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Letter to the editor of Heliyon re: *De novo* congenital malformation frequencies in children from the Bryansk region following the Chernobyl disaster (2000–2017). Heliyon. 2020; 6(8): e04616

Sir

The article by Korsakov et al. [1] compares the prevalence at birth of polydactyly (PD), limb reduction defects (LRD), and multiple congenital malformations (MCM) in the south-west territory (SWT) of the Russian Oblast Bryansk (which is bordering on Gomel Oblast in Belarus and which was highly contaminated from the radioactive fallout of the Chernobyl accident) to the respective prevalence in two districts of Bryansk with little radioactive and chemical contamination (Kletnyansky and Mglinsky). They also conducted a pooled analysis of these three categories of congenital malformations (Total CM). They found that "the sum of all congenital malformations was 3.5–4.6 times higher in contaminated regions in comparison with the control group".

To check the results I conducted Poisson regressions of the annual numbers of Total CM, i.e. for PD, LRD, and MCM combined, in the three study regions CP (for chemical pollution), RC (radioactive contamination), and CC (combined chemical and radioactive contamination). No case numbers of CM are given in Table 3, only the prevalence. Thus, the case numbers (O) needed for the Poisson regression had to be determined by the number of births (N) times the prevalence (pCM).

In each of the three study regions, the prevalence pCM1 was compared with the prevalence pCM0 in the control region (ES, for ecologically safe territories). The results are shown in the table below, together with the relative risks RR = pCM1/pCM0, the 95% confidence intervals of RR, and the two-sided p-values (t-tests). For comparison, the p-values from Table 4 in [1] are added.

comparison	pCM1[a]	pCM0[a]	RR	95% CI	p-value	p-value[b]
CP vs. ES	2.07	0.45	4.62	(1.62–22.35)	0.023	0.001
RC vs. ES	2.13	0.45	4.76	(1.77–18.61)	0.011	0.007
CC vs. ES	2.55	0.45	5.71	(2.05–24.85)	0.008	0.001

[a] per 1000 births.
[b] values from Table 4 in [1].

The p-values in Table 4 do not agree with those determined in my regression analyses. The discrepancy might be explained by differences in the statistical tests used. In my regression analysis, a t-test is used which adjusts the results for overdispersion.

The large relative risks, ranging from 4.6 to 5.7, are driven by a very low prevalence of 0.45 per 1000 in the control region which translates to only 3 CM cases. In the EUROCAT register, the prevalence of multiple congenital anomalies (MCA) is stated as 1.58 per 1000 [2] while, in Table 4, the prevalence of MCM is 0.19 per 1000 in the control region. This large discrepancy should have been discussed by the authors of [1]. Thus, a prevalence for Total CM of 0.45 per 1000, based on only 3 cases in 18 years, seems highly unlikely.

A larger control region, e.g. the oblast of Bryansk without the highly contaminated south-west territory should have been used in [1]. Unfortunately, data for Bryansk Oblast as a whole is not provided in [1]. In an alternative approach, I compared the CM-prevalence in areas with both chemical and radioactive contamination (CC) with the prevalence in areas with only chemical pollution (CP). Assuming that the risks from radioactive- and chemical pollution are additive, the difference in prevalence in areas CC and CP may then be attributed to radiation exposure. With N = 21,009, O = 54 in area CC and N = 93,581, O = 193 in area CP the relative risk in area CC vs. area CP is 2.55/2.07 = 1.24. Using a chisquare test, the p-value was p = 0.169. To adjust the result for over-dispersion, I conducted a combined Poisson regression which yielded a relative risk of RR = 1.24 (95% CI: 0.82, 1.81), p = 0.305 (F-test).

The present result can be compared with results of a study of two sentinel congenital malformations, neural tube defects (NTD) and microcephaly/microphthalmia (M/M), in the Oblast Rivne of Ukraine [3]. During 2000–2012, the rate of NTD was greater in the highly contaminated northern part (Polissia) of Oblast Rivne with 2.41 per 1000 (O = 236, N = 98,069) than in the less contaminated southern part (non-Polissia) with 1.75 per 1000 (O = 174, N = 99,429), a relative risk of 1.38. The rate of M/M was also higher in Polissia (0.86 per 1000, O = 84) than in non-Polissia (0.52 per 1000, O = 52), a relative risk of 1.65.

To conclude, the present analysis exhibits an increased prevalence of congenital malformations, albeit not statistically significant, in the highly contaminated south-west territory of Oblast Bryansk. The statistical power of the study could be substantially increased if all birth defects were included. Furthermore, a pooled analysis with data from Oblast Gomel in Belarus is recommended.

Declarations

Author contribution statement

Alfred Körblein: Wrote the paper.

Competing interest statement

The author declares no conflict of interest.

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