

## Maternal education, health profession and cigarette smoking are decisive factors for self-medication in children by parents

NATASA DUBORIJA-KOVACEVIC<sup>1</sup>  
MILICA MARTINOVIC<sup>2</sup>  
GORAN BELOJEVIC<sup>3</sup>  
DRAGAN LAUSEVIC<sup>4</sup>  
BOGDAN ASANIN<sup>5</sup>

<sup>1</sup> Medical Faculty of the University of Montenegro, Department of Pharmacology and Clinical Pharmacology Podgorica, Montenegro

<sup>2</sup> Medical Faculty of the University of Montenegro, Department of Pathophysiology and Laboratory Medicine Podgorica, Montenegro

<sup>3</sup> Medical Faculty of the University of Belgrade, Institute of Hygiene and Medical Ecology, Belgrade, Serbia

<sup>4</sup> Institute of Public Health of Montenegro Department of Epidemiology, Podgorica Montenegro

<sup>5</sup> Medical Faculty of the University of Montenegro, Department of Medical Ethics Podgorica, Montenegro

Self-medication of children by their parents (SMCP) is an important public health issue as the effects and potential risks may be unpredictable. The objective of this first national Montenegrin study was to assess the prevalence of and factors influencing SMCP among schoolchildren. Data were obtained from a national representative sample of 4496 schoolchildren aged 7–13 years (50.4 % boys). Parents/caregivers completed a questionnaire concerning their demographic characteristics, socio-economic and cultural status, as well as the self-medication (SM) of their children. The association between SMCP and parents' socio-economic, demographic or cultural status was assessed by logistic regression analyses. The prevalence rate of SMCP was 24.6 %. Univariate logistic regression showed that maternal socio-demographic characteristics (educational level, employment status, health care profession and smoking habits) were relevant for SMCP. In a multiple logistic regression the independent effect /adjusted odds ratio (AOR) (95 % CI) of maternal factors on SMCP remained for: education /2.23 (1.18–4.24)/, university-level *vs.* no education; profession /1.50 (1.07–3.00)/, health profession *vs.* non-health profession; and smoking habit /1.22 (1.04–1.42)/ smokers *vs.* non-smokers. SMCP may be expected for every fourth child in Montenegro. Specific maternal factors that independently raise the probability of SMCP are higher education, health profession and smoking.

*Keywords:* self-medication of children, mother, education, health profession, smoking

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Self-medication (SM) is referred to as the use of pharmaceutical products by a consumer in the treatment of self-recognized disorders or symptoms, or the self-organized use of a medication prescribed by a medical doctor. In practice, it also includes an SM of children by their parents (SMCP) (1). The investigation of SMCP is of great public health importance because children present a more vulnerable population group regarding the choice, dosing and effects of medicines.

\* Correspondence; e-mail: duborijan@ucg.ac.me

Both pros and cons are present in SMPC. The benefits include lower costs of health care, a possibility to treat minor disorders and symptoms without the inconvenience of having to spend time trying to reach a pediatrician, and an active role in the promotion and protection of child's health. However, there are numerous potential detrimental effects of SMCP in terms of inappropriate treatment especially in urgent medical conditions, erroneous self-diagnosis and missing a physician's advice when it is of crucial importance for a child (1). Additional risks include drug interactions and unwanted effects, masking or aggravating clinical symptoms, prolonging treatment duration, the emergence of antimicrobial resistance due to improper use of antibiotics, the development of addiction and abuse in some cases, *etc.* (2–4). Insufficient parental pharmacotherapy literacy was found to be an additional problem. Ubavic *et al.* (5) found that more than half of parents (56.7 %) of pre-school children in Serbia were not able to properly understand the dosage regimen of over-the-counter (OTC) medicines on the package label and in patient information leaflets. Around the same percentage of parents in France do not properly prepare and reconstitute oral antibiotics, resulting in a risk of underdose or overdose (6).

A comprehensive literature data review indicates a wide range of prevalences of SMCP in Europe, from 25 % in Germany (2) to 96 % in France (7). The most common conditions related to SMCP are fever, cough, headache, abdominal pain, diarrhea, nasal congestion, allergy and bronchospasm (2, 8–10). Accordingly, the main groups of self-prescribed drugs are analgesic/antipyretics (mostly paracetamol), cough and cold preparations, antihistamines, antacids, antiemetics and systemic antibiotics (8–10). Both Montenegro and the neighboring developing countries are challenged with a problem of the SMCP with prescription-only medicines (POM), such as antibiotics (11, 12). The number of POM bought without a prescription, according to Serbian authors, is significantly higher in households with children under 12 years of age compared to the other types of households (11). Giving antibiotics to children without a doctor's recommendation is still a practice in many countries (8, 10).

There are many reasons for SMCP, such as parental perception of illness to be of mild nature, positive previous experience with the treatment, availability of drugs without a prescription, but also a long waiting time in queues, high cost of doctor consultation and/or prescribed drugs, the long distance of a medical practitioner, busy workplace schedule, *etc.* (9, 10).

Recent studies, mostly in the developed countries, had examined the factors influencing SMCP and suggested both the educational programs for parents/caregivers and additional regulatory actions in order to improve and optimize them. A significant positive association with SMCP was found for socio-economic status (SES) (2, 13, 14), parental (15), usually maternal (2, 13, 16, 17), level of education, birth order of siblings (17) and children's age (14).

The aim of this study was to investigate the prevalence of and influencing factors on SMCP among Montenegrin schoolchildren, as there are no available national data on this subject. By using a wide range of potential predictors of SMCP, we hypothesize that there are some additional unrevealed factors that influence SMCP.

## EXPERIMENTAL

This research is a part of a national project on children's health in Montenegro performed by the Medical Faculty of the University of Montenegro, during a three year period (2013–2015). The investigation was approved by the Ethics Committee of the Faculty

of Medicine, University of Montenegro (Protocol No. 2397, the date of approval September 16<sup>th</sup>, 2013). Written informed consent was obtained from children's parents/guardians prior to the beginning of the study.

### *Sample*

We performed a descriptive, cross-sectional survey of SMCP among the parents/guardians of Montenegrin elementary schoolchildren from grades II to VII (7–13 years old). According to national census data, there are 46,183 pupils of this age from 163 schools in 21 municipalities (18). We planned a 10 % representative sample of about 4600 children with a two-stage cluster sampling design. In the first phase, we had selected 39 schools from 15 major municipalities, with the probability proportional to size. In the second phase, we randomly selected one class from each grade in each selected school. From previous experiences of a very good parental cooperation with medical doctors in Montenegro, we expected a high response rate and a random non-responsiveness. Out of 5508 delivered letters to obtain parental/guardian consent, positive answers were obtained from parents/guardians of 4496 children (response rate = 81.6 %). The gender ratio in the sample (50.4 % boys) fairly corresponds with census data of 51.8 % of males among Montenegrin children aged 6–15 years (18).

### *Questionnaire*

A closed questionnaire included questions on demographic data (school grade, child gender and the date of birth, number of children at home, child's order of birth and parents' marital status), socio-economic status (SES), education level, parental employment, occupation, parental smoking habits and SMCP ("Do you give your child some medicine at your judgment, without a recommendation of doctor or pharmacist?": "Yes, often"; "Yes, occasionally"; "Yes, rarely" and "No, I don't").

### *Statistical analysis*

In inferential statistics, we calculated the odds ratio (OR) for SMCP in relation to numerous independent variables in a univariate logistic regression. A dependent variable was binary, with a value "1" for the answers on SM question "often", "occasionally" and "rarely" and with a value "0" for the answer "never". We included all statistically significant independent factors from univariate logistic regressions into a multiple logistic regression model. When acting together in a multiple regression model, some significant variables from univariate logistic regression may lose their relevance. We were interested in which of the variables from univariate logistic regression would keep their significant and independent effect on SMCP in a multiple regression model. A significance level of less than 0.05 was accepted as significant.

## RESULTS AND DISCUSSION

One quarter of parents/guardians of Montenegrin schoolchildren (1107, 24.6 %) stated that they give medication to their children on their own, without the recommendation of

Table I. Self-medication in Montenegrin schoolchildren aged 7–13 by their parents/guardians

Frequency of self-medication	N	%
Often	14	0.3
Occasionally	149	3.3
Rarely	944	21.0
Never	3389	75.4
Total	4496	100.0

a doctor or a pharmacist, but only 0.3 % of them did it often. In fact, among the children who are exposed to SMCP, it predominantly rarely occurs (944/1107 or 85.3 %) (Table I).

Our finding of the prevalence of SMCP in Montenegrin schoolchildren is very similar to the results of a German study where approximately one-quarter (25.2 %) of children and adolescents are self-medicated (2). However, the studies of child SM in other European countries have shown a much higher prevalence. Even 96 % of parents in France self-medicate their children younger than 12 (7). In a population-based study in Finland within the same age group, SMCP was three times more common compared to the exclusive use of POM (50 vs. 17 %) (19). About 30 % of the psychotropic medication in German children and adolescents, especially sedatives, are used without prescription (20). The reasons for a relatively low prevalence of SMCP in Montenegro may be due to the parental lower level of health education and relatively low SES, their belief that minor health problems in their children will pass without any medication, but also the fear of harming their child, as well as the accessible health-care and a high level of confidence in pediatricians and pharmacists.

Univariate logistic regression showed that maternal, but not paternal socio-demographic characteristics, were relevant for SMCP in Montenegro. Maternal education raises the probability of child SM and at the university level of education, this difference is statistically significant, with the odds ratio of 2.4 compared to no education. If the mother is employed, the odds for SMCP is 19 % higher compared to unemployed mothers. Mother

Table II. Univariate logistic regression with self-medication in children by parents as a dependent variable and parental socio-demographic characteristics as independent variables<sup>a</sup>

Independent variable	Regression coefficient B	Standard error	Odds ratio (OR)	95 % CI for OR	p-value
Maternal education					
No education (reference)			1.000		
Elementary	0.428	0.285	1.534	0.878–2.679	0.133
Secondary	0.522	0.276	1.685	0.980–2.897	0.059
College	0.504	0.305	1.655	0.910–3.011	0.099
University	0.885	0.289	2.423	1.374–4.273	0.002

Paternal education						
No education (reference)				1.000		
Elementary	0.173	0.337	1.188	0.613–2.302	0.609	
Secondary	0.275	0.326	1.317	0.696–2.493	0.398	
College	0.382	0.342	1.465	0.749–2.866	0.265	
University	0.331	0.339	1.393	0.717–2.707	0.329	
Maternal employment						
0 = unemployed						
1 = employed	0.172	0.071	1.188	1.034–1.365	0.015	
Paternal employment						
0 = unemployed						
1 = employed	-0.012	0.065	0.988	0.870–1.122	0.853	
Maternal health profession						
0 = other professions						
1 = health profession	0.462	0.163	1.587	1.152–2.187	0.005	
Paternal health profession						
0 = other professions						
1 = health profession	-0.193	0.284	0.825	0.472–1.439	0.497	
Maternal smoking						
0 = no						
1 = yes	0.189	0.074	1.208	1.045–1.397	0.011	
Paternal smoking						
0 = no						
1 = yes	0.074	0.048	1.077	0.980–1.183	0.124	
Socioeconomic status						
0 = insufficient income						
1 = sufficient income	0.052	0.071	1.053	0.917–1.210	0.463	
Child gender						
1 = male, 2 = female	-0.112	0.069	0.894	0.781–1.024	0.107	
Child age						
Years	0.024	0.020	1.025	0.985–1.066	0.225	
Child's birth order						
First (reference)						1.000
Second	0.027	0.082	1.027	0.875–1.205	0.741	
Third and more	0.083	0.087	1.086	0.917–1.287	0.339	

CI – confidence interval

being a health worker raises the odds of SMCP by 59 % compared to a mother of any other profession. Maternal smoking raises the probability of SMCP by 21 % compared to non-smoker mothers (Table II).

After the adjustment of the multivariate analysis, the independent effect on SMCP remained for higher maternal education, health profession and smoking. The odds for SMCP are 2.2 higher for mothers with university level of education compared to those with no education. The odds for SM are 50 % higher for maternal health profession *vs.* non-health profession and 22 % higher for mothers smokers *vs.* non-smokers (Table III). It seems that maternal employment loses its relevance for SMCP in a multiple regression model probably due to the higher employment rate of highly educated women compared to those with no education.

Numerous researches investigated the factors associated with SMCP. A number of studies found a strong association of SMCP with parental SES (level of education, employment status, average family income, *etc.*). Similarly to our results, Du and Knopf (2) found that in Germany SMCP was associated with higher maternal educational level. Additionally, they showed a significant relationship between SMCP and a higher household income. This result

Table III. Multiple logistic regression with self-medication in children by parents as a dependent variable and maternal socio-demographic characteristics as independent variables<sup>a</sup>

Independent variable	Regression coefficient B	Standard error	Adjusted odds ratio (AOR)	95 % CI for AOR	p-value
Maternal education					
No education (reference)			1.000		
Elementary	0.449	0.313	1.567	0.848–2.897	0.152
Secondary	0.529	0.307	1.697	0.930–3.099	0.085
College	0.553	0.338	1.738	0.895–3.373	0.103
University	0.803	0.327	2.232	1.176–4.237	0.014
Maternal employment					
0 = unemployed	0.014	0.086	1.015	0.858–1.200	0.866
1 = employed					
Maternal health profession					
0 = other professions	0.404	0.172	1.498	1.070–2.097	0.018
1 = health profession					
Maternal smoking					
0 = no, 1 = yes	0.197	0.079	1.218	1.042–1.423	0.013
Constant	-1.776	0.315	0.169		< 0.001

CI – confidence interval

<sup>a</sup> N = 4496

could be partially explained by the assumption that in developed countries, such as Germany, the educational and economic status of a family usually correlate, whereas, in the countries currently in the socio-economic transition, such as Montenegro, this is usually not the case. On the other hand, according to Japanese investigators, only parental education, but not the household income, is a significant factor in a caregiver-initiated medication behavior for children (15). Maternal education was also identified by Italia *et al.* (16) as the main socio-economic factor that predicted the use of over-the-counter (OTC) drugs in 15-year-old children. A scientific question arising from our study requires an explanation: "Why are maternal but not paternal factors important for SMCP?" One explanation may derive from the traditional role of a mother when it comes to taking care of children's health, nutrition, education, *etc.* According to Finnish authors, mothers still represent the main children's educators and caregivers in a family (21). In addition, it has been shown that a mother in France is usually "the referent of family pharmacy" (22), that females report buying OTC medicines more often than males (23), and that mothers who self-medicate themselves are prone to SMCP (24). Our finding of a positive correlation between maternal and not paternal education and SMCP may be explained with the fact that more educated mothers are usually better informed about diseases and drugs than fathers with equal education, therefore, they make a decision to self-medicate their children more easily.

The result that mothers with health profession self-medicate their children more frequently in comparison to other professions is not surprising since they are considered to be more educated and experienced about the application of medicines in children. Although conceivable and quite expected, such a finding hasn't been mentioned in the available literature till now.

Particularly interesting is the finding that mothers smokers more frequently self-medicate their children in comparison to non-smoking mothers. To our knowledge, a similar result has not yet been published. A possible explanation for this finding may be that mother smoker is more prone to depression and anxiety as shown in previous studies (25, 26), and experiences greater psychological distress because of impaired child's health in comparison with mothers non-smokers, urging her to self-medicate her children. Also, children's exposure to passive smoking is related to obesity (27), wheeze and asthma (28), lower respiratory tract infections (29) and different allergic manifestations such as rhinitis and eczema (30). It is well-known that some of these conditions may be treated symptomatically and this may contribute to increased SMCP.

Several limitations of this research should be taken into consideration when interpreting the obtained results. Because of its cross-sectional design, there is no possibility of investigating causal relationships. Additionally, this survey was performed among the parents/guardians of elementary school children (7–13 years old) and other age groups are not included. There is a need for further investigation of diseases related to SMCP, type of self-prescribed drugs (including POM) and parental opinion regarding reasons for SMCP in all age groups of children.

## CONCLUSIONS

In this cross-sectional study, we show that SM may be expected in every fourth Montenegrin schoolchild. This finding requires more detailed research and careful monitoring. Among maternal factors decisive for increased SMCP, we point out for the first time in literature the importance of health profession and smoking.

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