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Study of the effect of green tea extract as an iron chelating agent in tuberculosis adjuvant therapy and supression of malondialdehyde levels

Green tea with possessing iron chelating properties can be useful in TB treatment and management. We studied the effect of green tea consumption on iron status and improving process of pulmonary tuberculosis treatment (accelerating the negative sputum smear, reducing the level of oxidative stress). Following the approval by Ethics Committee for Human Studies of Golestan and Tehran Universities of Medical Sciences and also obtaining the written consent of patients, this double-blinded randomized clinical trial study was conducted on patients with TB who were assigned randomly to the intervention group (41 patients) receiving 500mg catechin of green tea extract and the control group (39 subjects) receiving placebo for two months, since the beginning of concomitant anti-TB treatment. Sputum evaluation was carried out on three slides using the Ziehl Nelson method. At first, the demographic and dietary intake data were obtained. After obtaining 10ml of venous blood, Hemoglobin (Hb), Transferrin, Ferritin, Total iron binding capacity (TIBC), Iron and Serum malondialdehyde (MDA) were measured at the beginning and end of the study.

Sputum samples were collected from the third week (every 10 days) and the reduction of microbial load was also tested until sputum smear became negative. Data were processed using independent and paired t-test, McNemar, Wilcoxon, Kaplan-Meier, Log-rank test and Cox regression model. P-value was taken significant as <0.05. Average daily energy intake of patients was 1518 ± 431 kcal, distribution of which was as follow: carbohydrates (58%), protein (17%) and fat (22%). Vitamin D and Zinc intake of patients were less and iron intake was higher than the DRI. Weight changes in both groups of placebo and green tea had tendency of increase with a significant difference at two and six month follow ups ($p<0.0001$). However, there were no significant changes due to intervention compared to placebo. Sputum conversion time (days) was 52.5 ± 24.5 (median= 53 days) and 40.6 ± 22.5 (median= 29 days) in placebo and catechin groups, respectively. The proportion of patients in the green tea group based on criterion of; the short duration of being negative sputum smear; was significantly

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higher than the placebo group (p=0.032). To measure the mean of iron status after intervention, ANCOVA test showed mean difference level (P value) in both groups for Hb, iron, TIBC, transferrin and ferritin as of: 0.004, 0.56, 0.65, 0.38 and 0.16, respectively which means that increase of hemoglobin in the green tea group was significant compared with the placebo group. There was just a 9.2nmol/ml difference between the two groups for MDA at the beginning of study which was not statistically significant (p=0.078) whereas, it was increased to 24.8nmol/ml after the intervention, indicating a significant difference (p<0.001). The decline value was estimated -45.45±14.69nmol/ml for catechin group and -19.91±18.38nmol/ml for placebo group. In conclusion green tea can systematically reduce the inflammatory elements and oxidants (decrease of MDA as fatty acids oxidation indicator) and consequently, can improve the hematopoiesis and hemoglobin level. Therefore, localized inflammation and damage in the lung is reduced and adjunct to antimicrobial therapy, accelerate sputum smear conversion, disease amelioration and treatment improvement. Finally, given the higher iron intake despite of lower micronutrients and macronutrients in diet of our patients, and considering the iron effect on mycobacterium survival and the incidence and exacerbation of inflammatory complications in patients, it seems that policy of mandatory flour fortification with iron, especially in provinces such as Golestan, must be viewed cautiously and its further implementation being revised meticulously.

Biography

Eghtesadi S received Bachelor degree in Nutrition Science and Food Chemistry 1975, from Shahid Beheshti University of Medical Sciences, Tehran; MSPH degree in Nutrition, 1977, from Tehran University of Medical Sciences, Tehran and PhD from University of California at Davis(UCD), USA, in Nutrition (1985). He served as Visiting Scientist in USDA Human Nutrition Research Center on Aging (HNRCA) at Tufts University, Boston, USA (1994-1995); Full professor of Tabriz, Iran and Tehran Universities of Medical Sciences and currently serves as Professor of Azad University, Science & Research Branch. He was the chairs of Departments of Nutrition and Biochemistry, Biochemistry & Clinical Nutrition, Public Health Nutrition and Nutrition in aforementioned Universities respectively. Also served as Associate Dean and Dean of School of Public Health & Nutrition and School of Public Health of Tabriz and Iran Universities of Medical Sciences respectively. He was selected as distinguished professor and Scientist in preceding universities. For long and extended period of time, experienced teaching various courses in nutrition in undergraduate, graduate and postgraduate and international bureau programs and directed many projects and dissertations of MS and PhD programs and published numerous peer reviewed articles in journals and also edited several books and finally served as Principal Investigator of World Bank Project for Capacity Building in Nutrition in Iran.