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### Determinants of Suboptimal Peak Inspiratory Flow Rates among Patients with Chronic Obstructive Pulmonary Disease in Southwest, Nigeria

#### *Déterminants des Débits Inspiratoires de Pointe Sous-Optimaux chez les Patients Atteints de Bronchopneumopathie Chronique Obstructive dans le Sud-Ouest du Nigeria*

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#### ABSTRACT

**BACKGROUND:** Inhalational therapy is the cornerstone in the management of chronic obstructive pulmonary disease (COPD) patients. Patients' peak inspiratory flow impacts effective dry powder inhaler (DPI) delivery and management outcome.

**OBJECTIVE:** This study assessed peak inspiratory flow rates (PIFR) and determined the factors associated with suboptimal inspiratory flow rates among COPD patients.

**METHODS:** A descriptive cross-sectional study was conducted among 60 participants (30 stable COPD patients and 30 age-and-sex-matched controls). Socio-demographic characteristics was obtained and spirometry was done for all participants. PIFR assessment was done using the In-Check Dial Meter and was categorized as suboptimal (< 60L/min) or optimal ( $\geq$  60L/min). P values less than 0.05 were taken as statistically significant.

**RESULTS:** Mean age of the COPD patients and healthy controls were both  $67.8 \pm 10.3$  years, with 53.3% being females. Post-bronchodilation FEV<sub>1</sub>/FVC% for COPD patients was  $54.15 \pm 11.27\%$ . The mean PIFR among COPD patients was significantly lower than that of healthy controls, in all DPIs simulated, especially for Clickhaler ( $46.2 \pm 13.4$  vs  $60.5 \pm 11.4$ L/min,  $p < 0.001$ ). A significant proportion of COPD patients had suboptimal PIFR, in the simulated resistances against Clickhaler and Turbuhaler (70% vs 80%;  $p < 0.001$ ). Older age, shorter height and low BMI were associated with suboptimal PIFR among COPD patients. However, independent predictors of suboptimal PIFR were BMI, PEF, FEV<sub>1</sub>% and FVC%.

**CONCLUSION:** Suboptimal PIFR was found in a significant number of COPD patients when compared with healthy respondents. Routine assessment using In-Check Dial meter should be done to determine the suitability of dry powder inhalers for patients with COPD. **WAJM 2023; 40(5): 553–561.**

**Keywords:** Dry powder inhaler, Peak inspiratory flow, Lung function.

#### RÉSUMÉ

**CONTEXTE:** Le traitement par inhalation est la pierre angulaire de la prise en charge des patients atteints de bronchopneumopathie chronique obstructive (BPCO). Le débit inspiratoire de pointe des patients a une incidence sur l'efficacité de l'inhalateur de poudre sèche et sur les résultats de la prise en charge.

**OBJECTIF DE L'ÉTUDE:** Cette étude a évalué les débits inspiratoires de pointe et déterminé les facteurs associés aux débits inspiratoires sous-optimaux chez les patients atteints de BPCO.

**MÉTHODES:** Une étude transversale descriptive a été menée auprès de 60 participants (30 patients atteints de BPCO stable et 30 témoins appariés selon l'âge et le sexe). Les caractéristiques socio-démographiques ont été recueillies et une spirométrie a été effectuée pour tous les participants. L'évaluation du PIFR a été réalisée à l'aide du Dial Meter In-Check et a été catégorisée comme suboptimale (< 60L/min) ou optimale ( $\geq$  60L/min). Les valeurs P inférieures à 0,05 ont été considérées comme statistiquement significatives.

**RÉSULTATS:** L'âge moyen des patients atteints de BPCO et des témoins sains était de  $67,8 \pm 10,3$  ans, avec 53,3 % de femmes. Le pourcentage de VEMS/FVC après bronchodilatation chez les patients atteints de BPCO était de  $54,15 \pm 11,27$  %. Le PIFR moyen des patients atteints de BPCO était significativement plus faible que celui des témoins sains, pour tous les DPI simulés, en particulier pour le Clickhaler ( $46,2 \pm 13,4$  vs  $60,5 \pm 11,4$ L/min,  $p < 0,001$ ). Une proportion significative de patients atteints de BPCO avait un PIFR sous-optimal, dans les résistances simulées contre Clickhaler et Turbuhaler (70% vs 80% ;  $p < 0,001$ ). L'âge avancé, la petite taille et un faible IMC étaient associés à une PIFR sous-optimale chez les patients atteints de BPCO. Cependant, les prédicteurs indépendants du PIFR suboptimal étaient l'IMC, le DEP, le VEMS et la CVF.

**CONCLUSION:** Un nombre significatif de patients atteints de BPCO présente un PIFR sous-optimal par rapport aux personnes interrogées en bonne santé. Une évaluation de routine à l'aide de l'appareil de mesure In-Check Dial devrait être effectuée pour déterminer si les inhalateurs de poudre sèche conviennent aux patients atteints de BPCO. **WAJM 2023; 40(5): 553–561.**

**Mots clés:** Inhalateur de poudre sèche, Débit inspiratoire maximal, Fonction pulmonaire.

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