



FAS prevalence in a sample of urban schoolchildren in Croatia

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ABSTRACT

We present the results of active case ascertainment of fetal alcohol syndrome (FAS). This study included a sample of urban schoolchildren attending 1st to 4th grade elementary school and their mothers. Out of 912 mothers, 575 (63.04%) participated in the interview. Prenatal alcohol consumption was admitted by 15.47% and binge drinking by 3.13% of interviewed mothers. We evaluated 466 (51.09%) schoolchildren for signs of FAS or partial fetal alcohol syndrome (PFAS) using revised Institute of Medicine (IOM) diagnostic criteria. Nineteen students had features consistent with FAS or PFAS. The observed prevalence of FAS is 3 children and of PFAS is 16 children among 466 students, based on 51% participation rate. The estimated prevalence of FAS is 6.44/1000, of PFAS 34.33/1000 and overall prevalence of FAS/PFAS 40.77/1000. This is the first study of FAS prevalence in Croatia and as far as we are aware the second study in Europe.

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1. Introduction

Maternal alcohol drinking during pregnancy has adverse effects on developing fetus and is associated with fetal alcohol syndrome disorder (FASD). FASD is characterized by growth deficiency, unique pattern of facial anomalies, and structural or functional impairment of central nervous system. The most severe type of the spectrum is fetal alcohol syndrome (FAS). The teratogenic effects of alcohol on developing fetus are well known [1–7]. On the contrary, the epidemiology of the syndrome in Europe is not well documented and prevention efforts are limited.

Available data show high variability of estimated prevalence of FAS. FAS prevalence has been extensively studied in the USA, while such studies in Europe are rare. In the USA the prevalence of FAS was reported as 1–3/1000 newborns, and that of fetal alcohol spectrum disorders as high as 9.1/1000 live births [8]. FAS prevalence is higher in certain risk groups with prevalences of 10–15 cases per 1000 foster home children and 8.97/1000 in Native American population [9,10]. Abel and Sokol in 1991 performed prospective study and estimated the overall FAS prevalence in the Western world at 0.33 cases per 1000, being 0.29 per 1000 and 0.48 per 1000 among white and black population respectively [11]. So far performed studies reported high FAS prevalence of 40.5–46.4 and 65.1–74.2 per 1000 first grade schoolchildren in South Africa and 13–45% in foster home children in Russia [12–14]. In Europe, a study done in Italy, found prevalence of FAS to be 3.5–7.5/1000 schoolchildren [15].

Available data suggest that observed differences of FAS prevalence are mostly due to variation in research method used, as well as to the differences between race, ethnic groups, socioeconomic background and attitude towards alcohol consumption [16–19].

Investigations of FAS prevalence carried out so far have mostly involved rural or high risk populations, whereas data on urban children are missing. In Croatia, no published data exists on FAS prevalence and studies of alcohol consumption during pregnancy were not performed so far. In this paper we present the results of FAS detection study in a sample of urban schoolchildren in Croatia. The aim of this investigation was to estimate the prevalence of FAS in urban sample and to evaluate the feasibility of FAS screening within our school system in order to contribute to the prevention of this congenital syndrome.

2. Materials and methods

This investigation focused on full-blown FAS and partial fetal alcohol syndrome (PFAS), the two most serious and best defined categories of FASD. For the purpose of this study we used the revised Institute of Medicine (IOM) diagnostic criteria and evaluated the presence of the cardinal features of FAS, that is growth deficiency, microcephaly, short palpebral fissure length, smooth philtrum and thin upper lip [20].

Research included a sample of schoolchildren attending the first to fourth grade elementary school. Zagreb is the capital city and the biggest urban center in Croatia. Seven elementary schools were identified within a 10-min walk from the center. Selection of 4 out of 7 elementary schools was random and performed blind to the school name and address. The goal of the screening program was explained to every school principal and permission was obtained. The total number of children enrolled in these schools was 912. The process of parental information before the beginning of the project was addressed and discussed with school principals, teachers and social workers. Parents and children were informed of the upcoming research, either by the medical personnel during the parents meetings or by teachers and notification

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Table 1
Maternal characteristics and results of interview analysis of 575 mothers.

Variable	Number	%
Education level		
High school	246	42.78
College	66	11.47
University	252	43.82
Unanswered	11	1.91
Attitude towards alcohol effect on pregnancy outcome		
Positive	2	0.34
Negative	560	97.39
Unanswered	13	2.26
Daily alcohol intake during pregnancy		
1–3 drinks per week	30	5.21
3–7 drinks per week	3	0.52
7–14 drinks per week	0	
>14 drinks per week	0	
No	535	93.04
Unanswered	7	1.21
Binge drinking during pregnancy		
1× during pregnancy	7	1.21
2–3× during pregnancy	8	1.39
4–6× during pregnancy	2	0.34
6–9× (1× a month)	0	
10–18× (2× a month)	1	0.17
>18× (>2× month)	0	
Type of alcohol consumed		
Beer	45	7.82
Vine	48	8.34
Spirits	1	0.17
Trimester of alcohol intake		
1st	10	1.73
2nd	16	2.78
3rd	16	2.78
During the entire pregnancy	18	3.13
Total number of mothers confirming daily alcohol intake during pregnancy	33	5.73
Total number of mothers confirming binge drinking during pregnancy	18	3.13
Number of women confirming regular or binge drinking during pregnancy	44	7.65
Number of women confirming type and trimester of alcohol consumption without confirming binge or regular drinking	45	7.82
Total number of women confirming alcohol intake during pregnancy	89	15.47

sent to their homes. The form of information was decided by individual principles in association with school teachers and social workers. The notice included description of the study goal, methods and the guaranty of confidentiality. In this study we used passive parental consent [21]. The parents were notified that if they want their children examined, the mother should participate to interview and sign the questionnaire. This study was approved by the Ethics Committee of the Children's University Hospital Zagreb.

The questionnaire for the maternal interview consisted of 29 questions. Most of the questions, 26 of 29, had predefined answers, to minimize the duration of the interview and facilitate answers as no to alienate the mothers from answering. Questionnaire included name and surname of the mother and child, information about maternal age, educational level, pregnancy outcome, smoking habits. Ten questions about alcohol drinking, before and during the pregnancy were integrated in series of questions about nutrition, medication and life style. Questions referred to regular alcohol consumption (number of alcoholic drinks per week), number of binge episodes during pregnancy, type of alcohol consumed as well as the pregnancy trimester when the drinking occurred. Alcohol drink was defined as 0.5 dL of spirits, 1.5 dL of wine or 3.3 dL of beer, as derived from ounce metric system, and binge drinking as having 5 or more alcoholic drinks per occasion [22,23].

Out of 912 mothers of children enrolled in four schools, 575 (63.04%) participated to the interview and answered the questionnaire. The educational level of 575 participating mothers (Table 1) was compared to that of 81 control mothers of children attending 1st to 4th class from one randomly selected school out of remaining three in Zagreb center.

Maternal age in the control group was 39.8 ± 1.73 , 30 (37.03%) graduated high school, 8 (9.87%) have college diploma, 43 (53.08%) university degree and 81 (100%) are aware of harmful effect of prenatal alcohol exposure. No significant difference was found ($\chi^2 = 3.617$, $df = 3$, $p > 0.05$) between two groups confirming that the sample of 575 mothers can be representative in studied aspects of Zagreb population. Maternal questionnaires were collected and a list of participating children was prepared. Children whose mother did not sign the questionnaire were not included in the clinical part of the study.

The physician involved in the clinical part of the study was blinded to all information regarding maternal interview. The clinical evaluation included body mass, height, head circumference, palpebral fissure length measurements and evaluation of upper lip and philtrum [20]. Measurements were performed by experienced physician in the morning hours and the tools used for measurements were checked daily. Palpebral fissure length was measured in millimeters from endo to exocanthion in Frankfurt plain by a clear ruler [24–27]. Upper lip thinness and philtrum smoothness were examined using a five point lip-philtrum guide [24,25]. Scores of 4 or 5 were considered to be consistent with FAS/PFAS [20]. The anthropometric measurements were evaluated using age specific percentile [28,29]. The screening process was quick, painless and was done during regular classes with minimal disruption of the teaching process or children lives.

In this study we used revised IOM criteria and evaluated the combination of the characteristic growth and facial anomalies of FAS [20]. For the diagnosis of FAS (with or without confirmed maternal alcohol exposure), a child must exhibit a combination of at least two characteristic facial anomalies (palpebral fissure length at or below the 10th centile for age, smooth philtrum as diagnosed by class 4 or 5, thin upper lip class 4 or 5 on lip-philtrum guide), evidence of growth retardation (height or weight at or under the 10th centile for age) and microcephaly (head circumference at or under the 10th centile for age). The diagnosis of partial FAS (PFAS) (with or without confirmed maternal alcohol exposure) required evidence of at least 2 cardinal facial features and one of following features: growth retardation or microcephaly.

After the identification of children presenting a combination of features suggestive of FAS or PFAS, clinical findings were matched with maternal questionnaire answers regarding pregnancy alcohol exposure.

3. Results

Out of 912 mothers of students enrolled in four elementary schools, 575 (63.04%) answered the questionnaire. Table 1 provides characteristics of participating mothers. Average maternal age at the time of the study was 39.69 ± 2.05 years, 43.82% have a university degree, 11.47% college diploma and 42.78% graduated high school. Alcohol consumption during pregnancy was confirmed by 89 (15.47%) women, binge drinking by 18 (3.13%) and 7 mothers did not answer the questions regarding alcohol consumption in pregnancy.

Out of 575 interviewed mothers, 466 signed the questionnaire, allowing further clinical examination of their children, and 109 did not. Alcohol intake during pregnancy was admitted by 74 (15.87%) out of 466 and by 15 (13.76%) out of 109 mothers. No significant difference ($\chi^2 = 0.163$, $df = 1$, $p > 0.05$) in alcohol consumption was observed between the signed and anonymous group.

Children (466), whose mothers participated in the interview and signed the questionnaire, were included in the clinical part of the study. The examined group consisted of 229 (49.14%) boys and 237 (50.85%) girls. Ages of the children ranged from 6y6mo to 11y1mo old, with the mean age 8.8 ± 0.2 years.

The physical examination revealed growth retardation (height or weight or both at or below the 10th centile for age) in 58 (12.44%) and microcephaly (head circumference at or below 10th centile for age) in 27 (5.79%) children. Three facial dysmorphic features were evident in 30 (6.43%) and 2 of 3 examined features in additional 74 (15.87%) children (Table 2).

Nineteen students presented the pattern of clinical findings characteristic of FAS/PFAS (Table 3). Group of children included 12 girls and 7 boys. The age of the children ranged from 7y4mo to 10y6mo and the mean age was 9y1mo. Three children had all the clinical findings of full-blown fetal alcohol syndrome (Table 3, Cases 3, 5, 16). Clinical findings in sixteen children met the criteria for PFAS (Table 3). Observed prevalence of FAS in our cohort of schoolchildren is 3 in 466 children or 6.44/1000, of PFAS is 16

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