

Sensory Deprivation and Psychiatric Disorders: Association, Assessment and Management Strategies

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ABSTRACT

Background: Sensory deprivation (SD) is a widely prevalent condition that leads to various health-related consequences and is also an important cause of disability worldwide. Earlier, SD experiments were used as research modalities to alter human behavior. In recent years, the focus has shifted to understand how SD can affect the mental health of individuals (with congenital or acquired sensory impairments). This narrative review focuses on the current understanding about the association of SD and psychiatric disorders.

Methods: A comprehensive literature search was done PubMed, Scopus, PsycINFO, and Google Scholar and in the cross-references of relevant articles. Keywords included “sensory deprivation,” “blindness,” “deafness,” “mental illness,” “psychiatric disorders,” “prevalence,” “assessment,” and “management” in various combinations. Only original articles (abstract and full text) published in English till October 2020 were included.

Results: The prevalence of anxiety, depression, dementia, suicidality, and

psychosis in persons with SD is higher than the general population (highest being in persons with dementia with comorbid SD). Several mechanisms/hypotheses have been proposed to explain these associations. Assessment of SD includes a thorough history taking, with adequate awareness about the difficulties faced during a psychiatric interview in this population. Modifications in the psychometric assessment procedures are warranted. Management depends on a multi-disciplinary approach that includes proper referral to specialties, pharmacological management (depending on diagnosis as well as taking care of ototoxic/ocular side-effect profile of the drugs), and nonpharmacological supportive measures.

Conclusions: SD is a complex condition, and evidence suggests that persons with SD have higher psychiatric morbidity. A comprehensive assessment, along with holistic management approach is warranted.

Keywords: Sensory deprivation, mental illness, assessment, management, association

The *Cambridge Dictionary* defines “deprivation” as a situation in which you do not have things or conditions usually considered necessary for a pleasant life.¹ Living can be difficult without special senses, and the experience of persons with sensory deprivation is difficult to fathom. As per the World Health Organization (WHO), globally, about 285 million people of all ages have visual impairment, of whom 39 million have complete vision loss.² Also, about 466 million people have disabling hearing impairment, of whom 34 million are children.³ With regard to India, as per the latest Census 2011, about 2.2% of the Indian population had disability, with visual disability, hearing disability, and speech disability accounting for 18.8%, 19.0%, and 7.6% of the total disability, respectively.⁴ Data on other sensory impairment (India and world) is not available. However, it is estimated that by 2050, over 900 million people will have hearing impairment and that visual impairment will soon

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become a major global health issue. Psychiatric morbidity in persons with SD is common. However, there are no definite guidelines/recommendations for assessing and managing psychiatric disorders in persons with SD. Assessment of persons with SD is also not a focus during the routine psychiatric post-graduate teaching. This narrative review focuses on the prevalence of psychiatric disorders in persons with SD and vice versa. Additionally, we attempt to provide a basis framework that can be followed for psychiatric evaluation in persons with SD.

Materials and Methods

A comprehensive literature search was conducted on SD in PubMed, Scopus, PsycINFO, and Google Scholar and through the cross-references of relevant articles, till October 2020. Keywords included “sensory deprivation,” “blindness,” “deafness,” “mental illness,” “psychiatric disorders,” “prevalence,” “assessment,” and “management” in various combinations. Only original articles (abstract and full text) and review articles, published in English, till October 2020, were reviewed and checked thoroughly. More than 300 articles related to the topic were found, out of which those relevant to mental illness/psychiatry have been included. Articles that focused only on the policy and social issues related to persons with SD were excluded.

Results

Prevalence of Psychiatric Disorders in Persons with SD

A few studies have explored the prevalence of SD, mainly hearing loss and vision loss, in persons with mental illness (Tables S1 and S2). The available evidence suggests a high prevalence of hearing and visual impairment in persons with mental illness. Additionally, available data suggests that, compared to the general population, the prevalence of psychiatric morbidity is high among those who develop SD in early life.

With regard to persons with intellectual disabilities (IDs), sensory deprivation, mostly hearing loss, was quite prevalent. Evidence in this favor

has come from a large scale descriptive study conducted at Special Olympics sports events, where on screening around 10,000 ($n = 9,961$) persons with ID for hearing loss, a prevalence rate of 24% was reported (which was 1.4 times greater than the general population prevalence of the same age of 18 to 55 years). Further, it was seen that hearing loss was previously undetected or undertreated in most cases, warranting greater care and attention to this special population.⁵

Effects of SD on Neuro-Cognitive Development

Various neurodevelopmental changes in all domains have been noted in patients with SD. Some of the important neurodevelopment problems encountered in children with both visual and hearing impairment are delay in language acquisition leading to problems in home or school learning experiences; short-term-memory problems; delay in the written word, vocabulary, grammar, syntax, and reading skills; and poor theory of mind.⁶⁻⁸ Further, as they grow up, most of them would become anxious whenever they experience communication failure, which later on transited to adulthood too.⁷ Further, autism spectrum disorders have been reported in 10% of children with both visual and hearing impairments.⁹ There is also evidence to suggest that there is a delay in language acquisition in people with visual impairment, and many have different levels of cognitive decline as they age.¹⁰ Due to these limitations, persons with SD develop feelings of isolation, stigmatization about the illness, lack of stimulation, significantly reduced opportunity in education and employment, and dependence on family members and feel disabled.¹¹ All these factors (bio-psycho-social), when analyzed in totality, can help understand the high prevalence of various psychiatric comorbidities in this special population.

Interaction of Specific Sensory Loss with Psychiatric Disorders

Hearing Loss/Deprivation and Psychiatric Illnesses

Studies have reported that hearing deprivation in childhood is associated with

an elevated risk of later development of major psychiatric illness, apart from poor cognitive and intellectual development.

Hearing loss and psychosis: In the most recent systematic review and meta-analysis of cross-sectional and longitudinal studies evaluating the association between hearing loss and psychosis, early development of hearing impairment was associated with the later development of psychosis/schizophrenia by an OR of 3.15.¹² Loneliness, social isolation, disturbances of source monitoring and interpreting sounds, and misattribution of the intention of others has been postulated as the possible explanations for this association.¹² Further, some evidence suggests that the greater level of complexity of the social world (such as urbanicity) affects an individual's ability to process and correct sensory information, leading to psychotic experiences.¹³ Thus, both contextual and environmental factors impact the risk of development of psychosis in an individual with hearing impairment.

Hearing loss and dementia: The rates of cognitive decline and risk of incident cognitive impairment were linearly associated with the severity of an individual's baseline hearing loss.¹⁴ Compared to those with normal hearing, individuals with hearing loss have a 24% (HR: 1.24) increased risk of cognitive impairment.¹⁴ A longitudinal, population-based epidemiological study of aging from the USA (data collected every five years) found that the 10-year, unadjusted cumulative incidence of cognitive impairment for subjects with hearing, visual, and olfactory impairment was 17.3%, 23.5%, and 30.0%, respectively.¹⁵ In another study, peripheral hearing impairment was independently associated with accelerated brain atrophy in the whole brain, especially the right temporal lobe, in elderly individuals.¹⁶

A few hypotheses have been postulated to explain the relationship between cognitive decline and hearing deprivation. These are: (a) *The Cognitive Load on Perception hypothesis*, which suggests that declining cognitive capacity places a cognitive load on the perception, which gradually becomes poorer, that is, cognitive decline causes sensory decline,¹⁷ (b) *The Sensory Deprivation hypothesis*, which postulates that sensory decline

causes cognitive decline.^{17,18} This hypothesis has been supported by the facts that progressive cognitive decline occurs with age-related perceptual deficits, or age-related atrophy in the auditory system occurs due to long-term sensory deprivation, yet is limited by another fact that sensory decline in early life does not always lead to cognitive decline.¹⁹ (c) Lastly, the *Common Cause hypothesis* suggests that a third variable causes both hearing loss and cognitive decline. This is supported by literature showing a cognitive decline to occur more with multiple sensory deficits. The common underlying cause might be the interaction of various factors such as cerebrovascular disease, social relations, and genetics.^{19–21}

Hearing loss and common mental disorders (depression and anxiety): Social isolation, loneliness, and cognitive decline have been shown to reduce the activation of central auditory pathways, leading to compensatory increased activations in the cognitive control network of the brain, to support effortful listening.²² The long-term adverse neuroplastic sequelae of this compensation leads to executive dysfunction and impaired affective information processing, thereby elevating the risk of development of depression and anxiety in these individuals.²² This is supported by studies that reported significant improvement in sadness and irritability and improved cognition after using vision-enhancing aids and hearing aids in persons with dual sensory loss.²³

Hearing loss/impairment and Delirium: Sensory deprivation is one of the major risk factors for developing delirium in hospitalized patients. A very recent cross-sectional study that evaluated 3,038 hospitalized elderly patients (aged >65 years) found that patients with delirium have a higher prevalence of hearing impairment (30.5% vs 18%), visual impairment (24.2% vs 15.7%), and bisensory impairment (16.5% vs 7.5%).²⁴ Hearing impairment and visual impairment have been two of the six major risk factors contributing to delirium; others are cognitive impairment, sleep deprivation, immobility, and dehydration.^{25,26}

Vision Loss/Visual Impairment and Psychiatric Disorders

Visual impairment and psychosis: Visual deprivation has been linked with future psychosis risk in a few studies. A longitudinal cohort data linkage study conducted on the Swedish population reported that of 11,40,710 registered individuals (>18 years), 10,769 developed psychosis later. Further, the study had four main findings: (a) severe impairment before optical correction in their best eye increased the psychosis rate compared to those with normal uncorrected vision (HR: 1.26), (b) larger interocular visual acuity difference was associated with an increased psychosis rate (adjusted HR: 1.49), (c) impaired vision that could not be corrected to normal with lenses had highest rates of psychosis (adjusted HR: 1.56 in the best eye), and (d) individuals with visual impairment had higher rates of psychosis than their full siblings with normal vision.²⁷ All these findings more or less highlight that a significant association exists between visual deprivation and the risk of development of psychosis in visually challenged individuals. More recently, biological studies in patients with schizophrenia revealed potential retinal biomarkers for schizophrenia which includes widened retinal venules, thinning of the retinal nerve fiber layer, and abnormal electroretinogram amplitudes.²⁸

Visual impairment and dementia: There is an increasing incidence of ocular pathology such as cataract, diabetic retinopathy, and refractive error with increasing age. Although visual impairment and dementia develop independently, both have an impact on each other. Visual impairment has been associated with an increased risk (2–5 fold) and clinical severity of Alzheimer's disease.^{10,29} Further, some form of visual impairment has been documented in 25%–28% of patients diagnosed with dementia.³⁰ Visual impairment, when combined with hearing impairment (i.e., dual sensory impairment), causes higher cumulative dementia incidence than hearing or visual impairment alone. In a Japanese retrospective study, among sensory impairments, dual sensory impairment was the greatest risk factor for developing dementia (HR: 1.45).³¹

Visual impairment and common mental disorders (depression and anxiety): Visual impairment poses a sense of dependence on others for all activities. It has been seen that those with visual impairment suffer from loneliness, get fewer opportunities to learn social skills, participate less in leisure-time activities, find it difficult to predict other people's behavior, and are often overprotected by their families. They may also feel less attractive and more socially incompetent and have a sense of loss of status and worthlessness, all of which can lead to common mental disorders such as depression and anxiety.³² Individuals aged ≥16 years with visual impairments (both near and distance vision impairments) have significant psychological morbidity, predominantly depression and anxiety.^{33,34} Impairment in social functioning, a potentially modifiable risk factor, is a significant contributor to the development of anxiety and depression in visually challenged individuals.

Visual impairment and delirium: In several systematic reviews, visual impairment was significantly associated with delirium in older individuals in medical units, with odds ratio ranging from 1.89 to 3.5.^{35–37} “Black patch psychosis” or postoperative delirium in patients undergoing eye surgery is a faulty adaptation to the stress of visual deprivation with loss of perceptual and conceptual triggers. Restricted mobility alongside their visual impairment leads to disorientation, confusion, and agitation following acute trauma. Psychiatric examinations reveal the presence of paranoid feelings, sadness, suspiciousness, and fearfulness for several days.³⁸

Visual impairment and Charles Bonnet syndrome: Charles Bonnet Syndrome (CBS) is an uncommon condition that involves visual hallucinations in visually impaired individuals in the absence of cognitive impairment or psychiatric illness. There are complex visual hallucinations in 11% to 15% of individuals with CBS.³⁹ Patients usually have insight into their visual experiences' unreality, which are often pleasant but may be unpleasant at times.⁴⁰ Cases of delirium superimposed on CBS and CBS-induced psychosis have also been reported.^{41,42}

Other Sensory Deprivations and Psychiatric Illness

Studies have shown that impairment of smell and taste is associated with cognitive function impairment, feelings of vulnerability, loneliness, and depressive symptoms.⁴³ It has been found that those disorders which affect dopaminergic neurotransmission (such as Parkinson's disease, schizophrenia, attention deficit hyperactivity disorder, and autism spectrum disorders) have pronounced alterations in olfactory functions.^{44,45} Newer studies are upcoming in this regard.

Gustatory deprivation and touch/tactile deprivation are rare. Tactile deprivation is occasionally associated with phantom perception/phantom limb. There is discomfort at the site of the amputated body part, due to denervation, which leads to further loss of neural connections; however, cortical processing of the same occurs. Denervation hallucinations are seen in this syndrome along with a plethora of psychological morbidity and chronic pain symptomatology, which degrade one's quality of life.⁴⁶

Discussion

From the above literature review, it is evident that SD (mostly hearing and visual impairment) poses a greater risk of developing various psychiatric morbidities in different degrees of severity. Additionally, a few studies also provide some evidence that patients with psychiatric morbidities (psychosis, dementia, etc.) have comorbid conditions of SD (hearing and/or visual impairments). In this regard, it is essential to develop a holistic approach for proper assessment of psychiatric morbidity in persons with SD and to suggest a proper format of management options (keeping in view the various limitations encountered). We have tried to present some of the basic principles of assessment and management strategies for psychiatric morbidities in persons with SD.

Assessment for Psychiatric Morbidity in Persons with SD

Limited options for communication is the biggest barrier in the assessment of patients with SD. Obtaining consent for

assessment and treatment might also be a significant problem in this population. The presentation and phenomenology of various psychiatric illnesses might also be being atypical, making diagnosis difficult. Along with these difficulties in basic clinical assessment, psychometric tools standardized for these special populations are grossly lacking.⁴⁷ These patients are frequently excluded from most studies and randomized controlled trials. Hence, information about the presentation, assessment, and management is mostly derived from case reports rather than larger studies. Also, a systematic review of the available information is difficult to carry out because of a very small sample size of case series and use of non-standard terms and descriptors by different authors. **Tables 1** and **2** list certain difficulties and relevant suggestions to overcome such problems in various clinical situations.

Management of Patients with SD and Comorbid Psychiatric Illness

Management of psychiatric issues in persons with SD involves a multidisciplinary team approach. After proper assessment of the subject (which might take multiple sittings), a treatment plan is to be formulated. If the subject is violent and aggressive, there can be challenges while managing such patients, as communication is compromised and, at times, too difficult to interpret. There have been reports of subjects with hearing impairment demonstrating higher levels of violent and sexual offenses than their hearing counterparts.⁶¹ The treating physician/psychiatrist might feel helpless, and adequate treatment of even uncomplicated illness might be problematic. Proper documentation of all procedures is essential to safeguard oneself from various legal implications/proceedings. Legal guidelines for persons with disabilities apply to those with SD.

Use of appropriate technology, assisted interview skills, and communication support through certified interpreters are essential management components. As an aid to assessment and interventions, developing programs for training professionals (certificate courses) to assist in psychometric assessments, and psychiatric management of persons with SD can be taken up by recognized insti-

tutions across the country and world. In this regard, the National Institute for the Empowerment of Persons with Intellectual Disabilities (formerly National Institute for the Mentally Handicapped) and the Rehabilitation Council of India conduct training programs to train professionals.

Hearing deprivation/impairment and psychiatric disorder:

Management includes assessing the severity of the current ongoing situation and providing prompt relief to the patient:

- Seclusion is not allowed as per the Mental Health Care Act 2017. If the subject is violent or extremely aggressive with potential risk to self and staff, then pharmacological interventions might be required to calm down the patient. Moreover, the patient should be stationed near an observer/nursing staff who can make adequate eye-to-eye contact with the patient with hearing impairment so as to look for any signal for help by the patient. Certain facial expressions (such as angry expressions and challenging eye contact) should be avoided when attempting to de-escalate.⁶¹ General precautions such as unnecessary sedation should be avoided like in all cases of psychiatric patients as there are chances of being "overmedicated" or "sedated" in, and it could interfere with attempts to communicate. Evidence suggests that hospitalized patients with hearing impairment are restrained up to four times more than patients who can hear.⁶¹
- **Pharmacological management:** After establishing a diagnosis, psychopharmacological treatment is similar to patients with normal hearing. Strict vigilance for renal compromise in conditions associated with hearing loss (such as renal insufficiency in Alport syndrome) needs to be considered. Ototoxic medications should better be avoided in persons with hearing impairment or those with complete hearing loss. First-generation antipsychotics (thioridazine, chlorpromazine), carbamazepine, topiramate, and tricyclic antidepressants have been associated with ototoxic side effects and, therefore, need to be used more cautiously if required.^{62,63}

TABLE 1.

Assessment of a Patient with Hearing Deprivation and Psychiatric Disorder

Prerequisite conditions for the assessment of a patient with hearing impairment^{47,48}:

- There should be a skilled interpreter who can help interpret the language and signs of the patient.
- Family members as interpreters are discouraged as they might give biased opinions based on their subjective viewpoint of the patient's condition; also, there can be medicolegal consequences (For example, there can be issues related to confidentiality and family members are often not able to be impartial due to emotional involvement; therefore, in legal settings, they are usually refrained from interpreting the patient's version and interpreters are assigned).⁴⁹
- Patients with hearing impairment who are educated usually know to report in American sign language or Indian Sign Language. However, if the patient is "language dysfluent" or has not been taught any formal language, a certified interpreter (signer) must be assigned to help in the assessment process.
- If an interpreter not available, assistive listening or video, remote interpreting services should be used.
- Back-and-forth note writing is not recommended but can be used if an interpreter is unavailable.
- Avoid making distracting motions.

Difficulties encountered in assessment of hearing impairment subjects:

- Some of the common signs for assessing substance abuse such as confabulation, loud/slurred speech, etc., are usually not present in patients with hearing loss/impairment. Therefore, more importance to be given to physical examination and laboratory investigations.
- During the assessment of psychopathology, care should be taken not to confuse language dysfluency as formal thought disorder and diagnose it as psychosis.
- Patients with hearing loss more often report visual elements/experiences while describing their perceptual phenomenon; these experiences should not be regarded as visual hallucinations.⁵⁰
- Prelingual hearing impaired patients are unlikely to have true auditory hallucinations.⁵⁰
- Usually, subjects with severe hearing impairment distrust the health system and can be uncooperative. Such uncooperativeness should not be interpreted as paranoid delusions.⁵¹
- Many a time, subjects with hearing impairment report hearing buzzing/humming sounds, beating/tapping sounds, ringing, or multiple elementary sounds, yet these experiences are unlikely to be associated with a psychiatric disorder. Therefore, solely relying on these experiences and labeling it to be auditory hallucinations might lead to overdiagnosis of psychosis.⁵² Behavioral observation is needed to reach to a conclusion of psychosis in hearing impaired individuals.
- Formal thought disorders are difficult to elicit. Hence, rely on behavioral presentations; significant change from the previous usual routine should be taken into account.

Tips for assessment of psychiatric morbidities in patients with hearing impairment⁴⁸:

- Use of signs with similar shapes but without meaning is suggestive of clanging.
- Repeating the signs of the examiner is suggestive of echopraxia.
- Repeated use of the same sign beyond the point of relevance is suggestive of preservation
- Use of a new sign could be suggestive of neologism but must be differentiated from their self-made home signs, which are used frequently by patients with hearing loss.
- When suspecting depression, "behavioral equivalents of depression" such as aggression, irritability, screaming, and retardation may be given more weightage.
- While suspecting mania, rapid signing and cheerful look and mannerisms can be present; require multiple observations before reaching a final diagnosis of mania.
- In people with limited communication, ICD/DSM diagnostic criteria may not be applicable.

Things to note while taking the history of hearing loss in such a scenario:

- Explore the onset of hearing loss—congenital or acquired, early-onset or late-onset.
- Explore the determinants of hearing loss—born to normal hearing parents or to parents with hearing impairment, whether it is partial or total hearing loss.
- Severity of hearing loss, age of onset of hearing loss/impairment, use of hearing aids, communication preference—sign language, assisted device, use of an interpreter, etc.
- Ever attended a specialized school for hearing challenged and taken advice for home communication patterns.
- Explore in detail about any recent change in behavior.
- Assess for genetic syndromes (velo-cardio facial syndrome, Turner syndrome, Down syndrome, etc.).
- Screen for physical abuse, sexual abuse, suicide risk, and trauma exposure such as loud noise blasts.
- Gather more data from observations.
- Assess for stigma as persons with hearing impairment and mental illness often face double stigma, that is, stigma due to hearing loss and stigma due to mental illness.⁵³

Psychometric assessment in patients with hearing impairment⁵⁴:

- Assessment can be made using sign language or print media; supplementary use of sign and verbal instructions is helpful.⁵⁵
- Nonverbal cognition is measured by tests developed for the hearing deprived population, like Snijders-Oomen Nonverbal Intelligence Test and Leiter International Performance Scale.
- Psychometric tests are usually applied in the same way as in patients with normal hearing. But subscales involving audiological perception can be omitted, and results are obtained with remaining items primarily involving vision.
- The interpreter is needed, and repeated demonstration of the various test tasks with positive encouragement is advisable.

TABLE 2.

Assessment of a Patient with Vision Deprivation/Loss and Psychiatric Disorder

Tips for assessment of a patient with visual impairment⁵⁶:

- While interviewing a patient with complete vision loss/low vision, one should speak in a normal tone of voice that is nonthreatening.
- Don't be loud or talk in high pitch, which can be perceived as threatening.
- The patient should be made to sit with hands in contact with the physical structures of the environment, as it will help in their orientation and balance.
- Encouragement for independence during the interview helps promote rapport, boosts confidence, and improves the patient's self-esteem.
- History should proceed as does in a patient with normal vision.
- Diverse information sources must be taken into account.
- Verbal indication must be given while approaching the patient, to avoid a startle response, and when leaving the bedside/interview room, to avoid the embarrassment of talking alone.
- Always introduce if any new team member joins the interview room. Don't allow cross-questioning by other team members.
- After each question, ask permission from the visually challenged subject to proceed. Give sufficient time to answer.
- Ask if the person is feeling tired or uncomfortable in between the interview. Often, due to embarrassment/shame/stigma, persons with sensory deprivation do not report feeling uneasy.
- Always elicit family history of eye disease (e.g., retinitis pigmentosa is the most common cause of inherited vision loss).
- Explore coping strategies used by the subject for meeting his/her daily needs.
- Explore with empathy how the person had adjusted with the vision loss and look for guilt, feeling of being a burden on the family, etc.
- Explore for suicidality—passive death wish, suicidal ideations, past suicidal attempt/plan, etc.
- Effective communication can be achieved by acknowledging the person with vision loss/impairment as a human being with the same range of needs and feelings as a person with normal sight.

Difficulties faced/encountered in assessment in visually challenged/impaired subjects⁵⁷:

- Patients with visual impairment have a similar presentation like subjects with autistic spectrum disorder, unlike hearing deprivation (autism is more than 30 times common in persons with complete vision loss than sighted people).
- Similarities with autism include atypical communication, language, and social skills, as well as stereotypies, resistance to change, severe anxiety, and high pain tolerance.
- There is a greater prevalence of ID in children with visual impairment, making assessment further challenging.
- Certain typical behaviors known as “blindisms” are noted in persons with visual impairment, which are also seen in persons with profound ID. These include eye-pressing, light gazing, flicking fingers in front of lights, rocking, spinning, tapping, and twirling.⁹

Psychometric assessment in visually challenged persons^{58,59}:

- Psychometric tests often evaluate one's innate ability and skills. But a visually challenged individual's skills can be different from those of a sighted individual. Therefore, appropriate modifications need to be done in the psychometric test being used to assess ID, personality, reasoning, etc.
- Visually challenged persons take more time to read than sighted people. Therefore, standard time extensions for psychometric tests may not be applicable. Hence, the cutoff for different tests in visually challenged subjects should be different than in sighted individuals.
- Only the verbal components of the psychometric tests are to be applied, and such a narrow approach in assessment can give a skewed cognitive profile. Therefore, reasonable adjustments and validations need to be done for wider use.⁵⁸
- A few visual performance subsets adapted for visually challenged children have been developed.⁶⁰

- **Consultation-liaison with other specialties:** Assessment of severity of hearing loss and referral to neurologist, ENT surgeon, or pediatrician as per the case is required for holistic care of the individual. Those subjects with congenital hearing loss can be referred to an ENT surgeon for a cochlear implant or hearing aids. To assess genetic syndromes or any neurological deficits, the patient needs to be referred to the respective specialty (for genetic workup). Some form of cognitive impairment arises if a child is not taught any form of language by the age of 7 or 8 years. Approximately

90% of people with complete hearing loss are born to parents with normal hearing who are unable to identify hearing impairment at early age and hence pose an increased risk of language deprivation.^{48,64} Patients need to be referred to a special school for learning of language, which could be crucial for their development trajectory. The psychiatrist may help in alliance-building to ease the delivery of holistic treatment, alleviate anxiety among clinicians and patients with hearing impairment, and overcome trust issues with proper psychoeducation.⁴⁸ Communication support and

technologies developed to improve information accessibility, such as audio-induction loop, recorders, and note-takers, can be helpful, and proper information can be provided to them through social workers.⁶⁵

- **Nonpharmacological treatment:** A few nonpharmacological therapies have been developed for subjects with hearing impairment and comorbid psychiatric issues. Some of them are structured psychotherapies for skill-building to enhance self-esteem. An interpreter is necessary for therapy sessions, due to higher possibilities of miscommunication. Written

materials can be provided for psycho-education. Skill-building tips include learning technology (video conferencing, emails instead of phone calls), and learning sign language. The psychiatrist/psychologist can further help in guiding facilitation for disability certification to avail of disability benefits and facilities by the central and state government bodies that they are rightfully entitled to. Moreover, the patients can be linked with various local nongovernment organizations providing support to this special population.

Management of a patient with visual deprivation/complete vision loss and psychiatric disorder:

Management includes psychometric testing, referral to various specialties, and pharmacological and nonpharmacological treatment in outpatient or inpatient settings. If the patient is violent and difficult to manage, then appropriate medications to calm down can be used, preferably in low doses (as compared to patients with normal vision). Proper history should be taken to differentiate abnormal behavior and agitation from uncooperativeness due to low ID/poor understanding of instructions.

- **Psychometric testing:** The psychological tests are usually the same as for patients with normal vision, but subscales involving visual perception (such as visual retention in memory) can be omitted, and results are obtained with remaining items primarily involving hearing and other senses. Other details are mentioned in **Table 2**.
- **Referral:** The patient should be referred to an ophthalmologist for the correction of vision by eyeglasses or surgical procedures if needed/possible. Pediatrics and neurology consultation may be needed to assess the associated genetic syndromes (such as *Usher Syndrome*)⁶⁶ or any other neurological deficit.⁶⁷
- **Pharmacological treatment:** Pharmacological treatment strategy remains the same as for patients with normal vision. However, a few psychotropics are associated with ocular side effects; examples include first-generation antipsychotics (thioridazine,

chlorpromazine), carbamazepine, topiramate, tricyclic antidepressants, etc. Such agents need to be used with caution, and strict monitoring is essential.⁶⁸ Patients with CBS usually do not respond to antipsychotics, and behavioral techniques need to be explained to cope with distressing hallucinations.³⁹ A typical antipsychotics have the propensity to cause weight gain, diabetes mellitus, and subsequent metabolic syndrome, which can further worsen vision.⁶⁹ Mood stabilizers like carbamazepine have been associated with impairment in color perception and discrimination of contrasts, and lithium has been reported to cause bothersome eye irritation in some patients.⁶⁸ These points need to be kept in mind while monitoring response to psychotropic medications.

- **Nonpharmacological treatment:** Psychotherapies are conducted as in a patient with normal sight but definitely with obvious limitations as visually challenged individuals rely mainly on hearing sensations. A few therapies for patients with acquired vision loss have been developed, focusing on coping with vision loss. These include grief therapy, cognitive therapy, personal achievement skills training, and group counseling programs. However, research in the psychosocial intervention strategies is limited, and hence, the effectiveness of each therapy cannot be commented upon.⁷⁰

Conclusions and Future Directions

Available data suggest a greater prevalence of psychiatric morbidities in persons with SD (mostly hearing and/or visual impairment). There are several explanations regarding the genesis of psychiatric morbidities in this section of vulnerable and physically challenged individuals. Moreover, newer data is emerging on the greater prevalence of SD in persons with mental illness due to several metabolic issues (such as psychotropic-induced metabolic syndrome and consequences of metabolic syndrome such as ocular changes, retinal detachment, etc., as well as age-related sensory impairments).

More research is needed in terms of longitudinal observational studies and randomized clinical trials in this special population, to understand the genesis and management of different psychiatric morbidities in them. There is also a need to formulate guidelines for assessing and managing psychiatric disorders in the sensory-deprived population. Psychiatry trainees should be trained on how to handle and assess persons with SD. Better holistic care and a multidisciplinary approach are the need of the hour to help this special population take care of their emotional and psychological needs, which remain neglected.

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