

Special Article

Understanding whole grain awareness and consumption in select Indian cohorts

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Background and Introduction: Grains are an integral part of Indian diet. Carbohydrates constitute to 60-70% of total daily calorie intake and grains are the key carbohydrate source. Including whole grains (WG) in the diet for its health benefits is recommended in dietary guidance around the world. There is consistent evidence to support existence of barriers to WG consumption in Indian population but limited evidence assessing their level of awareness and knowledge on WG. Thus, an independent survey was designed for assessing the level of awareness and consumption of WG amongst millennials and nutritionist and dieticians.

Data collection and analysis: Tool employed was self-developed questionnaire. SPSS software and MS Excel were used for analysing data.

Results: Only 2% of the surveyed millennials were aware of all aspects of WG. Nutritionists and dieticians showed better responses than millennials. Daily WG consumption in millennials was less than 10% (42 g/day) compared to total grain consumption (432g/day) across food categories. 50% nutritionists and dieticians consume oats for breakfast.

Conclusion:

Results highlight the importance of raising awareness on the knowledge and consumption of WG amongst urban Indian millennials. It also emphasises the need of national recommendations, encouraging consumers to make half of their total grain consumption as WG. A WG stamp from FSSAI for identification of products with considerable amount of WG and campaigns with public-private partnership supported by nutritionist, dieticians, culinary experts can further help in attaining the goal of a WG rich "Sustainable Healthy Diet" for a healthy living.

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Key words : Dieticians, Nutritionists, Urban millennials, Whole grains.

Whole grains became a part of the human diet about 10,000 years ago. Grains are an integral part of Indian diet. Carbohydrates constitute to 60-70% of total daily calorie intake and grains are the key carbohydrate source¹. Including whole grains (WG) in the diet is recommended in various international dietary guidance due to its association with increased health benefits and reduced risk of chronic disease. Whole grains consist of the intact, ground, cracked or hulled fruit of the grains where the primary components (bran, germ, endosperm) are retained within their natural ratio

(²) whereas refined grains contain only the endosperm. Whole grains are known for their high fibre, nutrients and bioactive compounds like high concentrations of vitamins; basic amino acids and numerous phytochemicals (antioxidants) which are mainly found in the bran and germ³. Micronutrients and phytonutrients that are present in whole grains play a crucial role in several metabolic pathways that aid in optimal immune function⁴. Oats and barley exhibit higher beneficial effect in reducing total and LDL cholesterol (3-8% reduction) in people with elevated lipid levels due to their soluble fibre content⁵.

Processing especially refining and polishing of the grains reduces their nutritive value and the healthfulness⁶⁻⁸. Hence, it is recommended to consume intact whole grains as a part of one's daily diet.

Eating a variety and replacing half of the grains consumed daily with whole grains has therefore been recommended by various international guidelines like Whole grain council, 2015-2020 Dietary Guidelines for

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Americans (DGA), and summary report of the EAT-Lancet Commission⁹⁻¹¹. To achieve planetary healthy diets by 2050, Eat-Lancet recommends¹², increased consumption of plant-based foods-including whole grains ie, 232 g of whole grains intake per day in a 2500kcal diet.

In a study by V. Mohan et.al conducted in urban population of Chennai, India⁽¹³⁾ it was found that refined cereals contributed to the bulk of the energy (45.8%), followed by visible fats and oils (12.4%) and pulses and legumes (7.8%). This evidently highlights that majority of energy requirement of Indian population is derived through refined cereals.

There is also consistent evidence to support existence of barriers^{14,15} to whole grain consumption. In a study by Vasudevan Sudha, author concluded that cooking quality and appearance of the grains were perceived as the most important factors to consider when purchasing rice among Chennai urban adults¹⁴. Other probable reasons contributing to low consumption of whole grains could be difficulty in identifying foods that contain whole grains, availability, palatability, high price, long cooking time or lack of strong and consistent messages that clearly communicate to the public the health benefits of eating more whole grains¹⁶. We also see, limited evidence of studies conducted to assess the level of awareness and knowledge on wholegrains amongst Indian population.

Thus, we decided to conduct 2 independent surveys amongst urban Indian population namely, millennials (consumers) and nutritionists and dieticians to assess the level of awareness of whole grains & estimated consumption of whole grains. The millennial population was targeted as they are more likely to drive consumption¹⁷ and can influence their peers as well as the upcoming generation. The urban millennial group in India constitutes 33% (at 450 million) of the country's total millennial population¹⁸.

We decided to include nutritionists and dieticians as one separate cohort considering their expertise in the field of nutrition. This was deemed to be necessary as the incidences of life style disorders are on the rise and hence people prefer professional assistance for diet recommendations.

MATERIALS AND METHODS

Sample Selection :

This cross-sectional study was focused on

understanding the awareness and consumption of whole grains in 2 cohorts, namely urban millennials (consumers) and nutritionists and dieticians.

Study Methodology :

For millennials this survey was conducted in 4 metro cities namely Delhi, Mumbai, Kolkata and Chennai from March 2018 to April 2018. For sample size selection, factors considered were a confidence level of 95%, confidence interval of 3, income status primarily focusing on middle income group. The estimated sample size was calculated based on the total population of millennials, aged 18 to 40 years in India (n = 463,920,049), derived from the Population Enumeration Data 2011, published by the Government of India⁽¹⁹⁾. A total of 1,000 millennials were selected as the final sample size in equal proportion across each of the four metropolitan regions (n =250 each). A standardized ratio of 1:1 for gender was used to determine the number of males and females in the selected sample. Data collection tool employed in this survey was a self-developed questionnaire administered online. Questionnaire was developed to understand awareness & consumption of participants along with basic information on demographic parameters like age and gender. The awareness questions captured data across 4 key elements; understanding of whole grain concept, benefits of consuming whole grain, recommended whole grain intake and awareness regarding food items containing whole grain. Questions on consumption included amount and frequency of whole grains consumed. The questionnaire used to gather inputs from the millennials was validated prior to survey by Euromonitor (leading global provider of market research), in-house survey experts, and with top independent nutritionists and dieticians from the country (eg, National Institute of Nutrition (NIN), Indian Dietetic Association (IDA), etc.) for the relevance and accuracy of questions concerning awareness and consumption of wholegrains in India. The survey was initially piloted among a sample of 100 millennials across the four cities, to test responses and check for any issues with the survey being run online, before carrying it out with the complete sample. Questionnaire was a blend of open and close ended questions.

Online surveys were distributed to consumers through leading panel providers who abide by the ICC / ESOMAR²⁰ code for ethical market research.

Respondents were screened to ensure pre-defined, nested quotas are met. These quotas were typically set to match the broader population of the country in terms of age and gender and consent from consumers / their agreement to specific terms and conditions while signing was taken.

For the second cohort of nutritionists and dieticians, structured pre validated questionnaire was used. Questionnaire was mainly designed to cover the aspects such as awareness on whole grains along with its benefits, recommended daily intake and consumption by the participants. Participants who voluntarily filled the forms were included in the survey. This survey conducted in December 2017 comprised of participants from various metro and non-metro cities and included practicing nutritionists and dieticians. From a total of 310 participants, 94% were females.

Statistical Analysis :

SPSS and MS Excel software were leveraged for analysing millennials data while only MS Excel was leveraged in case of nutritionists and dieticians. MS Excel was primarily used for frequency distribution analysis, while Statistical Package for Social Sciences statistical software package version 20.0 (SPSS Inc., Chicago, IL, USA) (SPSS) was used for conducting detailed analysis especially for determining the consumption of whole grains from different food types. Descriptive statistics were carried out; not inferential statistics.

Categorical data were presented as number and percentage. Continuous data were presented as mean. Univariate analyses were carried out using descriptive statistics. Since millennial survey was an online survey, there was the risk that participants could refer to published material online to answer the questions. All responses which were a direct replica of standard definition available online were thus considered to be outliers and removed from the dataset, before running the analysis.

Since not all questions in all the surveys were mandatory to answer, hence the sample numbers differ for different questions, and analysis was done based on the number of participants answering a particular question.

Results :

This survey focused on assessing awareness and consumption of whole grains in selected cohorts of

the study. A sample size of 1000 millennials (250 from each of the 4 metro cities) and 310 nutritionists and dieticians (from 4 metro cities and other tier 2 cities) completed this study. The demographic data collected for two cohorts under investigation revealed that maximum (45%) millennials were in the age group 31-35 years and had reasonable purchasing power considering the income data available. For nutritionists and dieticians 48% were in the age group 20-30 years while 31% were in the age group 31-40 years.

As discussed in the methods section, the survey was conducted using separate methodologies for each of the two cohorts.

As indicated in Table 1, the extent of awareness on whole grains in millennials was studied across 4 key elements understanding of whole grain concept, benefits of consuming whole grain, recommended whole grain intake and awareness regarding food items containing whole grain.

Findings suggest a lack of consistency in response to all 4 elements. Considering this variation, we decided to analyse certain crucial questions from each of the 4 elements, in a consolidated manner. The primary outcome was that only 2% (15 out of 1000) millennials were aware regarding the concept of whole grain in all respects.

In the millennial population, 86% participants believed that they were aware of the term wholegrain but, only 5.4% correctly responded to the question related to composition of wholegrain. This clearly reflects the gap in the understanding of the concept of whole grains. Regarding the health benefits of whole grains, 71% millennials mentioned that whole grains offer superior nutritional benefits compared to refined grains. However, on an average only 47% participants could correctly identify the specific health benefits. This points towards the lack of awareness in terms of health benefits of wholegrains. Further, only 44% of millennials aptly identified 48g or 3 table spoon to be the minimum recommended quantity of whole grains to be consumed in a day.

This disparity in the responses strongly highlights the need for focused efforts in increasing awareness with respect to understanding of whole grains and recommended intake of whole grains among millennials.

When similar survey and analysis was done for the second cohort comprising of, nutritionists and

Table 1 — Whole grain Awareness survey in millennials and nutritionists and dieticians		
Questions	Millennials	Nutritionists and dieticians
Understanding of whole grain concept		
Are you aware about the term 'whole grains'?	86% were aware	100% were aware
If you are aware about whole grains, what do you understand about whole grains?	5.4% defined correctly	40% defined correctly
Understanding regarding whole grain benefits		
Whole grains offer superior nutritional benefits compared to refined grains	71% Agreed 10% Disagreed 19% mentioned both to be similar in nutritional benefits	100% Agreed
Which among the following are the benefits of consuming whole grains?	On an average 47% answered correctly	Average 77% answered correctly
Recommended whole grain intake		
Are you aware of the minimum amount of whole grain one needs to consume in a day?/ How many grams are in <u>one</u> serving of whole grains?/ How many minimum servings of whole grains one needs to consume in a day?	44% said 48g or 3 tbsp 56% answered other than 48g or 3 tbsp	54% answered 32g in one serving 43% answered 3 servings
Awareness regarding food items containing whole grain		
Please select all the foods you believe contain whole grains, from the list / Which of these are made up of whole grains?	70.1% said brown rice 64.1% said Oats Rotis with multi grain ata 61.0% Brown bread 52.7% Corn flakes 41.2% White flour 37.0%	56% said Dalia
Do you believe foods that are enriched / fortified, provide the same benefits as whole grain foods?	53% said Yes	

dieticians, their responses as seen in Table 1 were found to be better than the first cohort of millennials. This describes the impact education can have on awareness. 40% nutritionist and dieticians correctly defined whole grains. Further, 54% correctly answered the questions based on number of grams present in one serving of whole grain and 56% participants were able to correctly identify the food that contained whole grains from the total list of foods made available to them. A very high percentage of participants in this cohort agreed to oats being a good source of fibre (99%) and 70% considered it to be a super grain.

The overall findings on awareness in both the cohorts reinforces the need for suitable Indian guidelines on wholegrain intake and recommendation on serve sizes, both of which could be considered as reference standard for awareness and can also drive the consumption of whole grains.

As a second objective of this survey, wholegrain

consumption in both the cohorts was also studied. Tables 2 and 3 describes consumption behaviour in millennials and nutritionist and dieticians, respectively.

It was found that 64% of millennials believed that they consume adequate amounts of wholegrain. To verify the same, analysis of further questions namely means to measure the quantity of whole grains, amount of whole grain consumption from refined and/or processed foods and amount of consumption of grains in the whole form was performed. However, results based on actual calculated daily grain consumption showed that whole grain consumption per day in millennials was less than 10% (42 g/day) when compared to total grain consumption (432g/day) across food categories (Fig 1). It was also found that average whole grain consumption per day from processed foods in this cohort was merely 5.85 g/day and 36.3g/day from unprocessed food. Low average consumption of whole grains from the millennial survey emphasises

Table 2 — Whole grain Consumption survey in millennials

Understanding of whole grain consumption by millennials	
In your opinion, are you consuming sufficient amount of whole grain foods?	64% Yes 7% No 29% Not sure
If your answer to question 1 is Yes, how do you measure your consumption?	25% measure each intake using measuring cup/spoon
If your answer to question 1 is No, do you intend to increase your consumption of whole grain foods?	91% Yes
Amount of whole grain consumed	
Amount of whole grain consumption from refined and/or processed foods	5.85 g/day
Amount of consumption of grains in the whole form	36.3g/day, and driven mainly by consumption of red/black/brown rice (13.5g/day)
Which of the below listed cereals / grains do you consume in the whole form (at least once in more than 2 months)?	Corn (70%) and oats (64%) appear to be the top consumed grains in the whole form

that consumption pattern of urban millennials is driven by refined foods and limited awareness about whole grain nutrition could be one of the reasons for lesser consumption of whole grains.

The consumption data of nutritionists and dieticians shows that 50% consume oats in their breakfast. This clearly suggests positive impact of education and awareness about whole grains on increase in consumption when compared to millennials. The survey also showed that 52% of nutritionist and dieticians consume white rice daily. The barriers to wholegrain consumption could be consumer taste preferences, price, availability, and convenience. While encouraging whole-grains consumption, consumer education efforts need to place greater emphasis on the substitution of refined grains with wholegrains rather than simply adding more whole grains, and therefore more calories, to the diet²¹.

To summarize, findings of survey suggest that millennials claim to be aware about whole grain foods, but understanding is limited. This clearly highlights the gap amongst millennials with respect to awareness of whole grains. The lack of sufficient awareness and thereby the limited ability to correctly identify whole grain products is one of the key constraints in

Table 3 — Whole grain Consumption survey in Nutritionists and Dieticians

Nutritionists consumption survey	
Understanding of whole grain consumption by consumer	
Which grain is the best nutritionally?	Average 46% opted for whole wheat and oats
Oats are good source of fibre	99% Agreed
Oats are good for the entire family.	85% Agreed
Oats are good for children.	82% Agreed
Oats are Super Grains	70% Agreed
Oats has better protein quality when compared with white rice and wheat	58% Agreed
Oats are only good for heart patients.	31% Agreed
How many times per week do you consume white rice?	52% said once daily

consumption of whole grains for this cohort. Awareness of nutritionist and dieticians is understandably better when compared with millennials. Additionally, there is scope even for them to further expand on their awareness and consumption.

DISCUSSION

The present study, to our knowledge, is the first of its kind to assess the awareness and understanding on wholegrains amongst Indian urban millennials, nutritionist & dieticians. The study also assessed the consumption of wholegrains in this population.

Overall, the study indicates that only 2% (15 out of 1000) millennials were aware regarding the concept of whole grains in all respects. Although 86% participants believed that they were aware of the term wholegrain but, only 5.4% correctly responded to the question related to composition of wholegrain and a significant number (56%) were not aware of the minimum amount of wholegrain that needs to be consumed. 40 % nutritionist and dieticians correctly defined whole grains and 56% were able to correctly identify food that contained whole grains from the list of foods provided to them.

This clearly highlights the need for a national standard on what constitutes a “whole-grain food,” to help researchers, the food industry, regulatory authorities, and consumers to have a credible harmonized source of reference.

WGs are linked to reduced risk of obesity or weight gain; reduced risk of cardiovascular disease (CVD), including coronary heart disease (CHD), hypertension, and stroke; improved gut health and decreased risk of cancers of the upper gut; perhaps reduced risk of colorectal cancer; and lower mortality rate⁽²²⁾. Research reports indicate presence of a unique

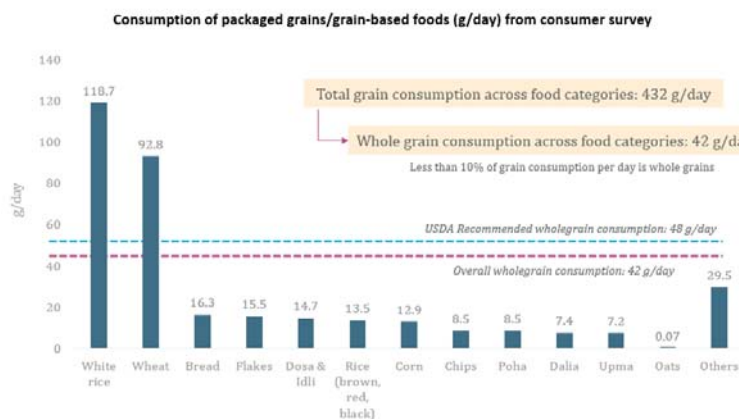


Fig 1 — Consumption by consumers in the whole form, n=1000

antioxidant, avenanthramides in whole grain oats that help protect blood vessels from the damaging effects of LDL cholesterol²³. A deeper understanding on benefits of consuming wholegrains may help in consumer acceptance and in adoption of Eat Lancet recommended Sustainable healthy diet for a healthy living²⁴.

The second part of the survey was focused on assessing the consumption of wholegrains in this population. It was found that 64% of millennials stated that they consumed adequate amount of wholegrains. However, based on actual calculated daily grain consumption, out of the total grains consumed (432g/day) daily less than 10% (42 g/day) were wholegrains. The consumption data of nutritionists and dieticians show 50% consume oats in their breakfast. This clearly suggests positive impact of education and awareness about whole grains on increase in consumption when compared to millennials. 52% of nutritionist and dieticians are also seen to consume white rice daily which could be due to traditional, cultural dietary habits.

Our findings were found to be consistent with the Chennai Urban Rural Epidemiological Study (CURES)¹³, 2009, Madras Diabetes Research foundation. There was high consumption of refined cereals (330.2g/day) which alone contributed 45.8% of total energy intake. Polished white rice (parboiled) was the most frequently consumed.

This further highlights the need for consumer education & probably a need for a national “Wholegrain Stamp”. Global, *Whole Grains Council*²⁵ and a panel of scientific and culinary advisors in January 2005

created “The Whole Grain Stamp” as a visual marker to signal products that contain dietarily-significant amounts of *whole grains*. There are three different types of the Whole Grain Stamp: the 100% Stamp (*all its grain ingredients are whole grain*), the 50%+ Stamp (*at least half of its grain ingredients are whole grain*), and the Basic Stamp (contains at least 8g- a half serving – of whole grain but may contain more refined grain than whole). There is also minimum prerequisite of whole grain per labeled serving, for products using the 50%+ & 100% Stamp.

A similar approach and stamp from Food Safety Standard authority of India for packaged foods can aid Indian consumers in making healthier grain choices.

Further in alignment to the global recommendations, National Institute of Nutrition can update the Dietary Guidelines for Indians with clear recommendations for citizens to ensure consuming half of the total grains as whole. This will translate to approximately 135-300g/day of whole grain consumption for an adult dependent on gender and activity levels. It is aligned to the recent recommendations from Eat Lancet of 232 g of whole grain intake per day in a 2500kcal diet^{11,12}. Nutritionists and dieticians can assist these national bodies in carrying forward the message to consumers. Under the Eat Right India campaign, FSSAI can nudge the consumers to eat more wholegrains and amplify the message in schools, hospitals, corporates through public-private partnership.

However sensorial acceptance of any food is important for it to become a part of the daily diet. Hence, partial substitution of grains with wholegrains in any dish like combination of ragi, oats & rice to make idli, dosa, adding some additional nutrient rich wholegrains to make Indian breads (chapati, roti) could be a desirable solution to improve nutrient density and at the same time deliver to taste. Partnership with culinary institutes, chefs can further help in bringing nutritious & exciting recipes to the consumers enabling translation of theoretical knowledge to daily practice.

Conclusion :

The result of this study highlights the importance

of raising awareness on the knowledge and consumption of wholegrains amongst urban Indian millennials. It is the need of the hour to have national recommendations, encouraging consumers to ensure half of the total grains consumed are wholegrains. In addition, a whole grain stamp from Food Safety Standard Authority of India for easy identification of products with considerable amount of wholegrains and a campaign with public-private partnership supported by nutritionist, dietitians, culinary experts can further help in achieving the goal of having a whole grain rich “Sustainable Healthy Diet” for a healthy living.

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Conflict of Interest :

No conflicts of Interest

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