A possible model of the relation between genitourinary infection and gastroschisis involves an infection associated with early sexual activity, and the related risk for gastroschisis might be amplified among adolescents and younger women. Susceptibility among these women might be due to several factors, including the immune response to new pathogens, new partners, and changes in partners.[15] Our finding that the risk was highest for exposure to both types of infection, particularly among younger women, suggests a combined role of infection and early sexual activity. This finding is consistent with but does not prove a role for dose of pathogen in the risk for gastroschisis. Alternatively, contributors to risk could include the type of pathogen(s) or the inflammatory or immune response to the infections. The prevalence of self reported chlamydia was higher in the group of women who reported both types of infection compared with the control group. *C trachomatis* might be a candidate for future research as it is known to cause both urinary tract infections and sexually transmitted infections.

We thank the participants of the national birth defect prevention study. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
Contributors: See bmj.com.
Funding: Cooperative Agreement No U50/CCU822097 from the Centers for Disease Control and Prevention.
Competing interests: None declared.
Ethical approval: Institutional review boards at CDC and at each participating centre have approved the study.
Provenance and peer review: Not commissioned; externally peer reviewed.

1 Penman DG, Fisher RM, Noblett HR, Soothill PW. Increase in incidence of gastroschisis in the south west of England in 1995. *Br J Obstet Gynaecol* 1998;105:328-31.
2 Kazaura MR, Lie RT, Irgens LM, Didriksen A, Kapstad M, Egenaes J, et al. Increasing risk of gastroschisis in Norway: an age-period-cohort analysis. *Am J Epidemiol* 2004;159:358-63.
3 Hougland KT, Hanna AM, Meyers R, Null D. Increasing prevalence of gastroschisis in Utah. *J Pediatr Surg* 2005;40:535-40.
4 Kilby MD. The incidence of gastroschisis. *BMJ* 2006;332:250-51.
5 Mastroiacovo P, Lisi A, Castilla EE. The incidence of gastroschisis: research urgently needs resources. *BMJ* 2006;332:423-424.
6 Williams LJ, Kucik JE, Alverson CH, Olney RS, Correa A. Epidemiology of gastroschisis in metropolitan Atlanta, 1968 through 2000. *Birth Defects Res Part A Clin Mol Teratol* 2005;73:177-83.
7 Yoon PW, Rasmussen SA, Lynberg MC, Moore CA, Anderka M, Carmichael SL, et al. The national birth defects prevention study. *Public Health Rep* 2001;116(suppl 1):32-40.
8 Rasmussen SA, Olney RS, Holmes LB, Lin AE, Keppler-Noreuil KM, Moore CA, et al. Guidelines for case classification for the national birth defects prevention study. *Birth Defects Res A Clin Mol Teratol* 2003;67:193-201.
9 Centers for Disease Control and Prevention. Sexually transmitted diseases treatment guidelines, 2006. *MMWR Recomm Rep* 2006;55(RR-11):1-94.
10 Draper ES, Rankin J, Tonks AM, Abrams KR, Field DJ, Clarke M, et al. Recreational drug use: a major risk factor for gastroschisis. *Am J Epidemiol* 2008;167:485-91.
11 Pimenta J, Catchpole M, Gray M, Hopwood J, Randall S. Evidence based health policy report. Screening for genital chlamydial infection. *BMJ* 2000;321:629-31.
12 Gilson RJ, Mindel A. Recent advances: sexually transmitted infections. *BMJ* 2001;322:1160-4.
13 Weinstock H, Berman S, Cates W Jr. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. *Perspect Sex Reprod Health* 2004;36:6-10.
14 Nguyen H, Weir M. Urinary tract infection as a possible marker for teenage sex. *South Med J* 2002;95:867-9.
15 Chambers CD, Chen BH, Kalla K, Jerrigan L, Jones KL. Novel risk factor in gastroschisis: change of paternity. *Am J Med Genet A* 2007;143:653-9.

Accepted: 7 April 2008

Long term prognosis in preschool children with wheeze: longitudinal postal questionnaire study 1993-2004

Peter I Frank,[1] Julie A Morris,[2] Michelle L Hazell,[1] Mary F Linehan,[1] Timothy L Frank[1]

EDITORIAL by Russell

[1]General Practice Research Unit, North West Lung Research Centre, Wythenshawe Hospital, Manchester M23 9LT
[2]Department of Medical Statistics, University Hospital of South Manchester NHS Foundation Trust, Manchester
Correspondence to: M L Hazell
michelle.hazell@manchester.ac.uk

BMJ 2008;336:1423-6
doi:10.1136/bmj.39568.623750.BE

This article is an abridged version of a paper published on bmj.com. Cite this article as: *BMJ* 2008, doi: 10.1136/bmj.39568.623750.BE

ABSTRACT

Objectives To follow a population of preschool children with and without parent reported wheeze over a period of 6-11 years to determine prognosis and its important predictive factors.

Design Longitudinal series of five postal surveys based on the international study of asthma and allergies in childhood questionnaire carried out between 1993 and 2004.

Setting Two general practice populations, south Manchester.

Participants 628 children aged less than 5 years at recruitment and those with at least six years' follow-up data.

Main outcome measures Parent completed questionnaire data for respiratory symptoms and associated features.

Results Of 628 children included in the study, 201 (32%) had parent reported wheeze at the first observation (baseline), of whom 27% also reported the symptom on the second occasion (persistent asthma). The only important baseline predictors of persistent asthma were exercise induced wheeze (odds ratio 3.94, 95% confidence interval 1.72 to 9.00) and a history of atopic disorders (4.44, 1.94 to 10.13). The presence of both predictors indicated a likelihood of 53.2% of developing asthma; if only one feature was present this decreased to 17.2%, whereas if neither was present the likelihood was 10.9%. Family history of asthma was not predictive of persistent asthma among children with preschool wheeze.

Conclusion Using two simple predictive factors (baseline parent reported exercise induced wheeze and a history of atopic disorders), it is possible to estimate the likelihood of future asthma in children presenting with preschool wheeze. The absence of baseline exercise induced wheeze and a history of atopic disorders reduces the likelihood of subsequent asthma by a factor of five.

INTRODUCTION

Although most cases of asthma begin in early childhood, it has been difficult to predict which preschool

children with wheeze develop asthma in later years.[1] We followed the progress of children aged less than 5 years with and without parent reported wheeze at recruitment over 6-11 years. We determined the prevalence of persistent and transient wheeze and examined the effect of potential predictors on these outcomes to predict the likelihood of children having asthma in later years.

METHODS

The present longitudinal study forms part of the Wythenshawe community asthma project.[2] The methodology has been described.[3] Briefly, five surveys were carried out in two general practice populations in south Manchester in 1993, 1995, 1999, 2001, and 2004. For each survey we posted questionnaires to the parents or guardians of all children (<16 years) on the practice registers. Reminders were sent to non-responders after four and eight weeks. For the 1993 survey the proportion of people no longer living at the mailing address was estimated to be 5.4% of mailed adults.[2] The same proportion was assumed for children and was used for subsequent surveys. The questionnaire was based on that used by the international study of asthma and allergies in children.[4] As no agreed definition of asthma in preschool children exists, we used parent reported wheeze (wheezing or whistling in the chest in the past 12 months) as a marker for respiratory disease.

We considered four mutually exclusive cohorts for our analyses according to the receipt of two questionnaires (see bmj.com). As a comparison of the prevalence of wheeze in the second survey showed no significant differences between the four cohorts we combined these for the present analyses.

We included only children aged less than 5 years at baseline and with follow-up of more than six years. We categorised children according to the presence or absence of wheeze in the past year at the first observation (baseline), and in those for whom wheeze was reported, according to the presence of any of four features—being woken by wheeze at least once a week, speech disturbed by wheeze, exercise induced wheeze, and more than three attacks of wheeze in the past year.

According to responses to the first and last surveys we categorised the children into four outcome categories: no wheeze (wheeze not reported in either survey), late onset asthma (wheeze reported in last survey only), persistent asthma (wheeze reported in both surveys), and transient wheeze (wheeze reported in first survey only). We used wheeze reported in the second survey as a marker for asthma.

Analysis

We calculated the crude prevalence by dividing the number of children in an outcome category by the number of children included in the particular analysis. Prognosis was examined by determining the proportion of children with wheeze at baseline who developed persistent asthma and the proportion in whom the symptom was transient. For those for whom no wheeze was reported at baseline, we calculated the proportion with late onset asthma.

To determine the likelihood of having parent reported wheeze in school years, we categorised children according to whether or not wheeze was reported at recruitment. We estimated the effect of potential predictors on prognosis using multiple logistic regression analysis and multinomial logit models, treating each child as the unit of analysis. This effect was expressed as a regression coefficient with 95% confidence interval and P value.

For children with wheeze reported at recruitment, we included as potential predictors the four associated features of wheeze, age at entry into the study, sex, a family history of asthma, and a history of hay fever or eczema (a marker for atopic disorders). For children with no wheeze reported at recruitment we included these potential predictors minus the four associated features of wheeze. As the association between cohort and prevalence of wheeze was weak, we included cohort as a potential predictor in both analyses. To estimate the likelihood of asthma after age 5 years we also used multivariate analysis, but included only those potential predictors that had reached a 5% significance level in the first analysis.

RESULTS

Overall, 1281 under 5s had baseline data available for 1993 or 1995. Of these, 628 (49.0%) had 6-11 years of follow-up. Children for whom only baseline information was available were similar for potential predictors to those included in the analyses (see bmj.com).

Overall, 147 of the 628 (23.4%) children had transient wheeze; wheeze was persistent in 54 (8.6%) and they were classified as having persistent asthma, and 47 (7.5%) were categorised as having late onset asthma. The remaining 380 (60.5%) reported no wheeze in either survey. Thus, of 201 children with reported wheeze at baseline, 26.8% had persistent asthma.

Effect of potential predictors on prevalence of persistent wheeze among children with baseline wheeze adjusted for other potential predictors and cohort effect (n=201)

Variable	Adjusted odds ratio (95% CI)	P value
>3 attacks of wheeze in past year	1.53 (0.70 to 3.35)	0.29
Woken by wheeze	1.71 (0.80 to 3.66)	0.17
Speech affected by wheeze	0.82 (0.32 to 2.08)	0.67
Exercise induced wheeze	3.94 (1.72 to 9.00)	0.001
Age (one year)	1.29 (0.91 to 1.82)	0.15
Boy	1.99 (0.95 to 4.16)	0.07
History of atopic disorders*	4.44 (1.94 to 10.13)	<0.001
Family history of asthma	0.58 (0.17 to 2.04)	0.40
Cohort (reference 1995-2001):		
1993-2001	0.31 (0.06 to 1.48)	0.14
1995-2004	0.28 (0.04 to 1.84)	0.19
1993-2004	0.07 (0.005 to 1.02)	0.05
Overall cohort effect	—	0.23

*Hay fever or eczema.

WHAT IS ALREADY KNOWN ON THIS TOPIC

It has been difficult to predict which preschool children with wheeze will go on to develop asthma

Identifying simple predictive factors would improve the long term management of children and help in the planning of healthcare provision

WHAT THIS STUDY ADDS

Exercise induced wheeze and a history of atopic disorders in preschool children are significant predictors of future asthma

The absence of these two factors reduces the likelihood of asthma by a factor of five

Only history of atopic disorders (odds ratio 4.44, 95% confidence interval 1.94 to 10.13, P<0.001) and exercise induced wheeze (3.94, 1.72 to 9.00, P=0.001; table) had a significant effect on the prevalence of persistent asthma. Of 201 children with wheeze at baseline 37.8% and 52.7% had these potential predictors, respectively.

To predict the likelihood of asthma in school years in those presenting with wheeze at age less than 5 years, only the two significant predictors were included in the analysis (see bmj.com). Less than 11% of children with preschool wheeze but no added predictors reported wheeze in the second survey, compared with 17.2% of those who presented with exercise induced wheeze or a history of atopic disorders, and 53.2% of those with both predictors.

The effects of potential predictors on the reporting of wheeze at the second observation in those without wheeze at the first observation was examined. A history of atopic disorders was the only significant predictor of late onset asthma (2.78, 1.45 to 5.34, P=0.002). Being male (1.93, 1.00 to 3.71, P=0.05) and a family history of asthma (2.28, 0.92 to 5.63, P=0.75) did not reach statistical significance (see bmj.com).

DISCUSSION

Among preschool children with wheeze, we identified exercise induced wheeze and a history of atopic disorders as predictors of the development of persistent respiratory symptoms in later childhood. This population study followed the natural course of wheeze in more than 600 children aged less than 5 years at entry, over a period of 6-11 years. For preschool children we used wheeze as a marker of respiratory disease, whereas for school aged children we followed other studies and used wheeze in the past year as a marker of asthma.[5-7]

About one third of preschool children were reported to have had wheeze in the past year, almost three quarters of whom were categorised to have only transient symptoms. These results are similar to those reported in three other large studies.[1 8 9]

The only significant predictors of persistent asthma were a report of exercise induced wheeze at baseline and a history of atopic disorders. No significant difference was found between the size of effect exerted by each. None of the other features of wheeze at baseline had any significant effect on prognosis. In the present study only half (53.2%) of the children presenting with preschool wheeze together with both exercise induced wheeze and a history of atopic disorders developed persistent asthma, whereas if only one of these predictors was present the likelihood fell to 17.2%. If neither was present, the likelihood of later asthma was only 10.9%.

Although biased estimates of prevalence and remission cannot be ruled out, we reduced the likelihood of measurement error by using identical questionnaires on four occasions. Selection bias was also reduced by using a general population survey rather than including specific groups. Also, two reminders were sent to non-responders in each survey to maximise response rate.

The estimate of 5.4% of non-responders who no longer lived at the mailing address, used for adjustment in all four surveys, was based on information from the first survey and may have changed over the observation period. It is, however, likely to be a conservative figure.

Only half of those replying to the first survey were included in these analyses, mainly because of the strict inclusion criteria and population mobility. Although this may have been a source of bias, no important differences were found between those responding on the first occasion and those included in this study. Finally, for the analyses we combined four separate cohorts with different lengths of observation. To adjust for this, we included cohort as a potential predictor in the multivariate analyses.

Conclusion

Wheeze is transient in about three quarters of under 5s. Using baseline exercise induced wheeze and a history of atopic disorders as predictors, it is possible to estimate a likelihood of future asthma in children presenting with preschool wheeze. The absence of baseline exercise induced wheeze and a history of atopic disorders reduces the likelihood of subsequent asthma by a factor of five.

We thank the patients and staff at the two general practices for their help and cooperation.

Contributors: See bmj.com.

Funding: The four surveys were funded by grants from the NHS Executive (RDO/28/1/01), Allen & Hanburys, Manchester airport, and Astra Zeneca. None of the funding bodies had involvement in the data collection or analysis, the preparation of manuscripts or the decision to submit papers for publication.

Competing interests: PIF has received fees for attending meetings from GlaxoSmithKline and Merck Sharp & Dohme and funds for research and travel grants from GlaxoSmithKline, Boehringer Ingelheim, and Merck Sharp & Dohme. MLH has received a fee for speaking from Boehringer Ingelheim and travel grants from GlaxoSmithKline, Boehringer Ingelheim, and Merck Sharp & Dohme. MFL has received travel grants from GlaxoSmithKline. TLF has received fees for speaking from GlaxoSmithKline, Boehringer Ingelheim, Schering Plough, Pfizer, and Astra Zeneca; funds for research from GlaxoSmithKline, Boehringer Ingelheim, Merck Sharp & Dohme, and Schering Plough; funds for consultancy from GlaxoSmithKline, Chiesi Pharmaceuticals, and Pharmacia; and travel grants from GlaxoSmithKline, Boehringer Ingelheim, Astra Zeneca, Chiesi Pharmaceuticals, and Merck Sharp & Dohme.

Ethical approval: Ethical approval was not required for the first two postal questionnaire surveys. The last two surveys were approved by south Manchester local research ethics committee.
Provenance and peer review: Not commissioned; externally peer reviewed.

1 Lowe LA, Simpson A, Woodcock A, Morris J, Murray CS, Custovic A. Wheeze phenotypes and lung function in preschool children. *Am J Respir Crit Care Med* 2005;171:231-7.
2 Frank P, Ferry S, Moorhead T, Hannaford P. Use of a postal questionnaire to estimate the likely under-diagnosis of asthma-like illness in adults. *Br J Gen Pract* 1996;46:295-7.
3 Frank PI, Wicks PD, Hazell ML, Linehan MF, Hirsch S, Hannaford PC, et al. Temporal change in the prevalence of respiratory symptoms and obstructive airways disease 1993-2001. *Br J Gen Pract* 2005;55:596-602.
4 Keil U, Wieland S. International asthma and allergy study. *Lancet* 1992;340:46.
5 Kuehni CE, Brooke AM, Silverman M. Prevalence of wheeze during childhood: retrospective and prospective assessment. *Eur Resp J* 2000;16:81-5.
6 Garcia-Marcos L, Suarez-Varela MM, Canflanca IM, Garrido JB, Quiros AB, Lopez-Silvarrey Varela A, et al. BCG immunization at birth and atopic diseases in a homogeneous population of Spanish schoolchildren. *Int Arch Allergy Immunol* 2005;137:303-9.
7 Masoli M, Fabian D, Holt S, Beasley R. The global burden of asthma: executive summary of the GINA Dissemination Committee report. *Allergy* 2004;59:469-78.
8 Morgan WJ, Stern DA, Sherrill DL, Guerra S, Holberg CJ, Guilbert TW, et al. Outcome of asthma and wheezing in the first 6 years of life. *Am J Respir Crit Care Med* 2005;172:1253-8.
9 Kurukulaaratchy RJ, Fenn MH, Waterhouse LM, Matthews SM, Holgate ST, Arshad SH. Characterization of wheezing phenotypes in the first 10 years of life. *Clin Exp Allergy* 2003;33:573-8.

Accepted: 9 April 2008

Body piercing in England: a survey of piercing at sites other than earlobe

Angie Bone,[1] Fortune Ncube,[1] Tom Nichols,[1] Norman D Noah[2]

[1]Centre for Infections, Health Protection Agency, London NW9 5EQ
[2]London School of Hygiene and Tropical Medicine, London WC1E 7HT

Correspondence to: A Bone, South West London Health Protection Unit, Lupin Ward, Jasmine Tower, Springfield Hospital, London SW17 7DJ abone@nhs.net

BMJ 2008;336:1426-8
doi:10.1136/bmj.39580.497176.25

ABSTRACT

Objectives To estimate the prevalence of body piercing, other than of earlobes, in the general adult population in England, and to describe the distribution of body piercing by age group, sex, social class, anatomical site, and who performed the piercings. To estimate the proportion of piercings that resulted in complications and the proportion of piercings that resulted in professional help being sought after the piercing.

Design Cross sectional household survey.

Setting All regions of England 2005.

Participants 10 503 adults aged 16 and over identified with a two stage selection process: random selection of geographical areas and filling predefined quotas of individuals. Results weighted to reflect the national demographic profile of adults aged 16 and over.

Main outcome measures Estimates of the prevalence of body piercing overall and by age group, sex, and anatomical site. Estimates, in those aged 16-24, of the proportion of piercings associated with complications and the seeking of professional help.

Results The prevalence of body piercing was 1049/10 503 (10%, 95% confidence interval 9.4% to 10.6%). Body piercing was more common in women than in men and in younger age groups. Nearly half the women aged 16-24 reported having had a piercing (305/659, 46.2%, 42.0% to 50.5%). Of the 754 piercings in those aged 16-24, complications were reported with 233 (31.0%, 26.8% to 35.5%); professional help was sought with 115 (15.2%, 11.8% to 19.5%); and hospital admission was required with seven (0.9%, 0.3% to 3.2%).

Conclusions Body piercing is common in adults in England, particularly in young women. Problems are common and the assistance of health services is often required. Though serious complications requiring admission to hospital seem uncommon, the popularity of the practice might place a substantial burden on health services.

This article is an abridged version of a paper that was published on bmj.com. Cite this article as: *BMJ* 2008, doi: 10.1136/bmj.39580.497176.25

INTRODUCTION

Few data indicate how many people have had a cosmetic body piercing, how often it is performed, and how often complications occur. Three surveys of the general population provide estimates of prevalence of body piercing (excluding earlobe piercing) of between 6.7% and 14%.[1-3] Two of these were recent studies, but none of them was performed in the United Kingdom. Complications are estimated to develop in 17% to 70%.[4-7]

The annual incidence of auricular perichondritis more than doubled from 1990-1 to 1997-8,[8] possibly because of the increasing popularity of high ear piercing—that is, in the upper third of the pinna. On one survey of 115 general practitioners, 95% had seen a patient with a complication of piercing.[9] In another study 62 of 64 dentists had seen patients with lip or tongue piercings in the previous 12 months, and 44% of respondents had seen patients with associated oral health problems.[10]

We estimated the prevalence of body piercing in England in those aged 16 and over; the proportion of piercings that resulted in complications; and the proportion of piercings that resulted in complications serious enough for further help to be requested.

METHODS

A market research company carried out the survey in January to March 2005 in 10 regions in England. See bmj.com for full details of the sampling process. A total of 694 different neighbourhoods were sampled, which were considered to be representative of neighbourhoods in England.