



Survey of Delivery Outcomes Among Employees at MRI Facilities in Japan Based on Records of the Maternal Handbook

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Magnetic resonance imaging (MRI) is a diagnostic imaging technique which uses strong static magnetic fields (SMFs) for image acquisition. There have been no clear reports of non-ionizing radiation (NIR) from MRI equipment exerting a harmful effect on fetal development and growth [1]; however, the latest epidemiological study reported on 1993 [2]. An update of the information is currently required since the field intensity used in MRI systems has increased from 1.5 to 3 T. The present study collected pregnant reports (records of the maternal handbook) from female employees at MRI facilities in Japan based on mail survey. Influence of occupational NIR exposure from MRI systems on delivery outcomes (premature birth and low birth weight) was analyzed.

We sent 2241 questionnaires to female employees working at MRI facilities in Japan in February and March 2018 to survey their pregnant reports. After the exclusion of invalid data, the number of valid answer in the present study was 258. The total number of delivery was 439 cases. Respondents were divided into 3 groups, 1) NIR (-): not exposed to NIR (n=173), 2) NIR (+): exposed to NIR only before pregnancy (n=68), 3) NIR (++): exposed to NIR both before and during pregnancy (n=198). Binominal logistic regression analysis was performed to examine the effects of NIR on the occurrence of premature birth and low birth weight. Smoking, alcohol intake, pregnancy over 35, and BMI were selected as variable for the analysis. Adjusted odds ratio was calculated using these variables and NIR (-) was used as a reference. The IBM SPSS 25 software was used for statistical analyses. Statistical significance was set at $p < 0.05$.

Adjusted odds ratio (OR) for premature birth was NIR(+):1.741 (95% CI: 0.682-4.447) and NIR(++):0.552 (95% CI: 0.225-1.354) and for low birth weight was NIR(+):1.082 (95% CI: 0.459-2.552) and NIR(++):0.520 (95% CI: 0.248-1.092), respectively when NIR (-) was a reference.

In conclusion, these results imply that NIR exposure during MRI scan duty had no influence on delivery outcomes.

References

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- [2] Kanal E, Gillen J, Evans JA, Savitz DA, Shellock FG. Survey of reproductive health among female MR workers. *Radiology.* 1993 May;187(2):395-9.