

Impact of ENDS Use on Salivary Cytokines among College Students

PURPOSE
The purpose of this study was to analyze the differences in salivary cytokine profiles between Electronic Nicotine Delivery System (ENDS) users and non-ENDS users in a sample of college students.

BACKGROUND

- Conventional tobacco use alters immune function, contributing to adverse respiratory health effects, but little is known about the impact of ENDS use.
- Nearly 25% of college student use at least one form of tobacco, and 23.3% report ever-use of ENDS.
- The Surgeon General has declared electronic cigarette use among young people “a major public health concern”.
- Similar to respiratory discomforts reported by conventional cigarette users, ENDS users have reported an increase in throat irritation, eye irritation and cough.

METHODS

- This was a descriptive comparative study using quota sampling.
- Data was collected using an iPad, and survey measures included demographics and tobacco/ENDS use behaviors.
- Current use was defined as using an ENDS within in the past 30 days.
- Salivary cotinine and Interleukin (IL) 1 β , 2, 4, 6, 8, 10, 12p70, TNF α and INF γ were analyzed.

RESULTS

- 61 students, ages 18-24 participated (48% male, as expected due to quota sampling), mostly white (95%), and underclassman (70%).
- 100% of participants chose JUUL as the brand of ENDS product used.
- ENDS users had significantly higher levels (geometric mean, pg/mL) compared to non-ENDS users (covariates included current cigarette and marijuana use):
 - INF γ (8.58 vs 4.12, p=0.008)
 - IL-2 (2.12 vs 1.27, p=0.023)
- ENDS users had lower levels of:
 - IL-4 (0.08 vs 0.16, p=0.034)
- Cotinine levels were significantly higher among ENDS users compared to non-users (78 ng/mL vs 0.9 ng/mL, p=0.015)

CONCLUSION
Overall, these data demonstrate dysregulation of salivary immune profiles in emerging adult ENDS users trending toward a TH1 phenotype, highlighted by significant increases in IL-2 and INF- γ , and decreases in IL-4 among ENDS users.



Salivary immune function is dysregulated in young adult ENDS users.



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Table 1. Demographic characteristics

Characteristic	Total sample (N= 61)	ENDS use		p
		Yes (n = 32)	No (n = 29)	
Sex				.91
Male	29 (47.5%)	15 (46.9%)	14 (48.3%)	
Female	32 (52.5%)	17 (53.1%)	15 (51.7%)	
Race/ethnicity				.73
White	58 (95.1%)	31 (96.9%)	27 (93.0%)	
Black	2 (3.3%)	1 (3.1%)	1 (3.5%)	
Hispanic	1 (1.6%)	0 (0.0%)	1 (3.5%)	
Academic class				<.001
Freshman/ Sophomore	29 (47.5%)	22 (68.8%)	7 (24.1%)	
Junior/Senior	32 (52.5%)	10 (31.2%)	22 (75.9%)	

Table 2. Geometric means and standard deviations for cytokines by ENDS status; and linear regressions modeling the associations between log-transformed cytokines and current ENDS use status, with current cigarette and marijuana use as covariates.

Cytokine	ENDS use		p
	Yes (n = 32) geometric mean (geometric SD)	No (n = 28) geometric mean (geometric SD)	
IL – 2	2.12 (1.87)	1.27 (1.99)	.023
IL – 4	0.08 (3.51)	0.16 (2.92)	.034
IL – 6	10.81 (2.23)	8.27 (1.95)	.56
IL – 8	989.14 (1.44)	892.34 (1.54)	.47
IL – 10	3.30 (2.25)	3.13 (1.94)	.90
IL – 12p70	0.55 (1.95)	0.71 (1.80)	.078
IL – 13	9.36 (1.68)	8.75 (1.85)	.75
TNF α	10.38 (1.86)	7.29 (1.83)	.14
INF γ	8.58 (2.68)	4.12 (2.23)	.008

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