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PATTERN OF PSYCHIATRIC DISORDERS AT HIGH ALTITUDE: A CROSS-SECTIONAL STUDY FROM SKARDU, PAKISTAN

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ABSTRACT

OBJECTIVE

To assess the frequency of various psychiatric disorders among individuals presenting to a psychiatric facility at high altitude, and to evaluate their association with demographic variables including age, marital status, and education level.

STUDY DESIGN

Cross-sectional study

PLACE AND DURATION OF STUDY

The Department of Psychiatry, Combined Military Hospital (CMH) Skardu, Pakistan, conducted from September 2021 to February 2022.

METHOD

A total of one hundred adult males, aged 21 to 40 years, who presented to the psychiatric unit at CMH Skardu and provided documented informed consent were enrolled in this study. All the patients were interviewed by consultant psychiatrist and diagnosed according to the International Classification of Diseases (ICD) 10.

RESULTS

Of the 100 participants, 81% were married, and the mean age was 26.94 ± 4.35 years. The most common diagnoses were major depressive episode (44%), adjustment disorders (30%), anxiety disorder (12%), dissociative disorder (9%), and mood disorders (5%). The psychiatric disorders were significantly associated with age, marital status and educational status of the individuals ($p < 0.05$).

CONCLUSION

Depressive episode and adjustment disorder were the most prevalent psychiatric disorders in this high-altitude sample.

KEYWORDS

Adult; Altitude; Hospitals, Military; International Classification of Diseases; Pakistan; Psychiatry.

INTRODUCTION

Globally, psychiatric issues contribute approximately 30% to diminished economic productivity and adult independence. Research indicates that up to three-quarters of psychiatric disorders manifest in adolescence or earlier. A systematic review from developing regions shows prevalence rates of 10–20% among youth. Socioeconomic background, gender, and age are major determinants, and boys being more prone to behavioural issues such as ADHD (Attention deficit hyperactivity disorder), while post-pubertal females commonly reporting disorders like anxiety.

The dynamics and environment of high altitude expose young adults to multiple risk factors associated with psychiatric disorders. The lifestyle and the environmental factors play an important role in this. Stressful nature of the job, lack of communication, loneliness, inadequate physical activity and restricted access to friends and family are among additional stressors that a soldier has to go through while serving in these areas. The individuals residing at high altitude not only battle with the weather, but physical and mental stress as well.4 These inhabitants confront harsh weather, ultraviolet exposure, strong winds, snowstorms, avalanches, and hazardous terrain, making their logistics demands considerably higher. Their shelters lack ventilation and are heated by wood or kerosene, leading to prolonged exposure to indoor pollutants. Additionally, rigid routines, limited recreation, and extreme cold intensify the psychological burden. 5

Thus, this study aimed to assess burden of psychiatric disorders in such settings to strengthen the existing data and inform future mental health strategies tailored to high-altitude environments.

METHOD

Procedure

The descriptive cross-sectional research was carried out at the Department of Psychiatry, Combined Military Hospital (CMH) Skardu, Pakistan from September 2021 to February 2022, following formal approval from the Ethical Review Committee of the Combined Military Hospital Skardu, Pakistan before commencement (ERC No. Psy-2/2021, dated: 07th August 2021).

Participants

A total of 100 adult male participants were recruited for the study. The sample was aged 21 to 40 years, consulting the Psychiatry Department Combined Military Hospital Skardu, Pakistan during the study period. Patients who fulfilled the selection criteria of the study and provided informed consent were interviewed by a consultant psychiatrist after being referred from general and medical out-patient departments. The sampling technique was non-probability consecutive. Sample size estimation was performed using WHO software, assuming a prevalence rate of 25%, 95% CI (confidence interval), and 5% margin of error, yielding a target of 73 participants, which was exceeded.

Individuals with autoimmune disorders, neurological conditions, or chronic comorbidities (e.g., diabetes, asthma, hypothyroidism, epilepsy) were excluded from the study.

Instruments

Data were collected using a structured questionnaire, which comprised demographic details and psychiatric diagnosis. The clinical diagnoses were made by a consultant psychiatrist according to ICD-10 clinical diagnostic criteria. The major conditions assessed included depressive episode, dissociative disorder, anxiety disorder, mood disorder and adjustment disorder.

Data Analysis

Data were entered and analysed using the Statistical Package for Social Sciences (SPSS) version 23.0. Frequencies and percentages were used for qualitative variables, whereas means and standard deviations were described for continuous data. Chi-square analysis was performed after stratification.

RESULTS

The participants' mean age was 26.94 + 4.35 years, with the majority of patients (77%) being younger than 29 years. Most were married (81%). Education levels varied, with 38% participants had matriculation level education (Table 1). Depressive episodes were the most prevalent diagnosis (44%), followed by adjustment disorder (30%), anxiety disorder (12%) and dissociative disorder (9%).

Post-stratification data of psychiatric disorders with respect to age, marital status and educational status showed that depression and adjustment disorders were significantly associated with age, marital status and educational level of the patients (Table 2).

Table 1
Demographic Details of the Patients (N=100).

Characteristics	Values
Age (years)	26.94 ± 4.35
21-28	77 (77%)
29-40	23 (23%)
Marital Status	
Unmarried	19 (19%)
Married	81 (81%)
Educational Level	
Middle	30 (30%)
Matriculate	38 (38%)
Intermediate	32 (32%)

Table 2
Post-stratification Chi-Square Test on Demographics and Psychiatric Disorders.

haracteristics	Depressive Episode n=44		Anxiety Disorder n=12		Dissociative disorder n=9		Mood Disorder n=5		Adjustment Disorder n=30	
	n	p-value	n	p-value	n	p-value	n	p-value	n	p-value
ge (years)										
1-28	40	0.01	0	0.73	3	0.06	1	0.74	9	0.01
9-40	4		12		6		4		21	
Marital status										
Married	28	0.62	9	0.28	7	0.61	2	0.02	20	0.41
Unmarried	16		3		2		3		10	
ducation										
Middle	23	0.01	3	0.35	1	0.42	0	0.05	3	0.006
Matric	18		3		4		1		12	
ntermediate	3		6		4		4		15	

DISCUSSION

This study examined the types and distribution of psychiatric diagnoses among individuals living in high-altitude settings, revealing a predominance of depressive and adjustment disorder. Research suggests a link between altitude and increased risk of depression and suicidality. In one study, the prevalence of depressive episode (F32) in "acclimatized individuals" is 19.0%,[4] suggesting that the clinical population assessed here may have distinct vulnerabilities. Ahmed et al found a high percentage of the volunteers with mild-to-moderate symptoms of anxiety and depression.[6] Another study reported that six of 76 foreign patients had anxiety-related primary diagnoses during the season.[7] Sracic et al found that out of 1036 subjects studied, 7 developed anxiety symptoms in the initial days after ascending to a high altitude.8 One hypothesis is that hypoxic conditions may elevate inflammatory markers, thereby increasing susceptibility to emotional disturbances and suicidal tendency.[9] Young et al assume that the undesirable effect of hypoxia on serotonin synthesis may have a causative role in the occurrence of elevated suicide rates and depression in individuals at high-altitude.[10]

In contrast with the previous research, this study had a high frequency of depressive episodes (44%) and adjustment disorder (30%). The major reason for this difference is that the present research only included patients reporting to hospital with some presenting complaint. However, most of the prior studies were conducted on either mountaineers or acclimatised individuals. Nock et al described that an eminent reason for hypoxia was altitude, and that the higher the elevation, the more severe the hypoxia. Chronic hypoxia also known to escalate mood disturbances, particularly in emotionally unstable individuals.[11] According to Yu et al, there is a complex association between affect and hypoxia, because oxygen therapy, which improves pulmonary function in hypoxic individuals with sleep apnea, does not benefit the mood.[12]

Exposure to a high altitude for a short duration causes a period of sudden and strong happiness and euphoria. This enhancement in mood comes from an overflow of a chemical called dopamine in the brain, caused by the lower oxygen concentrations in the air. But it also leads to lower levels of another chemical in the brain, serotonin, which is strongly associated with mood, sleep, and well-being. With a decrease in serotonin caused by higher altitude, an individual may experience intense emotions such as sadness, grief, worry, confusion or despair, which in turn makes the individual more prone to depression, anxiety and suicide.[13]

Furthermore, it was observed that one's extended stay at high altitude leads to more symptoms and an increased likelihood of them developing a neurotic or psychotic disorder.[14]

Another possible reason reported was the disrupted melatonin release and circadian rhythms because of decreased sunlight and a lack of its exposure. This may lead to undesirable mood changes, as well as cognitive weaknesses, and other critical physiological functions.[15] Other studies described the factors like dietary deficiencies, fluid and electrolyte imbalance, which may be fairly stressful to yield or maintain neurotic symptoms.[16]

Dissociative disorders were found in 9% of the sample in the present study. Somatic and dissociative symptoms are often experienced by individuals at high altitudes, initiated by hypoxia, as dyspnea, palpitations, dizziness, headache, and disturbed behaviour. Most of these symptoms are similar to those stated in anxiety disorders or panic attacks.[17] Dissociation is the phenomenon in which an individual experiences a disturbance or discontinuity in one or numerous aspects of their psychological processes, which comprise memory, perception, consciousness, identity, and motor control. High altitude is assumed to play a significant role in the development of Dissociation symptoms.18

Five percent of the study sample showed symptoms of mood disorders. A case report revealed the diagnosis of mania at high altitude in a patient with a pre-diagnosed bipolar disorder. Though, it is unknown if the possibility of developing mood symptoms at high altitude is increased in individuals with a pre-diagnosed mood disorder.[3]

Limitations

This study has some limitations. It was conducted at a single hospital and included only male patients reporting to the out-patient department, which may not represent the wider community. The cross-sectional design restricted causal interpretation and captured associations at a single point in time. Diagnosis relied on clinical interviews without using standardised rating tools, which may affect diagnostic assessment and consistency. The exclusion of female participants and those with comorbid chronic illnesses may further limit the generalisability of the findings. Sociocultural factors, including stigma surrounding mental illness, may have influenced help-seeking behaviours, thus affecting the observed pattern.

CONCLUSION

The most common psychiatric disorders among individuals residing at high altitude in this study were depressive episode and adjustment disorder. Very limited scientific evidence on the subject of disorders at high altitude was identified. The findings highlight the need to strengthen mental health assessment and support systems in high-altitude regions, particularly for military personnel. There is a need for expanded research and improved psychological care infrastructure in these unique environmental conditions.

Recommendations

Future research should include both genders, incorporate larger, more diverse samples by including multiple centers and utilise longitudinal study designs with validated assessment instruments to improve accuracy of findings.

CONFLICT OF INTEREST

None

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AUTHOR(S) CONTRIBUTION / UNDERTAKING FORM

Sr. #	Author(s) Name	Author(s) Affiliation	Contribution
1.	Malik Awais Amin	Combined Military Hospital Skardu, Pakistan.	Study design, acquisition of data, and manuscript writing
2.	Mustajab Alam	Combined Military Hospital Skardu, Pakistan.	Contributions to data analysis and interpretation and manuscript writing
3.	Muhammad Adil	Combined Military Hospital Skardu, Pakistan.	Conception and critical review
4.	Anam Manzoor Alam	Combined Military Hospital Skardu, Pakistan.	Data acquisition and interpretation, and manuscript writing
5.	Qasim Zia	Combined Military Hospital Skardu, Pakistan.	Data acquisition and analysis, and critical review.
6.	Syed Noman Uddin	Combined Military Hospital Skardu, Pakistan.	Data interpretation and analysis, and manuscript writing.