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Nationwide Variation of Sodium Levels and Portion Sizes of Chinese Restaurant Menu Items

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Abstract

Sodium levels are typically high in Chinese dishes due to the use of ingredients such as soy sauce. Chinese restaurants are popular among many Americans, outnumbering in total number the combined top three major fast food establishments. The Nutrient Data Laboratory expanded the number of Chinese foods in its USDA National Nutrient Database for Standard Reference with new analytical data. This study aimed to examine the variability of sodium and order size in Chinese entrées. Eleven popular entrées were sampled from independent restaurants in up to 12 nationwide locations and sent for nutrient analysis according to National Food and Nutrient Analysis Program protocol. Mean sodium levels ranged from 252 to 553 mg/100 g among the 11 entrées; differences in variability were indicated by CV's ranging from 13% (general Tso's chicken) to 56% (lemon chicken). The weight of an order varied among the different restaurants for each dish, creating an even greater impact on the sodium level per order. Sodium levels per order showed significant differences across four U.S. regions ($p < 0.0001$). The high variability of sodium levels in prepared Chinese foods impacts the amount of sodium consumed from these foods.

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1. Introduction

Americans have been advised to reduce their daily sodium intake to no more than 2,300 mg, or 1,500 mg for high risk populations¹. Over 90% of the American population consumes more than 2,300 mg sodium per day which is the Institute of Medicine (IOM) Tolerable Upper Intake Level (UL) for adults². In 2011-2012, the mean daily sodium intake was 3,478 mg for the U.S. population aged 2 years and older³. Men aged 40-49 years had the greatest mean daily intake (4,646 mg), more than twice the UL. This excessive sodium intake is of public health concern as it has been determined to be a major risk factor for hypertension, which is a key contributor to cardio- and cerebrovascular diseases^{4, 5}. Cardiovascular disease (CVD) is the leading cause of death in the U.S., accounting for 1 of every 3 deaths in 2010⁶. To help reduce this widespread incidence of CVD, several government and private institutions have set recommendations and guidelines for reduction of sodium intake^{1, 7, 8}.

As part of its strategies to reduce sodium consumption, the IOM recommends, “USDA should enhance the quality and comprehensiveness of sodium content information in its tables of food composition” and “monitor the sodium content of the total food supply”⁹. The Agricultural Research Service’s Nutrient Data Laboratory (NDL), in collaboration with other Federal agencies, is monitoring levels of sodium in commercially processed and restaurant foods which are the primary sources of sodium in the U.S. diet^{10, 11}. These efforts involve use of laboratory analyses or Nutrition Facts Panel information to update foods in the USDA National Nutrient Database for Standard Reference (SR), which is the foundation for most food composition tables, used by consumers, public health professionals, food manufacturers, restaurants and research scientists^{12, 13}.

Restaurant foods contribute substantial amounts of sodium to the U.S. diet¹⁴. Restaurants account for 25% of the sodium consumed by the overall U.S. population, and 50% for those reporting consumption of any restaurant foods, as reported in the 2007-08 What We Eat in America, National Health and Nutrition Examination Survey (WWEIA, NHANES)^{14, 15}. Chinese restaurants are ubiquitous in the United States¹⁶, found in cities and small towns across the country¹⁷. Numbering near 47,000¹⁸, Chinese restaurants exceed the number of top three major fast food establishments (McDonald’s, Burger King and Wendy’s) combined¹⁷. Salt is used liberally in traditional Chinese cooking, providing about 75% of the sodium consumed in China¹⁹. Other sources of sodium intake in China include soy sauce, preserved vegetables, tenderizers, noodles and monosodium glutamate¹⁹.

Independent restaurants are more numerous than major chain outlets serving Chinese food in the U.S.^{20, 21} -- in 2013 there were only 2,000 restaurant chains with Chinese menu items²². Independent restaurants may have less consistent recipes and preparation methods than restaurant chains, which introduces a greater chance of variability in food composition. Upon examining variability of mineral levels in foods, Pennington²³ suggested that variations in mineral levels in a Chinese dish were due to different ratios of meat to other ingredients across various restaurant locations. Regional differences may exist in cuisine from different parts of China. Anderson et al.¹⁹ found the use of discretionary salt is twice as high in Northern as in Southern provinces, contributing about 3,600 and about 1,800 mg/day, respectively. These regional differences likely impact the cooking styles of Chinese chefs in U.S. restaurants, reflecting the varying sodium levels of their cuisine.

The objective of this study was to explore the possible impact of individual restaurant, region of sample pick-up, and order size on the variability of sodium levels in commonly consumed dishes from Chinese restaurants in the U.S.

2. Methods

Popular Chinese menu items were sampled nationwide and analyzed to contribute to the sodium monitoring effort and to expand the Chinese restaurant category of foods in SR. NDL selected the following 11 Chinese restaurant entrées (excluding rice) for analysis based on WWEIA, NHANES 2005-06²⁴ and 2007-08²⁵ consumption data: beef and vegetables, chicken and vegetables, chicken chow mein, general Tso’s chicken, kung pao chicken, lemon chicken, orange chicken, shrimp and vegetables, sweet and sour pork, vegetable chow mein and vegetable lo mein. The

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