Original Article

Factors Influencing the Quality of Life of Family Caregivers of Stroke Patients: A Cross-Sectional Survey

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Purpose: This study aimed to explore the quality of life of family caregivers of stroke patients and investigate how resilience, uncertainty, caregiving appraisal, and patients' cognitive and functional status affect caregivers' quality of life. **Methods:** This descriptive cross-sectional study was conducted between October 2018 and November 2020. In total, 199 family caregivers completed self-reported questionnaires, while their family members who had been diagnosed with stroke within the past 6 months underwent nurse-assisted assessments. The data collected were analyzed using descriptive statistics, comparative analysis, and multiple regression analysis. **Results:** Most caregivers were female (82.4%) who provided care to stroke patients in the first 6 months after their diagnosis (mean duration: 65.11±34.50 days). More than half of the patients exhibited mild cognitive impairment (63.8%) and varying degrees of functional dependence (67.3%). Family caregiver's quality of life was significantly associated with the functional dependence of the patient (β=.56), the duration since diagnosis (β=.16), support from other family members (β=-.25), the caregiver's gender (β=.13), religious affiliation (β=-.19), employment status (β=.14), and caregiving appraisal (β=-.18). These variables explained approximately 61% of the variance in family caregivers' quality of life. **Conclusion:** The findings show a decline in the quality of life of family caregivers in the first 6 months after patients had a stroke for the first time. They also emphasize the importance of considering negative caregiving appraisal, patient's functional dependence, and limited support for caregivers in future intervention research aimed at enhancing caregivers' quality of life.

Key Words: Activities of daily living; Caregivers; Family; Quality of life; Stroke

This article is a condensed form of the first author's master's thesis from Chungnam National University.

INTRODUCTION

1. Background

A stroke is a neurological condition characterized by damage to a specific area of the brain because of the blockage or rupture of a blood vessel supplying blood to the brain [1]. It has been identified as a significant contributor to mortality and disability in South Korea. Notably, it accounts for the highest rates of single-disease deaths. A multicenter prospective cohort study conducted in Korea found that the 5-year survival rate after stroke is 74.8%, but 23.8~38.6% of these stroke survivors experience residual disability related to motor function, cognitive function, language, and mobility [1]. These disabilities can cause financial burdens and affect the daily functioning and quality of life of both patients and their families [2].

The occurrence of a stroke is often perceived as a sudden and unpredictable event by the family members of stroke patients [3]. Family caregivers find themselves performing unexpected roles and assuming responsibilities, leading to feelings of confusion, frustration, and burden [4]. The first six months after a stroke pose significant challenges for family caregivers. They grapple with high levels of uncertainty regarding their caregiving duties and the difficulties in adapting to their new role [5,6]. If these challenges are not addressed timely and appropriately, they can bring physical, psychological, and social difficulties, potentially reducing the caregiver's overall quality of life.

Family caregivers' quality of life can be influenced by various factors, such as resilience, perceived uncertainty, and caregiving appraisal [7-9]. Resilience is one's capability to effectively manage and overcome adversity and challenges, thus bringing stability to one's life. It involves expanding one's cognitive and emotional resources and utilizing appropriate coping mechanisms [7]. Although there has been limited research on the impact of resilience on the quality of life of the family caregivers of stroke patients, studies have demonstrated that resilience can mediate the relationship between caregiving burden and depressive symptoms [8]. They have also shown that resilience influences the acquisition of new caregiving skills and the provision of care aligning with the patient's needs while enabling caregivers to effectively manage their needs and balancing them with the patient's needs [9].

Uncertainty is a cognitive state that arises when individuals encounter difficulties in interpreting the cues in a given situation. It is primarily influenced by factors such as situational ambiguity, the complexity of the information available, and the lack of relevant information [10]. In the context of a stroke, the prolonged presence of multi-functional disability and limited understanding of the etiology and prognoses can cause significant uncertainty. This uncertainty exerts a detrimental impact on both patients and their family caregivers. It impedes their capability to fulfill their responsibilities and reduces their hope throughout the caregiving journey [11]. The six months after a stroke is diagnosed is characterized by a plethora of transition care and adaptation needs. However, comprehensive evidence about the experiences of family caregivers of stroke patients during this crucial period remains scant, particularly in the context of non-western societies. Thus, it becomes imperative to collect relevant data and shed light on the challenges family caregivers of stroke patients face during this period.

Caregiving appraisal is a comprehensive process through which family caregivers evaluate their experiences and perceptions concerning their caregiving roles. It involves assessing factors such as burden, satisfaction, competence, impact, and demands [12]. The appraisal of caregiving experiences is influenced by the caregiver's relationship with the care recipient, the caregiver's characteristics, and the available support [13]. Research has demonstrated that caregivers who appraise their caregiving experiences more negatively tend to experience lower levels of physical and psychological well-being [14,15]. This negative appraisal can mediate the relationship between personal characteristics, such as education and perceived health status, and quality of life among family caregivers of first-time stroke patients discharged within a year [16]. This mediating role can be attributed to the physical and mental strain that arises from assuming new caregiving responsibilities.

After a stroke patient is discharged from the hospital, their cognitive and functional disability directly affects the quality of life of their family caregivers [2]. More specifically, family caregivers who provide care to patients with cognitive impairment tend to have a lower quality of life than those providing care to patients with preserved cognitive function [16]. It has also been found that the level of functional dependence exhibited by stroke patients in their daily activities affects the quality of life of their family caregivers [6]. Further, as patients' cognitive and functional impairments worsen, caregivers face increasing demands to address patients' unmet needs and adapt to the changes in their lives, which reduces caregivers' quality of life [2,17].

Considering the patient's cognitive and functional status, as well as resilience, uncertainty, and caregiving appraisal, it can be hypothesized that the quality of life of family caregivers is significantly impacted in the first six

months of caring for first-time stroke patients. Some factors concerning their quality of life have been identified. However, there is a need for a comprehensive evaluation of such factors. Therefore, this study comprehensively explores the quality of life of family caregivers of stroke patients and provides valuable insight into enhancing it.

2. Aims

This study aimed to explore the quality of life of family caregivers of stroke patients and examine how the cognitive and functional status of patients, resilience, uncertainty, and caregiving appraisal affect their quality of life. More specifically, it aimed to 1) describe the sociodemographic characteristics of stroke patients and their family caregivers, 2) examine the differences in caregivers' quality of life based on their sociodemographic characteristics, 3) identify the relationship between caregivers' quality of life and the continuous variables of resilience, uncertainty, and caregiving appraisal, and 4) determine the factors associated with caregivers' quality of life.

METHODS

1. Study Design

This study is a descriptive survey aimed at identifying the determinants of the quality of life of caregivers providing care to a family member who has suffered a stroke.

2. Study Participants

This study recruited a sample of patients who had been diagnosed with stroke within the past six weeks to six months and caregivers who were adult members of the patient's household. The eligibility criteria for participating in the study was that the patient must have been diagnosed with stroke in the past six weeks to six months within I60-I69 as per the Korean Standard Classification of Disease. Moreover, the patient must have voluntarily agreed to participate. The family caregivers must have been adult family members who provided care to the patient for at least six hours daily and voluntarily agreed to participate in the study. The patient and their family caregiver were selected as a dyad; if either of them declined to participate, they were not selected as study participants.

The sample size was determined using the G*Power 3.1 statistical power analysis program. Based on 19 predictor variables, a significance level of .05, a power of .80, and an effect size of 0.15, a minimum of 153 participants were required to perform multiple regression analysis [2,6,18]. Moreover, 190 participants were required to meet the statistical requirement of having at least 10 observations per variable for multiple regression analysis. After excluding the participants with insufficient data, 199 participants were included in the data analysis, thus meeting the requirement concerning the minimum sample size.

3. Measures

1) Patient's cognitive function

Post-stroke patients' cognitive function was evaluated using the Korean version of the Montreal Cognitive Assessment (MoCA-K). This assessment tool was developed to screen for mild cognitive impairment [19]. It comprises 24 items that comprehensively assess various cognitive domains, including visuospatial/executive function, naming, attention, language, abstraction, delayed recall, and orientation. Scores on the MoCA-K range from 0 to 30, with scores of 23 or higher indicating normal cognition and scores of 22 or lower indicating mild cognitive impairment. This tool provides a numerical score that reflects one's cognitive function. However, a dichotomous approach was used to clarify the identification of the risk of cognitive impairment. The original MoCA is considered a reliable tool, with a Cronbach's α coefficient of .83 during its initial development [19]. In this study also, its internal consistency was found to be good with a Cronbach's α coefficient of .88.

2) Patient's functional dependence

Post-stroke patients' functional dependence was assessed using the Korean version of the Modified Barthel Index (K-MBI). This measure was originally developed to evaluate the daily life activities of individuals with chronic diseases, but it was modified to be applicable to stroke patients. Later, the MBI was translated into Korean to fit the Korean context [20]. The K-MBI comprises 10 items measuring personal hygiene, bathing, eating, stair climbing, and dressing. The total score ranges from 0 to 100, with higher scores indicating lower levels of functional dependence. The internal consistency of the K-MBI has been high in previous studies, with a Cronbach's α coefficient of .84[20]. In this study, its Cronbach's α coefficient was .95.

3) Resilience

Family caregivers' resilience was measured using the Korean version of the Resilience Scale [7,21]. The scale comprises 25 items, with 17 items assessing personal com-

petence and eight items measuring perceptions of life and acceptance. Each item is rated on a seven-point Likert scale, and higher scores indicate higher levels of resilience. Its Cronbach's α coefficient has been found to be .85 [7,21], and it was .90 in this study.

4) Uncertainty

The uncertainty perceived by family caregivers of post-stroke patients was assessed using the Patient Perception of Uncertainty Scale-Family Member (PPUS-FM). This scale was developed to evaluate the uncertainty experienced by family members concerning patients with chronic illness [22] and then translated and demonstrated as a valid and reliable tool [23]. The scale comprises 29 items that are rated on a 5-point Likert scale, with higher scores indicating greater uncertainty. In line with the scale instructions, the PPUS-FM was administered without specific items that were deemed inappropriate as family caregivers of outpatients. The reliability of this scale was found to be high in previous studies, with Cronbach's α coefficients of .81 [22] and .90 [23]. In this study, the Cronbach's α coefficient was .83.

5) Caregiving appraisal

The experience of family caregivers in providing care to post-stroke patients was evaluated using the Caregiving Appraisal Scale, a tool developed to assess the perception of caregiving experiences [12,24]. The scale comprises 27 items related to caregiving burden, satisfaction, competence, demands, and impact. The items are rated on a five-point Likert scale, with higher scores indicating more negative perceptions of caregiving experiences. In previous studies, the scale has had a Cronbach's α coefficient between .73 and .89 [24]. In this study, the Cronbach's α coefficient of the entire scale was .85, while that of the subscales ranged from .49 to .87.

6) Quality of life

Family caregiver's quality of life was measured using the Scale of Quality of Life of Care-Givers (SQLC) [25]. This scale was developed to assess the impact of caregiving activities on the caregiver's work life, social and leisure activities, caregiving responsibilities, and depressive symptoms. The scale was translated for this study; two doctorally prepared nurse scholars and two nurses with over five years of clinical experience in caring for stroke patients back-translated the scale. This translation process was conducted after obtaining approval from the original developer. Before administering the Korean version of the SQLC, its validity was established through a confirmation process involving three experts in the fields of cognitive sciences and cerebrovascular diseases. The composite score was calculated based on the scoring guideline proposed by the developer. The total score could range from 6 to 145; a score of 85 or less implied a seriously impaired quality of life, and higher scores indicated a higher quality of life [25]. The scale's double-blind system allowed the monitoring of response validity. However, the non-uniform scoring of items posed a challenge in performing traditional reliability analyses, and the original developer did not assess the scale's reliability. In this study, all items of the scale were transformed into z scores, and the Cronbach's α coefficient was .88.

4. Ethical Considerations

This study was conducted with approval from the institutional Review Board of the Chungnam National University (approval number: 201806-SB-067-01).

5. Study Procedures

Data were collected between October 5, 2018, and November 14, 2020. Through convenience sampling, 199 patient-caregiver dyads were recruited at the outpatient clinic and the stroke department at the Regional Medical Rehabilitation Center of C University Hospital in D metropolitan city. Stroke patients were identified by accessing the hospital's patient registration system, and caregivers of these stroke patients were approached to gauge their interest in participating in the study. Before data collection, the researcher explained the study purpose, anonymity, confidentiality, voluntary participation, and withdrawal to all participants. The family caregivers filled out the survey questionnaire, and post-stroke patients completed cognitive and functional status assessments in a quiet place. Both parties were provided adequate time for completion. Data collection lasted from 20 minutes to an hour depending on the stroke patient's functional status. As a token of appreciation, a small gift was given to all participants.

6. Statistical analyses

Statistical analyses were performed using SPSS 26.0 Statistics for Windows, with a significance level of .05 for all tests. Descriptive statistics were utilized to describe the general characteristics of stroke patients and family caregivers. Using the Shapiro-Wilk test, it was confirmed that the dependent variable followed a normal distribution ($p =$ .20). Then, independent t-tests and one-way analysis of

variance (ANOVA) were performed to analyze the differences in caregivers' quality of life based on the general characteristics of stroke patients and family caregivers. When ANOVA produced a statistically significant result, a post hoc analysis was performed using Scheffé test to identify the subgroups that differed from each other. Pearson's correlation coefficients were calculated to determine the relationship between family caregivers' quality of life and resilience, uncertainty, caregiving appraisal, and other continuous variables. Finally, multiple linear regression analysis was performed with the Enter method to identify the factors associated with family caregivers' quality of life.

RESULTS

1. Differences in Family Caregivers' Quality of Life Based on Sample Characteristics

Table 1 presents the characteristics of post-stroke pa-

Table 1. Caregiver's Quality of Life Based on Sample Characteristics (N=199)

Characteristics	Categories	n (%) or M±SD	Caregiver's quality of life		
			M±SD	t or F (p)	Post hoc
Patient's gender	Men	131 (65.8)	61.73±19.58	-1.07 (.288)	
	Women	68 (34.2)	64.84±19.48		
Patient's cognitive status	Normal	72 (36.2)	71.00±18.02	4.69 ($<$.001)	
	MCI	127 (63.8)	58.13±18.91		
Patient's functional dependence	Complete[a]	17 (8.5)	41.65±14.87	27.81 ($<$.001)	a, b, c$>$d$>$e
	Severe[b]	20 (10.1)	47.85±15.46		
	Moderate[c]	51 (25.6)	55.51±14.67		
	Mild[d]	46 (23.1)	65.61±16.20		
	Minimal[e]	65 (32.7)	76.63±16.52		
Caregiver's gender	Men	35 (17.6)	63.57±16.53	2.69 (.795)	
	Women	164 (82.4)	62.62±20.18		
Caregiver's educational attainment	≤Middle school	63 (31.7)	59.40±18.86	1.69 (.187)	
	High school	67 (33.7)	63.06±18.94		
	≥College	69 (34.7)	65.62±20.53		
Caregiver's marital status	Married	159 (79.9)	61.77±20.06	1.47 (.142)	
	Single	40 (20.1)	66.85±16.99		
Caregiver's religion	Yes	125 (62.8)	59.34±19.56	3.32 (.001)	
	No	74 (37.2)	68.62±18.23		
Caregiver's employment status	Employed	84 (42.2)	70.24±19.40	-4.85 ($<$.001)	
	Unemployed	115 (57.8)	57.35±17.86		
Caregiver's monthly income (10,000 won)	$<$200[a]	129 (64.8)	58.75±19.03	8.46 ($<$.001)	b, c$>$a
	200~299[b]	36 (18.1)	70.92±16.70		
	≤300[c]	34 (17.1)	69.50±20.28		
Relationship with the patient	Parent	18 (9.0)	57.72±16.23	2.94 (.034)	
	Spouse	109 (54.8)	61.37±19.35		
	Offspring	62 (31.2)	64.23±20.25		
	Other	10 (5.0)	78.50±16.62		
Availability of support from other family members	Yes	52 (26.1)	72.69±19.69	4.45 ($<$.001)	
	No	147 (73.9)	52.29±18.32		
Caregiver's comorbidity	Yes	80 (40.2)	60.41±20.36	1.41 (.161)	
	No	119 (59.8)	64.39±18.91		

M=mean; MCI=Mild Cognitive Impairment; SD=standard deviation.

tients and their family caregivers. The mean age of the patients was 66.68±14.03 years, and the mean time since diagnosis was 65.11±34.50 days. Of the 199 patients, more than half of them were male (n=131, 65.8%) and had mild cognitive impairment (n=127, 63.8%). Approximately one-third of patients (n=65, 32.7%) exhibited a minimal level of dependence on performing daily life activities. The remaining patients depended mildly (n=46, 23.1%), moderately (n=51, 25.6%), severely (n=20, 10.1%), or completely (n=17, 8.5%) on their family caregivers for performing daily life activities. The mean age of family caregivers was 57.65±13.21 years, with 82.4%(n=164) being female. Their education level was distributed nearly equally, with 31.7% having completed middle school or lower levels of education, 33.7% having completed high school, and 34.7% having completed college or higher degrees. Most were married (n=159, 79.9%), followed a religion (n=125, 62.8%), were unemployed (n=115, 57.8%), and had a monthly income of less than KRW 2 million (n=129, 64.8%) at the time of data collection. In most cases, the family caregiver was the stroke patient's spouse (n=109, 54.8%), followed by their offspring (n=62, 31.2%). A total of 147 family caregivers (73.9%) provided 24-hour care alone, while 80 (40.2%) reported having a comorbid condition.

Family caregivers' quality of life differed significantly based on the stroke patient's functional dependence (F=27.81, $p < .001$) and cognitive function (t=4.69, $p < .001$) of the post-stroke patients. Their quality of life also differed based on whether they followed a religion (t=3.32, $p=.001$), their employment status (t=-4.85, $p < .001$), their monthly income (t=8.46, $p < .001$), their relationship with the patient (F=2.94, $p=.034$), and whether other family members supported them in performing caregiving duties (t=4.45, $p < .001$).

2. Relationships of Family Caregivers' Quality of Life with the Study Variables

On average, family caregivers' quality of life was 62.79 ±19.55, indicating a severe impairment in their quality of life. The mean score of resilience was 129.7±20.34, which was above average. The mean score of uncertainty and caregiving appraisal was 79.41±3.44 and 78.10±10.11, respectively, indicating moderate levels. Higher quality of life was significantly associated with younger age (r=-.24, $p=.001$), higher levels of resilience (r=.16, $p=.025$), lower levels of uncertainty (r=-.32, $p < .001$), and more positive caregiving appraisal (r=-.30, $p < .001$)(Table 2).

3. Factors Influencing the Quality of Life of Family Caregivers

Multiple regression analysis was performed to determine the factors that affect the quality of life of family caregivers. The independent variables in the model were selected based on previous studies [5,6,13,15,17,26] and the results of univariate analyses. Before conducting the regression analysis, the assumption of the regression model was evaluated. The tolerance limits ranged from 0.58 to 0.91, exceeding the threshold of 0.1 and suggesting no concerns of multicollinearity. The Durbin-Watson statistic was 2.11, indicating no violation of residual independence. The scatter plot of residuals against the fitted values displayed a symmetrical distribution around zero and the Breusch-Pagan test was not significant ($p < .05$), which is indicative of meeting the assumption of homoscedasticity. Additionally, the P-P plot of standardized residuals was close to the 45-degree line, suggesting the normality of residuals.

The multiple regression analysis revealed that family

Table 2. Correlations between the Study Variables

Variables	M±SD	1 r (p)	2 r (p)	3 r (p)	4 r (p)	5 r (p)	6 r (p)
1. Days since stroke		1.00					
2. Caregiver's age	57.65±13.21	.04 (.570)	1.00				
3. Resilience	129.70±20.34	-.04 (.551)	.09 (.199)	1.00			
4. Uncertainty	79.41±3.44	.12 (.084)	.17 (.015)	-.21 (.003)	1.00		
5. Caregiving appraisal	78.10±10.11	.15 (.031)	.02 (.783)	.16 (.104)	.09 (.187)	1.00	
6. Quality of life	62.79±19.55	-.04 (.626)	-.24 (.001)	.16 (.025)	-.32 (<.001)	-.30 (<.001)	1.00

M=mean; SD=standard deviation.

Table 3. Factors Associated with the Caregiver's Quality of Life

Variables	B	SE	β	t	p
Patient's cognitive status (MCI) [†]	-2.79	2.04	-.07	-1.37	.173
Patient's activity of daily living	0.40	0.04	.56	10.65	< .001
Days since diagnosis	0.09	0.03	.16	3.35	< .001
Caregiver's gender (women) [†]	6.44	2.46	.13	2.62	.010
Caregiver's age	-0.15	0.09	-.10	-1.72	.088
Caregiver's religion (yes) [†]	-7.69	1.96	-.19	-3.93	< .001
Caregiver's employment status (employed) [†]	5.52	1.97	.14	2.80	.006
Relationship with the patient (spouse) [†]	-3.10	2.13	-.08	-1.45	.148
Availability of support from other family members (no) [†]	-11.17	2.12	-.25	-5.28	< .001
Comorbidity (yes) [†]	0.14	1.96	.00	0.07	.941
Resilience	0.08	0.05	.09	1.77	.078
Uncertainty	-0.01	0.08	-.01	-0.14	.891
Caregiving appraisal	-0.25	0.08	-.18	-3.27	.001
R^2=.64, Adj. R^2=.61, F=25.04, p< .001					

B=unstandardized estimate; β=standardized estimate; MCI=mild cognitive impairment; SE=standard error; [†] The referneces were patient's cognitive status (normal), caregiver's gender (men), caregiver's religion (no), caregiver's employment status (unemployed), relationship with the patient (others), availability of support from other family members (yes), and comorbidity (no).

caregivers' quality of life is significantly associated with patients' functional dependence for performing daily life activities (β=.56, p <.001), the number of days since diagnosis (β=.16, p <.001), being female (β=.13, p =.01), following a religion (β=-.19, p <.001), being employed (β=.14, p = .006), support from other family members (β=-.25, p <.001), and caregiving appraisal (β=-.18, p <.001). These variables significantly explained approximately 61% of the variance in the quality of life of family caregivers (Table 3).

DISCUSSION

This study revealed noteworthy associations between the quality of life of family caregivers and patients' and caregivers' characteristics. Notably, patients' functional dependence for performing daily activities, caregivers' resources (i.e., religion and support from other family members), and their appraisal of caregiving responsibilities had the strongest correlation with caregivers' quality of life. Other associated factors were the number of days since diagnosis, the caregiver's sex, and their employment status. These findings underscore the importance of simultaneously considering the characteristics of the stroke patient and their family caregiver in addressing the quality of life of family caregivers.

The score of family caregivers' quality of life was 62.79 out of a total score of 145. This score indicates a significant impairment in quality of life [25]. Previous studies utilizing the same assessment tool have reported higher scores of 113.82 [27] and 99.57 [28] among family caregivers of Parkinson's disease patients. These variations in the quality of life score may be because of differences in caregiving burden and adaptation patterns of different groups of family caregivers. Furthermore, another study found that specific domains of quality of life improved a year after the start of caregiving. Similar to previous studies, these improvements were associated with the presence of residual symptoms in patients and the adjustment to new caregiving roles during the initial caregiving period [6].

Caregiving appraisal was found to be significantly associated with family caregivers' quality of life. Positive appraisals were characterized by higher satisfaction and mastery in caregiving, while negative appraisals were representative of greater caregiving burden, demands, and impact [12,24]. When family caregivers viewed caregiving roles and responsibilities in a positive light, it positively affected their quality of life. Compared to the appraisal by Korean family caregivers of stroke survivors in previous studies, the participants in this study appraised caregiving more positively. However, their appraisals were more

negative compared to those of family caregivers of stroke survivors in Nigeria in a previous study [13]. These variations in caregiving appraisals may be because of differences in caregivers' sociodemographic characteristics, the cultural values and norms in evaluating caregiving experiences, and the care recipient's severity and illness prognosis. While caregiving stress and burden have been extensively studied in the context of chronic disease management, there is also evidence suggesting that emphasizing positive reappraisals has a promising effect on enhancing family caregivers' psychological well-being and quality of life [29]. Future studies should examine the multidimensional relationship between caregiving appraisal and quality of life to develop psycho-educational interventions that promote the adaptation of appraisal strategies for these family caregivers.

Our participants reported lower levels of uncertainty than families caring for stroke patients in the first three months of hospitalization [18] and family or primary caregivers in the first 6 weeks after the stroke [5] in previous studies. The occurrence of a severe stroke brings a profound sense of uncertainty that negatively affects family caregivers' perceived burden and actual caregiving capabilities [9]. Although patients' stroke classification data were not reported in this study, it was observed that 18.6% of stroke patients exhibited severe to complete levels of functional dependence. This finding implies that the relatively lower level of uncertainty observed in this study may be because a small proportion of patients had more severe clinical conditions. While this study did not find a significant association between uncertainty and quality of life, previous studies have consistently reported the detrimental effect of uncertainty on overall caregiving burden, abilities, and subsequent life satisfaction [8,9,11,15,16,18]. It is reasonable to assume that increasing uncertainty would, directly and indirectly, decrease caregivers' health-related quality of life by intensifying the caregiving burden. Future studies should further investigate the intricate relationship between uncertainty, caregiving burden, and quality of life.

Participants in this study showed a moderate level of resilience, aligning with the findings of a previous study involving family caregivers of stroke patients whose average duration of stroke was 36.89 months [15]. Our univariate analysis showed that caregivers with higher levels of resilience are more likely to experience lower levels of uncertainty and better health-related quality of life. However, when other potential factors were controlled in the regression model, the relationship did not reach statistical significance. This result contrasts with that of other studies that have highlighted the crucial role of resilience in determining the quality of life, particularly alongside cognitive factors, such as caregiving appraisal, uncertainty, and perceived support [8,9,15]. Although there has been no consensus on the role of cognitive factors in predicting the relationship between resilience and health-related quality of life, these studies suggest that a comprehensive approach should be employed to better understand caregivers' health-related quality of life, considering the complex interactions between resilience and other cognitive factors.

As anticipated, this study revealed that the patient's ability to perform daily activities has the greatest impact on their family caregiver's quality of life. This finding aligns with that of previous studies that showed that patient's inability to perform daily activities was associated with decreased quality of life of family caregivers [6,26]. Further, this finding suggests that stroke-induced functional dependence likely intensifies the caregiving burden, which hinders caregivers from attending to their own needs when they provide care to the patient.

Caregivers who provided 24-hour care daily had a lower quality of life than those who did not. Other studies have reported similar findings, suggesting that the lack of personal time for family caregivers exacerbates the caregiving burden and negatively impacts their quality of life [2, 18]. In addition, caregivers who were employed outside their homes exhibited greater quality of life than those who were not. Studies have shown that employment status can serve as a resource that can improve family caregivers' quality of life. It offers several benefits, including financial stability, a sense of fulfillment from meaningful work, and opportunities for social interactions, which provide them a welcome break from caregiving responsibilities [6,16]. These findings can contribute to improving health policies, the distribution of community resources, stroke survivors' recovery, and their family caregivers' quality of life.

Examining the impact of caregivers' religion on their quality of life yielded inconsistent results. While this study found that caregivers with religiosity have a lower quality of life than those without religiosity, studies have shown that religious involvement increases the quality of life by mitigating the caregiving burden [30]. These findings indicate that religion can shape caregivers' caregiving experience by building a positive and accepting attitude toward life, which is often inherent in religious beliefs [14]. However, this study did not provide sufficient evidence of the specific influence of religion on caregiving attitudes and behaviors. Further research must be conducted on

how family caregivers' spirituality and religious attitudes affect their quality of life.

This study had several methodological limitations that should be considered. First, participants were recruited from one medical facility in one region of Korea. To enhance the generalizability of the findings, future studies should be conducted with larger and more diverse samples from multiple facilities. Despite this limitation, the internal validity of this study's results can be considered high because the data collection process was meticulously conducted through in-person interviews. Second, the cross-sectional design of this study limited our ability to examine whether the pattern of quality of life changes during caregiving. Future studies should employ a longitudinal approach to deeply explore how the quality of life evolves and identify modifiable factors that impede caregivers from adapting to their caregiving role, particularly in the early stages of caregiving.

CONCLUSION

This study reveals that caregivers experience a decline in their quality of life in the first six months of the patient's first stroke attack. This decline is associated with negative caregiving appraisal, greater functional dependence of patients, limited support from other family members, and various sociodemographic characteristics of the caregiver. Recognizing the significance of these factors is vital for proper case management and providing counseling, psychoeducation, and integrated community stroke services. It is also vital for conducting future intervention research aimed at improving the quality of life of family caregivers of stroke patients.

CONFLICTS OF INTEREST
The authors declared no conflict of interest.

AUTHORSHIP
Study conception and design acquisition - Lee J-H and Jung M S; Data collection - Lee J-H; Data analysis & Interpretation - Lee J-H and Jung M S; Drafting & Revision of the manuscript - Lee J-H and Jung M S.

DATA AVAILABILITY
Please contact the corresponding author for data availability.

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