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PSYCHOMETRIC PROPERTIES AND VALIDATION OF THE DEPRESSION ANXIETY STRESS SCALES (DASS-21).

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ABSTRACT

Background Depression, anxiety and stress are one of the commonest diseases of mind reported and that leads to considerable disability to the patients. One of the instruments frequently used to rate the Depression and anxiety is DASS-21 scale, which is not validated in Guajarati population. So, current study was aimed to assess and analyze the psychological stress, depression and anxiety with the use of DASS-21 amongst the healthy volunteers of Gujarati population. **Materials and Methods** Overall, 150 healthy volunteers were selected based on inclusion and exclusion criteria. Reading like blood pressure, heart rate, respiratory rate and breath pattern were recorded manually before filling the questionnaire and which continued after the completion of questionnaire up to 1 hour every 15 minutes. A total of 7 readings were recorded. The breathing pattern was measured in supine position with the help of two hands of the investigator placed on the subject's chest and abdomen to ascertain chest vs abdominal breathing. They were given DASS-21 questionnaire in vernacular language. **Statistical Analysis** All the participants were grouped according to their specific occupation and scoring of the questions of DASS-21 was accordingly segregated. The average and standard deviation for the same were calculated. Various symptoms of depression, anxiety as well as stress were evaluated in each group. Sum of the individual questions were considered to derive the intensity of each question as a measure of symptoms of depression, anxiety and stress in DASS-21. **Results** Total 138 participants filled the complete questionnaire. Of those participants, Males showed more severe depression while females showed more severe anxiety and stress. Psychological parameters were closely linked with the physical symptoms. In depression feeling of anhedonia was most commonly expressed as major concern by participants. In Anxiety and stress, palpitation and difficulty in relaxing were most common concerns. **Conclusion** The DASS-21 scoring system has an excellent affinity towards the measurement of symptoms of anxiety and depression depending upon the events in the person's day to day life.

KEYWORDS : Depression, Anxiety, Stress, Dass-21 scale, Validation

INTRODUCTION

The current era of modernisation and development has also been associated with proportionate increase in the incidences of depression and anxiety. Depression has been accountable for 40.5% of Disability Adjusted Life Years (DALYs) whereas anxiety being responsible for 14.6% of DALYs. These ailments ultimately impart negative impact on the person's physical as well as mental health.[1] It is therefore of utmost importance to form a consolidated measure to develop a measure to assess the growing stress which is applicable to wide range of population.[2]

Various factors associated with routine life like work overload, unfavourable work conditions, financial stress, organizational supports as well as performance pressure on job contribute to the development of anxiety and stress. This reflects in the form of effects like physical fatigue, insomnia, apathy, irregular dietary pattern, negative thoughts as well as mood swings.[3]

Lovibond and Lovibond developed 21 item depression anxiety stress scale (DASS-21) for the assessment of psychological distress which is for the purpose of self-reporting.[4] This score has been utilized in multiple analysis and studies by many researchers for the assessment of psychological stress.[5,6,7] For the three components of DASS 21, the internal consistency for depression was .81, for anxiety .73 and for stress .81. It has been established in the previous studies that DASS is able to discriminate effectively between depression and anxiety as compared to other modes.[8] Each section in the score contains a statement with its four response options to suggest the severity with the score 0 being the lowest and 3 highest. It is a self-reporting questionnaire with 21 responses (7 for each section). The higher the score, the more severe the emotional stress.[9]

The aim of the present study was to assess and analyse the psychological stress, depression and anxiety with the use of DASS-21 amongst the healthy volunteers of Gujarati population belonging to various occupational class.

MATERIAL AND METHODS

Study design

This was a cross sectional analysis in the form of a survey conducted between October 2020 to March 2021. The study design, consent form as well as the questionnaire set were reviewed and approved by the Institutional Ethics Committee (IEC). The survey questionnaires were translated in to the local language (Gujarati) from the original set in English and back translated to validate. For the further validation, a pilot study involving 4 volunteers was conducted to ensure that the questionnaire was clear and understandable.

Study population

A total of 150 healthy volunteers were enrolled in the present study belonging to various occupational class like government workers, industrial workers, truck drivers, constructional workers, peons, security staff etc.

A healthy volunteer, male or females, aged between 20-60 years of age were included in the present study. Volunteers with the history of hypertension, diabetes mellitus, cardiovascular diseases or other metabolic disorders were excluded. Subjects using OTC drugs, supplemental items as well as routinely practicing meditation and yoga were also excluded from the present study. Known patients of psychiatric illness like psychosis, depression or others were also excluded.

Informed consent form

The consent form for the participation in the study was

prepared in the English language which was translated in to the local language. This form contained various study particulates like aims and objective of the study, methodology, sample collection, confidentiality and risk benefit of the same. The participants were explained all the details of the study as well as the consent form verbally in detail and any clarification sought were answered. Two copies of the consent form were signed by the participant, one out of which kept in the record file and the other was given back to the volunteer.

Vital parameters and breathing pattern analysis

Before half an hour of the questionnaire filling, the vitals were recorded in seated erect posture. Reading like blood pressure, heart rate, respiratory rate and breath pattern were recorded manually which continued after the completion of questionnaire up to 1 hour every 15 minutes. A total of 7 readings were recorded. The breathing pattern was measured in supine position with the help of two hands of the investigator placed on the subject's chest and abdomen. The hand placed on chest moving faster than the one on abdomen was considered as stressed chest breathing.[10]

DASS-21 questionnaire

The questionnaire set was obtained from www.psy.unsw.edu.au/groups. The participants were asked to sit in a quiet and separate room and handed over the questionnaire set. In order to avoid the investigator's bias, a third person assisted the volunteers for each question. Participants were encouraged to clarify any doubts or sought clarification about any of the questions in the set. Incomplete questionnaires were excluded from the study. Out of 150 participants, 138 questionnaires were completely filled. These questionnaires were secured and collected for further data analysis.

Psychometric property analysis of DASS-21

After the collection of the responses of the participants, the calculation of the stress, depression and anxiety was done by summing the scores of each question in the questionnaires. Each section of the questionnaire contained seven questions for three subscales measured on a Likert four scale points (0-3), 0 being never and 3 being almost always present. Separate scoring was calculated to get the score values for each component of DASS-21 separately. According to the DASS-21, score for depression was categorized as normal (0-4), mile (5-6), moderate (7-10), severe (11-13) or extremely severe (≥14). Similarly, score for anxiety was designated as normal (0-3), mild (4-5), moderate (6-7), severe (8-9) and extremely severe (≥10), and for stress, as normal (0-7), mild (8-9), moderate (10-12), severe (13-16) and extremely severe (≥17).

Analysis of psychological stress symptoms in various occupations

All the participants were grouped according to their specific occupation and scoring of the questions of DASS-21 was accordingly segregated. The average and standard deviation for the same were calculated. Various symptoms of depression, anxiety as well as stress were evaluated in each group. Sum of the individual questions were considered to derive the intensity of each question as a measure of symptoms of depression, anxiety and stress in DASS-21.

RESULTS

Out of the total 150 recruited volunteers, 138 completed the study signified by the completion of all the questions in the DASS-21. A total of 12 patients were excluded from the consideration due to incomplete questionnaire response. Out of 138 subjects, there were 97 males (70.29%) and 41 females (29.71%). The average age for the both were 40.22±10.32 and 39.42±11.58 years respectively. Table – 1 shows the details of the occupational groups of the patients and its distribution. As shown in the table – 1, majority of the volunteers were construction site workers, sweepers and security personals.

Table – 2 shows the information of the vital parameters of the subjects enrolled in the study. Various parameters like blood pressure, heart and respiratory rate and body temperature were measured at various 7 time points at 15 minutes interval. The average systolic and diastolic blood pressure (SBP & DBP) in males were 136.56 ± 4.6 and 82.98 ± 3.8 respectively as well as in females 132.5 ± 5.4 and 82.35 ± 2.4 respectively. Respiratory rate for males and females were 22.32 ± 1.3 and 21.33 ± 2.1 respectively. The other parameters like heart rate and body temperature were found to be in normal range for both males as well as females. Table – 2 depicts the breathing patterns of the subjects. It is evident from the table that the number of subjects with abdominal pattern of breathing were comparatively lesser than chest breathing. The numbers of the subjects with abdominal breathing to chest breathing in males as well as females were 39.80% and 54.28% respectively. The concept of breathing pattern of a patient in stress tells that it results in increased respiration with initial slow chest respiration. This concludes that though the volunteers were shown to have higher respiration, they cannot be considered relaxed and their vital parameters didn't come down to normal because of the chest breathing which followed.

As per the DASS subscale scoring system, males in the present study were found to be suffering from severe levels of depression whereas there were no females suffering from extremely severe depression. (Table 3) As shown in table – 4, in contrast to prevalence of depression, females were seen to more suffer from severe degree of anxiety similarly were males. These recorded values were in accordance with the severity, intensity and recurrence of each variable. The scoring for anxiety were also higher in females as compared to males for each of the categories. Similarly, as anxiety, the DASS scoring for females for psychological stress were higher than males for all the subsets. Males were observed to be suffering from severe level of psychological stress whereas extremely severe stress levels were more commonly prevailing in females. (Table – 5)

We enrolled volunteers from different working class of people from the society and assess the levels of depression, anxiety and stress they are facing in their daily life. While analysing the various such parameters in people from different occupational classes, it was found to have a linear association. Also, these psychological parameters were directly linked with physical symptoms like heart rate, blood pressure (systolic and diastolic) and respiratory rate. We observed in the present study that males were more commonly suffering from depression whereas levels of anxiety and psychological stress were commoner in females, severity being more as compared. Table 6 depicts the analysis of DASS-21 subsets and questions for the same.

Various questions in the questionnaire were for the evaluation of psychological symptoms like anhedonia, inertia, hopelessness, dysphoria, apathy, as well as devaluation of life and self-deprecation. Table 6 and 7 shows the average value for each of the parameter separately and comparison of average values of each of them. It was observed that the participants were cety and stress were analysed by single question as well ommonly suffering from symptoms like anhedonia during the study period which was measure by the question number 3, "I could not seem to experience any positive feelings at all".

Symptoms related to anxias the combination of several questions together. The question no 2, 4 and 19 were indicative of the autonomic arousal and the results of each of the three questions were added together and average was calculated. Similarly for the consideration of subjective experience of anxiety, the question no 15 and 20 were evaluated together.

Relaxation problems were calculated by evaluation of question 1 and 12.

DISCUSSION

All the three symptoms, anxiety, stress and depression are interconnected and heavily depend upon the occupation, workload and lifestyle of a patient. Chronic exposure to these lead to development of any of these symptoms over a period of time.[11] The DASS-21 scoring system helps differentiating amongst all these three symptoms and help diagnosing the condition as a disorder owing to its tripartite model.[12] It was found in the present study that most of the volunteers were under the frequency level 1 (sometimes) and others were under frequency level 2 (often) and 3 (almost always) equally. We observed the symptoms of stress, depression and anxiety in males and females both along with the difference in their response to the management of stress, measures to alleviate the same as well as recovery process to strengthen resistance against the symptoms.[13] These features are known to be linearly related and governed by the changing lifestyle and modernization and moderated by self-esteem and mediated by hopelessness depending upon their relation status with their immediate surroundings. It may ultimately result in trembles in the professional as well as social life.[14]

Growing work on the utility and applicability of DASS-21 scoring system in the society has shown the reliability to a great extent. This proves the use of DASS-21 scoring system to be an excellent tool for the physicians, psychiatrists, occupational therapists for the diagnosis of psychological problems, in patients as well as employees working in various industries and their work output.[15] The type of the occupation as well as the working environment has a great impact on the precipitation of the psychological symptoms like stress, depression and anxiety. The data of the present study will strength this relationship of occupation with the mental stress more and help understanding the reaction of employee to the related work stress. In the healthy persons as well as in patients, DASS-21 scoring system has been designated as one of the most reliable tools to identify and evaluate the intensity of the problem.[16, 17] Additionally, it will also help to understand the compensatory efforts of the people against the stressful working environment.

DASS-21 is useful for measurement of overall stress symptoms which is a nonspecific factor of anxiety as well as depression. This scoring is also helpful for the evaluation of other physiological impact of stress, depression and anxiety like changes in blood pressure, respiratory rate, heart rate and breathing pattern. Depression precipitating because of the underlying stress might result in alteration of the physiological functioning due to the alteration of Hypothalamic Pituitary Axis (HPA) which was reflected in the vital functions analysis in the present study.[18] Dysphoria in house-maids could be because of the loneliness they might be facing regularly. Self-conception is similar to self-esteem which is having a close association with the perception of emotions which causes complex buffering of stress developing from the psychological state of the person and stress. This on long term might damage or endanger the self-esteem of the individuals particularly those with more self-consciousness which could be measured by the present study.

CONCLUSION

Various psychological symptoms like stress and anxiety are the physiological response of an individual to the surroundings, many times reflected by the changes in the physiological functioning. This physiological phenomenon might over the period of time of sustainment result in development of a pathological state. The DASS-21 scoring system has an excellent affinity towards the measurement of symptoms of anxiety and depression depending upon the events in the person's day to day life. A smaller sample size was a limitation of the present study. A larger study with more sample size and involvement of more diverse population is recommended for the data generation for a large population scale. The present study provides support for the methodology for the identification and evaluation of the psychological symptoms like depression, anxiety and stress as well as their evaluation and association with the occupational environment validating the role of DASS-21 as an important tool.

Table 1: Details of the occupation of the participants in the present study

Employment	Number of volunteers (n=138)	Males (n=103)		Females (n=35)	
		n	%	n	%
Shop keepers	11	11	7.97	0	0.00
Commercial drivers	14	14	10.14	0	0.00
Government employees	9	4	2.90	5	3.62
Industrial laborers	15	12	8.70	3	2.17
Construction site workers	19	17	12.32	2	1.45
Peons	14	7	5.07	7	5.07
Sales persons	12	7	5.07	5	3.62
Security persons	17	14	10.14	3	2.17
Sweepers	19	14	10.14	5	3.62
House maid	8	3	2.17	5	3.62

Table 2: Vital parameters and Breathing pattern analysis of the subjects

Level of stress (DASS -21)	Males			Females			Average score (male & female)
	N	Average age	Average score	N	Average age	Average score	
Normal (0-4)	12	24.33±11.77	3.47±1.78	5	26.35±9.14	3.12±3.48.	2.21±3.54
Mild (5-6)	19	25.86±10.13	5.43±2.65	10	38.25±9.25	5.43±3.52	5.36±2.36
Moderate (7-10)	28	40.91±13.54	8.73±3.55	13	43.35±9.10	8.74±6.25	8.24±3.35
Severe (11-13)	36	45.36±13.00	12.56±5.46	7	49±4.36	12.75±2.7	12.36±4.36
Extremely severe (+14)	8	43.45±19.05	26.45±4.56	0	0.00	0	23.35±5.37

Table 3: Psychometric properties of DASS-D (Depression)

Level of stress (DASS -21)	Males			Females			Average score (male & female)
	N	Average age	Average score	N	Average age	Average score	
Normal (0-3)	14	23.0±10.05	2.55±2.22	6	23.35±1.01	2.22±1.76	2.38±0.71
Mild (4-5)	15	26.21±05.65	4.59±3.34	5	35.0±10.23	4.22±0.46	4.77±2.53
Moderate (6-7)	18	28.37±9.36	6.76±4.39	9	38.2±11.34	6.56±0.25	6.64±1.87
Severe (8-9)	27	43.49±10.98	8.77±4.21	12	47.2±09.82	8.39±0.01	8.47±2.24
Extremely severe (10+)	29	47.11±10.32	16.25±4.57	3	52.0±2.21	13.35±0.62	14.39±3.94

Table 4: Psychometric properties of DASS-A (Anxiety)

Level of stress (DASS -21)	Males			Females			Average score (male & female)
	N	Average age	Average score	N	Average age	Average score	
Normal (0-7)	34	25.24±10.22	5.30±5.77	14	32.11±13.21	4.22±2.01	4.88±2.27

Mild (8-9)	22	39.71±11.72	8.77±3.89	10	47.2±05.11	8.49±0.15	8.76±3.16
Moderate (10-12)	25	46.87±10.29	11.11±4.29	5	51.11±1.22	11.27±0.47	12.01±2.29
Severe (13-16)	18	49.11±11.78	14.29±2.15	4	52.10±0.11	15.01±1.21	15.02±1.38
Extremely severe (17+)	4	48.21±08.11	30.14±3.67	2	54.98	25.32±5.12	29.11±3.14

Table 5: Psychometric properties of DASS-S (Stress)

DASS-21 Subscale	Symptoms	Q no.	Questions in DASS-21	Never 0	Some times 1	Often 2	Almost Always 3
Depression	Dysphoria	Q13	I felt downhearted and blue	30(21.73%)	29(21.01%)	56(40.58%)	23(16.67%)
	Hopelessness	Q10	I felt I had nothing to look forward to	46(33.33%)	35(25.36%)	27(19.57%)	30(21.74%)
	Devaluation of life	Q21	I felt that life was meaningless	50(36.23%)	36(26.09%)	25(18.12%)	27(19.57%)
	Self-deprecation	Q17	I felt I was not worth much as a person	30(21.74%)	34(24.64%)	39(28.26%)	35(25.36%)
	Lack of interest/involvement	Q16	I was unable to become enthusiastic about anything	30(21.74%)	37(26.81%)	34(24.64%)	37(26.81%)
	Anhedonia	Q3	I could not seem to experience any positive feelings at all	37(26.81%)	33(23.91%)	36(26.09%)	32(23.19%)
	Inertia	Q5	I found it difficult to work up the initiative to do the things.	35(25.36%)	33(23.91%)	35(25.36%)	35(25.36%)
Anxiety	Autonomic arousal	Q19	I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)	38(27.54%)	30(21.74%)	33(23.91%)	37(26.81%)
		Q2	I was aware of dryness of my mouth	44(31.88%)	34(24.64%)	30(21.74%)	30(21.74%)
		Q4	I experience breathing difficulty (e.g.excessively rapid breathing, breathlessness in the absence of physical exertion)	48(34.78%)	30(21.74%)	31(22.46%)	29(21.01%)
	Skeletal musculature effects	Q7	I experienced trebling in hands	36(26.09%)	30(21.74%)	36(26.09%)	36(26.09%)
	Situational anxiety	Q9	I was worried about situations in which I might panic and make a fool of myself	49(35.51%)	33(23.91%)	29(21.01%)	27(19.57%)
	Subjective experience of anxious effect	Q15	I felt that I was close to panic	47(34.06%)	33(23.91%)	32(23.19%)	26(18.84%)
		Q20	I felt scared without any good reason	40(28.99%)	31(22.46%)	35(25.36%)	32(23.19%)
Stress	Difficulty in relaxing	Q1	I found it hard to wind down	44(31.88%)	36(26.09%)	29(21.01%)	29(21.01%)
		Q12	I found it difficult to relax	41(29.71%)	33(23.91%)	29(21.01%)	35(25.36%)
	Nervous arousal	Q8	I felt that I was using a lot of nervous energy	39(28.26%)	37(26.81%)	33(23.91%)	29(21.01%)
	Easily upset/agitated	Q11	I found myself getting agitated	51(36.96%)	28(20.29%)	29(21.01%)	30(21.74%)
	Irritable/over reactive	Q6	I tend to over react to situations	46(33.33%)	31(22.46%)	31(22.46%)	30(21.74%)
		Q18	I felt that I was rather touchy	49(35.51%)	30(21.74%)	26(18.84%)	33(23.91%)
	Impatient	Q14	I was intolerant of anything that kept me from getting on with what I was doing	39(28.26%)	32(23.19%)	33(23.91%)	34(24.64%)

Table 6: Psychological stress symptoms analysed through DASS-21 subscales. Values expressed in number of subjects and percentage in total study population

DASS-21 Subscale	Symptoms	Shopkeepers	Commercial drivers	Government employees	Industrial laborers	Construction site workers	Peons	Salespersons	Security persons	Sweepers	Housemaid
		11	14	9	15	19	14	12	17	19	8
Depression	Dysphoria	0.53	0.99	0.83	1.25	2	1.55	1.47	1.69	0.76	1.4

	Hopelessness	0.27	0.78	0.54	0.24	0.64	0.1	0.15	0.15	0.14	0.67
	Devaluation of life	0.71	0.80	0.77	0.74	0.6	0.42	0.55	0.2	0.38	0.57
	Self-deprecation	0.44	0.76	0.96	0.69	0.45	0.19	0.77	0.81	0.77	0.56
	Lack of interest/involvement	0.43	0.21	0.38	0.13	1.8	0.21	0.22	1.25	0.97	0.15
	Anhedonia	0.22	0.78	0.16	0.51	0.44	0.33	0.33	0.71	0.78	0.78
	Inertia	0.74	0.24	0.31	1.59	0.8	0.14	1.51	0.3	0.89	1.65
Anxiety	Autonomic arousal	0.15	0.11	0.44	1.5	1.24	1.35	1	0.28	1.58	1.74
	Skeletal musculature effects	0.97	0.84	0.8	0.83	0.79	0.61	0.52	0.77	0.16	0.52
	Situational anxiety	0.63	1.19	0.66	0.65	0.62	0.79	0.42	0.45	0.63	0.29
	Subjective experience of anxious effect	0.35	0.78	0.25	0.56	0.21	0.45	0.34	0.68	0.5	0.36
Stress	Difficulty in relaxing	0.62	0.70	0.9	0.64	0.44	0.75	0.12	0.64	0.75	0.24
	Nervous arousal	0.48	0.44	0.48	0.46	0.58	0.31	0.42	0.16	0.77	0.51
	Easily upset/agitated	0.99	0.41	0.55	0.19	0.97	0.69	0.41	0.35	0.54	0.45
	Irritable/over reactive	0.8	0.87	0.17	0.26	1	0.54	0.35	0.86	0.95	0.78
	Impatient	0.31	0.93	0.58	1.67	1.7	1.19	1.43	1.26	1.22	1.07

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