



ISSN Print: 2394-7489  
ISSN Online: 2394-7497  
IJADS 2021; 7(2): 357-360  
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[www.oraljournal.com](http://www.oraljournal.com)

Received: 18-01-2021

Accepted: 03-03-2021

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## Cerebral palsy, an odontological point of view

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DOI: <https://doi.org/10.22271/oral.2021.v7.i2f.1230>

### Abstract

**Introduction:** Cerebral palsy is a group of permanent disorders that affect movement development and result in activity limitation, it is considered the most common cause of childhood disability.

**Objective:** To analyze the literature on cerebral palsy, from an odontological point of view.

**Methodology:** Using the keywords "cerebral palsy", "etiology", "prevalence", "oral manifestations" and "clinical management", the MEDLINE/PubMed and Science Direct databases were searched, with emphasis on the last 5 years. It was evaluated with the PRISMA and AMSTAR-2 guidelines.

**Results:** There are multiple factors to explain the etiology of cerebral palsy, in private practice that a patient suffering from cerebral palsy can be very common, if we count that the incidence 2 to 3 people per 1000 births. The oral manifestations that have more incidence in these patients are dental caries and periodontal disease, the care of patients with cerebral palsy is not simple, it requires skill and training by the dentist in charge of the treatment plan, as well as an interdisciplinary management.

**Conclusions:** Patients with cerebral palsy should seek medical and dental care due to the risk that these patients present of developing oral diseases such as caries and periodontal disease, due to the lack of hygiene due to the physical disability they have, the dentist should be trained to provide effective dental care, as well as techniques and skills that promote proper care.

**Keywords:** Cerebral palsy, etiology, clinical management, oral manifestations

### 1. Introduction

Cerebral palsy (CP) is a well-known condition, the prevalence of which has varied slightly over the years. This physical disability is the most common in childhood and occurs in 1 in 500 live births. Historically, the diagnosis was made between 12 and 24 months of age but can now be made before 6 months of age [1]. The most common subtype is spastic diplegia and spasticity is the most disabling symptom for the patient [2]. It is characterized as a high incidence medical problem that significantly impacts the quality of life of patients and their families [3]. It is considered a non-progressive neurological disease. It is one of the most common causes of disability in children, often coexisting with epilepsy, particularly drug-resistant epilepsy, but also with mental retardation, visual and hearing impairment, as well as feeding and behavioral disorders [4, 5]. The etiology of the disease is undoubtedly multifactorial, and the pathogenesis is associated with focal damage to the central nervous system [6]. Children with cerebral palsy are at increased risk for dental problems that generate significant morbidity that can further affect their well-being and negatively affect their quality of life. Screening for dental disease should be part of the initial evaluation of any child with CP [7]. The most common oral diseases in these patients are dental caries and periodontal disease. Motor disorders in CP are frequently accompanied by sensory, cognitive, communication, perceptual, behavioral and/or recurrent seizures [8]. The aim of the study is to analyze the literature on CP, its etiology, prevalence, oral manifestations and clinical management for patients suffering from this condition, with the aim of making dentists aware of the clinical management of such patients in order to provide ideal treatment and quality care.

### 2. Materials and Methods

Articles on the subject published through the PubMed, SCOPUS and Google Scholar databases were analyzed, with emphasis on the last 5 years.

The quality of the articles was evaluated using PRISMA guidelines, i.e., identification, review, choice and inclusion. The quality of the reviews was assessed using the measurement tool for evaluating systematic reviews (AMSTAR-2)<sup>[9]</sup>.

The search was performed using Boolean logical operators AND, OR and NOT.

It was realized with the words “cerebral palsy”, “etiology”, “prevalence”, “oral manifestations” and “clinical management”. The keywords were used individually, as well as each of them related to each other. Initially, the titles of all the articles were selected, the abstract of each one was evaluated, and the articles were chosen for a complete reading review.

### 3. Results and Discussion

#### 3.1 Etiology of cerebral palsy

There are multiple causes of brain damage, including defective brain development, anoxia, prematurity, hypoglycemia, genetic causes, intracranial hemorrhage, excessive neonatal jaundice, trauma, and infection. CP is also the result of various prenatal factors genetic and metabolic disorders, exposure to teratogens and toxins, maternal fever, neural tube closure defects and microcephaly<sup>[8, 10]</sup>. In some cases, the cause is unclear, and in many others, knowledge of the cause does not necessarily indicate a diagnosis or case history. Cerebral palsy is thought to be mainly due to sentinel events around the time of delivery, such as hypoxia at birth and premature delivery<sup>[11-13]</sup>. The origin of cerebral palsy is localized in the Central Nervous System, that implies that almost all children with infantile CP present, in addition to postural and movement defects, other associated disorders<sup>[14]</sup>. Many children have no detectable risk factors and 30% of cerebral palsy cases may be of genetic origin, however, the contribution of genetic variation to treatment outcomes remains largely unknown<sup>[15, 16]</sup>.

The etiology of CP lists a large number of factors involved during pregnancy such as premature birth, infections, and hereditary factors. Although among many researchers the etiology is still unclear, it is known that it may be due to problems during gestation and the first days of life, but the most commonly identified cause is hypoxia during the first days of birth.

#### 3.2 Prevalence of cerebral palsy

The World Health Organization (WHO) estimates that about one billion people in the population live with some type of disability or impairment, which limits activity and participation due to a health problem where personal, environmental and public factors<sup>[17]</sup>. The life expectancy of people with cerebral palsy has increased over the past four decades, creating a growing adult patient population with a high prevalence and accelerated development of chronic diseases, such as cardiometabolic diseases<sup>[13]</sup>. There is controversy regarding the prevalence of CP, as it is considered the most common cause of childhood physical disability, in the United States it can be found to have a prevalence of 1.5 to 3.8 per 1000 live births<sup>[18, 19]</sup>. While in the United Kingdom a prevalence of 186 per 100,000 inhabitants has been identified<sup>[20]</sup>, according to authors in Europe the incidence of CP is 2 to 3 per 1000 births<sup>[21]</sup>. Other authors report that this pediatric motor disability occurs in two to four out of every 1000 children<sup>[22]</sup>. Infants born prematurely have a higher risk of dying in the first weeks of life and those who survive have a higher rate of cerebral palsy

<sup>[23]</sup>.

CP is the leading cause of childhood disability, it is a lack of brain development that can occur in two to three out of every 1000 children worldwide, WHO estimates that about one billion of the population lives in this disabling condition.

#### 3.3 Oral manifestations of cerebral palsy patients

Studies have shown that the more severe the neurological damage in children with cerebral palsy, the greater the risk of dental disease. This is due to multiple factors including motor and coordination difficulties, as well as limited oral care and hygiene. Excessive drooling (Sialorrhea) is also the result of cerebral palsy, sialorrhea has a prevalence of between 10% and 58% in patients with CP<sup>[7, 24]</sup>. CP causes structural changes in the orofacial region and parafunctional oral habits associated with neuromuscular deficits have been reported resulting in a variety of dental disorders ranging may be developmental enamel defects<sup>[25]</sup>. To identify the most frequent oral manifestations in various studies, children with CP of different ages and healthy children were selected, an oral examination was performed and indices of decayed, missing and filled teeth, simplified oral hygiene index and angle malocclusion were recorded along with other important dental findings, where higher prevalence of caries, malocclusions, and periodontal disease was found in the CP group, that means the results showed a significant difference between healthy children and CP group<sup>[25-27]</sup>. CP does not cause specific oral alterations; however, these patients may have more severe conditions than the general population, including: Gingival hyperplasia. It occurs due to anticonvulsant medications, especially phenytoin<sup>[28]</sup>. Other findings as a consequence of motor defects associated with CP include mouth breathing, tissue trauma (soft and hard) and temporomandibular joint problems<sup>[29]</sup>.

Among the most evident oral manifestations of CP is a high incidence of caries due to the patient's motor ability to perform good oral hygiene, the second most evident oral manifestation is periodontal disease and sialorrhea.

#### 3.4 Clinical management of cerebral palsy

In order to carry out an adequate dental management, the patient with cerebral palsy should be evaluated in a complete way, performing an anamnesis of all their apparatus and systems, as well as their oral cavity will result in a safer care for these patients<sup>[7, 30]</sup>. Treatment should be comprehensive, multi- and interdisciplinary, planned and coordinated, aiming to improve the quality of life of these children. Prevent early pregnancies, consanguinity, noncompliance with prenatal control and maternal malnutrition. Currently more than 90% of children with infantile CP survive to adulthood<sup>[28, 31]</sup>. Relaxed and supportive management can help the child's cooperation during the consultation, the visit should be scheduled as early in the day as possible and allow considerable time for care<sup>[7, 32]</sup>. In a 2016 study it was found that for clinical management the patient should be kept semi-sitting to decrease swallowing difficulty, if the patient has a wheelchair and prefers the treatment to be performed there, they can be accommodated<sup>[26, 33]</sup>. Dental treatment is sometimes complicated as it involves many times the treatment of convulsive patients due to cerebral palsy, it is necessary to establish a link between the neuropediatrician to have detailed information regarding medication<sup>[34]</sup>. A complete team of specialists such as pediatrician, neurologist, dentist will be necessary for the clinical management of these CP patients, due to the multiple oral problems they present<sup>[18]</sup>.

35, 36]. Patients with cerebral palsy have diminished motor skills; the patient's head should be supported, arms should be placed forward, and the chair should be elevated [28, 37, 38]. In the dental office, many factors should be considered when evaluating patients with cerebral palsy such as the type of cerebral palsy and the control within the dental office for proper management, it is likely that patients with CP will require sedation for dental care [25, 39-41].

A correct clinical history will result in good management of these patients; knowledge of the characteristics of CP allows us to adopt techniques and skills for proper dental care, as well as relaxation techniques and behavioral management are key to treatment.

#### 4. Conclusions

There are no clear factors to explain the etiology of CP, but it is known that the most identified cause is hypoxia during the first days of birth. In the private practice a patient suffering from CP can be very common, if we count that the incidence is 2 to 3 persons per 1000 births. The oral manifestations that have more incidence in these patients are dental caries and periodontal disease, the care of patients with CP is not simple, it requires skill and training by the dentist in charge of the treatment plan, as well as an interdisciplinary management, for an effective care that sometimes involves sedation due to behavioral management. It is important that patients have the support of their parents for prevention and control of oral diseases at home, since their motor disability makes oral cavity hygiene very difficult.

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