ABSTRACT

Background:

Cigarette smoking is related to chronic obstructive pulmonary disease (COPD).

The study aimed to :assess the influence of smoking on the dose delivered to exacerbated COPD subjects using automatic continuous positive airway pressure (Auto-CPAP).

Patients and methods:Invitro: Two spacers (CombiHaler and AeroChamber MV (AC), and one (VMN) (Aerogen Solo (SOLO) performance was evaluated: Using Auto CPAP in a standard NIV circuit, Salbutamol was nebulized in 3 runs (200µg delivered by MDI connected to AeroChamber and Combihaler connected, 5000µg delivered by the combihaler and Aerogen solo, and 5,200µg delivered by Aerogen solo and combihaler plus 2 puffs MDI, Aerodynamic characterization of the emitted dose was determined using Andersen Cascade Impactor.

In-vivo: Two patient groups (smokers and non mokers), each consist of 12(6 females), were involved in the in-vivo study. Each group received inhaled salbutamol using either Solo Aerogen (Viberating mesh nebulizer)or spacer(Aerochamber or CombiHaler) 1ml, of salbutamol respiratory solution alone , 1ml of salbutamol respiratory solution plus two puffs MDI and 12 puffs salbutamol MDI were delivered to each patient 30minute urine and pooled upto24hours urine were collected and analyzed for salbutamol using HPLC. On day 2, ex-vivo study was carried out on the patients using the same volumes.

Result: **Invitro**:Nebulization of 1ml salbutamol respirable solution with and without 2 puffs MDI using Aerogen solo connected to combihaler has a significantly ($p<0.05$) higher total

emitted dose, percentage amount remained in connections and fine particle dose (FPD) than 12 puffs MDI using AeroChamber and CombiHaler $p<0.05$. while there was no significant difference between spacer and combihaler when the same conditions were applied to both connections.

In vivo: Significantly higher lung deposition (30 minutes urinary salbutamol) delivered to non-smoker compared to smokers ($p<0.05$). This significance relation was observed with all aerosol generators studied. Significantly higher systemic bioavailability (pooled 24-hour urinary salbutamol) for smokers compared to non-smokers was found with Aerogen Solo connected to its T-piece delivering 1 ml respirable solution and CombiHaler spacer with 12 puffs salbutamol pMDI ($p<0.05$). Significantly higher amount desorbed from the ex-vivo filter from 12 puffs salbutamol pMDI delivered using both spacers to non-smokers ($p<0.05$) compared to the smokers

Conclusion:

Both connections used with VMN could produce comparable emitted dose hence these connections could be exchangeable. Addition of 2 ml saline to the respirable solution of salbutamol was found to improve the lung deposition.

The study demonstrated that smoking reduced the lung deposition of inhaled salbutamol delivered by nebulizer or pMDI. However, smoking was observed to increase systemic absorption of inhaled dose which is predominantly formed of an ingested portion of inhaled dose. The lower lungs deposition and higher systemic absorption should be taken into consideration while prescribing inhaled medication to COPD smoker especially exacerbated patient that need ventilation.