



Factors Affecting Depression among the Juangs: A Vulnerable Tribal Group in Odisha

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Abstract: Depression is a mental disorder which affects the behavioural, somatic and emotional components in an individual. Earlier prevalence of depression was restricted to urban dwellers but now it is prevalent also among the vulnerable tribal communities. By applying the Beck Depression Inventory (BDI-II) on 125 adults from the Juang community, a PVTG in Odisha, the severity of depression was measured. Moderate depression was more prevalent among females and elderly population. Seven components of BDI-II had greater impact on the intensity of depression among the Juang participants. They are: self-criticalness, guilty feelings, crying, loss of pleasure, irritability, past failures and loss of energy. The poor socio-economic conditions, cultural changes, alcohol addiction, domestic violence and abuse, moderate physical labour and inadequate food intake in form of protein and fat are the reasons for the prevalence of depression among the Juang. The identification of depression among the Juang indicates the immediate need for incorporation of the mental health care in the primary health care services. This would help in early identification and diagnosis, counselling and care of the depressed person in the Juang community in particular and tribal societies in general.

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Introduction

Depression is a mental disorder of major public health importance (WHO, 2008). Depression affects an individual's mood, physical activities, and their

social interactions irrespective of age and gender (Moreh & Lawrence, 2016). Depression is characterized by persistent feeling of sadness and lack of interest in activities which one normally enjoyed accompanied by an inability to carry out routine activities (WHO, 2017). Mental disorder is the second leading cause of disease burden in terms of years lived with disability (YLDs) and sixth leading cause of disability adjusted life years (DALYs) in the world posing a serious challenge to health systems in the middle- and lower-income countries (Sagar *et al.*, 2020). Mental disorders are associated with high levels of stigma, disability and discrimination (Trani *et al.*, 2015).

According to the GBD report, globally around 792 million people lived with mental health disorder, out of which about 264 million suffered from depressive disorders (Ritchie & Roser, 2018). However, the GBD studies report revealed about 197.3 million people suffer from mental disorder in India, comprising of about 45.7 million with depressive disorders and around 44.9 million with anxiety disorders. Depression is the leading cause of disability and it is increasing in the present decade with prevalence close to five percent per year (Wang *et al.*, 2017, WHO, 2017). In India, the National Mental Health Survey (NMHS) was conducted in 2015-16 whose findings were limited to twelve states. The NMHS reported around 150 million Indians suffered from mental disorder (Gururaj *et al.*, 2016).

There are various psychological theories on depression including psychodynamic approach (Freud, 1917), cognitive approach (Beck, 1967), operant conditioning (Lewinsohn, 1974), learned helplessness (Seligman, 1974). Beck (1967) as a cognitive theorist proposed that depression results from negative bias in the thinking processes. Depressive individuals have negative thoughts about self, world, and the future. According to Beck (1967) a person when depressed thinks himself as worthless, helpless, and inadequate. Beck (1961) published the Beck Depression Inventory (BDI) to measure the behavioural manifestations of depression. However, BDI was not based on any theory but it laid on clinical observation of depressive patients (Steer *et al.*, 1986). These symptoms include sadness, loneliness, apathy, negative self-concept, and negative self-punitive wishes. It also includes physical symptoms insomnia, loss of sleep, appetite, and loss of libido. Depressed individuals also showed changes in activity retardation or agitation (Beck, 1967). The BDI consists of items describing symptoms and categories reflecting overt behavioural manifestations of depression. The BDI was revised twice in 1978 as BDI-I and in 1996 as BDI-II. Among various psychometric tools, the BDI-II includes both somatic and cognitive affective manifestation of a depression

episode and the tool has been translated into 17 languages and used in various countries including Europe, Middle East, Asia and Latin America (Wang & Gorenstein, 2013).

Depression as a common mental health disorder is more prevalent in urban population in South Asian countries as well as in India (Reddy & Chandrasekhar, 1998; Poongothai *et al.*, 2009). Studies have concluded that depression is more among aged population, women, widowed or divorced and urban dwellers (Shidhaye & Patel, 2010; Grover *et al.*, 2010, Arvind *et al.*, 2019). Previous studies have pointed out the prevalence of depression is higher in females than males (Lenzo *et al.*, 2016; Upadhyay *et al.*, 2017; Ritchie & Roser, 2018). Socio-economic factors including abuse, education, and income impact higher rate of depression in women (Rai & Jones, 2013). The increased prevalence of depression among females also correlates to the biological factors (Albert, 2015). Studies on elderly population in community, hospitals, old age homes have also reflected that depression is the common mental disorder among them and one of the causes of morbidity among elderly (Nandi *et al.*, 1997; Jain *et al.*, 2005; Sinha *et al.*, 2013; Chauhan *et al.*, 2016). Nearly 15 percent of the adults in India who are identified with depressive disorders symptoms seek medical help (Roberts *et al.*, 2020).

Depression results in behavioural, somatic and emotional changes ranging from bad mood, sadness, anxiety, loss of energy, decrease in physical activity, loss of appetite, disturbed sleep, weight loss or gain, low libido, decreased concentration, feeling of worthlessness and guilt (Stoyanova, 2014). Mental health has been incorporated in the primary care services as an effort to reduce the burden but only ten percent of the rural population has access to mental health care (Khandelwal *et al.*, 2004). A study from rural community of Madhya Pradesh discussed that depressive disorder symptoms are recognised as tension and stress interlinked with the poor social and economic conditions which couldn't be solved by medical treatment (Roberts *et al.*, 2020). There is huge disparity in access to mental health services for people in rural areas in terms of unavailability of services, poor quality of existing services, lack of knowledge about mental illness and fear of stigma and discrimination (Raguram *et al.*, 1996; Reddy & Chandrashekhar, 1998 and Kermode *et al.*, 2009). In rural areas, depressed persons report distress as somatic symptom and usually rely on primary care than specialist mental health care providers (Mathias *et al.*, 2015).

Tribes in India constitute nearly 8.6 percent of the total population including 645 tribal groups (Census Report, 2011). The tribal communities and

Particularly Vulnerable Tribal Groups (PVTG) are highly prone to diseases and illness compounded with poverty, illiteracy and ignorance about the illness (Balgir, 2004). The impact of social change, acculturation urbanization, use of alcohol, substance abuse has predisposed the tribals to various mental health issues. The indigenous communities are facing loss of community resources and the local economy is unable to sustain them which has led to depression among them (Elliot, 2016). Very few studies have highlighted the mental health issues of the tribal population. Among the *Idu Mishmi* tribe in Arunachal Pradesh, suicide attempt (14.22 %) was higher than the urban population and females were more vulnerable, (8.26 %) reported depression and (6.42 %) reported anxiety syndrome (Singh *et al.*, 2013). Tribal women from Jharkhand suffered moderate to severe depression in comparison to the non-tribal women because they had to balance both household chores and labour work outside homes (Singh & Dewan, 2018). There has been much research carried out in India on the broader area of mental health, however the mental health issues of the tribal population specifically the vulnerable tribal groups remain a neglected area and needs greater and immediate attention.

Taking cue from the scanty literature on the mental health of tribals, the present paper is based on a study conducted among the Juangs, a PVTG in Odisha India. The paper aims to focus on the following objectives:

- (i) To assess the impact of age and gender on depression among the Juang community.
- (ii) To explore the main components of depression (BDI-II) among the Juang.

Area and People

The community based cross-sectional study was conducted in Keonjhar district situated at the north western part of Odisha, India. According to the GBD report, Odisha has higher prevalence of depression among the group of states with low Socio-Demographic Index (Sagar *et al.*, 2018). Odisha is the third highest tribal populated state in the country with 22.85 percent of tribal population consisting of 62 tribal groups and 13 PVTGs (Mohapatra, 2011). Keonjhar has a total geographical area of 8303 sq. kms, lies between 21°1'N to 22°10'N latitude and 85°11'E to 86°22' E longitude (Ota & Mohanty, 2015). Keonjhar district is rich in mineral resources mainly iron, manganese, chromite and bauxite ores and it has also dense forest resources. Keonjhar is a tribal dominant district inhabiting 55 tribal groups and two vulnerable tribal groups the Juang and Paudi Bhuiyan. The ST comprises 44.5 percent of the

total population in Keonjhar (Census Report, 2011). Besides being a tribal and mineral rich district, Keonjhar is also known for its scenic beauty and natural serenity being surrounded by hills and waterfalls. The Baitarani river is the major river of the district which originates from the Gonasikha hills and flows through Singbhum, Mayurbhanj, Jajpur and finally falls in Bay of Bengal at Dhamara in Bhadrak district. In Keonjhar, the Juang community are mostly concentrated in Banspal, Telkoi, Ghatagaon and Harichandanpur blocks. This study was conducted in three villages: Ghungi, Kundhei and Tala Kansa of Kodiposa Gram Panchayat in Banspal block of Keonjhar. The study villages were located at about 24 kilometres from Keonjhar town and 184 kilometres from Bhubaneswar which is the State capital of Odisha.

The Juang is a PVTG of Odisha inhabiting the hilly-forest area of Keonjhar and some parts of Dhenkanal district. Etymologically the term Juang means 'Sons of Man', they believed themselves to be the first men born on the earth (Mohanty, 1992). The Juang community are classified into two groups: 'Thaniya', who are the original settlers in Keonjhar and the 'Bhagudias' who have migrated to Pallahara area in Dhenkanal (Mohanty, 2007). The Juangs belong to the Austro-Asiatic racial ethnicity and Mundari linguistic group (Ota & Mohanty, 2015). According to the Census Report (2011), the total population of the Juang in Odisha is around 47,095, out of which about 26707 of them reside in Keonjhar district. The sex ratio of Juang is 1039 and the literacy rate stands at 42.85 in Odisha. The Juangs constitute about 4.04 percent of the total population of Keonjhar District. The traditional structure of the Juang community is in transition, some of the primitive social institutions still exist such as the youth dormitory known as *Majang* or *Mandaghar* which is situated in the centre of the village and acts as a community house for the unmarried boys and girls. But the practice of staying in the dormitory has changed and now it is used only for organizing community festivals, functions and ceremonies. The Juang mostly live in a nuclear family comprising of a man, his wife and unmarried children. The patrilineal, patrilocal, and patriarchal system is prevalent among the Juang. The major occupation of Juang included shifting cultivation, hunting and food gathering in the past. But now most of them work as settled cultivators and farm labourers.

Material and Methods

The present cross-sectional study was conducted in January - February 2020 in three villages of Banspal block of Keonjhar district in Odisha to explore the major components affecting the depression among the Juang adult population

(>18 years age). Overall, the study included 197 households from the Juang community. The sex ratio in the community was 1011. Majority of the households were illiterate (52.86 %) and earned very low wages (<INR 2300 per month). Around 88 percent of the Juang households were practising cultivation and collection of forest produce as their occupation. The intake of alcohol (*Handia*, *Mahuli*) had a cultural significance among the Juang community traditionally. But the consumption of alcohol has now become an addiction for them which leads to marital conflict and domestic violence in the family. Among 197 households, 125 participants voluntarily agreed for assessment of depression through BDI-II. The informants were briefed about the objectives of the study and the possible use of the study result. The BDI-II schedule was administered after all the participants volunteered and consented for undertaking the study. The data for the study was collected in a face-to-face interview by trained field investigators through a pretested structured interview schedule. Beck Depression Inventory -II (BDI-II) was adopted as a tool for measuring the intensity of depression among the tribal groups. BDI-II is a 21 item self-reporting instrument which assesses the range of symptoms of depression (Beck, *et al.*, 1996). Each of the 21 items has responses scored with value from 0 to 3 and the summation of scores ranging from 0 to 63. Based on the scores four categories of depression were identified (Beck *et al.*,1996). According to the summation of scores of BDI-II, depression is classified as Minimal, Mild, Moderate and Severe. Table 1 presents the range of depression in each category.

Table 1: Range of Depression

<i>Depression</i>	<i>Range</i>
Minimal	0-13
Mild	14-19
Moderate	20-28
Severe	29-63

Source: Beck *et al.*, 1996

The BDI-II consists of 21 components. They are sadness, pessimism, past failures, loss of pleasure, guilty feelings, punishment feelings, self-dislike, self-criticalness, suicidal thoughts, crying, agitation, loss of interest, indecisiveness, worthlessness, loss of energy, changes in sleeping patterns, irritability, changes in appetite, concentration difficulty, tiredness and fatigue and loss of interest in sex (Beck *et al.*,1996). Joe *et al.* (2007) applied confirmatory factor analysis to group and classify the 21 components of BDI-II while studying psychometric

properties of BDI-II among African American suicide attempters. They grouped the items of depression as Somatic and Cognitive Affective factors (Table 2).

Table 2: Factors of Depression

<i>Item No.</i>	<i>Somatic Factors</i>	<i>Item No.</i>	<i>Cognitive Affective Factors</i>
4	Loss of Pleasure	1	Sadness
10	Crying	2	Pessimism
11	Agitation	3	Past failures
12	Loss of Interest	5	Guilty Feelings
13	Indecisiveness	6	Punishment feelings
15	Loss of energy	7	Self-dislike
16	Changes in sleeping pattern	8	Self-criticalness
17	Irritability	9	Suicidal thoughts
18	Changes in Appetite	14	Worthlessness
19	Concentration Difficulty		
20	Tiredness and Fatigue		
21	Loss of Interest in Sex		

Source: Joe et al. 2007

Statistical Analysis

The mean and standard deviation of 21 component of BDI-II for men and women were calculated and simultaneously t' test also calculated the gender differences between both sexes. Correlation and linear regression also used in present study. By this correlation analysis we are wanted to show that the relationship between participants' age and each components of BDI-II and by regression analysis, we are showed the age and gender effect on total BDI, somatic and cognitive effective. In that regression analysis age was independent variable and total scores of BDI-II components of each participants. Factor analysis a multivariate statistical technique was used for the identification of specific factors in a set of measurements. Such factors would correspond to indicators, and all components were considered simultaneously, each one in relation to the others. For the applicability of factor analysis, the uniformity of sample was tested by examining the distribution of components in a loading plot, contrasting the value observed against those expected in a normal distribution which was verified by Kaiser-Meyer-Olkin (KMO) measurement of adequacy. A KMO value of more than 0.50 was considered acceptable. The

presence of correlations between each component of BDI-II was tested using the Bartlett test of sphericity (homogeneity of variance). The Bartlett test statistic is approximately distributed with chi-square and was accepted when it is significant at $p < 0.05$. PCA was used for extraction of factors and orthogonal rotation (varimax option) to derive non-correlated factors (Hair *et al.*, 1995). This varimax method attempts to minimize the number of indicators that have high loading on one factor (Mardia *et al.*, 1980). The first factor extracted is the one that accounts for the maximum possible variance in the dataset. The second component, independent of the first, will be the one that explains the largest possible share of the remaining variance and so on, without the components being correlated with each other (Newby *et al.*, 2004). Kaiser criterion, namely Eigen value of >1.0 , is the widely-used criterion for the choice of the number of factors in factor analysis. It was also based on the Eigen plot (scree plot), which shows the total variance associated with each other. Discriminant function analysis was carried out using the depression factors of BDI-II scores derived through the factor analysis to determine as to how correctly those people who were depressed. Statistical analysis was performed using the SPSS software (version 16.0).

Results

The present study included 125 Juang adults, where 88 (70.4%) were female participants and 37 (29.6%) were male participants. The age of the participants ranged from 18 to 75 years with mean age of the participants being 39.22 ± 15.65 years. The mean age of male participants (46.59 ± 13.67) was significantly higher ($t = 3.574$, $p < 0.01$) than their female (36.13 ± 15.45) counterparts.

Table 3 represents the mean of BDI-II score of total participants was 18.31 ± 7.12 , where male (17.32 ± 6.57) and female (18.69 ± 7.56) participants had not shown any significant gender difference. Hence, the mean of two first order factors i.e., somatic, and cognitive-affective of BDI-II were 10.79 ± 3.60 and 8.66 ± 4.25 respectively. The mean of cognitive-affective among males (7.24 ± 3.88) were significantly lower ($t = -2.471$, $p < 0.05$) than females (9.26 ± 4.28). The gender differences between males and females of the 21 components of BDI-II including 'Loss of Pleasure', 'Crying', and 'Changes in sleeping pattern' of somatic factors have shown significant differences ($t = -2.091$, $p < 0.05$, $t = 2.018$, $p < 0.05$ and $t = 3.515$, $p < 0.01$) respectively. On the other hand, the components of BDI-II including 'Sadness', 'Self-dislikes', 'Self criticalness' and 'Suicidal thoughts' of cognitive affective factors were also significant ($t = -3.073$, $p < 0.01$, $t = -2.842$, $p < 0.01$, $t = -2.597$, $p < 0.05$ and $t = -2.034$, $p < 0.05$) respectively.

Table 3: Descriptive analysis on the total components of BDI-II

Serial number	Age and Components of BDI-II	Total participants (N=125)		Male (N=37)		Female (N=88)		t' test
		Mean	SD	Mean	SD	Mean	SD	
	Age	39.22	15.65	46.59	13.67	36.13	15.45	3.574**
4	Loss of Pleasure	0.6	0.68	0.41	0.6	0.68	0.70	-2.091*
10	Crying	1.01	0.56	1.16	0.55	0.94	0.55	2.018*
11	Agitation	0.61	0.65	0.57	0.65	0.63	0.65	-0.0453
12	Loss of Interest	0.75	0.50	0.65	0.48	0.8	0.51	-1.527
13	Indecisiveness	0.62	0.75	0.51	0.73	0.66	0.76	-1.006
15	Loss of energy	0.97	0.59	0.97	0.6	0.97	0.60	0.06
16	Changes in sleeping pattern	1.66	1.03	2.14	0.75	1.45	1.07	3.515**
17	Irritability	0.82	0.66	0.81	0.66	0.83	0.66	-0.145
18	Changes in Appetite	0.77	0.48	0.78	0.42	0.76	0.50	0.258
19	Concentration Difficulty	0.78	0.57	0.7	0.52	0.81	0.58	-0.984
20	Tiredness and Fatigue	1.02	0.58	1.03	0.5	1.01	0.62	0.149
21	Loss of Interest in Sex	1.20	1.00	1.32	0.88	1.15	1.05	0.965
	ΣTotal Somatic components	10.79	3.60	11.05	3.08	10.68	3.81	0.573
1	Sadness	0.97	0.65	0.70	0.62	1.08	0.63	-3.073**
2	Pessimism	1.22	0.71	1.11	0.61	1.27	0.74	-1.286
3	Past failures	1.02	0.88	1.08	0.89	0.99	0.88	0.531
5	Guilty Feelings	1.02	1.24	0.76	1.16	1.14	1.26	-1.623
6	Punishment feelings	0.81	0.58	0.76	0.6	0.83	0.57	-0.63
7	Self-dislike	1.02	0.70	0.76	0.64	1.14	0.70	-2.842**
8	Self-criticalness	0.50	0.67	0.27	0.51	0.6	0.70	-2.597*
9	Suicidal thoughts	1.12	1.05	0.84	1.12	1.25	1.00	-2.034*
14	Worthlessness	0.97	0.59	0.97	0.55	0.97	0.61	0.063
	ΣTotal Cognitive-affective components	8.66	4.25	7.24	3.88	9.26	4.28	-2.471*
	ΣTotal BDI-II components	18.31	7.12	17.32	6.57	18.69	7.56	-1.016

Table 4 shows the correlation between age and different components of BDI-II. In gender combined of total participants, except 'Loss of Pleasure' ($r = -0.204$, $p < 0.01$), 'Crying', 'Changes in sleeping pattern', 'Changes in Appetite', 'Tiredness

and Fatigue', 'Loss of Interest in Sex', 'Past Failures' and 'Worthlessness' has shown a positively significant ($r = 0.193$, $p < 0.05$; $r = 0.537$, $p < 0.01$; $r = 0.331$, $p < 0.001$; $r = 0.428$, $p < 0.001$; $r = 0.690$, $p < 0.001$; $r = 0.360$, $p < 0.001$ and $r = 0.412$, $p < 0.001$ respectively) relationship with age increment. In gender specific correlation between age and components of BDI, it was found that the 'Changes in sleeping pattern', 'Changes in Appetite', Tiredness and Fatigue', Loss of Interest in Sex', 'Past Failures' and 'Worthlessness' were significantly increasing with age of male participants ($r = 0.357$, $p < 0.05$; $r = 0.359$, $p < 0.05$; $r = 0.340$, $p < 0.05$; $r = 0.692$, $p < 0.001$; $r = 0.335$, $p < 0.05$; $r = 0.413$, $p < 0.01$ and $r = 0.473$, $p < 0.01$ respectively) and female participants ($r = 0.527$, $p < 0.001$; $r = 0.335$, $p < 0.01$; $r = 0.477$, $p < 0.001$; $r = 0.705$, $p < 0.001$; $r = 0.375$, $p < 0.001$; and $r = 0.418$, $p < 0.001$ respectively). Another gender specific, two depression components: 'Punishment feelings' and 'suicidal thoughts' also showed significant increase with the age of female participants.

Table 4: Correlation between age and components of BDI-II

Serial number	Correlation			
	Age Vs. Components of BDI scale	Total	Male	Female
4	Loss of Pleasure	-0.204**	-0.115	-0.171
10	Crying	0.193*	0.082	0.171
11	Agitation	0.127	0.112	0.159
12	Loss of Interest	-0.034	-0.11	0.049
13	Indecisiveness	0.113	0.071	0.176
15	Loss of energy	-0.069	-0.056	-0.082
16	Changes in sleeping pattern	0.537***	0.357*	0.527***
17	Irritability	0.002	-0.015	0.014
18	Changes in Appetite	0.331***	0.359*	0.335**
19	Concentration Difficulty	0.058	0.1	0.084
20	Tiredness and Fatigue	0.428***	0.340*	0.477***
21	Loss of Interest in Sex	0.690***	0.692***	0.705***
	Somatic	0.490***	0.408*	0.528***
1	Sadness	0.041	0.012	0.177
2	Pessimism	-0.021	0.227	-0.052
3	Past failures	0.360***	0.335*	0.375***
5	Guilty Feelings	0.141	0.193	0.196
6	Punishment feelings	0.174	0.151	0.222*
7	Self-dislike	-0.12	-0.065	-0.041
8	Self-criticalness	-0.008	0.032	0.077
9	Suicidal thoughts	0.132	0.166	0.213*
14	Worthlessness	0.412***	0.473**	0.418***
	Cognitive-affective	0.209*	0.305	0.295**

Table 5 represents the gender specific depression among Juang participants. Among 125 Juang participants, 35.20% were moderately depressed and 8.00% were severely depressed. Hence, in gender specific observation on moderate and severe frequency, females' frequencies (36.36% and 9.09% respectively) were slightly higher than males (32.43% and 5.41% respectively).

Table 5: Gender specific percentage of depression

Category of depression	Total		Male		Female	
	N	%	N	%	N	%
Minimal	36	28.80	12	32.43	24	27.27
Mild	35	28.00	11	29.73	24	27.27
Moderate	44	35.20	12	32.43	32	36.36
Severe	10	8.00	2	5.41	8	9.09

Linear regression analyses were undertaken with age and gender as the independent variables and the BDI-II, somatic and cognitive affective as the dependent variable. Table 6 presents the combined positive effect of gender ($\beta = 3.341$, $p < 0.05$) and age ($\beta = 0.188$, $p < 0.001$) on the level of depression among Juang. While, the somatic factors of depression, only age ($\beta = 0.121$, $p < 0.001$) of participants showed a significant association and in cognitive-affective, age ($\beta = 0.083$, $p < 0.01$) and gender ($\beta = 2.886$, $p < 0.01$) effect also showed significant associations. The three equations from the table 6 revealed that age and gender correctly predicted the somatic factors, cognitive-effective factors and BDI

Table 6: Affecting Factors of Age and Gender on Depression

Dependent variable = Total scores of BDI-II components					
	β	Se β	Beta	T	Sig.
Constant	5.206	3.289		1.583	0.116
Gender	3.341	1.388	0.21	2.407	0.018
Age	0.188	0.041	0.405	4.632	0.000
Dependent variable = Total scores of Somatic components					
	β	Se β	Beta	T	Sig.
Constant	4.534	1.531		2.962	0.004
Gender	0.892	0.646	0.114	1.381	0.170
Age	0.121	0.019	0.525	6.381	0.000
Dependent variable = Total scores of Cognitive effective components					
	β	Se β	Beta	T	Sig.
Constant	0.496	1.949		0.255	0.799
Gender	2.886	0.823	0.311	3.507	0.001
Age	0.083	0.024	0.305	3.438	0.001

among Juang adults were 50.03%, 36.30% and 39.56% respectively. Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were statistically significant for all studied participants (KMO=0.769, Bartlett's test=707.108, $p<0.001$), which implies that sufficient correlation existed between different depression components of BDI to proceed with complex multidimensional statistical analysis. The Bartlett test of sphericity for different components of BDI among all studied sample was highly significant ($p<0.001$), indicating homogeneity of variance by the concerning components of depression.

Table 7 reveals the six components for total participants were extracted by factor analysis using PCA with varimax rotation for depression groups. The first six components (factors) in the initial solution have an Eigen value over 1, and they accounted for about 59.23% of the observed variation in the depression groups pattern among all Juang participants. According to Kaiser criterion having Eigen value of >1 only should be considered for interpretation. The parallel line to horizontal at Eigen value equalling to 1 in scree plot showed that six factors will be extracted for type of depression among Juang participants (Fig.1).

The first factor, which accounted for 23.81% of the total variance among all participants were labelled as cognitive-affective elastic items. High factor loading observed for 'Self criticalness', 'Guilty feelings' and 'Crying' characterized these factors. The second factor explained 9.59% of the total variance and was labelled as 'Loss of pleasure'. The third factor accounted for 8.25% of the total variance, and this factor was characterized by the 'Irritability'. The fourth factor explained 6.64% of the total variance and labelled as 'Past failure'. The fifth factor accounted for 5.92% of the total variance and characterized by the 'Loss of energy'. The last and the sixth factor explained 5.01% of the total variance and was labelled as 'Loss of energy'.

Table 7: Rotated component matrix for components of BDI

Different items for depression	Component					
	1	2	3	4	5	6
Sadness	0.577	0.26	-0.038	-0.207	0.067	0.074
Pessimism	0.49	0.277	0.184	-0.298	0.362	0.229
Past failures	0.576	-0.206	-0.07	0.428	0.115	0.089
Loss of Pleasure	0.263	0.567	0.173	-0.235	-0.05	-0.182
Guilty Feelings	0.651	0.156	-0.035	0.131	0.008	0.014
Punishment feelings	0.587	0.181	-0.205	-0.003	-0.492	0.182

Different items for depression	Component					
	1	2	3	4	5	6
Self-dislike	0.371	0.473	0.276	0.127	-0.035	-0.126
Self-criticalness	0.731	0.271	0.063	0.048	0.066	0.069
Suicidal thoughts	0.532	0.032	-0.374	0.092	0.131	-0.352
Crying	0.648	0.118	0.059	0.141	-0.315	0.283
Agitation	0.505	-0.11	0.02	0.18	0.399	-0.365
Loss of Interest	0.409	0.016	-0.63	0.228	0.182	-0.151
Indecisiveness	0.386	-0.007	-0.456	-0.355	0.163	-0.011
Worthlessness	0.478	-0.409	0.486	-0.244	0.231	-0.035
Loss of energy	-0.063	0.142	0.01	0.442	0.416	0.652
Changes in sleeping pattern	0.4	-0.564	-0.103	0.095	-0.338	0.04
Irritability	0.311	0.207	0.514	0.254	-0.29	-0.18
Changes in Appetite	0.451	-0.305	0.202	0.35	-0.106	-0.164
Concentration Difficulty	0.404	0.064	-0.252	-0.425	-0.185	0.109
Tiredness and Fatigue	0.477	-0.41	0.415	-0.269	0.175	0.017
Loss of Interest in Sex	0.48	-0.556	-0.066	-0.217	-0.094	0.202
Eigen value	5.001	2.013	1.733	1.395	1.244	1.253
Variance explained	23.81	9.585	8.25	6.64	5.92	5.01

Extraction method; Principal component analysis; Rotation method; Varimax with Kaiser Normalization; Rotation converged in 6 iterations

Scree Plot

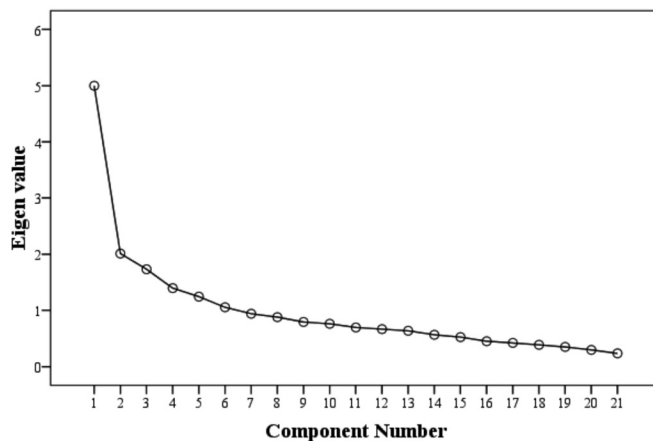


Figure 1: Depression components among adult Juang

Scree plot showing Eigen values for each of the depression components, extracted by Principal Component Analysis from data obtained by BDI-II method on 125 Juang adults.

Discussion

In the present study the prevalence of moderate depression is 35.20 percent and severe depression is 8 percent. In India, most of the studies using BDI as a tool to assess and diagnose depression severity were undertaken in urban and clinical set up. The National Mental Health Survey report (2016) including 12 states of India revealed the prevalence of depressive disorder to be 5.25 percent. Studies in urban areas have revealed moderate depression to be higher than severe depression, a study in Chennai reported 19.4% were moderately depressed and 4.3% as severely depressed (Mohanraj & Subbiah, 2010). A study in Karnataka reported moderate depression as 29.3 % and severe depression as 7.5% (Kumar, *et al.*, 2012), similarly in Haryana a study reported moderate depression as 11.3 % and severe depression as 1.8% (Malik *et al.*, 2015). A study in Arunachal Pradesh in a tribal village revealed the prevalence of depression was 8.6 percent (Singh *et al.*, 2013).

Among the Juang community, females were found to be more depressed than males (table 5). Depression among women is more due to the gender differences in roles in the experiences of life events (Nazroo *et al.*, 1997). Previous studies have also acknowledged that depression was more among women (Lenzo *et al.*, 2016; Upadhyay *et al.*, 2017; Ritchie & Roser, 2018). Studies have also addressed that tribal women were more depressed than the non-tribal women (Singh & Dewan, 2018). The reasons for depression among women were biological factors, domestic abuse, lower socio-economic conditions and managing household chores and work simultaneously (Albert, 2015, Rai & Jones, 2013, Singh & Dewan, 2018). In case of Juang community, women had to face domestic violence and abuse mainly due to the alcohol addiction of their husbands. Women facing domestic violence in their homes reported to be depressed and sad for three to four days. Some of them also remained sad for about a week. Crying was the most common components among women facing violence at home.

The findings of the study also revealed a positive correlation between age and components of BDI-II among the Juang (table 4). The somatic components (49.5%) had greater association with age than the cognitive- affective components (20.9%) of BDI-II. The findings are in coherence with the previous studies which states depression to be a cause of morbidity among the elderly population (Singh & Mishra, 2009, Sinha *et al.*, 2013; Chauhan *et al.*, 2016).

The physical illness is a cause of depression in later part of life, the effects of living with illness, chronic pain and biological effects of medications cause depression among elder population (Singh & Mishra, 2009). Studies have also conferred that depression increases the risk of morbidity in adults mostly by cardiovascular disease (Wulsin *et al.*, 1999). Among the Juang population, somatic components including changes in sleeping pattern, changes in appetite, tiredness and fatigue, loss of interest in sex and loss of pleasure has been significantly increasing with age. Similarly, the cognitive affective components including past failures and worthlessness are increasing with age. The findings were at par with the study done by (Steer *et al.*, 2000) where it was found somatic factors were stronger in adults than the cognitive factors.

To explore the principal factors among the 21 components of BDI-II in the Juang community, a Principal Component Analysis was undertaken. Six factors were identified which accounted for about 59.23 percent of total variation in BDI-II among the Juang. Previous studies have also used PCA as a tool for analysing the components of BDI-II (Steer *et al.*, 2000; Segal *et al.*, 2008). In the present study the first factors included the cognitive affective components Self Criticalness, Guilty Feeling and Crying. In the context of Juang community, the feeling of self-criticalness or self-blame was more due to their poor socio-economic conditions, geographical remoteness, and their poor access to government intervention. The feeling of guilt and regret among the Juang participants was high due to their poor economic conditions, indebtedness, inability to save loved ones from the wrath of diseases. The Juang participants had a sense of regret that they were left behind in the development process. A Juang man named Samu stated *'I don't have enough income for maintaining my family. There is no job opportunity in our village hence, I have to sell my goats and cows to fulfil the family needs sometimes. My children are studying but I am not sure whether they will get a job after their studies or not. My mother is ill I am unable to take her to hospital for treatment, it makes me feel guilty that I am unable to perform a son's responsibility. All these conditions make me feel worried all the time'*.

Crying was a cognitive component found more among female than male participants. The reason for crying could be attributed to the alcohol led abuse and domestic violence the Juang women face at homes. A young woman named Binita told *'My in-laws don't treat me well. Once at the time of Makar Parva, she told me to prepare different dishes. I asked her money to buy some ingredients from the market. She thus started to abuse me and my parents. I was very hurt emotionally couldn't stop crying for many days. While among male participants crying was due to the failure of meeting his family needs and demands with his meagre*

income. The Juang like other PVTG were prone to the poor living and socio-economic conditions, debts, erosion of traditional rights on forests (Pathy, 2003; Jana & Ghosh, 2015) and exposed to malnutrition, illness, and morbidity (Sahoo, 2017).

The second factor is a somatic component, loss of pleasure and is related to the first set of factors. The market intervention in the tribal areas has changed their subsistence economy. Earlier the Juang were shifting cultivators but now they have been transformed into settled cultivators. Their access to forest has also been restricted which has been affecting their day to day living and sustenance. The participants revealed that they are always worried about their family sustenance needs. This is the reason their cultural sphere has also undergone changes. The source of recreation among them in form of their traditional dormitory culture Majang and the Changu dance form have lost sense in the present. The Juang elders reported '*now Majang is mostly used for organizing meetings and arranging feasts. Young girls and boys don't stay here anymore. The Changu dance is only performed in some occasions and rituals, the use of phones and television have replaced the folk dance with modern dance form*'. Another associated factor is Irritability among the Juang adults. The lack of recreation and more pressure of work have reduced the leisurely time among the Juang. One of the causes of irritability among the Juang adults was the increased alcohol consumption. The addiction to alcohol creates conflict in the family and when the drinking habit is opposed by other family members violence occurs. The blaming and nagging attitude of the Juang women about their husband's alcohol addiction also irritates the Juang men. *Ram Juang, a middle-aged man revealed 'I work very hard in the field, I plough the land, graze the goats and cows. I get very tired so I consume Handia thrice a day. My wife doesn't appreciate my work and complains that I should earn more money for the family, I get irritated and sometime I get into quarrels with my wife'*.

Past failure is the fourth component in the BDI-II which affects the level of depression among Juang more. It is a cognitive component. Among the Juang participants, the past failures were more reported among the elderly. They blamed those past failures responsible for the present situation of their children.

The fifth and sixth factors which have led to higher depression level among Juang is identified as the loss of energy which is a somatic component. Due to the poor socio-economic conditions in their community, the Juang participants were unable to consume required amount of food and nutrients. The Juang participants mostly had two meals in a day which comprised of rice, pulse and

seasonal vegetables. They also were addicted to *Handia* and *Mahuli*. But the intake of milk, dairy products and meat was almost negligible. They consumed meat only in ritual feasts. Most of the Juang participants were involved in cultivation and collection of forest produce which required lot of physical labour. The absence of protein source in their food in form of milk and meat led to their loss of energy. Previous work on the Juang by Patnaik (1986) also reflected the deficient intake of protein, fat, calorie, Vitamin C, and common salt among Juang men and women. They take two meals in a day. The Juangs of Keonjhar are also habituated to drinking liquor brewed from rice. The work pattern of the Juang males included manual work, agricultural work and collection of forest products. While the females were involved in domestic chores in the house, then they were also engaged in manual work and collection of forest products. For females the work burden was more than males (Patnaik, 1986).

The study has few limitations. Firstly, the male female participants ratio is disproportionate, but it was due to the consent of the participants and females easily agreed to respond. The second limitation is the study is conducted in a rural and tribal area among a vulnerable tribal group. No such study has been performed in Indian context, so it is difficult to validate the findings. But a further study with larger tribal population could be planned to increase the validity of the tool. BDI-II as a tool has proven to be relevant in urban and clinical set up. But the use of the tool in the tribal or community level needs to be validated. Efforts would be made for standardizing a tool for measuring depression in the tribal community in the later work.

Conclusion

The present study identifies the severity of depression level among the Juang, a PVTG in Odisha India by using BDI-II as a tool. It also confirms that the age and gender have a positive association with the somatic components of depression. The seven major components of BDI-II which have been affecting the level of depression are self-criticalness, guilty feelings, crying, loss of pleasure, irritability, past failures, and loss of energy. These components are more significant in case of the Juang because of their poor socio-economic conditions, remoteness, alcohol addiction, domestic violence, marital conflict, inadequate food and lack of nutrition and their involvement in work demanding more physical labour, lack of awareness, lower accessibility to the government interventions. Thus, there is an urgent need for identifying the issues of depression and mental disorders in the tribal societies in general and the Juang in particular.

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