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Title: Association of lung function with waterpipe (shisha) tobacco use in healthy adults

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Body: Background Waterpipe (WP) tobacco (shisha, hookah, narghile) smoking is gaining popularity in Europe. There is a perception among UK students that waterpipe smoking is “safer” than smoking cigarettes. We hypothesized that WP smoking as practiced by UK students results in particulate matter-mediated lung effects, including increased loading of airway macrophages (AM) with black carbon (BC) and reduced lung function. Aims To assess the effect of WPS on AM BC and lung function in healthy non-cigarette smoking students. Methods After informed consent, AM BC and spirometry were assessed in 11 WP smokers and 13 controls. AM were sampled by sputum induction, imaged under light microscopy (x100) and the mean area of BC in 50 random AM asessed using image analysis (image J, NIH). Results

Table 1 - Demographics, Spirometry and AMC

Waterpipe Exposure	Smoker	Non-Smoker	Significance
N	11	13	N/A
Age (y)	25.6 ± 1.6	24.8 ± 1.5	NS
Male/Female	9/2	10/3	NS
Caucasian	1/11	6/13	NS
South Asian	10/11	5/13	NS
African	0/11	2/13	NS
FEV1 z-score	-1.06 ± 0.17	-0.16 ± 0.22	<0.01
FVC z-score	-1.46 ± 0.15	-0.21 ± 0.28	<0.001
Sputum Induction Success	6/11	6/13	NS
AMC (μm²/cell)	0.42 ± 0.13	0.35 ± 0.05	NS

FEV1 and FVC are reduced in waterpipe smokers. Statistical significance was calculated using unpaired t-test or chi-squared test as appropriate

Conclusion This study is the first to show reduced lung function in UK WP smokers. The lack of change in AM carbon may be due to small study size.