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Evaluation of Virulent Bacteria and Viral Organisms Present in the Nasopharyngeal Gland of Catarrh Subjects and its Effect in the Respiratory Region of Subjects in Emene Enugu State.

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ABSTRACT

Catarrh infection also known as post nasal drip is a symptom of an underlying disease. 170 subject constituting males and females with clear symptoms of cold, congested nose, running nose were selected for the study which lasted for 2 months during the major dry season in our region. The study evaluated virulent bacteria and virus organisms present in the nasopharyngeal region of catarrh subjects. Various diagnoses were carried out to find out the most determinant virus and bacteria causing catarrh infection in the subjects.

Nasopharyngeal and Oropharyngeal swab samples of subjects were collected with swab sticks and plated in the culture media. Viral studies and bacteria studies using the samples were done using virus culture, time-resolved fluoro immunoassay, cell cultures and PCR assays.

Results obtained from bacterological studies shows that Chlamydia pneumonia bacteria were present (60%), Haemophilus influenza (20%), streptococcus pneumonia (10%), mycoplasma pneumonia (7%) and the least is Moraxella catarrhalis (3%). In viral studies, the result shows that rhinovirus was more dominant (65%), corona virus (15%), influenza virus (10%), Respiratory syncytial virus (5%), Adenovirus (3%) and the least in occurrence is Enterovirus (2%).

Rhinovirus could be suspected to be the key virus that infect the epithelial/tissues of the nasal region causing catarrh infection.

INTRODUCTION

The embarrassing state of subjects sniffing nose, sneezing, occasional redness of the eye and heavy mucus in the nose all expressing catarrh infection in our region have necessitated this study. Catarrh also known as chronic rhinorrhea or post nasal drip is the medical word for a buildup of mucus in the back of the nose, throat or sinuses. The condition is characterized by excessive mucus production in the nasal passages (Mark et al, 1992), leading to a persistent running nose, congestion and coughing. Since the origin of Man, bacteria and viruses have coexisted together and competing to exterminate man but with wisdom, man have been able to overcome, dominate and control these virulent organisms.

A virus is a small infectious agent that replicates inside the cell of an organisms. Viruses can infect all types of life forms from animals and plants to micro organisms including bacteria and archaea.

The characteristics of viruses include small size between 20-400nm in diameter which is smaller than a bacterium, Non-cellular they have a protein coat known as capsid, they have either DNA or RNA as their genetic material but not both and lastly they are highly specific to their host cells and can only infect specific cells or organisms.

There are different types of viruses namely DNA viruses with DNA as their genetic materials such as herpes virus and adenoviruses, RNA viruses with RNA as their genetic material such as influenza viruses and HIV, Retroviruses which reverse transcribe their RNA genome into DNA such as HIV and again viruses with reverse genetics which are viruses that can reverse transcribe their genetic material such as retroviruses and some RNA viruses. Bacteria are a type of micro organisms that are prokaryotic hence they lack a true nucleus and other membrane bound organelles.

They can be classified into the following type of cell; the ovoid or spheroid called coccus, the rod or cylindrical bacillus, the curved vibro, the spiral shaped spirillum and coil shaped spirochaetes. (Ebede et al, 2021) the characteristics of bacteria include single celled, prokaryotic lacking a true nucleus cell walled, has metabolic diversity and reproduces by binary fission.

Types of bacteria include Gram-positive bacteria that stain positive with Gram stain such as staphylococcus and Bacillus, Gram-negative bacteria that stain negative with Gram stain such as Escherichia and Pseudomonas, spiral bacteria that have a spiral shape such as Helicobacter and campylobacter and lastly Rod shaped bacteria that have a rod-like shape such as bacillus and clostridium.

Barri in 1836 helped to establish that micro organisms could cause disease when using a heat sterilized pin; he transmitted a disease from the silk worm infected with a fungus to a healthy silkworm

Often catarrh can be as a result of an intermittent or temporary illness such as allergy or cold. It typically goes away once the illness has passed.

However some people may experience chronic catarrh that persists for months or even years forming a nuisance to live with.

Causes of Catarrh

The most common cause of catarrh is a viral infection such as the common cold or flu, bacterial infections such as sinusitis can also cause catarrh, Allergies to substances like pollen, dust or pet dander,

Environmental factors such as exposure to pollution, tobacco, smoke or strong odors can cause catarrh and lastly hormonal changes such as hormonal fluctuation during pregnancy, menstruation or menopause can stimulate catarrh (Ekman et al, 1993).

Our main aim in this study is to evaluate the percentage presence of virulent bacteria and virus organisms present in the sinus gland of catarrh subjects and its effect in the respiratory region of the subjects.

Symptoms of catarrh include: a tickling feeling of mucus draining into the throat, a blocked or stuffy nose, headache, facial pain' a loss of taste or smell, difficulty sleeping, rasping or gurgling when talking, nasal fluid draining from the nose or running nose

MATERIALS AND METHODS

Experimental Design

A total of 170 subjects consisting of adult male and females were selected for this study which was carried out during dry season when the infection of catarrh is very common in our Eastern Region of Nigeria.
Records of their clinical symptoms typical to catarrh infections were used to select this study group

Bacteriological studies

Nasopharyngeal samples were collected from the subjects suffering from catarrh infection using sterile swab sticks and cultured in blood agar medium, mackonkey agar media and Nutrient agar media using the method of culturing techniques as described by Baker and silverton (1998).

The cultured samples were allowed to incubate in anaerobic condition in an incubator for 24-48hrs before reading out and examining the micro organisms.

Catalase and coagulase tests were done using the procedure described by Baker et al 1998. Gram staining test was carried out using the procedure described by Baker et al, 1998.

Identification of Viral Organisms in Catarrh Infection

Viral antigens were detected by time- resolved fluoro immunoassay for seven common respiratory viruses (adenovirus, respiratory syncytial virus (RSV), para influenza virus types 1, 2 and 3 influenza A and B viruses) (Arstila et al, 1988).

Virus vulture was done by using the Ohio strain of Hela cells and human foreskin fibroblasts according to routine procedure as described (Al-Nakib et al, 1988).

Cell cultures exhibiting cytopathogenic effect were passaged once, and the supernatant of the cell culture fluid was further tested by antigen detection. Those samples positive by virus culture but negative by rhinovirus, PCR were tested for acid lability.

Detection of Rhinovirus

Two reverse transcription –PCR assays were used. The first one utilizes primers from the conserved 5 non coding region and the VP2 capsid protein coding region of the viral genome (Arola et al 1996), while the other test uses two primers from the 5 non coding region (Halonen et al 1995)

RESULTS

Results obtained from this research study were represented with a histogram.

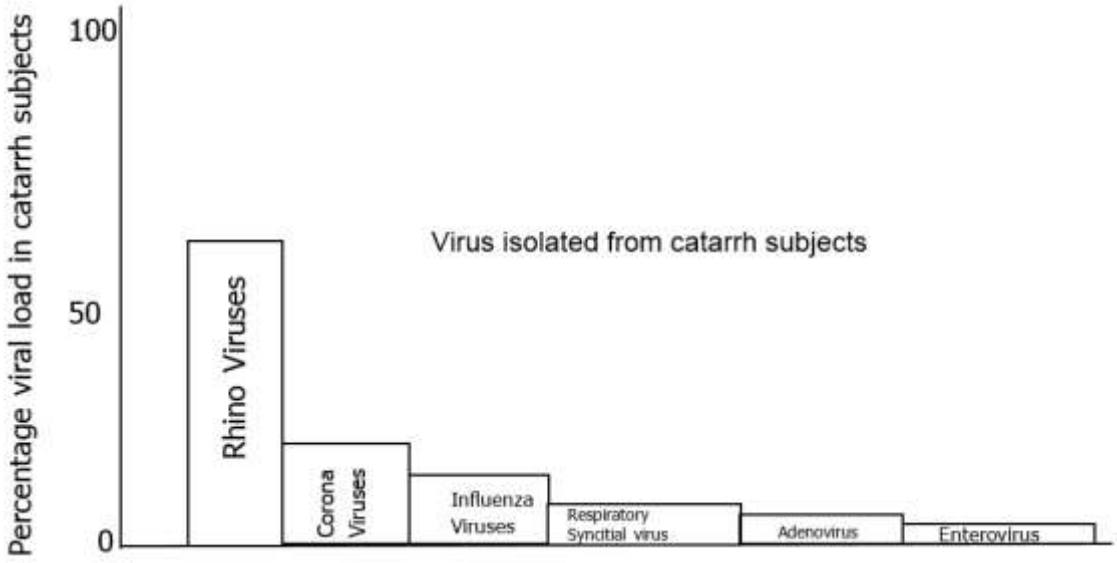

Figure 1: represents the percentage viral load in the Nasopharyngeal region of male and female catarrh subjects.

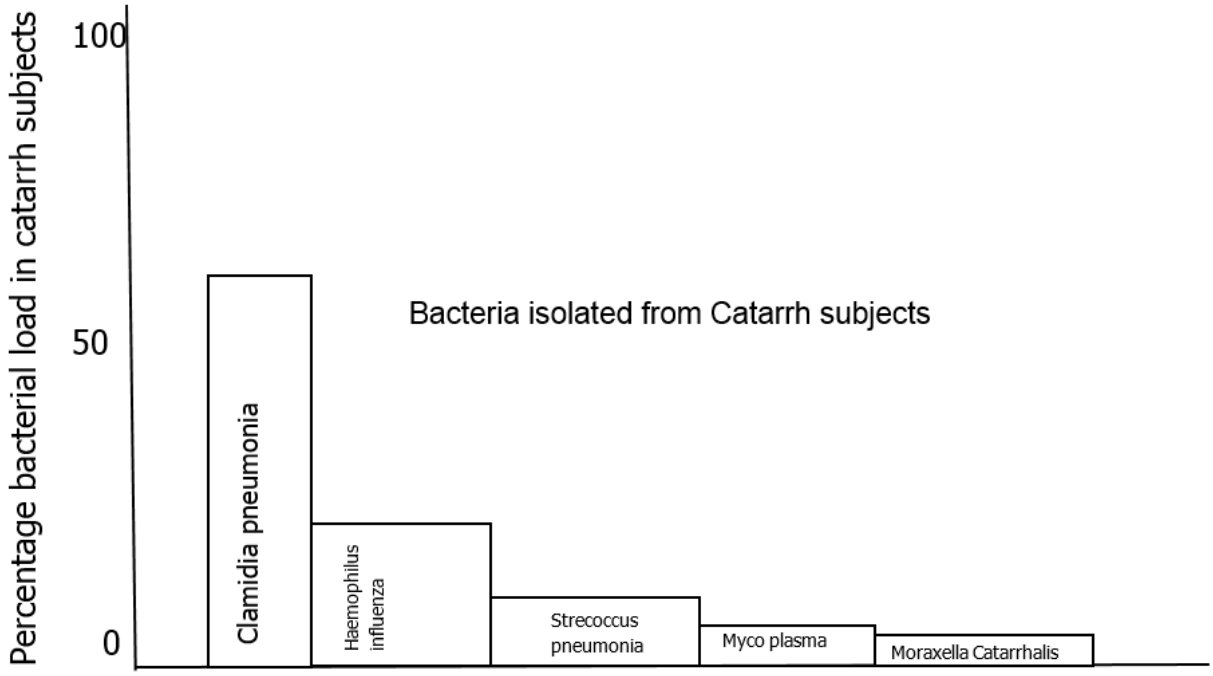

Figure 2: shows the percentage bacterial load in the Nasopharyngeal region of male and female catarrh subjects.

DISCUSSION

Virulent bacterial and viral organisms present in the Nasopharyngeal region of catarrh infected subjects and the effect of this infection in their respiratory region have been elucidated. Although catarrh is typically harmless and symptoms come with an underlying cause, it can be a nuisance. This study is carried out during dry season in our country which is usually December and January when there used to be outbreak of the infection due to dust particles, air pollution and other precipitating materials in the environment.

The result of study in figure 1 shows that of the entire virus identified in the male and female subjects Via Enterovirus.

Coronavirus, Influenza virus A & B, rhinovirus, adenovirus and respiratory syncytial virus, rhinovirus occurred most (65%) common in their sample and enterovirus occurred least (2%).

Rhinovirus is a small single-stranded RNA virus that belongs to the picornaviridae family. It is composed of protein coat that surrounds the RNA genome; Simple stranded RNA genome that contains the genetic material necessary for replication.

This virus infects the nasal epithelial tissues when dust or agents carrying the virus is inhaled, this leads to inflammatory response and the production of excess mucus, when the virus gets into the nasal epithelial tissues, it triggers the release of cytokines which are signaling molecules that promote inflammation and attract immune cells to the site of infection. The inflammation and excess mucus production caused by Rhinovirus infection lead to nasal congestion and discharge which are characteristic symptoms of catarrh. Rhinovirus infection predisposes individual to secondary bacterial infections such as shown in figure 2; streptococcus pneumonia (10%) Haemophilus influenza (20%), Chlamydia pneumonia (60%) mycoplasma, pneumonia (7%) and Moraxella catarrhalis (3%). Rhinovirus is highly contagious hence the embarrassing condition of having this infection and coming out in public to serve as a cook, attendant in hotels, teach in the classroom or serve as a sex worker.

Direct contact such as touching or shaking hands with an infected person or indirect contact such as touching contaminated surfaces or objects and air borne transmission, inhaling droplets that contain the virus could be possible ways of contacting the infection.

The result in figure 2 shows that Chlamydia pneumonia were mostly isolated in the samples collected from both male and female subjects. It's presence is more in occurrence (60%). Chlamydia pneumonia is a gram negative bacteria, an obligate intracellular parasite that grows and replicates inside the cells of a host organism, causing a serious respiratory problem coughing, sneezing and running rose.

Chlamydia pneumoniae can be transmitted through respiratory droplets such as coughing or sneezing when one comes to a close contact with an infected person or if one has a weakened system and he is taking immunosuppressive medications.

Catarrh infection can affect the respiratory system of the subjects leading to changes in lung volumes and capacities.

Catarrh infection can cause a decrease in the expiratory reserved volume which is the amount of air that can be exhaled after a normal exhalation.

It can also decrease the Tidal volume which is the amount of air that is inhaled and exhaled during normal breathing thus causing shallow breathing. It decreases inspiratory reserve volume in the subjects which is the amount of air that in inhaled after a normal breathing.

The mechanisms by which this infection causes decrease in lung volume are by inflammation, mucus production leading to airway obstruction, bronchospasm leading to a decrease in lung volumes and capacities. This study agrees with results of a recent study in which rhinovirus was detected in 276 of 346 epidemic fall season (Arrula et al 1997).

Herzog and Co workers detected rhinoviruses in 55% of 122 patients with acute upper respiratory tract infections (Herzog et al, 1986) thereby showing that rhinovirus is the causative agent of common cold that results to catarrh infection.

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