

## Assessment and Associated Factors of Suicidal Behavior among Cancer Patients visiting the Oncology Outpatient Unit in Mekelle Oncologic Clinics, Tigray, Ethiopia: A Cross-Sectional Study

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### ABSTRACT

#### **BACKGROUND**

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. According to estimates from the International Agency for Research on Cancer, there will be 17.0 million new cancer cases in 2018 worldwide. Depression, age, sex, divorced, and hopelessness are of most factors can patient with cancer result in suicidal behavior. The purpose of this study is to identify and associated factors of suicidal behavior among cancer patients in Mekelle, Ethiopia.

#### **METHODS**

The cross-sectional study design was conducted with a total of 345 study subjects in Mekelle, Ethiopia. Suicidal behavior was assessed by the Suicidal Behavior Questionnaire-Revised (SBQ-R) scale tool. Bivariate and multiple logistic regression analyses were performed to determine between the explanatory and outcome variables.

#### **RESULTS**

The magnitude of suicidal behavior was 20%. Previously suicidal attempt [AOR = 31.466, 95% CI (14.552, 68.042), P <0.0001] was associated factor whereas no comorbid physical illness [AOR = 0.363, 95% (0.164, 0.806)] and current treatment regimen (surgery, radiotherapy, and palliative care) were significantly protective factors for suicidal behavior.

#### **CONCLUSION**

No comorbid physical illness, suicide attempt and current treatment regimen were significant factors of suicidal behavior. Oncologic professionals should assess patient suicidal risk assessment routinely and every professional focus on management besides the medication.

#### **KEYOWRDS**

Suicidal behavior; Cancer; Oncology; Factors; Hospital; Ethiopia

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## **INTRODUCTION**

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. It can be also defined as a term for diseases in which abnormal cells divide without control and can invade nearby tissues. There are several main types of cancer; for instance, sarcoma cancer that begins in bone, and fat, blood vessels, leukemia, cancer that begins blood-forming tissues; lymphoma, cancer that starts lymph nodes. The portion of the health record of cancer provides the background of the current illness, including types and duration of symptoms, exposures, and other information that might affect the diagnosis. If the spread is not controlled, it can result in about 1 in every 6 deaths worldwide, more than AIDS, tuberculosis, and malaria combined. Today, it is the second-leading cause of death (following cardiovascular diseases) worldwide and in high and very high Human Development Index (HDI) countries [1].

According to studies from the International Agency for Research on Cancer (IARC), there will be 17 million new cancer cases in 2018 worldwide, of which six hundred thousand will occur in low HDI countries, 2.8 million in medium HDI countries, 6.4 million in high-HDI countries, and 7.2 million in very high-HDI countries [2]. By 2040, the global burden is expected to grow to 27.5 million new cancer cases and 16.3 million cancer deaths simply due to the growth and ageing of the population [3].

Diagnosis and treatment should be available, and the early identification of cancer should be prioritized. Detecting cancer at its early stages enables treatment that is generally more effective, less complex, and less expensive [4]. Palliative and supportive cares are essential in comprehensive cancer control and providing access to pain relief is an international legal obligation [5].

Suicide defined, a serious public health problem, as the act of deliberately killing oneself. The expected risk factors for

suicide include chronic psychiatric disorder (Depression, and Neurological disorders) and chronic medical diseases (Cancer and HIV infection). Every year, almost one million people die from suicide, 86% of whom are in low-income countries like our country Ethiopia, and it does not have one single cause and is preventable. World health organization (WHO) estimates for the year 2020, approximately 1.53 million people will die from suicide; and 10 folds - 20 folds more people will attempt suicide worldwide. These estimates represent on average one death every twenty seconds and one attempt every 1 second - 2 seconds [6].

We can see one or more of these in someone who have been diagnosed cancer especially early and newly diagnosed contemplating suicide. These are the signs that are generally clear and easy to observe: Talking about dying or wanting to die, talking about feeling empty, hopeless, or having no way out of problems, mentioning strong feelings of guilt and shame, talking about not having a reason to live or that others would be better off without them, social withdrawal and isolation, giving away personal items and wrapping up loose ends, saying goodbye to friends and family this is all because of the illness condition, and its severity treatment.

Suicidal behavior refers to talking about or taking actions related to ending one's own life or thoughts or tendencies that put a person at risk for committing suicide. Suicidal behavior can, therefore, be conceptualized on a phenotypic continuum ranging from suicidal behavior to suicidal attempt and completed suicide.

A surveillance analyses study done in the United States, Los Angeles, showed that of 467,368 women with gynecologic cancers, there were 309 (0.07%) suicides during the study period; specifically, uterine cancer 88.2%, cervical cancer 78.1%, and ovarian cancer 73.6%; all,  $P < 0.05$  [7].

According to the study done in Canada revealed that 15.7% of patients with Head and Neck Cancer were suicidal 1 year from diagnosis [8]. Whereas another study done in China indicated that suicidal behavior was 15.3% in Chinese cancer inpatients [9].

The study conducted in Korea showed that the suicidal behavior was present in 10.9% of participants at 1 week and 11.4% at 1 year after breast cancer surgery [10]. According to the report in USA, New York, negative religious coping (AOR = 2.65, 95% CI 1.22-5.74, P = 0.01) was associated with an increased risk for suicidal behavior [11].

A surveillance analyses study done in United States, Los Angeles, showed that white race (AOR = 3.619 CI: 1.696-7.722), P=0.001); divorced (AOR = 1.49, CI 1.053-2.112, P = 0.024); Cancer stage IV (AOR = 1.735, CI 1.147-2.624, P = 0.009); cancer type like ovarian cancer (AOR = 1.991, 95% CI 1.461-2.712, P <0.001) and cervical cancer (AOR = 1.765, 95% CI = 1.290-2.413, P <0.001) were significant factors for suicide [7].

A study done in Colorado; Western United States showed the magnitude of suicidal behavior ranged greatly from 0.7% to 46.3%. Commonly identified risk factors for suicidal behavior were included age, sex, and disease/treatment-related characteristics, as well as psychological constructs including depression, anxiety, hopelessness, existential distress, and social support [12].

Study conducted in China indicated that depression (AOR = 6.41, CI 3.30-12.42, P <0.001), anxiety (AOR = 6.93, 95% CI 1.57-30.66, P = 0.011, moderate to severe pain (AOR = 2.35, 95% CI 1.32-4.17, P = 0.004), metastatic cancer (AOR = 2.94, CI 1.26-6.98, P = 0.015), poor performance status (AOR = 2.01, 95% CI 1.11-3.64, P = 0.021), surgery (AOR = 6.62, 95% CI 2.30-19.07, P <0.001), and palliative care (AOR = 1.90, 95% CI 1.01-

3.61, P = 0.049) were significantly associated with suicidal behavior [9].

A study done in Taiwan indicated that the first month of cancer diagnosis was associated behavior of suicide with in the first month (AOR = 3.47, 95% CI 52.60-4.62) and the sixth month following a cancer diagnosis (AOR = 1.53, 95% CI 51.11-2.12) [13].

According to a study conducted in Iceland suicidal behavior was after a cancer diagnosis (AOR = 1.6, 95% CI 1.4-1.9). The risk increase was greatest immediately after diagnosis; during the first year after diagnosis (AOR = 2.5, 95% CI 1.7-3.5) and thereafter diagnosis (AOR = 1.5 95% CI 1.2-1.8) [14].

A study done in Korea showed that suicidal behavior was associated with cancer stage, I stage (AOR = 1.97, 95% CI 1.05-3.69, P <0.05), living alone (AOR = 3.57, 95% CI 1.05-7.77, P <0.05) after 1-year diagnosis [15].

A study was done in South Korea showed that the risk of suicide attempts was significantly higher in participants diagnosed with cancer before 45 years of age compared with those diagnosed at 45 years - 64 years (AOR = 3.81, 95% CI 1.07-13.60, P = 0.039), and the higher risk of suicide attempts with borderline significance was found in those for whom more than 10 years had passed since diagnosis compared with those for whom the diagnosis was made only 2 years - 10 years ago (AOR = 3.38, 95% CI 1.98-11.70, P = 0.055) [10].

Cancer patients are at high risk for suicide, particularly when they are informed about the cancer diagnosis or hospitalized for cancer treatment. Therefore, oncology tertiary healthcare settings like Ayder comprehensive specialized hospital may represent an ideal setting to identify and treat suicidality in cancer patients in Mekelle, Ethiopia.

## **METHODS**

### ***Study Areas and Period***

This study was conducted in 2019 at Mekelle, oncology clinics, Ayder Comprehensive Specialized Hospital. According to the Ethiopian central statistical agency report, the total population in 2012 Ethiopian calendar has been 420,350, which is located in Tigray regional state 783 km away from Addis Ababa, the capital city of Ethiopia. Oncologic services are given by oncologists and general practitioners. More than 36 health professionals work in an oncologic clinic, out of them, 4 were oncologists. The current flow of oncologic patients on average was 1500 patients per month in Ayder Comprehensive Specialized Hospital, which has 25 beds for inpatient services. The study period was from April 10 to June 10, 2019.

### ***Study Design***

An institutional-based cross-sectional study was conducted.

Source population and study population.

### ***Source Population***

All oncologic outpatient unit visitors were in Mekelle, oncologic clinics, Tigray, Ethiopia.

### ***Study Population***

All oncologic sampled outpatient unit visitors were in Mekelle, oncologic clinics, Tigray, Ethiopia.

Eligibility criteria.

### ***Inclusion criteria***

Oncologic outpatient unit visitors, patients who had diagnosed known cancer and aged 18 years and above, patients attending treatment at the oncology clinic during the data collection period were included in the study.

### ***Exclusion criteria***

Patients who were unable to communicate, severe pain, unable to sign a verbal informed consent and those who had decision incapacity were not be included in the study.

### ***Sample Size and Sampling Procedure***

#### ***Sample size***

The sample size was calculated using a single proportion formula and since there is no study published in Ethiopia show the prevalence so that we used 50%. Other assumptions made during the sample size calculation are 5% marginal error (d) and a confidence interval of 95% ( $z_{\alpha/2} = 1.96$ ). Based on these assumptions, the sample size calculated as follows:

$$n = Z^2 pq / d^2 \quad (1)$$

$n = (1.96)^2(0.50.5)/(0.05)^2 = 384$ . But during that study, 39 respondents missed from the study though we tried a 10% non-response rate, no participants participated. So, the final sample size was 345.

#### ***Sampling technique and procedure***

The systematic sampling technique was employed. The study participants were proportionally taken. Since the ratio of 1500 samples to 345 was 4, we took every 4 samples were selected.

#### ***Data Collection Procedure***

Face to face interview method using a structured questionnaire was used in this study to identify the magnitude and associated factors of suicidal behavior such as (1) Sociodemographic information, (2) Biopsychosocial and (3) Suicidal behavior.

The SBQ-R is a self-report measure of suicidal behavior. This shortened version of the SBQ consists of four questions to assess suicidal behavior history, current suicide status and self-appraisal and expectancies about the future likelihood of engaging in suicidality. The magnitude of overall suicidal behavior (as defined by SBQ-R a total score  $\geq 8$  for adult clinical population) and the total score ranges from 3 to 18.

The Oslo 3-items social support scale (OSSS-3) was used to measure the strength of social support. The scores range from 3-14. A score ranging between 3 and 8 is classified as poor support, a score between 9 and 11 as moderate support, and a score between 12 and 14 as strong support. These three items were considered to be the best predictors of mental health, covering different fields of social support.

Data were collected by seven B.Sc. oncology professionals having previous experience of data collection. The principal investigator checked the filled questionnaires for consistency and completeness each day. The questionnaire was translated from English to Tigrigna language by English teacher and retranslated to English by another expert in English. This primary version was made to compare with the original English version to resolve inconsistencies and then the data collectors, who are Tigrigna native speakers, collected data in the Tigrigna questionnaire.

#### ***Study Variables***

##### ***Dependent variables***

Suicidal behavior.

##### ***Independent variables***

Socio-demographic, medical and psychiatry illnesses and substance.

#### ***Operational Definitions***

Suicidal behavior: after the diagnosis of cancer, the patient experience of having recurrent thought of death, ideation, intention, and plan to kill oneself and having organized plan; and based on SBQ-R scale scores  $\geq 8$  from 18, the total scale scores range from 3 to 18 [16].

- 0-7 no suicidal behavior.
- 8-18 suicidal behavior.

**Social support:** The OSSS-3 sum score can be operationalized into three broad categories of social support [17].

- 3-8 poor social support.
- 9-11 moderate social support.
- 12-14 strong social support.

#### ***Data Quality Assurance***

The pre-test was conducted on a sample of 10% (34 samples) of the total study population in Quiha General Hospital before one month of data collection and a common understanding was reached between the data collectors. The pre-test questionnaires were not included in the analysis as part of the main study. Data collection was collected within 50 working days. Regular supervision by the principal investigator was done. During data collection, filled questionnaires were checked for completeness and consistency daily.

#### ***Data Analysis Procedure***

After data collection, filled questionnaires were coded. The data were entered using Epi data version 4.2 statistical software to minimize error that occurs during data entry and exported to SPSS; and analyzed using SPSS version 25. Data cleaning was performed to check for frequencies, accuracy, and consistencies and missed values and variables. The finding of this study was presented using text and tables form the result of frequencies and crosstabs.

A bivariate logistic regression model analysis was done to see the association between the risk factors and outcome variables. Multivariable logistic regression analysis was employed by selecting only variables with a P-value  $< 0.25$  in the bivariate analysis. The odds ratio with 95% CI was used to measure the strength between dependent and independent variables at P-value  $< 0.05$  to determine the level of statistical significance. Variables with the P value

less than 0.05 in multivariate regression were considered to be potential predictors for suicidal behavior.

## RESULTS

### Sociodemographic Characteristics

A total of 345 respondents were enrolled in the study, making a 100% response rate. Of those enrolled, 164 (47.5) were females. Age who are in 25 years - 34 years old were 27 (39.1) had suicidal behavior whereas 92 (33.3) had no. Participants who had suicidal 38 (55.1) and not suicidal 122 (44.2) were single in marital status.

Variable	Category	Suicidal Behavior (20%)	
		No	Yes
Age	18-24	44(15.9)	14(20.3)
	25-34	92(33.3)	27(39.1)
	35-45	85(30.8)	18(26.1)
	≥46	55(20)	10(14.4)
Gender	Male	139(50.4)	42(60.9)
	Female	137(49.6)	27(39.1)
Marital Status	Single	122(44.2)	38(55.1)
	Married	107(38.8)	24(34.8)
	Divorced/Widowed/Separated	47(17)	7(10.1)
Ethnicity	Tigray	256(92.8)	59(85.5)
	Afar	12(4.3)	5(7.2)
	Wollo	8(2.9)	5(7.2)
Educational Status	Illiterate	64(23.2)	11(15.9)
	Read and Write Only	29(10.5)	3(4.3)
	Primary School	54(19.6)	13(18.8)
	Second School	82(29.7)	20(29.0)
	Tertiary School	47(17.0)	22(31.9)
Occupation	Unemployed	97(35.1)	19(27.5)
	Government	38(13.8)	12(17.4)
	Farmer	88(31.9)	21(30.4)
	Student	53(19.2)	17(24.6)
Income (ETB)	500-1000	22(25)	7(23.3)
	1001-2501	32(36.4)	10(33.3)
	2501-3000	7(8.0)	2(6.70)
	3501-5000	13(14.8)	1(3.3)
	≥5001	14(15.9)	10(33.3)
Living With Whom	Alone	36(13.0)	12(17.4)
	With Family	128(46.4)	33(47.8)
	With Relative	112(40.6)	24(34.8)
Education-Related Stress	No	156(73.6)	38(65.5)
	Yes	56(26.4)	20(34.5)
Work-Related Stress	No	43(48.9)	11(36.7)
	Yes	45(51.1)	19(63.3)

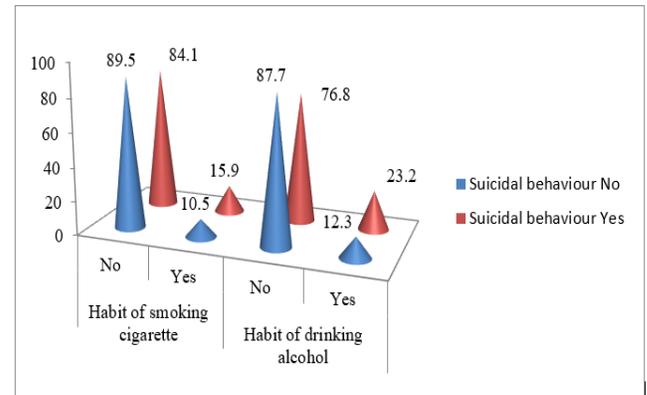
**Table 1:** Sociodemographic characteristics among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345).

Nearly half of participants 160 (47.5) were married. Concerning educational status, 75 (21.7) of respondents were illiterate and 67 (19.4) of them attended primary

school. Regarding occupation, unemployed were 116 (33.6) and 29 (8.4) of them, were daily laborer (Table 1).

### Substance Use History

Regarding the frequency of taking the substance, (10.5%) participants that had no suicidal behavior and (15.9%) participants that had suicidal behavior smoked a cigarette (Figure 1).



**Figure 1:** Substance characteristics among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345).

### Comorbid Medical and Psychiatric Illness

From all respondents participated in study 345 (20%) of them had suicidal behavior. Out of those participants with comorbid physical illness had 37.7% suicidal behavior. The magnitude of suicidal behavior among cancer patient with attempt suicide previously was 76.8%.

The magnitude of suicidal behavior was higher in respondents with stomach cancer at 46.4%. Regarding the history of psychiatric disorder, schizophrenia 42.9%, major depressive disorder 28.6%) and bipolar I disorder 14.3% had suicidal behavior.

The distributions of suicidal behavior among patients who had a family history of suicide attempt 15.9% and the stage of cancer participants with local stage were 42.0% (Table 2).

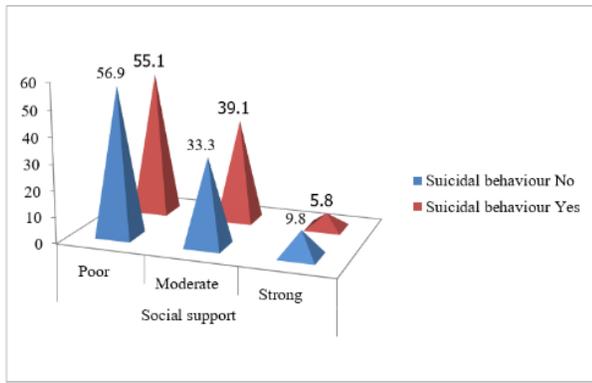
Variables	Category	Suicidal Behaviour (20%)	
		No	Yes
Comorbid Physical Illness	No	81.5	62.3
	Yes	18.5	37.7
Type/s of Physical Diagnosis	Hypertension	17.6	23.1
	TB	5.9	23.1
	HIV/AIDS	11.8	11.5
	DM	21.6	7.7
	Epilepsy	15.7	7.7
	Asthma	7.8	3.8
Previous Psychiatry History	No	83.3	69.6
	Yes	16.7	30.4
History of Psychiatric Disorder	Schizophrenia	63.0	42.9
	Major Depressive Disorder	15.2	28.6
	Bipolar I Disorder	10.9	14.3
	Other	10.9	14.3
Attempt Suicide Previously	No	88.8	23.2
	Yes	11.2	76.8
Family History of Suicide Attempt	No	96.4	84.1
	Yes	3.6	15.9
Patient's Types of Cancer	Stomach Cancer	26.8	46.4
	Liver Cancer	12.7	11.6
	Lung Cancer	43.8	29.0
	Breast Cancer	4.0	4.3
	Cervical Cancer	3.3	2.9
	Colon Cancer	4.3	1.4
	Other	5.1	4.3
Cancer Stage	Moderate to Severe	10.1	21.7
	Local	47.5	42.0
	Regional	30.4	26.1
	Metastatic	12.0	10.1
Duration of Illness Before Starting Treatment	Less than 1 Year	17.8	15.9
	2 Years - 5 Years	40.2	49.3
	≥15 Years	42.0	34.8
Hospital Admission	No	79.3	62.3
	Yes	20.7	37.7
How Long Admitted	1 Week	29.8	26.9
	2 Weeks	21.1	34.6
	3 Weeks	33.3	19.2
	One Month and Above	15.8	19.2
Current Treatment Regimen	Chemotherapy	9.8	29.0
	Radiotherapy	53.6	50.7
	Palliative Therapy	29.0	17.4
	Surgery	7.6	2.9
Current Status of Treatment	No	93.5	96.8
	Yes	6.5	3.2

**Table 2:** Comorbid medical and psychiatric illness characteristics among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345). **Note:** A physical illness that comorbid with cancer includes TB (tuberculosis), HIV/AIDS (Human immune deficiency virus/Acquired immune deficiency syndrome), and diabetes mellitus (DM). Psychiatric illness that comorbid with cancer includes PTSD (post-traumatic stress disorder), OCD (obsessive-compulsive disorder) and BDD (body dysmorphic disorder). Other in physical diagnosis includes weakness, sepsis, traumatic brain injury (TBI). Other in psychiatric disorder includes PTSD, OCD and BDD. Other in types of cancers includes brain cancer, uterine cancer.

### Social Support

Respondents with poor social support (55.1%) and Moderate social support (39.1%) had a higher prevalence

of suicidal behavior than with strong social support 5.8% (Figure 2).



**Figure 2:** Social support characteristics among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345).

**Suicidal Behavior Assessment (SBQ-R)**

This study reported that the magnitude of suicide behaviour was 20%.

This study found that (80.8%) never lifetime suicidal ideation, intention and attempt and (68.1%) suicidal participants had suicide attempt history. The Frequency suicidal ideation in the past year more than half of the participants reported never and one-fourth participants once a time in the past year (Table 3).

Variable	Category	Suicidal Behavior (20%)	
		No	Yes
Lifetime Suicidal Ideation, Intention, and Attempt	Never	223(80.8)	0(0.0)
	Suicidal Deaction	36(13.0)	4(5.5)
	Suicidal Intention	8(2.9)	18(26.1)
	Suicide Attempts	9(3.3)	47(68.1)
Frequency Suicidal Ideation in the Past Year	Never	239(86.6)	9(13.0)
	Once	34(12.3)	32(46.4)
	Twice	2(0.7)	18(26.1)
	3 times - 4 times	1(0.4)	6(8.7)
	≥5 times	0(0.0)	4(5.8)
Suicidal Threats	No	268(97.1)	23(33.3)
	Once	8(2.9)	39(56.5)
	Twice and More	0(0.0)	7(10.1)
Likelihood of Suicide in the Future	Never	174(63.0)	0(0)
	No Chance at All	90(32.6)	7(10.1)
	Unlikely	12(4.3)	15(21.4)
	Likely	0(0.0)	47(68.2)

**Table 3:** Suicidal behavior assessment among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345).

**Bivariate Regression of Analysis of Suicidal Behavior**

In the bi-variable logistic regression analysis, variables such as diagnosis, educational status, psychiatric

comorbidity and alcohol use, hospital admission, current treatment, family history of suicide and previous suicidal attempt were a candidate for multiple logistic regression with (P-value <0.25) (Table 4).

Variables	Category	COR (95% CI)	P-value
Educational States	Illiterate	.367 (.162, .830)	.016
	Read and Write	.221 (.061, .804)	.022
	Primary School	.514 (.234,1.132)	.099
	Secondary School	.521 (.258,1.053)	.069
	The tertiary School	Reference	
Diagnosis of Comorbid Physical Illness	No	Reference	
	Yes	2.668 (1.503,4.736)	0.000
Psychiatric Comorbidity	No		
	Yes	2.187(1.197,3.996)	0.011
Family History of Suicidal Attempt	No	Reference	
	Yes	5.045 (2.046,12.436)	0.001
Current Treatment Regimen	Chemotherapy	Reference	
	Radiotherapy	.319 (.161, .634)	0.01
	Palliative therapy	.203 (.088, .468)	0.000
	Surgery	.129 (.027, .613)	0.010
Hospital Admissions	No	Reference	
	Yes	2.323 (1.317,4.098)	.004
The Habit of Drinking Alcohol	No	Reference	
	Yes	2.149 (1.106,4.176)	0.024

**Table 4:** Bivariate regression of analysis of suicidal behavior among cancer patients visiting the oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345).

**Note:** N.B COR = Crude odds ratio.

**Multivariable Logistic Regression Factors Independently Associated with Suicidal Behavior**

All variables that had P <0.25 in the bivariate analysis were included in multivariate analysis for backward logistic regression. From total variables included in the logistic regression models, two variables were found to be statistically significant at the level of P <0.05 and one variable as protective factors. As of this result, participants had no comorbid physical illness 63.7% [AOR =0.363, 95% (0.164, 0.806)] less likely to develop suicidal behavior than had a comorbid physical illness. Current treatment regimen was also as significant protective factor for suicidal behavior that is radiotherapy [AOR = .178, 95% CI (.066, .479), P = 0.001], palliative therapy [AOR = .204 (.067, .621), P = 0.005], and surgery [AOR = .054, 95% CI (.007, .424), P = 0.006].

Regarding previously family suicidal attempt 31 times more likely to develop than respondents did not attempt suicide previously [AOR = 31.466, 95% CI (14.552, 68.042),  $P < 0.0001$ ] (Table 5).

Variable	Category	AOR (95% CI)	P-value
Comorbid Physical Illness	No	.363 (.164,.806)	.013*
	Yes	Reference	
Current Treatment Regimen	Chemotherapy	Reference	
	Radiotherapy	.178 (.066,.479)	.000*
	Palliative therapy	.204 (.067,.621)	.005*
	Surgery	.054 (.007,.424)	.006*
Family Attempt Suicide Previously	No	Reference	
	Yes	17.466 (14.552,21.042)	.0001*

**Table 5:** Multivariable logistic regression of analysis of suicidal behavior among cancer patients visiting oncology outpatient unit in Mekelle oncologic clinics, Tigray, Ethiopia, 2019 (N = 345). Note: \*Indicates variables which show significant factors with suicidal behavior at multivariate analysis at P-value less than 0.05.

## DISCUSSION

Suicide behavior is by definition, collectively explained words like hopelessness, suicidal thought, intention, organized pan and self-inflicted and/or para-suicide by different things in different settings and conditions.

This study showed that the magnitude of suicide behavior was 20%. This lower than a study done in Colorado (46.3%) [12], this discrepancy due to sample size and tool. Whereas it is higher than studies conducted in USA (0.07%), Canada (15.7%), China (15.3%), and Korea (11.4%) [7-10]. This might be due to sample size, settings, scale, infrastructure and domestic, and community-based study in the USA.

In the study, cancer like cervical cancer was 3.3%, which is lower than a study done in USA [7]; the magnitude of cervical cancer was 78.1% and this discrepancy might be due to community-based study and sample size.

Current treatment regimen (Surgery and Palliative care) were significantly protective factors for suicidal behavior and this result is contrasted with a study done in China [9],

which were associated factors. It might be due to tool, settings, and sample size of the population.

No comorbid physical illness and suicide attempt were significant factors of suicidal behavior but not in other studies [19,20].

## CONCLUSION

No comorbid physical illness, suicide attempt and current treatment regimen were significant factors of suicidal behavior.

## RECOMMENDATION

- I. Oncologic professionals should assess patient suicidal risk assessment routinely and should put the diagnosis with suicidal if the client is suicidal so that every professional focuses on management besides the medication.
- II. Oncologic professionals should assess patient whether he/she has a comorbid physical illness or not to prevent the complication of cancer together with suicide which in turn refused to take proper management because of hopelessness.
- III. Educate the family/caregivers of suicidal patients with previous attempts, suicidal thought and intention to have closely followed up.
- IV. It is also recommended researchers to conduct further research studies.

## LIMITATION OF THE STUDY

Inspite of providing valuable baseline data, there are also some limitations encountered:

1. Social interest bias as the data was collected by a face to face an interviewer-administered approach. So the respondents might reply in favor of others that are either over-reporting or under-reporting because of the illness severity.

2. Recall bias; there might be forgetfulness and there was not cross-check about the information they gave us because treatment and/or healthcare service.
3. In this study, only adult oncologic patients were included, so it is difficult to generalize all oncologic patients because children and adolescents' oncologic patients are not included in the study.

## **DECLARATION**

### ***Ethics Approval and Consent to Participate***

This study was carried out after obtaining ethical approval from Mekelle University, College of Health Science office of Health Research Ethics Review Committee (HRERC) with the reference number of Notification of Expedited Approval ERC 1301/2019.

Permission letter was obtained from Mekelle University to oncologic clinics, and finally, the letter was distributed to oncologic professionals, data collectors, who work in the oncologic clinics. Verbal consent was attained from each participant before starting data collection. Study participant had the right to withdraw from the study at any time and information was recorded anonymously.

### ***Consent for Publication***

Consent of publication for this research is Mekelle University, College of health science, oncology and psychiatry department and participants.

### ***Availability of Data and Materials***

All availability of data and material is attached to the manuscript.

### ***Competing Interests***

We three authors declare that we have no conflict of interest for example on financial support for educational programs, employment or consultation, support from a project sponsor, position and/or rank on advisory board or else type of management relationships and multiple affiliations.

### ***Authors' Contributions***

The principal investigator was AT. All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by AT, WM and BG. The first draft of the manuscript was written by Abreha Tsegay and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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