

# Food portion size educational programme in a workplace setting in Puducherry – Is it effective?

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## ABSTRACT

**Background:** Consuming larger portion sizes, i.e., in excess of a typically recommended serving size, has been attributed to the obesity epidemic. The workplace acts as an efficient target for health promotion activities. **Aims:** To assess the effectiveness of a food portion size educational programme in increasing knowledge among the employees of a software company in Puducherry. **Methodology:** An interventional study was conducted with a pre-post design. A single group of software company employees ( $N=120$ ), age  $\geq 30$  years selected by simple random sampling was included in the study. The intervention consisted of a health education programme on the portion sizes of common food items including fruits and vegetables. A self-administered questionnaire was used to collect information on personal and sociodemographic details. Self-regulation on eating was assessed using the Self-Regulation of Eating Behaviour Questionnaire (SREBQ). **Results:** The mean age of the study participants was  $27 \pm 5$  years. Most of the participants were males, i.e., 72 (60%). Of the total, 55 (47.8%) participants were obese and 18 (15.7%) were overweight. The median number of meals and snacks consumed by the participants was 3 (1-3) and 1 (1-2), respectively. The median (interquartile range [IQR]) knowledge scores of the food portion size significantly increased from 9 (0-16) to 14 (5-19) ( $P < 0.05$ ). **Conclusions:** This study has demonstrated that an educational intervention in the workplace setting is feasible and effective in increasing the knowledge of food portion size over a short term.

**Keywords:** Food portion size, healthy diet, self-regulation, workplace intervention

## Introduction

Portion size is the amount of food one chooses to eat during a single eating occasion such as a meal out, at home, or a pre-packaged snack. The energy intake depends on the portion size of a meal which is a strong environmental factor influencing food intake.<sup>[1]</sup> Consuming larger portion sizes, i.e., in excess of a typically recommended serving size, has been attributed to the

obesity epidemic by providing higher energy.<sup>[2]</sup> Individuals who consume a larger portion size, generally taking 30% higher energy than the others consuming the normal portion size, are prone to obesity.<sup>[3]</sup> Over the past three decades, industrialised countries have witnessed increased food portion sizes and ‘portion distortion’ as individuals do not realise that their portion size commonly exceeds the serving size.<sup>[4,5]</sup> The portion size effect is a phenomenon where consumers tend to consume more when a larger portion size is served to them. Many factors can influence the portion size effect such as social norms, characteristics of food and state of hunger.<sup>[6]</sup> In addition, there is a high likelihood that foods with high-energy density are likely to be consumed more as compared to low-energy-density foods which ultimately leads to overconsumption.

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Of all the ethnic populations, Asian Indians stand a very high chance of developing diabetes and cardiovascular diseases (CVD) at a younger age and at lower body mass indices.<sup>[7-9]</sup> The overweight/obese female, as well as male, population has more than doubled in India in 2015–2016 over the last one and a half decades and this increasing trend has been attributed to unbalanced diets and physical inactivity.<sup>[10]</sup> A possible solution to this could be active self-regulation of food intake, which has the potential to bring about a dietary change.<sup>[11]</sup> ‘Self-regulation’ refers to the multiple processes involved in goal-directed behaviour and encompasses the management of behaviour, thoughts, feelings, attention and environment in the pursuit of personal goals. Self-regulation actions tend to be conscious at the beginning and become automatic and less effortful over time.<sup>[12]</sup> There are several external factors such as mindless eating, value for money and estimation bias which are responsible for the impaired portion size.

In the wake of the rising burden of non-communicable diseases in developing countries like India, there is a need to combat negative nutritional trends and changing sedentary lifestyle.

The World Health Organisation (WHO) recommends effective implementation of nutritional interventions, especially through primary healthcare, which will play a pivotal role in helping countries combat malnutrition and achieve the WHO global nutrition targets 2025, and thereby, sustainable development goals (SDG). It discusses nutrition as a foundation for health for all and an integral component of primary healthcare. Under Ayushman Bharat, Health and Wellness Centres (HWCs) are established which deliver comprehensive primary healthcare. Along with a range of services, they include screening for non-communicable diseases and counselling for healthy nutrition and lifestyle modification at the population level. Integrating nutrition as a part of primary healthcare, will put the needs of the individuals, families and communities as the focus of the health system and empower people to take a more active and informed role in their health.<sup>[13]</sup>

Eat Right India movement is one such initiative launched to train and educate the population at the mass level for healthy nutrition practices and food safety.<sup>[14]</sup> Other ongoing nutrition programmes in India mainly focus on the well-being of maternal and child health while adult nutrition goes unnoticed.

The literature regarding the interventions targeting the portion size and portion control behaviour is limited<sup>[6]</sup> but there is evidence that the design and implementation of the interventions may effectively moderate the effects of the portion size distortion.<sup>[15]</sup> However, the type of interventions that work best, for whom and in what context, still remains unclear.<sup>[6]</sup> Further, in this context, the effect of consumer education about appropriate portions and the required self-regulatory skills have not been studied in our country.

The workplace has been identified as an easily accessible point for providing dietary interventions to curb the rising incidence of

chronic diseases by the WHO.<sup>[16]</sup> Healthful nutrition promotion at the worksite has the potential to reach people from different social backgrounds and age strata and is likely to be effective since adults spend a considerable amount of time at work,<sup>[17]</sup> especially since the highly prevalent health problems related to eating habits significantly affect the middle-aged adult working population. Furthermore, the existing infrastructure at the workplace helps in the planning of multilevel intervention programmes which will significantly contribute to reducing the burden of NCDs- Noncommunicable diseases in the community.

An analysis and discussion with the stakeholders and decision-makers recommended that the transferability of any health intervention should be assessed before its implementation not only to judiciously use limited resources but also to tailor the intervention to the target population.<sup>[18]</sup>

Hence, this study aimed to assess the effectiveness of a food portion size educational programme in the workplace in increasing dietary knowledge and self-regulation in portion control among the employed adults.

## Methodology

A pre-post-intervention study was planned in an industrial setting in Puducherry, South India, during July–August 2018. Puducherry is a hub for manufacturing and service units representing a cross-section of industries in seven well-established industrial estates. The oldest and largest of these firms was selected purposively for the development and implementation of a health-promoting worksite. Around 1,400 workers are employed in the company. The baseline risk assessment showed around 55% of the employees to be obese.<sup>[19]</sup> Sample size was calculated using the *n* Master software with a precision of 8%, 95% confidence limits and power of 80%. Assuming an increase in the knowledge score of portion sizes from 25 to 55% at the end of the intervention and adding 10% loss to follow up, the calculated sample size was 120.<sup>[20]</sup> The participants above the age of 18 years were recruited by simple random sampling from the available list of employees, using software-generated random numbers.

After approvals from the institutional scientific and ethics committee (JIP/IEC/2018/088) and the industry to conduct the intervention, the study was conducted in four phases. The study tool and the educational intervention were developed in the first phase. The commonly consumed food items by the local community during the common meals were free listed. Based on the existing literature and nutrition guidelines from the National Institute of Nutrition, the appropriate portion size for the average Indian male and female was listed after consultation with the nutritionists.<sup>[21]</sup> The food items were clubbed into main food groups and represented pictorially. A score of 1 was given for each correct response, and thus, the total knowledge score was 20. An educational programme was developed comprising the role of diet in obesity and chronic diseases, the need for portion control and portion sizes of common food items including fruits and

vegetables. Other topics included in the educational programme were energy density of foods, triggers for overconsumption and self-regulation skills. A pilot study was conducted among 10–15 willing individuals at a different workplace, to assess the understandability of the content and also test the feasibility of the intervention.

In the second phase, a baseline assessment was conducted after taking written informed consent from all the participants. A self-administered questionnaire was used to collect information on personal details like age, gender, participation in physical activity, self-reported height and weight, chronic comorbidity, knowledge regarding portion size and eating patterns. The knowledge regarding the correct portion sizes was assessed at baseline and after the intervention. Eating in self-regulatory capacity was assessed using a validated tool—Self-Regulation of Eating Behaviour Questionnaire (SREBQ).<sup>[12]</sup> The response options ranged from 1 (never) to 5 (always) for questions that measure self-regulatory capacity relative to eating intentions already established by the individual.

In the third phase, the educational intervention programme was conducted after the baseline assessment through the Intranet facility of the software company and live demonstration. Discussions were facilitated on the triggers for overconsumption and self-regulation skills. Brochures on portion sizes containing relevant details were also provided. An end-line assessment was carried out after 1 month of intervention. In addition, details like modifications in the eating environment and challenges in exercising portion control were also collected.

Data were entered in Excel and analysed using the SPSS version 21. The categorical variables were summarised as frequencies and percentages and continuous variables were summarised as mean, standard deviation or median with interquartile range (IQR). A change in the knowledge scores from pre- to post-intervention was done using the Wilcoxon signed-rank test. As per protocol, analysis was done and the *P* value < 0.05 was set as statistical significance.

## Results

A total of 120 workers participated in the study. The sociodemographic characteristics and dietary patterns of the employees are summarised in Table 1. The mean age of the study participants was 27 ± 5 years. Most of the participants were males, i.e., 72 (60%). Of the total, 55 (47.8%) participants were obese and 18 (15.7%) were overweight. Around 9 (7.5%) reported a history of chronic morbidities like diabetes or hypertension. The median number of meals and snacks consumed by the participants was 3 (1-3) and 1 (1-2), respectively.

Table 2 describes the factors determining self-regulation in eating behaviour. A majority of them reported easy distraction from the intended diet (52%) and had difficulty in remembering the past meals (50%).

**Table 1: Sociodemographic characteristics and dietary patterns of employees at a selected software company in urban Puducherry (n=120)**

Categories	Mean (SD)/ Median (IQR)	Frequency (Percentage)
Age (in years)	27 (±5)	
Height (in cm)	158.3 (±16.4)	
Weight (in kg)	63.9 (±14.2)	
Gender		
Male		72 (60.0)
Female		48 (40.0)
Body Mass Index (kg/m <sup>2</sup> )* (n=115)		
Underweight (<18.5)		11 (9.2)
Normal (18.5-22.9)		31 (27.0)
Overweight (23-24.9)		18 (15.7)
Obese (>=25)		55 (47.8)
History of Chronic Morbidity <sup>§</sup>		
Yes		9 (7.5)
No		111 (92.5)
Meals consumed	3 (1-3)	
Snacks consumed	1 (1-2)	
Second servings during meal		48 (40.0)
Restricted diet		110 (91.7)

\*Body mass index-Asia Pacific Classification.<sup>28</sup> §Chronic morbidity includes diabetes, hypertension, thyroid

**Table 2: Self-regulation in eating behaviour as assessed by SREBQ (Self-Regulation of Eating Behaviour Questionnaire) (n=120)**

	n (%)
Give up easily on eating intentions	59 (49)
Good at resisting food	43 (36)
Easily get distracted from the intended diet	62 (52)
Not happy with current eating behaviour, intends to make changes	53 (44)
Has difficulty remembering past meals	60 (50)

\*Multiple responses

Around 53% said that the amount of food consumed depended on the type of food served and 23% responded that it depended on environmental factors such as dining with friends, guests or family. Around 36, 45 and 62% admitted to engaging in other activities like reading newspapers, watching TV, talking on the phone or checking their phone while eating breakfast, lunch and dinner, respectively. Around 65% of them felt that it is important to control the portion size [Table 3].

Figure 1 compares the knowledge scores on the portion size before and after the intervention. The median knowledge score of the food portion size at the baseline for the various food groups was 9 (0–16). Post-intervention there was a 5-point increase in the knowledge scores which was statistically significant (*P* < 0.05).

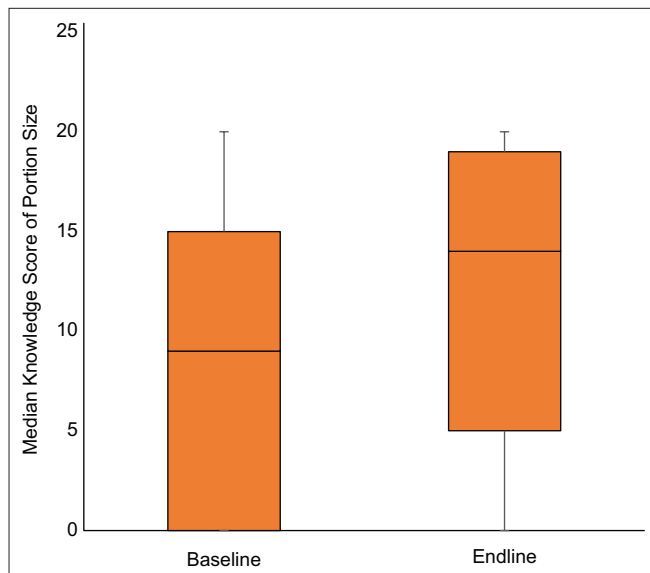
## Discussion

This study assessed the change in knowledge regarding portion size before and after the educational programme and the self-regulatory capacity of the participants on portion control.

**Table 3: Factors determining the amount of food consumed by employees at a selected software company in urban Puducherry (n=120)**

Factors and categories	n (%)
Influencers for the amount of food consumed	
Situational	54 (45.0)
Environmental	28 (23.3)
Food-related	63 (52.5)
Fixed portions served	12 (10.0)
Influencers for overeating	
Eat out with friends	48 (40.0)
Weddings/Parties	29 (24.0)
Weekends	36 (30.0)
Others	15 (12.5)
Concurrent activities*	
Breakfast	43 (35.8)
Lunch	54 (45.0)
Dinner	74 (61.7)
Perceived importance of controlled portion size	78 (65.0)

\*Activities like reading newspaper, watching TV, using phone



**Figure 1:** Comparison of knowledge scores on the portion size before and after the intervention ( $P < 0.05$ )

We found that the knowledge was substantially low at the baseline. This finding was similar to the study conducted by Eva Almiron-Roig *et al.*<sup>[22]</sup> among young adults in the UK. This might be due to a misconception about healthy eating and distorted views on the portion size. Surveys of dietary intake in the developing countries indicate an increase of 200 kcal per day per head from 1977 to 1978 to 1994 to 1996<sup>[23,24]</sup> and studies have reported that consuming a high-energy meal over 6 months led to significant increases in the energy intake and weight gain in a real-life work setting.<sup>[25]</sup> Subsequently, overweight, obesity, diabetes and CVD are on the increase.

The educational programme and pamphlet designed for intervention substantially helped in improving the knowledge of the participants regarding the portion size in the short term.

These findings are consistent with the previous studies which also reported similar results.<sup>[26-28]</sup> The possible explanation could be that the tailored intervention package, interactive session and self-explanatory pamphlet helped the participants to alter their behaviour.

Obesity is both an NCD and a fundamental driver of many others like type 2 diabetes and heart diseases. The global monitoring framework for NCDs aims to track the implementation of the NCD action plan through monitoring and reporting on the attainment of the global targets in 2015–2020. Target 7 aims at halting the rise in diabetes and obesity, while obesity also features at the heart of achieving the SDG target on NCDs. Food habits related to obesity/abdominal obesity in South Asians have been documented. Similarly, challenges in the prevention and treatment of obesity include a lack of awareness regarding the correct diet and non-compliance to a healthy diet. Diet and lifestyle management should start at the lower limits of BMI (according to the Indian guidelines) and waist circumference. Reducing excess calories from carbohydrates and fat should be the main focus of such educational and behavioural interventions. The Eat Right India initiative, Nutrition India programme, etc., integrating nutrition and primary healthcare, aim to create this awareness through social and mass media campaigns, and help individuals to take informed decisions about their dietary choices.

The present study also reported a lack of self-regulation in eating behaviour. The common reasons reported were distractions from the intended diet, giving up easily on planned diets and difficulty in remembering the past meals. Other studies also reported similar findings where merely changing the diet plans and creating awareness about healthy eating were not sufficient in the regulation of food intake.<sup>[29]</sup> For a long-term sustainable change in dietary intake, alterations in the food environment and appropriate food standards play a major role.

One of the common influencers for overeating reported in our study was eating away from home and out with friends. A nationwide survey conducted in Brazil also reported excessive consumption of fast food when eaten out of home.<sup>[30]</sup> Easy availability and accessibility of high-energy density and fatty foods are one of the reasons for an increased intake of portion size.

These topics have gained great relevance today with the rising rates of non-communicable diseases, especially among the sedentary workers as in the software industry. Thus, the intervention has proven beneficial in improving knowledge about healthy eating among office-goers. This increase in awareness about the appropriate portion sizes can lead to a modification of food consumption in accordance with the recommendations among the study participants. Our study highlights the importance of health promotion activities in a workplace setting for a healthy, safe and productive working life. It also displays the combined effect of the employers, employees and company on the overall well-being and progress of workers.

However, the prolonged effect of the intervention could not be studied since the study period was limited to 4 weeks. The long-term change in the behaviour can lead to a decrease in the incidence of obesity, diabetes and CVDs in the participants which needs to be studied in further research. This study also helps in assessing the workplace as an effective platform for an intervention involving lifestyle changes, thereby, paving way for future beneficial interventions at workplaces.

## Conclusion

The awareness of food portion control and self-regulation in eating behaviour are important measures to regulate daily calorie intake and combat the global epidemic of malnutrition and rising non-communicable diseases. This study has demonstrated that an educational intervention regarding the portion size in the workplace setting is feasible and effective in increasing the knowledge of food portion size and has a transferable outcome over a short term. The results of this study indicate that the implementation of such initiatives in the workplace as a part of the primary healthcare can contribute to healthful nutrition among working adults, however, further research is required to test the effect of the supportive strategies and long-term effectiveness of the behavioural regulation strategies.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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