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ΜΕΤΑΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ

«Το παθητικό κάπνισμα και η πολιτική του καπνίσματος στην Ελλάδα»

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ΥΠΟΥΡΓΕΙΟ ΕΘΝΙΚΗΣ ΠΑΙΔΕΙΑΣ ΚΑΙ ΘΡΗΣΚΕΥΜΑΤΩΝ
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Ευχαριστίες

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ΠΕΡΙΕΧΟΜΕΝΑ

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Τίτλος εργασίας: «Το παθητικό κάπνισμα και η πολιτική του καπνίσματος στην Ελλάδα»

Του: Κωνσταντίνου Βαρδαβά

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Η χώρα μας υποφέρει από «μάστιγα» καπνίσματος, ενεργητικού και παθητικού, μιας και έχει το υψηλότερο ποσοστό ενήλικων καπνιστών στην Ευρώπη. Με επιπολασμό πού ποικίλλει μεταξύ 39-57% ανάλογα με το φύλο, την ηλικία, το κοινωνικό-οικονομικό επίπεδο αλλά και τον τόπο διαμονής το κάπνισμα αποτελεί την σημαντικότερη απειλή για την δημόσια υγεία στην χώρα μας αλλά και πιθανώς παγκοσμίως. Η νομοθεσία γύρω από το κάπνισμα και την έκθεση στο παθητικό κάπνισμα είναι ιδιαίτερα «χαλαρή» στην Ελλάδα. Στην παρούσα πτυχιακή αναλύω την υπάρχουσα πολιτική του καπνίσματος πραγματοποιώ αναφορά στην μελλοντική αλλά και αποδεικνύω και την πλήρη αποχή ή και αδιαφορία των πολιτών και του κράτους απέναντί στην ήδη εφαρμοσμένη (αλλά και μη τηροούμενη) νομοθεσία στην Ελλάδα. Είναι σχεδόν εγκληματική η αδιαφορία και η αμάθεια του γενικού πληθυσμού και ιδιαίτερα των γονιών απέναντί στην έκθεση των παιδιών τους, είτε στο σπίτι είτε στην βόλτα, είτε στο αυτοκίνητο. Είναι ευθύνη αλλά και υποχρέωση μας σαν επαγγελματίες υγείας να προωθούμε μια πιο «καθαρή» πολιτική υγείας και είτε επιστημονικά είτε νομοθετικά να αλλάξουμε την υπάρχουσα κατάσταση ώστε να διαφυλάξουμε τις επόμενες γενεές από ίσως και την μεγαλύτερη απειλή για την υγεία τους.

Λέξεις κλειδιά: παθητικό κάπνισμα, πολιτική υγείας, τοξική έκθεση, Ελλάδα

Abstract

Title: Passive Smoking and Tobacco Policy in Greece
By: Constantine Vardavas
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Smoking is probably the largest and most immediate threat to public health. Currently Greece is suffering from an active and passive smoking "epidemic". With smoking prevalence ranging between 39-57% depending on gender, age, socio-economical status and place of residence, Greece has been classified as having the highest percent of adult smokers amongst all countries in the E.U. Greece's anti-tobacco legislation most likely plays an important role as stated and proven in this thesis. A large number of laws regarding tobacco use in Greece, if not most of them, are bluntly ignored either by employers, employees, patrons and even the general population. With cotinine levels proving the extent of smoke exposure among preschool children one can conclude that the current status-quo of smoking in Greece is almost criminally affecting not only the adults but also the children's health. It is imperative that all the loopholes in the existing laws are expunged and a more health-oriented policy is adopted not only by policy makers but also by the Greek population.

Key words: Passive Smoking, Health Policy, Toxic Exposure, Greece, SHS, PM2.5

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1. Vardavas C.I, Kafatos A. Greece's tobacco policy: another myth? ***The Lancet*** 2006; 367 (9521): 1485-1486
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1. Η ΠΟΛΙΤΙΚΗ ΤΟΥ ΚΑΠΝΙΣΜΑΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ: ΈΝΑΣ ΑΚΟΜΑ ΕΛΛΗΝΙΚΟΣ ΜΥΘΟΣ?

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Vardavas C.I, Kafatos A. Greece's tobacco policy: another myth? ***The Lancet*** 2006; 367 (9521): 1485-1486

Σύντομη Ελληνική Περιγραφή:

Το παρόν άρθρο συζήτησης εστιάζεται στην παραβίαση των νόμων περί παθητικού καπνίσματος στην Ελλάδα και ιδιαίτερα όσον αφορά τον νόμο που ορίζει χώρους καπνιστών και μη καπνιστών σε εστιατόρια, καφετέριες και κέντρα διασκέδασης. Η νομοθεσία είναι αρκετά ασαφής με αποτέλεσμα να υπάρχουν αρκετοί τρόποι παράκαμψης της. Στην προκειμένη περίπτωση η συγκεκριμένη νομοθεσία στην Ελλάδα, όπως και στην Ισπανία, δεν τηρείται με δυσμενείς επιπτώσεις στην υγεία των εργαζομένων και θαμώνων.

►GREECE'S TOBACCO POLICY: ANOTHER GREEK MYTH?

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MAIN TEXT

As stated by Samuel Loewenberg (Feb 11, p 464),[1] Greece has one of the highest rates of adult tobacco use worldwide, and the highest rate of adult tobacco use in Europe, even surpassing that of the Spaniards. Epidemiological studies estimate that up to 51% of men and 39% of women in Greece are current smokers.[2] The smoking problems of Spain and Greece are very similar since both populations adhere to the classical Mediterranean libertarian ideas of free will and choice of lifestyle. There is thus an inherent loath to comply with any laws that restrict personal freedom. The extent of this problem was depicted in a pan-European health survey that assessed the newly introduced European guidelines on enforced labelling of health warnings on cigarette packages. Remarkably, the Greek male population was the only one in the European Union to regard the warnings as annoying, pointless, and invasive.3 Together with Spanish men, they were the only participants in the study to actually question the role of on-pack labelling. Just as is common in Spain, most of the bars, cafes, and restaurants in Greece use outdoor areas most of the year, taking advantage of the mild Mediterranean climate. Outdoor areas make the enforcement of tobacco smoking laws very difficult since, and as stated in Loewenburg's report, laws banning tobacco smoking are only applicable in indoor areas. This therefore excludes the larger areas in most venues, since most need only a small indoor area for their clientele in winter. Although Greece has enforced a ban on the advertising of tobacco products and sponsorship by tobacco companies, the law is inadequate because it excludes poster and billboard advertising. The recent law banning smoking in the workplace is equivocal since it implies that smoking at work is at the discretion of the employer. Further, since a large percentage of adults are smokers, there is a certain degree of solidarity between them to ignore pressure to refrain from smoking. Politicians in Greece have often turned a blind eye to the smoking problem. Suggestions to sue tobacco companies have been ignored because taxes on tobacco products are an immediate source of

revenue for the Ministry of Health. It is worth noting that, when a past Health Minister, S Doxiadis, took the matter seriously and implemented a nationwide antismoking campaign in 1978, the result was a reduction in the annual increase in tobacco consumption in Greece[3] to nearly 0%. Since then all efforts have been quite fruitless. Therefore, if Spain and Greece wish to ban or seriously restrict smoking in public venues, it is imperative that all the loopholes in the existing laws are expunged. Sadly, lobbying against tobacco companies in Greece resembles mortals battling the demigods of Greek mythology.

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Σύντομη Ελληνική Περιγραφή:

Το άρθρο αυτό δίνει για πρώτη φορά στην Ελλάδα, τα επίπεδα ορρού στους βιολογικούς δείκτες κοτινίνης και νικοτίνης σε παιδιά προσχολικής ηλικίας. Το δείγμα αποτέλεσαν παιδιά δημόσιων νηπιαγωγείων του Νομού Χανίων. Βρέθηκαν πολύ υψηλές συγκεντρώσεις κοτινίνης (ο οποίος είναι μεταβολίτης της νικοτίνης στον οργανισμό) σε παιδιά με γονείς καπνιστές αλλά ακόμα και σε παιδιά με γονείς μη καπνιστές, προφανώς εξαιτίας άλλου μέλους του σπιτιού που να καπνίζει μπροστά στο παιδί. Το παρόν άρθρο έχει παρουσιαστεί εν μέρει στο 44^{ο} Πανελλήνιο Συνέδριο Παιδιατρικής (στην Ρόδο τον Ιούνιο του 2006), στο 18^{ο} Πανελλήνιο Συνέδριο Κοινωνικής Παιδιατρικής και Προαγωγής Υγείας (Ηράκλειο Σεπτέμβριος 2006), καθώς επίσης και στην τοπική εφημερίδα «η Πατρίδα» αλλά και στην Κυριακάτικη έκδοση του «Βήμα».

►BIOMARKERS OF PASSIVE SMOKING AMONG GREEK PRESCHOOL CHILDREN

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ABSTRACT

Greece has the highest adult smoking prevalence in the European Union, affecting not only those who smoke but also threatening the health of those who are involuntarily exposed to passive smoke, especially young Greek children. The aim of this study was to quantify passive smoking biomarkers (serum nicotine and cotinine levels) among preschool children in Crete in relation to parental smoking habits. For the above purpose all children enrolled in kindergarten in western Crete (1757 preschool children and 2809 parents), were interviewed during the 2004 - 2005 Cretan health promotion programme out of which a sample of 81 children was randomly selected according to parental smoking status and blood samples for cotinine and nicotine assay were taken.

The geometric means of serum nicotine values in children with both parents current smokers and in those with both parents non-smokers were 0.71ng/ml (95%CI 0.62, 0.80) and 0.59 ng/ml (95%CI 0.49, 0.69), respectively, (p=0.073). Cotinine geometric mean values were found at 1.69 ng/ml (95%CI 0.93, 3.06) and 0.15 ng/ml (95%CI 0.09, 0.28), respectively, (p<0.001). Girls with smoker parents had also greater cotinine geometric mean values than boys (3.35 versus 0.85 ng/ml, respectively, p=0.018). Our findings prove that Greek preschool children, especially young girls are exposed to substantial levels of passive smoke which therefore stresses the need for immediate action so as to prevent the predisposition and early addiction of Greek preschool children to tobacco.

Keywords: Nicotine, Cotinine, Preschool children, Environmental Tobacco Smoke, passive smoking, Greece

Abbreviations ETS: environmental tobacco smoke; CI: confidence interval

MAIN TEXT

INTRODUCTION

Exposure to environmental tobacco smoke (ETS) is a serious public health hazard. It has been estimated that at least 1000 million adults are smokers worldwide and that at least 700 million children breathe air polluted by tobacco smoke at home [28]. ETS itself comprises sidestream smoke emitted from the smoldering tobacco between puffs and exhaled mainstream smoke from the smoker, both sidestream and mainstream smoke affects not only tobacco users but also passively affects other people who share their close environment. Children's exposure to ETS is usually involuntary, arising from smoking, mainly by adults, in the places where children live, and play. It already has been shown in numerous studies that exposure to ETS during childhood can lead to serious health problems, and possibly predisposes children to adult noncommunicable diseases such as cardiovascular disease and cancer [12,18]. There is growing evidence that children are more susceptible to genetic damage than adults [17] and it has been shown that exposure to ETS does cause molecular and genetic damage even in low doses [23]. Children, due to higher ventilation rates, inhale elevated levels of ETS for the same level of exposure and it has been proven that passive smoking in children diminishes pulmonary function, increases the risk of lower respiratory tract illness, exacerbates asthma and possibly even leads to an increased risk for asthma [5]. Even though further studies are needed to confirm the relation between exposure to ETS and neurological disorders, passive smoking has been shown to affect cognitive abilities in children, even at extremely low levels, therefore stressing the need to prevent childhood exposure to ETS to avert the social and economical consequences of learning disabilities [21,29].

The major metabolite of nicotine in the human body is cotinine and is generally used to estimate the degree of exposure to ETS [4]. Cotinine can be found

in blood, saliva, urine, hair and semen [11,16]. In young children the preferable method for analyzing cotinine levels is by extraction from urine or saliva, as serum measurements are not often taken due to the necessity of drawing a blood sample.

The purpose of this study was to evaluate serum cotinine and nicotine levels of 81 preschool children from Crete, Greece so as to quantify their exposure to ETS while taking into account parental smoking status and tobacco consumption.

MATERIALS AND METHODS

Field study

The study was conducted during 2004 - 2005 in preschools of the prefecture of Chania in Crete (Chania has a population of 150.000, which represent 25% of the population of Crete) as part of an educational health intervention programme planned to commence when the preschool children entered primary education. The measurements taken in this study were obtained during the children's baseline examinations, so as to evaluate the nutritional, growth and health level of all preschoolers before entering the programme.

From a total of 121 preschools 118 participated in the study. Out of the other three, two did not operate that academic year and one was excluded due to its topographical inaccessibility and small number of children. A total of 2630 children were listed in preschools, 77% of whom accepted to participate (1988 children). Finally, 1757 children were examined, their ages ranging between 4 and 7 years of whom 50.7% were boys and 49.3% were girls.

The examinations took place at the children's schools after the parents were informed and had given written consent. The Greek Ministry of Education and the University of Crete's Ethics Research Council approved the study. The Prefecture and Municipality of Chania funded the research.

The health habits of 1420 families were recorded using the questionnaire designed by Mammas et al. 2003 [13]. Out of the 1420 families 17 were single parented so that 1398 fathers and 1411 mothers were interviewed (2809 adults in total).

Based on the smoking habits of both parents, the place of residence and the sex of the children, we randomly selected 84 children with ages between 5 and 7 years that constituted 20% of the population. From these children we took blood samples for serum cotinine and nicotine analysis. A total of 42 children were selected with the criterion that both parents smoked (198 families) and 42 with the criterion that both parents were non smokers (269 families). Finally, due to an inadequate amount of blood in 3 samples, a total of 81 children were analyzed for their serum nicotine and cotinine levels.

Serum blood samples were taken from the children after a fast of 12 hours by an experienced pediatrician. The samples were stored in a portable fridge and taken to the laboratory of Toxicology and Criminal Chemistry, of the University of Crete for analysis.

Standards and reagents

Samples of (-)-nicotine were obtained from Sigma (Sigma-Aldrich CO. P.O. Box 14508 St. Louis MO, USA). Ammonia 25%, isoamylalcohol, dichloromethane and buffer solution ready for use with pH 6.88 were obtained from Merck (Merck, D-6100 Darmstadt, F.R. Germany). The SPE columns (C18, 200 mg), were provided by RIGAS LABS, 5 Salaminos Str., Thessaloniki, Greece. Isopropanol and methanol (analytical grade) were obtained from Labscan (Labscan Limited, Unit T26, Stillorgan Industrial Park, CO. Dublin, Ireland) and Scharlau (Scharlau Hemie S.A. La Jota, 86 08016, Barcelona, Spain), respectively.

Sample preparation

An aliquot (1 ml) of each serum sample was mixed with 1 ml of buffer solution pH 6.88, respectively. The SPE columns were preconditioned with 2 ml of methanol and 2 ml of buffer pH 6.88. The mixture of biological sample and buffer spiked with ketamine (IS) (12.5 μg/ml) was passed through the conditioned SPE columns at a flow rate of 1 ml/min by applying a vacuum. The columns were rinsed with 2 ml HPLC water and dried under full vacuum for 5 min. The analytes were eluted with 2 ml dichloromethane-isopropanol-isoamyalcohol-ammonia (96/2/2/0.4 % v/v). The organic phase was dried under stream of N_2 and reconstituted in 50 μl of methanol.

Apparatus

Electron ionization mass spectrometric confirmatory analysis was performed on a Finnigan Mat GCQ_{TM} system equipped with an HP-5MSI (30m x 0.25mm ID x 0.25μm) capillary column (J&W Scientific). Pure helium (99.999%) was used as a carrier gas with a velocity of 20 cm/sec. Two micro litres of each sample were injected into the system in the splitless mode. Analysis conditions were as follows: The column temperature programme started from 90°C for 1 minute and was raised to 280°C at the rate of 20°C/min. The injector temperature was 280°C. The transfer line temperature was set at 300°C. The mass spectrometer acquisition parameters were: Ion source 200°C, electron impact ionization 70 eV and electron multiplier voltage of 1200 V. The mass spectrometer was operated at the selected ion-monitoring mode and was programmed for the detection of m/z = 84 for nicotine, m/z = 98, 175 for cotinine and m/z = 180, 209 for ketamine. Under these conditions nicotine eluted at 6.16 min, cotinine at 9.01 min and ketanine at 10.15 min.

Preparation of standard curves

Stock solution containing nicotine and cotinine were prepared in methanol at a concentration of 100 μg/ml and stored at 4°C. Seven diluted solutions were prepared and used for the preparation of the fortified standards.

Quantification of biological extracts

Biological samples (blood) were collected from non-smoker donors. A 7-point standard curve was prepared daily from the standard solutions. The concentrations of serum fortified standards were 0, 0.6, 1.25, 2.5, 5.0, 10.0, 20.0 ng/ml. The nicotine curve was linear $y = 0.0005x - 5.10^{-5}$, with an $R^2=0.9987$ while for cotinine it varied linearly as $y = 0.0001x - 1.10^{-5}$, with an $R^2=0.9979$

Statistical analysis

Descriptive measurements were used to define the characteristics of children in the study. Due to the abnormal distribution of nicotine and cotinine values, their $\log_{10}$ transformed values were estimated, giving geometrical means and 95% Confidence Intervals. Student t test method (equal variances assumed) was used comparing values between the groups. The statistical analysis was accomplished using SPSS 13.0.

RESULTS

All of the children of our sample, which is representative of preschool children in Crete and possibly Greece, have detectable levels of cotinine and nicotine in their blood, thus reflecting exposure to ETS. As shown in **Table 1,** the serum nicotine and cotinine values in children with smoker parents ranged between 0.28 and 2.10 ng/ml and from 0.0 to 12.0 ng/ml, respectively. In children with non-smoker parents serum

nicotine and cotinine levels ranged between 0.15 and 1.35 ng/ml and from 0.0 to 3.86 ng/ml, respectively. Independent cotinine measurements are shown in **Figures 1** and **2**. Such levels indicate the exposure to ETS not only from houses in which both parents smoke but also in non-smoking households. As shown in **Table 2,** the children with smoker parents, in relation to children with non smoking parents, had greater nicotine values (geometric means: 0.71 versus 0.59 ng/ml, respectively, p=0.073) and statistically significant greater cotinine values (1.69 versus 0.15 ng/ml, respectively, p<0.001).

It is interesting that higher cotinine levels were detected in female rather than in male children **(Table 3)** (geometric means: 3.35 versus 0.85 ng/ml, respectively, p=0.018). It is possible that girls spend more time indoors and closer to their parents than boys do at that age who spend a substantial time of the day on outdoor activities, therefore exposure to ETS was lower than that amongst females.

DISCUSSION

Preschool children in Crete and possibly in the rest of Greece are exposed to ETS. Greece has the highest smoking prevalence in Europe [9] and its smoking problem has been assessed already and discussed [25-26]. When taking into account Greece's adult smoking prevalence one can estimate the number of Greek children involuntarily exposed to ETS. Only one in three households in our sample was found to have non-smoking parents and so do not expose their children to smoke (data not presented). We expect that the actual percentage of tobacco-smoke free households is even lower due to the fact that other members of the extended family who live or spend time in the house may also be smokers and so expose the children involuntarily to ETS.

Although cotinine levels have been evaluated in young children by a number of authors [2,6,7,8,14,15,20] to our knowledge there are insufficient data regarding serum cotinine levels, especially in Greek children who are heavily exposed to ETS.

Bakoula et al. 1997 [2] presented a relevant study of passive smoking among Greek children, including a large number of children up to 14 years of age, but related only to urinary cotinine levels. When their urine cotinine measurements are transformed to serum nicotine levels using the Rosetta stone equations for the transformation of secondhand smoke exposure between biological markers, as shown by Repace et al. [19], our results of ETS exposure are similar to those presented by Bakoula et al. and quantify ETS exposure among Greek preschool children.

Nicotine is not only found in tobacco, but also in small amounts from dietary sources such as peppers, aubergines and potato skins, although it has been noted that the dietary nicotine intake is minute compared to the intake from tobacco smoke [10]. It is possible that elevated cotinine levels in children without household exposure might also be due to the effect of ETS as an urban toxicant [27], even though elevated cotinine concentrations found in children whose parents do not smoke are most likely due to smoking from other family members or friends for whom we were not able to determine the tobacco consumption.

Public education, community programmes as well as legal and regulatory measures have been used to curb tobacco consumption in public places, but the reduction and even the banning of tobacco consumption in the home, although shown to reduce cotinine levels in children [22] is not easily regulated. The home is often the most important site for ETS exposure among children, since many people are against external interference, even though this is not in agreement with laws and regulations designed to protect children from abuse [1].

Although our study proves that Greek children are substantially exposed to ETS and gives, for the first time, quantification of passive smoking serum biomarkers among Greek children, its weakness is the relatively small number of children selected for cotinine and nicotine assay compared to the large number in the original survey. Also we were not able to measure ETS exposure in the home from other household members or visitors, and whether or not the parents take any precautions to protect

their offspring from inhaling their smoke (i.e. smoking outdoors). Futher studies are needed to calculate such parameters.

CONCLUSIONS

Maternal smoking is typically the largest source of a child's exposure to tobacco pollutants because of the cumulative effects of exposure in utero and close proximity to the mother during early life. As children grow older, the relative contribution of other exposure sources, including smoking in public places, increases. Our study notes the extent of passive smoking among Greek preschoolers and stresses the need for action to be taken to protect young children from involuntary passive smoking. Research has shown that passive smoking among children, and the associated cotinine levels, is an independent predictor of teenage smoking [3]. Since Greece has the highest smoking prevalence in Europe, it is possible that it arises from elevated cotinine levels and hence childhood addiction to ETS. Our findings emphasize the need for immediate action to prevent the addiction of new generations to such a lethal habit.

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TABLES

Table 1. Descriptive characteristics of serum nicotine and cotinine levels in children in relation to parental smoking.

		Smoker Parents		Non Smoker Parents	
		Boys	**Girls**	**Boys**	**Girls**
Nicotine (ng/ml)	N	21	21	21	18
	Mean (SD)	0.81 (0.44)	0.74 (0.24)	0.65 (0.29)	0.68 (0.32)
	Median	0.64	0.75	0.61	0.69
	Minimum	0.28	0.31	0.15	0.25
	Maximum	2.10	1.28	1.21	1.35
Cotinine (ng/ml)	N	21	21	21	18
	Mean (SD)	2.82 (2.58)	4.32 (3.19)	0.55 (1.06)	0.42 (0.46)
	Median	1.91	3.61	0.26	0.37
	Minimum	0.00	0.54	0.00	0.00
	Maximum	7.94	12.00	3.86	1.84

SD: standard deviation

Table 2. Serum nicotine and cotinine levels in children in relation to number of parental cigarettes smoked per day.

		Nicotine (ng/ml)	Cotinine (ng/ml)
Children's parents:	**n**	**Geometric Mean (95% CI)**	
Smokers	42	0.71 (0.62-0.80)	1.69 (0.93-3.06)
<40 cigarettes/day (median) for both parents	20	0.68 (0.60-0.76)	2.28 (1.15-4.54)
≥40 cigarettes/day	22	0.74 (0.59-0.93)	1.28 (0.48-3.45)
Non Smokers	39	0.59 (0.49-0.69)	0.15 (0.09-0.28)
p-value		0.073	**<0.001**

Student t test (equal variances assumed)

Table 3. Serum nicotine and cotinine levels in relation to sex of child.

Children's parents:	sex	Nicotine (ng/ml)			Cotinine (ng/ml)		
		N	Geometric Mean (95% CI)	p-value	N	Geometric Mean (95% CI)	p-value
Smokers	Boys	21	0.72 (0.58-0.89)	0.791	21	0.85 (0.28-2.56)	**0.018**
	Girls	21	0.70 (0.59-0.81)		21	3.35 (2.38-4.72)	
Non Smokers	Boys	21	0.57 (0.44-0.73)	0.690	21	0.14 (0.06-0.33)	0.689
	Girls	18	0.61 (0.47-0.78)		18	0.18 (0.07-0.42)	

Student t test (equal variances assumed)

FIGURES

Figure 1. Serum nicotine levels in preschool children with both parents that smoke and those that both do not.

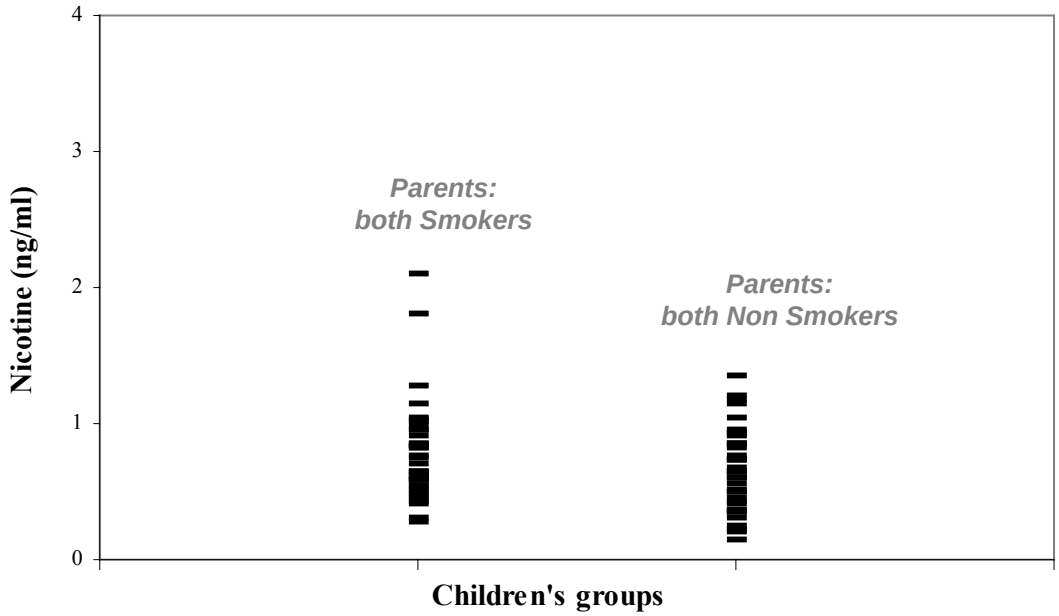
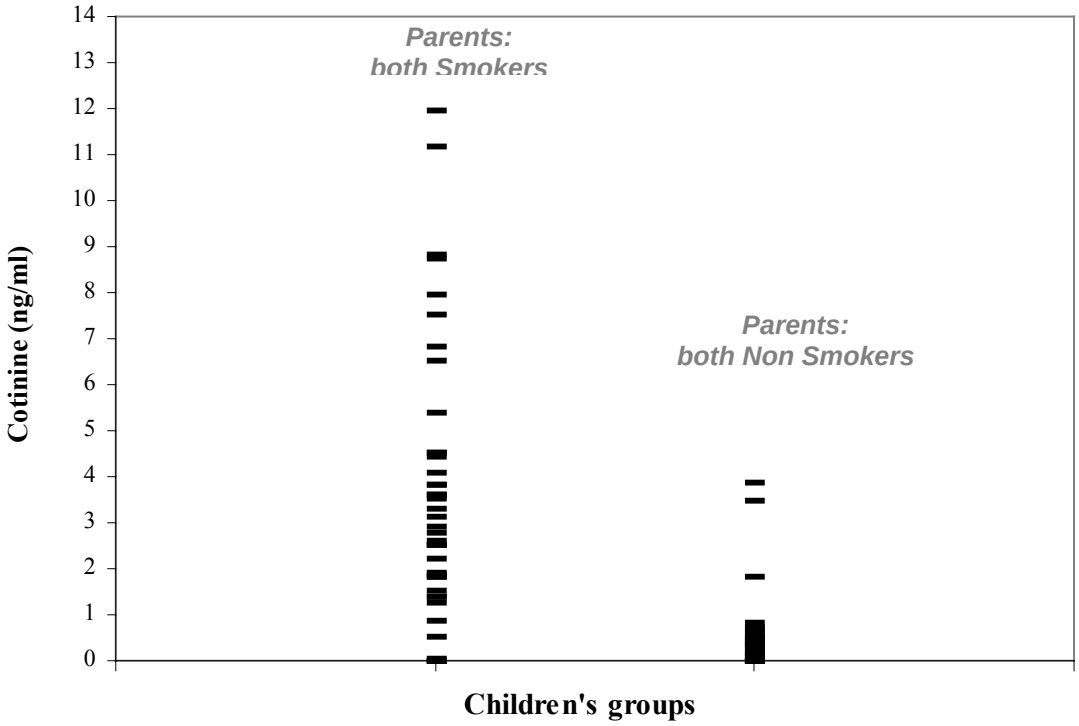


Figure 2. Serum cotinine levels in preschool children with both parents that smoke and those that both do not.



3. ΑΝΑΣΚΟΠΗΣΗ ΤΟΥ ΕΠΙΠΟΛΑΣΜΟΥ ΚΑΙ ΤΗΣ ΠΟΛΙΤΙΚΗΣ ΤΟΥ ΚΑΠΝΙΣΜΑΤΟΣ ΣΤΗΝ ΕΛΛΑΔΑ

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Vardavas C.I, Kafatos A. "Tobacco policy and smoking prevalence in Greece" ***European Journal of Public Health*** (In press) December 2006

Σύντομη Ελληνική Περιγραφή:

Το άρθρο αυτό συλλέγει όλα τα στοιχεία που έχουν δημοσιευτεί την τελευταία χρόνια στην βάση δεδομένων ΙΑΤΡΟΤΕΚ στην Ελλάδα και στο PUBMED στο εξωτερικό πάνω στο θέμα επιπολασμό καπνίσματος στην Ελλάδα. Επίσης έχοντας πραγματοποιήσει συζητήσεις με συνεργάτες στην Ελλάδα καθώς και με στελέχους του Υπουργείο Υγείας καταγράφθηκε η παρούσα πολιτική και νομοθεσία γύρω από το κάπνισμα στην Ελλάδα. Δυστυχώς και ο επιπολασμός καπνίσματος είναι υψηλός, ιδιαίτερα στους νέους, και η υπάρχουσα πολιτική είναι ανεπαρκής. Το παρών άρθρο επίσης δίνει την δυνατότητα στο διεθνές επιστημονικό κοινό να ενημερωθεί για το περιεχόμενο σχετικών δημοσιεύσεων στα Ελληνικά επιστημονικά περιοδικά. Παρουσιάστηκε στο διεθνές 4th Annual Conference of the International Society for the Prevention of Tobacco Induced Diseases (Αθήνα, 2005)

►SMOKING POLICY AND PREVALENCE IN GREECE: AN OVERVIEW

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ABSTRACT

Background: Smoking is one of the largest public heath problems and a cause of major concern not only among European members such as Greece, but also worldwide. Greece over the past years has been suffering from a smoking epidemic with dramatic consequences on the economy and the cost of health services. Therefore, the purpose of this study is to describe the extent of tobacco usage, the methods used to control tobacco consumption and the main reasons of anti-tobacco legislation failure over the past decades in Greece.

Methods: Data was collected from the international Pubmed database and from the Greek database, Iatrotek during January 2006. The current tobacco legislation was discussed with other counterparts in Greece and was re-checked with the Greek ministry of Health and Social Welfare.

Results: Currently Greece has the highest smoking prevalence not only among members of the European Union but also among all members of the OECD. Recent epidemiological studies estimate that 40% of the adult population are daily smokers, with one in two adolescents in certain areas also current smokers. Although anti-smoking policies do exist, and have been enforced over the years, many factors have contributed to their failure with a pro-tobacco culture and an increasing number of adolescent smokers exacerbating the problem.

Conclusions: It is obvious that the strict enforcement of a nationwide anti-tobacco policy must be a priority on the national health agenda, if we are to ever effectively combat the high prevalence of smoking in Greece.

Keywords: tobacco**,** smoking**,** tobacco policy, smoking prevalence, Greece

MAIN TEXT

INTRODUCTION

Smoking is one of the largest public heath problems and a cause of major concern not only among European members such as Greece, but also worldwide. Although Greece is suffering from a smoking epidemic, there is insufficient international scientific literature on the health hazard that affects dramatically the economy and welfare of the Greek population. Therefore, the purpose of this study is to describe the extent of tobacco usage, the methods used to control tobacco consumption and the main reasons of anti-tobacco legislation failure over the past decades in Greece.

METHODS

Data was collected from the international Pubmed database and from the Greek database, Iatrotek during January 2006. Only population based epidemiological studies were included. Iatrotek articles are written in Greek (with an English abstract) and are not easily available to researchers in other countries, resulting in the fact that their findings on smoking prevalence in Greece are most often left out of international literature. The current tobacco legislation was discussed with other counterparts in Greece and was rechecked by visiting the web page of the Greek ministry of Health and Social Welfare[1].

RESULTS

Greece has one of the highest percentages in adult tobacco use worldwide, and the highest adult percentage of current tobacco use among OECD countries[2]. Recent epidemiological studies estimate different prevalences, according to the age group and place of residence. City areas, such as Athens, have higher smoking rates among men and women (51% of men and 39% of women[3]) than rural areas. The

difference is more noticeable between Greek women. Those of higher socio-economic position are more likely to smoke than the less educated or those of lower income[4]. Women in rural areas also smoke less, possibly due to the existing traditional culture that regards female smoking a taboo.

Adolescents in Greece have a major smoking problem. According to recent studies on the usage of tobacco among high school students, smoking prevalence ranged from 10 – 32% for 15 year olds (again depending on the location)[4,5], to a maximum of 50% in 16-19 year olds[6]. Smoking prevalence among university students ranged between 28-30% for medical students[7,8] to 42-44% for other university students[9]. An alarming factor is the similar smoking habits between male and females[10], especially in the age group of 16-24. A summary of all relevant publications in Pubmed and the Greek medical database IATROTEK published between 2000-2005 on smoking prevalence among in Greece is shown in **Table 1.**

Regarding adolescent tobacco use, no nation-wide smoking research has been done and there are no data that is representative of the entire Greek population. Only separate studies exist for different locations and since demographically the population is spread out with a substantial percentage living on the islands or in rural areas, adolescent smoking prevalence most likely differs within the population.

Passive smoking and the effects of environmental tobacco smoke also affect the total population, but Greek children and adolescents are the most vulnerable; it is likely that they are already predisposed to start smoking, not only from growing up with the familiarity of cigarettes but also due to environmental tobacco smoke addiction, which has been suggested as being an independent predictor of adolescent smoking[13].

DISCUSSION

The price of tobacco products is one of the main causes of the problem. Tobacco products, mainly cigarettes, are still relatively cheap compared to the price of cigarettes in other country members of the European Union[14] and therefore easily accessible to adolescents, even those with limited spending power. Suggestions have been to enforce higher taxes and to raise the price on tobacco products. Such actions would probably lead, as shown in other countries, to a decrease in tobacco consumption and to an increase in the population's health status[15]. On the other hand, since Greece has been classified as a medium tobacco smuggling country[16] (with a contraband market share of 8%) and keeping in mind its geographical location and large number of islands one can deduce that efforts to raise prices and taxes would possibly be counterbalanced by an increase in tobacco smuggling.

Taking into account the low price of cigarettes and the non-existence of any law forbidding the sale of tobacco products to minors, children are susceptible to tobacco advertising and are targeted by tobacco companies. Anti-tobacco education is not incorporated into the school curriculum and although school smoking prevention legislation does exist it is not always enforced, since smoking by students and teachers in school grounds does take place, thus demonstrating the inadequate enforcement of such legislation.

Many factors are responsible for Greece's current anti-tobacco policy failure[17]. Smoking is a socially accepted habit and is embraced by a large part of the culture in which tolerance and freewill play and important role. Greece is also a tobacco producing country where the agricultural produce in some regions is largely tobacco thus creating a pro tobacco norm. As shown above, with such a high smoking prevalence and with a culture and economy that supports in certain areas tobacco use, there is insufficient basis for the efficient implementation of anti-smoking campaigns. During 1978-1980, Greece attempted and for a limited time efficiently conducted its only ever nationwide anti-smoking campaign. The national ban on

tobacco advertising on broadcasting media enforced in 1979 gave rather unimpressive results. However, when the campaign became rather aggressive with repeated anti-smoking messages and the circulation of posters and booklets the annual increase in tobacco consumption dropped to nearly 0%. When the campaign stopped two years later tobacco consumption returned to prior rates[18].

Television and radio advertisements of tobacco products have been banned since then but only recently (August, 2005) did Greece comply with the European directive 2003/3/EC on the advertising and sponsorship of tobacco products, forbidding their free distribution, promotion, sponsorship or advertising. The newly passed Greek law forbids advertisement of such products in magazines and the press but allows tobacco companies to freely advertise using posters and billboards.

Introducing tobacco-free zones in public transport and in the private and public workplace and creating smoking cessation clinics have been at the forefront of suggested measures by many ministries. Although some measures have been brought into action, most ministries seem afraid to face the tobacco companies' pressure and keep such ideas on the drawing board. As for laws on tobacco control, many loopholes exist; for example, a ban on smoking in the private-sector workplace although passed by law, depends on the employer who has the final decision whether or not smoking is to be permitted in the workplace. In certain cases smokers, especially in the public-sector workplace, bluntly ignore such rules since most directing bodies turn a blind eye, or do not risk confronting smokers over such matters.

Greece complied with the EU Directive on Tobacco Product Regulation (EU Directive 2001/37/EC) and introduced large warning labels on tobacco-product packages and although generally they were thought to have produced some positive results, they do not always and in particular they do not seem to affect Greek male smokers who regard the labelling as pointless and invasive[11]. European guidelines do exist for adopting colour photographs and illustrations as health warnings on tobacco

packages (EU Directive 2001/37/EC), a method that could be introduced in Greece. Such labels expose current (and / or candidate) smokers many times daily to a tobacco control intervention measure every time they reach for the packet[19]. The effects though of such graphic labels on smoking habits are controversial. Although they are said to reduce tobacco consumption and increase the tendency to quit, they can also induce defensive reactions in smokers, who in turn might tend to get rid of the fear or disgust instead of facing the threat itself[20,21]. The public health benefits of such an intervention though would outweigh any negative reactions by some Greek adults and adolescents. A pilot study to observe the possible reactions and asses the results of graphic labels on tobacco products would be valuable.

Obviously, since Greece's smoking epidemic mostly seems to affect adolescents and students, (male and female) one can see the need for anti-tobacco intervention programs aimed at the younger people. High smoking rates in those populations will inevitably lead to higher adult smoking rates in the future, continuing the tobacco epidemic. School based health intervention programs have been implemented in certain areas in Greece leading to a decrease in smoking among children in the targeted group, even though, and as stated in numerous reviews, there are relatively no long-term effects from such intervention programs on their own[5,7,22]. Combinations of social influence interventions and school based interventions have never been enforced but would probably produce more positive results, even though the population's pro tobacco norm might make the implementation of such measures difficult. A national anti-smoking movement, such as the one mentioned above, in combination with continuous school and socially based intervention programmes would probably give the best results, since it has been shown to be effective on the Greek population in the past.

In summary, tobacco policies that exist in Greece have been ineffective in combating a habit that affects so widely the population. Since tobacco related diseases have a high health and economical cost, it is obvious that the strict

enforcement of a nationwide anti-tobacco policy must be a priority on the national health agenda, if we are to ever effectively combat the high prevalence of smoking in Greece.

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Conflicts of interest: None declared

Key points:

Recent smoking prevalence data as reviewed in this paper:

- States the extent of Greece's smoking problem.
- Questions the effectiveness of existing anti-tobacco regulations.
- Stresses the need for more effective nation wide actions to be taken.

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TABLES

Table 1. Studies on smoking prevalence in Greece (Published 2000-2005*)*

Year[i]	Study[ii]	Where	Population	Age group	Smoking prevalence			Authors
					Male	Female	General	
2005	Adults	Greece[iii]	5489	25-59	57%	23%	40%	Huisman et al[10]
2005	High School students	Athens	909	16-19	-	-	50.2%	Labiris et al.[6]
2005	High School students	Northern Greek cities	9276	15-18	32.6%	26.7%	30%	Sichletidis L et al.[11]
2003	Medical Students	Crete	865	20-24	33.2%	28.4%	-	Mammas et al.[7]
2003	Medical Students	Athens	430	-	-	-	28%	Avlonitou et al.[8]
2003	Adults	Athens	3042	18-89	51%	39%	-	Pitsavos et al.[2]
2003	Adults	Crete	1192	18+	55%	38%	-	Linardakis et al.[4]
	Children	Crete	634	15	-	-	10%	
2002	University Students (Non health studies)	Ioaninna, - Athens	794	17-30	44%	42.5%	-	Steptoe et al.[9]
2000	High School students	Athens, Thessaloniki	8557	13-14	-	-	16.2%	Kokkevi et al.[5]
				15-16	-	-	32.1%	
				17-18	-	-	40.1%	

i Year published
ii Only population based epidemiological studies included found in Pubmed and the Greek medical database Iatrotek were included.
iii Based on the European Community Household Panel Survey

4. ΕΠΙΠΕΔΑ ΠΑΘΗΤΙΚΟΥ ΚΑΠΝΙΣΜΑΤΟΣ ΣΕ ΑΥΤΟΚΙΝΗΤΑ

Δημοσιεύτηκε στο διεθνές επιστημονικό περιοδικό ***Tobacco Control*** (2005 I.F: 2,415) με την μορφή original research letter, λόγω έλλειψης χώρου στο περιοδικό.

Vardavas C.I, Linardakis M, Kafatos A "Environmental Tobacco Smoke exposure in motor vehicles" ***Tobacco control*** 2006

Σύντομη Ελληνική Περιγραφή:

Είναι η πρώτη φορά παγκοσμίως που μετράται η έκθεση στο παθητικό κάπνισμα σε αυτοκίνητο, για τον ακριβή υπολογισμό των σωματιδίων PM 2.5μm που εκλύονται από το τσιγάρο κατά την καύση του στην καμπίνα των επιβατών. Υπό ορισμένες περιπτώσεις τα επίπεδα PM 2.5μm υπερβαίνουν και τις 112 φορές τα επίπεδα σε κέντρα διασκέδασης και καφετέριες στην Ελλάδα. Το μέγεθος του αυτοκινήτου, η ταχύτητα κίνησης καθώς και η ύπαρξη ανοιχτών ή κλειστών παραθύρων επηρεάζουν και την συγκέντρωση των σωματιδίων PM 2.5μm. Δεδομένου ότι το αυτοκίνητο αποτελεί το μέσο μεταφοράς εκατομμυρίων ατόμων σε όλο τον πλανήτη μπορεί κανείς να φανταστεί πόσο σημαντική απειλή αποτελεί το παθητικό κάπνισμα στο αυτοκίνητο για την δημόσια υγεία.

►ENVIRONMENTAL TOBACCO SMOKE EXPOSURE IN MOTOR VEHICLES

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Keywords: secondhand smoke exposure, environmental tobacco smoke, motor vehicle,RSP

ABSTRACT

Objectives - Measurements of fine Respiratory Particles ($RSP_{2.5}$) taken to assess average secondhand smoke exposure of vehicle passengers.

Methods – Experimental measurements of fine Respiratory Particles ($RSP_{2.5}$) were taken in three different vehicles, with different variables such as baseline pollution and air circulation taken into consideration so as to simulate average secondhand smoke exposure of vehicle passengers.

Results - High concentrations of $RSP_{2.5}$ particles were found, in all of the three types of motor vehicle considered, when a passenger smokes. Depending on the size of the vehicle cabin volume and air circulation, mean levels of $RSP_{2.5}$ particles ranged between 1.33 ($\pm$0.76) mg/m^3 and 12.77 ($\pm$7.53) mg/m^3, these correspond to levels 11 to 112 times higher than the mean $RSP_{2.5}$ levels found in the smoking areas of bars and pubs in the UK. Allowing air to circulate by keeping a window half or fully open resulted in lower SHS exposure than when all windows were kept closed ($p<0.001$).

Conclusions – Motor vehicles are potentially a major source of high exposure to ETS. Due to their global use and the high worldwide smoking prevalence, passive smoking by motor vehicle passengers is a major public health threat. Our study stresses the immediate need for measures to be taken to protect motor vehicle passengers, especially children, from high exposure to SHS

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MAIN TEXT

INTRODUCTION

Tobacco is the largest cause of preventable death worldwide, not only affecting those who smoke but also those who are exposed voluntarily or involuntarily to secondhand smoke. Environmental tobacco smoke (ETS) contains over 3000 chemicals out of which at least 50 are known or suspected to be human carcinogens, whilst over 200 are regarded as poisonous.[1-2] ETS itself comprises mainstream smoke, which is exhaled by the smoker, and sidestream smoke that is released from the smoldering cigarette. Sidestream smoke not only represents the major source of ETS but also contains much higher concentrations of chemical carcinogens, such as benzene, N-nitrosamines and aniline compared to mainstream smoke and is therefore more toxic.[3-4] Passive smoking affects people of all ages but it is estimated that over 700 million children, breathe air polluted by ETS.[5] Exposure to secondhand smoke often occurs in the workplace, at home, in hospitality venues and also in private motor vehicles. Since it is estimated that global smoking prevalence is approximately at 29% (an equivalent of 1.3 billion smokers) one can deduce that passive smoking affects almost everyone worldwide.[6]

Although passive smoking in private and public workplaces, hospitality venues, casinos, airplanes, airports and homes has been extensively researched, to our knowledge there are insufficient data published on motor vehicle secondhand smoke levels. Therefore, the purpose of this study was to measure SHS exposure (sidestream) in different size vehicles when one passenger in the vehicle smokes.

METHODS

Measurements of airborne Respiratory Particles under 2.5 μm in diameter were taken using the TSI SidePak AM510 Personal Air Monitor, which uses a built-in sampling pump to draw air (calibrated to a known flow rate) through the device where

the particulate matter in the air scatters the light from a laser. The Air Monitor is fitted with a 2.5μm impactor in order to measure the concentration of airborne matter with a diameter less than 2.5μm. Particles of this size are not specific to tobacco smoke, since background levels arising from cooking or vehicle fumes are also of that size, but high levels of such particles can be attributed almost solely to ETS and are used to measure it.[7-8]

Baseline measurements were first taken inside and outside the car before the smoking tests were performed in order to eliminate possible detection of other $RSP_{2.5}$ particles other than ETS). To eliminate background environmental pollution, all measurements took place in rural areas with low baseline $RSP_{2.5}$ measurements (baseline measurements = 0.013 mg/m^3. During the measurements, the inlet of the machine was placed at the base of the front seat passenger's headrest approximately 0.7m above the seat.

Real-time measurements were taken and automatically stored on the monitor every 10 seconds representing the average measurements of the 10-second intervals. Mainstream smoke was not evaluated, as sidestream smoke is more toxic and more abundant in ETS. In each test a cigarette was left to burn inside the vehicle until its extinguishment, usually between ten and twenty minutes, depending on air circulation. The first test measured $RSP_{2.5}$ levels with all windows closed, so as to simulate driving in cold and/or rainy weather. The second and third tests measured $RSP_{2.5}$ levels with the driver's window half open and fully open, respectively. In all cases all other windows were closed, outdoor wind was not noticeable and the heating/air-conditioning fan was turned off. Weather conditions were similar during all tests.

Three different vehicles were selected, based on the interior passenger cabin size. One large five-door station wagon, one three-door small city car and one two-door open pick-up vehicle were selected to cover three different size ranges. Their passenger cabin volume (PCV) was estimated approximately to be $3m^3$, $2.5m^3$ and

1.4m^3, respectively. The majority of vehicles commonly used have passenger cabin sizes that range between these values.

For the statistical analysis, non-parametric methods of Kruskal-Wallis and Mann-Whithey, were used to estimate the differences in values of the Respiratory Particles, in relation to the window condition. Analysis was performed using SPSS 13.0

RESULTS – DISCUSSION

SHS exposure varies according to the vehicles interior PCV and air circulation, as shown in **Table 1**. In all three study vehicles, SHS exposure varied according to the driver's window status. When windows were closed so as to simulate a cold and/or rainy day, $RSP_{2.5}$ levels were higher than when the windows were left half or fully open, allowing air to circulate (p<0.001). Lower $RSP_{2.5}$ values found in the city car (with windows open), compared to the smaller PCV utility car could be attributed to the larger size of windows in the city car and therefore to larger air exchange rates. Under all other conditions and for all cars tested, $RSP_{2.5}$ levels varied according to PCV size.

Motor vehicle drivers and passengers are exposed to a number of toxic substances, mainly due to petrol and pollution but also due to articles inside the car. High levels of volatile organic substances, such as benzene, toluene, xylene and trimethylbenzene have been detected in cars, and are known to be genotoxic. [9] Professional car drivers, such as taxi drivers, are known to be exposed to high levels of nitrogen monoxide, nitrogen dioxide and carbon monoxide with adverse effects to their health.[10-11] SHS is now added to the list of toxic substances that vehicle passengers are exposed to, however unlike other toxic compounds from air pollution or petrol, exposure to SHS is completely preventable. In comparison, motor vehicle SHS levels of exposure are much higher than the levels found in hospitality venues such as casinos, bars and restaurants found, for example, in New York and Delaware

in the USA, and in pubs and bars in the UK (Up to 112 times higher than the mean levels found in the smoking areas of UK pubs and bars and 55 times higher than the levels found in venues in Delaware, US before smoking was banned).[7, 8, 12] In order to protect public health, the USA EPA set as standards 0.015 mg/m^3 $RSP_{2.5}$ as the annual average level of $RSP_{2.5}$ exposure and 0.065 mg/m^3 for 24-hour exposure. Thus, the levels of air toxicity a car passenger is exposed to are high, since not only are the mean $RSP_{2.5}$ levels produced by smoking in motor vehicles up to 200 times over the EPA daily average concentration, but also the particle matter produced by cigarette smoke is known to be carcinogenic.[13-14]

Although it is preferable to ban smoking inside motor vehicles altogether, the levels of $RSP_{2.5}$ can be reduced by opening a car window. Our measurements were taken in stationary vehicles therefore, in normal driving conditions $RSP_{2.5}$ levels would probably be lower than the levels we found, due to more frequent outside air replenishment by higher wind speeds entering through an open window. Inner city driving in traffic would expose passengers to SHS magnitudes similar to those found in our study.

Limitations of our study are that we were unable to measure mainstream smoke emitted from cigarettes (only sidestream smoke was measured), PCV was estimated not taking into account interior seating or plastics, and we were unable to calculate actual rate of air change. Further studies are needed to evaluate SHS exposure taking into account such parameters.

CONCLUSIONS

Motor vehicle SHS exposure, due to the high worldwide smoking prevalence and the global use of motor vehicles, is a true global health problem. Our study shows that passive smoking among motor vehicle passengers is potentially a major source of SHS exposure that threatens, on a daily basis, the well being and health of millions of people worldwide. Since motor vehicle ETS exposes passengers to over

200 times the limit of average daily exposure set by the US EPA, our study stresses the immediate need for measures to be taken to protect motor vehicle passengers from high exposure to SHS by restricting or even banning smoking in motor vehicles.

Acknowledgements: We would like to thank IARC and Roswell Park Cancer Institute for lending us the air-monitoring machine used in this study.

Competing interests: None declared

Funding: None

Ethics approval: Not necessary

What is already known on this subject:

Environmental tobacco smoke (ETS) contains over 50 known carcinogens and nearly 200 substances toxic to humans, therefore it classifies as a significant public health threat. To date, there are no data on the exact levels of ETS that people are exposed to when someone smokes in a motor vehicle and no comparisons have been made with other areas people are involuntarily exposed to ETS.

What this study adds:

Our study demonstrates that extremely high levels of exposure to ETS can occur in motor vehicles. Specifically ETS levels were found to be 11 to 112 times higher than the mean measurements taken in smoking areas of pubs, bars or other hospitality venues in the UK.

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TABLES

Table 1. Concentration of $RSP_{2.5}$ particles in mg/m^3

	Fully open window	Half open window	Closed window	
Vehicle Type		Mean ± SD (N)		**p-value**
Two-door pick-up Utility vehicle	4.57±1.43 [1,2] (90)	4.89±2.06 [3] (76)	12.77±7.53 (99)	<0.001
Three-door small city car	1.33±0.76 [1,2] (82)	5.32±3.00 [3] (86)	13.15±6.59 (45)	<0.001
Five-door Station wagon	5.28±1.80 [1,2] (72)	12.15±3.63 (80)	12.37±5.63 (68)	<0.001

Kruskal Wallis test
Mann Whitney test (p<0.05): 1. fully open window vs half open
2. fully open window vs closed
3. half open window vs closed
(N) Number of measurements

5. Η ΕΚΘΕΣΗ ΣΤΟ ΠΑΘΗΤΙΚΟ ΚΑΠΝΙΣΜΑ ΣΕ ΧΩΡΟΥΣ ΕΣΤΙΑΣΗΣ ΚΑΙ ΔΙΑΣΚΕΔΑΣΗΣ ΣΤΗΝ ΕΛΛΑΔΑ

Υπο κρίση στο διεθνές επιστημονικό περιοδικού, ***Nicotine and Tobacco Research*** (2005 I.F: 2,55) με την μορφή original research article

Σύντομη Ελληνική Περιγραφή:

Το παρών ερευνητικό άρθρο αποτελεί τμήμα μιας παγκόσμιας μελέτης για την μέτρηση της έκθεσης και των επιπέδων παθητικού καπνίσματος. Διοργανώθηκε από το International Agency for Research into Cancer I.A.R.C (του Π.Ο.Υ), του Harvard University School of Public Health, καθώς και του U.S Roswell Park Cancer Institute, μελέτη στην οποία επιτελώ επιστημονικός υπεύθυνος Ελλαδικού χώρου. Στην μελέτη αυτή μετρήσαμε με συνεργάτες από το Πανεπιστήμιο Αθηνών, την Εθνική Σχολή Δημόσιας Υγείας και το Hellenic American University επίπεδα παθητικού καπνίσματος σε χώρους διασκέδασης και εστίασης στην Ελλάδα σε περιοχές των Αθηνών και της Κρήτης. Συγκριτικά με άλλες χώρες στην Ευρώπη και στην Αμερική η Ελλάδα έχει ιδιαίτερα υψηλά επίπεδα παθητικού καπνίσματος σε τέτοιους χώρους εργασίας και διασκέδασης με αποτέλεσμα να επιφέρει δυσμενείς επιπτώσεις στους εργαζόμενους και πελάτες.

►ENVIRONMENTAL TOBACCO SMOKE IN HOSPITALITY VENUES IN GREECE

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ABSTRACT

Greece, having currently the highest smoking prevalence among all E.U member countries, faces a serious passive smoking problem, especially among workers and patrons in hospitality venues. Experimental measurements of particulate matter 2.5μm ($PM_{2.5}$), were performed in the non smoking areas of 49 hospitality venues and offices in Athens and Crete, Greece. Levels of indoor environmental tobacco smoke (ETS) air pollution ($PM_{2.5}$) were found to range between 19 μg/m^3 to 612 μg/m^3, differing according to the place of measurement. ETS levels were found to be highest in restaurants with a mean value of 298 μg/m^3 followed by bars and cafes with 271 μg/m^3 and offices with 88 μg/m^3. ETS levels were 76% lower in venues in which smoking was not observed compared to all other venues (p<0.001). Finally, ETS levels in smoking areas in pubs in the UK are 57% lower, in non-smoking areas of pubs 71% lower, in Ireland with a total smoking ban 89% lower and in the US, 91 - 96% lower than levels of ETS found in hospitality venues in Greece. Our findings show that indoor air in Greece is significantly polluted with ETS, even in non-smoking areas therefore proving how inadequate the current anti-tobacco legislation is. Since the implementation of indoor smoking bans in hospitality venues has been shown to have a positive effect on workers and patrons' health, the necessity of such legislation in Greece, is thus warranted.

MAIN TEXT

INTRODUCTION

Passive smoking is a serious threat to public health. It has been shown in numerous studies that prolonged exposure to Environmental Tobacco Smoke (ETS) in adults can predispose them to cardiovascular disease (by damaging the arteries endothelium, and reducing blood high density lipid levels), certain types of cancer, chronic obstructive pulmonary disease and to a dose response relation of lung function impairment (Leone et al. 2004; Moffatt et al. 2004; Kasim et al. 2005; Gammon et al. 2004; Eisner et al. 2005; Rizzi et al. 2004; Maziak et al. 2005). Effects of ETS on children are even greater due to their higher metabolism and ventilation rates predisposing them not only to cancer and cardiovascular disease but also to asthma, lower respiratory tract illness, neurological disorders and even impairing cognitive abilities (Yolton et al. 2005; Schettler 2001; Kosecik et al. 2005).

ETS itself comprises sidestream smoke emitted from the smouldering tobacco between puffs and exhaled mainstream smoke from the smoker, both sidestream and mainstream smoke affects not only tobacco users but also passively affects other people who share their close environment whether at home, at work or in a motor vehicle. Over the past years there has been a global movement to ban smoking from public places, initially in places related to health services and then in private sector places, such as offices and hospitality venues. Recently, there is an attempt to ban smoking in motor vehicles in certain countries (or states), since ETS exposure in motor vehicles can be up to 55 times higher than in hospitality venues in Delaware and 10 - 112 times higher than pubs in the UK, under certain circumstances depending on the vehicles speed, number of smokers and air circulation. (Vardavas et al. 2006).

$PM_{2.5}$ is the concentration of particulate matter in the air smaller than 2.5 microns in diameter. Particles of this size are released in significant amounts from burning

cigarettes, are easily inhaled deep into the lungs, and are associated with pulmonary and cardiovascular disease and mortality (US EPA 2006). ETS is not the only source of indoor particulate matter since particles of this size are not specific to tobacco smoke (ambient particle concentrations arising from cooking or vehicle fumes are also of that size), but $PM_{2.5}$ monitoring is highly sensitive to ETS and elevated levels of such particles can be attributed almost solely to ETS and are used to measure it (Repace 2004; Gee et al. 2006; Ott et al. 1996).

Avoiding exposure to ETS in Greece is extremely difficult. Greece has the highest adult smoking prevalence in Europe and one of the highest worldwide. It is estimated that 40% of the adult population are current daily smokers with smoking prevalence differing according to location (Huisman et al. 2005; Linardakis et al. 2003). Currently smoking is forbidden in public service institutions, transport waiting areas and means of transport, health care service centers and educational institutions, but on the other hand permitted in certain areas of hospitality venues and private workplaces. Taking into account the serious adverse health effects that ETS probably has on the Greek population, the purpose of this study is to quantify the levels of ETS exposure in a substantial number of public venues in Greece and to compare them with the air pollution levels found in other, non-smoking venues nationally and internationally.

METHODS

A TSI SidePak AM510 Personal Aerosol Monitor (TSI, Inc., St. Paul, Minnesota, USA) was used to sample and record the levels of respirable suspended particles (RSP) in the air. The SidePak uses a built-in sampling pump to draw air through the device and the particulate matter in the air scatters the light from a laser to assess the real-time concentration of particles less than 2.5μm in micrograms per cubic meter, or $PM_{2.5}$. The SidePak was calibrated against a light scattering instrument, which had been previously calibrated and used in similar studies. In

addition, the SidePak was zero-calibrated prior to each use by attaching a HEPA filter according to the manufacturer's specifications.

Sampling of Venues

A total of 51 venues were sampled in Athens (Athens, Haidari, Kifissia, Nea Erythrea, Penteli, Peristeri) and in Crete (Archanes, Heraklion, Rethymnon). The venues were selected to get a broad range of size, location and type of venue that included restaurants, cafés, bars and offices. The equipment was set to a one-minute log interval, which averages the previous 60 individual second measurements. Sampling was discreet in order not to disturb the occupants' normal behaviour, during which observational information was noted, regarding number of cigarettes, people, air volume and other factors that might affect the data (i.e. candles or cooking in area). The monitor was generally located in a central location of the non smoking area (where available) on a table or bar and not on the floor, so that the air being sampled was within the occupants' normal breathing zone. For each venue, the first and last minute of logged data were removed because they are averaged with outdoors and entryway air. The remaining data points were averaged to provide an average $PM_{2.5}$ concentration within the venue. After the collection data was sorted and two venues (restaurants) were excluded from the study, one due to incomplete observational data and one due to open fire grilling which caused a lot of smoke leading to extreme measurements of $PM_{2.5}$, not due to ETS. Analysis of the data was performed at the Roswell Park Cancer Institute.

Statistical Analysis

The primary goal was to record the SHS levels in the venues and then to assess the difference in the average levels of $PM_{2.5}$ in places that were observed to be smoke-free and places that were not (smoking was observed during sampling). Additionally, levels in venues where smoking occurred were compared with levels in

venues in the US, the UK and Ireland where there is a comprehensive smoking policy. The data from the US was based on research done by Repace (2004) Farrelly et al. (2005) and Travers et al. (2003). The data from the UK involved smoking and non-smoking areas of pubs (Gee et al. 2006) and the data from Ireland are from a study by Mulcahy et al. (2006). All five were included as groups for comparison with the data of the present study. Finally, the comparison between smoking and smoke-free venues is made for each type of venue. Statistical significance is assessed using the Mann-Whitney U-test.

RESULTS

Smoking was observed in 46 of the 49 venues sampled, even though measurements were taken in the non smoking area of each venue (where available). No smoking was observed only in two offices and one restaurant. **Table 1** presents detailed information about each restaurant sampled. Levels of restaurant indoor air pollution ranged from 64 μg/ m^3 to 612 μg/ m^3, with a mean value of 298 μg/m^3. Only one of the venues sampled was observed to be smoke-free, and the average level of $PM_{2.5}$ in this venue was 64 μg/m^3. The venue smoker density ranged between 0 – 2.45 cigarettes per 100 m^3, with a mean value of 1.17. **Table 1** also presents the measurements taken in offices and banks. Smoking was not observed in only two of the offices sampled, in the three other offices and one bank, smoking was observed, although prohibited. In the offices with no smokers the $PM_{2.5}$ levels ranged between 39 and 63 μg/m^3 and in those where smoking was observed $PM_{2.5}$ levels ranged between 19 and 236 μg/m^3. Totally the mean $PM_{2.5}$ level was 88 μg/m^3, with 51μg/m^3 and 107μg/m^3 found in offices were smoking was not observed and observed, respectively.

As shown in **Table 2,** the mean $PM_{2.5}$ levels in cafés and bars ranged between 49 and 612 μg/m^3, depending on venue size, smoker density and other

factors, such as open windows, ventilation etc. The mean $PM_{2.5}$ level was 271μg/m^3. Smoking was observed in all 31 venues, not one was found to be smoke free.

Averaged across each type of venue, the lowest levels of indoor air pollution were found in offices and banks (88 μg/m^3) and the highest levels were found in restaurants (298 μg/m^3). Café's and bars were found to have $PM_{2.5}$ levels between those two levels (271μg/m^3) **(Figure 1).** In general, the level of indoor air pollution was 76% lower in venues that were smoke-free (only one restaurant) compared to venues where smoking was observed (13 restaurants and 31 cafes and bars), and this difference was statistically significant ($p<0.001$).

Figure 2 compares the levels of $PM_{2.5}$ before and after the implementation of a smoking ban in the US (Delaware, Wyoming, New York, Maryland, Washington DC, Philadelphia, New Jersey and Los Angeles), the UK (Manchester) and Ireland to the levels found in venues in Greece. It is clear that the decrease in $PM_{2.5}$ levels is dramatic after the implementation of a smoking ban.

DISCUSSION

Venues in Greece are heavily polluted by ETS, with a substantial difference in $PM_{2.5}$ levels between areas were smoking was noticed and areas where it was not noticed, although not prohibited (76% reduction). To our knowledge, concentrations of nicotine as a marker of ETS exposure has been measured once before in Greece but only in a few venues (Nebot et al. 2005). We note that since 2002 there is a law (Health Law 76017) that states that 50% of interior space of bars, cafés, and entertainment centres must be reserved for non-smokers, separated physically if possible, with adequate signs and air circulation. The present study clearly demonstrates that this law is ineffective since the $PM_{2.5}$ levels were found to be elevated in almost all venues sampled even though the measurements were taken in non-smoking areas. Loopholes in this law do exist (Vardavas & Kafatos 2006) since bars, cafes and restaurants in Greece use outdoor areas (many of which are covered

and walled) most of the year taking advantage of the mild Mediterranean climate. The enforcement of the legislation is very difficult since the ban is only applicable to indoor areas, thus excluding many venues that require only a small indoor area for their clientele in winter.

In the United States, the EPA cited over 80 epidemiological studies to create a particulate air pollution standard in 1997 (US EPA 1997). In order to protect public health, the EPA has set limits of 15 μg/m^3 (US EPA 1992, 2006) as the average annual level of $PM_{2.5}$ exposure. Based on the latest scientific evidence, the EPA currently proposes even lower $PM_{2.5}$ standards to adequately protect public health (US EPA 2005). This further highlights the concern of high $PM_{2.5}$ exposure of people in smoking environments.

Previous studies have evaluated air quality by measuring the change in levels of respirable suspended particles (RSP) between smoke-free venues and those that permit smoking. Repace (2004) studied 8 hospitality venues in Delaware before and after a state-wide prohibition of smoking in these types of venues and found that about 90% of the fine particle pollution could be attributed to tobacco smoke. Similarly, in a study of 22 hospitality venues in Western New York, Travers et al. (2003), found a 90% reduction in RSP levels in bars and restaurants, and an 84% reduction in large recreation venues such as bingo halls and bowling alleys after the smoking ban's implementation. Another cross-sectional study of 53 hospitality venues in 7 major cities across the U.S. showed 82% less indoor air pollution in the locations subject to smoke-free air laws, even though compliance with the laws was less than 100% (Hyland & Travers 2004). Compared to Greece, ETS levels in smoking areas in pubs in the UK are 57% lower (even though the legislation is similar with different designated smoking areas in the "bar areas" of pubs), in non-smoking areas of pubs 71% lower and in Ireland (with a full ban) 89% lower. In New York, Delaware and Wyoming ETS levels are currently 91%, 92% and 96%, respectively, lower than levels in hospitality venues in Greece.

Other studies have directly assessed the role SHS exposure on human health. One study found that respiratory health improved rapidly in a sample of bartenders after a state smoke-free workplace law was implemented in California (Eisner et al. 1998) and another study reported a 40% reduction in acute myocardial infarctions in patients admitted to a regional hospital during the 6 months that a local smoke-free ordinance was in effect (Sargent et al. 2004). Farrelly et al. 2005, also showed a significant decrease in both salivary cotinine concentrations and sensory symptoms in hospitality workers after New York State's smoke-free law prohibited smoking in their worksites.

In the present study, the venues sampled were not selected randomly from a list of all venues in Crete and Athens, since no such list exists. Even so, this is the first time that $PM_{2.5}$ levels, as a marker of SHS exposure, were measured in Greece and compared with measurements taken in the US, UK and Ireland before and after the implementation of a total smoking ban in hospitality venues.

The present study demonstrates that workers and patrons are exposed to harmful levels of SHS, a known human carcinogen and toxin. The implementation of a total smoking ban in such hospitality venues in Greece would have a significant positive effect on the population's health, if it were enforced effectively. Unfortunately, since the Greek population adheres to the classical Mediterranean libertarian ideas of freewill and choice of lifestyle, there is an inherent loath to comply with any laws that restrict personal freedom, making the enforcement of such laws difficult. There is also a lack of systematic health education campaigns regarding smoking that would possibly nurture a smooth transition between old and new smoking policies in Greece, and hardly any existing mechanisms that would supervise their implementation.

Even so, laws that prohibit smoking in public work places, such as those enforced and adhered to in the US, UK and Ireland, would dramatically reduce second-hand smoke exposure and improve worker and patron health if enforced in Greece.

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TABLES

Table 1. Descriptive results and $PM_{2.5}$ measurements in restaurants, offices and banks in Greece.

Descriptive results and RSP 2.5 measurements in restaurants

Location	Volume (m^3)	People (mean)	Cigarettes (mean)	Smoker Density[1]	$PM_{2.5}$ Mean ($\mu g/m^3$)
Athens	328	36	5,3	1,63	**409**
Athens	304	51	1,7	0,55	**159**
Athens	144	20	2	1,39	**129**
Athens	314	42	6,3	2,02	**180**
Athens	631	23	3,3	0,53	**298**
Athens	117	24	2,7	2,27	**420**
Athens	507	10	1,3	0,26	**349**
Athens	150	26	3,7	2,45	**419**
Crete	612	60	8,7	1,42	**322**
Crete	2442	149	20,7	0,85	**541**
Crete	428	60	8	1,87	**290**
Crete	92	8	0	0	**64**
Total	**467**	**39**	**5**	**1.17**	**298**

Descriptive results and RSP 2.5 measurements in offices-banks

Type	Place	Volume (m^3)	People (mean)	Cigarettes (mean)	Smoker Density[1]	$PM_{2.5}$ Mean ($\mu g/m^3$)
Office	Athens	283	9	2,7	0,94	**118**
Office	Athens	59	3	0,3	0,57	**19**
Bank[2]	Crete	4672	82	1	0,02	**53**
Office	Athens	30	2	0	0	**63**
Office	Athens	4	3	0	0	**39**
Office	Athens	4	2	0,7	16,75	**236**
Total		**842**	**17**	**0,8**	**3**	**88**

[1] Average number of cigarettes per $100m^3$
[2] Smoking although strictly forbidden was observed.

Table 2. Descriptive results and $PM_{2.5}$ levels in Café, Clubs and Bars in Greece

Type	Location	Volume (m^3)	People (mean)	Cigarettes (mean)	Smoker Density[1]	PM 2.5 Mean ($\mu g/m^3$)
Café[2]	Athens	40	11	2,7	6,63	**221**
Bar	Athens	102	44	14	13,73	**521**
Bar	Athens	93	6	1	1,07	**231**
Café	Athens	335	46	14,3	4,28	**372**
Café	Athens	104	36	7	6,7	**452**
Café	Athens	150	27	3,7	2,44	**379**
Café	Athens	337	39	7,3	2,17	**214**
Café	Athens	191	17	2,3	1,22	**397**
Café	Athens	208	5	1	0,48	**71**
Café	Athens	112	21	5	4,47	**133**
Café	Athens	59	16	5	8,48	**175**
Café	Crete	125	25	5	3,99	**156**
Café	Crete	847	118	19	2,24	**332**
Café	Crete	159	20	5,3	3,36	**442**
Café	Crete	216	7	0,3	0,15	**49**
Café	Crete	190	35	9	4,73	**612**
Café	Crete	160	14	2,7	1,67	**108**
Café	Crete	520	25	4,7	0,9	**66**
Café	Crete	411	62	11	2,68	**339**
Café	Crete	318	51	11,7	3,67	**171**
Café	Crete	183	42	5,7	3,09	**173**
Café	Crete	153	10	1,3	0,87	**281**
Café	Crete	85	14	2,7	3,14	**412**
Café	Crete	1657	40	9,7	0,58	**121**
Café	Crete	230	20	7,3	3,18	**322**
Café	Crete	219	22	4,3	1,97	**143**
Café / Bar	Athens	391	27	5,7	1,45	**265**
Café / Bar	Athens	734	29	4,3	0,59	**97**
Café / Bar	Crete	411	34	8	1,95	**322**
Café / Bar	Crete	196	47	10,7	5,44	**520**
Café / Bar	Crete	883	53	17	1,93	**296**
Total		**317**	**31**	**6,7**	**3,2**	**271**

[1] Average number of cigarettes per $100m^3$

[2] Café located in a private hospital

FIGURES

Figure 1. Average ETS air pollution in Greece, according to venue area and smoking status measured in $PM_{2.5}$ μg/m^3 in non-smoking areas.

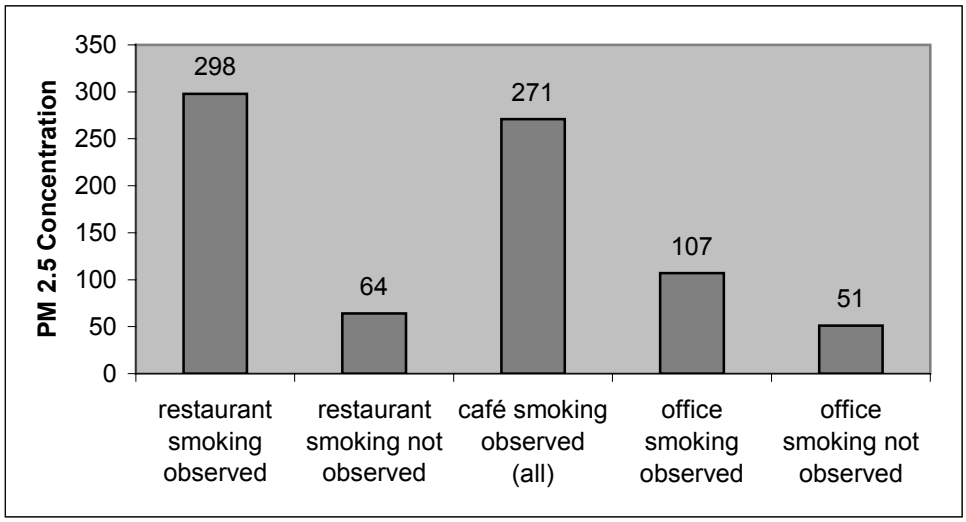
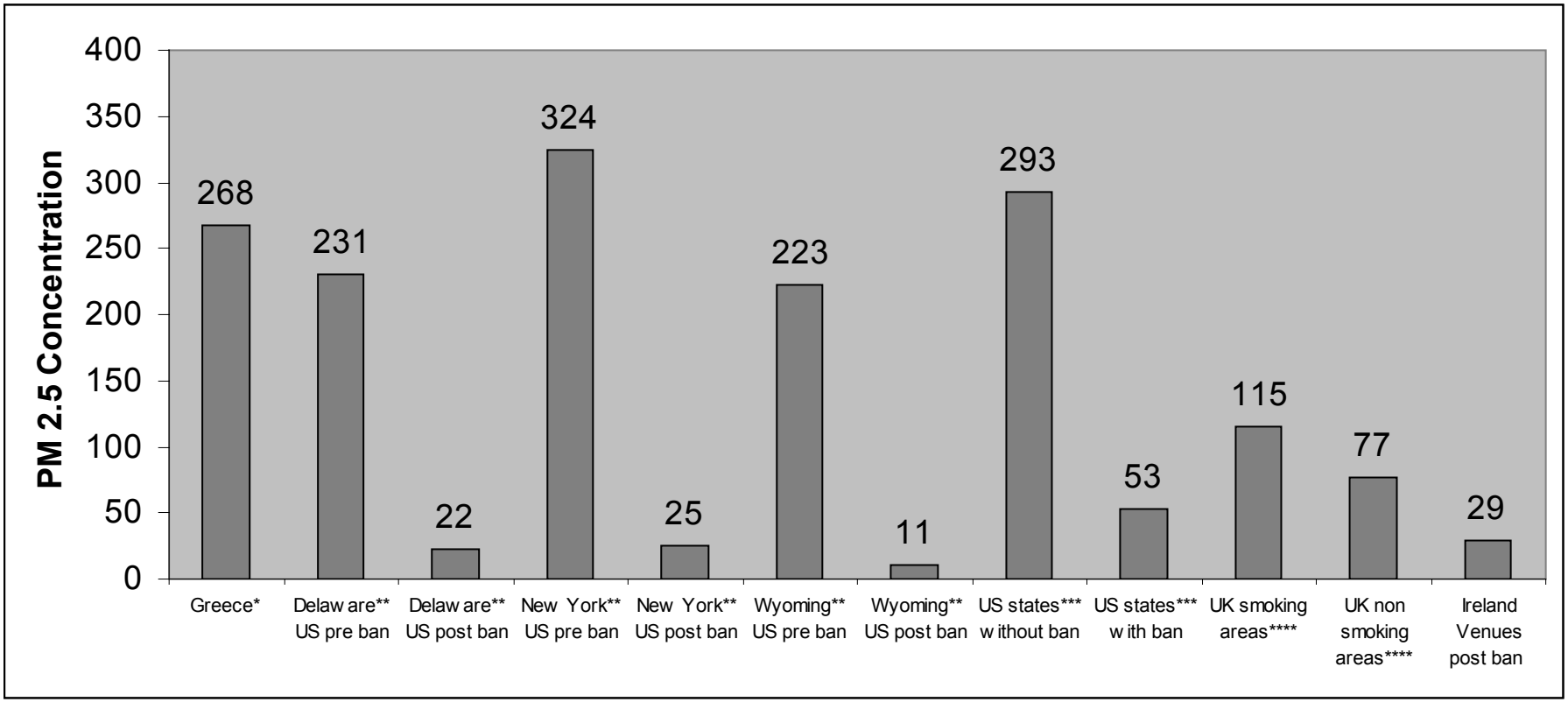


Figure 2. Average ETS Air Pollution ($PM_{2.5}$ in μg/m^3) in venues in Greece compared to the US, the UK and Ireland before and after the implementation of smoking bans.



*

*Restaurants, cafes and bars in which smoking was observed although banned (98% of venues).
** States measured before and after a smoking ban
*** States measured without ban (Maryland, W DC, Philadelphia, NJ)– states with a ban (LA, NY, Delaware) (Hyland et al 2004)
**** The UK has similar designated smoking and non-smoking areas in pubs.

6. ΟΙ ΚΑΠΝΙΣΤΙΚΕΣ ΣΥΝΗΘΕΙΕΣ ΚΑΙ ΤΟ ΑΡΝΗΤΙΚΟ ΠΡΟΤΥΠΟ ΜΙΜΗΣΗΣ ΤΩΝ ΓΟΝΙΩΝ ΠΑΙΔΙΩΝ ΠΡΟΣΧΟΛΙΚΗΣ ΗΛΙΚΙΑΣ ΣΤΗΝ ΕΛΛΑΔΑ

Υπό κρίση στο διεθνές επιστημονικό περιοδικού, ***Public Health*** (2005 I.F: 0,986) με την μορφή original research article.

Σύντομη Ελληνική Περιγραφή:

Το παρών άρθρο περιγράφει τις καπνιστικές συνήθειες των γονιών με παιδιά προσχολικής ηλικίας στην Ελλάδα και συγκεκριμένα στο νομό Χανίων. Συγκεκριμένα υπολογίζουμε τον επιπολασμό καπνίσματος στο 44% με αποτέλεσμα από την μελέτη να ήμαστε σε θέση να υποθέσουμε ότι το 63% των σπιτιών έχουν ένα γονιό τουλάχιστον καπνιστή με αποτέλεσμα δυνητικά να εθίζεται το παιδί βιολογικά λόγω εξάρτησης στην νικοτίνη αλλά και ψυχολογικά γιατί μεγαλώνει σε μία οικογένεια που το τσιγάρο αποτελεί και καθημερινό στοιχείο και όχι κάτι κακό για το οποίο τα παιδιά να εκπαιδεύονται στο να αποφεύγουν. Δυστυχώς η παρούσα κατάσταση όπως προκύπτει από τα παραπάνω ευνοεί την διαιώνιση του προβλήματος του καπνίσματος και στις επόμενες γενεές.

►SMOKING PREVALENCE, HABITS AND NEGATIVE ROLE MODELLING AMONG GREEK PARENTS WITH PRESCHOOL CHILDREN.

Short title: Smoking among young Greek parents

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ABSTRACT

Objectives: Smoking is Greece's largest public health threat. Greece has the highest adult smoking prevalence among all E.U countries, which in turn probably predisposes Greek children and adolescents to smoke. The purpose of our study was to research into the smoking habits of preschool children's parents since children of that age are most vulnerable to parental negative role modelling by exposing them at an early age psychologically to the familiarity of cigarettes and biologically to nicotine.

Methods - Study design: A cross-sectional study was performed on the parents of all children enrolled in kindergarten in western Crete (2809 parents), and interviewed during the 2004 Cretan health promotion programme to assess smoking prevalence and habits of parents with young preschool children in Crete, Greece

Results: 63% of households had at least one parent a current smoker and in 26% both parents were found to be current smokers. Smoking prevalence among adults with preschool children was estimated at 44% (52% of fathers and 36% of mothers). Paternal education and nationality were statistically significantly related to smoking ($p<0.001$), unlike place of residence ($p=0.862$) and level of maternal education ($p=0.132$).

Conclusions: Smoking prevalence is high even among parents with preschool children. Taking into account the parents' significant primary role in the children's upbringing and the effect that parental induced passive smoking has on children's health and health attitude, one can deduce that the health of Greek children is under serious threat. It is of paramount importance that educational and policy intervention measures are implemented to reduce such a situation that most likely promotes the initiation of smoking among Greek children.

Keywords: Smoking prevalence; parental role modeling; smoke-free households; ETS; Greece

MAIN TEXT

INTRODUCTION

Smoking is a major public health threat, causing the largest amount of preventable deaths worldwide [1]. Greece is among the countries that face a serious smoking problem. It has been estimated that Greece has the highest adult smoking prevalence among all countries in the European Union (E.U.) with an estimated 40% of the population being current smokers [2]. Greek women play an important role in increasing adult smoking prevalence in Greece. Unlike other member countries of the E.U., young Greek women have similar smoking rates to young man in the age group of 16-24 [2], and in certain areas (such as Athens) up to 39% of women smoke [3]. Adolescents also have a serious smoking problem, depending were they live. Smoking prevalence among 15 year olds in Athens is estimated at 32% [4], in contrast to the number of adolescent smokers in Crete (where this study took place) with only 10% current smokers [5].

Parents can affect the health and lifestyle of their children through role modeling, either positively or negatively, by influencing their attitudes towards health and substance abuse [6]. Parents that smoke not only act as negative role models for their children but also, unless precautions are taken, expose them to environmental tobacco smoke (ETS). It has been shown in numerous studies that exposure to ETS during childhood may lead to serious health problems. It has been estimated that at least 700 million children breathe air polluted by tobacco smoke at home [7]. Since Greece has a high percentage of current smokers, ETS exposure in the household, although never directly measured, is expected to be high. Since young children often imitate their parent's habits, the purpose of this cross-sectional study is to assess smoking prevalence and smoking habits among parents with preschool children in Crete, Greece.

MATERIALS AND METHODS

Field study

The study was conducted in the period 2004 - 2005 in preschools of the prefecture of Chania in Crete (Chania has a population of 150.000 which represent 25% of the population of Crete) as part of an educational health intervention programme planned to commence when the preschool children entered primary education. The measurements taken in this study were obtained during the children's baseline examinations, to evaluate the nutritional, growth and health level of all preschoolers before entering the programme, as well as the parents' lifestyle and health habits.

From a total of 121 preschools in the prefecture 118 participated in the study. Out of the remaining three, two did not operate that academic year and one was excluded due to its topographical inaccessibility and small number of children. A total of 2630 children were listed in preschools, 77% of whom accepted to participate (1988 children in total). Finally, 1755 children were examined, their ages ranging between 4 and 7 years of whom 50.7% were boys and 49.3% were girls.

The examinations took place at the children's schools after the parents were informed and had given written consent. The Greek Ministry of Education and the University of Crete's Ethics Research Council approved the study. The prefecture of Chania provided the funding.

The health habits of 1420 families were recorded using a questionnaire designed by our Preventive Medicine and Nutrition Clinic [8]. Out of the 1420 families 17 were single-parent so that 1398 fathers and 1411 mothers were interviewed (2809 adults in total). The characteristics of the adult population are shown in **Table 1.**

Statistical analysis

Descriptive measurements were used to define the characteristics of parents who participated in the study. The Chi-square test (χ^2) was used to calculate the

distribution of the parent population regarding parameters such as level of education, area of residence, nationality and level of smoking. The students' t test was used to check for differences between the age of the parents, the years they smoked and the number of cigarettes consumed per day. The statistical analysis was accomplished using SPSS 13.0.

RESULTS

The analysis of selected variables, such as residence, nationality, paternal and maternal education is shown in **Table 2.** Place of residence did not seem to be significantly related to smoking habits *(p*=0.862) with smokers coming from all areas, not only urban. Nationality was also strongly related to parental smoking habits (*p*<0.001). Higher percentages of smokers were found in families with both parents of Greek nationality. The mother's level of education was not related strongly to maternal smoking (*p*=0.132) unlike paternal education, which was found to be positively related to non smoking (*p*<0.001).

Finally smoking prevalence among parents with young children in Crete was estimated at 44% (mean parental age 37 years). A difference was noticed between paternal and maternal smoking, with a total of 51.9% of the adult male population being smokers in contrast to 36.1% of adult females. The average years of smoking differed between males and females [18(±6) for males and 12(±5) in females], although one must take into account the mean age difference, about 5 years, between the two sexes. Males were heavier smokers than females averaging 23 (12) cigarettes a day compared to the 15 (9) cigarettes for females. **Table 3** depicts the parental smoking habits.

DISCUSSION

An alarming aspect of our research is the small number of houses that are actually smoke-free (at least from parental smoke). As stated previously, our study

population comprises adults who exposed their preschool children to ETS and oblivious to its adverse health effects. Children, due to higher ventilation rates, inhale elevated levels of ETS for the same level of exposure and due to their smaller body mass are affected more seriously than adults. Exposure to ETS affects children's health in many ways, by predisposing them to cancer [9], cardiovascular disease [10], asthma and lower respiratory tract infections [11], neurological disorders [12], and has even been found to affect cognitive ability [13].

Only 37% of households in our sample were found to have non-smoking parents that do not expose their children to their smoke. Therefore taking into account that the other 63% of households have at least one parent as a current smoker, one can deduce that many Greek children are being unintentionally influenced to commence smoking. Although a number of studies correlate maternal education with smoking level [17-19], we did not find any such relation (p=0.132). It is possible that our findings are similar to those found by Huisman et al. [2], who compare income and education in relation with smoking habits in the European Union. According to that study, Greek women with higher education have higher smoking rates than those who are less educated.

Previous research, in the same prefecture, on the parents of preschool children found that 92% of the mothers and 84% of the fathers smoke indoors at home, ignoring the possible adverse effects on their children [5]. We expect that the actual percentage of tobacco-smoke free households is even lower due to the fact that other members of the extended family who live or spend time in the house may also be smokers and expose the children involuntarily to ETS. In a previous article regarding the same study population of preschool children, it was found that young Greek boys and especially Greek girls were found to have elevated serum cotinine levels (a biomarker of exposure to ETS), especially in households with both parents smokers (1.69 ng/ml) but also even in those households with both parents non-smokers (0.15 ng/ml) verifying our hypothesis that Greek preschool children are heavily exposed to ETS in their home. [14]

Regarding smoking prevalence, our results slightly differ from the 40% prevalence estimated for the general Greek population [2], but are similar with those found among adults in Athens with 51% of males and 39% of females classified as daily smokers [3]. Such a slight difference among females between both cities could either be attributed to the different lifestyles in Crete and Central Athens or most likely due to the fact that our study only included young parents with children at preschool. It is possible that a certain number of mothers possibly quit smoking, so as to protect their children from harm. An alarming aspect of our research was the fact that almost 70% of the male population and 50% of the female population are either current or ex-smokers. Taking into account the huge costs of smoking associated with personal health and the demands on health services, one can understand the economic and social burden carried by the Cretan population.

Since young children are influenced by and learn from their parents' (and siblings) behaviour, parents that smoke not only provide easy access to cigarettes but also act as a primary role model for the initiation to smoking and its acceptance. [15]. On the other hand, if parents quit the habit, especially before the child reaches 9 years of age, it has been shown that this reduces the likelihood of their children becoming smokers. [16].

In our study, we were not able to ascertain whether or not people other than the parents smoke regularly inside the house, nor were we able to determine if the parents take some precautions to prevent their children from inhaling smoke. Further studies are needed to assess such parameters, to measure ETS exposure in the home and to quantify the exact percentage of houses that are smoke-free in Greece. The indications are that elevated adult and adolescent smoking rates in Greece are partly attributable to parental role modelling, exacerbated by the fact that nicotine exposure of preschool children predisposes them to becoming adolescent smokers [20].

The above findings clearly indicate that as stated before, the smoking policy in Greece is ineffective [21-22], and highlight the need for an intensive public

awareness programme regarding the protection of children against ETS, through media campaigns (as was done in the U.K.) and more importantly, directed to parents during visits to child health care centres.

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Conflicts of Interest: none declared

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TABLES

Table 1. Characteristics of the parental population

	Father	Mother	p-value
N	1398 [a]	1411	
Age (years)	38.8±6.0 [b]	33.8±5.0	<0.001
Education			
ersity	14.9 (201) [c]	17.7 (239)	<0.001
Intermediate	14.4 (194)	14.9 (201)	
High school	55.3 (746)	59.5 (803)	
Primary or none	15.4 (207)	7.9 (107)	
Residence			
n	34.7 (493)		
Semi Urban	9.9 (141)		
Rural	55.4 (786)		
Nationality			
Greek	86.3 (1226)		
One parent Greek	5.7 (81)		
Both non Greek	8.0 (113)		

a. Although there where 1420 answered questionnaires, the differences between 1398 and 1411 were due to single parent families (17 in total)
b. The values are given as mean ± standard deviation [Student t test – equal variances not assumed]
c. The values are given as total % (N) [Chi-square test (χ^2)]

Table 2. Percentage (and number) of selected variables of preschool children's parents in relation to their parental smoking status

	Both smokers	*One parent smoker*	*Both non-smokers*	
	% (N[b])			p-value
Residence				
n	24.7 (120)	37.5 (182)	37.7 (183)	
Semi Urban	29.3 (41)	42.9 (60)	27.9 (39)	0.862
Rural	25.2 (195)	36.3 (279)	38.5 (296)	
Nationality				
Greek	27.1 (326)	36.7 (442)	36.2 (436)	
One parent Greek	18.8 (15)	41.3 (33)	40.0 (32)	0.001
Both non Greek	12.7 (14)	41.8 (46)	45.5 (50)	
Paternal education				
ersity	21.0 (42)	34.0 (68)	45.0 (90)	
Intermediate	24.6 (47)	36.1 (69)	39.3 (75)	
High school	24.8 (183)	38.1 (281)	37.0 (273)	0.001
Primary or none	33.8 (69)	35.8 (73)	30.4 (62)	
Maternal education				
ersity	20.5 (49)	39.3(94)	40.2 (96)	
Intermediate	27.8 (55)	32.3 (64)	39.9 (79)	
High school	26.5 (209)	37.6 (297)	35.9 (283)	0.121
Primary or none	27.4 (29)	34.0 (36)	38.7 (41)	

a. Chi-square test (χ^2) (linear by linear association
b. Numbers in brackets refer to families, not individuals.

Table 3. Parental Smoking habits in brief

		Father	Mother	p-value
Smoking Prevalence				
Current smoker		51.9 (726) [1]	36.1 (510)	
Non smoker		30.8 (431)	52.2 (737)	<0.001
Ex smoker		17.2 (241)	11.6 (164)	
Years				
Current smoker		18±6 [2]	12±5	<0.001
Ex smoker		14±8	9±6	<0.001
Quantity (cigarettes / day)				
Current smoker		23±12 [2]	15±9	<0.001
Ex smoker		22±15	12±9	<0.001
Parental Smoking				
Both smokers		25.5 (356) [3]		
One smoker		37.3 (521)		-
Both non smokers		37.2 (519)		
		Father		
		Smoker	*Ex / Non smoker*	
Mother	*Smoker*	25.5 (356) [4]	11.0 (153)	<0.001
	Ex / Non smoker	26.4 (368)	37.2 (519)	

1. The values are given as % (N= individuals) [Chi-square test (χ^2)]
2. The values are given as: mean ± standard deviation [Student t test – equal variances not assumed]
3. The values are given as % (N= families)
4. The values are given as total % (N= families) [Chi-square test (χ^2)]

7. ΕΠΙΠΕΔΑ ΝΙΚΟΤΙΝΗΣ ΚΑΙ ΚΟΤΙΝΙΝΗΣ ΟΡΡΟΥ ΩΣ ΒΙΟΔΕΙΚΤΕΣ ΠΑΘΗΤΙΚΟΥ ΚΑΠΝΙΣΜΑΤΟΣ ΣΕ ΠΑΙΔΙΑ ΠΡΟΣΧΟΛΙΚΗΣ ΗΛΙΚΙΑΣ ΣΤΗΝ ΚΡΗΤΗ

Δημοσιεύτηκε στο διεθνές επιστημονικό περιοδικό ***Toxicology Letters****,* 2006; 164, Supp 1, S149 με την μορφή Proceedings to the Eurotox conference 2006 (I.F 2005 2.43)

C.I. Vardavas, M.N. Tzatzarakis, A.M. Tsatsakis, D. Athanasopoulos, E. Balomenaki, M.K. Linardakis and A.G. Kafatos Serum nicotine and cotinine levels as passive smoking biomarkers in preschool children of Crete, Greece. ***Toxicology Letters****,* 2006; 164, Supp 1, S149 με την μορφή Proceedings to the Eurotox conference 2006

Βασίζεται στα δεδομένα του άρθρου που έχει ήδη δημοσιευτεί στο European Journal of Pediatrics για το παθητικό κάπνισμα για αυτό δεν θεωρείται και αυτόνομη δημοσίευση. Παρατίθεται ως συμπληρωματική παρουσίαση.

►SERUM COTININE AND NICOTINE LEVELS AS PASSIVE SMOKING BIOMARKERS IN PRESCHOOL CHILDREN OF CRETE

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Greece is known to have an extensive smoking problem. Specifically it has been estimated that it has the highest adult smoking prevalence among all countries of the European Union and the O.E.C.D. Although Greek children are exposed involuntarily to environmental tobacco smoke there is insufficient data on the exact levels of passive smoking biomarkers such as cotinine and nicotine in the Greek population especially among children. To estimate the exact levels of early age passive smoking among preschool children in Crete in regard to parental smoking habits by estimating serum cotinine and nicotine values. All children enrolled in kindergarten in western Crete (1757 preschool children and 2809 parents), and interviewed during the 2004 Cretan health promotion programme. A sample of 81 children were randomly selected according to parental smoking status and provided blood samples for cotinine and nicotine assay. Cotinine and nicotine values in serum samples from children with smoker parents were evaluated at 1.69 ng/ml (95% confidence limits 0.93–3.06) and 0.71 ng/ml (95% confidence limits 0.62–0.80) respectively. Correspondingly the cotinine and nicotine levels from children with non-smoker parents were estimated at 0.15 ng/ml (95% confidence limits 0.09–0.28) and 0.59 ng/ml (95% confidence limits 0.49–0.69). Cotinine levels were found to be related to household smoking ($p < 0.001$) and so was the children's sex with females having higher levels than males ($p = 0.043$). Passive smoking is a serious problem among Greek preschool children with elevated cotinine levels found even in non-smoking households. Greece's high adult and adolescent smoking rates could partly be attributed to elevated child cotinine levels since Greek children are heavily exposed to secondary tobacco smoke from their parents. Our findings stress the need for immediate action so as to prevent the predisposition and early addiction to tobacco.

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Επίλογος

Το κάπνισμα είναι γνωστός προδιαθεσικός παράγοντας για την ανάπτυξη χρόνιων νοσημάτων, όπως αποτελούν τα καρδιαγγειακά νοσήματα και τα νεοπλάσματα. Περιέχοντας 3000 χημικές ουσίες από τις οποίες 200 είναι δηλητηριώδεις και τα 50 πιστοποιημένα καρκινογόνα (ή σχεδόν σίγουρα καρκινογόνα από το I.A.R.C) αποτελεί πιθανώς και την καρκινογόνος και τοξική ουσία στην οποία εκτίθεται ενεργητικά το 30% των κατοίκων της γης και παθητικά ακόμα περισσότεροι. Ανάμεσα σε αυτούς που εκτίθενται καθημερινώς στο παθητικό καπνό υπάρχουν και περίπου 700 εκατομμύρια παιδιά. Εκτίθενται στο σπίτι, στο παιχνίδι, στην βόλτα αλλά και στο αυτοκίνητο με δυσμενείς επιπτώσεις στην υγεία τους.

Είναι ευθύνη αλλά και υποχρέωση μας σαν επαγγελματίες υγείας να προωθούμε μια πιο «καθαρή» πολιτική υγείας και είτε επιστημονικά είτε νομοθετικά να αλλάξουμε την υπάρχουσα κατάσταση και να εφαρμόσουμε αυστηρότερα μέτρα πρόληψης (έναρξης αλλά και έκθεσης στο κάπνισμα). Σε αντίθετη περίπτωση, οι απώλειες -οικονομικές αλλά και ανθρώπινες- των επόμενων γενεών αναμένονται αβάσταχτες.

Κωνσταντίνος Ηλίας Βαρδαβάς

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