Nose and throat complications associated with passive smoking among Congolese school children

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Abstract

Objective: To assess associations between nose-throat (NT) diseases and passive smoking prevalence among school children.

Methods: A cross-sectional survey was carried out on a randomized multistage sample of 381 school children (50.9% males, aged 9.8 ± 3.5 years) from Kinshasa town. Parents and children were asked to fill in a questionnaire detailing their smoking habits. The NT symptoms and diseases were assessed by the survey NT specialist.

Results The prevalence of passive smoking was 38.6% (n=147). Residence in peripheral areas, catholic school system, elementary level, exposure of family to passive smoking ,history of NT surgery, medicines and menthol inhaling, headache, nasal pain, dysphagia, odynophagia, dysosmia, dysphonia, pharyngeal irritation, dry throat, snooze, , and chronic pharyngitis were more reported by passive smokers. After adjusting for confounding factors, passive smoking (OR=16.7 95%CI 3.3-83.3), catholic system(OR=2 95%CI 1.2-3.2), and elementary degree(OR=1.4 95%, CI 1.1-2.1) were identified as independent determinants of chronic pharyngitis.

Conclusion: Parents should not smoke in the same room used by their children.

Keywords: Passive smoking, children, nose, throat, chronic pharyngitis

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Introduction

Epidemiological studies have shown that passive smoking may have particularly more deleterious effects in children than in adults, because of immature respiratory and immune systems in children[1-4]. Furthermore, the longer and intense exposure, smoke renders children more vulnerable to undergo nose and throat (NT) procedures[5]. Indeed, tobacco contains many substances that often result in irritations and inflammation of NT mucosa. However, the association between passive smoking and NT diseases remains controversial[6]. Passive smoking is associated with NT symptoms, upper respiratory tract infections, chronic pharyngitis, and chronic rhinitis[7-15]. On the contrary ther studies do not support the relationship between passive smoking and NT diseases[16-18].

In sub-Saharan Africa , the prevalence of passive smoking is very high and estimated at 44%[19]. However, there is no data on the relationship between prevalence of passive smoking and NT problems among African children. This study was therefore, initiated to address this gap.

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Methods

This cross-sectional survey was conducted between January 10th and November 20th, 2005. Kinshasa town, the capital of the Democratic Republic of Congo (DRC) has 10 million inhabitants and enjoys a tropical climate in Central Africa and comprises of 6 strata including 24 districts.

A statistical multistage and stratified random sample model was used at districts, sub-districts and schools of Kinshasa town. The survey was specifically and extensively designed to select representatives from a list at each level. The sample size (ni) of children was calculated as follows**:** ni = $(K \times (Z)^2 \times P \times Q/D^2)$ P= prevalence of passive smoking in Kinshasa (Longo-Mbenza) according to,

unpublished data) equals 17% or 0.17, Q= 1 – 0.17, Z parameter related to error risk of 5% = 1.96, K= cluster factor =2, and D= accuracy level of 0.05. Thus, 433 children were eligible for the study. Permission to conduct the study was obtained from the Ministry of Public Health, the Ministry of Education, the school principal and the parents. Ethical approval was obtained from the institutional review board of Kinshasa University Medical School, DRC. Eligible school children were invited to participate in the survey at study centres on specified dates. They were free to enrol and gave informed consent according to the Helsinki Declaration II. Incentives (transport and a soft drink) were available for all participants.

The survey workers were trained to avoid duplicates (school after school and classroom after classroom) and to ensure quality control and validity of the study. The protocol and procedures were identically self-administered with anonymity and confidentiality ensured. All adult household members completed the questionnaire containing questions on residence (peripheral areas including rural, semi-urban/slums vs. urban inner areas), their past exposure to passive smoking and their current smoking behaviour. School children completed the self-administered questionnaire about their smoking habits, school system (catholic, protestant, and private), school degree(elementary, primary, secondary), age, gender, and passive history of NT treatment (menthol inhaling, surgery and medicines). Passive smoking was defined as living in the household with at least one adult who smoked for at least one year.

The survey NT specialist(SGJ) examined the children to collectNT symptoms and diseases including rhinorrhoea, headache, nasal algia, dysphagia, odynophagia, dysosmia, dysphonia, pharyngeal irritation, , and chronic pharyngitis.

Statistical analysis

Age was expressed as mean+- standard deviation and grouped into <8 years vs.>8 years. Categorical variables were presented as proportions (%) and numbers. Proportions were compared using the chi-square test. After adjusting for confounding factors, a logistic regression model was used to identify the independent determinants of the presence of chronic pharingitis (dependent variable). Association between NT diseases and passive smoking was defined bythe odds ratio (OR) and its corresponding 95% confidence intervals (CI). All analyses were performed using SPSS for windows, version 18.0(SPSS Inc, Chicago, Il, USA).

Results

A total of 381(50.9% n=194 males) school children (response rate of 88%), aged 9.8± (SD 3.5) years accepted to participate in this study. The prevalence of passive smoking among the children was 38.6% (n=147).

The passive smoking rate in males (38.7% n=75) was similar (OR=1.01 95% CI 0.8-1.3) while that in females (38.5% n=72). Passive smoking was commoner in peripheral areas (100% n=43) than in inner areas (60.1% n=104). Passive smoking was more frequent in the catholic system (97.1%, n=33) than in the protestant (69.6% n=71), and private (17.6% n=43) systems. Passive smoking was also more prevalent at the elementary degree (55.6% n=20) than in the primary (34.8% n=100) and secondary (46.6% n=27) degrees. There was also a significant association between history of NT surgery (OR=2.5 95%CI 2.1 – 3.1), family exposure to passive smoking (OR=12 95%, CI 8.3 -19.3), history of NT medicines (OR=3.1 95%, CI 2.7 -3.7), and children passive smoking. Table 1 shows that headache, pharyngeal irritation, dry throat, dysphagia, odynophagia, dysphonia, nasal algia, snooze, dysosmia and chronic pharyngitis were more reported by children exposed to passive smoking than children not exposed to it.

Table 1: Comparisons and Risks/Odds ratio (OR) of ENT symptoms as functions of presence and absence of Passive smoking

Variables of interest	Exposed to passive smoking n (%)	Not exposed to passive smoking n (%)	OR (95%CI) of ENT symptom
Headache	59(54.3)	16(6.3)	18.0(10.0-33.0)
Pharyngeal irritation	52(40.9)	46(18.1	3.1(2.0-5.1)
Dry throat	25(19.7)	7(2.8)	8.7(3.6-21.0)
Dysphagia	24(18.9)	23(9.1)	2.3(1.3-4.3)

Continuation of table 1

Variables of interest	Exposed to passive smoking n (%)	Non exposed to passive smoking n (%)	OR (95%CI) of ENT symptom
Odynophagia	21(16.5)	18(7.1)	2.6(1.3-5.1)
Dysphonia	21(16.5)	18(7.1)	2.6(1.3-5.1)
Nasal algia	20(15.7)	18(7.1)	2.5(1.3-5.1)
Snooze	21(16.5)	18(7.1)	2.6(1.3-5.1)
Dysosmia	9(7.1)	8(3.1)	2.4(0.9-6.2)
Chronic pharyngitis	72(56.7)	17(6.7%)	18.3(10-33.4)

After adjusting for confounding factors (gender, age, residence, family history to passive smoking, history of NT medicines and surgery), only children's passive smoking (OR=16.7 95% CI 3.3 – 83.3), catholic system(OR = 2 95% CI 1.2 -3.2), and the elementary degree(OR =1.4 95% CI 1.1 -2.1) were identified as the independent determinants of chronic pharingitis.

Discussion

This study estimated the magnitude of passive smoking among school children from Kinshasa, DRC and it demonstrated the harmful association with NT diseases.

Nose and throat diseases in general and chronic pharyngitis in particular, may be determined by irritant substances in smoke such as acrolein, aldehyde, cetone and nitrosamines[20,21].

Respiratory tract symptoms (dry throat, nasal algia, allergic rhinitis and snooze) were reported by the present study and other researchers in the literature[22-25]. Cellular infiltrates in the nasal mucosa containing increased numbers of IgE^+ cells and eosinophils but not of IgE^+ mast cells, are associated with passive smoking[25]. A marked and statistically significant association exists between the incidence of tonsillectomy in children and parental smoking in the home environment[26]. There is a higher frequency of attacks of tonsillitis requiring antibiotics in those children whose parents smoke in front of them. This effect may be mediated by altered orophangeal flora, mucociliary dysfunction, increased cross-infection or a combination of these.

Willatt observed a significant association between children's sore throats and maternal smoking[27]. However, Capper and Canter did not observe any significant association between passive smoking and the number of sore throat episodes[28].

The proportion of pharyngitis in children exposed to passive smoking in this study was similar with the 59% of children reported by Mania et al. [29].

Clinical implications and public health perspectives

These finding have major public health policy and clinical practice implications.

Parents must be educated about the dangers of passive smoking and the need to prevent of smoking in their own homes. It is urgent that the Congolese government develops and implements an efficient policy and legislative action against smoking in homes and public areas.

It is recommended that parents, general practitioners and otolaryngologists work together to accurately diagnose NT diseases.. Otolaryngologists are requested to adequately treat chronic pharyngitis, chronic rhinitis, and allergic rhinitis.

Children are unable to remove themselves from the passive smoking. It is better to reduce the proportion of family members who smoke at home than to isolate smokers or increase ventilation.

Limitations of the study

The present study was limited to some degree. Its cross-sectional design was not able to demonstrate a causal association which would require prospective studies. The reliability of the declaration of the parents in the estimation of passive smoking could be lower than it is in reality.

It was not possible to measure urinary cotinin in children.

Conclusion

An urgent programme for prevention and control of the epidemic of passive smoking is needed for

schoolchildren in Kinshasa, DRC. This programme may reduce chronic NT diseases.

References

1. Cook DG, Strachan DP. Health effects of passive smoking-10: Summary of effects of parental smoking on the respiratory health of children and implications for research. *Thorax*. 1999;54:357–366.
2. Pedreira FA, Guandolo VL, Feroli EJ, Mella GW, Weiss IP. Involuntary smoking and incidence of respiratory illness during the first year of life. *Pediatrics*. 1985;75:594–597.
3. Elliot J, Vullermin P, Robinson P. Maternal cigarette smoking is associated with increased inner airway wall thickness in children who die from sudden infant death syndrome. *Am J Respir Crit Care Med*. 1998;158:802–806.
4. Landrigan PJ, Kimmel CA, Correa A, Eskenazi B. Children's health and the environment: public health issues and challenger for risk assessment. *Environ Health Perspect*. 2003;112: 257–265.
5. DiFranza JR, Lew RA. Morbidity and mortality in children associated with the use of tobacco products by other people. *Pediatrics*. 1996; 97:560–568.
6. Bakley BW, Bakley JM. Smoking and middle ear disease; are they related? A review article. *Otolaryngol Head Neck Surg* 1995; 112(3):441-6.
7. Charlton A. Children and passive smoking: a review. *J Fam Pract* 1994; 38: 267 – 277.
8. Collet JR, Holland WW, Corkhill RT. Influence of passive smoking and parental phlegm on pneumonia and bronchitis in early childhood. *Lancet* 1974; 2 : 1031 – 1034.
9. Leider Sr, corkhill RT, Irwig LM, Holland WW. Influence of family factors on asthma and wheezing during the first five years of life. *Br J Prev Soc Med* 1976; 30 : 213 – 218.
10. Tager JB, Hanrahan JP, Tosteson TD, Castile RG, Bran RW, Weiss ST et al. Lung function, pre – and post natal smoke exposure, and wheezing in the first year of life. *Am Rev Respir Dis* 1993; 147: 811 – 817.
11. Larsson, Frisk M, HallstronJ, Kiviloog J, Lundback B. Environmental tobacco smoke exposure during childhood is associated with increased prevalence of asthma in adults. *Chest* 2001; 120 , 711 – 717.
12. Overpeck MP, Moss AJ. Children's exposure to environmental cigarette smoke before and after birth. Health of our nations children united states *Adv Data* 1991; 1-11.
13. Cook DG, Whincup PH, Jarvis MJ, Strachan DP, Papacosta O, Bryant A. Passive exposure to tobacco smoke in children aged 5–7 years individual family, and community factors. *BMJ* 1994: 308 : 384 – 389.
14. Tecle DW. Long term sequelae of otitis media: fact or fantasy? *Pediatr Infect Dis J* 1994; 13: 1069 – 1073.
15. Ilicali OC, Keles N, Deer K, Saun OF, Guldiken Y. Evaluation of the effect of passive smoking an otitis media in children by an objective method ; urinary cotinine analysis. *Laryngoscope* 2001; 111 (1) : 163 – 167.
16. Montefort S, Muscat HA, Caruana S, Lenicker H. Allergic conditions in 5-8-year-old Maltese schoolchildren: prevalence, severity, and associated risk factors [ISAAC] *Pediatr Allergy Immunol*. 2002; 13:98–104.
17. Miyake Y, Yura A, Iki M. Cross-sectional study of allergic disorders in relation to familial factors in Japanese adolescents. *Acta Paediatr*. 2004;93:380–385.
18. Lieu JEC, Feinstein AR. Confirmations and Surprises in the association of Tobacco Use with Sinusitis. *Arch Otolaryngol Head Neck Surg* 2000; 126: 940 – 949.
19. Warren CW, Riley L, Asma S, Eriksen MP, Green L, Blanton C, Loo C, Batchelor S, Yach D. Tobacco use by youth: a surveillance report from the Global Youth Tobacco Survey project Bull *World Health Organ* 2000;78(7):868-76.
20. Kallail KJ, Rainbolt HR, Bruntzel MD. Passive smoking and middle ear problems in Kansas public school children. *J Commun Disord* 1987; 20 (3) : 187 – 96.
21. The Airliner cabin environment: Washington. DC. *Air quality and safety*. 1986; 135- 136.
22. Hoffman D, Hoffman I. The changing cigarette, 1950-1995. *J Toxicol environment Health* 1997; 50 (4) :307 – 364.
23. Colley JR; Holland WW, Corkhill RT. Influence of passive smoking and parental phlegm on pneumonia and bronchitis in early child hood. *Lancet* 1974; 2 : 1031-1034.
24. Rylander E, Pershagen G, Eriksson M, Nordvall L. Parental Smoking and other risk factors for wheezing bronchitis in children. *Eur J Epidemiol* 1993; 9: 517 – 526.
25. Vinked JG, Klein Jan, Severijne LW, Fokker WJ. Passive smoking causes an allergic all infiltrate in

the nasal mucosa of atopic children. *Int J Pediatr Otorhinolaryngol* 1999; 51: 73–81.
26. Hinton AE, Herdman RC, Martin-Hirsch D, Saeed SR. Parental cigarette smoking and tonsillectomy in children. *Clin Otolaryngol Allied Sci* 1993;18: 178-180.
27. Wilhatt DJ. Children's sore throats related to parental smoking. *Clin Otolaryngol Allied Sci* 1986; 11:317-321.
28. Capper R, Canter RJ. Is the incidence of tonsillectomy influenced by the family medical or social history? *Clin Otolaryngol Allied Sci* 2001;26:484-487.
29. Mania M, Przybys Z, Kurylak A. Passive smoking and frequency of occurrence of disease symptoms in the respiratory system in children aged 0-7. *Przeql Lek* 2006;63:831-833.