotherapy to medical staff.[18] Therefore, this present study aimed to examine whether gender was associated with symptom experience.

Each chemotherapy regimen has a distinct toxicity profile. A well-known side effect of oxaliplatin is peripheral neuropathy, which increases with cumulative dose of oxaliplatin.[19] The chronic form of oxaliplatin-induced peripheral neuropathy is cumulative dose-dependent.[20] A longitudinal study conducted six follow-ups during chemotherapy. It found that common symptoms such as pain, lack of energy, nausea, drowsiness, difficulty sleeping, and changes in food taste varied in occurrence, intensity, and distress over time.[21] As the cumulative dose of chemotherapy increases, the cumulative toxic effects of chemotherapy drugs in the body increase. As a result, the patient's tolerance to the drugs decreases, as does the body's resistance. Therefore, the level of symptoms experienced by the patients increased.[22] So, this present study examined whether different cumulative doses of oxaliplatin were related factors of symptom experience.

Self-care behavior reflects patients' adoption of a healthy lifestyle, daily functional recovery exercise, and other behaviors.[17] Previous studies have found that through symptom management strategies, constantly adjusting

lifestyle behaviors can ease the burden of the symptom experiences in cancer patients.[7] It is worth noting that enhancing the power of self-care behavior can promote symptom management.

Social support is a situational factor, which refers to any combination of informational, tangible, emotional, and appraisal support from family, friends, or medical experts.[11] A study showed that patients having good social support with colorectal cancer reported fewer adverse symptoms. The result also showed that cancer patients with higher social support would be more confident in overcoming the experience of uncomfortable symptoms.[12]

Despite the evidence of research that supports the relationships between age, gender, cumulative dose of oxaliplatin, self-care behavior, and social support with symptom experience in cancer patients undergoing chemotherapy, less is conducted on GI cancer patients in Wenzhou, China. To address this gap, the present study aimed to examine symptom experience in postoperative GI cancer-received chemotherapy patients and its association with the selected factors (i.e., age, gender, cumulative dose of oxaliplatin, social support, and self-care behavior). The results could be helpful information for understanding the incidence and severity of various symptoms and designing the intervention to manage a series of symptoms during chemotherapy.

Methods

A correlational research design was used to explore symptom experience and its relationships with age, gender, cumulative dose of oxaliplatin, self-care behavior, and social support among persons with GI cancer having chemotherapy after surgery. The study population was patients hospitalized in the gastrointestinal oncology department and the department of radiotherapy and chemotherapy at the Second Affiliated Hospital of Wenzhou Medical University in China. Participants were recruited from November to December 2021. To be eligible, participants had to be 18 years old or over, receive at least two cycles of oxaliplatin combined with capecitabine, be able to read, write, and speak Chinese, be with no recurrent or metastatic cancer, be with no history of psychiatric disorders from medical record, and be with no cognitive disorders that may affect the ability to respond to the survey.

This study sample size was calculated using the G*Power 3.1.9.7 program.[23] The researcher tested the relationship between the symptom experience and each independent variable. Based on correlation analysis, type I error was set at 0.05 and a statistical power of 0.80. From the literature review, the effect size of correction about symptom experience ranged from 0.22 to 0.28 [7,18,22] With the 0.25 effect size, a total of 120 participants were needed.

Research instruments

A questionnaire was used to collect data. The first part collected demographic characteristics including age, gender, marital status, educational level, employment status, Body Mass Index (BMI), primary tumor site, cancer stage, cumulative dose of oxaliplatin, and comorbidity.

The second part assessed symptom experience using the Memorial Symptom Assessment Scale (MSAS). Portenoy developed the MSAS to measure common physical and psychological symptoms' occurrence, frequency, severity, and distress.[24] Cheng back translated this scale to Chinese.[25] The occurrence, severity, and distress of symptoms were evaluated with 32 specific symptoms. In contrast, symptom frequency was evaluated in only 24 of these symptoms because frequency for 8 was irrelevant (e.g., hair loss).[24,25] The patients were asked to recall the symptoms as present or absent during the past seven days. If they experienced the symptoms, they were asked to rate their frequency, severity, and distress. Frequency and severity were rated using a four-point rating scale ranging from 1-slight, to 2-moderate, 3-severe, and 4-very severe). Distress was rated using a five-point rating scale ranging from 0-not at all, to 1-a little bit, 2-somewhat, 3-quite a bit, and 4-very much.[24, 25] For ease of calculation, Portenoy et al recommend converting the values on the distress scale to a range that is roughly similar to the other dimensions, specifically 0 = 0.8, 1 = 1.6, 2 = 2.4, 3 = 3.2, and 4 = 4.[24] The initial step calculates a score for each symptom.

In addition, the MSAS provides several subscale scores.[24] The PSYCH subscale score is the average of the symptom scores for six symptoms: feeling sad, worrying, feeling irritable, feeling nervous, difficulty sleeping, and having difficulty concentrating. The PHYS subscale score is the average of the symptom scores for the 12 symptoms identified as high-occurrence physical symptoms: lack of appetite, lack of energy, pain, feeling drowsy, constipation, dry mouth,

nausea, vomiting, change in taste, weight loss, feeling bloated and dizziness. The Global Distress Index (GDI) is the average of the single dimension scores for ten symptoms: the frequency scores for feeling sad, worrying, irritable, and nervous, and the distress scores for lack of appetite, lack of energy, pain, feeling drowsy, constipation and dry mouth.[24] MSAS total score is the average score of all 32 symptoms in the MSAS symptom assessment form, and the average score of each symptom is the frequency, severity, and distress of the symptoms.[24] In this present study, the internal consistency reliability of the frequency, severity, and distress dimensions of the MSAS scale were acceptable to high (Cronbach's alpha coefficients of 0.79, 0.86, and 0.88, respectively); while those of PHYS subscale, PSYCH subscale, and GDI subscale were acceptable (coefficients of 0.79, 0.78, and 0.75, respectively).

In the third part, the Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure the level of social support.[26] Chou did a back-translation on this scale to Chinese.[27] The scale consists of 12 items, divided into three subscales, i.e., support from family, friends, and significant others. Patients were requested to rate each item on a 7-point Likert-type scale ranging from 1-very strongly disagree to 7-very strongly agree. The total score of the perceived social support ranges from 12 to 84 points, with a higher average score indicating higher social support.[27] The internal consistency reliability was high with a Cronbach's alpha coefficient of 0.89 for the Chinese version. In this study the coefficient was 0.94.

The fourth part used the Appraisal of Self-Care Agency Scale-Revised (ASAS-R) scale to measure self-care behavior.[28] Guo did a back-translation of this scale to Chinese.[29] It is a 15-item scale that measures one's general and specific capabilities to engage in self-care and self-care behaviors. It has three subscales namely 1) having power for self-care (6 items, 2) developing power for self-care (5 items), and 3) lacking power for self-care (4 items).[28,29] Each item uses a 5-point Likert-type scale ranging from 1 (totally disagree) to 5 (totally agree), with summated scores ranging from 15 to 75 points where higher average scores indicating greater self-care.[28,29] The Chinese version of the ASAS-R had a high internal consistency reliability with a Cronbach's alpha coefficient of 0.89.[29] In this study, the ASAS-R scale had a Cronbach's alpha coefficient of 0.89.

Participant ethical protection

The study was approved by the Ethical Approval Committee, Burapha University, Thailand (approval number: G-HS0044/2564), and the Second Affiliated Hospital of Wenzhou Medical University in China (approval number: 2021-K-55-02). The participants were informed about the aims of the study, the involvement procedure, and the rights to participate or refuse the study. All the forms for collecting data were anonymous, and involvement in this study was not harmful to subjects. Confidentiality was maintained because no names were disclosed in the research report. Written informed consent was obtained. Should the participants feel uneased or negatively affected by the questionnaire, they could withdraw from the study at any time with no consequences on the care they received. Information from all participants was secured and presented as summary results, not individual participants.

Statistical analysis

Descriptive statistics (frequency with percentage and mean with standard deviation) were used to summarize the participants' demographic characteristics and the study variables. Pearson's product-moment correlation coefficient was used to explore the association between symptom experience and selected factors, including age, cumulative dose of oxaliplatin, self-care behavior, and social support. Point biserial correlation was used to examine the relationship between gender and symptom experience. Assumptions for statistical use were checked before the analysis, and all assumptions were met. Statistical significance was at a type I error of 5%. All statistical analyses were done using the software program SPSS 26.0.

Results

Of the 120 participants, their age ranged from 37 to 78 years, with an average of 59.6 years (*SD* = 9.78). majority of them were in their 60 - 74 years of age (58.3%), followed by middle-aged adults aged 45 - 59 (30.8%). There were more men (58.3 %) than women (41.7 %). The majority were married (98.3%). About one-third had junior high school education (37.5%), and primary school (35.8%). While most were retired (45.8%) and 41.7% still worked. It was found that 84.2% of the participants had a normal weight range, 81.7% had no comorbidities, and 53 % were diagnosed with

colorectal cancer, followed by gastric cancer (46.7 %). Moreover, 86.7% of patients had stage III GI cancer. The participants received chemotherapy in cycles 3 - 8, with an average number of cycle of 5.58 (*SD* = 1.34), while the cumulative dose of oxaliplatin ranged from 342 to 1,073 mg/m^2 (*M* = 678.72, *SD* = 170.64) (Table 1).

Table 1 Frequency, percentage, mean, and standard deviation of demographic characteristics and health information of the participants (N =120).

Characteristics	N	%
Age (years)		
37 - 44	11	9.2
45 - 59	37	30.8
60 - 74	70	58.3
75 - 78	2	1.7
M = 59.60; *SD* = 9.78; *Min* = 37; *Max* = 78		
Gender		
Male	70	58.3
Female	50	41.7
Marital status		
Single	2	1.7
Married	118	98.3
Education		
Primary school	43	35.8
Junior high school	45	37.5
High school	27	22.5
College	5	4.2
Employment status		
Employed	50	41.7
Unemployed	15	12.5
Retired	55	45.8
BMI (kg/m^2)		
Underweight (<18.5)	11	9.2
Normal weight (18.5 – 24.9)	101	84.2
Overweight (⩾ 25)	8	6.6
M = 21.5; *SD* = 2.394; *Min* = 14.8; *Max* = 28.4		
Comorbidity		
None	98	81.7
Hypertension	21	17.5
Diabetes	1	.83
Primary tumor site		
Gastric cancer	56	46.7
Colorectal cancer	64	53.3
Stage of cancer		
Stage II	16	13.3
Stage III	104	86.7
Chemotherapy cycles		
M = 5.58; *SD* = 1.34; *Min* = 3; *Max* = 8		
Cumulative dose of oxaliplatin (mg/m^2)		
M = 678.72; SD = 170.64; Min = 342; Max = 1,073		

Symptom experience

Participants reported the occurrence of symptoms from 2 to 25 with a mean of 9.8 (*SD* = 5.22). The highest occurrence was numbness/tingling in hands/feet (81.7%), followed by lack of energy (78.3%), nausea (73.3%), lack of appetite (71.7%), and change in the way food tastes (56.7%). Lack of energy had the highest frequency with an average score of 1.67 (*SD* = 1.13), followed by numbness/tingling in hands/ feet (*M* = 1.63, *SD* = 1.05), nausea (*M* = 1.53, *SD* = 1.16), lack of appetite (*M* = 1.49, *SD* = 1.22), and vomiting (*M* = 0.78, *SD* = 1.00). In terms of severity, lack of energy had the highest severity with an average score of 1.41 (*SD* = 0.96), followed by numbness/tingling in hands/ feet (*M* = 1.36, *SD* = 0.81), lack of appetite (*M* = 1.35, *SD* = 1.11), nausea (*M* = 1.33, *SD* = 1.03), and change in the way food tastes (*M* = 0.98, *SD* = 1.02). The order of distress of symptoms were lack of energy with the highest distress with an average score of 1.53 (*SD* = 0.98), followed by lack of appetite (*M* = 1.47, *SD* = 1.05), nausea (*M* = 1.47, *SD* = 1.01), numbness/tingling in hands/feet (*M* = 1.37, *SD* = 0.92), and change in the way food tastes (*M* = 1.06, *SD* = 1.04) (Table 2, Table 3).

The total frequency score of symptom occurrence ranged from 2 to 43, and the mean score was 14.17 (SD = 8.24), while the total severity score ranged from 2 to 59, and the mean score was 15.85 (*SD* = 10.24). The total distress score ranged from 0.8 to 48.4 with a mean score of 17.90 (*SD* = 11.91) (Table 3).

The total score of the MSAS-PHYS ranged from 0 to 2.31 with a mean score of 0.84 (*SD* = .51), while the total score of the MSAS-PSYCH score ranged from 0 to 2.20 with a mean score of 0.53 (*SD* = 0.61). In terms of the MSAS-GDI, the total score ranged from 0 to 1.76 with a mean score of 0.73 (*SD* = .47). The total MSAS score ranged from 0 to 1.85 with a mean score of 0.31 (*SD* = .46) (Table 3).

The social support score ranged from 32 to 80, with a mean score of 59.9 (SD = 11.1), indicating that participants' social support was slightly high. The mean score of the family subscale was 21.3 (*SD* = 4.05), showing a high level of social support as well as a significant others subscale (*M* = 21.1, *SD* = 4.01), while the friends subscale score showed a moderate level (*M* = 17.4, *SD* = 4.87) (Table 3).

For self-care, the total scores of the ASAS-R ranged from 23 to 63 (*M* = 43.97, *SD* = 7.99). Having ability for self-care had the mean score of 17.89 (*SD* = 3.78), developing power for self-care (*M* = 15.45, *SD* = 3.21), and lack power for self-care (*M* = 10.63, *SD* = 3.16) (Table 3).

Table 2 Frequency, percentage, mean, and standard division of symptom occurrence, frequency, severity, and distress among patients (*n*=120)

Symptoms	Occurrence		Frequency		Severity		Distress	
	n	(%)	Mean	SD	Mean	SD	Mean	SD
Numbness/tingling in hands/feet	98①	81.7	1.63②	1.05	1.36②	0.81	1.37③	0.92
Lack of energy	94②	78.3	1.67①	1.13	1.41①	0.96	1.53①	0.98
Nausea	88③	73.3	1.53③	1.16	1.33④	1.03	1.47②	1.05
Lack of appetite	86④	71.7	1.49④	1.22	1.35③	1.11	1.47②	1.01
Change in the way food tastes	68⑤	56.7	-	-	.98⑤	1.02	1.06④	1.04
Vomiting	56	46.7	0.78⑤	1.00	0.69	0.90	0.89⑤	1.05
Weight loss	54	45	-	-	0.72	0.94	0.75	0.91
Dizziness	45	37.5	0.58	0.87	0.48	0.69	0.61	0.85
Feeling irritable	45	37.5	0.55	0.84	0.55	0.82	0.67	0.96
Feeling drowsy	43	35.8	0.62	0.94	0.57	0.88	0.65	0.94
Worrying	43	35.8	0.59	0.91	0.66	1.00	0.73	1.08
Feeling sad	40	33.3	0.54	0.84	0.64	1.00	0.69	1.01
Dry mouth	39	32.5	0.43	0.73	0.38	0.58	0.44	0.69
Feeling bloated	39	32.5	0.48	0.79	0.43	0.71	0.55	0.84
Diarrhea	38	31.7	0.57	0.95	0.45	0.76	0.54	0.89
Difficulty sleeping	36	30	0.57	1.02	0.53	0.93	0.65	1.08
Changes in skin	36	30	-	-	0.46	0.79	0.43	0.72
Feeling nervous	33	27.5	0.48	0.86	0.49	0.90	0.57	1.01
Pain	32	26.7	0.48	0.92	0.39	0.74	0.46	0.81
Sweats	20	16.7	0.32	0.78	0.26	0.63	0.29	0.68
Constipation	20	16.7	-	-	0.27	0.68	0.32	0.75
Mouth sores	19	18.3	-	-	0.23	0.60	0.29	0.72
Difficulty concentrating	15	12.5	0.17	0.47	0.17	0.49	0.17	0.50
Problems with urination	14	11.7	0.15	0.48	0.15	0.44	0.18	0.51
Shortness of breath	13	10.8	0.21	0.67	0.17	0.52	0.21	0.64
Itching	13	10.8	0.15	0.46	0.14	0.45	0.15	0.45
Hair loss	13	10.8	-	-	0.23	0.77	0.24	0.74
Cough	10	8.3	0.10	0.35	0.10	0.35	0.11	0.39
Swelling of arms or legs	9	7.5	-	-	0.09	0.37	0.13	0.47
I don't look like myself	9	7.5	-	-	0.10	0.40	0.14	0.50
Problems with sexual interest or activity	5	4.2	0.06	0.29	0.06	0.30	0.08	0.45
Difficulty swallowing	3	2.5	0.04	0.27	0.03	0.22	0.04	0.25

Table 3 Mean scores of MSAS three dimensions, subscales, symptom numbers per patient, social support, and self-care behavior (N = 120).

Variables	Possible score	Actual score	*M*	*SD*
MSAS dimensions				
Frequency	0 - 96	2-43	14.17	8.24
Severity	0 - 128	2-59	15.85	10.24
Distress	0 - 128	.80-48.4	17.90	11.91
MSAS subscales				
MSAS-PHYS	0 - 4	0-2.31	.84	.51
MSAS-PSYCH	0 - 4	0-2.20	.53	.61
MSAS-GDI	0 - 4	0-1.76	.73	.47
TMSAS score	0-4	0-1.85	.31	.46
Number of symptoms	0 - 32	2-25	9.8	5.22
Social support	12 - 84	32-80	59.9	11.1
Self-care behavior	15 - 75	23-63	43.97	7.99

Note: MSAS-PHYS= Physical Symptom Subscale, MSAS-PSYCH= Psychological Symptom Subscale, MSAS-GDI= Global Distress Index, TMASA= Total MSAS score.

Table 4 Correlations of age, gender, cumulative dose of oxaliplatin, self-care behavior, and social support with subscales of symptom experience (N = 120).

	Symptom experience		
	MSAS-PHYS	MSAS-PSYCH	MSAS-GDI
Age	0.076	-0.059	0.005
Gender	0.31***	0.44***	0.34***
Cumulative dose of oxaliplatin	0.37**	0.43**	0.47**
Self-care behavior	-0.49**	-0.30**	-0.40**
Social support	-0.32**	-0.26**	-0.29**

Note: ** P-value < 0.01; rpbi = Point Biserial correlation (male =1, female = 2); *** = rpbi.

Table 5 Correlations of age, gender, cumulative dose of oxaliplatin, self-care behavior, and social support with three dimensions of symptom experience (N =120).

	Symptom experience		
	Frequency score	Severity score	Distress score
Age	0.064	-0.018	0.012
Gender	0.41***	0.40***	0.42***
Cumulative dose of oxaliplatin	0.44**	0.47**	0.48**
Self-care behavior	-0.55**	-0.49**	-0.43**
Social support	-0.37**	-0.37**	-0.30**

Note: ** P-value < 0.01; rpbi = Point Biserial correlation (male =1, female = 2); *** = rpbi.

Correlations of various factors with subscales of symptom experience

Gender had a moderate positive relationship with the MSAS-PHYS, MSAS-PSYCH, and MSAS-GDI (r = 0.31, 0.44, and 0.47, respectively, P-value < 0.01 for all). Cumulative dose of oxaliplatin had a moderate positive relationship with these subscales (r = 0.37, 0.43 and 0.47, respectively, P-value < 0.01 for all). Self-care behavior had a moderate negative relationship with these subscales (r = -0.49, -0.30, and -0.40, respectively, P-value < 0.01 for all). Social support had a moderate negative correlation with these subscales (r = -0.32, -0.26, and -0.29, respectively, P-value < 0.01 for all). Age had no statistically significant correlations with these subscales (r = 0.076, -0.059, and 0.005, respectively, P-value > 0.05 for all) (Table 4).

Correlations of various factors with three dimensions of symptom experience

Gender had a moderate positive relationship with symptom frequency, severity, and distress (r = 0.41, *0*.40, and 0.42, respectively, P-value < 0.01 for all). The cumulative dose of oxaliplatin had a moderate positive relationship with these three dimensions (r = 0.44, 0.47, and 0.48, respectively, P-value < 0.01 for all). Self-care behavior negatively correlated these three dimensions (r = -0.55, -0.49, and -0.43, respectively, P-value < 0.01 for all). In addition, self-care behavior had a strong relationship with symptom frequency and a moderate relationship with the other dimensions. Social support had a moderate negative correlation with symptom frequency, severity, and distress (r = -0.37, -0.37, and -0.30, respectively, P-value < 0.01 for all). Age had no statistically significant correlations with symptom frequency, severity, and distress (r = 0.064, -0.018, and 0.012, respectively, P-value > 0.05 for all) (Table 5).

Discussion and Conclusion

The results from this study suggest that post-surgery GI cancer patients who were treated with chemotherapy could experience multiple symptoms. The mean number of symptoms per individual was 9.8 (*SD* = 5.22). The result of this study is consistent with other findings on patients with GI cancer. Pettersson et al found that patients treated with chemotherapy for colorectal cancer (CRC) can experience multiple symptoms and reported a mean of 10.3 symptoms per individual.[30] In contrast, two studies found that the GI cancer patients reported a mean of 10.5 and 11 symptoms per individual, respectively.[31,32] A cancer patient may be suffering physical, psychological, social, as well as soulful in four dimensions, and each discomfort symptom needs to be seen and valued.[32]

In this study, physical symptoms were the top 5 of the occurrence, frequency, severity, and distress. The numbness/tingling in hands/feet, lack of energy, nausea, lack of appetite, and change in the way food tastes were higher and caused more severe distress to patients. These findings consist of the results of the MSAS subscales. For all participants, the highest score in the domain of MSAS-PHYS was 0.84 (*SD* = 0.51). In addition, the subscale of MSAS-GDI means score was 0.73 (*SD* = 0.47), while the lowest score in the MSAS-PSYCH was 0.53 (*SD* = 0.61). The results are consistent with the previous study. Wu (2010) studied the symptom experience in GI patients undergoing chemotherapy in China and found that the MSAS-PHYS score was the highest (*M* = 0.94, *SD* = 0.39). The mean MSAS-GDI score was 0.74 (*SD* = 0.35), MSAS-PSYCH score was 0.57 (*SD* = 0.38). However, the overall scores of the three subscales were higher than in this study. The reasons for these findings can be enumerated in terms of the different cancer stages of the participants and different BMI.

Based on the unpleasant symptom theory[11], symptoms can be influenced by physiological factors, which are those related to “normally functioning bodily systems” factors like an alteration in nutrition, including cancer stage and BMI.[33] Our study showed that the participants were at cancer stages II and III, which was lower than Wu’s study (stage II - stage IV). The literature showed that symptom experience was higher in patients with a more advanced cancer stages.[34,35]

Moreover, 84% of the participants in this study had a normal range BMI and relatively higher overall nutritional status than in the Wu study in which 60% of the participants had a below-normal BMI.[22] At a time when cancer and chemotherapy are very taxing on the body, those with a normal BMI have a relatively better nutritional status, thus patients are more capable of self-care and activity. Therefore, more attention was paid to nutritional support therapy for cancer patients in clinical practice. This will lead to the improvement of symptom management in cancer patients.

For the highest occurrence of symptom, numbness/tingling in the hands and feet was the most prevalent one (81.7%)

reported in this study, which was much higher than the previous study (64%, 52%).[22,30] Numbness/tingling is related to chemotherapy-induced peripheral neuropathy (CIPN), which interferes with several activities of patients. Acute and chronic neuropathy differ in their timing, duration, and symptomatology. Acute oxaliplatin neurotoxicity is induced by cold weather and is characterized by distal sensory symptoms such as paresthesia and dysesthesia occurring in days following oxaliplatin infusion.[36] It occurs rapidly in nearly all patients treated and is typically transient. The chronic form occurs because of the repetition of chemotherapy cycles. Neuropathy is cumulative dose-dependent and can persist for months, leading to quality-of-life deterioration.[20]

The high occurrence of numbness/tingling in the hands and feet among the participants in the current study can be explained by the time of data collection in this study. It was November and December, which was winter in China. Likewise, the mean cumulative of oxaliplatin that the participants received was 678.72 mg/m^2 (*SD* = 174.06). The literature review showed that the median cumulative dose of oxaliplatin that induced neuropathy was 432.4 mg/m^2.[20] Therefore, the occurrence of hand and foot numbness in this sample is relatively high.

Moreover, 42% of the participants in this study were employed, and the impact of hand numbness on work and the impact on fine work will cause distress to patients.[20] These findings thus support the view that patients should be informed and educated about neurotoxicity to assess early changes. It is also essential that they know how to report these changes to the healthcare personnel responsible for their care.

The TOUS explains that symptoms interact with each other, and when patients have severe numbness in their hands and feet, they tend to lack energy.[21] In addition, the participants in this study were postoperative persons with GI cancer. Therefore, postoperative reconstruction of the digestive tract affects the patient's digestive function and lead to some GI reactions. Moreover, a variety of gastrointestinal responses lead to a reduced intake of patients, which is also easy to cause a lack of energy.

This study also found that the symptoms with the highest distress scores did not have the highest occurrence rates or severity scores, which was consistent with the previous study.[30] The second most frequent symptom in our study was lack of energy (78.3%). Even though when looking at the proportion of patients scoring the symptom as present frequently or almost constantly, lack of energy was ranked the top. The same applies to the dimensions of severity and distress of lack of energy (i.e., fatigue).

Cancer-related fatigue (CRF) is a subjective experience that constitutes one of the most common and frustrating symptoms through all stages of the cancer trajectory and into survivorship.[37] It is defined as a distressing, persistent, subjective sense of physical, emotional, and cognitive tiredness or exhaustion related to cancer and cancer treatment that is not proportional to recent activity, interferes with usual functioning, and is not relieved by rest or sleep.[37] A study supported the high occurrence of lack of energy among patients with CRC undergoing chemotherapy in cycle two or cycle 3.[30] The occurrence in their study (60%) was a little lower than our findings (78.3%), which may indicate that as the course of chemotherapy increased, the patient's symptoms increased. Our results indicate the importance of informing patients about fatigue at the start of the treatment and increasing efforts to find strategies to reduce fatigue.

Regarding TOUS, symptoms are considered multidimensional, including four dimensions of intensity, distress, timing, and quality.[11] These four symptom dimensions may interact with one another.[11] An evaluation of symptom distress is critical because unrelieved distress can interfere with patients' willingness to obtain or continue treatment[30], which can impact overall survival, so evaluating a particular symptom should integrate all three dimensions of the symptom. Our findings suggest that nurses must assess multiple dimensions of symptom experience in patients with GI cancers and attempt to manage the most common, severe, and distressing symptoms.

In this study, gender had a significant positive correlation with symptom frequency, severity, and distress, as well as symptom experience subscales. According to TOUS, gender, a physiologic factor, has a reciprocal relationship with the occurrence of symptoms.[11] Female participants reported higher symptom frequency, severity, and distress scores than male counterpart. Similar findings were reported by Hua, who conducted a survey of patients with adjuvant chemotherapy after colon cancer surgery in China.[18] The total symptom frequency and severity score in female patients was significantly higher than in male patients, but there was no difference in the distress dimension. This suggests that female patients are more likely to have adverse reactions to

chemotherapy and are more inclined to report the uncomfortable symptoms of chemotherapy to medical staff.[18]

Besides that, in this study, female participants reported significantly higher scores on the MSAS-PHYS, MSAS-PSYCH, and MSAS-GDI subscales than men. The results of a survey by Wu[22] showed that the scores of those three MSAS subscales in female gastric cancer patients during chemotherapy were significantly higher than in men, which indicated that gender is one of the influencing factors for the symptom experience of gastric cancer patients. Another prospective study of changes in anxiety, depression, and problems in living during chemotherapy treatments also showed that female patients reported greater emotional, family, and physical problems than men[38], which also revealed that gender had a relationship with the MSAS-PHYS, MSAS-PSYCH.

A previous study showed that among patients with higher postoperative chemotherapy symptom distress in colon cancer, female patients were more inclined to fail to complete chemotherapy as planned.[18] As a result, nurses should pay more attention to female patients with postoperative adjuvant chemotherapy for GI cancer, have foresight on the occurrence of physical and psychological symptoms and multidimensional evaluation of symptoms, intervene early, and improve the completion rate of chemotherapy.

The results showed that the cumulative dose of oxaliplatin positively correlated with symptom experience. The participants in this study received 3 - 8 cycles of oxaliplatin combined with capecitabine. The mean cumulative dose of oxaliplatin that the participants received was 678.72 mg/m^2 (*SD* = 170.64). One of the most critical limits of oxaliplatin treatment is its peripheral neurotoxicity. Neuropathy is cumulative dose-dependent and can persist for months, leading to quality-of-life deterioration.[20] As the cumulative dose of chemotherapy increases, the cumulative toxic effects of chemotherapy drugs on the body increase[20], and the level of symptoms experienced by the patient increases.[22]

The present study showed that cumulative dose of chemotherapy had a significant positive correlation with all symptom experience subscales. This could be because, in this study, the average hospitalization time of patients undergoing chemotherapy was 1 - 3 days, and the average cycle of chemotherapy was 21 days. Because of cyclical reasons, chemotherapy patients need to spend not only the cost but also time as well as the companionship of caregivers. This situation may have a psychological impact on cancer patients. Based on TOUS, it is acknowledged that physiological (e.g., cumulative dose of chemotherapy), psychological (e.g., mood state), and situational factors (e.g., frequent medical visits) are interrelated and may interact to influence symptom experience.[15]

In addition, 41.7% of the participants in this study still worked and needed to take time off to go to the hospital during chemotherapy. As the chemotherapy course increased, the number of visits to the hospital increased, so the physical and psychological burden of the patients increased, which made them more distress.[18] Furthermore, 58.3% of the participants were younger elderly. When they go to the hospital to receive chemotherapy, they might need the guidance of their family members. With the increase in chemotherapy courses, they will feel more guilty to their family members, and their psychological burden will increase.

According to the TOUS, physiologic factors (age) and situational factors (self-care behavior) relate to one another.[11] A previous study found that with the increase in age, there was a decline in both abilities for self-care and functional independence.[28] Some self-care behaviors may be intuitive, such as resting when fatigued. However, nurses may teach more complex and systematic self-care behaviors to help patients cope with the anticipated effects of chemotherapy treatment.[28] Therefore, young people are more capable of receiving knowledge than older people and have higher levels of self-care behavior.

In this study, self-care behavior had a negative significant correlation with each dimension of symptom experience (frequency, severity & distress) and all three subscales of symptom experience. The TOUS also indicates that situational factors (self-care behavior) may interact to influence the symptoms.[11] Previous research supports the result of this study; Akin and Kas Guner reported that self-care behaviors may positively impact performing cognitive and behavioral fatigue management strategies in GI cancer patients to reduce fatigue.[34]

The present study showed that self-care behavior negatively correlated with physical and psychological symptom subscale and global distress index. A previous study demonstrated that self-care behavior was positively correlated with self-efficacy. This indicates that individuals need to believe that they can put self-care activities into practice to exert sufficient effort and perform self-care behavior.[17] Based

on literature review, self-efficacy is negatively correlated with symptom distress of cancer patients undergoing chemotherapy.[34,39-41]

In this study, social support negatively correlated with symptom experience. Based on the TOUS, situational factors can influence how an individual interprets or deals with symptoms. This result is consistent with a previous study, which showed that patients with less social support tend to have more difficulty controlling postoperative physical symptoms in each dimension.[42] Moreover, another study suggested that perceived social support affects a cancer patient's psychological condition, and it has been widely recognized that there is a relationship between a low level of perceived emotional support and a high level of depression.[43] This result shows that social support plays an important role in alleviating the symptoms experienced by GI cancer patients undergoing chemotherapy.

Findings indicated that age did not correlate with symptom experience. From the literature review, the relationship between age and symptom experience among postoperative GI cancer patients undergoing chemotherapy remains unclear. Some study findings suggest that younger patients with cancer undergoing chemotherapy experienced more significant symptomatic distress than older adults.[13,31] Other study findings show either no association[14,22] or a positive association between age and symptom distress.[12]

In this study, the population of younger elderly aged 60 - 74 were found the most, accounting for 58.3%. In addition, age has a two-sided effect on symptoms. First, older people's memory, adaptability, and physical fitness are not as good as young people's.[22] Second, they have less access to disease-related health knowledge than young people.[18] Elderly participants' ability to learn and accept ways to relieve symptoms is not as good as younger people's. However, they might forget some light symptoms that they experienced one week ago because of poor memory.

On the other hand, young people are in their golden years of work and study, and sudden diagnosis of cancer and treatment causes psychological and financial distress to young patients.[22] Young people have a higher quality of life demands than older people and are more likely to express discomfort to medical personnel. Therefore, chemotherapy can cause unpleasant symptoms at any age.

The findings confirmed the high symptom burden experienced by GI cancer patients receiving chemotherapy and identified differences in symptoms by occurrence, frequency, severity, and distress. Self-care behavior and social support are important factors related to decreased symptom experience, while women and cumulative doses of oxaliplatin are important risk factors for increased symptom experience. These factors can help nurses identify GI cancer patients with an increased need for early, aggressive symptom management. The study establishes a theoretical foundation for clinical staff to manage patients' symptoms, but it has certain limitations. It focused solely on inpatients in a specific hospital, which may limit its generalizability. In future research, expanding the sample size and conducting longitudinal studies to track changes in symptoms over time could provide a more comprehensive understanding. Symptom clusters can also be studied based on this in the future.

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