Depressive symptoms and associated factors among public high school students in Bahir Dar City, Northwest Ethiopia: A cross-sectional study

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Abstract

Background: Depression is the most prevalent mental disorder in adolescents that lead to educational impairment, substance use problems, and suicidal attempts. The aim of this study was to assess depressive symptoms and their associated factors among public high school students in Bahir Dar city, Northwest Ethiopia.

Methods: An institution-based cross-sectional study was conducted from March to April 2021 at Bahir Dar City public high school students. Data were collected from 781 participants using a self-administered questionnaire. Participants were selected using the multistage sampling method. Patient health questionnaire 9 modified for adolescents (PHQ-9A) was used to measure depressive symptoms. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 25. Logistic regression analysis was done to identify factors associated with depressive symptoms. Variables with P-value <0.05 were considered statistically significant.

Result: The prevalence of depressive symptoms were found to be 19.7% (CI=16.9, 22.6). Depressive symptoms were significantly associated with female sex (AOR=2.36, 95% CI=1.54-3.61), having known medical conditions (AOR=1.85, 95% CI=1.03-3.31), poor social support (AOR=1.83, 95% CI=1.03-3.31), childhood abuse (AOR=2.02, 95% CI=1.28-3.20) and neglect (AOR=2.78, 95% CI=1.70-4.55), and occupation of mother (AOR=0.38 CI=0.15-0.95).

Conclusions: One in five public high students reported depressive symptoms. Schools need to institute routine mental health screening services and implement appropriate interventions to initiate and improve access to school-based mental health services, particularly for female students.

Introduction

Adolescence is the peak age of onset for depression disorder (1). The transition period from childhood to adulthood is particularly a stage marked by emotional instability that makes adolescents vulnerable to depression (2). Half of all mental health conditions start at 14 years of age but most cases are undetected and untreated (3). Early depression especially persistent childhood/adolescent depressive symptoms have robust, lasting associations with adult functioning (4). Early intervention may reduce the long-term burden of disease (5). Approximately 60.1% of adolescents with major depressive episodes did not receive treatment (6). World Health Organization (WHO) identified depression as a priority mental health disorder of adolescence because of its high prevalence and associated disabilities, including increased risk of suicide (5, 7, 8). Depression is also one of the leading causes of illness and disability among adolescents (9).

The lifetime prevalence of major depression in adolescence is 15–20% globally (10). In the USA, the prevalence of major depressive episodes was higher among adolescent females (20.0%) compared to males (6.8%) (11). A systematic review done on the prevalence of mental health problems in sub-Saharan adolescents showed that the median point prevalence of depression among adolescents is 26.9% (12).

The strongest risk factors contributing to depression in adolescents are a family history of depression and exposure to psychosocial stress, inherited risks, developmental factors, sex hormones, and psychosocial adversity interact to increase risk through hormonal factors and associated perturbed neural pathways (7). Understanding the risk factors of depressive symptoms is a vital first step in contributing to planning preventive and control strategies (13). However, evidence on the magnitude and associated factors of depressive symptoms among high school students is scarce in Ethiopia (14–18). Therefore, the purpose of this study was to determine the magnitude of depressive symptoms and their associated factors among public high school students.

Material And Methods

Study design and setting

An institutional-based cross-sectional study was conducted from March to April 2021 at Bahir Dar City, Northwest Ethiopia. Bahir Dar city is located in Northwestern Ethiopia and is the 3rd largest city in Ethiopia. The city has an estimated population of 170,000. Bahir Dar is the capital city of the Amhara Regional State. The city is located 578 km far apart from Addis Ababa and has an elevation of 1840m above sea level. Bahir Dar city administration is divided into six administrative sub-cities. Regarding Education services, the city comprises eleven public high schools with a total number of students 23,316 in the academic year of 2020/2021.

Source populations and study populations

All regular public high school students in Bahir Dar City were the source of the population. The study populations were all selected students in the three selected public high schools.

Sample size and sampling procedure

The sample size was calculated using a single population proportion formula considering 36.2% depression (17), 95% confidence interval, 5% margin of error, 2 design effects, and 10% non-response rate. The final sample size was 781. A multistage sampling technique was used to select participants. In the first stage, three schools were selected from eleven public high schools by lottery method. In the second stage, students of the selected public high schools were categorized into grade levels from 9th to 12th separately. The sampling frame of students in each of the grade levels and sections was obtained from the academic director offices of schools.

Then the students were stratified according to their grade level and sections. The sample sizes were distributed to each grade and section proportionally according to the class size of the grade level. Finally, students were chosen from each grade level 9th – 12th and section using a simple random sampling technique (see Fig. 1 below).

Study variables

The dependent variable was depressive symptoms among public high school students (yes/no). Independent variables included were socio-demographic factors (age, sex, level of grade, living status, residence, educational status of the father, educational status of the mother, occupation of the father, occupation of the mother, parental marital status); psycho-social factors (adverse childhood experience, social support); health-related factors (family history of mental illness, having known medical illness); substance-related factors (alcohol use, khat use, tobacco use, and marijuana use).

Data collection and measurement tools

Data were collected by self-administered questionnaire consisting socio-demographic factors, patient health questioner modified for adolescent (PHQ-9A), adverse childhood experience (ACEs), clinical features, social support, substance use assessment, and academic stressors. Depressive symptoms were assessed by Patient health questionnaire 9 modified for adolescents (PHQ-9A), a self-report instrument comprised of 9-items. Items are rated on a four-point ordinal scale. The total PHQ-9A score for each respondent was calculated by adding all 9 items and scores range from 0 to 27. The total scores were then categorized into 0–4 Minimal depression, 5–9 mild depression, 10–14 moderate depression, 15–19 moderately severe depression, and 20–27 severe depression (19). In this study, PHQ-9A was checked for reliability test, and it has been found to have Cronbach's alpha of 0.79 to assess depressive symptoms.

Adverse childhood experience was assessed by adverse childhood experience (ACEs). It addresses 10-item ACEs under three categories: (1) abuse (2) neglect, and (3) household dysfunction. The higher the ACE Score indicates the greater the likelihood of exposure to adverse childhood experiences. The ACE questionnaire is reliable and valid in measuring childhood adverse experience that has been used in large-scale ACE studies (20). In the current study, Cronbach's alpha was 0.71.

Substance use was assessed by adopting questions from the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). ASSIST was developed by the World Health Organization with fair reliability ($\alpha = 0.73$) (21).

Oslo 3 Social Support Scale was used to know the level of social support towards students. The scale divides the level of social support into three as poor social support (3–8), moderate social support (9–11), and strong social support (12–14). The internal consistency of this tool (Cronbach's $\alpha = 0.91$) among university students in Nigeria (22).

The questionnaire was prepared in English and translated into the Amharic language and then back-translated into English by two experts to ensure consistency and understandability. The Amharic version was used to collect the data. The instruments were pre-tested in 5% ($n = 39$) of sample size. The training was given to supervisors by the principal investigator regarding the questioners' detail, methods of data collection, quality control, and ethical consideration. After data collection, the filled questionnaires were checked for completeness and consistency.

Data analyses

The data were cleaned, coded, and entered into the computer using Epi-Data version 3.1 and analyzed using Statistical Package for Social Sciences (SPSS) version 25. The presence of an association between dependent and independent variables was assessed using logistic regression. Variables with a p-value less than 0.25 at univariable logistic regression were entered into multivariable logistic regression. Statistical significance was considered at a p-value less than 0.05, and the strength of association was estimated by odds ratio with a 95% confidence interval. Descriptive statistics including frequencies, percentages, and median was used to describe findings.

Results

Socio demographic characteristics of participants

A total of 756 (54.5.7% female) students were participated, yielding a response rate of 96.8%. The mean age of participants was 17.79 years (SD $\pm$ 1.49). Among all, 524 (69.3%) were living with both parents (See Table 1 below).

Table 1

Distribution of socio-demographic factors in public high school students at Bahir Dar city, 2021 (n = 756).

Variables	Category	Frequency(756)	Percent (%)
Sex	Male	344	45.5
	Female	412	54.5
Age	14–16	141	18.7
	17–19	522	69.0
	20–22	93	12.3
Religion	Orthodox	697	92.2
	Muslim	37	4.9
	Protestant	17	2.2
	Catholic	5	0.7
Educational level of respondents	9th	217	28.7
	10th	214	28.3
	11th	164	21.7
	12th	161	21.3
Residence of respondents	Urban	674	89.2
	Rural	82	10.8
Occupation of father	Government employee	233	30.8
	Merchant	181	23.9
	Farmer	196	25.9
	Daily labor	39	5.2
	Other**	107	14.2
Occupation of mother	Housewife	463	61.2
	Merchant	70	9.3
	Government employee	98	13.0
	Farmer	76	10.1
	Daily labor	17	2.2

*= Institution care, with husband and worker as maid **=car deliver, student, religious leader ***= maid, student

Variables	Category	Frequency(756)	Percent (%)
	Other***	32	4.2
Educational level of father	Unable to read and write	105	13.9
	Read and write	269	35.6
	Elementary school	102	13.5
	High school and above	280	37.0
Educational level of mother	Unable to read and write	233	30.8
	Read and write	233	30.8
	Elementary school	112	14.8
	High school and above	178	23.5
Parental marital status	Married	624	82.5
	Divorced	109	14.4
	Separated/widowed	23	3.0
Living status of respondents	With both parents	524	69.3
	With one parent	106	14.0
	With relatives	89	11.8
	Alone	31	4.1
	Other*	6	0.8
*= Institution care, with husband and worker as maid **=car deliver, student, religious leader ***= maid, student			

The Magnitude of Depression among public high school students

The prevalence of depressive symptoms were found to be 149 (19.7%) (95% CI = 16.9–22.6). Based on the severity scale, 101(13.4%) had moderate depression, 38(5%) had moderately severe depression, and 10(1.3%) of participants had severe depression.

Adverse Childhood Experience among public school students

Among the 756 students who participated in this study, 389 (51.5%) of the participants answered yes to at least one or more questions among the total 10 questions of ACEs. According to the 3 categories of adverse childhood experience (ACE) from 344 female students, 103 (25.0%) had been abused emotionally, physically, or sexually (See Table 2 below).

Table 2: The cross-tabulation of ACE category by sex of public high school students at Bahir Dar city, 2021 (n = 756).

ACE category	Girls (N=344), %	Boys (N=412), %	Overall (N=756), %	P-value
Abuse	25.0	31.7	28	0.042
Neglect	18.0	16.3	17.2	0.542
Household dysfunction	33.0	42.7	37.4	0.006

Health related factors of participants

Of the total respondents of 756, 76 (10.1%) have known medical illness. Likewise, 44 (5.8%) have a family history of mental illness. Measurement by the Oslo 3-Item Social Support Scale showed that 297 (39.3%) had poor social support, 288 (38.1%) where had moderate social support and 171 (22.6%) had strong social support.

Substance use among high school students

The life time use of substance was 18%. One hundred one (13.4%) of students used substances within 3 months (See Table 3 below).

Table 3: Description of substance use among high schools students at Bahir Dar city, 2021 (n = 756).

Variables	Response	Frequency	Percent (%)
Life time substance use	No	620	82.0
	Yes	136	18.0
Substances used in lifetime	Khat	24	3.2
	Cigarette	16	2.1
	Alcohol	89	11.8
	Marijuana	3	0.4
	More than one substance	4	0.5
Substance use within 3 months	No	655	86.6
	Yes	101	13.4
Substances used within 3 months	Khat	17	2.2
	Cigarette	15	2.0
	Alcohol	61	8.1
	Marijuana	5	0.7
	More than one substance	3	0.4

Factors associated with depression

The current study indicated that factors associated with depression are the sex of participants, have known medical conditions, social support, and childhood abuse, and neglect experience. The odds of developing depression was 2.40 times (AOR = 2.40, 95% CI = 1.56–3.68) higher in females compared to males. The odd of developing depression among participants of merchant mothers decrease by 61% as compared to participants of a housewife (mothers AOR = 0.39, 95% CI = 0.15–0.98). The odds of having depression among respondents who have known medical conditions was 1.84 times higher than those without having known medical conditions (AOR = 1.84, 95% CI = 1.01–3.35). In this finding, the odds of having depression among respondents who have poor social support was 1.82 times (AOR = 1.82, 95% CI = 1.01–3.30) higher as compared to those who have strong social support. The odds of having depression among respondents who have a history of abuse were 2.07 times higher as compared to those who have no history of abuse (AOR = 2.07, 95% CI = 1.36–3.28). The odds of having depression among respondents who have a history of neglect 2.57 times (AOR = 2.57, 95% CI = 1.56–4.24) is higher as compared to those who have no history of neglect (see Table 4 below).

Table 4

Bivariable and Multivariable binary logistic regression analysis showing association between depression and associated factors among public high school students, 2021 (n = 756).

Explanatory variables	Variables category	Depression		COR (95%CI)	AOR, (95%CI)	p-value
		No	Yes			
Sex	Male	295	49	1.00	1.00	
	Female	312	100	1.93(1.32–2.81)	2.36(1.54–3.61)	< 0.0001
Living status	With both parents	438	86	1.00	1.00	
	With one parent	80	26	1.66(1.01–2.73)	1.26(0.60–2.65)	0.536
	With non-parent	89	37	2.12(1.35–3.31)	1.76(0.99–3.10)	0.051
Occupation of father	Government employee	177	56	1.00	1.00	
	Merchant	155	26	0.53(0.32–0.89)	0.62(0.33–1.16)	0.135
	Private employee	275	67	0.77(0.52–1.15)	0.73(0.40–1.33)	0.299
Occupation of mother	Housewife	378	85	1.00	1.00	
	Merchant	64	6	0.42(0.18–0.99)	0.38(0.15–0.95)	0.039
	Government employee	69	29	1.87(1.14–3.06)	1.71(0.93–3.15)	0.087
	Private employee	96	29	1.34(0.83–2.17)	1.11(0.63–1.94)	0.721
Educational level of father	High school and above	219	61	1.00	1.00	
	Unable to read and write	79	26	1.18(0.70,2.00)	0.94(0.46–1.90)	0.862
	Read and write	223	46	0.74(0.46,1.13)	0.67(0.38–1.18)	0.169
	Elementary school	86	16	0.67(0.37,1.22)	0.82(0.40–1.67)	0.578
Parental marital status	Married	512	112	1.00	1.00	
Hosmer and Lemeshow goodness of test p-value = 0.95						

	Unmarried	95	37	1.78(1.16–2.74)	1.38(0.72–2.66)	0.338
Abuse	No	467	77	1.00	1.00	
	Yes	140	72	3.12(2.15,4.53)	2.02(1.28–3.20)	0.003
Neglect	No	534	92	1.00	1.00	
	Yes	73	57	4.53(3.01,6.84)	2.78(1.70–4.55)	< 0.0001
Household dysfunction	No	404	69	1.00	1.00	
	Yes	203	80	2.31(1.60,3.32)	1.22(0.76–1.98)	0.414
Medical conditions	No	560	120	1.00	1.00	
	Yes	47	29	2.88(1.74,4.76)	1.84(1.01–3.33)	0.045
Family history of mental illness	No	579	133	1.00	1.00	
	Yes	28	16	2.49(1.31,4.73)	0.96(0.43–2.14)	0.925
Current substance use	No	538	119	1.00	1.00	
	Yes	69	30	1.90(1.19–3.05)	1.16(0.64–2.10)	0.624
Social support	Strong	151	20	1.00	1.00	
	Moderate	240	48	1.51(0.86,2.64)	1.49(0.82–2.72)	0.193
	Poor	216	81	2.83(1.67,4.82)	1.83(1.02–3.31)	0.044
Hosmer and Lemeshow goodness of test p-value = 0.95						

Discussion

This study showed that the magnitude of depressive symptoms were 19.7% with (95% CI = 16.9%-22.6%). This implies that depression among high school students is a public health concern because it leads to problems in everyday activities, educational impairment, comorbid psychoactive substance abuse, poor psychosocial outcomes, including lower social support, and risky reproductive and sexual practices (23). Adolescent depression increases the risk for subsequent depression later in life (5). The current study is consistent with the study reported 21.0% in Uganda (24), 21.2% in Nigeria (25), 19.9% in China (26), and 20.3% in India (27). The current study is lower than in studies reported 28% in Southwest Ethiopia (28), 45.9% in Kenya (29), 62.6% in India (30), 25% in Bangladesh (31), and 42.5% in Malaysia (32). It is higher

than in studies which reported 14.9% in Northern Ethiopia (17), 14.19% in Thailand (33), 13.6% in Korea (34), and 14.2% in Jamaica (35), and. Such a degree of difference in the prevalence of depression across the different parts of the world could originate from variations in the depression screening tools used, different study periods, and different populations. A study done in Malaysia used Depression, anxiety and stress scale (DASS) and a cross-sectional study in Korea used health-related behaviors 7 items. A study done in India and Jamaica used Beck's Depression Inventory-II and a cross-sectional study in Bangladesh and Thailand were used the Center of Epidemiologic studies depression scale (CES-D).

Moderate depression was 13.4% which was consistent with the study reported 11.4% in North Ethiopia (17), 16.1% in Nigeria (25), and 15.5% in India (27), and. The prevalence of moderately severe depression was found to be 5%. It is consistent with the study reported 5.1% in Nigeria (25), and 3.7% in India (27). The prevalence of severe depression was 1.3%. This is consistent with findings reported 1.3% in Southwest Ethiopia (28), 1.1% in India (27).

Sex is one of the important factors contributing to depression (11, 17, 36). The current study indicated that female participants had more than twofold ($AOR = 2.40$) odds of having depression as compared to male participants. This was supported by the study conducted in Ethiopia (17, 37), in India (38), in Malaysia (36), and Bangladesh (31). This may be due to different psychosocial stressors for females and male (39), involve hormonal differences, and females being more sensitive to interpersonal relationships problem (40).

Having known medical conditions is another factor that contributes to depression among high school students. The current study showed that participants who have known medical conditions had 1.83 times the odds of having depression than those who have no known medical conditions. This finding is consistent with a meta-analysis done in Germany (41). This may be due to having known medical conditions increase psychological stressors and affect cognitive mechanisms. In addition to this, physical illness can also cause depression directly by affecting brain functions (40).

During adolescence, social support is a strong protector against a wide range of adversities and is necessary for ensuring health development (41). In the current study odds of having depression among respondents who have poor social support was 1.82 times ($AOR = 1.8$, 95% $CI = 1.01-3.30$) higher as compared to those who have strong social support. This finding is consistent with studies done in Aksum (17), Jimma (37), and Kenya (29). This might be due to poor social support directly affecting social relationships and indirectly increasing the risk to face stressful circumstances (41).

Adverse childhood experiences (ACE) are another factor that contributes to depression (42). In the current study, the odds of having depression among respondents who have a history of abuse were twofold times higher as compared to those who have no history of abuse ($AOR = 2.07$, 95% $CI = 1.30-3.30$). This finding is consistent with the study done in Jimma (37), India (27), and meta-analysis studies done in China (43). Similarly, the odds of having depression among respondents who have a history of neglect 2.57 times ($AOR = 2.57$, 95% $CI = 1.64-4.51$) is higher as compared to those who have no history of neglect. This finding is in concordance with studies done in Aksum (17), and Jimma (37). This may be

due to the increased ACE leads to health risk behaviors such as substance abuse, alcoholism, drug abuse, and chronic disease even suicide (44). As research shows that chronic stress plays a critical role in the development of hippocampal and medial prefrontal cortex deficits, which are the well-documented neural abnormalities in depression (45).

The odds of developing depression among participants whose merchant mothers decrease by 61% as compared to participants of housewife mothers. This may be due to better income than housewives.

Limitation of the study

The study has some limitations. First, it is cross-sectional in design, so the direction of causality between depression and associated variables could not be inferred from the findings. Second, the recall bias may occur for questions about adverse childhood experience. Thirdly, the parenting style, family dynamics, self-esteem, and negative life events of the students were not assessed. Those variables may be important factors for depression among adolescent population.

Conclusion

The prevalence of depression among public high schools students in Bahir Dar city is high. One in five students was found to have depression in Bahir Dar city. The sex of participant, occupation of mother, having known medical conditions, lifetime substance use, social support, abuse, and neglect were significantly associated with depression. Schools need to institute routine mental health screening services and implement appropriate interventions to initiate and improve access to school-based mental health services, particularly for female students.

Abbreviations

ACE: Adverse Childhood Experiences, BDI II: Beck's Depression Inventory-II, CDI: Children Depression Inventory, CES-D: Children Epidemiologic Studies-Depression Scale, DASS: Depression, Anxiety and Stress Scale, DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, LMICs: Low-income and Middle-Income Countries, PHQ-9A: Patient Health Questionnaire-9 modified for adolescent, SPSS: Statistical Package for Social Sciences, USA: United State America, WHO: World Health Organization

Declarations

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding authors on reasonable request.

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Authors' contributions

DT developed the proposal, analyzed, and interpreted the data, and wrote the draft manuscript. TM, GA, and HT have revised the proposal, checked the data analysis, and revised the manuscript. DT TM, GA, and HT have read and approved the final manuscript.

Ethics approval and consent to participate

The ethics approval was obtained from the Institutional ethical review Board of Bahir Dar University College of medicine and health sciences and a permission letter were obtained from selected public high schools in Bahir City. Informed consent was obtained from participants. For students who are under 18 years old, parent consent forms were obtained from parents by written letter sent through their students before one week of data collection. The letter informs them of the purpose of the study, as well as provides them with the contact information of the principal investigator for any questions related to the study. The information from the individual participant was kept confidential.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Schematic representation of the sampling procedure among public high school students in Bahir Dar city, Northwest Ethiopia, 2021.