**Total Dietary Studies and Food Safety Assessment in Taiwan-Food Preservatives as an Illustration**

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**ABSTRACT**

This second total diet study (TDS) in Taiwan was initiated to assess the health risk posed on general consumers from the dietary intake of benzoic acid and sorbic acid as an illustration of a risk assessment of food preservatives. Health risk was assessed by estimating the ratio of the exposure level to the acceptable daily intake (ADI) level of an analyte. This ratio, known as the hazard index (HI), must be less than 100% to ensure no health risk of concern. The ADI values were obtained from the Joint FAO/WHO Expert Committee on Food Additives (JECFA). The present TDS was conducted based on the two analytes, benzoic acid and sorbic acid. Exposure levels of the analytes were determined by using three sets of local data: 1) the analyte concentrations (C) in pertinent food samples, 2) the individual consumption rates (CR) of these food samples, and 3) the body weight (BW) of consumers. C values were obtained by chemical analysis of the analytes in food samples, while CR and BW values were derived from the database of the Nutrition and Health Survey in Taiwan (NAHSIT). The HI values were calculated using the equation below and expressed as % ADI.

\[ HI = \sum \frac{C \times CR}{BW \times ADI} \times 100\% \]

A scheme was developed to select food items to represent the total diet consumed in Taiwan. Based on the NAHSIT database, the total diet was classified into 12 categories and 47 sub-categories. By ranking food consumption rates, 128 food items were selected to form a basic list for the TDS, which represented 83% of the total diet consumed daily in Taiwan. Taking into consideration the occurrence pattern of the analytes in foods, the list was adjusted to a total of 97 food items for sample collection and preparation for chemical analysis. Food products were purchased from 50 strategic sampling sites throughout Taiwan over two seasons (spring/summer and autumn/winter) for two consecutive years. Food samples were prepared according to the conditions of serving and were homogenized and mixed prior to chemical analysis to obtain data on C, of which the maximum concentration of each food item was used to make a conservative estimate. The BW of nine age groups and CR of individual food items by each age group were used as exposure factors in risk calculation. The results indicated that the levels of exposure to benzoates and sorbates of the general consumers at 95th percentile in Taiwan were below 50% ADI for benzoates and around 10% ADI for sorbates, which suggest relatively low risk of concern. The present TDS work has helped to renew and strengthen the framework of TDS in Taiwan and facilitate further similar risk assessment work on other target chemicals in food.

Key words: total diet study, health risk, food preservatives, benzoic acid, sorbic acid

**INTRODUCTION**

The Total Diet Study (TDS), also known as the “market basket study”, is a research exercise that determines the levels of various contaminants and nutrients in foods as actually consumed. From this information, dietary intakes of those analytes by population groups of a country or a defined region, and hence the associated health risk, can be assessed. Since its inception in 1961 as a program of the U.S. Food and Drug Administration (USFDA)¹ to monitor radioactive contamination of foods, the TDS has been performed by various regional, national and international food safety agencies on a continuing basis to survey a broad range of analytes in diets, including pesticide residues, industrial chemicals, and toxic and nutrient elements². A unique aspect of the TDS is that food samples are prepared as they would be consumed (table-ready) prior to analysis, so the analytical results provide the basis for a realistic estimation of the dietary intake of these