



Data Article

Data on advanced glycation end-products concentrations and haemodynamic parameters following caffeine and nicotine consumption in nursing students

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ABSTRACT

This work presents data from a non-invasive interventional trial investigating the early effects of caffeine and nicotine on both the concentrations of advanced glycation end-products (AGEs) and haemodynamic parameters in 178 healthy nursing students aged between 18 and 40. These students were allocated into four groups (A, B, C and D) and the concentrations of AGEs as well as haemodynamic parameters were measured non-invasively using the AgeReader and the Finometer devices, respectively. The haemodynamic parameters that were measured included systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate, inter-beat interval, stroke volume, cardiac output, ventricular ejection time, total peripheral resistance, ascending aorta impedance and total arterial compliance. According to our

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protocol, each beverage contained 100 mg of caffeine each cigarette contained 1.5 mg of nicotine. The present data reveal the combined effect of smoke and caffeine consumption to several hemodynamic parameters that may be related to the onset of elevated blood pressure during smoking and following caffeine consumption.

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Specifications Table

Subject	Public Health
Specific subject area	Caffeine and nicotine effects on healthy nursing students
Type of data	Tables, SPSS file
How data were acquired	AgeReader Device, Finometer device, self-reported demographic data
Data format	Raw, descriptive, analyzed
Parameters for data collection	Ethical approval was obtained by the evaluating committee of the Ministry of Education and Religious Affairs, according to the Declaration of Helsinki, as revised in Brazil, 2013. All participants provided written informed consent. Anonymity was preserved at all times. Participants were given a detailed information sheet regarding the data collection's purpose and procedures prior to providing written consent. They were also informed that their participation was voluntary while they maintained the right to withdraw at any time.
Description of data collection	Measurements were performed in four groups of 178 students in total, using the Finometer and AgeReader devices according to predefined protocol
Data source location	Lamia, Greece
Data accessibility	Data are hosted with the article

Value of the Data

- Data can be linked to physiology processes related to nicotine and caffeine consumption. Data demonstrate early findings of haemodynamic and advanced glycation end-products changes in prospective health care workers.
- Researchers in all countries may use present data and compare them to their own in an effort to present potential harmful effects of nicotine and caffeine consumption in younger age groups.
- Present data may inspire further investigation of nicotine and caffeine use in various settings and various situations.
- Data can be used to demonstrate the need for health promotion activities that should focus on the direct effects of smoking and caffeine consumption.
- An issue of great importance is the fact that there is still a need for regulations/guidelines concerning public health and especially young people [1,2]. Communication of such policies should be done by employing contemporary approaches [3,4].

1. Data description

This dataset presents measurements of several haemodynamic parameters and advanced glycation end-products concentrations in 178 (92 women and 86 men) healthy (as self-reported) nursing students, aged between 18 and 40 years old. Raw data include all participants' measurements, according to group allocation (supplementary SPSS file format), as well as their age, gender and body mass index (BMI). Variables included in the comprehensive supplementary file

Table 1

Descriptive statistics for Systolic Blood Pressure (SYS), Cardiac Output (CO) and AgeReader.

	N	Min	Max	Mean	SD	Variance	Skewness value	S.E.	Kurtosis value	S.E.
Systolic Blood Pressure at rest	178	94.30	154.73	120.17	10.01	100.333	.627	.182	.988	.362
Systolic Blood Pressure during smoking (groups B + D)	68	105.97	163.47	131.10	12.36	152.860	.307	.291	.185	.574
Systolic Blood Pressure following caffeine consumption (groups C + D)	98	94.50	184.47	129.74	13.73	188.535	.850	.222	2.013	.440
Cardiac Output at rest	178	3.28	9.83	5.815	1.238	1.535	.397	.182	.102	.362
Cardiac Output during smoking (groups B + D)	68	4.27	9.54	6.794	1.161	1.349	-0.038	.291	-0.512	.68
Cardiac Output following caffeine consumption (groups C + D)	98	3.51	9.23	6.333	1.231	1.516	.015	.222	-0.617	.119
1st Measurement with Age Reader (at rest)	178	1.00	3.60	1.969	.4198	.176	.71	.182	1.586	.362
2nd Measurement with Age Reader (1 hour following intervention) (groups B-C-D)	117	1.10	3.70	2.116	.4398	.193	.64	.224	1.384	.444

represent mean values of systolic blood pressure measured in mmHg every one minute (SYS), diastolic blood pressure measured in mmHg every one minute, mean arterial pressure measured in mmHg every one minute (MAP), heart rate measured every one minute (HR), inter-beat interval measured in seconds every one minute (IBI), stroke volume measured in ml every one minute (SV), cardiac output measured in l/min every one minute, (CO), ventricular ejection time measured in seconds every one minute (EJT) total peripheral resistance measured in MU every one minute (TPR), ascending aorta impedance measured in mMU every one minute (Zao) and total arterial compliance measured in MU every one minute (CwK).

Students were allocated into four groups (A, B, C and D). Concentrations of AGEs and haemodynamic parameters were measured using the AgeReader and the Finometer devices, respectively. The haemodynamic parameters that were measured non-invasively included systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate, inter-beat interval, stroke volume, cardiac output, ventricular ejection time, total peripheral resistance, ascending aorta impedance and total arterial compliance. Participants in the control group (A) ($n=59$) were only measured once, at rest (AgeReader, Finometer). Participants in group B ($n=21$) were measured at rest (AgeReader, Finometer), during smoking (Finometer) and 30 min after smoking (AgeReader, Finometer). Participants in group C ($n=50$) were measured at rest (AgeReader, Finometer) and one hour after the caffeine consumption (AgeReader and Finometer). Finally, participants in group D ($n=48$) were measured at rest (AgeReader, Finometer), 45 min after caffeine consumption at which time they smoked one cigarette (Finometer), 1 hour after caffeine consumption (AgeReader) and 30 min following smoking (Finometer). Each beverage contained 100 mg of caffeine. According to our protocol, participants in group B smoked 1 cigarette (1.5 mg of nicotine), participants in group C consumed a beverage containing 100 mg of caffeine, participants in group D smoked 1 cigarette and consumed a beverage containing 100 mg of caffeine, while, group A was the control group (non-smokers, non-caffeine consumers).

Descriptive statistics for systolic blood pressure (SYS) and cardiac output (CO) are presented in [table 1](#) (comprehensive raw data file provided with submission) as well as the two measure-

Table 2

Kruskal-Wallis Test for MeanAP, HR and IBI following caffeine consumption.

Test Statistics ^{a,b}	Mean Arterial Pressure following caffeine consumption	Heart Rate following caffeine consumption	Inter-Beat Interval following caffeine consumption
	Groups B-C-D	Groups B-C-D	Groups B-C-D
Chi-Square	8.855	43.228	41.464
Asymp. Sig.	.012	<0.001	<0.001

^a Kruskal Wallis Test..^b Grouping Variable: Groups.

ments of advanced glycation end-products (AF values) using the AgeReader device. The most significant part is the evaluation of skewness and kurtosis in order to confirm any deviation from normality. Skewness measures the lack of symmetry in a distribution. The data set is symmetric (for example the normal distribution) in case it has a uniform distribution both on the left and on the right side of the center point. Kurtosis on the other hand is a measure of whether the data are peaked or flat relative to a normal distribution. More specifically, if X is a real-valued random variable, the variance of X is the second moment of X about the mean while the third and fourth moments of X about the mean measure skewness, and kurtosis respectively. A major value hidden in these data is the extracted information from the four groups regarding possible differences among them. The latter was studied with the help of the Kruskal-Wallis test and the analysis of variance (ANOVA). Kruskal-Wallis test is a nonparametric test, commonly used when the assumptions of ANOVA are not met. Both ANOVA and Kruskal-Wallis test estimate whether there are statistically significant differences on a continuous dependent variable by a grouping independent variable for more than two groups. However, in the ordinary ANOVA, it is assumed that the distribution of each group is normal and there is approximately equal variance in the measurements for each group. Kruskal-Wallis test, overpasses these assumptions. The test examines the null hypothesis that the medians of all groups are equal i.e. the alternative hypothesis is that a population median of one group is different from the population median of at least one other group. Data reveal that most of the factors do not deviate greatly from normality. Thus, in order to be confident about the statistical inferences, both statistical tests assuming normality and non-parametric tests were performed. In summary, in the case of comparisons among groups apart from Kruskal-Wallis test, an advanced ANOVA test assuming not equal variances selecting Tamhane's T2 algorithm was performed (but Levene test indicated that the variances across groups were significantly different).

Another important aim of the data analysis is to reveal differences between two relevant factors concerning groups of the same subjects. Wilcoxon Matched-Pair Signed-Rank test was used as a non parametric test in order to search for differences between two related factors. The test is based on difference scores, but in addition to analyzing the signs of the differences, it also considers the magnitude of the observed differences. The method tests the null hypothesis that the median of a distribution is equal to a certain value. In addition, as an adjunct verification control, the paired t -test was also utilized since it has already been mentioned that the deviations from normality were not very strong. Non parametric comparison of factors among four different groups were also used, since, as mentioned above, the present dataset comprises four different groups (A, B, C and D) and each group consists of different students.

Representative, between-groups comparisons concerning caffeine consumption are presented in tables 2 and 3 (comprehensive raw data file provided with submission). Here are presented the results of Kruskal-Wallis test between the B, C and D groups, since, all comparisons with the inclusion of group A result to statistically significant differences, namely, between groups A-B-C, A-C-D and A-B-D. Nevertheless, presentation of such information may be beyond the scope of the journal, while, interested readers may run any analysis with raw data included with the present submission, to verify the above.

Table 3

Kruskal-Wallis Test for factors CO, EJT, TPR and CwK following caffeine consumption.

Test Statistics ^{a,b}	CO following caffeine consumption	EJT following caffeine consumption	TPR following caffeine consumption	CwK following caffeine consumption
	Groups B-C-D	Groups B-C-D	Groups B-C-D	Groups B-C-D
Chi-Square	24.936	8.021	15.426	6.119
Asymp. Sig.	<0.001	.018	<0.001	.047

^a Kruskal Wallis Test,.^b Grouping Variable: Groups.**Table 4**

Wilcoxon Signed Ranks Tests for Ventricular Ejection Time (EJT) and Systolic Blood Pressure (SYS).

Test Statistics ^a	EJT during smoking vs EJT at rest Group B	EJT following caffeine consumption vs EJT at rest Group C	EJT following caffeine consumption vs EJT during smoking Group D	SYS during smoking vs SYS at rest Group B	SYS following caffeine consumption vs SYS at rest Group C	SYS during smoking vs SYS at rest Group D
Z	-3.520 ^b	-2.615 ^b	-4.039 ^b	-6.361 ^b	-7.372 ^b	-7.430 ^b
Asymp. Sig. (2-tailed)	<0.001	.009	<0.001	<0.001	<0.001	<0.001

^a Wilcoxon Signed Ranks Test,.^b Grouping Variable: Groups.**Table 5**

Wilcoxon Signed Ranks Tests for Heart Rate (HR), Stroke Volume (SV) and Total Arterial Compliance (CwK).

Test Statistics ^a	HR during smoking vs HR at rest Group B	HR following caffeine consumption vs HR during smoking Group D	SV following caffeine consumption vs SV at rest Group C	SV following caffeine consumption vs SV during smoking Group D	CwK during smoking vs CwK at rest Group B	CwK following caffeine consumption vs CwK at rest Group C
Z	-6.782 ^b	-5.457 ^b	-4.362 ^b	-3.807 ^b	-6.526 ^b	-6.722 ^b
Asymp. Sig. (2-tailed)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

^a Wilcoxon Signed Ranks Test,.^b Grouping Variable: Groups.

Statistically significant differences among B-C-D groups were seen for mean pressure (Mean AP), heart rate (HR), inter-beat Interval (IBI), cardiac output (CO), ventricular ejection time (EJT), total peripheral resistance (TPR) and total arterial compliance (CwK). Finally, statistically significant differences ($H=40.968$, $p<0.001$) among the four groups were seen for the first measurement by the Age Reader (AF1) with group A presenting the lowest values. Significant difference, was also seen for the second measurement (AF2) among groups B-C-D ($H=11.767$, $p=0.003$). Other findings regarding statistically significant differences are presented in tables 4 and 5 (comprehensive raw data file provided with submission). In brief, SYS, DIAST, HR, CO, EJT, ascending aorta impedance (Zao) and CwK increased after smoking and caffeine consumption compared to resting condition, IBI increased during smoking compared to resting condition, SV increased after caffeine consumption compared to resting condition.

With regard to differences between genders, the non-parametric test for two independent samples' median test for k samples has been used. There weren't any differences between men and women regarding Age Reader values, both at rest and following interventions. Indicative

statistically significant differences between genders were observed for mean systolic and diastolic blood pressure following caffeine consumption and for ascending aorta impedance, total arterial compliance, stroke volume and cardiac output during smoking. However, an exhaustive statistical analysis is beyond our aim and, to this end, several indicative information have been presented to highlight the potential value of the present dataset which is openly accessible for further exploration.

2. Experimental design, materials and methods

The population invited to participate were students of Health Care professions studying in a tertiary institute of Lamia, Greece. Two hundred students were asked to participate in the data collection procedures. One hundred and seventy eight accepted to participate and provided written informed consent. Inclusion criteria were the age of above 18 years and under 40 years, absence of known cardiovascular conditions as well as any other chronic or systemic disease, daily smoking of more than 10 cigarettes/day for at least the past two years (groups B and D) and daily consumption of caffeine (groups C and D). Participants were allocated to either a control group (A) ($n=59$), or to three intervention groups: (B) ($n=21$) this group consisted of smokers who didn't consume caffeine on daily basis, (C) ($n=50$) this group consisted of non-smokers who consumed caffeine on daily basis and (D) ($n=48$) this group consisted of smokers who also consumed caffeine on daily basis.

Participants were selected non-randomly until there had been saturation and purposefully allocated to the above groups. All participants completed a medical history form and sociodemographic data were retrieved (gender, age, BMI).

Participants in the control group were only measured once, at rest (AgeReader, Finometer). Participants in group B were measured at rest (AgeReader, Finometer), during smoking (Finometer) and 30 min after smoking (AgeReader, Finometer). Participants in group C were measured at rest (AgeReader, Finometer) and one hour after the caffeine consumption (AgeReader and Finometer). Finally, participants in group D were measured at rest (AgeReader, Finometer), 45 min after caffeine consumption at which time they smoked one cigarette (Finometer), 1 hour after caffeine consumption (AgeReader) and 30 min following smoking (Finometer). Each beverage contained 100 mg of caffeine. According to our protocol, participants in group B smoked 1 cigarette (1.5 mg of nicotine), participants in group C consumed a beverage containing 100 mg of caffeine, participants in group D smoked 1 cigarette and consumed a beverage containing 100 mg of caffeine, while, group A was the control group (non-smokers, non-caffeine consumers). Time intervals between caffeine consumption, nicotine intake and measurements were decided upon previous literature [5,6].

In the present data collection procedures, accumulation of advanced glycation end-products (AGEs) was measured using the AGE Reader device. This instrument emits light of specific wave length to a 0.4cm² skin surface, nearly 10–15 cm below the elbow fold. The mean value of three consecutive measurements was calculated allowing a 5 min interval between measurements.

Haemodynamic parameters were estimated using a non-invasive device called Finometer. This device provides several information regarding cardiac output, stroke volume, systolic and diastolic blood pressure, mean arterial pressure, pulse rate, inter-beat intervals, arterial compliance and systemic vascular resistance (i.e. SYS (Systolic pressure, mmHg), DIAST (Diastolic pressure, mmHg), Mean AP (Mean pressure, mmHg), HR (Heart/pulse Rate, bpm), IBI (Inter-beat Interval, sec), SV (Stroke Volume, ml), CO (Cardiac Output, l/min), EJT (Ejection Time, sec), TPR (Total Peripheral Resistance, MU), Zao (ascending aorta impedance, mMU) and CwK (total arterial compliance, MU).

It is beyond the scope of the present data set to extensively describe the mechanisms that caffeine, nicotine and AGEs have on bodily functions, nevertheless, interested readers are referred to more detailed published work [7,8].

Before the beginning of the process, the Finometer's arm cuff was positioned above the brachial artery. The finger cuff was placed on the right middle finger. Three different cuff sizes

were available according to the size of the participants' arms and middle fingers (small, medium, large). Finger arterial pressure was continuously measured from the middle left finger positioned at heart level. Prior to the initial measurement at rest, participants were in a lying down position for 10 min in a quiet room and temperature-controlled environment. Then, measurements were performed for 15 min in a sitting position. Calibration of each device took place before of each measurement. Reliability of Ager reader and Finometer has been established prior to acquiring the present dataset and have presented elsewhere [9]. Participants should not have consumed any alcohol, coffee or tea nor exercise, or smoke before the procedure. These are all known to have an effect on cardiovascular parameters [10-14].

Ethics Statement

Ethical approval was obtained by the evaluating committee of the Ministry of Education and Religious Affairs, according to the Declaration of Helsinki. All participants provided written informed consent.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

CRediT authorship contribution statement

Anna Deltsidou: Conceptualization, Methodology, Validation, Investigation, Resources, Writing - original draft, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Vasilios Zarikas:** Conceptualization, Methodology, Validation, Formal analysis, Writing - original draft, Writing - review & editing. **Dimos Mastrogiannis:** Conceptualization, Investigation, Writing - original draft, Writing - review & editing, Project administration. **Eleni Kapreli:** Conceptualization, Writing - original draft. **Dimitrios Bourdas:** Conceptualization, Investigation, Resources, Project administration. **Vasilios Raftopoulos:** Conceptualization, Methodology, Writing - original draft. **Maria Noula:** Conceptualization, Writing - original draft. **Katerina Lykeridou:** Conceptualization, Writing - review & editing.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.dib.2020.106063](https://doi.org/10.1016/j.dib.2020.106063).

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