Title: Comparison of end tidal carbon monoxide (eCO) levels in shisha (water pipe) and cigarette smokers

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Body: Background: 100 million people smoke shisha, its use was more prevalent among Arabs but now getting endemic in other parts of World. Measuring eCO concentration is an easy method to correlate intensity of tobacco smoke and different kinds of smoking techniques. Objective: The aim of this study was to evaluate and compare the increase in end tidal carbon monoxide levels in exhaled breath of passive smokers and healthy smokers after cigarette and shisha smoking. Methodology: In a cross sectional study eCO levels were measured in 70 subjects (24 healthy cigarette smokers, 20 healthy shisha smoker, 26 passive smokers) by portable device, Micro Plus Smokerlyzer. Smokers were asked to smoke shisha for 30 mins in shisha bar or to smoke 5 cigarettes in 30 mins in simple restaurant. A group of people exposed to smoke for 1 hour was also recruited. eCo levels were measured at baseline and at 5 mins, 30 mins and 60 mins. Result: The mean age was 23.22 +/-1.91 years. One way ANOVA and paired t test were run through SPSS. The baseline mean eCO in cigarette smokers was 3.50 +/- 0.65 ppm (part per million), passive cigarette smoker 3.71 +/- 1.06 ppm, shisha smokers 27.70 +/- 4.92 ppm and passive shisha smokers 18.33 +/- 8.41 ppm and this difference was due to close environment and poor ventilation of shisha bars. The mean increase in eCO from baseline after 60 min in healthy smoker was 9.4 +/- 4.67 (p<0.005) in passive cigarette smoker 3.57 +/- 2.53 (p<0.05), healthy shisha smoker 57.9 +/- 27.4 (p <0.005) and passive shisha smokers 13.33 +/- 4.69 (p=0.03). Conclusion: One session of shisha smoking is 6 times more toxic than cigarette smoking and sitting in shisha bar itself cause significant increase in eCO levels.