Depressive Symptoms and Associated Factors Among Caregivers of Cancer Patients Attending Public Hospitals in Addis Ababa, Central Ethiopia: A Hospital Based Cross-Sectional Study

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Abstract
Background: *According to a report by the World Health Organization in 2018, depression affected approximately 350 million people worldwide, although by 2030 it will be the leading cause of the disease burden.*

Objectives: *This study is aimed at assessing the prevalence and associated factors of depression among caregivers of cancer patients at Saint Paul Hospital Millennium Medical College, Ethiopia.*

Methods: *An institution-based cross-sectional study was conducted among 622 adult caregivers of cancer patients attending Saint Paul Hospital Millennium Medical College, Ethiopia, from May 1 to 30, 2019 by using a standard, structured, and preteed questionnaire. The predictors were established via multivariate logistic regression analysis.*

Results: *In the current study, about 49% (95% CI: 46.6–54.0%) of caregivers of cancer patients had depression. Being female [AOR= 2.46; 95% CI: 1.25-4.05], having no formal education [AOR= 2.06, 95% CI: 1.07-3.96], being spouse to the cancer patients [AOR= 2.76; 95% CI: 1.37-5.59], and having poor social support [AOR= 2.11; 95% CI: 1.11-3.78] were factors significantly associated with depression at p-value < 0.05.*

Conclusion: *About half of the respondents had depression. Being female, having a lack of formal education, being a spouse to the cancer patients, and having caregivers with poor social support were all found to be determinants of depression.*

Keywords: Caregiver, Cancer Patient, Depression, Ethiopia

Abbreviations
BDI: Beck depression inventory, HADS: Hospital anxiety and depression scale; CESD: Center for Epidemiological Studies-Depression Scale; NSCLC: Non-Small Cell Lung Cancer, SPSS: Statistical Package for the Social Sciences; PHQ-9: Patient Health Questionnaire

1. Introduction

Depression is the most prevalent mental health condition today. Its symptoms includesadness or a depressed mood, loss of interest or pleasure in previously enjoyed activities, increased fatigue or decreased energy, altered appetite pattern, weight loss or gain, difficulty sleeping or sleeping too much, poor concentration or difficulty in making decisions, feelings of worthlessness or guilt, and recurrent thoughts of death that last for at least two weeks [1].

According to a World Health Organization report in 2018, depression affected approximately 350 million people worldwide, although by 2030 it will be the leading cause of the disease burden [2]. The estimated prevalence of depression is 5.9% in the African region, whereas in Ethiopia it is about 4.7% [3].The economic burden of depression has increased worldwide. Data showed that in the USA, it rose by 21.5% from the cost of $173.2 billion to $210.5 billion. The costs associated with depression account for 45%, the costs associated with its consequence, which is suicide account for 5%, and the costs associated with work with 50% [4]. A depressed individual may experience mental and physical suffering, as well as impaired functioning at job, in the classroom, and in family relationships [5].

A caregiver is a person who gives care for family members who are sick by assisting with physical care, providing comfort, or helping the patient gain strength from the disease's recovery. Family caregivers are essential partners in the delivery of complex healthcare services, and this case exemplifies the associated caregiver burden and stress during cancer treatment. The level of burden on caregivers of cancer patients is greater than the burden experienced by those caring for the elderly and similar to that experienced by caregivers of patients with dementia [6,7].

Caregivers face a wide range of responsibilities as a result of the multimodal response to the financial, social, psychological, emotional, and physical stressors associated with providing care [6,8].The caregiver often sacrifices during caregiving since cancer management becomes more complex [9].

Cancer is a physically and psychologically debilitating condition. The majority of deaths worldwide are currently attributed to non-communicable diseases (NCDs), with cancer predicted to be the leading cause of death and the main obstacle to raising life expectancy in every nation in the twenty-first century [1,10]. Approximately 5.8% of all national deaths in Ethiopia are caused by cancer [11].

Cancer affects the physical, emotional, and psychological aspects of the life of patients and family caregivers [12]. Caregiver burden starts with the diagnosis of the patient with cancer, and caregiver stress levels are elevated when they hear their relatives' diagnosis with cancer, which is a risk for psychological distress [13].

Caregivers missed work in giving care to the patient, whereas the patient began to demand more care; for this reason, they lost their work while giving care to the patient [14]. Although caregiver responsibilities result in suffering from a chronic pattern of sleep deprivation, it is one of the potential contributing factors to physiological and emotional problems, and it is a strong predictor of depression [15].Caregivers also experience their relatives' pain and suffering, and it is one of the main stressful events that make them feel stressed [16].

The purpose of this study was to assess the prevalence of depression and associated factors among caregivers of patients with cancer at St. Paul Hospital, Millennium Medical College, Addis Ababa, Ethiopia.

2. Materials and Methods

2.1 Study Setting, Design, and Period

An institution-based cross-sectional study was carried out at Saint Paul Hospital Millennium Medical College, one of Addis Ababa's referral hospitals. Emperor Haile Selassie built it with the support of the German evangelical church in 1961, making it the country's second-largest public hospital. The hospital has 13 departments that make 350 beds. The hospital provides medical management, surgical intervention, obstetric and gynecological management, pediatric management, orthopedic management, psychiatry service, oncology service, and other vital services for a significant number of people. The study period was from May 1 to May 30, 2019.

2.2 Source of Population and Study Population

All caregivers of cancer patients aged 18 and above who were providing cares to the client at Saint Paul Hospital Millennium Medical College were the source population, and caregivers of cancer patients aged 18 and above who were providing cares to the client at Saint Paul Hospital Millennium Medical College during the study period were the study population.

2.3 Inclusion Criteria and Exclusion Criteria

All caregivers of cancer patients aged 18 and above who were providing cares to the client at Saint Paul Hospital Millennium Medical College during the data collection period were included. Caregivers who were unable to communicate during data collection were excluded from the study.

2.4 Sample Size Determination

Using a single population proportion formula, the optimal number of samples required for the study was calculated based on the following assumptions: The prevalence of depression was found to be 62 percent in a study conducted in Kenya, with a margin of error of 4% and a non-response rate of 10% [17].

$$n = \frac{(Z\alpha/2)^2 \, P(1-P)}{d^2}$$

$$n = \frac{(1.96)^2 \times (0.62 \times 0.38)}{(0.04)^2} = 565$$

The sample size of the second objective was smaller than the firstobjective. Therefore, the final sample size by taking 10% non-response was 622.

2.5 Sampling Procedure/Technique

The study participants were chosen via systematic random sampling. The sampling interval (k) was determined by dividing the total number of cancer patients who had follow-up in a month by the total sample size (622). Therefore, the calculated interval was 2. Participants were chosen at two intervals as their selection intervals. The first person was chosen by lottery from the appointment register book.

3. Data Collection Method
3.1 Data Collectors and Supervisors

Based on their experience with data collection and supervision, three health professional data collectors and one supervisor were assigned.

3.2 Data Collection Instruments and Procedure

Standard tools were used to collect the data. A structured questionnaire was used to obtain socio-demographic data. The clinical factors were gathered by reviewing the patient's chart. The Oslo social support scale (Oslo-3) was used to assess social support [3-8]. Poor support, moderate support, and strong support are the three categories on the total score scale, which ranges from 3 to 14 [9-14,18]. In this investigation, the internal consistency (Cronbach's alpha) of oslo-3 was 0.86. The Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST) were used to assess substance use. Current use was measured by those who have used substances (alcohol, khat, cigarettes, and others) in the recent three months (for non-medical purposes only). Ever use was measured by those who have used substances (alcohol, khat, cigarettes, and others) in their lives (for non-medical purposes only) [19].

Depression was measured using the Patient Health Questionnaire (PHQ-9). PHQ-9 has been translated to Amharic and was validated in Ethiopia with a sensitivity of 86% and a specificity of 67%. Respondents were asked about experiencing symptoms of depression over the past 2 weeks. Scores range from 0 to 27. The score for each item ranges from 0 mild to 3 severe, with a total maximum score of 63. A cut-off point of 10 or more was used to screen for depression [20]. The internal consistency (Cronbach's alpha) of PHQ-9 in the current study was 0.87.

4. Study Variables
4.1 Dependent Variable
Depression symptoms

4.2 Independent Variables
Sociodemographic factors: age, sex, marital status, religion, occupation, educational status, relationship of patient with caregiver;clinical, behavioral and psychosocial factors:types of cancer, duration of illness, stage of cancer, treatment modality, number of caregiver's, current alcohol use, current khat use, current cigarette use, and social support.

4.3 Operational Definitions
4.3.1 Depression: participants who score 10 and above on the PHQ-9 depression screening tool [21].

4.3.2 Social Support: According to OSS-3, poor social support is 3–8, moderate social support is 9–11, and strong social support is 12–14 [22].

4.3.3 Current Substance Use: using substances (alcohol, khat, cigarettes, and others) in the recent three months (for non-medical purposes only) [23].

4.4 Data Quality Control
Data quality was assured before, during, and after the data collection process. Before data collection, a standardized questionnaire was prepared. A pre-test was done on 5% of caregivers of cancer patients at Betezata Hospital five days before the actual data collection time to check for the understandability and reliability of the questionnaires. The questionnaire was translated into the local language versions (Amharic) and re-translated back to English to ensure accuracy. Data collectors and supervisors received one-day instruction on how to use the questionnaire, sampling methodologies, ethical principles, data management, and participant identification. During the data collection process, there was close day-to-day supervision, and the questionnaire was checked to ensure completeness. After data collection, double data entry and validation were done to avoid errors in data entry.

4.5 Data Processing and Analysis
Data was entered by Epi Data Version 3.1 and STATA Version 17.0 for analysis. To summarize the descriptive statistics of the data, frequencies, proportions, mean, and standard deviation (SD) were employed, as well as tables and graphs for data presentation. Binary logistic regression, both bivariable and multivariable, was used. The relationship between the dependent and independent variables was investigated. To identify independently associated factors in the model, an independent variable with a p-value less than 0.2 in bivariable logistic analysis was fitted into multivariable logistic regression; the strength of association was determined using an odds ratio with a 95 percent CI, and a p-value less than 0.05 was considered a statistically significant association in the final model. The model's fitness was checked using the Hosmer and Lemeshow tests.

4.6 Ethics Approval and Consent to Participate
Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the University of Gondar, College of Medicine and Health Sciences with reference number (SOM/1540/2019) and granted ethical clearance and permission. The Chief Executive Officer (CEO) of Saint Paul Hospital Millennium Medical College received an official letter of cooperation after the approval. The head of the oncologic clinic unit was then asked for authorization. Before the questionnaire was administered to any eligible participants, written and verbal

consent was obtained from each study participant after the study objective was explained to them in detail by the data collectors. The study participants were given the right to refuse or discontinue participation at any time they wanted and the chance to ask anything about the study.

5. Results
5.1 Socio-Demographic Characteristics of the Respondents
Six hundred seven eligible family caregivers of patients with cancer were included in the study, with 622 sampled participants, with a response rate of 97.5%. The median age (±SD) of the caregiver was 44.0 (±16), and around three-fifths (57.3%) were female. Around one-third (33.4%) of the participants were married. Close to half (45.6%) of the participants were orthodox, and 19.4% were merchants. Close to one-third of participants were able to attend primary education level, and 16.3% of the participants were the wives of the patients. (Table1)

Table1: Description of Socio-Demographic Factors Among Family Caregivers of Cancer Patients in St' Paul Hospital Millennium Medical College, Addis, Ababa, Ethiopia, 2019 (n=607).

Variables	Category	Frequency	Percentage (%)
Age	18-27	113	18.6
	28-37	126	20.8
	38-47	131	21.6
	48-57	114	18.8
	≥58	123	20.3
Sex	Male	281	46.3
	Female	326	53.7
Marital status	Single	122	20.1
	Married	231	38.1
	Divorced	123	20.3
	Widowed	131	21.6
Religion	Orthodox	227	37.4
	Muslim	159	26.2
	Protestant	103	17.0
	Catholic	68	11.2
	Others	60	8.24
Occupation	Jobless	73	12.0
	Farmer	101	16.6
	House wife	97	16.0
	Merchant	118	19.4
	Government employed	113	18.6
	Private employed	105	17.3
Educational status	Unable to read and write	115	18.9
	Primary	163	26.9
	High school	105	17.3
	College degree	138	22.7
	Degree and above	86	14.2
Relationship of patient with caregiver	Father	98	16.1
	Mother	99	16.3
	Spouse	181	29.8
	Brother	43	7.1
	Sister	33	5.4
	Daughter	67	11.0
	Son	86	14.2

5.2 Clinical, Behavioral and Social Factors of the Respondents
About two-fifth (21.6%) of cancer patients had breast cancer, and around one-third (33.6%) of the cancer patients were in treatment for less than six months' duration. Around half (50.6%) of the study participants have used alcohol for the last three months. About one-third (33.1%) of cancer patients had two caregivers, and 36.2% of caregivers had poor social support. (Table 2)

Table 2: Description of Socio-Demographic Factors Among Family Caregivers of Cancer Patients in St' Paul Hospital Millennium Medical College, Addis, Ababa, Ethiopia, 2019 (n=607)

Variables	Category	Frequency	Percentage (%)
Types of cancer	Breast cancer	100	16.8
	Cervical cancer	85	14.0
	Stomach cancer	131	21.6
	Lung cancer	33	5.4
	Liver cancer	62	10.2
	Bones	88	14.5
	Hematopoietic	59	9.7
	Brain	40	6.6
	Other unspecified	9	1.5
Duration of illness	Less than six months	204	33.6
	Six months – 2 years	84	13.8
	Two years- five years	133	21.9
	Greater than five years	186	30.6
Stage of cancer	Early-stage	351	57.8
	Late-stage	256	42.2
Treatment modality	Chemotherapy	112	18.5
	Chemotherapy and Radiotherapy	453	74.6
	Chemotherapy and Surgery	42	6.9
Number of caregiver's	One	201	33.1
	Two	123	20.3
	Three	141	23.2
	Four	142	23.4
Current alcohol use	Yes	278	45.8
	No	329	54.2
Current khat use	Yes	285	47.0
	No	322	53.0
Current cigarette use	Yes	104	17.3
	No	503	82.7
Social support	Poor	285	47.0
	Moderate	134	22.0
	Strong	188	31.0

5.3 Prevalence of Depression Among Caregivers of Cancer Patients

In the current study, the magnitude of depression was found to be 49% (95% CI: 46.6–54%).

5.4 Factors Associated With Depression Among Caregivers of Cancer Patients

In multivariate binary logistic regression, after controlling for possible confounding effects of other covariates, female sex, having no formal education, being a spouse caregiver, and having poor social support were identified as significant factors associated with depression at a p-value less than 0.05.

The odds of having depression were 2.4 [AOR = 2.461; 95% CI: 1.251–4.054] times higher among females as compared to male respondents. The odds of having depression were 2.06 [AOR = 2.062, 95% CI 1.071–3.963] times higher among respondents who have no formal education as compared to the respondents who have an educational level of college or above. The odds of having depression were 2.76 [AOR = 2.765; 95% CI: 1.372–5.595] times higher among respondents who are spouses to the cancer patient as compared to other caregivers. The odds of developing depression were 2.11 [AOR = 2.11; 95% CI: 1.11-3.78] times higher among caregivers with poor social support as compared to those caregivers who have strong social support (Table 3).

Table 3: Bivariate and Multivariate Logistic Regression Analysis Showing the Association between Factors and Depression Among Family Caregivers of Cancer Patients in St' Paul Hospital Millennium Medical College, Addis, Ababa, Ethiopia, 2019 (n=607).

Explanatory variables	Category	Depression		COR, (95%CI)	AOR, (95%CI)
		Yes	No		
Sex	Male	102	179	1	1
	Female	200	126	2.76(1.07-4.45)	**2.46(1.25-3.67) ***
Occupation	Jobless	39	34	1.26(0.76-1.76)	0.78(0.22-1.34)
	Farmer	53	48	1.21(0.72-1.71)	0.95(0.55-1.35)
	House-wife	55	42	1.44(0.24-2.64)	0.69(0.23-1.15)
	Merchant	51	67	0.84(0.74-0.93)	0.71(0.23-1.19)
	Government employed	54	59	1.01(0.41-1.60)	0.84(0.40-1.28)
	Private employed	50	55	1	1
Education	Unable to read and write	83	32	2.26(1.97-2.55)	**2.06(1.07-3.05) ***
	Primary	70	93	0.65(0.42-0.88)	0.83(0.34-1.32)
	High school	45	60	0.65(0.42-0.88)	0.77(0.39-1.15)
	College diploma	58	80	0.63(0.36-0.90)	0.56(0.11-1.01)
	Degree and above	46	40	1	1
Relationship to patient	Father	40	58	0.58(0.55-0.68)	0.85(0.25-1.45)
	Mother	57	42	1.14(0.66-1.64)	0.76(0.32-1.20)
	Spouse	105	76	1.17(1.01-1.35)	**2.76(1.37-4.15) ****
	Brother	18	25	0.61(0.42-0.80)	0.91(0.13-1.69)
	Sister	23	10	1.94(0.45-3.43)	0.83(0.11-1.55)
	Daughter or son	83	70	1	1
Current alcohol use	Yes	146	132	1.23(1.11-1.34)	1.26(0.96-1.56)
	No	156	173	1	1
Current Khat use	Yes	143	142	1.03(0.92-1.14)	0.87(0.14-1.61)
	No	159	163	1	1
Social Support	Poor	175	110	2.29(1.45-3.14)	**2.11(1.11-3.11) ****
	Moderate	50	84	0.86(0.66-1.72)	0.89(0.23-1.55)
	Strong	77	111	1	1

Key: *Significant at p-value <0.05; COR: crude odds ratio; AOR: adjusted odds ratio; CI: confidence interval. Those with p value 0.25 and less than were entered into the multivariate regression*

6. Discussion

The level of burden on caregivers of cancer patients is greater than the burden experienced by those caring for the elderly and similar to that experienced by caregivers of patients with dementia (6, 7). Therefore, the results presented here are crucial, and the main objective to be attained is to determine the prevalence and associated factors of depression among caregivers of cancer patients at Saint Paul Hospital Millennium Medical College.

In this study, the prevalence of depression was 49% (95% CI: 46.6–54.0%), which is in line with the studies conducted in Iceland (51.2%) and China (46.1%) [24,25].However, the result of the present study is higher than the study reported in the USA by 23% [26]. The variation might be due to the difference in study design, which was used as a correlation study in the USA, and the purposive sampling technique in Canada.In contrast, this study was lower than the studies done in Egypt (81.5%) and Kenya (62.7%) and Pakistan (70%) [9,27,28]. The possible reasons for the discrepancy might be a socio-economic difference, a sample size difference, or a sampling technique in which only 157 participants participated in Egypt [27]. A study from Pakistan used the non-probability sampling technique [28].

Regarding factors associated with depression, there is a significant association between being female and depression among caregivers of cancer patients. The odds of having depression were 2.4 [AOR = 2.461; 95% CI: 1.251–4.054] times higher among female respondents as compared to male respondents. This is similar to the findings of a study conducted in Korea [29]. This might be due to the fact that being female is a risk factor for depression because women may have a strong genetic predisposition to develop, and they are much more subjective to fluctuating hormonal levels.

The study also showed that the odds of having depression were 2.06 [AOR = 2.062, 95% CI 1.071–3.963] times higher among respondents who have no formal education as compared to those who have an educational level of college or above. This finding is consistent with the finding from Egypt. This might be due to caregivers with no formal education having a lack of knowledge about disease treatment, progress, and the like.

The current study revealed that the odds of having depression were 2.76 [AOR = 2.765; 95% CI: 1.372–5.595] times higher among respondents who are spouses to the cancer patient as compared to other caregivers. This is supportedby the study conducted in

Taiwan. The possible justification for this strong association might be that spousal caregivers consider caregiving a very stressful situation, and they have a greater emotional burden, worrying about the patient's future, having nightmares of death, and suffering.

The findings of the study also showed that the odds of developing depression were 2.11 [AOR = 2.11; 95% CI: 1.11-3.78] times higher among caregivers with poor social support as compared to those caregivers who have strong social support. This finding is in line with a study done in the United Kingdom. The possible reason might be that having poor social support in such a difficult condition can negatively influence the emotions of caregivers, which in turn increases the risk of developing depression.

7. Conclusion
In the current study, a high prevalence of depression was prevalent among caregivers of cancer patients. Female sexes, spousal caregivers, caregivers who have no formal education and caregivers who have poor social support were found to be significant predictors of depression.

8. Recommendation
In this study, there was a high prevalence of depression among caregivers of cancer patients. Health care providers need to provide psychosocial intervention and screening to caregivers of cancer patients with depression. Health care providers require training to be able to identify and manage the symptoms of depression. It would have been better to conduct a prospective study to investigate the cause-and-effect relationship between risk factors for depression.

9. Strengths and Limitations of the Study
This study used standardized and valid tools. The study also used large sample size which decreases random error and increases the precision of the study. Since the study was a cross-sectional study, it didn't allow a temporal relationship between depression and associated factors among caregivers of patients with cancer. Interviewer-administered data collection methods could magnify social desirability biases.

Data Availability
This research included pertinent data, and the corresponding author is available to offer further information upon reasonable request.

Disclosure
This paper is based on the thesis of (Esayas Kibrom, Sewbesew Yitayih, Alem Kebede, Awoke Mihretu, Henock Asfaw, Abiy Mulugeta, Deribe Bekele Dechasa, Jerman Dereje and Samuel Demissie Darcho). It has been published on the institutional website.

Competing Interests
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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