

Effects of Fatigue, Rumination Thinking and Sleep Quality on the Hopelessness of Advanced Tumour Patients' Family Caregiver

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Research Article

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Abstract

Objectives: To explore the relationship between fatigue, rumination, sleep quality and hopelessness in family caregivers of patients with malignant tumor, and to provide theoretical basis for maintaining their physical and mental health.

Methods: Caregivers of malignant tumor patients who met the inclusion criteria in three Grade-A hospitals in Liaoning Province were investigated with Beck hopelessness scale (BHS), fatigue Scale-14 (FS-14), Nolen-Hoeksema ruminative responses scale (RRS) and Pittsburgh sleep quality index (PSQI), SPSS 26.0 was used to analyze the data, and Amos 22.0 was used to fit the structural equation model.

Result: The main caregivers of patients with malignant tumor had a higher degree of hopelessness, and fatigue, sleep quality and rumination were positively correlated with the sense of hopelessness ($r = 0.483-0.906$; $r = 0$; $P < 0.05$); Fatigue and sleep quality can indirectly affect hopelessness through rumination thinking, and hopelessness has a direct effect on sleep.

Conclusion: There are multiple action paths between fatigue and sleep quality, rumination thinking and hopelessness, which can maintain their physical and mental health and avoid hopelessness by improving their sleep quality, alleviating their fatigue and psychological counseling.

1 Introduce

Over the past decade, the incidence rate and mortality rate of malignant tumours in China have been increasing[1]. Malignant tumor is not only long course and poor prognosis, but also brings a heavy financial burden to general families. Therefore, the diagnosis and treatment of malignant tumours will not only make patients feel miserable, but also bring enormous physical and psychological pressure to their family caregivers[2]. When these pressures cannot be effectively relieved, negative emotions will gradually accumulate, causing individuals to lose hope for life and even produce a sense of hopelessness. It makes people lose hope for life and even have a sense of hopelessness[3]. Hopelessness means that people lose interest in their own social environment, their own life, the people and things around them, hold a state of loss of confidence in anything, feel powerless about anything, and feel that they live in such away. Hopelessness is defined as a very serious psychological disease. The generation of hopelessness will not only weaken the ability of family caregivers of malignant tumour patients to care for patients, but also reduce their own quality of life, but also have adverse effects, such as auditory hallucinations, mental sensitivity or some physical symptoms, It will continue until the patient terminates treatment or a long time after the patient dies. In severe cases, it will lead to self-injury and suicide of family caregivers of patients with malignant tumours [4]. The sense of hopelessness will also lead to the decline of individuals' ability to control their emotions. They will become irritable, sensitive and suspicious. They are more likely to conflict with the people around them, which will lead to the breakdown of their family relations, and sometimes they will have conflicts with nurses or doctors[5].

Experts and scholars are drawing attention to the importance of maintaining the physical and mental health of caregivers of patients with malignant tumours. Some studies have found the family caregivers of patients with malignant tumours have poor sleep quality, and they often feel physically and mentally fatigued[6]. Some research results show that caregivers of patients with malignant tumours have high levels of rumination thinking[7]. Rumination thinking refers to the process of passively indulging in some negative thoughts and aggravating heavy negative emotions. Some studies have found that, Relatives and/or caregivers of seriously ill patients have serious rumination, and they will repeatedly fall into meaningless thinking, such as "why my family is so unfortunate", which will lead to anxiety and depression[8]. In addition, long-term rumination thinking is closely related to the occurrence of some mental diseases[9], some studies have found that rumination thinking can reduce sleep quality; Many researches have proved that rumination thinking, fatigue and the decline of sleep quality are the risk factors of hopelessness[10,11].

In order to clarify the causes of hopelessness of caregivers of malignant tumour patients, we investigated the current situation of hopelessness and fatigue, rumination thinking and sleep quality of family caregivers of malignant tumor patients by issuing questionnaires, studied the relationship between them, and explored the internal action path between them. Aim to provide the theoretical basis for preventing and reducing the hopelessness of family caregivers of patients with malignant tumours, maintaining their physical and mental health and improving their quality of life.

2 Materials And Methods

2.1. Study design and participants

Using the convenient sampling method, family caregivers of malignant tumor patients were selected from the Department of oncology of three first-class hospitals in Liaoning Province From 1 June 2021 to 1 March 2022. The inclusion and exclusion criteria were as follows: inclusion criteria ≥ 18 years old; \square Served as the main caregiver of patients diagnosed with a certain malignant tumor by pathology; \square Take care of the patient's daily life, participate in the diagnosis and treatment activities when the patient is hospitalized, and the care time is ≥ 1 month; \square The caregiver has no tumor, cardiovascular and cerebrovascular disease or other major diseases; \square Be aware, have certain expression and reading ability, and be able to fill in the questionnaire; \square Sign the informed consent form for this study. Exclusion criteria: \square major negative life events in recent years; \square nannies or nursing workers employed for salary; \square mental history or other mental diseases.

2.2 sample size calculation

The number of subjects included in the study was roughly estimated by using the method of 10 times of the highest items of the scale. The scale with the most items in this study had 22 items, and the general data questionnaire included 8 items. Considering 15% invalid questionnaires, at least 353 caregivers need to be investigated. A total of 537 subjects were investigated in this study.

2.3. Measurements

2.3.1 General demographic characteristics questionnaire

A thorough literature review was conducted, after which the team designed the questionnaire. Eight socio-demographic items were: age, gender, education level, marital status, occupation, family income, relationship with patients, duration of illness (from the date of diagnosis).

2.3.2 Beck Hopelessness Scale (BHS)

The scale was compiled by American psychologist Aaron T. Beck in 1959. It is used to evaluate the subjects' negative emotions or suicidal ideas about future life. The scale includes three factors: feelings about the future (7 items), loss of motivation (8 items) and expectations for the future (5 items). The total score ranges from 0 to 20. According to the total score, it is divided into four levels: 0 ~ 3 as normal, 4 ~ 8 as mild hopelessness, 9 ~ 14 as moderate hopelessness and 15 ~ 20 as severe hopelessness[4]. The higher the score, the higher the sense of hopelessness. In this study, the total amount of this scale is Cronbach's α value was 0.85.

2.3.3 Nolen- Hoeksema Ruminative Responses Scale, RRS

The scale was developed by Nolen Hoeksema in 1991 and was originally used to evaluate the response style of depressed individuals. There are 22 items in the revised scale, and each item is scored by Likert 4. The higher the score, the higher the ruminant thinking level of the individual. [12] translated the scale into Chinese. The ruminant thinking response scale after Sinicization includes three dimensions and 22 items: symptomatic rumination, forced thinking and reflective thinking. In this study, the total scale Cronbach's α value was 0.90, and each dimension was 0.85, 0.72 and 0.68 respectively.

2.3.4 Fatigue Scale-14, FS-14

This scale was compiled by trndie Chalder of the Department of psychological medicine, Kings College Hospital, UK in 1992[13]. It consists of 14 items. Answer "yes" or "no" according to whether its content is consistent with the actual situation of the subjects. The scale consists of two dimensions: physical fatigue (8 items) and mental fatigue (6 items). The answer of "yes" or "no" to each question is recorded as "0" or "1" according to the positive and negative scores. The total score ranges from 0 to 14. The higher the score, the more serious the fatigue is. In this study, the total scale Cronbach's α value was 0.86.

2.3.5 Pittsburgh sleep quality index, PSQI

This scale was compiled by Buysse DJ, a sleep expert in the sleep and biological rhythm research center of the psychiatric department of the University of Pittsburgh Medical Center in 1993[14], and was used to evaluate the subjective sleep quality of subjects in the last month. The reliability and validity of this scale have been tested by Liu Xianchen. The scale is composed of 19 self-evaluation and 5 other evaluation items, of which 18 items form 7 factors. Each factor is scored according to the grade of 0-3. The

cumulative score of each factor component is the total score, ranging from 0-21. The higher the score, the worse the sleep quality. In this study, the total scale Cronbach's α value was 0.71.

2.4. Data analysis

Input the original data into EpiData 3.1 and use SPSS 26.0 for data analysis: the measurement data is described by $\pm s$ and the correlation between factors is analyzed by Pearson correlation. Path analysis was performed using Amos 22.0. Inspection level α was 0.05.

2.5. Ethical considerations

Participants were informed of the purpose and methods of the study, risks and benefits of participation, confidentiality of their data and the voluntary nature of participation. Written informed consent was obtained before the interviews for item development and refinement study. The return of the filled anonymous questionnaire was taken as consent to participate in the main study. The study protocol was approved by the Ethics Committee of the First Affiliated Hospital of Jinzhou Medical University (KYLL202127).

3 Results

3.1. Baseline characteristics of family caregivers

A total of 536 caregivers were investigated, There were 306 males (57.09%) and 230 females (42.91%); the age range was 24 ~ 69, with an average age of 50.30 ± 7.99 years; the time range of caring for patients was 1 ~ 5 years, with an average length of care of 3.01 ± 0.962 years; the relationship with patients was mainly 418 spouses (77.99%), 28 children (5.22%), 14 parents (2.61%), 32 brothers and sisters (5.97%) and 44 other relatives (8.21%) ,Table 1 for the basic information of the research objects

Table 1 basic information of research objects

Variables	Number	Rate
Gender		
male	306	57.09%
female	230	42.91%
Occupation		
civil servant	82	15.30%
technician	228	42.54%
businessman	134	25.00%
farmer	28	5.22%
unemployed	64	11.94%
Marital status		
In marriage	501	93.47%
single	5	0.93%
divorce	22	4.10%
Widowed	8	1.49%
Educational background		
Primary School Education	35	6.53%
Junior high school education	271	50.56%
High school / technical secondary school	125	23.32%
University/college education	85	15.86%
Graduate education or above	20	3.73%
Relationship with patients		
children	28	5.22%
parent	14	2.61%
spouse	418	77.99%
brothers and sisters	44	8.21%
Other relatives	32	5.97%
Monthly Income		
<5000	368	68.66%

5001-8000	125	23.32%
8001-10000	38	7.09%
>10000	5	0.93%

3.2 Current situation of fatigue, rumination thinking, sleep quality and hopelessness of family caregivers

3.2.1 Fatigue status of patients with malignant tumors

The total fatigue score of 536 respondents was 10.20 ± 2.50 , the score range was 3-14, the average score of physical fatigue dimension was 6.09 ± 0.97 , and 455 (84.89%) participants were "do you feel physical strength is not enough?" "Yes" is selected on this issue; The average score of mental fatigue dimension was 4.11 ± 1.56 ; In the dimension of mental fatigue, 532 people, 99.25% chose "yes" on the question "do you have difficulty concentrating"; 504 caregivers (94.03%) had a total fatigue score of more than 7.

3.2.2 Rumination thinking

The total score of rumination thinking was 43.42 ± 5.89 , and the score range was 26-61 points. The total score of depression factor was 24.98 ± 3.66 , and the score of numbness to other things was the highest, 3.19 ± 0.54 ; The total score of forced meditation factor was 9.73 ± 1.59 , and the highest score was 2.88 ± 0.45 ; The total score of reflection factor is 8.94 ± 1.51 , among which the score of "I often think alone about why it is like this" is the highest, 1.97 ± 0.27 . 73.69% of the caregivers (395 / 536) had a higher total score of rumination thinking than the average.

3.2.3 Sleep quality

The total sleep score was 8.35 ± 1.59 , with a score range of 4-15. 6.7% (36 / 536) of the caregivers had poor sleep quality; the average sleep time of 5.7% (31 / 536) of the caregivers was 19.66 ± 2.12 min, and 11.00% of the caregivers had difficulty falling asleep < 1 week/time. The total sleep quality score and each factor score are shown in Table 2.

3.2.4 Hopelessness

The results of the baker's despair scale showed that 41.42% (222 / 536) of family caregivers had a total despair score above 10. The total despair score and average scores of each dimension are shown in Table 2.

Table 2 fatigue, rumination, sleep status and hopelessness of caregivers of cancer patients

variable	($\bar{x}\pm s$)	Score range	variable	($\bar{x}\pm s$)	Score range
FS-14			PSQI		
physical fatigue	6.09±0.97	3-8	sleep quality	1.07±0.25	0-2
mental fatigue	4.11±1.56	0-6	sleep latency	1.06±0.23	1-2
Total score	10.20±2.50	3-14	sleep time	1.07±0.28	0-3
RRS			sleep efficiency	1.08±0.31	0-3
Depression	24.98±3.66	15-33	sleep disturbance	1.05±0.24	0-3
Forced meditation	9.73±1.59	6-13	Sleeping drugs	1.98±0.47	1-3
Reflection factor	8.94±1.51	5-12	daytime sleep disorders	1.05±0.23	0-3
Total score	43.42±5.89	26-61	Total score	8.35±1.59	4-15
BHS					
Feelings about the future	4.00±1.61	0-7			
Loss of motivation	5.18±2.69	0-8			
Expectations for the future	1.29±1.42	0-5			
Total score	10.47±5.32	1-20			

3.3 correlation analysis of caregivers' fatigue, rumination thinking, sleep quality and hopelessness in patients with malignant tumors

Pearson correlation analysis showed that there was a positive correlation between the total scores of RRS, fs-14, PSQI and BHS ($r = 0.483 \sim 0.906$, $P < 0.01$). The correlation analysis between fatigue, rumination thinking, sleep status and hopelessness of family caregivers of cancer patients is shown in Table 3.

Table 3 Correlation Analysis of fatigue, rumination, sleep status and hopelessness of caregivers of cancer patients

	RRS	FS-14	PSQI	BHS
RRS	1			
FS-14	0.906**	1		
PSQI	0.619**	0.503**	1	
BHS	0.903**	0.841**	0.483**	1

*"P<0.05"***"P<0.01

2.4 path analysis of caregivers' fatigue, rumination thinking, sleep quality and hopelessness in patients with malignant tumors

By consulting relevant literature and data, it is found that there are the following action pathways among caregivers' fatigue, rumination thinkingn, sleep quality and hopelessness of patients with malignant tumors: fatigue → rumination thinkingn; sleep → rumination thinkingn; Fatigue → rumination thinkingn → hopelessness sleep → rumination thinkingn → hopelessness hopelessness → sleep. The structural equation model of caregivers' fatigue, rumination thinkingn, sleep quality and hopelessness in patients with malignant tumors is shown in Figure 1; The results of each direct path effect are shown in Table 4; The goodness of fit of the model is shown in Table 5.

Table 4 Direct path coefficients and significance test of fatigue, sleep quality, rumination and hopelessness of caregivers of patients with malignant tumor

<i>Path</i>	<i>Estimated value</i>	<i>SE</i>	<i>Critical value</i>	<i>P</i>
<i>fatigue→sleep quality</i>	0.941	0.197	4.783	0.000
<i>fatigue→rumination thinking</i>	0.865	0.049	17.492	0.000
<i>sleep quality→rumination thinking</i>	0.738	0.076	9.683	0.000
<i>rumination thinking→hopelessness</i>	0.870	0.020	44.070	0.000
<i>hopelessness→sleep quality</i>	-0.567	0.188	-3.023	0.018

Table 5 Model fitting index of fatigue, sleep quality, rumination and hopelessness of caregivers of patients with malignant tumor

<i>Indexes</i>	χ^2/df	<i>P</i>	<i>GFI</i>	<i>IFI</i>	<i>TLI</i>	<i>CFI</i>	<i>RMSEA</i>
<i>Fitting index</i>	0.137	0.712	1.000	1.001	1.003	1.000	0.000
<i>Evaluation criterion</i>	≤3	<0.05	>0.90	>0.90	>0.90	>0.90	<0.10

4 Discussion

3.1 The family caregivers have a high level of hopelessness

In this study, the Beck Hopelessness Scale score of caregivers of malignant tumor patients is (10.47 ± 5.32), which is consistent with the research results of previous studies (Hassankhani, H et al,2020)[15], indicating that the hopelessness level of caregivers of malignant tumor patients is high, and the scores of fatigue-14 scale, Rumination thinking Scale and PSQI are significant higher than those of normal people in China (Xianchen, L et al,1996;Yuzhen, L et al,2016)[16,17].It shows that the family caregivers of malignant tumor patients have serious physical and mental health problems, which may be related to the physical and mental health of caregivers. Caregivers of malignant tumor patients often ignore their own health problems; Other family members and medical staff of patients with malignant tumors often only pay attention to the diagnosis and treatment of patients, nurses ignore the physical and mental health level of caregivers, and there is little research on the physical and mental health of caregivers of patients with chronic diseases, resulting in the lack of relevant knowledge of maintaining physical and mental health of caregivers of patients with malignant tumors. The long-term lack of sleep and excessive physical and mental load of caregivers will not only cause diseases, but also lead to other more serious consequences. Therefore, timely and effective intervention must be carried out to maintain the quality of life of caregivers, so as to ensure their normal functions of caregivers.

3.2 Rumination thinking can directly lead to hopelessness

According to the correlation test and model results, it is found that rumination thinking can directly lead to hopelessness.It can be considered a great mental attack on a person when a relative is diagnosed with a malignant tumour, and this is regarded as a negative life event.The generation of negative life events will make them more depressed,, repeatedly think about the reasons for their plight, fall into sadness and depression, and aggravate rumination thinking. Nolen Hoeksema, the founder of the theory, pointed out, rumination thinkingn can directly lead to depression; The theory of depression proposed by Abramson, Metalsky and Alloy in 1989 holds that when negative events occur, Some person with cognitive susceptibility to depression ☐ attribute it to their own incompetence or defects ☐ No effort can avoid disappointing results or achieve their expected effects ☐ Attribute the occurrence of negative events to universal and lasting reasons. This directly leads to a sense of hopelessness.

3.3 Fatigue directly affects sleep quality and rumination thinking

In the model formed in this study, fatigue can directly affect sleep quality. The research object of this survey is the caregivers of patients with malignant tumors. Caregivers need to help patients complete various examinations in the hospital and cooperate with doctors and nurses to treat patients. At home, they need to take care of the daily life of patients and observe the situation of patients at any time, In our study, 88.09% of caregivers have jobs, such as civil servants, employees of enterprises and institutions and self-employed persons. In addition to facing heavy work, they also need to deal with their relationships with leaders, colleagues, customers and other social relationships. When they return home,

they need to assume the roles of parents, children and spouses, and bear corresponding responsibilities and obligations, Long term overload work causes them to lose their physical and mental strength, resulting in them often feeling exhausted. If this sense of fatigue is not effectively alleviated, it is easy to lead to organic and functional diseases, such as lumbar muscle strain, lumbar disc herniation or heart failure, as well as low fever, sore throat and other symptoms due to the decline of immunity.

3.4 Sleep quality can directly affected rumination thinking

This survey found that all caregivers use sleeping drugs, and 99.99% of caregivers have less than 7h of effective sleep time. Sleep is a very important physiological activity. It is a regulatory mechanism for nerve cells in the cerebral cortex to protect nerve cells and re excite them for normal physiological activities after continuous excitation. Some basic studies have proved that rumination thinking is related to the excessive inhibition of thinking produced by the medial temporal lobe in the two brain regions of the midline of the brain - the medial prefrontal lobe and the posterior cingulate gyrus. Lack of sleep will aggravate this inhibition. A large number of empirical studies show that lack of sleep will reduce people's attention and memory, emotional instability and lack of patience, which can directly lead to their mistakes or conflicts with others in the process of daily life, work and taking care of patients, resulting in negative life events. This vicious circle will make people feel like "bad luck" and worsened the rumination thinking.

3.5 Hopelessness can affect sleep quality

Hopelessness can lead to the decline of sleep quality. The sense of hopelessness is composed of the sense of inferiority, the sense of decreased ability and the sense of gloomy. It belongs to a serious negative emotion, studies have confirmed that long-term exposure to a certain negative emotion will lead to autonomic nerve dysfunction and sleep disorder characterized by rapid eye movement sleep behavior disorder(Tanaka, M,et al,2015)[18].

5 Conclusion

Research on the physical and mental health of caregivers of patients with chronic diseases is still rare in China, and the physical and mental health of caregivers has not received due attention. We should not ignore the physical and mental health among family caregivers of advanced tumor patients in the context of advocating for universal health. Screening for physical and mental disorders should be encouraged to assess whether they need counselling and treatment. According to the related predictive factors, medical providers should pay more attention to emotional change, somatic function and sleep qualities to reduce levels of negative emotion and physical fatigue among family caregivers, not only can effectively prevent them from feeling desperate, maintain their physical and mental health and quality of life, and can also help them to improve the ability to deal with death.

Clinical implications

This study has several potential clinical implications. The results of this study show that the physical and mental health status of family caregivers of cancer patients is worrying. Family caregivers often focus on taking care of patients without realizing the importance of their own health. However, we must realize that if caregivers are in sub-health status, they can not bear the burden of caring for patients, nor can they play other social roles well. Once they get sick, they will increase family medical expenditure, just like one disaster after another. Hence we should emphasize in health propaganda that caregivers should pay attention to their own physical and mental health. People who take care of patients with the malignant tumor for a long time can reduce mental fatigue, eliminate tension, depression and other negative emotions by listening to music and mindfulness meditation, and relax for a period of time when necessary. In terms of improving sleep, caregivers try to get enough sleep, stick to a regular, healthy sleep schedule, learn to pour out grief and adjust to their losses; Avoid strenuous exercise before sleep. Try to eat foods that help sleep, such as warm milk, bananas, oats and almonds; But avoid forced sleep and abuse drugs. If necessary, see a psychiatrist for professional help.

There are multiple action paths among caregivers' fatigue, sleep quality, rumination thinking and hopelessness, which can help us effectively identify and predict caregivers' hopelessness, and further implement targeted measures to maintain their physical and mental health. Nurses can make assessments when they have communication with family caregivers. If the caregiver is found to have insufficient sleep and complains that often feels tired and can not be effectively relieved, the nurse can suggest them to appropriately carry out jogging, yoga, Tai Chi (Huang, J, et al,2021)[19], meditation or progressive muscle relaxation exercises to relax their muscle and minimize the use of hypnotic drugs, Introduce them to some food or vitamins that help sleep. In this study, we can find that for caregivers who have developed a sense of despair, adequate and high-quality sleep is an effective way to prevent their further aggravation of despair, Hence caregivers with excessive mental tension and ruminating thinking, nurses should advise them to seek the help of psychologists or psychiatrists.

Declarations

Funding

No funding was obtained for this study.

Conflicts of interest

The authors declare that they have no competing interests.

Code availability

Not applicable

Authors' contributions

Zhaoming Cao: Conceptualization, Data curation, Formal analysis, Investigation, Writing – original draft. Yingchun Wang: Investigation, Formal analysis, Visualization. Yingchun Wang: Investigation, Methodology, Software. Huijun Zhang: Project administration, Supervision, Writing – review & editing.

Ethical approval

Participants were informed of the purpose and methods of the study, risks and benefits of participation, confidentiality of their data and the voluntary nature of participation. Written informed consent was obtained before the interviews for item development and refinement study. The return of the filled anonymous questionnaire was taken as consent to participate in the main study. The study protocol was approved by the Ethics Committee of the First Affiliated Hospital of Jinzhou Medical University (KYLL202127).

Declaration of Competing Interest

The authors declare no conflict of interest.

Consent to participate

All interviewees signed an informed consent form

Consent for publication

No personal information of the interviewees was disclosed in this study

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Figures

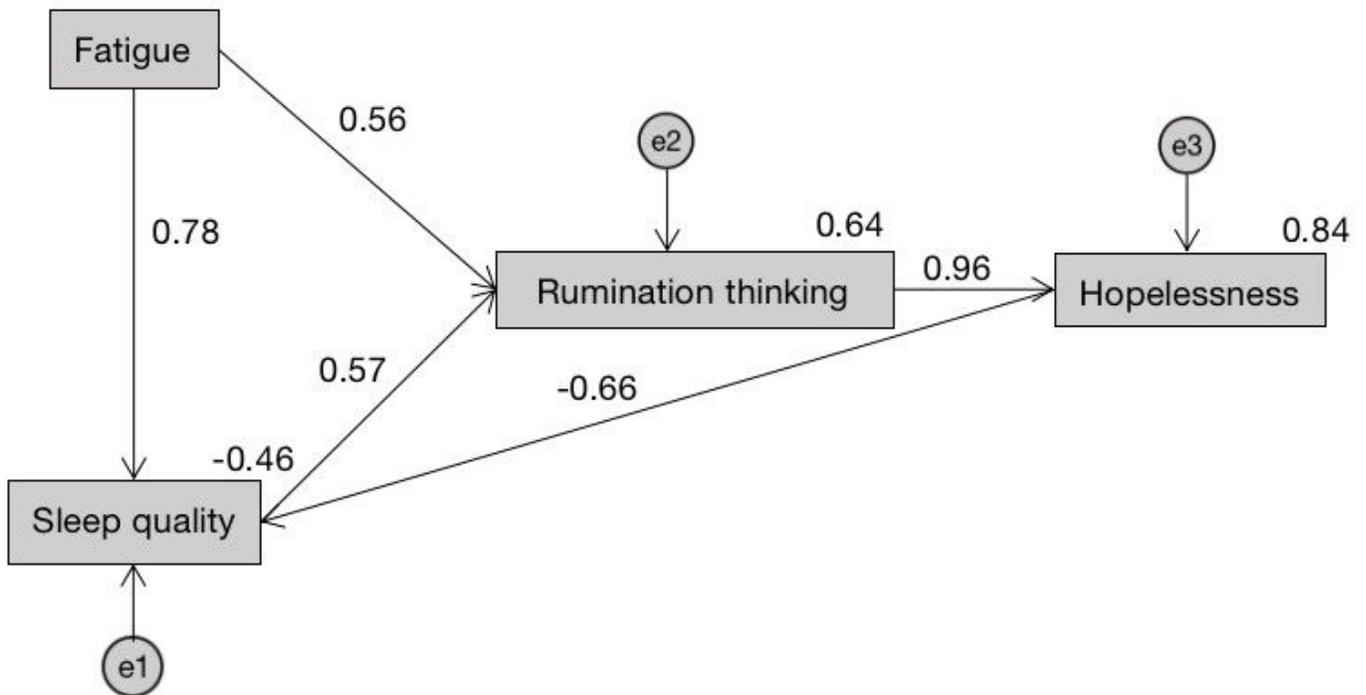


Figure 1

The structural model of fatigue, sleep quality, rumination and hopelessness among caregivers of cancer patients