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Title: FEV_6 as an alternative for FVC in detecting airflow obstruction in COPD patients undergoing six minute Walk test

RN. Li-Fei 12415 Chen lifei310@yahoo.com.tw [1], Dr. Shu-Chuan 12416 Ho sc6212.ho@msa.hinet.net [1], RN. Wen-Cing 12417 Jao chin0522@ms29.hinet.net [1], RN. Te-Feng 12418 Sheng rubysheng050@gmail.com [1], Prof. Dr Han-Pin 12419 Kuo q8828@ms11.hinet.net MD [1] and Dr. Chun-Hua 12423 Wang wchunhua@ms7.hinet.net MD [1]. [1] Department of Thoracic Medicine, Chang Gung Memorial Hospital, Taipei, Taiwan .

Body: Forced expiratory volume in 6 seconds (FEV_6) could complement forced expiratory volume in 1 second (FEV_1) and forced vital capacity (FVC) for detecting airflow obstruction in chronic obstructive pulmonary disease (COPD). Our aim is to evaluate the use of the FEV_1/ FEV_6 and FEV_6 as an alternative for FEV_1/FVC and FVC in the detection of dynamic hyperinflation during six minute walk test (6MWT). Sixty-two ambulatory and clinically-stable COPD patients were randomized to this cross-over study. One group of 31 patients performed the spirometry by FVC first, then measuring FEV_6, before and after 6MWT. The other 31 patients initiated the maneuver of FEV_6 first, then followed by FVC, during the 6MWT. FVC, FEV_1, inspiratory capacity (IC), FEV_6 and FEV_1/FEV_6 were recorded. FEV_6 and FEV_1/FEV_6 were strongly correlated with FVC ($r=0.907$, $n=62$, $p<0.0001$) and FEV_1/FVC ($r=0.865$, $n=62$, $p<0.0001$) before 6MWT. Values of FEV_6 and FEV_1/FEV_6 were also strongly related to FVC ($r=1.00$, $n=62$, $p<0.0001$) and FEV_1/FVC ($r=0.809$, $n=62$, $p<0.0001$) after 6MWT. We found that FVC showed good correlation to pre-exercise IC ($r=0.697$, $n=62$, $p<0.0001$) and post-exercise IC ($r=0.642$, $n=62$, $p<0.0001$). The value of FEV_6 also have similar correlation with pre-exercise IC ($r=0.593$, $n=62$, $p<0.0001$) and post-exercise IC ($r=0.584$, $n=62$, $p<0.0001$). The delta IC was correlated with delta FEV_6 ($r=-0.357$, $n=62$, $p=0.004$), however, was not related to delta FVC ($r=-0.093$,$n=62$, $p=0.470$).In conclusion, FEV_6 and FEV_1/FEV_6 can be used as a valid alternative for FVC and FEV_1/FVC to detect airway limitation or dynamic hyperinflation during 6MWT.