

Pet birds and lung cancer

EDITOR,—In response to John Britton and Sarah Lewis's editorial on the risk of lung cancer associated with exposure to birds and possible confounding by heavy smoking by those who kept birds,¹ we wish to point out that our study did assess the total number of cigarettes smoked by cases and controls up to five years before the diagnosis of lung cancer, and the number of smoking years.² We did not present these findings in our paper since there was no significant difference in the total exposure to cigarettes between smokers with pet birds and those without.

As there was some discrepancy between our findings (in 239 cases)² and those of Gardiner and colleagues (in 143 cases),³ we wish to point out the differences in the studies. Our cases were incident, and a reasonable participation rate was achieved among the cases and controls. The British study seems to have been of prevalent lung cancers, with diagnoses five years before the study; thus there is the possibility that, owing to the high mortality from lung cancer, people with severe disease (who may have had more birds) were lost during this period. No information was provided on the participation rates among the cases, and duration of exposure was not analysed. From the non-significant point estimates of the odds ratios (which were close to 2.0 for people who kept birds 10 to 20 years before admission and 2.2 for employees of pet shops and keepers of caged birds) it seems that the British study lacks the power to provide a definitive answer to the hypothesis in question.

More importantly, the validity of hospital based controls reflecting the true underlying distribution of the exposure of the population is questionable. Exposure to birds among patients who develop clinically severe heart disease might well be greater than that in the population at large (they may have a passive lifestyle). If this is also a predictor of bird keeping, an overrepresentation of the underlying population exposure to birds is expected. Differences between the odds ratios for the orthopaedic controls and the heart disease controls confirm this expectation. In general, selection and power in this study need to be questioned.

The findings of the three independent studies on the subject¹⁻³ confirm the hypothesis that exposure to birds (or bird faecal products) increases the risk of lung cancer. Work should now concentrate on the aetiology—whether viral, fungal, or physical—and means of prevention.

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- 1 Britton J, Lewis S. Pet birds and lung cancer. *BMJ* 1992;305:970-1. (24 October.)
- 2 Kohlmeier L, Armingier G, Bartolomeycik S, Bellach B, Relun J, Thamm M. Pet birds as an independent risk factor for lung cancer: case-control study. *BMJ* 1992;305:986-9. (24 October.)
- 3 Gardiner AJS, Forey BA, Lee PN. Avian exposure and bronchogenic carcinoma. *BMJ* 1992;305:989-92. (24 October.)
- 4 Holst PA, Kromhout D, Brand R. Pet birds as an independent risk factor for lung cancer. *BMJ* 1988;297:1319-21.

EDITOR,—John Britton and Sarah Lewis suggest¹ that the increased risk of lung cancer associated with exposure to pet birds^{2,3} might have arisen because of failure to adjust for confounding effects of smoking. This could not have been so in our study.⁴ Our control groups showed no relation between keeping birds and any index of smoking habits (table). Keeping birds was also not correlated with social grade, contrary to Britton and Lewis's assumptions (table). Pigeon keepers were more commonly of social grade D, but they did not smoke more—indeed, they were more commonly never smokers than other controls.

Britton and Lewis suggest restricting attention to lifelong non-smokers. This would require another study. There were only five cases of lung cancer in lifelong non-smokers (of whom two had kept birds, though none pigeons) in our study,⁴ only one in Holst's study,³ and only 11 in Kohlmeier and colleagues'.¹

Kohlmeier and colleagues question lack of power and the method of selecting controls in our study. Since our study looked at three times as many cases of lung cancer as did Holst's it had adequate power to meet our objective, which was to confirm or deny the strong association that he reported. The power was, however, inadequate to confirm or deny the weaker association reported by Kohlmeier and colleagues.

Choice of controls is a contentious issue. We did not use population controls because we thought that being ill and in a hospital environment may affect answers to questions and because of likely differential non-response rates—which are clearly evident in Kohlmeier and colleagues' study. Our hospital controls were easy to obtain and caused no problems with non-response: all subjects approached agreed to be interviewed. To guard against bias arising if a control disease was itself related to keeping birds we used two control groups. Frequency of keeping birds was similar in

the heart disease and orthopaedic controls, which suggests that any bias is minor.

We agree with Kohlmeier and colleagues that the overall evidence is consistent with exposure to birds increasing the risk of lung cancer. Combining the relative risks of 6.7,² 2.14,³ and 1.58¹ by meta-analysis gives an estimate of 2.21 (95% confidence interval 1.54 to 3.16). Though we agree that examination of the possible aetiology is important, we are more cautious in our interpretation and prefer to see results from other studies, both epidemiological and ecological, before considering that a hazard has certainly been shown.

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- 1 Britton J, Lewis S. Pet birds and lung cancer. *BMJ* 1992;305:970-1. (24 October.)
- 2 Holst PAJ. *Bird keeping as a source of lung cancer and other human diseases. A need for higher hygienic standards.* Heidelberg: Springer-Verlag, 1988.
- 3 Kohlmeier L, Armingier G, Bartolomeycik S, Bellach B, Rehm J, Thamm M. Pet birds as an independent risk factor for lung cancer: case-control study. *BMJ* 1992;305:986-9. (24 October.)
- 4 Gardiner AJS, Forey BA, Lee PN. Avian exposure and bronchogenic carcinoma. *BMJ* 1992;305:989-92. (24 October.)

EDITOR,—In the two recent case-control studies exploring the association between pet bird keeping and risk of lung cancer the proportion of people who had ever kept pet birds is comparable for cases (41% in L Kohlmeier and colleagues' study¹ and 50% in Austen J Gardiner and colleagues' study²) but drastically different for controls (24% and 51% respectively). These differences raise the question of whether one of the two control groups was inadequate.

A possible source of selection bias in Kohlmeier and colleagues' study is that people who kept birds were more reluctant to receive interviewers at their house than those who did not. This selection bias would affect only controls since cases were interviewed in hospital. Of the 635 controls contacted, 137 (22%) refused to participate. I have computed that if 51% of the non-participating controls kept birds the odds ratio for lung cancers would be

Relation of bird keeping to smoking and social grade among 286 control subjects. Values are numbers (percentages)*

| Characteristic | All controls | Ever kept pet birds | Kept pet birds 5-14 years before admission | Ever kept pigeons |
|-----------------------------------|--------------|---------------------|--|-------------------|
| Smoking habit: | | | | |
| Never smoked | 63 (22) | 36 (24) | 14 (32) | 7 (41) |
| Ex-smoker | 108 (38) | 53 (36) | 14 (32) | 4 (24) |
| Current smoker: | | | | |
| Pipe only | 6 (2) | 4 (3) | 2 (5) | |
| Cigar only | 5 (2) | 3 (2) | 2 (5) | 1 (6) |
| Hand rolled only | 9 (3) | 3 (2) | | |
| Manufactured cigarettes only: | | | | |
| 1-19/day | 35 (12) | 16 (11) | 3 (7) | 1 (6) |
| 20/day | 25 (9) | 11 (7) | 2 (5) | 2 (12) |
| >20/day | 25 (9) | 15 (10) | 5 (11) | 2 (12) |
| Other (mixed, quantity not known) | 10 (3) | 6 (4) | 2 (5) | |
| Social grade: | | | | |
| AB | 11 (4) | 5 (3) | | 1 (6) |
| C1 | 55 (19) | 34 (23) | 12 (27) | 2 (12) |
| C2 | 106 (37) | 52 (35) | 17 (39) | 4 (24) |
| D | 110 (38) | 56 (38) | 15 (34) | 10 (59) |
| Housewife | 4 (1) | | | |
| Total | 286 (100) | 147 (100) | 44 (100) | 17 (100) |

*Differences shown were not significant after adjustment for age.

Advice to authors

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