Prevalence and correlates of co-morbid anxiety and depression among patients with dental disease on follow up at Saint Paul's hospital millennium medical college, Addis Ababa, Ethiopia.

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Abstract: Objective: Anxiety and depression are the most common mental disorders co-occurring among people with dental diseases. However, research into co-morbid anxiety and depression and correlates in low- and middle-income countries is limited. Therefore, this study aimed to determine the prevalence of co-morbid anxiety and depression and associated factors in persons with dental disease. Institution cross-sectional design was used at Saint Paul's Hospital Millennium Medical College May, 2016. Data were collected using a pretested, structured, standardized and culturally validated version of Hospital anxiety and depression scale (HADS). Systematic sampling technique was used to selected study participants. The prevalence of co-morbid anxiety and depression were found to be 21.5%. In the multivariable analysis, poor social support [AOR= 2.54 95% CI (1.26, 5.15), oral bad odor [AOR= 8.21, 95% CI (4.09, 16.47), tooth loss [AOR= 2.18, 95% CI (1.13, 4.18), khat use [AOR=3.10, 95% CI (1.19, 8.06) and tobacco use [AOR=3.79, 95% CI (1.37, 10.50) were significantly associated with co-morbid anxiety and depression among people with dental disease. The prevalence of Co-morbid anxiety and depression was high among people with dental disease. Integrating mental health service into dental clinic is vital for early Identifying and treating anxiety and depression.

Keywords: Comorbidity, Anxiety, Depression, People with Dental Disease

1. Introduction

Oral disease is a serious community health issue (Glassman A and Buse K, 2008). It may involve restricted region of the human body but its effects and impacts involve all human body. The world health organization defines oral health "as' a state of being free from mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking and psychosocial wellbeing" (FDI, 2015.).

Dental diseases are serious and painful chronic disease which economic burden estimated 5% to 10% of public health expenses (Widström et al., 2004). Tooth decay is the most prevalent one which 5 billion peoples affected over the world and more than 90% of caries never treated (Moynihan and Petersen, 2004). In developed most industrialized countries dental disease affects large amount of adults and 60% to 90% of school-aged children (Petersen, 2003, Widström et al., 2004). In developing country the prevalence rate of dental disease is high(Petersen, 2003). Study done in Ethiopia the prevalence of oral hygiene practice was found 57.0% (Senait, 2016). More over different determinants of dental disease can expose to poor oral health. Such as high consumption of sugar content nutrients, sufficient disclosure to fluorides, fear of extracted pain or distress and absence of oral health services were high risk factors for dental diseases (Ogawa et al., 2005, Petersen, 2005).

Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. At its most severe, depression can lead to suicide (Organization, 2012). Globally depression is affecting over 350 million people worldwide(Marcus et al., 2012). The prevalence of depression is range from 10% to 15% worldwide (Demyttenaere et al., 2004). According to the WHO estimation, unipolar depressive disorders were ranked as the third leading cause of the global burden of disease in 2004 and will move into the first place by 2030 (Health, 2012). In Ethiopia, survey done in Addis Ababa show that the life time prevalence of mood disorders was 5.0% (Kebede and Alem, 1999).

Anxiety is an emotional state that helps normal individuals to defend themselves against a variety of threats. Additionally, anxiety disorders are a dysregulation of these normal defensive mechanisms, with either excessive or deficient responses(Nesse, 1994). The National Comorbidity Study reported that one out of four persons met the diagnostic Criteria for at least one anxiety disorder and that there is a 12-month prevalence rate of 17.7% in the world (McLean

et al., 2011). Study done in Ethiopia at jimma university the prevalence of anxiety among university students was 41% (Ayele and Mengistu, 2004).

Patients with dental problem suffer from both physical and mental disorders. Depression and anxiety are the most intermittent emotional disorders occurring among dental patients. Greater than 73% of patients with dental disease had psychiatric co-morbidity and 14% of them had mixed anxiety and depressive disorders (Ray et al., 2015). The study result show in USA and Finland the prevalence of co-morbid anxiety and depression are 8.6%(Wiener et al., 2015), 60%(Pohjola et al., 2011) respectively. Study conduct in different countries on prevalence of anxiety and depression among people with dental disease show that 84% (anxiety), 46% (depression) in Sweden(Bohman, 2010), 20.86% (anxiety), 9.04% (depression) in India(Suresh et al., 2015), 36.8% (anxiety), 31.64% (depression) in Pakistan(Rashid and Hussain, 2014).

Risk factors of anxiety and depression are multifaceted. Chronic disease, poor dental care, smoking and alcohol consumption are the major social problem of determinant of mental disorders (Jiang, 2013). The impacts of depression and anxiety on dental disease person have been several effects. It is related with physiological reactions, psychological state, daily living activities and poor oral hygiene which facilitate the cause of dental disease (Cohen et al., 2000, Rosania et al., 2009, Lieutenant Randy Reese M, 2003). Early detection and case management of anxiety and depression can improving dental patient's distress, better clinical outcome and reducing chronic complication (Armfield and Heaton, 2013, Hmud and Walsh, 2009, Newton and Asimakopoulou, 2015).

A few studies have been done over the world concerning Co-morbid anxiety and depression on dental health problems, little is known about the effect of anxiety and depression among dental disease person. So far the prevalence of co-morbid anxiety and depression and its correlates has not been investigated in Africa as well as in Ethiopia. The objective of this study aim to (1) determine the prevalence of co-morbid anxiety and depression on dental disease person (2) identify the associated factors among dental diseases person at Saint Paul's Hospital Millennium medical College (SPHMMC), Ethiopia.

Methods

Institutional based cross-sectional study was conducted at St Paul's Hospital Millennium Medical College May, 2016, Addis Ababa, Ethiopia. The study population consisted of all adult with dental disease who were on follow up at Saint Paul's Hospital Millennium Medical College who were included in the

sample. Those adult with dental diseases that were critically ill were excluded from the study.

The optimum number of sample required for the study was estimate using Epi-info version 7 with a 95% CI, 5% margin of error and taking prevalence of co-morbid anxiety and depression 50%. Considering 10% for non response rate, 423 sample sizes of persons with dental disease required. The study participants were selected by Systematic sampling technique. Sampling interval was determined by dividing the total study population who had follow-up during four weeks data gathering period by total sample size then the starting point was randomly selected.

Data were collected by trained psychiatry nurses by face to face interview using pre-tested questionnaire. The questionnaire had contains socio-demographic characteristics (age, education, occupation, marital status and others). Clinical factors were collected by semi-structured questionnaires. Substance related factors were collected by substance related questions. Social support was collected by Oslo 3-item social support scale, Oslo 3-item social support scale is 3-item questionnaire commonly used to asses' social support and it has been used in several studies, the sum score scale ranging from 3-14, which has three broad categories: "poor support" 3-8, "moderate support" 9-11 and "strong support" 12-14 (Abiola et al., 2013). It is reliable in pretest (Cronbach's α = 0.57).

An outcome variable (anxiety and depression) was collected by Hospital Anxiety & Depression scale (HADS-14). HADS is a 14-item questionnaire, commonly used to screen for symptoms of anxiety and depression in general medical setting. It has score of (0, 1, 2 and 3). The 14-item can be separated into two 7-item subscales for anxiety and depression. It was validated in Ethiopia and internal consistency was 0.87 for full scale. The scales use a cut off score for both anxiety and depression cut-off points of greater than or equal to 16 scores (Reda, 2011).

Data were analyzed using SPSS version 21. Description of means, frequencies, proportions and rates of the given data for each variable was calculated. Bivariate

analysis was done to see the association of each independent variable with the outcome variable. Those variables having p-value less than 0.2 were entered into the multivariate logistic regression model to identify the effect of each independent variable with the outcome variables. A p-value of less than 0.05 was considered statistically significant, and adjusted odds ratio with 95% CI was calculated to determine association.

Ethical clearance was obtained from the Institutional Review Board of the University

of Gondar and Amanuel Mental Specialized. A formal letter of permission was obtained from Amanuel mental specialized hospital and University of Gondar was submitted to St Paul's Hospital Millennium Medical College ethical review committee for getting ethical clearance to do on the site. Supportive letter was obtained from St Paul's Hospital Millennium Medical College. Written informed consent was obtained from each study participant after they were introduced to the purpose of the study and informed about their rights to interrupt the interview at any time. Participants were informed that the information collected for this research project were kept confidential and information about collected by this study will be stored in a file, without their name, but code number assigned to it. It will not be revealed to anyone except the principal investigator and during final dissemination of aggregate results on workshops, publications and the like. Any individual level clinical data will not be disseminated for any one and it will be kept locked with key. Patients with dental disease who were found to have anxiety and depression were referred for further investigations.

Results
Socio demographic characteristics of respondents.

A total of 423 participants were included in the study which makes the response rate 100%. The mean age of the respondents was 34.78(±standard deviation=12.86) years. Among total participants, about two-third of them 275(65%) were females, 238((56.3%) were married, 170(40.2 %) were between the ages of 30-44 years, About one-third of the study participants142 (33.6%) attended primary education, Majority of the participants 306(72.3%) were Orthodox Christians and around one third of the participants 35.5% were Oromo by ethnicity. The average monthly income of the participants was 800 Ethiopian birr.

Clinical and psychosocial characteristics of the respondents

One hundred eighty six (44.0 %) patients were with diagnosis of tooth decay, 252 (59.6%) were in new dental disease category, 248 (58.6%) had less than 6 months duration of illness, 190 (44.9%) had poor social support. Irregular tooth brushing practice and those who have oral bad odor were account 295 (69.7%) and 117 (27.7%) respectively. From all study participants 63 (14.9%) had co-morbid chronic diseases (hypertension, renal diseases, cardiovascular diseases & diabetes), 85 (20.1%) were currently alcohol users.

Table 1:- Socio demographic variables among people with dental disease in outpatient department of SPHMMC Addis Ababa, 2016. (n=423)

Variables	Frequency	Percentage (%)
Age group		
18-29	165	39.0
30-44	170	40.2
>45	88	20.8
Sex		
Female	275	65
Male	148	35
Religion		
Orthodox	306	72.3
Muslim	62	14.7
Protestant	50	11.8
Other	5	1.2
Marital status		
Married	238	56.3
Single	140	33.1
Divorced	28	6.6
Widowed	17	4.0
Ethnicity		
Oromo	150	35.5
Amhara	134	31.7
Gurage	62	14.6
Tigre	36	8.5
Silte	41	9.7
Educational status		
Not formally educated	108	25.5
Primary school	142	33.6
Secondary school	62	14.7
College /university	111	26.2
Occupational status		
Government employed	152	35.9
Private business	86	20.3
Farmer	65	15.4
Student	22	5.2
House wife	74	17.5
Jobless	24	5.7
Monthly Income		
< 735 ETB	192	45.4
735 – 1176 ETB	71	16.8
> 1176 ETB	160	37.8

Other religion: catholic, Adventist

Prevalence of depression among patients with dental disease

The prevalence of co-morbid anxiety and depression among patients with dental disease was 21.5% with 95% confidence interval of (17.5-25.6).

Factors associated with co-morbid anxiety and depression among people with dental disease.

During multivariable analysis variables such as Social support, oral bad odor, types of dental problem, Khat and tobacco uses were significantly associated with co-morbid anxiety and depression.

Table 2:- Clinical and Psychosocial factors among people with dental disease in outpatient department of SPHMMC Addis Ababa 2016 (n=423)

Variables	Frequency	Percentage (%)
Type of dental problem		
Tooth decayed	186	44
Tooth extraction	114	27
Toot loss	92	21.7
Trauma or accident of tooth	31	7.3
Duration of illness		
>6 month	175	41.4
<6 month	248	58.6
History of Visits dentist		
Repeat	171	40.4
New	252	59.6
Tooth brushing		
Regular tooth brush	128	30.3
Irregular tooth brush	295	69.7
Have Chronic disease		
Yes	63	14.9
No	360	85.1
Social support		
Strong social support	82	19.4
Intermediate social support	151	35.7
Poor social support	190	44.9
Oral bad odor		
Yes	117	27.7
No	306	72.3

Poor social support were developed co-morbid anxiety and depression about 2.54 times [AOR=2.54, 95% CI (1.26, 5.15)] likelihood when compare to with those who have good social support. Those who reported oral bad odor were 8.21 times [AOR=8.21, 95% CI (4.09, 16.47)] possibility to have co-morbid anxiety and depression when compared to those who had not oral bad odor. With regard to those who have tooth problems were about 2.18 times [AOR=2.18, 95% CI (1.13, 4.18)] chance to have anxiety and depression as compared to those who have no tooth problem. On the subject of subjects of current khat chewing those who chewing khat 3.10 times [AOR=3.10, 95% CI (1.19, 8.06) opportunity to have co-morbid anxiety and depression when compared to those who have not chewing khat. While study subjects who smoke cigarette were 3.49 times [AOR=3.79, 95% CI (1.37, 10.50)] at risk to develop co-morbid anxiety and depression as compared to those who have no current smoking cigarette.

Table 3:-Factors associated with co-morbid anxiety and depression among people with dental disease in outpatient department of SPHMMC Addis Ababa 2016.

Explanatory Variables	Anxiety and Depression		Crud OR (95% CI)	Adjusted OR (95% CI)
	Yes	**No**		
Sex				
Male	13	135	1.00	1.00
Female	78	197	4.11(2.20,7.69)	1.47(0.65,3.33)
Educational status				
Not formally educated	54	54	7.51(4.51,12.51)	1.76(0.87,3.56)
Formal educated	37	278	1.00	1.00
Occupational status				
Have a jobs	64	239	1.00	1.00
Jobless	27	93	1.08(0.65,1.81)	1.08(0.54,2.17)
Social support				
Poor social support	73	117	7.45(4.25,13.08)	2.54(1.26,5.15)*
Good social support	18	215	1.00	1.00
Tooth brushing				
Regular tooth brushing	15	113	1.00	1.00
Irregular tooth brushing	76	219	2.61(1.44,4.76)	1.26(0.59,2.70)
Oral bad odor				
Yes	67	50	15.75(9.04,27.42)	8.21(4.09,16.47)**
No	24	282	1.00	1.00
Types of dental problem				
Tooth loss	60	177	1.70(1.04,2.75)	2.18(1.13,4.18)*
Tooth decayed	31	155	1.00	1.00
Duration of illness				
Less than 6 month	48	200	1.00	1.00
Greater than 6 month	43	132	1.36(0.85,2.16)	1.61(0.87,2.98)
Having chronic disease				
Yes	38	25	8.81(4.92,15.77)	1.66(0.68,4.06)
No	53	307	1.00	1.00
Alcohol use				
Yes	37	48	4.05(2.42,6.81)	1.43(0.63,3.22)
No	54	284	1.00	1.00
Khat use				
Yes	18	37	1.97(1.06,3.65)	3.10(1.19,8.06)*
No	73	295	1.00	1.00
Tobacco use				
Yes	28	29	4.64(2.59,8.34)	3.79(1.37,10.50)*
No	63	303	1.00	1.00

* Significant association (p-value < 0.05) **- significant association (p-value < 0.01) Hosmer and lemeshow test = 0.740
Chronic disease = hypertension, renal diseases, cardiovascular diseases & diabetes

Discussion

Prevalence and factors associated with co-morbid anxiety and depression among people with dental disease.

Our study revealed significant large of peoples with dental disease had co-morbid anxiety and depression. Definitely, this study was conducted on the area of not yet studied health problem among people with dental disease in low and middle income countries. This study discovered that the prevalence of co-morbid anxiety and depression was 21.5% with 95% confidence interval of (17.5-25.6). Poor social support, oral bad odor, tooth loss, khat and tobacco use were significantly associated with co-morbid anxiety and depression among people with dental disease.

The prevalence of co-morbid anxiety and depression in this study was higher than studies conducted in USA 8.6%(Wiener et al., 2015) The deviation might be due to the variation in Study design and data collection tool which was Behavioral Risk Factor Surveillance System. On the other hand, our finding was lower than the studies result in Finland 60%(Pohjola et al., 2011). The difference might be due to the deviation in Study design, data collection tool and sample size.

Poor social support was associated with co-morbid anxiety and depression. The possible explanation might be lack of (poor) social support may lead to increased psychological distress; in contrast, good social support is vital for those with good health in prevention of co-morbid anxiety and depression.

In this study we found oral bad odor associated with co-morbid anxiety and depression disorders. In actual fact, oral bad odor has its own social implications which can lead to possible health condition and psychological alterations to social and personal isolation. Studies state that Poor oral hygiene, periodontal disease, tongue coating, food impaction, unclean dentures, faulty restorations, and dry mouth were the main cause of malodor which lead to shame, depression and make relationships more difficult (Van Steenberg, 2005, Pratibha and Bhat, 2006).

The study revealed that Individual who had tooth loss was two times more likely to develop anxiety as compared with those who have tooth decay. This finding was in line with the study result in USA which show tooth loss was three times more possible to develop anxiety (Okoro et al., 2012). This was not unexpected that tooth loss causes a decreased ability to chew and speak; increased disability and handicap, poor nutrition and potential harm to general health and affect oral hygiene**.** Mouth and teeth have also social, psychological and cultural significance due to their importance in verbal and nonverbal communication (Scully, 2000, Joshipura et al., 1999). Hence this situation may be lead to anxiety. We found association between co-morbid anxiety and depression and current khat users. Khat leaves contain cathinones, an active brain stimulant that is similar in structure and pharmacological activity to amphetamines. Like amphetamines, Khat ingestion in High doses and chronic use of Khat can cause more serious adverse neurological, psychiatric and dental problem (Ageely, 2008). On the other hand, individual who currently smoke cigarettes were four times likely develop Co-morbid anxiety and depression. The possible explanations may be due to nicotine effect on the tooth and tooth discoloration have psychological problem in the social aspects.

This study was conduct in clinical setting to determine the prevalence and associated factor of anxiety and depression. Limitation of our study is, Validation study was not done for the Oslo 3-item social support scale in Ethiopia. It was also cross-sectional design; causality and temporality cannot be established or inferred, and there may be a bidirectional relationship occurring among anxiety, depression and oral hygiene as a result of anxiety and depression are lead to poor oral hygiene due to poor self care and side effect of anti depressants.

The prevalence of Co-morbid Anxiety and depression was 21.6%. Poor social support, oral bad odor, tooth loss, khat use and tobacco use were significantly associated with co-morbid anxiety and depression among people with dental disease. Increase of incorporating mental health service into different health institution including dental health services is vital for early on Identifying and treating these problems that is important measure to prevent anxiety and depression in dental clinic.

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