

*Case Report***IRRATIONAL ASTHMA THERAPY OF A CHILD; A CASE REPORT****Noureen Latif**

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ABSTRACT

Asthma (inflammatory conditions of the lung) is characterized by variable and recurring symptoms, bronchospasm and reversible airflow obstructions. The incidence, prevalence, and mortality of the disease will increase by 20% with incoming 10 years if not controlled. This case study has been designed to report the irrational medication therapy of a 5 years old asthmatic child (a girl) who was admitted in a local hospital of Rawalpindi. SOAP (Subjective, Objective, Assessment, and Plan) study of the child was taken into account and her mother was directly interviewed for complete past history. The case study showed that the child was administered Ventoline (salbutamol) continuously excluding her response to therapy. She was also given 2 antibiotics at a time without dose adjustment. Results obtained from the study clearly showed that BNF protocol was not followed for some medicines, and also no dose adjustment was done. There must be deep insight in rational therapy of treatment to cure the disease, otherwise both the ADRs and non-compliance will increase.

Keywords: Irrational medication therapy, Ventoline, Dose adjustment, SOAP study.

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INTRODUCTION

Asthma is a chronic condition involving the respiratory system in which the airway occasionally constricts, becomes inflamed, and is lined with excessive amounts of mucus, often in response to one or more triggers. These episodes may be triggered by such things as exposure to an environmental stimulant (or allergen) such as cold air, warm air, moist air, exercise or exertion, or emotional stress. In children, the most common triggers are viral illnesses such as those that cause the common cold.^[1] As said by Abramson MJ ^[2] the most effective treatment for asthma is identifying triggers, such as pets or aspirin, and limiting or eliminating exposure to them. Desensitization is currently the only known "cure" to the disease. Specific treatments for asthma are broadly classified as relievers, preventers and emergency treatment. The Expert Panel Report

2 Guidelines for the Diagnosis and Management of Asthma (EPR-2) ^[3] of the U.S. National Asthma Education and Prevention Program, and the British Guideline on the Management of Asthma. ^[4]

Asthma appears to be more prevalent in athletes than in the general population. One survey of participants in the 1996 Summer Olympic Games, in Atlanta, Georgia, U.S., showed that 15% had been diagnosed with asthma, and that 10% were on asthma medication. ^[5] It is becoming one of the chronic diseases and its mortality rate will increase in incoming 10 years by 20%. Asthma is one of the most chronic diseases in the world affecting more than 300 million people worldwide and causing about 255,000 premature deaths annually. Asthma accounts for at least one in every 250 deaths. Studies reveal that asthma deaths would increase by almost 20% in the next 10 years if urgent action is not taken. Asthma occurs in almost all countries regardless of level of development, however, over 80% of asthma deaths occur in low and middle-income countries. The prevalence of asthma in Pakistan is increasing day-by-day with an annual increase of 5% of which 20% to 30% are children between 13 and 15 years of age. Nearly 20 million persons i.e 12% of Pakistani adult population are already suffering from the disease.

CASE REPORT

A child patient 5 years old (girl), weight 15kg, was presented in pediatric ward hospital, Rawalpindi, Pakistan with chief complaints of high grade fever (101°F) from previous 3 days, fever was temporarily relieved by the medication such as Calpol (Paracetamol), an analgesic. Fever was associated with shivering, rigor and chills. The child was having cough from previous three days, its episodes become more severe at night associated with vomiting, awakening with shortness of breath (SOB). She was administered Beta-2 agonist (Salbutamol), to which she was not responding, it became sever with this agent.

She was also having upper respiratory tract infection, for which she was administered 2 antibiotics Clarithromycin and Ceftriaxone. When two antibiotics are administered at a time, their dose must be adjusted but that child was administered these without any dose adjustment. From about 2 days she was eating banana and oranges. Her pulse rate was normal according to her age (102) but respiratory rate (36/min) was greater than the normal value (20-25/min).

Asthmatic attacks had become more frequent from last 1 year and also increase in severity in winter. At night she had to use bronchodilators twice or thrice per month. She was diagnosed asthmatic at the age of 4 months. She was hospitalized twice. Since then initially attacks occur after every 3-4 months for which treatment was taken and now from last year attacks occur every year. There was no family history of asthma, she was having 2 brothers and 1 sister, and all were elder to her and were not asthmatic.

On the basis of her medical examination doctor prescribed her Injection Ceftriaxone-2gm for once daily (7days), syrup Calpol (Paracetamol) 1 tsp/4hr, Ventoline (Salbutamol or Albuterol) nebulizer 4cc plus 2cc N/S- after every 4 hrs, Injection Solucartef (Hydrocortisone Sodium Succinate)-IV stat, after 2 days doctor added "nebulizer with Clenil (Beclometasone Dipropionate) ½ ampoule + 2cc N/S, which is not recommended for children under 6 years. Doctor also added injection Solucartef (Hydrocortisone Sodium Succinate) -30mg V TDS, syrup- Klaracid (Clarithromycin) 5ml x BD Syrup- Ventoline (Salbutamol or aAbuterol) 2tsp-TDS.

DISCUSSION

Findings of the study are acquiesced by Laga M, *et al.*,^[6] who reported that the Ceftriaxone is 3rd generation cephalosporin, having longer half life and therefore need to be given only once daily. It works by inhibiting the mucopeptide synthesis in the bacterial cell wall. The beta-lactam moiety of Ceftriaxone binds to carboxypeptidases, endopeptidases, and transpeptidases in the bacterial cytoplasmic membrane. These enzymes are involved in cell-wall synthesis and cell division. By binding to these enzymes, Ceftriaxone results in the formation of defective cell walls and cell death. Indication includes serious infections such as septicaemia, pneumonia and meningitis. While; Lamb HM *et al.*,^[7] reported that the calcium salt of Ceftriaxone forms a precipitate in gall bladder, which may rarely cause symptoms but these usually resolve when antibiotic is stopped. Its recommended dose is 1gm OD (50-100mg/kg/day) for children as it is written in BNF, but a double dose of it was administered to the child, which can be lethal.

The finding of this case report also supported by Hinz, B *et al.*,^[8] who reported that the Calpol (Paracetamol) is non opioid analgesic; it is a COX-2 inhibitor, having antipyretic anti-inflammatory effects. Its peripheral anti-inflammatory effect is limited due to high level of peroxide in inflammatory lesions. As reported by Weiler JM, *et al.*,^[9]. the correct dose of Paracetamol for a child does not depend on its age, but its weight. The usual dose is 15 mg per kilogram of weight. In other words if a baby weighs 10 kg it should have 150 mg. This dose can be taken once every 4 hours, up to 4 times per day if needed.

Cullum *et al.*^[10] reported Ventolin is a beta-2 adrenergic agonist and thus it stimulates beta-2 adrenergic receptors. Binding of Albuterol to beta 2 receptors in the lungs results in relaxation of bronchial smooth muscles. It is believed that Salbutamol increases cAMP production by activating Adenylate cyclase, and the actions of Salbutamol are mediated by cAMP. Increased intracellular cyclic AMP increases the activity of cAMP-dependent protein kinase A, which inhibits the phosphorylation of myosin and lowers intracellular calcium concentrations. A lowered intracellular calcium concentration leads to a smooth muscle relaxation. Increased intracellular cyclic AMP concentrations also cause an inhibition of the release of mediators from

mast cells in the airways. In addition to 'British National Formulary for children' it is also supported by Kamburoff *et al.* ^[11] who recommend dose (2-6 years) 0.1 - 0.2 mg/kg body weight given 3 times daily. The maximal daily dose must not exceed 4 mg, 3 times daily, and the daily dose for 6 - 12 years-old children is to 24 mg daily, divided in 3 or 4 doses. It was clearly mentioned in the preceding notes of patient's file that she was not responding to Beta agonist (Ventoline), and patient was administered Ventoline for inhalation and syrup also, due to this her condition was getting severe.

Clenil is the brand name of Beclometasone Dipropionate, a corticosteroid. Willey RF *et al.* ^[12] reported that it is indicated for the prophylactic treatment of asthma. Its mechanisms as reported by Salzman GA *et al.*, ^[13] that unbound corticosteroids cross cell membranes and bind with high affinity to specific cytoplasmic receptors. The result includes inhibition of leukocyte infiltration at the site of inflammation, interference in the function of mediators of inflammatory response, suppression of humoral immune responses, and reduction in edema or scar tissue. The anti-inflammatory actions of corticosteroids are thought to involve phospholipase A2 inhibitory proteins, lipocortins, which control the biosynthesis of potent mediators of inflammation such as prostaglandins and leukotrienes. According to 'Paediatric Formulary Committee (2009)' ^[14] Beclometasone is not a licensed drug for children under 6 years but in this case study Beclometasone was not only indicated, but also its dose was not according to its BNF protocol.

CONCLUSION

Irrational drug therapy leads to development of adverse reactions, suboptimal effects, drug interactions and non compliance; as seen in this case. So; rational medication should be encouraged in actual clinical practice. Some of the understandable clinical errors are not be give due care and needed to be addressed to improve the current clinical services and pharmaceutical care. Moreover; it becomes more important in poly-pharmacy or multi-disease therapy of certain seriously ill patients.

RECOMMENDATION

- Ceftriaxone overdose can cause diarrhea, muscle twitching, and seizures. Its overdose can also severe asthma.
- Recommended and maximum tolerated dose of Ceftriaxone for 3-6 years old child is 50-75 mg/kg/day approximately 1gm OD, so its dose should not be doubled because it can severe the patient's asthma.

- Clarithromycin is approved to treat a variety of different infections but its overdose can cause nausea, vomiting, diarrhea, abnormal taste, indigestion and heart burns. Recommended dose of Clarithromycin (Klaracid) is 2.5mL BD or 5mL OD.
- Dose adjustment of drugs is the factor which can not be neglected while prescribing two antibiotics. Looking at the body weight not only both of the antibiotic's dose adjustment is neglected but also these are prescribed 2 and 3 times greater than that of their recommended doses respectively. When the patient was administered Ceftriaxone, her condition was improving with one antibiotic, and there was no need of the second one, and as she was also administered Clarithromycin, its dose must be adjusted.

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