v. 4, n. 33, 2024

International Journal of Health Science

# IMPORTANCE OF DIFFERENTIAL DIAGNOSIS OF CHARLES BONNET SYNDROME IN THE PRESENCE OF VISUAL HALLUCINATIONS

***Helen Rocha de Morais Gonçalves***
Graduation student of the Medicine course at the Faculty of Medical Sciences of Minas Gerais, Belo Horizonte, MG
http://lattes.cnpq.br/3140486499718813

***Bruna Bastos Pacheco***
Graduation student of the Medicine course at the Faculty of Medical Sciences of Minas Gerais, Belo Horizonte, MG

***Fernanda Damasceno Ferreira***
Graduation student of the Medicine course at the Faculty of Medical Sciences of Minas Gerais, Belo Horizonte, MG
http://lattes.cnpq.br/2296632333720844

***Hélio Lauar***
Psychiatrist. Preceptor of the IRS FHEMIG Forensic Psychiatry Residency, Guest Professor, Department of Preventive and Social Medicine of the Faculty of Medicine, UFMG, Belo Horizonte, MG
http://lattes.cnpq.br/8879779545541139

**Abstract: Introduction**: Charles Bonnet syndrome (CSB) is a neuropsychiatric clinical condition characterized by the presence of visual hallucinations in patients with significant deterioration of vision and preserved cognitive status. Considering the emotional disorder caused by this pathology, recognizing the symptoms is essential in the therapeutic management of these patients. **Goal**: Highlight the importance of the diagnosis of CBS for the quality of life of the population with decline in acuity and visual field. **Method**: Integrative literature review based on 8 articles taken from the "Scielo" and "Pubmed" databases, using the descriptors "Charles Bonnet Syndrome" and "Vision Disorders". **Results:** CBS is estimated to occur in 11–15% of the population with vision loss. Variations between studies regarding prevalence are probably due to differences in population, age, etiology of visual impairment and underdiagnosis of the condition. The occurrence occurs after days or weeks of loss of visual field, persisting from minutes to years. Patients describe simple or complex figures, such as people, animals, inanimate objects or scenes, often irritating ones that cause fear, worry, anxiety and disturbance. Such visual hallucinations may disappear with closing the eyes, changes in lighting or gaze direction, and increase with social contact. Many patients prefer to hide their disorder for fear of having a serious psychiatric illness and often when they question their views they receive inadequate responses. It is strictly important to recognize differential diagnoses, ruling out serious causes of visual hallucinations, such as psychiatric, neurological, ocular disorders or drug intoxication. Therefore, it is essential to know about CBS, which is often underdiagnosed and unidentified. **Conclusion**: In view of the emotional disorder caused by this disease, the diagnosis of CBS is essential to alleviate the suffering of patients. It is necessary to monitor and choose effective and appropriate therapeutic management.
**Keywords**: Charles Bonnet Syndrome; Visual hallucinations; Diagnosis

## INTRODUCTION

The phenomenon of SCB was first described in 1769 by the Swiss philosopher and biologist Charles Bonnet, who described the case of his 87-year-old grandfather who had a severe case of cataracts and complained of realistic and elaborate visual hallucinations (1). Years later, Bonnet personally experienced visual hallucinations similar to those of his grandfather after suffering from deteriorating visual acuity. Thus, the term "Charles Bonnet Syndrome" was first used to define the occurrence of visual hallucinations in elderly patients with intact brain function. However, with the advancement of clinical understanding, it was realized that the syndrome is not exclusive to the elderly and can affect individuals of different age groups. Therefore, currently, most authors describe it as the presence of complex visual hallucinations in patients with visual deficits, in the absence of psychiatric illness or altered consciousness, regardless of age (2).

CBS is a cause of visual hallucinations in patients with visual impairment, either reduced field or acuity (1). The syndrome has a benign character, in which the patient remains aware of the unreal nature of the phenomenon, and has been reported mainly in the elderly (3). Diagnostic criteria include the presence of simple or complex, persistent or repetitive visual hallucinations, loss of acuity and/or visual field, understanding of the unreal nature of hallucinations with preserved consciousness and absence of psychotic symptoms and cognitive impairment (4,2).

Although visual hallucinations are often not functionally disabling, the vision of inanimate figures and objects can be extremely distressing, drastically affecting patients' quality of life.

However, this condition is often unknown to medical professionals and underreported by patients themselves due to doctors' lack of knowledge and patients' fear of being stigmatized as having mental illnesses (4).

Given this context, understanding and recognizing BCS is crucial to ensure adequate assessment and management of patients with visual hallucinations, especially those with underlying visual impairment. Raising awareness of this syndrome among healthcare professionals can help improve the support and treatment offered to patients, providing them with a better quality of life and well-being.

## METHOD

The bibliographical survey for the construction of this article was carried out from March 2023 to March 2024, using as descriptors the terms "Charles Bonnet Syndrome", "Visual Hallucinations", "Diagnosys" and the Boolean operators "AND" and "OR". Articles published between 2005 and 2024 in the Scielo, PubMed and BVS databases, in Portuguese, Spanish and English, were selected as inclusion criteria for the research. After selecting these articles, the summaries and conclusions of the options provided were read and the articles that best met the bibliographic research proposal were selected. Regarding the type of study, comparative studies, case reports, prospective and systematic cohort studies and randomized clinical trials were chosen. As exclusion criteria, articles published before 2005 and the lack of relationship with the main theme were determined.

## RESULTS

| Author/Year | Title | Type of study | Goals | Results |
|---|---|---|---|---|
| Munoz *et al.* (2007) [1] | The Charles Bonnet Syndrome. | Review article | Update knowledge about Charles Bonnet syndrome. | The etiology, pathophysiology, diagnosis, differential diagnosis, evolution, prognosis and treatment of Charles Bonnet syndrome were reviewed. |
| Santos-Bueso *et al.* (2015) [2] | Charles Bonnet syndrome. A 45-case series | Case study | Study and identify the characteristics of a series of 45 patients diagnosed with Charles Bonnet syndrome. | A total of 66.66% were women, over 80 years old (68.88%), mainly with age-related macular degeneration (37.77%). The hallucinations that patients presented most frequently were people and faces (35.55%), colorful (66.66%), moving (80%), with an evolution time of 6 to 12 months (26.66%), frequency of three episodes a day (35.55%) and lasting 3 to 5 minutes (35.55%). |
| Rojas-Rojas *et al.* (2015) [3] | Síndrome de Charles Bonnet | Review article | Offer an updated view on clinical, pathophysiological, epidemiological aspects along with the most reasonable management strategies. | CBS is an underreported and underdiagnosed syndrome that sets in at advanced ages, when there is no cognitive impairment. Pathophysiology is still discussed. Research is needed for better therapeutic management. |
| Herter. *et al.* (2024) [4] | Case report: Charles Bonnet syndrome | Case report | To present a case of a young man who developed Charles Bonnet syndrome. | The case of a 28-year-old man who suffered a traumatic brain injury (TBI) and subsequently developed visual hallucinations consistent with Charles Bonnet syndrome (CSB).1 The main features of this health condition are visual hallucinations, preserved awareness of unrealistic visions, and absence in psychotic symptoms. |

| | | | | |
|---|---|---|---|---|
| Subhi *et al.* (2021) [5] | Prevalence of Charles Bonnet syndrome in patients with glaucoma: a systematic review with meta-analyses | Systematic review with meta-analysis | To provide an overview of the literature addressing the prevalence of CBS in patients with glaucoma | Eight studies (n = 827 patients) were identified and included for qualitative and quantitative analysis. No studies included a representative sample of patients with glaucoma alone. In patients with glaucoma at different stages and with ocular comorbidities, the prevalence of CBS was 2.8% (95%CI: 0.7-6.1%). Among patients with glaucoma, all of whom had low bilateral visual acuity, the prevalence of CBS was 13.5% (95%CI: 8.4-19.6%). In glaucoma patients who visited visual rehabilitation clinics, presumably due to extensive visual impairment, the prevalence of CBS was 20.1% (95% CI: 16.8-23.6%). Risk factors for CBS other than low vision were older age, female sex, reduced contrast sensitivity and not living alone. Taken together, we found that CBS may not be rare in patients with advanced glaucoma with and without ocular comorbidities. |
| Donoso *et al.* (2007) [6] | Charles Bonnet syndrome: presentation of three cases and review of the literature | Literature Review and Case Report | Report the case of 3 patients with severe vision loss with silent visual hallucinations that they recognized as unreal. | Both cases present symptoms of visual hallucinations, with a detailed description of the images perceived, but without severe cognitive impairment. However, in the first case, there is a five-year history of progressive decrease in vision and the presence of a disciform fibrovascular scar in the macular region, while in the second case, the main complaint is a serious detachment of the neurosensory retina in the left eye. Both patients were referred for neurological evaluation due to the nature of the visual symptoms. |
| Cortizo *et al.* (2005) [7] | Charles Bonnet syndrome: visual hallucinations in patients with ocular diseases - Case report | Case report | Describe two cases of Charles Bonnet Syndrome. | A delay in the growth of glucose-fermenting tumors was observed in animals in the ketogenic diet group compared to animals in the standard diet group. The unrestricted ketogenic diet was associated with survival and the effect was not dependent on calorie restriction. No significant difference was observed between blood glucose levels and there was no loss of body weight. |
| Russel *et al.* (2014) [8] | Charles Bonnet syndrome and cognitive impairment: a systematic review | Systematic review. | Systematically examine the evidence for any link between CBS and cognitive impairment. | Three studies were found where cognitive functioning was the main focus of the research. All were small, did not adequately apply diagnostic criteria, and reported conflicting results. Eight other studies commented on cognitive functioning, but none used tests sensitive enough to detect changes seen in dementia praecox. One hundred and thirty-four case reports were examined and reports of 16 patients with CBS where dementia emerged were found. High rates of partial insight into the diagnosis of CBS were observed in these patients. |

**Table 1:** Data from the main theoretical references used in this work

## DISCUSSION

### TYPES OF VISUAL HALLUCINATIONS

In general psychopathology classified by psychiatry, hallucination is characterized as a qualitative alteration in sensorial perception, with the visualization of an object that is not actually present, or perception without the corresponding external stimuli. Hallucinations can be classified in three different ways. Such as, the true hallucination in which the hallucinatory experience has the same characteristics as the normal perceptual image, including corporeality, that is, it has three dimensions, and location in the external objective space. It can also be classified as a pseudohallucination, in which the hallucinatory experience has characteristics more similar to those of the representative image, especially the absence of corporeality and location in the internal subjective space. Finally, it can be classified as hallucinosis, with the hallucinatory experience located in the external objective space caused by an organic impairment and which is promptly criticized by the individual, who recognizes it as something unreal (5,6,7).

Therefore, it is possible to conclude that Charles Bonnet Syndrome can be classified as a hallucinosis, since for its diagnosis it is necessary for the individual to recognize their "visions" as unreal images and present criticism about the phenomenon (4).

### PREVALENCE

The prevalence of CBS is estimated to be 11–15% in people with vision loss, but numbers vary between studies due to differences in population, age, diagnostic criteria, cause of visual impairment, and underdiagnosis of cases (4). The main reasons for this underdiagnosis are: the medical community's lack of knowledge of this entity, making it difficult to recognize and diagnose the syndrome, and the patient's reluctance to share such experiences, for fear of the stigma of psychiatric illnesses or of being considered mentally incapable.

Most cases are described in the elderly population aged 70 to 93 years, with no difference between male and female sexes and associated with visual loss due to degenerative processes (3,1). Although SCB is not rare in patients with visual deficits, its description in ophthalmological publications is unusual, perhaps due to the lack of knowledge about this entity by most ophthalmologists (7).

### PATHOPHYSIOLOGY

The most common cause of CBS is a decrease in visual acuity, so that cases begin with a visual acuity of less than 20/60 associated with pathologies such as glaucoma and age-related macular degeneration, diabetic retinopathy, cerebral infarction, post-surgery for macular translocation, cataract and temporal arteritis, secondary to pituitary tumors and cortical lesions (1,7). Different theories have been proposed to explain the origin of pseudo-hallucinations in BCS, but none are completely satisfactory (1).

The most accepted theory currently suggests that pseudohallucinations have their origin in the visual cortex, with their content varying depending on the cortical area from which they originate. When there is a decrease in visual acuity, an essential condition for Charles Bonnet syndrome, the stimulation of the visual cortex from the retina decreases. However, neuronal activity does not disappear completely, as occurs in total blindness, as some neural connections are maintained. This leads to what is called the sensory neural deafferentation process, resulting in hyperexcitability in a specific area of the cortex. The reduction in cortical stimulation leads to a decrease in synaptic

activity, triggering compensatory anatomical and physiological changes in neurons. These changes include an increase in the number of neurotransmitters, such as dopamine and serotonin, and a decrease in the amount of acetylcholine in the thalamus, causing the majority of visual stimuli to begin to be perceived from the retina in an indiscriminate and unfiltered manner. In parallel, there is an increase in the response of NMDA glutamate receptors and a decrease in GABA, making neurons more hyperexcitable. In addition to neural and biochemical changes, irreversible structural changes were observed, such as an increase in horizontal axonal growth in the deafferent area, seeking more connections with adjacent cortical areas. In short, the reduction in visual acuity results in less cortical stimulation, triggering an anatomical reorganization in the deafferent area. This precarious and non-physiological imbalance leads to hyperexcitability in the area, activating ectopic or autonomous fields, believed to be responsible for the hallucination process present in Charles Bonnet Syndrome (1, 4, 7).

Another theory about the pathophysiology of CBS is about the release phenomenon, which postulates that signals from regions of the primary visual cortex trigger a disinhibition of visual association regions, which can lead to the emergence of visual hallucinations. After damage to the retina, neurons in the cerebral cortex become more sensitive, resulting in an increase in the number of postsynaptic receptors. This phenomenon is interpreted as an adaptive mechanism in response to decreased stimulation in the visual cortex. These changes may explain why symptoms often appear after a reduction in visual acuity but may gradually disappear over time. Recent neuroimaging studies that corroborate this explanation suggest that dysfunction in visual association areas, both primary and secondary, may be related to the onset of symptoms. Under normal conditions, stimuli from the external environment act as inhibitors of endogenous cortical activity, via the main and secondary visual cortex. However, it appears that these mechanisms do not function properly in affected patients, resulting in inadequate transmission of impulses to the visual association cortex (3).

Additionally, other studies using MRI have reported brain changes before symptoms appear. Using positron emission tomography and magnetic resonance imaging, during episodes of hallucinations, an asymmetric reduction in blood flow in the thalamus, temporal lobe cortex and striatum was observed. Based on these findings, it was suggested that elderly people, when suffering vision loss, could develop compensations in these areas, which could contribute to the emergence of symptoms. However, in this study, no significant activation of the primary visual cortex compared to the visual association cortex was observed (3).

**CLINIC**

Hallucinations can vary in their complexity, from simple diffuse images, such as lines, flashes and lights, geometric shapes and even elaborate scenes, with human figures, animals and lived environments. The duration can be brief, lasting just a few seconds, or extending throughout the day, persisting for days, weeks or even years, with different degrees of frequency and detail. Furthermore, images are usually in color and can be static or animated (2, 5).

In some cases, hallucinations may stop when the patient closes their eyes or looks away (7). In SCB, there is no evidence of cognitive deficits or other forms of sensory hallucinations, which distinguishes it from psychiatric conditions. The emergence of CBS appears to be associated with several triggering factors, such as fatigue, stress, low

light and glare, in addition to being related to social isolation, cognitive deficiencies and sensory deprivation (2).

What makes Charles Bonnet Syndrome peculiar is the fact that complex visual hallucinations are observed in a significant portion of patients who do not have psychiatric or neurological pathologies. According to psychiatric semiology, such hallucinations could be classified as hallucinoses, since there is no evidence of neurological or metabolic changes, delirium, dementia or disturbances in the state of consciousness that justify this phenomenon (3).

### DIFFERENTIAL DIAGNOSES

Differential diagnoses must be made with all clinical conditions in which there are complex visual hallucinations (1). They include neurological disorders such as migraine with aura, epileptic seizures, dementias, encephalopathy and Parkinson's disease; psychiatric disorders; toxic causes such as drugs, intoxication or alcohol and peduncular hallucinosis (5).

### PHARMACOLOGICAL AND NON-PHARMACOLOGICAL THERAPIES TO BE APPLIED

An essential part of treatment is to reassure the patient and convince him that he does not have psychosis (1). Furthermore, recommendations such as having good lighting, avoiding isolation, learning maneuvers (blinking, looking in another direction) have helped patients' prognoses. It is observed that there is a variation in the prognosis according to the nature of the visual dysfunction. Some patients respond partially or completely to the treatment of the ocular disease, such as cataract surgery, while others only experience relief from the symptoms after the ocular disease progresses to complete blindness (1, 4).

In addition to maximizing visual function, psychotherapy and treatment of associated entities such as depression form the basis of treatment. Antiepileptics have been used as medications and can reduce or extinguish visual hallucinations in some cases, while the use of antipsychotics does not always provide an effective response, so favorable results have only been reported in isolated cases. The use of pharmacotherapy is indicated according to the characteristics and severity of each case (6,8).

## CONCLUSION

This integrative review allowed the understanding that Charles Bonnet Syndrome fits within the framework of hallucinosis as it is associated with the patient's presence of consciousness. It is worth highlighting the importance of correctly diagnosing the condition, in order to make a differential diagnosis with other mental illnesses, and a multidisciplinary approach between ophthalmologists, neurologists and psychiatrists is essential to provide adequate treatment (2). Therefore, it is necessary to increase awareness and knowledge about CBS, effecting possible impacts on symptoms and prognosis, avoiding patient suffering.

| Etiology | Classification and Characteristics | Duration | Frequency | Associated Symptoms |
|---|---|---|---|---|
| Charles Bonnet syndrome | Complex and varied, including the perception of patterns, shapes, colors, objects, or scenes. They can be realistic and carved involving multiple elements that interact with each other. | Variable, can last from seconds to weeks. | They may occur sporadically, intermittently or persist over time. | Anxiety, fear or confusion. Maintains awareness that hallucinations are unreal. |
| Migraine with aura | Simple or complex, with visualization of objects, people and geometric shapes. Sparkling, colorful viewing areas. | Several minutes to hours. | Variable, but less frequently than weekly | Severe headache, nausea, vomiting and photophobia |
| Seizures | Simple or complex with views of objects, people, animals, geometric patterns, lights, among others. | Seconds to minutes or persist for longer periods. | It depends on the severity and control of the underlying condition. In some cases, seizures may occur at all, while in others it may be less frequent. | Motor convulsions, automatisms, change in consciousness, loss of consciousness, change in sensory perception, deja-vu, post-ictal headache |
| Demência | Simple as dots and lines, and repetitive. Or they can include complex ones, such as people, animals, objects | Persistent and recurring. Lasts from minutes to days. | Variable, can be daily. | Memory loss, difficulty in reasoning and judgment, changes in mood and behavior, among others. |
| Encephalo-pathy | Variety of forms and contents, including perception of objects, standard weights or scenes. They can be simple or complex, static or dynamic, colored or black and white. | Variable, can last seconds to days. | Variable, they may occur sporadically, intermittently or persist. | Mental confusion, changes in the state of consciousness, memory deficit, mood changes, sleep disorders, muscle we akness, tremor, convulsions, among others. |
| Parkinson's disease | Complex and vivid. Including views of very real people, animals, objects, scenes or events. | Persistent and recurring. They last from minutes to days. | Variable, can be daily. | Delusions, muscle rigidity, tremors, slowness of movement and balance problems. They can also occur in conjunction with auditory, olfactory, or tactile hallucinations. |
| Psychiat-ric illness (schizophre-nia, PTSD, bipolar disor-der, among others) | Complex or simple: They can include the perception of shapes, colors, patterns or objects that are not present in the real environment. Hallucinations can vary in intensity and realism, and can be static or dynamic. | Variable: In some cases, hallucinations may last only a few seconds or minutes, while in other cases they may persist for hours, days, or even weeks. | Frequent: The frequency of hallucinations may increase in situations of stress, anxiety or other emotional triggers. | Disordered thoughts and delusions, auditory, tactile or olfactory hallucinations, delusions, paranoia, anxiety, depression, mood changes, sleep changes, difficulty concentrating and other psychotic or affective symptoms. |

| | | | | |
|---|---|---|---|---|
| Toxic causes | They may include the perception of patterns, shapes, colors, objects, people or scenes that are not actually present in the environment. Hallucinations can be intense, vivid and altered, often reflecting the effects of the specific substance consumed. | They vary depending on the substance, the dose consumed and individual sensitivity. They may occur as single, brief episodes, lasting just a few minutes, or they may persist for longer periods, ranging from hours to days. | They can occur as an acute effect of the substance consumed, during drug use, or they can appear as withdrawal symptoms during the detoxification phase. | Anxiety, paranoia, agitation, mental confusion, changes in the state of consciousness, tachycardia, sweating, nausea, vomiting, dilated pupils, among others. |
| Toxic causes | Complex, vivid, complex and detailed. They can involve the perception of people, animals, objects, scenes or environments that seem very real to the patient. Hallucinations can be colorful, dynamic and can involve multiple elements interacting with each other. | Variable: They can last minutes, hours or even persist for days in some cases. | Variable. In some cases, they may occur daily, while in other cases they may be less frequent. Hallucinations tend to occur episodically, with periods of remission and relapse. | Sleep disorders, mood changes, anxiety, depression, mental confusion and disorientation |

**Table 2:** Differential diagnosis of disorders causing visual hallucinations.

## REFERENCES


**1.** MUÑOZ, C., H.; VARGAS, R., A. Síndrome de Charles Bonnet: revisión de tema. **Revista colombiana de psiquiatría**, v. 36, n. 2, p. 292-306, jun. 2007. Disponível em: <http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S0034-74502007000200009>.

2. SANTOS-BUESO, E.; SERRADOR-GARCÍA, M.; PORTA-ETESSAM, J. et al. Sindrome de Charles Bonnet. Serie de 45 casos [Charles Bonnet syndrome. A 45-case series]. **Revista Neurologia,** v. 60, n. 8, pag. 337-340, abr. 2015. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/25857856/>.

3. ROJAS, H., E.; MANRIQUE, F., P. Síndrome de Charles Bonnet. **Revista Saúde Florestal,** v. 1, n. 2, pag. 63-70, ago. 2015. Disponível em: <https://masd.unbosque.edu.co/index.php/RSB/article/view/96>.

4. HERTER, M. Relato de caso: síndrome de Charles Bonnet. Hospital de Clínicas de Porto Alegre, 2024. Disponível em: <https://lume.ufrgs.br/handle/10183/273174>.

5. SUBHI Y, SCHMIDT DC, BACH-HOLM D, et al. Prevalence of Charles Bonnet syndrome in patients with glaucoma: a systematic review with meta-analyses. Acta Ophthalmol 2021; 99:128. Disponivel em:<https://pubmed.ncbi.nlm.nih.gov/32749787/>.

6. DONOSO, A.; SILVA, C.; FUENTES, P.; GAETE, G. Síndrome de Charles Bonnet: presentación de tres casos y revisión de la literatura. **Revista médica de Chile**, v. 135, n. 8, p. 1034-1039, ago. 2007. Disponível em: <https://www.scielo.cl/scielo.php?pid=S0034-98872007000800011&script=sci_arttext&tlng=pt>.

7. CORTIZO, V.; ROSA, AA.; SORIANO, DS.; TAKADA, LT.; NITRINI, R; Síndrome de Charles Bonnet: alucinações visuais em pacientes com doenças oculares-Relato de caso. **Arquivos Brasileiros de Oftalmologia.** 2005;68:129-32. Disponível em: <https://www.scielo.br/j/abo/a/rJzH38WbJMR3SvKG4T9BcCL/>.

8. RUSSELL G, BURNS A. Charles Bonnet syndrome and cognitive impairment: a systematic review. Int Psychogeriatr 2014; :1. Disponível em: <https://pubmed.ncbi.nlm.nih.gov/24848082/>.