

Rice Consumption among US Adults with CD: Impact on Inorganic Arsenic Intake

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Objective

To assess rice consumption patterns of adults with celiac disease.

Background

- Inorganic arsenic is a known carcinogen and ingestion may cause an increased risk of certain cancers.
- The EPA and the FDA have limits on the amount of total arsenic that may be found in drinking water and bottled water, respectively of 10 micrograms per liter (1,2).
- The FDA recently proposed an action level of 10 ppb of inorganic arsenic in apple juice (same level set for water) (3).
- Several foods may contain inorganic arsenic and contribute to an individual's exposure, including rice and rice-based products.
- If individuals with CD have a largely rice-based diet inorganic arsenic may be an issue
- The EPA has set a reference dose for chronic oral exposure to inorganic arsenic of 0.3 micrograms per kg per day (4).
- FDA reports an average inorganic arsenic level of 6.7 micrograms per cup cooked non-basmati rice; 3.5 micrograms per cup cooked basmati rice; 3.5 micrograms per cup rice cereal; 5.4 micrograms per 2 rice cakes; 3.8 micrograms per cup rice beverage (5).

Methods

A survey containing questions on estimated weekly intake of servings of various categories of rice and rice products was posted on Survey Monkey for 30 days.

Figure 1: Reported number of white and brown rice servings per week (1 serving equals 1/2 cup cooked rice)

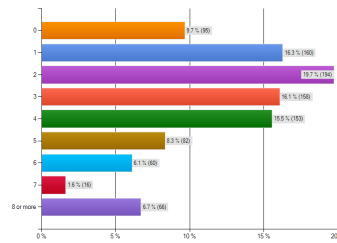


Figure 2: Reported number of servings of rice-based cereal (1 serving equals 1/2 cup cooked or 1 cup ready-to-eat)

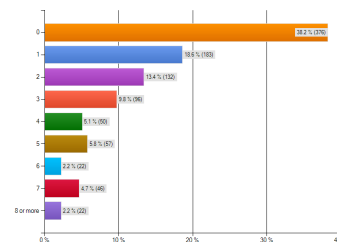


Figure 3: Reported number of rice-based pasta servings per week (1 serving equals 1/2 cup cooked pasta)

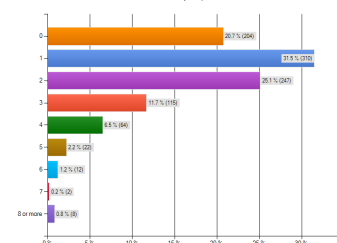


Figure 4: Reported number of rice-based bread and bread product servings per week (1 serving equals 1 ounce of product)

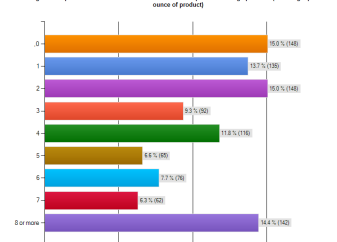


Figure 5: Reported number of rice-based crackers, chips, and rice cakes per week (1 serving equals 1 ounce of product)

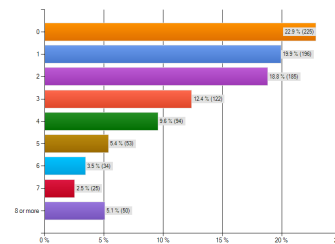


Figure 6: Reported number of rice-based tortilla servings per week (1 serving counts as 1 ounce of product)

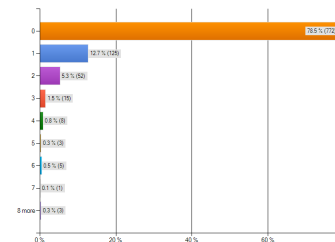


Figure 7: Reported number of rice-based cookie servings per week (1 serving counts as 1 ounce of product)

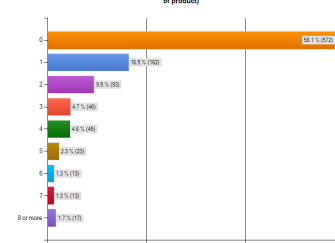


Figure 8: Reported number of rice-based milk substitute servings per week (1 serving equals 1 cup)

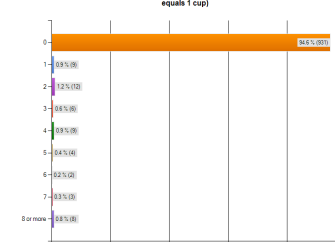
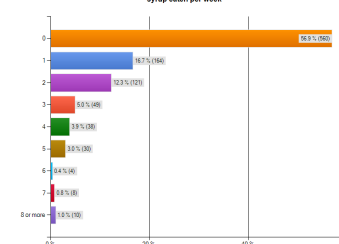


Figure 9: Reported number of snack/protein bars containing brown rice syrup or rice syrup eaten per week



Results

984 responses were received from individuals 18 years or older (13.8% men, 86.3% women) and biopsy diagnosed with celiac disease.

Using cumulative percentages, median servings per week were

Rice: 3 servings (interquartile range: 1 to 4 servings) (fig. 1)

Rice-based cereal: 1 serving (IQR: 0 to 3 servings) (fig. 2)

Rice-based pasta: 1 serving (IQR: 1 to 2 servings) (fig. 3)

Rice-based bread products: 3 servings (IQR: 1 to 6 servings) (fig. 4)

Rice cakes, crackers, chips: 2 servings (IQR: 1 to 4 servings) (fig. 5)

Rice-based tortilla: 0 servings (IQR: 0 servings) (fig. 6)

Rice-based cookies: 0 servings (IQR: 0 to 2 servings) (fig 7)

Rice-based milk substitute: 0 servings (IQR: 0 servings) (fig 8)

Snack bars containing rice syrup: 0 servings (IQR: 0 to 2 servings) (fig. 9)

Conclusion

Respondents consumed the greatest median number of servings from cooked rice, bread and bread products, and rice-based snack foods.

A hypothetical individual consuming median amounts from each category of product would consume 10 servings of rice products each week.

For each survey questions some individuals responded that they consumed the maximum number of servings which was listed as >= 8.

Based on these rice consumption patterns some individuals with celiac disease may be at risk of consuming above the EPA reference dose for chronic oral exposure to inorganic arsenic.

References

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