Factors influencing the age at which adolescents start smoking. A comparison between a big and a small city

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Key words:
Prevention; Smoking.

Background. **Most cigarette smokers take up their habit during adolescence. The aim of this study was to compare the age at which the students of a metropolitan high school and those of a non-metropolitan high school start smoking.**

Methods. **Nine hundred and seventy-eight students (55.6% males, mean age 15.8 ± 1.5 years) in a big city (Naples) and 467 (50.3% males, mean age 16 ± 1.5 years) in a small town (Capua-CE) filled in a questionnaire on cigarette smoking. Two hundred and nine (21.4%) students (99 males, 110 females, mean age 16.5 ± 1.3 years) in Naples and 99 (21.2%) students (59 males, 40 females, mean age 16.8 ± 1.3 years) in Capua stated that they had smoked at least one cigarette in the last week and were considered as smokers.**

Results. **The age at which adolescents start smoking did not differ between the big and the small city (Naples 14.9 ± 1.5 years; Capua 14.9 ± 1.6 years; p = 0.849) nor between sexes, both in Naples (males 14.9 ± 1.5 years, females 14.8 ± 1.4 years; p = 0.576) and in Capua (males 14.8 ± 1.6 years, females 15 ± 1.5 years; p = 0.379). Both in Naples and in Capua, no relation was found between the age at which the adolescent starts smoking and the smoking habits of the father, mother, siblings, best friend of the same sex, best friend of the opposite sex and friends. In Naples, the age at which the adolescent started smoking was related to the number of cigarettes he or she smoked in the last week (p = 0.004) and to the number of cigarettes smoked per day by the father (p = 0.001).**

Conclusions. **In adolescents, the age at which the habit of smoking is taken up does not differ both between a big and a small city and between sexes; in the big city, the age at which the adolescent started smoking was related to the number of cigarettes he or she smoked in the last week and to the number of cigarettes smoked per day by the father.**

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Tobacco smoking is the leading preventable cause of death. Most cigarette smokers take up their habit during adolescence[1,2]. In the United States, 88% of smokers start smoking before 18 years of age[3]. While several studies have investigated the influence of familial and peer custom on adolescent smoking habits[4-13], relatively few studies have inquired on the age at which the adolescent started smoking[14-25] and only one study has evaluated the influence of these factors on the age at which the adolescent started smoking[26]. The assessment of the age at which the adolescent started smoking is important not only for epidemiological purposes, but also in order to determine the most appropriate age at which preventive interventions should be started. Indeed, it has been demonstrated that pulmonary cancer is more frequent in subjects who start smoking precociously[27] and that men who start smoking before 16 years of age have an increased likelihood of not quitting the habit in comparison to those who take it up at an older age[23].

The purpose of this study was to assess the age at which the adolescent started smoking among the students of a metropolitan high school as compared to those of a non-metropolitan high school. Age, sex, demographic and socio-economic differences, as well as the influence of the smoking habits of family members and friends were all taken into consideration.

Methods

By means of an extensive, anonymous and self-administered questionnaire we evaluated the age at which the adolescent started smoking among students attending two high schools, one in a residential quarter of a big city (Naples; 1 067 365 inhabitants, 1991 census) and the other in a small town, 40 km away from Naples (Capua-CE; 18 845 inhabitants).

Students were asked to answer:
• about themselves: month and year of birth, sex, the number of cigarettes smoked in the last week (1÷7, 8÷21, 22÷42 e > 42), and the number of months since they have taken up the habit;
• about the father and the mother: age, education, employment, smoking habits including the number of cigarettes smoked per day, and whether they knew about the smoking habits of their son/daughter;
• about siblings: age, sex, education, smoking habits, and the number of cigarettes smoked per week;
• about friends: 1) smoking habits of the best friend of the same sex and of the best friend of the opposite sex; 2) the prevalent smoking habits of friends.

The questionnaires were distributed by teachers and then gathered by deputy students. The students who affirmed that they smoked at least one cigarette in the last week were considered as smokers. The age at which the adolescent started smoking (years) was computed as: [age (months) – number of months since the habit was taken up]/12. The students who had at least one sibling smoker were enrolled in the group "students with sibling smoker". The current smoking behavior of parents was taken into account for comparisons with parental habits.

Statistical analyses were performed using the Student's t-test, the χ^2 test, the one-way ANOVA with Bonferroni's multiple comparison test, and univariate and multivariate linear regression. A p value < 0.05 was considered statistically significant.

Results

Nine hundred and seventy-eight students (55.6% males, mean age 15.8 ± 1.5 years) out of 1150 in Naples (85%) and 467 (50.3% males, mean age 16 ± 1.5 years) out of 569 in Capua (82.1%) filled in the questionnaire. Two hundred and nine (21.4%) students in Naples (99 males, 110 females, mean age 16.5 ± 1.3 years, range 14÷19) and 99 (21.2%) in Capua (59 males, 40 females, mean age 16.8 ± 1.3 years, range 14÷19) answered that they had smoked at least one cigarette in the last week and supplied the other requested information. The study population by age and sex is reported in table I.

The characteristics of the parents (age, education, employment, whether they knew about the smoking habits of their son/daughter) and the prevalence of smoking habits among family members – including the number of cigarettes smoked per day – and friends are reported in tables II, III and IV respectively. In Naples, more so than in Capua, the mothers with a higher level of education and more skilled employment showed a higher prevalence of smoking habit. In a previous paper[13], we were not able to show any difference in the level of education and/or employment between the father and the mother in relation to the student's smoking habits.

Table I. Study population.

Age (years)	Naples		Capua	
	Males	Females	Males	Females
14	4	11	2	3
15	12	21	11	3
16	26	30	9	8
17	27	30	15	11
18	25	14	18	13
19	5	4	4	2
Total	99	110	59	40

Table II. Parents' characteristics.

	Naples	Capua	p
Father's age (years)	48.1 ± 5	47.1 ± 5.3	NS
Mother's age (years)	44.7 ± 4.3	43.5 ± 5.0	< 0.05
Father knows:			
yes/no/I don't know	58/124/27	32/50/17	NS
Mother knows:			
yes/no/I don't know	83/89/37	44/42/13	NS
Father's education			NS
Not graduated from high school	16.7%	23.7%	
Graduated from high school	41.9%	48.4%	
Graduated from college	41.4%	27.9%	
Mother's education			0.003
Not graduated from high school	19%	36.5%	
Graduated from high school	50.8%	40.6%	
Graduated from college	30.2%	22.9%	
Father's employment			NS
Unemployed	6.1%	2.2%	
Manual worker	6.6%	9.7%	
Clerk	32.5%	45.2%	
Retail dealer	8.1%	9.7%	
Professional/executive	46.7%	33.3%	
Mother's employment			< 0.001
Unemployed	40%	40.2%	
Manual worker	0	8.2%	
Clerk	33.2%	30%	
Retail dealer	3.5%	7.2%	
Professional/executive	23.3%	14.4%	

Table III. Smoking habits in the family.

	Naples	Capua	p
Father			
Non-smoker	16.4%	17%	
Smoker	57.7%	58.5%	NS
Ex-smoker	25.9%	24.5%	
Cigarettes/day	19 ± 14	21 ± 12	NS
Mother			
Non-smoker	23.8%	42.4%	
Smoker	60.2%	35.4%	< 0.001
Ex-smoker	16%	22.2%	
Cigarettes/day	15 ± 12	14 ± 11	NS
Siblings			
Non-smoker	45.3%	52.3%	
Smoker	54.7%	47.7%	NS

Table IV. Smoking habits among friends.

	Naples	Capua	p
Best friend of the same sex			NS
Non-smoker	9.3%	15.5%	
He/she had tried	35.3%	27.8%	
Smoker	55.4%	56.7%	
Best friend of the opposite sex			< 0.05
Non-smoker	15.5%	24.5%	
He/she had tried	29.5%	35.7%	
Smoker	55%	39.8%	
Friends			NS
Non-smokers	0.5%	0	
Few (< 50%) had tried	6.2%	9.1%	
Many (> 50%) had tried	5.7%	3.1%	
Few usually smoke	24.9%	23.2%	
Many usually smoke	62.7%	64.6%	

Table V. Age at which the habit of smoking was taken up and number of cigarettes smoked in the last week.

No. cigarettes smoked in the last week	Age (years)	p
Naples		0.004
1÷7	15.3 ± 1.5*	
8÷21	14.6 ± 1.3	
22÷42	15.0 ± 1.2	
> 42	14.4 ± 1.6*	
Capua		NS
1÷7	15.0 ± 1.6	
8÷21	15.0 ± 1.1	
22÷42	15.1 ± 1.5	
> 42	14.4 ± 1.7	

* = Bonferroni's multiple comparison test: $p < 0.05$.

The age at which the adolescent started smoking did not differ between the big and the small city (Naples 14.9 ± 1.5 years; Capua 14.9 ± 1.6 years; p = 0.849). In the same way, it did not differ between sexes, both in Naples (males 14.9 ± 1.5 years, females 14.8 ± 1.4 years; p = 0.576) and in Capua (males 14.8 ± 1.6 years, females 15 ± 1.5 years; p = 0.379). Two hundred and five (98.1%) and 98 (99%) students started smoking before the age of 18 in Naples and in Capua respectively. With regard to gender, in Naples 97 (98%) male and 108 (98.2%) female students started smoking before the age of 18 whereas in Capua these figures were 58 (98.3%) and 40 (100%) respectively. It is noteworthy that 54.5% of students in Naples (males 48.5%, females 60%) and 57.6% of those in Capua (males 59.3%, females 55%) started smoking before the age of 15.

The age at which the adolescent started smoking was found to be independent of the habits of the father, mother, parents, siblings, best friend of the same sex, best friend of the opposite sex and friends, both in the big and in the small city. Furthermore, the age at which the adolescent started smoking was also independent of the employment or education of the father or mother.

A relationship between the age at which the adolescent started smoking and the number of cigarettes smoked by the student in the last week (one-way ANOVA p = 0.004; Table V) was observed in Naples. This relationship was confirmed by multiple linear regression analysis (Table VI). Furthermore, a negative correlation between the age at which the adolescent started smoking and the number of cigarettes smoked per day by the father was evident only in the big city (r = -0.23, p = 0.001; Fig. 1).

In Capua, a trend towards a lower age at which the adolescent started smoking when the father knew of the smoking habits of his child (14.4 ± 1.6 years) was observed, compared to students whose father did not know/probably did not know about his son's/daughter's smoking habits (15.1 ± 1.4/15.2 ± 1.1 years; one-way ANOVA p = 0.069).

Table VI. Results of multiple linear regression analysis.

Independent variable	B	SE	p
Constant	15.518	0.34	< 0.001
No. cigarettes smoked in the last week	-0.221	0.70	0.002
Sex	-0.089	0.17	0.60
Big/small city	0.048	0.18	0.79

Dependent variable: age at which the habit of smoking is taken up. SE = standard error.

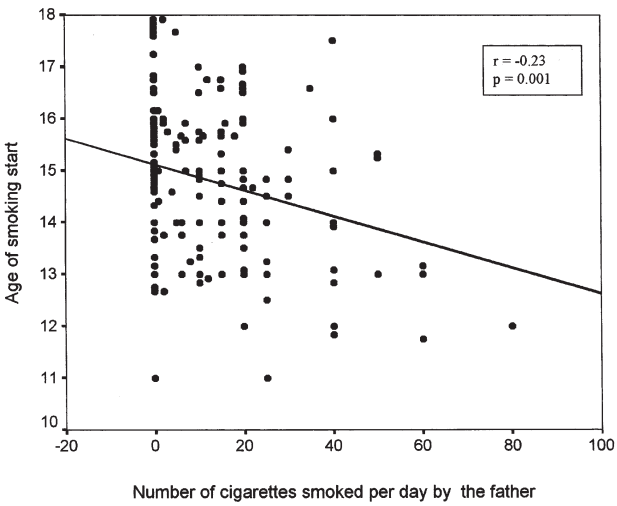

Figure 1. *Inverse relationship between the age at which the habit of smoking is taken up and the number of cigarettes smoked per day by the father.*

Discussion

In this study we provide evidence that for high school students of a big and small city, the age at which the adolescent started smoking is similar. Analogous to observations in the United States, more than half of the students begin to smoke before they are 15 and over

90% before they are 18[3]. No relationship was evident between the age at which the adolescent started smoking and the employment or education of both the father and mother and the smoking habits of the father, mother, parents, siblings, best friend of the same sex, best friend of the opposite sex and of friends, both in the big and small city. With regard to the students of the big city, a relationship was found between the age at which the adolescent started smoking and the number of cigarettes smoked by the student in the last week and the number of cigarettes smoked per day by the father.

The prevalence of the smoking habit in our study population was similar to that found in Italy in the "Indagine multiscopo sulle famiglie" (21.6% for the age range 14-24 years)[28].

The influence of gender on the age at which the adolescent started smoking is controversial. Salvadori et al.[14] demonstrated a reduced age at which the adolescent started smoking in male students; they also pointed out that males were "heavier" smokers than females. Santi et al.[15] found a younger age at which the habit of smoking is taken up in males. On the contrary, Canterin et al.[16] did not observe gender-related differences in the age at which the adolescent started smoking. Castello et al.[20] found a change in the age at which the adolescent started smoking from 13.5 to 14.5 years, when comparing the results of two epidemiological surveys conducted in Turin at a 12-year interval. Barrueco et al.[22] investigated a group of 12-14-year-old students and observed that the first contact with cigarettes occurred at the age of 12.1 ± 2.4 years and was more precocious in males.

Headen et al.[17] observed a "racial" effect on the age at which the adolescent started smoking: they reported that white adolescents were more precocious than black in taking up the habit of smoking (12 vs 14 years). Lee et al.[18] reported that the age at which the adolescent started smoking gradually decreased during a period of 30 years (1950-1980) and that today it is definitely under 20 years. In this study, and in that of Gilpin et al.[19], it was found that the smoking initiation ratio in younger subjects – chiefly female students – has not decreased in recent years, in contrast to what observed for adults (over 20-year-old). On the contrary, in China[21] the age at which the adolescent started smoking is more advanced (79.9% of Chinese start smoking after 20 years of age) although the smoking prevalence is still very high (67% for male adults).

With regard to the factors related to the age at which the habit of smoking is taken up, Zuskin et al.[26] have shown that in a sample of 2776 students aged 9-16 years, the age at which the adolescent started smoking is not influenced by family smoking habits; this is in agreement with our results. In this study over half (54.1%) of male students began to smoke before the age of 13.

In a previous study[13] regarding the same student populations, we demonstrated that the prevalence of the smoking habit in these two groups of students was similar and that no difference was evident between the student's smoking habits and parental education or employment. In this study, moreover, we were able to identify, in Naples, a relation between the smoking habits of the student and those of the father, mother, parents and siblings. In Capua, a relationship with the siblings' habits was evident. Both in Naples and Capua, we found a relation between the age at which the adolescent started smoking and the smoking habits of the best friend of the same sex, best friend of the opposite sex and friends in general. Among students from Naples, multivariate analysis showed an independent relationship between adolescent smoking behavior and the smoking status of siblings, best friends of the same sex and best friends of the opposite sex. Among students from Capua, student smoking was related to the smoking habits of the friends. We can state that in our study population the variables related to the establishment of the smoking habit do not influence the age at which the adolescent started smoking.

No differences were observed in the age at which the adolescent started smoking in relation to the father's or mother's education or employment. However, it is necessary to recognize the high prevalence of third degree education among the parents of our study population and that both these variables are only partially related to family income.

Our study pointed out that the students who smoke a higher number of cigarettes per week have an age at which they started smoking significantly lower than those who smoke a lower number of cigarettes, similar to what observed by Castello et al.[20] in their first study, and by Everett et al.[25], who found that a younger age of smoking initiation was associated with a higher number of cigarettes smoked per day. These findings are consistent with those of Fernandez et al.[24] who demonstrated that males who start smoking before the age of 15 smoke 5.5 cigarettes/day more than those who start at the age of 19 or later and that females who start smoking early in life smoke 6.8 cigarettes/day more than those who start later.

We can formulate two different hypotheses to explain the tendency of the smoking habit to become more severe as time goes on: 1) the development of nicotine tolerance, and 2) the coherence with the image of him/herself as a "smoker". We know that, as for any other drug, a continued intake causes tolerance towards nicotine, i.e. the need to increase the dose to obtain the same effect. With regard to the second proposed hypothesis, the adolescent's choice to be a "smoker" means a part of him/herself image in relation to others and, thus, it needs to be confirmed as time goes on. Naturally, this progressive tendency is balanced by the possibility of obtaining cigarettes and by the circumstances in which the adolescent can freely smoke.

The observed relationship between the age at which the adolescent started smoking and the number of cig-

arettes smoked per day by the father is, in part, a confirmation of a greater influence of the parents on the student's smoking habits in Naples. The tendency, observed only in the small city, of a lower age at which the adolescent started smoking if the father knows about his son's/daughter's habits seems "ancient".

Our study pointed out that the factors usually related to the adolescent's smoking habits did not influence the age at which the adolescent started smoking. We found only weak relations probably because other factors are related to the reasons leading the adolescent's choice to become smoker. We confirmed that the age at which the adolescent started smoking is inversely associated with the number of cigarettes smoked. Actions aimed at the prevention or delay of the onset of smoking among adolescents would have an important beneficial effect.

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