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**Brief Report**

# Cigarette smoking among adolescents in Thessaloniki, Greece

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**Summary**

**Objectives:** Epidemiological characteristics in tobacco smoking among adolescents were investigated in Thessaloniki, Greece.

**Methods:** The target sample was 1,221 students coming from 15 high schools.

**Results:** Cigarette smoking was higher among girls than boys (40.9 % vs. 34.3 %). However, the percentage of boys who were smoking more than 20 cigarettes per day was found larger than the relevant percentage of girls (81.2 % vs. 75 % of total smokers). The boys also reported an earlier initiation of tobacco use (12.7 years vs. 12.9 years in girls). Physical activity was negatively correlated with smoking, whereas drinking alcohol and low parental education were positively correlated with smoking.

**Conclusions:** Health promotion programs should be instituted not only during adolescence, but rather before the age of 14.

**Keywords:** Adolescents – Cigarette smoking.

A high percentage of cardiovascular, pulmonary disease and cancer are attributed to tobacco use[1]. The great majority of deaths from tobacco could be prevented by reducing the initiation of tobacco use by children and adolescents and increasing the cessation of tobacco use among adults[2].

Although there are many studies in the literature concerning smoking in adolescence, the data concerning Greek adolescents are very limited and dated with the most recent being referred seven years ago[3,4]. Moreover, social and cultural coordinates of Greek population are substantially different from those of northern Europe and North America: Greece is a tobacco producing country and until recently there was no restriction on its sale. This, in conjunction with the fact that smoking is a socially accepted substance, explains its wide use among the Greek population.

This study was focused on adolescents from Thessaloniki, after Athens, the second, largest metropolitan city of Greece, because their social group noted one of the highest numbers in prevalence of smoking as reported in an earlier nation wide study[3]. We carried out this study in order to update the current status of smoking among adolescents in Thessaloniki, as well as to investigate epidemiological patterns of health behaviors.

## Methods

*Samples*

The present study was conducted from September 2003 to February 2004 among school children of secondary education in Thessaloniki, Greece (secondary education is obligatory in Greece). A representative sample of 15 schools was selected from a complete official list of 108 schools, using a table of random numbers. Stratification was made on public and private schools, on general, technical and evening schools, so all socioeconomic categories were represented. All students of the relevant grade level within a selected school were included in the study. Authorization was obtained from the Ministry of Education and students as well as their parents were accordingly informed on the objective of the study. The students were asked to complete the self-administered anonymous

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questionnaire during the above mentioned school period. In this investigation we included two grades corresponding to the third grade of Gymnasium (age 14–15 years old) and third grade of Lyceum (age 17–18 years old) of secondary education. All students present at the day of data collection were included since neither the parents nor the students themselves were objected to the participation in the study. Participation was high with refusals limited to 3 %.

*Instruments and procedures*

The questionnaire consisted of pre-coded questions and it was based on previously used questionnaires in other European and global surveys, such as the ESPAD 2003 report and the World Health Organization (WHO) Global Youth Tobacco Survey (GYTS) questionnaire[5,6]. It covered a wide range of thematic areas such as demographics, drinking of alcohol beverages, smoking at least one cigarette every day, coffee consumption per day and having breakfast with toast, pastries or cereals. Physical activities were included either as gymnastics (aerobic, endurance or strength training) or as sports (soccer, basketball). Parental education as indicator of socioeconomic status was also included: primary school up to six years of education, gymnasium up to nine years of education, lyceum up to twelve years of education, technological level of education up to fifteen years and university level more than fifteen years of education.

Smoking was the major dependent variable in the statistical analysis. It was classified in four categories: light smokers belonged to category 1, smoking 1–5 cigarettes per day; category 2 included students smoking 6–10 cigarettes per day; category 3 (smoking 11–20 cigarettes per day); and category 4 referred to students smoking more than 20 cigarettes per day, representing the part of the smoking students called "heavy smokers". The number of smoking students was compared to the one of non-smokers and the odds ratios were also computed using chi-square test and a Mantel-Haenszel test was also applied for the variables per category. In order to make adjustments caused by potential con-founders, logistic regression analysis using the stepwise procedure was also conducted. Biostatistical analysis was performed using the statistical package SPSS for Windows ver. 14.0 (SPSS Inc., Chicago, IL).

## Results

A total of 1,244 students completed the questionnaire. However, 23 were found with missing data in regards to smoking and sex, and therefore were omitted, leaving 1,221 for the analysis. The number of adolescents participating in the survey, according to sex, school grade and number of cigarettes smoking can be seen in Table 1. Out of the surveyed students 465 were smokers (38.1 %).

Table 2 demonstrates the relationship between smoking and health habits of the participants. A significantly ($p = 0.02$) higher number of female (40.9 %) than male (34.3 %) students were smoking. A significantly higher percentage of the smoking adolescents omit their breakfast and display lower ($p < 0.0001$) physical activity both for gymnastics and sports. As one can see in Table 2, we found out in the present study that as high as 55 % of smoking adolescents used alcohol, compared with 45 % of non-smokers.

Parental education seemed to play an important role in acquiring a smoking habit, as both the mothers' and fathers' education levels of those smoking were significantly lower ($p < 0.05$) than the ones of the non-smokers.

Logistic analysis revealed that the only variable significantly and independently associated with smoking was drinking alcohol: OR = 5.24 (95 % CI 3.91–7.02).

## Discussion

In this study of 1,221 secondary education students in the second largest city of Greece, we discovered that nearly 38 % of the students had smoked cigarettes within last month. Greece for decades followed the pattern of southern European coun-

**Table 1.** Number of cigarettes smoked by the adolescents surveyed according to sex and school grade (total number of students participating, *n* = 1,221). The third grade of Gymnasium included students of age 14–15 years old, while the third grade of Lyceum included students of age 17–18 years old. Trends in smoking during the years 1984, 1993, 1998 come from reference (3).

| Category | Cigarettes | Boys (%) | 1984 % | 1993 % | 1998 % | Girls (%) | 1984 % | 1993 % | 1998 % | Overall (%) | Gymnasium (%) | Lyceum (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1–5 | 34 (18.8) | 22.4 | 14.0 | 13.5 | 71 (25.0) | 27.4 | 16.7 | 18.1 | 105 (22.6) | 48 (24.6) | 57 (21.1) |
| 2 | 6–10 | 48 (26.5) | 17.6 | 10.0 | 13.9 | 98 (34.5) | 12.8 | 9.2 | 12.5 | 146 (31.4) | 65 (33.3) | 81 (30.0) |
| 3 | 11–20 | 84 (46.4) | | | | 104 (36.6) | | | | 188 (40.4) | 79 (40.5) | 109 (40.4) |
| 4 | >20 | 15 (8.3) | 8.0 | 5.0 | 7.0 | 11 (3.9) | 2.9 | 2.4 | 4.0 | 26 (5.6) | 3 (1.6) | 23 (8.5) |
| | Total | 181 (34.3) | 48 | 29 | 34.4 | 284 (40.9) | 43.1 | 28.3 | 34.6 | 465 (38.1) | 195 | 270 |

| | Nonsmokers (%) | Smokers (%) | p-value |
|---|---|---|---|
| Males | 346 (65.7) | 181 (34.3) | 0.02 |
| Females | 410 (59.1) | 284 (40.9) | |
| Gymnasium | 340 (63.6) | 195 (36.4) | N.S. |
| Lyceum | 416 (60.6) | 270 (39.4) | |
| Breakfast | 567 (66.1) | 291 (33.9) | <0.0001 |
| Sports | 291 (69.5) | 128 (30.5) | <0.0001 |
| Gymnastics | 366 (67.7) | 175 (32.3) | <0.0001 |
| Alcohol consumption | 276 (45.0) | 337 (55.0) | <0.0001 |
| Coffee consumption (cups/day) | 187 (24.7) | 37 (8.0) | <0.0001 |
| No | | | |
| 1 | 268 (35.4) | 131 (28.2) | |
| 2 | 83 (11.0) | 162 (34.8) | |
| 3+ | 218 (28.9) | 135 (29.0) | |
| Mother's education | 165 (21.8) | 134 (28.8) | 0.028 |
| Primary school | | | |
| Gymnasium | 166 (21.9) | 79 (17) | |
| Lyceum | 243 (32.2) | 160 (34.4) | |
| Technological level | 144 (19.1) | 72 (15.5) | |
| University level | 38 (5) | 20 (4.3) | |
| Father's education | 142 (18.8) | 116 (24.9) | 0.032 |
| Primary school | | | |
| Gymnasium | 151 (20) | 103 (22.2) | |
| Lyceum | 271 (35.8) | 140 (30.1) | |
| Technological level | 146 (19.3) | 90 (19.4) | |
| University level | 46 (6.1) | 16 (3.4) | |

**Table 2.** Relationship between smoking and health habits/ socioeconomic status.

tries, as Italy and Portugal, with similar rates of smoking for boys and girls. However, for the first time during the study period, the surveyed girl smokers significantly outnumbered boys, as it has recently being observed in northern European countries like Sweden, Denmark and Ireland, and in high income countries as well[5,7].

It is of particular interest, that although girls smoking numbers were higher, boys were heavier smokers. Moreover, it has been demonstrated that cigarette use may be a marker for all types of drinking[7]. This epidemiological observation was also confirmed by the present study, as observed in the logistic regression analysis; smoking students were five times more likely to drink.

Smoking, alcohol drinking, excess of coffee consumption and lack of physical activity are all modifiable lifestyle factors. However, these multiple risk factors, emerging even in early adolescence, highlight the need for multi functioning health programs.

The powerful socioeconomic gradient of morbidity and mortality by social class, which seems to be universally applicable, is obvious in this investigation[7,8]. It appears that the variance of smoking between adolescents of high and low socioeconomic class is manifested; to a very large extend, during the adolescent years. It seems that some deep roots of socioeconomic inequalities in regards to health can be traced back to adolescent years, if not earlier.

The present study was based on a series of anonymous questionnaires which were filled during class time, without interference on the part of the investigation team and refusals were minimal. The study sample was not representative of Greek adolescents, but lack of representation should not affect the estimated measures of effect (ORs and regression coefficients), since sampling process is unlikely to be a modifier of the associations in this study[9].

A sliding trend in the prevalence of regular smoking by students was observed between 1984 and 1993[3]. However, a discontinuation of this trend occurred in 1998, partially attributed to the fact that anti smoking campaigns have rather come to an end (Table 1). Interestingly, when comparing our results with those reported earlier and those concerning the year 1998, we find out there was no change in the prevalence of smoking among male adolescents of our city. It is concluded that although from 1984 to 1998 gender differences in smoking among Greek adolescents have narrowed, girls smoking showed an upward trend since 1998, and presented a significantly higher prevalence of tobacco use in the present study.

The data from our study support the view that strengthening efforts to communicate to young people messages based on scientifically-sourced, objective information about the risks of smoking, must be a high priority issue on the agenda of policy makers in Greece.

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