

## The 3x3x3 diet for the management of diabetes and obesity in resource constrained settings

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### Abstract

In times when diseases like diabetes and obesity have attained pandemic proportions, it is essential to introduce lifestyle changes in early stages to prevent progression of these disorders. In health care systems with heavy patient load, time management is of utmost importance. In this communication, we share a simple 3x3x3 rubric based dietary prescription, which is easy to teach, and easy to grasp. It covers the most important dietary principles that are advocated in various evidence based clinical practice guidelines.

**Keywords:** Diabetes, diabetes, obesity, lifestyle management, dietary advice, patient centered management, south Asian phenotype.

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### Introduction

Primary care physicians often work without the help of supporting staff such as dieticians, educators, physiotherapists and nurses. This makes it difficult for them to provide customized life style advice. Even more challenging is to provide a dietary prescription for each individual patient. Lack of personalized dietary advice leads to inappropriate dietary intake, which in turn results in suboptimal outcomes.<sup>1</sup> This brief communication shares a simple 3x3x3 diet plan, which can be administered in a short time and improve the dietary intake of individuals having diabetes. The 3x3x3 diet is an attempt to suggest a balanced, nutritious diet, with appropriate meal quantity and distribution, to promote health, in a time- and cost-efficient manner.

### Meal Distribution

Wherever possible, encourage patients to take small, frequent meals. The 3+3 meal pattern concept implies

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the need to take 3 major and 3 minor meals (or snacks) per day. While this is mandatory for persons on a basal-bolus regimen of conventional insulin, or on high dose sulfonylureas, it helps persons on modern medication as well. It is also recommended that the meal timings are largely fixed and not changed for avoidable reasons.<sup>2</sup>

### Meal Composition

Each meal plate should be divided into three parts: cereals and starchy vegetables; non-vegetarian food, dairy products and lentils; and fruits, green leafy vegetables and salads. Each component, as noted, has three examples. This 3x3x3 structure makes it easy for physicians to share, and for patients to assimilate. Such a distribution facilitates a higher intake of protein, and reduction in carbohydrate consumption, as compared to routine South Asian diet.<sup>2-7</sup> Protein provides satiety, and more calories are burnt to digest proteins.

It is easy to explain this in Urdu/Hindi, as the words lend themselves to an alliterative scheme: anaaj and aalu, doodh and daal, and sabzi and salad. The word 'doodh', which means milk, reminds the health care provider to include animal products, including milk, eggs and meats, in the discussion on food. Vegan patients may be counseled to increase consumption of daal (pulses) and dry fruits, to ensure protein sufficiency. The 'sabzi and salad' component, which focuses on fresh products, includes fruits as well "coloured" vegetables.<sup>5</sup>

### Meal Quantity

Portion size is an important aspect of calorie counting and restriction. Portion size, and caloric intake, can be controlled by using smaller-sized crockery. The speed of eating can be reduced by using smaller cutlery, especially spoons.

Using quarter plates (6 inch diameter) instead of full dinner plates (10 to 12 inch diameter) to serve cereals, such as rice, is the first step in portion size management. Encourage patients to prepare breads, such as chapatti or naan, with a 3 inch radius. Serve curries and vegetables in 3 inch diameter bowls and 3 finger-breadth sizes, respectively. Glasses should be filled only to a height of 3 inches while taking any calorie-rich beverage.<sup>8</sup>

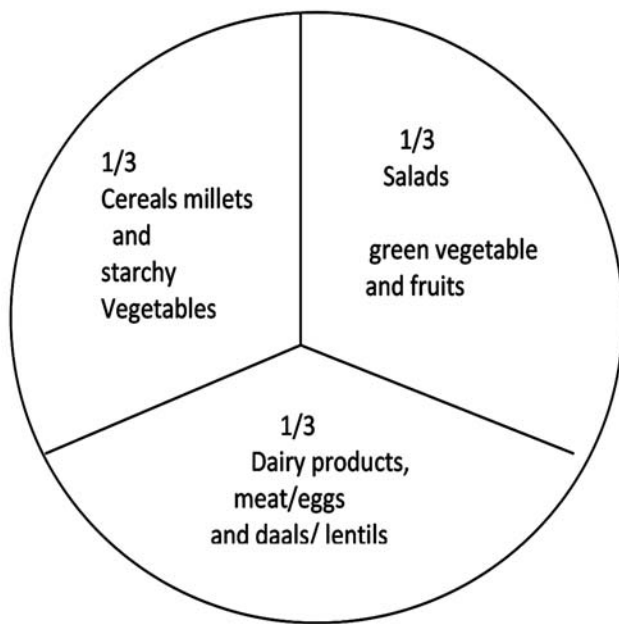


Figure: The 3x3x3 diet.

### Meal Accompaniments

The rule of three can be extended to meal accompaniments such as salt, spices and sugar. A suggestion to limit total intake of these to 3 teaspoonfuls (one teaspoon each of salt, spices and sugar) is applicable to, and appropriate, for most people living with obesity.

### Meal Preparation

South Asian cuisine uses liberal quantities of cooking oil, butter and ghee (clarified butter) for preparation of their dishes. These visible fats contribute to excessive caloric intake. Most families should be able to manage a healthy (and tasty) diet using 3 teaspoonfuls of cooking oil/ghee/butter per person per day (15 grams; 135 calories). Those who need a greater intake of fats, as in pregnancy, lactation or convalescence, may be asked to take up to 3 table spoonfuls of cooking oil/ghee/butter daily (45 grams; 405 calories).

Another simple advice given to reduce oil consumption is to limit the quantum of oil that is bought per month for use in the house. A total quantity of 300-500 ml per head per month of both saturated and unsaturated fat is recommended for everyone. If this oil is consumed prior to the end of the month, oil-free cooking should be practiced for the remainder of the month. Though a major step, helps to curb the oil intake for the whole family. Further advice can be given to store additional cooking oil for guests and for special occasions in a separate container.<sup>8</sup>

Table: The components of 3x3x3 diet.

Major	Minor
<b>Meal distribution</b> • 3+3 meal pattern	<b>Meal accompaniments</b> • 3 tsp of salt spice, sugar
<b>Meal composition</b> • 1/3 cereals, millets, starchy vegetables (tubers) • 1/3 salads, fruits, green vegetables • 1/3 dairy products, meats/eggs, daal/lentils	<b>Meal preparation</b>  • 3 tsp of cooking oil, ghee, butter • Total 300 ml per head per month
<b>Meal quantity</b> • 3 inch diameter breads • 3 inch radius chappati/naan • 3 finger breadth portion vegetables	<b>Meal utensils</b> • 3 inch diameter bowls for curries • 3 inch radius plate (6 inch diameter) for rice • 3 inch height of glasses for beverages

### Analysis

The 3x3x3 rubric differs from the 2+1+1/4 model of the ADA. We must remember, however, that a 1/3 consumption of protein rich foods itself is a significant shift in persons habituated to a South Asian cuisine. The 'power of 3', lends itself to ease of use and adherence as well. The 3x3x3 diet we propose uses an alliterative, and person- friendly model, to explain diet pattern, diet composition, and food quantity. The concept of 3 food groups, each with 3 examples, is easy to remember and easy to explain. The power of 3 can be extended to choice of utensils, and to quantify use of accompaniments and cooking oil while preparing food. In tech savvy patients the use of mobile apps can be used to enter the 3 meal+3 snack pattern dietary intake to ascertain caloric intake.

We admit that this approach is not as accurate as a calorie-based approach. However, the logical empiricism that it follows is robust, and its utility for overworked health care professionals cannot be overestimated. The 3x3x3 diet ensures healthy macro-nutrient consumption (by limiting carbohydrate rich and encouraging protein powered foods), micro-nutrient adequacy (by focusing on salads vegetables and fruits) and regular nutrient intake (through the 3+3 pattern). This can also have a major impact in improving the health-related quality of life in these individuals.<sup>9,10</sup>

The 3x3x3 diet is concordant with all possible pharmacotherapeutic interventions and should create no cause for concern. People who require a specialised diet, such as a low-calorie diet or other restrictive diets, will be referred to secondary or tertiary health care centers in due course.

### References

1. Kalra S, Kapoor N, Kota S, Das S. Person-centred Obesity Care - Techniques, Thresholds, Tools and Targets. *Eur Endocrinol*. 2020;16:11-3.

2. Kapoor N, Sahay R, Kalra S, Bajaj S, Dasgupta A, Shrestha D, et al. Consensus on Medical Nutrition Therapy for Diabetes (CoMeND) in Adults: A South Asian Perspective. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*. 2021;14:1703.
3. Kapoor N, Furler J, Paul TV, Thomas N, Oldenburg B. The BMI-adiposity conundrum in South Asian populations: need for further research. *J. Biosoc. Sci.*. 2019;51:619-21.
4. Viswanathan V, Krishnan D, Kalra S, Chawla R, Tiwaskar M, Saboo B, et al. Insights on medical nutrition therapy for type 2 diabetes mellitus: an Indian perspective. *Adv Ther* . 2019;36:520-47.
5. Salis S, Joseph M, Agarwala A, Sharma R, Kapoor N, Irani AJ. Medical nutrition therapy of pediatric type 1 diabetes mellitus in India: Unique aspects and challenges. *Pediatr Diabetes*.2021;23:93-100
6. Kapoor N, Furler J, Paul TV, Thomas N, Oldenburg B. Normal weight obesity: an underrecognized problem in individuals of South Asian descent. *Clin. Ther*.2019;41:1638-42.
7. Kapoor N. Thin Fat Obesity: The Tropical Phenotype of Obesity. In: Feingold KR, Anawalt B, Boyce A, Chrousos G, de Herder WW, Dungan K, et al., editors. *Endotext*. South Dartmouth (MA): MDText.com, Inc.2021.
8. Kapoor N, Sahay R, Kalra S, Bajaj S, Dasgupta A, Shrestha D, et al. Consensus on Medical Nutrition Therapy for Diabetes (CoMeND) in Adults: A South Asian Perspective. *Diabetes Metab Syndr Obes*.2021;14:1703-28.
9. Kapoor N, Kalra S, Kota S, Das S, Jiwanmall S, Sahay R. The SECURE model: A comprehensive approach for obesity management. *J Pak Med Assoc*. 2020;70:1468-69.
10. Ramasamy S, Joseph M, Jiwanmall SA, Kattula D, Nandyal MB, Abraham V, et al. Obesity Indicators and Health-related Quality of Life - Insights from a Cohort of Morbidly Obese, Middle-aged South Indian Women. *Eur Endocrinol*. 2020;16:148-51.