Association of Individual and Combined Exposure to Bisphenol and Serum Thyroid Hormones Level in Adults and Pregnant Woman: A Systematic Review and Meta-Analysis

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Abstract:

Background: Environmental factors influence thyroid malfunction; Bisphenols are a class of endocrine-disrupting substances widely detected in global populations. As awareness of its toxicity increased, BPA was substituted with presumably less toxic alternatives, such as bisphenols S, F, and AF. The present meta-analysis examines the association of individual and combined exposure to bisphenol and serum Thyroid hormone levels in Adults and Pregnant Women.

Material and Methods: A comprehensive search was conducted on PubMed, Web of Science, Embase, and Cochrane Library databases, resulting in the retrieval of a total of 4160 articles, utilizing both prospective and cross-sectional research designs. In total, aggregate hazards for the reliability of the included studies were also evaluated using a random effect model. Heterogeneity was performed by using the I^2 test.

Results: 14 studies were deemed eligible for our analysis. Overall, fixed model summary estimates indicated the negative association between BPA and TSH in adults with regression coefficient β=0.02 and [95% CI: -0.04; -0.0]. Meanwhile, marginally significant results also found an association between BPA and TT4 in adults. The overall summary showed that there is no association between bisphenols and thyroid hormones in 1st and 2nd Trimester of Pregnant women. Subgroup analysis in females revealed a positive association between BPA and TSH, a negative relationship with BPA and TSH with the effect size β=0.01, [95% CI: 0.00; 0.01] and β= -0.09, [95% CI: -0.17; -0.01], respectively.

Conclusion: There were notable gender-based disparities in the impact of BP on the levels of thyroid hormones. Bisphenols have the potential to exert a substantial influence on the concentrations of thyroid hormones in males, females, adults, and pregnant women. Data was not enough to analyze BPF and BPB exposure to thyroid hormones, so conducting a comprehensive study on the association of combined exposure to bisphenols and thyroid hormones in adults and pregnant women is suggested.

Key Words: Bisphenol A, Bisphenol B, BPS, BPB TBPA, Thyroid hormones (TSH, T_3, T_4, TT_3, TT_4, FT_3, FT_4), thyroxine, triiodothyronine, Free thyroxine, triiodothyronine, Thyroid stimulating hormone, Thyroid dysfunction.