



# Over-The-Counter Cold Remedies: Origins And Impact On Different Age Groups

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## Abstract:

**Introduction:** Over-the-counter (OTC) medications are commonly utilized for treating the symptoms of the common cold due to their accessibility and affordability, especially in regions where healthcare access is limited. This study aims to gather data on the usage of OTC medications, specifically focusing on cetirizine, levocetirizine, phenylephrine, paracetamol, and other commonly used remedies for cold relief.

**Methods:** Data collection involved surveying individuals to ascertain their utilization of OTC medications for treating common cold symptoms. Additionally, therapeutic effects reported in published articles regarding various OTC drugs were analyzed to determine their efficacy in alleviating cold symptoms.

**Results:** Our analysis revealed widespread use of OTC medications for the common cold. The data obtained from published studies provided insights into the therapeutic effects of various OTC drugs on the body. Through statistical analysis, we evaluated the effectiveness of these medications for cold remedies.

**Discussion:** The findings of this study shed light on the efficacy of OTC medications for treating the common cold. Furthermore, the study highlights the potential risks associated with overuse of these medications, particularly among different age groups. Awareness regarding appropriate OTC medication usage and its effects across extreme ages is crucial for optimizing healthcare practices.

**Conclusion:** This study contributes to the understanding of OTC medication usage for cold remedies and emphasizes the importance of responsible usage, especially considering the potential impact on individuals across different age groups. Further research and awareness efforts are warranted to promote safe and effective usage of OTC medications for cold relief.

**Keywords:** OTC, non-prescription, cetirizine, levocetirizine, common cold.

## Introduction:

OTC drugs stand for Over-the-Counter Drugs. OTC drugs are meant to be unprescribed or self-medication drugs. Over-the-counter (OTC) drugs are those drugs that are sold without a prescription by ordinary retail purchase, with no need for a prescription or a license(1). OTC medicines are nonprescription medicines; they are used interchangeably to refer to medicines that can be bought without a prescription. The drugs that come under schedules H and X are prescribed drugs according to the Drugs and Cosmetics Act of 1945, but these drugs are also sold as OTC drugs(1).

In day-to-day life, the use of OTC medicines is increasing continuously. OTC drugs are easily available and easily affordable; that's why the use of OTC medicines has increased in the last few years. Self-medications are the drugs that are obtained by patients for the recovery or treatment of common diseases and the treatment of a wide range of conditions, such as headaches, common colds, coughs, and musculoskeletal pain. These are the drugs that are not prescribed by the physician and are sold out without a prescription. The World Health

Organization (WHO) considers that the self-medication of patients is helpful in reducing the load on the health care system(2). OTC drugs are useful for a wide range of treatments for various conditions, like the common cold, cough, headache, muscle pain, allergies, tobacco dependence, acidity, heartburn, etc(3). The cost of the medicines is very high at present, and the doctors are also not easily available for treatment, so this condition makes health care costly and unaffordable for the patient(4). OTC medications have some advantages, like being easily available everywhere, the cost of the OTC drugs being affordable to the patient, and time management or less time required to take OTC medication as compared to prescribed medications. That is why people's rational use of OTC drugs is increasing every day (1).

The common cold is defined as the term for an illness of the mild upper respiratory track. Which show symptoms like sneezing, sore throat, etc. The common cold is a disease that is caused by numerous viruses that belong to several different families and come under the heterogeneous group of diseases(5). The common cold is a self-limited illness. In a few of the patients, the viral infection spreads to adjacent organs in various clinical manifestations. The common cold is caused by the different viruses that are surrounded around us and passed from one person to another, and most of the cold viruses spread from one body to another due to contact with the fluids from the mouth and nose(5).

The common cold shows various symptoms such as runny or stuffy nose, sneezing, headache, and fever. These symptoms offer changes every few days. There is only one option, which is an antibiotic that is used to fight with the infection that is caused by the bacteria. But antibiotics do not work against the viruses that caused the common cold; they last for 7 to 10 days, and our body is capable of fighting with the viruses that caused the common cold, so there is no need for antibiotics(5). The regular cause of the common cold is rhinoviruses (30–50%) and influenza viruses (5–15%). Most of the common cold viruses are spread through the floating of droplets or hand-to-hand contact.

A cold is not the same as the flu, sinusitis, bronchitis, or strep throat. Other types of URIs are those caused by a flu virus or bacteria. If you have a URI that is not caused by a cold, you may require medicine to help you recover. Many of these additional URIs begin with cold-like symptoms. Other URI symptoms, on the other hand, are more severe or continue to worsen after week to ten days(5).

There are no tests to determine if you have a cold. Your doctor can diagnose a cold by asking about your symptoms and performing a physical check. To ensure that you do not have the flu or strep throat, your provider may perform a flu or strep throat test on you.

Antibiotics are only effective against bacterial infections. The viruses that cause the common cold are not cured by antibiotics. Our bodies are capable of fighting cold virus without the use of drugs. The majority of healthy people recover from a cold without treatment. Although medicines will not cure a cold, there are other treatments that can alleviate your symptoms(5).

#### Treatment options for cold

Symptoms	Treatment	Important Notes
<b>Non-Medication Treatments</b>		
Any cold or infection	Sleep, rest, extra water	Very important

Runny or stuffy nose	Clean or flush the nose	Use a saline nasal spray or net pot
Runny or stuffy nose	Humidified (wet) air	Good for children

*Table 1 Treatment options for cold (6)*

### Over-the-Counter Medication Treatments\*

Fever, chills, pain, sore throat	Ibuprofen (Advil) or acetaminophen (Tylenol)	Do not take more than 3000mg of Tylenol in one day. Do not take more than 6 pills with 500 mg of Tylenol in 24 hours. Do not take more than 10 pills with 325 mg of Tylenol in 24 hours.
Runny or stuffy nose, sinus pressure	Fluticasone propionate nasal (Flonase)	
Runny nose, wet cough	Pseudo ephedrine (Sudafed)	Don't use for more than 3 days
Sore throat	Throat lozenges or spray	
Cough	Dextromethorphan (Robitussin)	
Dry cough	Guaifenesin (Mucinex)	

*Table 2 Over-the-Counter Medication Treatments (7)*

Most over-the-counter cold treatments include mixtures of two or more drugs, which is especially important for children. The elderly person, who may already be using numerous medicines. Individual reactions to medications will always vary, and the reactions become even more unpredictable when a single product has multiple active components. The risk to the consumer grows as the number of drugs in a regimen increases. Adding just one of the common cold treatments to an elderly person's medicine regimen may quadruple or even triple the amount of drugs that individual is taking. Most cough and cold treatments are a fixed-dose combo, which means that there is always a specific amount of each ingredient in the package. If a stronger decongestant is required, it is not possible to take more of that one substance if alleviation, cough suppression, or analgesia is required(8).

### Factors of Growth

The worldwide over-the-counter pharmaceuticals business is expanding due to rising demand for self-medication and drugs. According to the Pharmacoepidemiology and Drug Safety, around 20% of the Spanish population consumes non prescribed medicine, with females being more probable.

Furthermore, rising approvals for over-the-counter pharmaceuticals are propelling the worldwide over-the-

counter drugs market forward. Sanofi, for example, announced in February 2017 that the Food and Drug Administration has approved Xyzal Allergy 24HR as an over-the-counter medication for seasonal allergies. The worldwide over-the-counter pharmaceuticals industry is being propelled by an increase in demand for personalized medications for minor ailments and the deployment of treatment processes by healthcare payers.

CATEGORY	EXAMPLES OF INGREDIENTS
Antihistamines	Chlorpheniramine, diphenhydramine, hydroxyzine
Antipyretics	Acetaminophen, ibuprofen
Antitussives	Dextromethorphan
Decongestants	Pseudo ephedrine, phenyl propanolamine, phenylephrine
Expectorants	Guaifenesin

*Table 3 Examples of over-the-counter medications categorized according their medication(9)*

Over-the-counter cough and cold drugs (OTC CCM) will be used by youngsters. OTC CCM remedies are often a blend of at least two drugs, such as antihistamines, antitussives, expectorants, decongestants, and antipyretics. youngsters aged 2 to 5 years are the most likely to utilize such preparations, followed by youngsters less than 2 years

Various Types of OTC Drugs Consumed:

Antidepressants were the least regularly taken OTC medications (n = 3; 0.4%), whereas analgesics were the most commonly consumed (n = 357; 49.1%). Although antidepressants are not considered OTC, they have been included in this research since they are available from some internet "pharmacies" and have been acquired from traditional pharmacies on Occasion(9).

### **Drugs used for over-the-counter medication**

The medications were non steroidal anti-most widely utilized OTC inflammatory medicines (NSAIDs) (38%), gastrointestinal treatments (16%), cough cures (14%), and antimicrobials (10%). 1.5% of individuals in this group used OTC medicine containing atenolol and amlodipine for the treatment of chronic cardiovascular diseases such as hypertension.(4)

### **Indications for over-the-counter medication**

Fever was the most prevalent reason for using OTC medicine (22.42%), followed by pain (15.75%) and gastrointestinal problems (15.75%). The most prevalent reason for non-OTC medicine was pain (20.27%), followed by infection control (16.22%)(4)

INDICATION	OTCn=165(%)	N-OTCn=715(%)
Pain (include headache)	26(15.75)	145(20.27)
Fever	37(22.42)	104(14.54)
Infection	17(10.32)	116(16.22)
Gastrointestinal Disorders	26(15.75)	74(10.34)
Respiratory Symptoms	22(13.33)	42(5.87)
Skin Disease	4(2.4)	13(1.81)
Eye Disease	1(0.60)	6(0.83)
Ear Disease	3(1.81)	9(1.25)
CVS Disease	2(1.21)	74(10.34)
Urogenital Disease	6(3.63)	28(3.91)
Insomnia	9(5.45)	14(1.95)
Miscellaneous	12(7.27)	90(12.58)

Table 4 Indications for medication in over-the-counter and non-over-the-counter group(8)

Category (name of drugs)	Number of OTC request (n=165)
NSAIDs (paracetamol, diclofenac and their FDC)	63(38)
Antimicrobial (cefepodoxime, ciprofloxacin, norfloxacin, amoxicillin-clavulanic)	17(10)
Gastrointestinal drugs (ondansetron, proton-pump-inhibitors)	26(16)
Cough remedies (dextromethorphan, bromhexine)	23(14)
Cold remedies (cetirizine, levocetirizine)	3(2)
Central nervous system drugs (lorazepam )	1(0.6)
Eardrops (ciprofloxacin)	8(5)
Eyedrops (dexamethasone)	3(2)
Cardiovascular drugs (amlodipine)	1(0.6)
Uro genital disease (alkalizer)	2(1.2)
Others	5(3)

Table 5 Drugs used for over-the-counter medication(8)

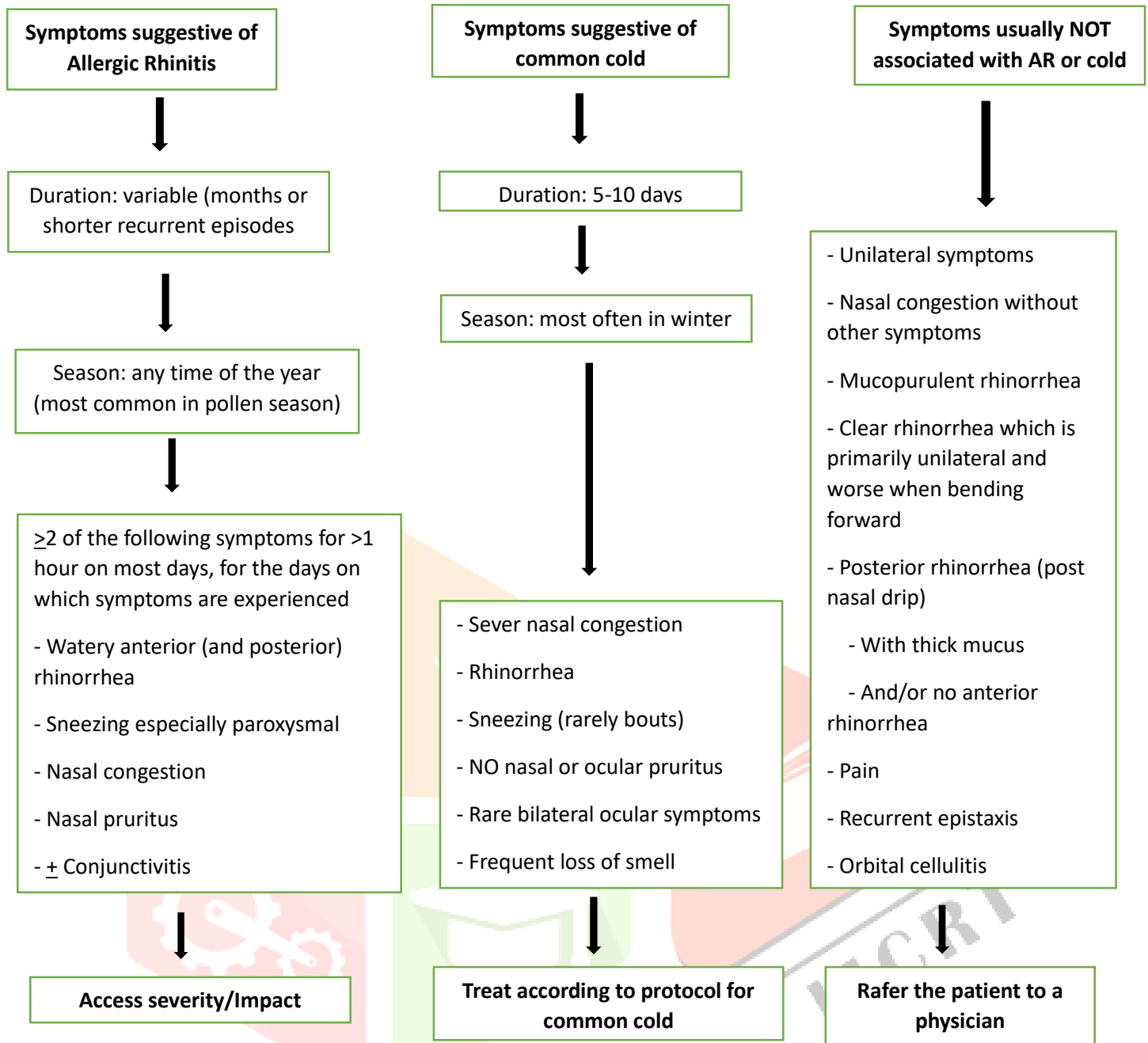


Figure 1 Recognizing allergic rhinitis in the pharmacy

## Mechanism of Action of Paracetamol

The most often used analgesic/antipyretic in children is paracetamol (acetaminophen). The product was introduced in the United States in 1955 and in the United Kingdom the following year. Its elevation followed the discovery of a link between Reye's syndrome and aspirin(1) Despite its ubiquity, the mechanism by which paracetamol works to reduce fever and discomfort remains unknown(9).

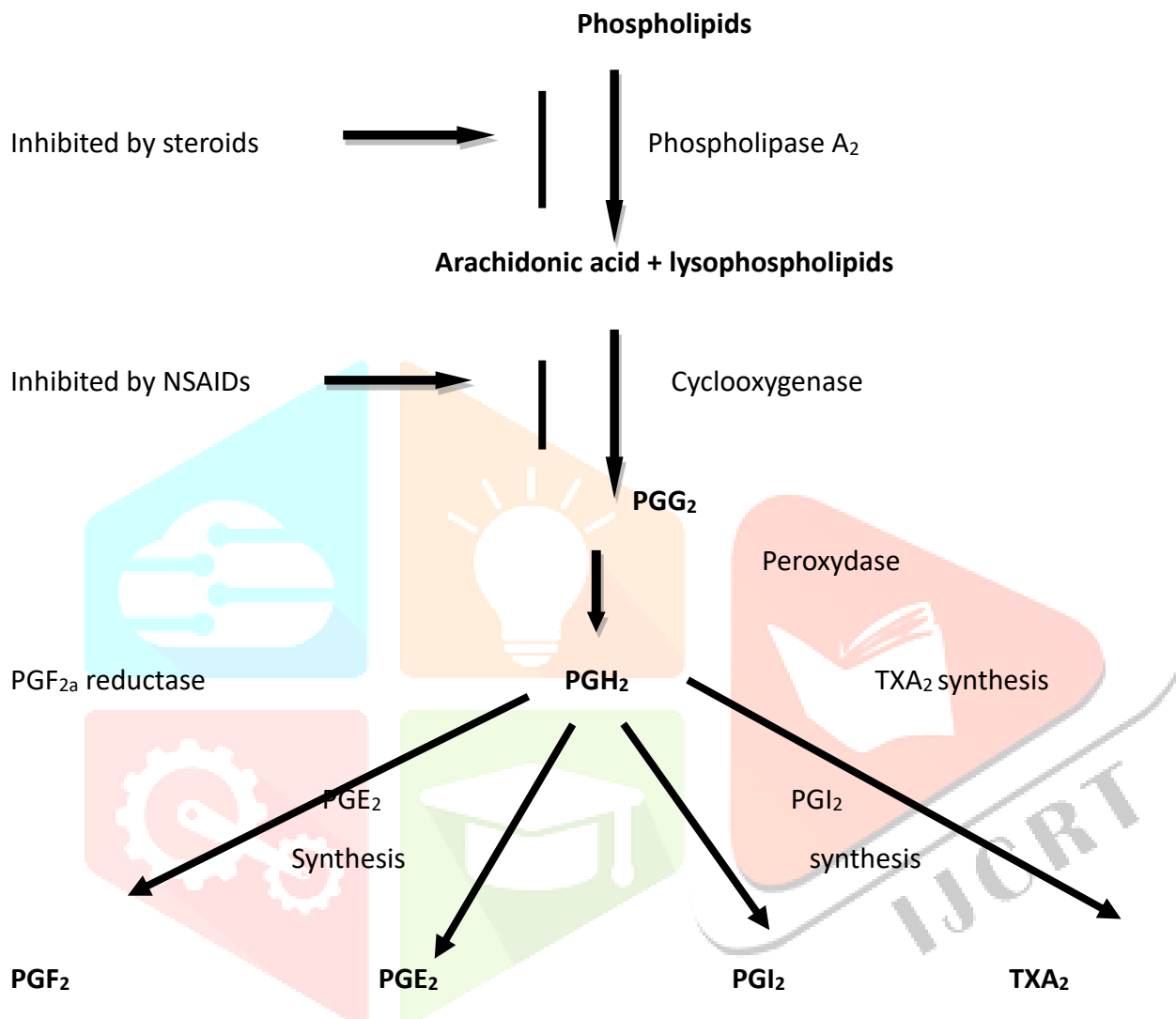


Figure 2 Schematic diagram of arachidonic acid metabolism.

Prostaglandin H<sub>2</sub> synthetase inhibition

Prostaglandin H<sub>2</sub> synthetase is the enzyme that converts arachidonic acid to the unstable PGH<sub>2</sub>. This enzyme exists in two forms: constitutive PGHS-1 and inducible PGHS-2. COX-1 and COX-2 are the common names for these two enzymes. However, the abbreviation PGHS is recommended since this enzyme has two active sites: a COX site and a POX site. The COX enzyme's activity is dependent on its being in the oxidized state, and it has been proposed that paracetamol lowers the quantity of the oxidized form by acting on the POX site (10). Another possibility is that the central nervous system (CNS) contains a PGHS variation (COX-3) that is extremely susceptible to paracetamol.

## Paracetamol activity at the POX site

Arachidonic acid to PGH<sub>2</sub> conversion is a two-step process. Arachidonic acid first absorbs two molecules of O<sub>2</sub> to generate PGG<sub>2</sub> (by COX), and then PGG<sub>2</sub> is reduced by two electrons (via POX). These responses take place at two separate locations. POX occurs in a heme-containing active site on the protein surface, whereas

COX occurs in a hydrophobic channel in the enzyme's core (10). COX is reliant on POX, while POX may function on its own (9).

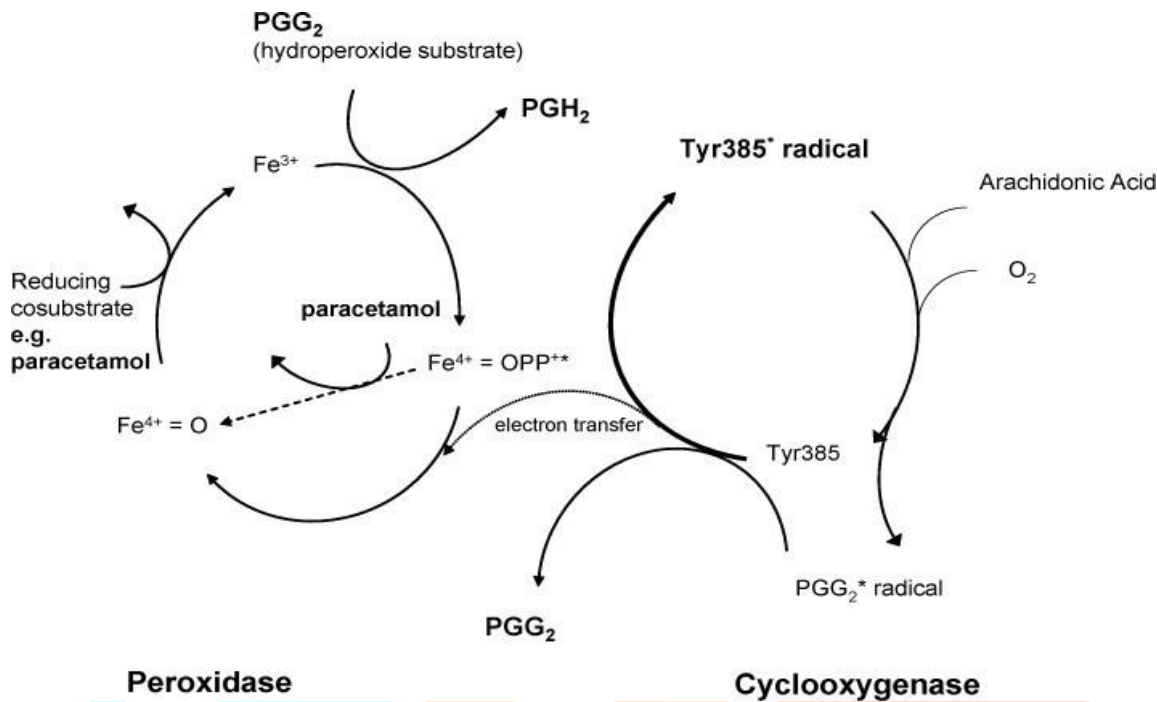


Figure 3 Paracetamol activity at the POX site

Etiology:

The genesis of the common cold was studied in young children who were newly sick but did not require hospitalization. We predicted that by testing for 16 viruses in outpatients, we might determine the etiology in all instances.

The common cold is considered a viral illness. Several novel respiratory viruses have been found in the opening years of the twenty-first century, including human Meta pneumo virus (hMPV), corona viruses NL63 and HKU1, and human bocavirus (HBoV). Many research has been undertaken on the role of these viruses in hospital settings, but few investigations have been conducted on outpatients. We investigated the genesis of the common cold in young children who were newly sick but did not require hospital treatment. We expected that the etiology might be found in all instances by employing contemporary diagnostics that test for 16 viruses in outpatients. We collected nasopharyngeal aspirate samples in outpatient setting from 194 Finnish children with freshly onset (48 h) symptoms of a common cold without acute otitis media (AOM) or other symptoms necessitating antibiotic treatment(11).

We collected nasopharyngeal aspirate samples in an outpatient environment from 194 Finnish children with freshly on set (48h) symptoms of common cold but no acute otitis media (AOM) or other symptoms requiring antimicrobial therapy between February 1996 and April 1998 (1) The research population's average age was 2.1 years (range 0.7-3.9 years), and 81% attended day care. All participants' parents submitted written informed consent, and the study procedure was approved by Turku University's Ethics Committee. Fresh nasopharyngeal aspirate samples were processed for antigen identification (RSV, parainfluenza viruses 1, 2, and 3, influenza A and B viruses, and adenovirus) using time-resolved fluor immunoassay(11).

Nucleic acid testing (NAT) was performed on stored samples to detect picorna viruses, RSV, corona viruses 229E, OC43, NL63, and HKU1; influenza C virus; HBoV; hMPV; and adenovirus. These samples were just retested for rhinovirus. 179 (92%) of the 194 children tested positive for at least one respiratory infection. The most frequent respiratory infection, rhinovirus, was detected in 138 (71%) of the children (Table). Other viruses were discovered in varying proportions: HBoV was found in 27 (14%) of the children; adenovirus



was found in 23 (12%) (3 were positive by antigen detection, and 23 by NAT); enterovirus was found in 20 (10%); corona viruses were found in 11 (6%) (NL63:7; HKU1:2; 229E/OC43:2); influenza viruses were found in 11 (6%) (A:4; B:1; C:6) Parainfluenza viruses were detected in 7(4%) (1:1;3:6) cases, and hMPV in 3(2%). 46(26%) of children with a positive viral result had two viruses, while 10 (6%) had three or four viruses. The viruses that co-occurred the most commonly with other viruses were adenovirus (100%), HBoV (81%), and enterovirus (75%) (11). Positive viral findings in 194 children with newly onset uncomplicated common cold, Finland, 1996–1998.

### **Mechanism of action of cetirizine:**

Cetirizine is an antihistamine that is used to treat allergic rhinitis and urticaria. It belongs to the second generation of antihistamines. Cetirizine was FDA-approved as a prescription-only medicine in the United States in 1995, and it was later authorized as an over-the-counter drug in 2007. Cetirizine is a potent and highly specific antagonist of the peripheral histamine H1 receptor. Cetirizine inhibits H1-receptors particularly in respiratory smooth muscle cells, vascular endothelial cells, immunological cells, and the gastrointestinal tract. Cetirizine, unlike first-generation antihistamines such as diphenhydramine and doxylamine, does not pass the blood-brain barrier very well, avoiding the neurons of the central nervous system.

Because of its antagonistic impact on histamine H1-receptors, cetirizine efficiently reverses many of histamine's effects. Cetirizine, like other second-generation antihistamines, reduces vascular permeability, which reduces fluid leaking from capillaries to tissues. Cetirizine also inhibits histamine-induced bronchospasm. Cetirizine has been shown to have strong anti-inflammatory effect, lowering inflammatory cell infiltration in the context of allergic rhinitis. Cetirizine, in particular, has been shown in studies to reduce neutrophil and eosinophil migration.

### **Pharmacokinetics:**

**Absorption:** Cetirizine is readily absorbed in the gastrointestinal system and excreted extensively by the kidney. After about an hour, cetirizine achieves its highest plasma concentration. Its effects usually start within 20 to 60 minutes and last at least 24 hours. Food has no effect on the amount of exposure (AUC) of cetirizine, although it did delay the time to peak concentration by 1.7hours(12).

**Distribution:** Cetirizine has an average plasma protein binding of 93%.

**Metabolism:** Cetirizine is oxidatively O-dealkylated to produce a metabolite with little antihistaminic action. Cetirizine is not a CYP450 system substrate. Evidence suggests that cetirizine is a P-glycoprotein substrate, which should be noted when using cetirizine in conjunction with P-gp inhibitors.

**Excretion:** Cetirizine has an elimination half-life of 8.3 hours.

**Administration:** Cetirizine is available in the form of pills, capsules, liquids, and orally disintegrating tablets. Cetirizine dose is determined on the patient's age. The suggested dose for adults and children 12 years and older is 5 or 10 mg per day orally, depending on symptom severity(6). It is available in 5mg and 10mg tablets, as well as a 5mg/5ml oral solution and elixir. The 0.24% cetirizine hydrochloride eye drops are available in 5 mL and 7.5 mL vials.

Depending on the severity of the symptoms, 5 or 10mg (1 or 2 teaspoons) once day in syrup form is indicated for children aged 6 to 11 years old. The suggested dose for children aged 2 to 5 years old is 2.5 milligrams (half a teaspoon) once day in syrup form. For individuals with allergic conjunctivitis, one drop (0.24% cetirizine hydrochloride ophthalmic solution) is administered twice day in the afflicted eye(12).

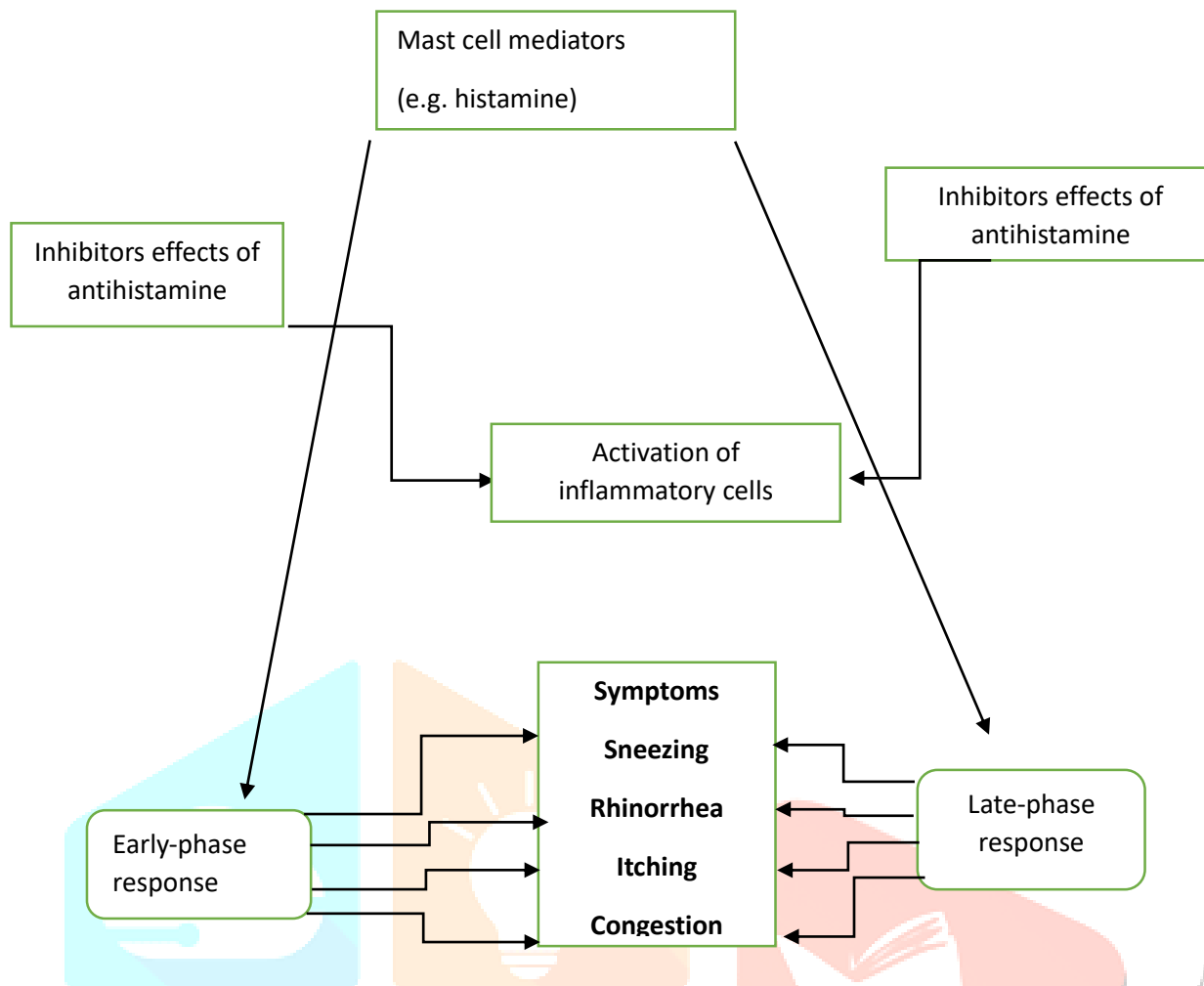


Figure 4 Mechanism of Cetirizine

**Result:** The study shows that over-the-counter (OTC) drugs are used commonly for the treatment of common cold or get relief from the cold. The OTC drugs are mostly available, affordable to the patient, so people are mostly taking non-prescription drugs as compared to prescription drugs.

The consumption of OTC drugs without knowing the dose level or about the drug can lead to severe consequences on patients.

**Conclusion:** According to research, the majority of individuals take over-the-counter medications for pain and other ailments. In the future, we may educate patients about the dangers of taking over-the-counter medications. This will assist patients in obtaining safe and effective over-the-counter medications.

OTC medicines are ones that may be purchased without a prescription or as non-prescription drugs. The usage of OTC medications is examined in this review. Data was acquired through an examination of several published papers.

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