IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Evaluation of Bronchodilator activity of Salbutamol on goat tracheal preparation.

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Abstract:

Asthma is common respiratory disorder that is characterized by airway obstruction and bronchial hyperresponsiveness. There are various drugs used to treat asthma that include beta agonist, Bronchodilators, corticosteroids, anti-cholinergic, and Leukotriene antagonist. Initially the drug is tested in vitro on tracheobronchial smooth muscles by using student organ bath. The study was made on tracheal muscles of goat, to monitor the bronchodilator activity of Salbutamol and antagonist Histamine. The fresh goat trachea was taken from the slaughter house. A study was made by obtaining a series of dose responses with different doses of Salbutamol. Histamine with varying doses was prepared by dissolving it in warm distilled water and added to student organ bath. It was observed that Histamine solution antagonized salbutamol induced dilation. The goat tracheal preparation is used to test various drugs and plant extract, to evaluate the bronchodilator activity [(1)]. This preparation is easily available, easy to handle and prepare. It was observed that goat tracheal preparation is more sensitive than pig ileum preparation [(1)].

Keywords:

Goat tracheal preparation; Bronchodilator activity; Salbutamol induce dilation; Histamine solution.

Introduction:

Bronchial asthma is most common chronic disease in adults and children that is characterized by airway obstruction and bronchial hyperresponsiveness. The clinical manifestation of asthma are difficulty in breathing, chest pain, cough, fast heart rate, throat irritation and anxiety [2] ·According to World Health Organization (WHO) in 2019, Asthma affected people were 262 million and it caused 461,000 deaths. There are number of medicines used to treat Asthma. Many Ayurvedic medicines are effective against Asthma and are used globally [3].

Various drugs are evaluated to screen the bronchodilator activity on goat tracheal muscle preparation. Initially the testing of drugs on tracheobronchial muscle is carried out in Organ bath [1]. A number of studies of Bronchodilating drugs are made on goat trachea.

Salbutamol is selective beta -2- adrenoreceptor stimulant with Bronchodilator activity [4]. In vitro study of bronchodilator activity of Salbutamol is observed in guinea-pig trachea, goat trachea, and bovine trachea [5, 6]. The pharmacological action of Salbutamol and many other bronchodilators were studied on goat tracheal preparation [7]. Salbutamol produces variable effect on the bronchial smooth muscles of mammalians species. The tracheobronchial tree is a branching tree of airways and composed of trachea, bronchi and bronchioles. Trachea & bronchi pharmacologically react in a similar way [1]. The study was made on goat tracheal preparation to monitor bronchodilator activity of Salbutamol and Histamine antagonist.

Methodology:

Fresh goat trachea was collected from the slaughter house and was transferred to thermostat flask. The thermostat contain Kreb's Hansleit solution (4° C). Before the use of goat trachea it is retained in Kreb's Hansleit solution at 4° C in refrigerator [1]. The goat trachea was transversely cut into number of rings [8]. The smooth muscles that were attached to the cartilaginous rings were separated. One end of the tracheal muscle was attached to lever writing and other end to tissue holder. A tissue was suspended in student organ bath containing 40ml of Kreb's Hansleit solution at 37o C. this process was aerated by Oxygen (95%) and Carbon dioxide (5%). And 0.5gm load was kept on the lever. The preparation is kept as it is to stabilize for 30min.

The speed (0.1cm/min) of the kymograph was set. Recording of the baseline was done on the smoked cylinder for 5min. during the end of the 5th min 0.1 m of agonist, Salbutamol was added. Salbutamol added is allowed to react for 5 min and at the end of the 5th min kymograph was stopped. Washing of the tissue was done with kreb's Hansleit solution. These cycle was repeated for 15 min that include 5min for tissue recovery. A various dose related responses with different doses of Salbutamol were obtained, until the ceiling dose is obtained. Histamine with varying doses was prepared by dissolving it in warm distilled water. Then the after dissolving, it was added to organ bath.

The submaximal dose response of Salbutamol was studied in presence of Histamine solution. The rise in dilation due to Salbutamol before and after each addition of Histamine were measured. Percentage of depletion in height of the dilation was calculated.

Observations: Maximum contraction(%)

Dose (10mg/Ml)	**control**	**Salbutamol**
Histamine concentration		
0.1	**21.64+_1.31**	**11.44 +_0.815***
0.2	**38.24+_1.86**	**19.43+_0.866***
0.4	**49.10+_1.78**	**25.82+_0.817***
0.8	**64.59+_1.88**	**37.18+_0.914***
1.6	**87.10+_3.2**	**45.19+_1.63***
3.2	**90.06+_2.05**	**46.80+_1.69***
6.4	**101.+_2.10**	**54.29+_1.39***

***p<0.001,d f=5**

Results:

Goat tracheal preparation show remarkable dilation to Salbutamol. The dose response curve (DRC) of Salbutamol was plotted in presence and absence of Histamine solution.

It was noted that Histamine solution used antagonized Salbutamol induced dilation responses.

Discussion:

For the study of Agonist & Antagonist action, goat tracheal preparation is best. Inhibition of response of Salbutamol was related to addition of Histamine solution to the organ bath [9].

Conclusion:

Trachea and Bronchi are composed of Hyaline cartilage [10]. Due to the similar anatomical & physiological properties both trachea & Bronchi react similarly to the Bronchodilators [5]. This study was made by using Salbutamol & antagonist Histamine to record the bronchodilator activity on goat tracheal preparation. Goat tracheal preparation can be used to screen & evaluate the responses of various drugs that show Bronchodilator activity. This preparation is easily available, easy to prepare, easily to handle and inexpensive. Goat tracheal preparation can be an alternative for other animal isolated preparations.

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