

# The sweet 'truth' of Gujarat – Gujarati diet & lifestyle and diabetogenesis

Om J. Lakhani, Altamash Shaikh<sup>1</sup>Department of Endocrinology, Zydus Hospital, Ahmedabad, <sup>1</sup>Department of Endocrinology, Saifee Hospital, Mumbai, India

## Abstract

Gujarat is a state in Western part of India. It is well known for its cuisine which is predominantly lacto-vegetarian and has characteristic 'sweet tinge' in all the food items.

The occupation and lifestyle of Gujarati people is mainly sedentary and participation in sports and other physical activities is limited. In this article we have explored the components and characteristics of Gujarati diet and lifestyle in relation to the risk of diabetes. Though prima facie the Gujarati diet and lifestyle may seem more diabetogenic compared to the cuisine of other states of India, there is very little objective evidence to suggest the same. Infact, the prevalence of diabetes in the state of Gujarat is lower compared to other states with equivalent GDP. In this is article we have also tried to find possible explanations of this paradoxical observation.

**Keywords:** Gujarat diet, Gujarati cuisine, Gujarat diabetes

**Address for correspondence:** Dr. Om J. Lakhani, 1st Floor, C Wing, Zydus Hospital, Zydus Hospital Road, Thaltej, Ahmedabad - 380054, India.

E-mail: dromlakhani@gmail.com

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## INTRODUCTION

Gujarat is a state in western part of India, rich in culture and tradition. However, Gujarati cuisine is not limited to the state of Gujarat. Gujaratis constitute a considerable portion of Indian Diaspora, hence, Gujarati cuisine is consumed, in some form or the other throughout the world.

In this article, we have explored the current state of diabetes in Gujarat and the contribution of Gujarati diet and lifestyle to the diabetes epidemic.

## CHARACTERISTICS OF GUJARATI DIET AND LIFESTYLE

The Gujarati cuisine is predominantly lactovegetarian. Lactovegetarianism is consumption of diet that includes

vegetables and dairy products but devoid of meat, fish, and eggs. The Gujarati food items are well known to have a 'sweet tinge'. It is believed that there is liberal use of oil and 'ghee' for preparation of most food items. Desserts and sweets are essential parts of most meals including breakfast. Dairy and diary-products are favored in Gujarat and most major meals end with buttermilk.

'Farsans' are traditional snacks or appetizers which accompany most meals and also consumed during the midmorning and afternoon period. Food items such as 'Dhokla', 'Khaman', 'Kachoris', and 'Samosas' are examples of 'farsans'. These food items are often consumed without portion control and Gujaratis are often obsessed with

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'farsans' and 'sweets'. Needless to say, these food items are often rich in fat and have high salt content. Pickles and papads having high salt content accompany most meals and hence salt intake is generally very high in Gujarati diet.

However, traditionally and predominantly in rural households, the consumption of sugar, sweets, and 'farsans' is limited. Carbohydrate is mainly consumed in forms of 'mixed grains' and 'Bajra' in rural households. The rural household consumes more of fresh fruits and vegetables and a good portion of fresh dairy products.

There is a small difference in dietary habits from various parts of Gujarat. South Gujarat includes areas such as Surat, Valsad, and Vapi. They prefer adding 'green chillies' to a large number of food items. There is also an influence of Parsi culture in these parts. 'Nankhatai' are shortbread biscuits, seem to have originated in Surat and have an influence of Dutch cuisine.

Farsans such as 'Khaman Dholka' are popular in Central and North Gujarat while the region of Kathiawad is popular for 'Dhebras' (a form of spicy bread), 'Chunddas' (which is a popular form of sweet pickle) and 'Rotlas' (a form of thick bread made from Bajra). The food consumed in Kutch region (the North-West part of Gujarat) is relatively simple compared to other parts of Gujarat and tend to have similarities to Rajasthani cuisine. 'Dabeli' is something like a burger which is a popular snack originating from Kutch.

The diet in Gujarat, as with other parts of India, is also influenced by religion. 'Jainism' is an important religion practiced in Gujarat and Jain cuisine is devoid of onion, garlic, and vegetables grown underground such as potato. Additionally, they refrain from eating after sunset. Those who follow the 'Swaminarayan sect' also refrain from having onion and garlic in their diet. The 'Vaishnav' diet involves foods that are offered to Lord Krishna. As mentioned in Bhagawad Gita, Lord Krishna consumes only the food which is considered 'sattvik'. Again, they are devoid of onion and garlic.

The Bohra Muslims of Gujarat have unique traditions. Their meals start with a pinch of salt and a dessert which is followed by bread and then the main course. Family members often dine together and often in a single large plate called 'Thal'. No grain of rice is wasted, as per the tradition.

The Parsi community has a strong influence on the diet and lifestyle of Gujaratis living in South-Gujarat and

the Gujarati community in Mumbai. Unlike the Gujarati Hindu diet, the Parsi diet is not restricted to vegetarianism and meat is consumed during dinner time. 'Dhanshak' is a popular Parsi dish which is a mixture of lentil and meat consumed with rice or roti.

Apart from the diet, there are certain other lifestyle practices in Gujarat which may have positive or negative influences on health. For example, Alcohol consumption is legally prohibited in the state of Gujarat. Gujarat ranks third lowest in alcohol consumption with a prevalence of alcohol intake of 11%.<sup>[1]</sup>

Tobacco consumption in Gujarat, however, is very high with more than 50% of men and around 7% of women admitting to using tobacco in some form or the other.<sup>[2]</sup> Gujaratis all over the world are mainly involved in sedentary occupation. They are mainly traders, businessmen, and brokers. Sports are not an important part of the Gujarati culture and apart from Cricket, Gujarat's representation in other sports has been fairly limited. Another unique lifestyle practice in some parts of Gujarat is having a regular afternoon nap. In fact, in some part of Gujarat, shops and offices are closed in the afternoon from 2 pm to 4 pm to account for the cultural practice of an afternoon nap!

## PREVALENCE OF DIABETES AND OBESITY IN GUJARAT

The second phase of Indian Council of Medical Research-INDIA DIABetes (ICMR-INDIAB) study evaluated the prevalence of diabetes in 8 states from the mainland and 6 from the northeastern part of the country. Gujarat was one of the states included in Phase II. The total prevalence of diabetes in Gujarat was 7.1% based on this study. The prevalence of diabetes was lower in Gujarat compared to Andhra Pradesh, Punjab, Karnataka, and Tripura but was higher than that of Bihar and all the other North-Eastern states.<sup>[3]</sup> The prevalence was also lower than that of states of Chandigarh, Tamil Nadu, and Maharashtra which were part of the Phase I of this study.<sup>[4]</sup> Overall, Gujarat stands in 8th position in the prevalence of diabetes amongst 18 states studied in the two phases of the ICMR trial. The prevalence of diabetes in Gujarat is lower than the national average which is close to 8%.<sup>[5]</sup>

The ICMR studies also compared the prevalence of diabetes with the GDP and concluded that in most states the prevalence of diabetes was directly proportional to the GDP of the state. Gujarat ranks high in per capita GDP, however, the prevalence of diabetes is lower compared to its enviable stand in the GDP ranks.<sup>[3]</sup>

**Table 1: Prevalence of overweight, very high blood glucose and hypertension in men and women of various representative districts in various regions of Gujarat (based on National family health survey-4 DATA)**

REGION	NORTH GUJARAT	CENTRAL GUJARAT	SAURAHTRA	KUTCH	SOUTH GUJARAT
REPRESENTATIVE DISTRICT	PATAN	AHMEDABAD	RAJKOT	KUTCH	SURAT
OVERWEIGHT MEN	15.30%	26.40%	22.30%	20.40%	23.20%
OVERWEIGHT WOMEN	17%	30.70%	36.10%	19.90%	34.50%
MEN WITH VERY HIGH BLOOD GLUCOSE	1.90%	3.70%	3.50%	3.20%	4.70%
WOMEN WITH VERY HIGH BLOOD GLUCOSE	2.00%	2.90%	3.50%	1.80%	2.80%
MEN WITH HYPERTENSION	7.40%	11.90%	8.30%	6.90%	9.50%
WOMEN WITH HYPERTENSION	7.50%	7.50%	5.90%	3.40%	8.40%

The prevalence of diabetes in the city of Ahmedabad, which is the largest city in Gujarat is 7.3%.<sup>[6]</sup> This is lower than the most urban cities of India including Delhi (10.3%), Mumbai (9.3%), Bengaluru (12.4%), Chennai (13.5%), and Jaipur (8.6%).<sup>[7]</sup> Interestingly, Mumbai that has a sizeable Gujarati population also has a lower prevalence of diabetes compared to Delhi, Bengaluru, and Chennai. Prevalence of diabetes has almost doubled in Ahmedabad over a period of 3 decades, whereas it has increased by 10 times over the same period in Delhi.<sup>[8]</sup>

The National family health survey (NFHS4) gives us insights into the prevalence of obesity in the state of Gujarat. The survey shows that around 20% of men and 23% of women between the ages of 15 to 45 years are overweight (BMI >25 kg/m<sup>2</sup>). There is a significant increase in the prevalence of obesity in Gujarat compared to NFHS3 survey a decade ago. However, the prevalence of obesity is significantly less as compared to the neighboring state of Maharashtra which is comparable to Gujarat in a number of parameters. According to NFHS-4 survey, 3.5% of men and 2.5% of women have 'very high' blood glucose (defined by the survey as blood glucose >160 mg/dl). The survey also reveals that 9.9% of adult men and 7.4% of adult women in Gujarat are hypertensive.

A district-wise breakdown of the NFHS-4 survey data gives more insights into the prevalence of overweight, 'high' blood glucose, and hypertension in the state of Gujarat. Data from a representative district from each area of Gujarat is represented in table 1. It is not surprising to see a higher prevalence of high blood glucose, obesity, and hypertension in the more urban districts of the state such as Central and South Gujarat.

### MACRONUTRIENT AND MICRONUTRIENT COMPOSITION OF GUJARATI DIET

Jonnalagadda *et al.*<sup>[9]</sup> conducted a study of dietary intake of Gujaratis who have immigrated to the US. They found that the Gujaratis in the US had a macronutrient distribution as follows: carbohydrate 57%, protein 12%, and total fat 33%. Amongst the micronutrients, the consumption of

vitamin D, copper, zinc, and potassium was less than the recommended intake.

Since Gujaratis are predominantly vegetarian, it is not surprising to see that the protein intake was below the recommended intake. The fat intake was above the recommendations while the carbohydrate intake was appropriate.

The conclusion which we can draw from this is that Gujaratis consume more dietary fat and have lower protein consumption compared to recommended guidelines, however, their carbohydrate consumption is appropriate.

### IS GUJARATI DIET AND LIFESTYLE DIABETOGENIC?

Type 2 diabetes, as it is well known, has multifactorial etiology based on both genetics and environmental influences. Though Gujarati diet may appear 'diabetogenic' and the Gujarati lifestyle seemingly sedentary, still the prevalence of diabetes in Gujarat is lower than other states of India which have comparable GDP. Additionally, the prevalence of diabetes in Ahmedabad is lower than that in other large cities in India.

There are many plausible explanations for this observed difference. One of the possible reasons is a genetic susceptibility to diabetes may be lower in Gujarati population. Additionally, as discussed above, the dietary intake in rural, traditional, and poor households of Gujarat is predominantly composed to low glycemic index carbohydrate meals compared to the urban, rich, and more modern Gujarati households.

Other unique features of the state of Gujarat which may contribute to lesser prevalence diabetes compared to other states are lactovegetarianism and presumably lower alcohol consumption.

Jenkins *et al.* wrote a review on 'Diabetes and Vegetarian diet'. The authors of the review concluded that though

vegetarian diet has several advantages in several aspects of metabolic parameters, the lower risk of diabetes with vegetarian diet is probably secondary to the weight loss. The benefit of a vegetarian diet on diabetes in absence of weight loss needs to be seen.<sup>[10]</sup>

A study performed in Sweden established that “high alcohol consumption increases the risk of abnormal glucose regulation in men”.<sup>[11]</sup> However, it would be naïve to conclude that despite the legal prohibition on alcohol, alcohol consumption in Gujarat is low. According to a study by Patel *et al.*, 60% of men living in a village in Gujarat reported alcohol consumption which was equivalent to the alcohol consumption amongst the Gujarati men living in Britain.<sup>[12]</sup>

The aforementioned study by Patel *et al.* reveals some interesting insights. They compared the Gujarati living in Britain to their counterparts living in a village in Gujarat. They found that diabetes prevalence was high in both the groups despite the fact that the Gujarati in Britain had greater BMI and greater fat intake. The 2-hour post-glucose challenge plasma glucose was higher in the Gujarati living in their native village and the difference was significant.<sup>[12]</sup>

Finally, it was noted in the recent National family health survey (NFHS4) that 25% men and 27% women in Gujarat are underweight. Thus, approximately a quarter of the population is thin. This may have an influence on diabetogenesis and diabetes prevalence in the state.<sup>[13]</sup>

### SUGGESTIONS FOR A ‘HEALTHIER’ GUJARAT

The prevalence of diabetes in Gujarat is lower compared to other states of India with comparable GDP, however, the alarming increase in the prevalence of diabetes and metabolic syndrome in Gujarat needs to be curbed.

One of the major dietary issue is inadequate protein intake in the diet owing to the predominant vegetarian dietary practices. Some of the Gujaratis, especially those living in urban areas have no objections to consumption of ‘eggs’. However, this is often discouraged by the more traditionalists in the family. The increase of consumption of eggs, especially those who are open to the idea, should be encouraged to increase the protein content of the diet. Additionally, use of soy products can act as substitute for the lack of animal protein in the diet. Apart from this, the consumption of ‘farsans’ and ‘sweets’ which have become second nature to the Gujarati cuisine should be controlled.

The culture of ‘sports’ (especially sports other than cricket) need to be inculcated especially in Gujarati Youth. Schools and colleges can help in building a sports culture in the state by encouraging sports activities and participation in competitive sports and athletic events.

The rapid urbanization and rise of the neo-middle class do carry the burden of increased prevalence of lifestyle disorders, however, increasing awareness of the lifestyle measures to curb the menace of metabolic syndrome can help reduce the burden of these modern age epidemics.

### CONCLUSION

The question we started with while writing this review was “Is Gujarati diet diabetogenic?”

Consequently, the evidence for diabetogenic nature of the Gujarat diet and lifestyle is weak. Consumption of high fat, low glycemic carbohydrate diet by the majority of the traditional and rural households may contribute to the lower prevalence of diabetes despite having a sedentary lifestyle. The protein intake, however, needs to be increased in the Gujarati diet. There is nothing in the published literature to suggest that the Gujarati diet and lifestyle have any significant negative impact on the risk of diabetes in the state. However, the evidence for the same is only circumstantial and only a well-designed epidemiological study can help answer the question with certainty.

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### Conflicts of interest

There are no conflicts of interest.

### REFERENCES

1. Balhara Y, Kalra S. The alcohol and tobacco burden of India. *J Soc Heal Diabetes* 2017;5:61-2. Available from: <http://www.joshd.net/article.asp?issn=2321-0656>
2. NFHS-4 FACT SHEETS FOR KEY INDICATORS BASED ON FINAL DATA. 2015.
3. Anjana RM, Deepa M, Pradeepa R, Mahanta J, Narain K, Das HK, *et al.*; ICMR–INDIAB Collaborative Study Group. Prevalence of diabetes and prediabetes in 15 states of India: Results from the ICMR-INDIAB population-based cross-sectional study. *Lancet Diabetes Endocrinol* 2017;5:585-96.
4. Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, *et al.*; ICMR–INDIAB Collaborative Study Group. Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: Phase I results of the Indian council of medical research-India diabetes (ICMR-INDIAB) study. *Diabetologia* 2011;54:3022-7.

5. Sadikot SM, Nigam A, Das S, Bajaj S, Zargar AH, Prasannakumar KM, *et al.* The burden of diabetes and impaired glucose tolerance in India using the WHO 1999 criteria: Prevalence of Diabetes in India Study (PODIS). *Diabetes Res Clin Pract* 2004;66:301-7. Available from: <http://www.sciencedirect.com/science/article/pii/S0168822704001147>
6. Sharma PK, Kumar R, Garg P, Kaur J. Insights into controlling role of substitution mutation, E315G on thermostability of a lipase cloned from metagenome of hot spring soil. *3 Biotech* 2014;4:189-96.
7. Mohan V, Pradeepa R. Mortality in diabetes mellitus: revisiting the data from a developing region of the world. *Postgrad Med J* 2009;85:225-6.
8. Gupta O, Phatak S. Pandemic trends in prevalence of diabetes mellitus and associated coronary heart disease in India – their causes and prevention. *Int J Diabetes Dev Ctries* 2003;23:37-49.
9. Jonnalagadda SS, Diwan S. Nutrient intake of first generation Gujarati Asian Indian Immigrants in the U.S. nutrient intake of first generation Gujarati Asian Indian immigrants in the U.S. *J Am Coll Nutr* 2013;21:37-41.
10. Jenkins DJA, Kendall CWC, Marchie A, Jenkins AL, Augustin LSA, Ludwig DS, *et al.* Type 2 diabetes and the vegetarian diet 1 – 4. *Am Journal Clin Nutr* 2003;78:610-6.
11. Cullmann M, Hilding A, Östenson CG. Alcohol consumption and risk of pre-diabetes and type 2 diabetes development in a swedish population. *Diabet Med* 2012;29:441-52.
12. Patel JV, Vyas A, Cruickshank JK, Prabhakaran D, Hughes E, Reddy KS, *et al.* Impact of migration on coronary heart disease risk factors: Comparison of gujaratis in britain and their contemporaries in villages of origin in India. *Atherosclerosis* 2006;185: 297-306.
13. Kalra S, Kumar A. Higher, sweeter, heavier: Not necessarily healthier. *J Soc Heal Diabetes* 2017;5:63-5. Available from: <http://www.joshd.net/article.asp?issn=2321-0656>