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RESEARCH ARTICLE
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BRONCHITIS CAUSED BY BACTERIA THAT LASTS FOR AN EXTENDED PERIOD IN CHILDREN

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ABSTRACT:

Background: Persistent bacterial bronchitis (PBB) is characterized by a worsening cough over time, posing significant diagnostic challenges and potentially severe outcomes if not managed appropriately in children.

Methods: This study employed a bibliographic review methodology using documentary sources, primarily electronic databases such as Google Scholar and PubMed. Data collection utilized health sciences descriptors and MESH terminology for comprehensive literature review and analysis.

Results: Children presenting with a daily cough lasting more than three weeks are at risk of developing PBB, primarily manifesting as a persistent wet cough without other clinical findings. Differential diagnosis is crucial due to the diverse nature of respiratory diseases, requiring tailored treatment approaches. Diagnostic steps typically include physical examination, supplemented by radiological assessments such as X-rays or CT scans, spirometry, and other modalities.

Conclusion: Initial treatment with amoxicillin-clavulanic acid for at least two weeks is effective in resolving PBB symptoms; however, relapses may occur, necessitating extended antibiotic therapy or adjunctive medications like corticosteroids if initial treatments are ineffective, indicating potential alternative pathologies.

KEYWORDS: Persistent bacterial bronchitis, Cough, Diagnosis, Differential diagnosis, Antibiotic therapy, Respiratory tract diseases, Radiological assessment, Amoxicillin clavulanic acid, Treatment strategies.

INTRODUCTION:

This clinical syndrome is characterised by upper airway symptoms (rhinorrhea, etc.), followed by lower respiratory tract infection with inflammation, which results in wheezing and crackling (Gallucci et al., 2020). Bronchiolitis is a condition that affects children younger than two years old. It happens most frequently in viral infections, whether the initial or subsequent infection (Gallucci et al., 2020). The WHO (World Organisation of Health) estimates that the significant virus that causes bronchiolitis is the respiratory syncytial virus, as it has a vital role with predominance in the mortality of almost four million children every year (Reddy et al., 2020). It has been predicted that persistent bacterial bronchitis (PBB) could be the most common cause of chronic cough in preschool-aged children, possibly accounting for as much as forty per cent of the cases in some series that include hospitalised patients (Korppi, 2019). The tables have been described similarly for decades under "chronic bronchitis of childhood." Even though its definition as a clinical entity is relatively recent (2006), previously, it was not included in the differential diagnosis of chronic cough due to either underdiagnosis, inadequate treatment, or a lower genuine incidence in primary care than stated. This disease is poorly recognised in our setting since it was not included in the differential diagnosis (Ruffles et al., 2021).

By the criteria that were utilised, the following four definitions are permitted: 1. According to the microbiological definition, a chronic wet cough " lasts more than four weeks." Bacterial growth is more significant than 104 UFC in some series and is regarded as more significant than 105 of a germ in sputum or a sample collected by bronchial lavage. b. Infection in the lower respiratory tract (Douros & Everard, 2020). c. The removal of the cough following a course of antibiotic treatment for two weeks for the treatment of prolonged bacterial bronchitis in children (often amoxicillin-clavulanate) 2. The clinical definition of the term to. Extended duration of a persistent wet cough (more than four weeks) b. The absence of signs and symptoms that were previously associated with other potential causes of chronic wet cough c. The completion of an antibiotic treatment regimen lasting two weeks (often amoxicillin-clavulanate) results in the resolution of the cough (Marsh et al., 2019). Assumptions 1 or 2 require antibiotic therapy for four weeks to resolve BBP-extended. According to Albañil Ballesteros et al. (n.d.), recurrent BBP occurs when more than three processes occur annually (Gross-Hodge et al., 2020). Non-typeable Haemophilus influenza, strains of Streptococcus pneumoniae that are typically not included in conjugate vaccines, and Moraxella catarrhalis were revealed to be the primary causative agents in the numerous experiments conducted utilising BAL cultures. According to these research findings, two pathogens were detected in as many as fifty per cent of the crops (O'Grady et al., 2021). According to Monge et al. (2017), polymerase chain reaction (PCR) has been used to identify viruses in as much as 38 per cent of the BAL samples that have been examined (O'Grady et al., 2021). The adenovirus is the most prevalent virus. In paediatrics, there is a current reluctance to give antibiotics for respiratory infections, which accounts for the apparent recent increase in their incidence.

Table 1: References on Clinical Syndrome and Bronchiolitis

Reference	Description
Gallucci et al., 2020	Describes upper airway symptoms followed by lower respiratory tract infection with wheezing and crackling.
Reddy et al., 2020	WHO estimates respiratory syncytial virus as a significant cause of bronchiolitis, contributing to child mortality.
Korppi, 2019	PBB is suggested as a common cause of chronic cough in preschool-aged children, potentially up to 40% of cases in some series.
Ruffles et al., 2021	Highlights poor recognition of PBB in clinical settings historically, leading to underdiagnosis and inadequate treatment.

Table 2: Definitions and Pathogens of Persistent Bacterial Bronchitis (PBB)

Reference	Description
Douros & Everard, 2020	Microbiological criteria for PBB: chronic wet cough lasting >4 weeks, significant bacterial growth in respiratory samples.
Marsh et al., 2019	Clinical criteria for PBB: persistent wet cough >4 weeks, absence of other causes, resolution with antibiotic treatment (often amoxicillin-clavulanate).
Albañil Ballesteros et al., n.d.	Recurrent PBB is defined as >3 episodes annually.
Gross-Hodge et al., 2020	Identified pathogens in PBB include non-typeable Haemophilus influenzae, non-vaccine strains of Streptococcus pneumoniae, and Moraxella catarrhalis.
O'Grady et al., 2021	Studies show dual pathogens in up to 50% of bronchoalveolar lavage cultures in PBB cases.
Monge et al., 2017	PCR identifies viruses in 38% of bronchoalveolar lavage samples, adenovirus being the most common.
Gilchrist, 2019	Discusses antibiotic reluctance in pediatric respiratory infections, impacting disease recognition and incidence trends.
Craven & Everard, 2015	Vaccination impacts respiratory pathogens, potentially affecting colonization patterns of non-vaccine strains.

Table 3: Definitions and Criteria for Persistent Bacterial Bronchitis (PBB)

Reference	Description
Douros & Everard, 2020	Microbiological definition: chronic wet cough >4 weeks, significant bacterial growth (>10^4 CFU/mL) in respiratory samples.
Marsh et al., 2019	Clinical definition: persistent wet cough >4 weeks, absence of other causes, resolution with antibiotic treatment (often amoxicillin-clavulanate).
Albañil Ballesteros et al., n.d.	Recurrent PBB is defined as >3 episodes annually.
Gross-Hodge et al., 2020	Identified pathogens: non-typeable Haemophilus influenzae, non-vaccine strains of Streptococcus pneumoniae, and Moraxella catarrhalis.
O'Grady et al., 2021	Dual pathogens in up to 50% of bronchoalveolar lavage cultures in PBB cases.
Monge et al., 2017	PCR identifies viruses in 38% of bronchoalveolar lavage samples, adenovirus being the most common.
Gilchrist, 2019	Impact of antibiotic reluctance on disease recognition and incidence trends in pediatric respiratory infections.
Craven & Everard, 2015	Vaccination impact on respiratory pathogens, potential unintended consequences on colonization patterns.

Table 4: Pathogens and Epidemiology in Pediatric Respiratory Infections

Reference	Description
Gallucci et al., 2020	Upper airway symptoms are followed by lower respiratory tract infection with wheezing and crackling.
Reddy et al., 2020	RSV is a significant cause of bronchiolitis, contributing to child mortality.
Korppi, 2019	PBB is a common cause of chronic cough in preschool-aged children, potentially up to 40% of cases.
Ruffles et al., 2021	Historical underrecognition of PBB in clinical settings leading to underdiagnosis and inadequate treatment.
Douros & Everard,	Pathogens: non-typeable Haemophilus influenzae, non-vaccine

2020	strains of Streptococcus pneumoniae, Moraxella catarrhalis in PBB.
O'Grady et al., 2021	Viral identification in PBB: adenovirus most prevalent in pediatric cases.
Gilchrist, 2019	Antibiotic reluctance impacting disease recognition and incidence trends in pediatric respiratory infections.
Craven & Everard, 2015	Vaccination effects on respiratory pathogens, the potential impact on colonization patterns.

This is owing to increased recognition of the condition (Gilchrist, 2019). Vaccines that are intended to prevent severe infections and invasive diseases, such as pneumococcal conjugate and Hib vaccines, may, however, allow for colonisation by less aggressive agents, such as non-typeable Haemophilus and streptococci, which are not included in the vaccine (Craven & Everard, 2015). This may be an unintended consequence of the vaccines (Gilchrist, 2019).

METHOD:

Because we will be dealing with issues presented on a theoretical level, such as prolonged bacterial bronchitis in children, the technique utilised for the current study effort is framed within a bibliographic review of a documentary type (Laird et al., 2021). This is the method for gathering information. It is composed of electronic materials, the latter of which include Google Scholar and PubMed, amongst others, and it provides support for this in the use of descriptors in scientific and health language, also known as MESH terminology. The information you acquired here will be examined for your upcoming analysis. (Perret et al., 2022).

RESULT:

The majority of children experience an acute cough as a result of IRVA, which often goes away on its own. At the age of one year, preschool-aged children can experience anywhere from eight to ten episodes of IRVA, which means that the cough may sometimes continue for more than two weeks (Perret et al., 2022). In most cases, children with an acute cough do not require supplementary exploration because the cough typically resolves independently (Principi et al., 2023). When there is a clinical suspicion of pneumonia, when there is evidence that suggests a chronic respiratory problem, when there is hemoptysis and a sudden onset of cough, or when there is a choking event that makes us assume that the patient has aspirated foreign body, it would be recommended to perform a chest x-ray (Principi et al., 2023). Antipyretics, sufficient hydration, and proper aspiration of secretions are all necessary components of the treatment for IRVA. Lamas et al. (2014) state that no evidence supports using antitussive syrups, antihistamines, or combinations of both (Tristram, 2019). Furthermore, these medications have the potential to cause severe adverse effects, which is another reason why they should not be utilised. A grey period between acute and chronic cough is called subacute cough (Biagi et al., 2020). This grey period is known as the subacute cough. According to the American and Australian-New Zealand guides, it is defined as a cough that lasts for four weeks, while the British reference defines the maximum as eight weeks (Lukianenko et al., 2021). Because of IRVA or bacterial infections that remain for a more extended period or overlap, most cases are caused by these conditions. Observation is the suggested approach, and if the cough has been present for more than four weeks, a chest x-ray should be taken. If the snap is standard, the kid should be monitored for six to eight weeks (Nathan et al., 2020).

• Chronic cough: According to the American and Australian-New Zealand guidelines, a chronic cough in children is defined as one that lasts for more than four weeks or more than eight weeks, according to the British guide. If the cough does not go away, it is considered chronic because of its duration. Therefore, diagnostic guidelines and therapeutics should be initiated for children with chronic coughs. Children of different ages can have various reasons for their persistent coughs. About the aetiology, chronic cough is a contributing factor. When it comes to children, it can be divided into three categories:

1. A cough that is deemed normal because the source of the cough is considered to be expected and does not require particular tests (Esposito et al., 2020).
2. Specific cough: Some symptoms and signs suggest a specific diagnosis, which was arrived after a thorough investigation. The presence of specific symptoms and indicators characterises this type of cough. This category encompasses a wide range of illnesses, including but not limited to asthma, bronchiectasis (BQ), cystic fibrosis (CF), foreign body aspiration, abnormal aspirations, unusual respiratory infections, cardiac anomalies, and pulmonary interstitial pathology (Ballarini et al., 2021).
3. Nonspecific cough: includes symptoms that present with cough, predominantly dry and as an isolated symptom, in the absence of signs or symptoms suggesting pathology in a child who is well and in whom complementary examinations (at least spirometry, if feasible, and chest x-ray) are standard (Lamas et al., 2014). This type of cough was described by Lamas et al., 2014.

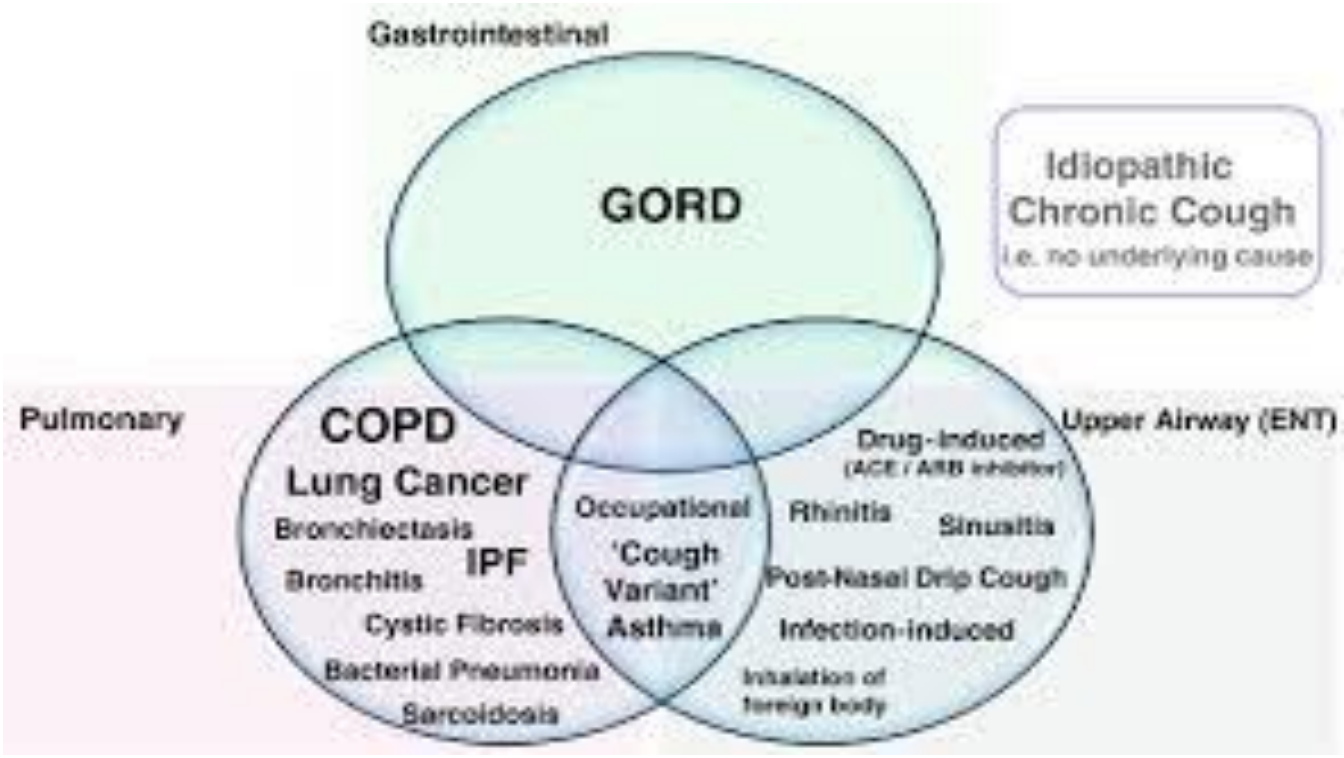

FIGURE 1: Classification of persistent cough according to the cause of the condition shown in According to Lamas et al.

THE DIAGNOSIS:

The initial diagnostic approach that we should take when dealing with a child who has a chronic cough should be based on whether the diagnosis can be easily made with a history and a physical examination or whether it is necessary to perform additional diagnostic tests in search of specific elements, and whether there is also an effective treatment available for those conditions, or whether we must wait, see, and reevaluate in a reasonable amount of time. (Fayzievna, 2022).

Table 1: Diagnoses

Exploration through the senses	The dimensions and weight of the user. Condition in general and nutritional intake also. Concha hypertrophy, polyps, and mouth breathing are all nasal conditions. A foreign body in the ear canal, also known as serous otitis, can affect the ears. Nasopharynx (the size of the tonsils, mucus placed in the cavum). Chest: cardiopulmonary auscultation, setup. Fingers appear to be clumping together. - Dermatitis can affect the skin.
evaluations and diagnoses	Examinations in tests The clinical history will need to be considered while determining the indication. Blood count, biochemistry, immunoglobulins, alpha 1 antitrypsin, and serologies will be carefully evaluated. Test on the skin Mantoux is the title. When the cause of a cough is not evident, an ionotest should always be performed. Skin pricks: Allergic testing (prick test or specific RAST) may effectively establish whether a kid is atopic and whether the cough is more likely due to asthma or allergic pathology. This is according to anamnesis from the parents. Research on microorganisms that For sputum culture, you should make an effort to notice the cough. If the kid is expelled, you should take a sputum sample for microbiological analysis and cytological laboratory research. Swabs were taken from the deepest part of the neck to culture Bordetella pertussis. To investigate respiratory viruses, nasal aspirate is required. Research involving radiography When dealing with children who have a persistent cough, it is recommended that they conduct a chest X-ray regularly. An x-ray considered normal does not necessarily rule out significant disease, such as bronchiectasis; therefore, the patient will require other, more specific tests, such as high-speed CT resolution. Assisting the lungs If the required training is received, spirometry can be performed on all children who are older than six years old, as well as on children who are between three and four years old. Diagnosing asthma based on the positive bronchodilator test results is possible because it indicates reversible airway blockage. Additional tests are necessary to arrive at a diagnosis when the spirometry results are expected. Assisting the lungs If the required training is received, spirometry can be performed on all children who are older than six years old, as well as on children who are between three and four years old. Diagnosing asthma based on the positive bronchodilator test results is possible because it indicates reversible airway blockage. Additional tests are necessary to arrive at a diagnosis when the spirometry results are expected.

Table 2: Treatment.

Focus on the ENT	Treatment for sinusitis often consists of antibiotics that kill germs and typically last between two and three weeks. Polyps, chronic rhinitis, and turbinate hypertrophy are all conditions indicated to be treated with nasal corticosteroids.
A cough that is characteristic of asthma	The treatment is the same as asthma, which includes avoiding triggering events whenever possible, providing inhaled corticosteroids and occasionally bronchodilators, and continuing the treatment until the symptoms disappear, typically taking six to eight weeks. Sometimes, you might need to take a course of oral corticosteroids.
Postinfectious disease	Etiological treatment in cases where it is possible, evaluation of the patient's reaction to the administration of bronchodilators and inhaled or oral corticosteroids in individuals who have been chosen for treatment
The psychogenic	Various aspects of the environment: In adolescents, it is essential to avoid both passive and active smoking. Symptomatic when treated with antitussives: Although the triggering reason is typically discovered, persistent versions of the condition are highly uncommon. In individuals who are older than five years old, the most effective medications are dextromethorphan and codeine.

In cases with prolonged bacterial bronchitis, it is suggested that children get empirical antibiotic therapy consisting of amoxicillin-clavulanic acid for at least two weeks. This treatment may sometimes continue for as long as four to six weeks. (Morice et al., 2020). It has been suggested that macrolides, cephalosporins, and trimethoprim-sulfamethoxazole could be acceptable substitutes. A positive reaction to treatment is being observed, which should be considered diagnostic confirmation. Nevertheless, relapses are relatively common (up to 25 per cent), and they may necessitate multiple courses of antibiotic treatment. It would be necessary to reject alternative processes to account for the poor answer or the recurrence of incidents. It has been shown that there are similarities between bronchial bronchial pneumonia (BBP), the condition bronchial suppurative, and bronchiectasis. These similarities exist as distinct stages of the same evolutionary process, according to Fernández Ventureira and García Vera's research from 2020. During a randomised, double-masked, placebo-controlled study, in which 25 children were given 22.5 mg/kg of amoxicillin clavulanic acid twice a day and the remaining 25 children were given a placebo, a resolution of cough was achieved in 48% of the children who were given the therapy. In contrast, only 16% of the children who were given the placebo could get rid of their cough. Nevertheless, the follow-up of these patients continued for 28 days, during which time the data about the likelihood of recurrences with this treatment regimen were collected. Therefore, although a treatment period of two weeks may be adequate to treat BBP, confident children must undergo antibiotic therapy for four weeks to resolve the symptoms. Various other options are based on the sensitivity patterns of the local environment. Oral cephalosporins, trimethoprim-sulfamethoxazole, and macrolides are some antibiotics that may be used in cases of acute hypersensitivity to penicillin. According to the guidelines made by the British Thoracic Society, respiratory physiotherapy may be effective in the management of BBP. However, no studies have been conducted to support this indication.

CONCLUSION:

The diagnosis of persistent bacterial bronchitis is more certain if, as symptomatology, only chronic wet cough occurs and no other clinical or radiological findings are found, which may indicate another condition. This is because persistent bacterial bronchitis is a widespread pathology in children that begins when a daily cough occurs and continues for more than three weeks. Because respiratory disorders are highly diverse and tend to confuse in certain instances, differential diagnoses must be adequate for individualised treatment. Regarding the diagnosis, the first step is the physical examination, which can be aided by other supplementary examinations such as X-rays or CT scans, spirometry, and other tests. Regarding the treatment, antibiotic therapy with amoxicillin acid and clavulanic acid was administered for at least two weeks.
In general, they can resolve the clinical picture; nevertheless, there is a chance of relapses and rises in the extension of antibiotic treatment, in addition to the use of additional medications such as corticosteroids, which, if the problem is not resolved, would suggest the presence of another pathology.

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