

## Effect of Nutritional Status and Life Style Modification on Pre-Diabetic Patient in Mumbai

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### ABSTRACT

*The Indian population faces a high risk for diabetes and pre diabetes because of high genetic predisposition, sedentary lifestyle patterns, wrong eating habits and lack of physical activity. This research study was aimed to reduce the blood sugar level and prevent onset of type 2 diabetes in pre diabetic patients. In this study pre diabetic patients (N=35) were selected from four municipal dispensaries across Mumbai. And they were assessed and evaluated which were noted in terms of pre and post questionnaire. Participants were also given nutrition education in a guideline format with certain recipes which were explained to them verbally. The results showed that majority of subjects had reduced blood sugar level and the impact of nutrition education was seen to have a positive result on blood sugar level as it was seen to significantly decrease as the p value of FBS was seen to be 0.007 and that of PLBS was seen to be 0.000 ( $p < 0.05$ ) which was highly significant. The results of physical activity also showed a positive outcome as participants were more involved in physical activity then what was observed previously. The present study would thus like to conclude that the subjects were seen to following a better lifestyle. The subjects were seen to eating healthier, eating homely food, going for more physical activity and thus showed improvement in their anthropometric and biochemical parameters.*

**Key words:** Intervention, pre-diabetes, blood sugar level, physical activity.

### INTRODUCTION

Clinical practice guidelines have defined pre-diabetes as either impaired fasting glucose (IFG) (fasting plasma glucose [FPG] of 100–125 mg/dl) or impaired

glucose tolerance (IGT) (glucose of 140–199 mg/dl on a 2-h oral glucose tolerance test [OGTT])<sup>1</sup>.

The prevalence of pre-diabetes among U.S. adults was 12.6% by the A1C criterion and 28.2% by the fasting glucose criterion<sup>2</sup>.

The prevalence of pre diabetes (impaired fasting glucose and/or impaired glucose tolerance) in Tamilnadu, Maharashtra, Jharkhand and Chandigarh was 8.3%, 12.8%, 8.1% and 14.6% respectively. Significant risk factors for pre diabetes were age, family history of diabetes, abdominal obesity, and hypertension and income status. It is also estimated that, in 2011, Maharashtra will have 6 million individuals with diabetes and 9.2 million with pre diabetes. And Projections for the whole of India would be 62.4 million people with diabetes and 77.2 million people with pre diabetes<sup>3</sup>.

Since increased weight, BMI, waist circumference, wrong eating habits and physical inactivity leads to increased risk of diabetes and pre diabetes, the current study therefore has been undertaken to investigate the effect of nutrition education and lifestyle intervention on pre diabetic patients with the following objectives:

- To assess the nutritional status by anthropometric measurements.
- To assess the nutritional status of pre diabetic patients using food frequency questionnaire.
- To see the effect of nutritional education and lifestyle intervention programme on pre diabetic patients.

## MATERIALS AND METHODS

### Selection of samples and data collection

The study was carried out in four dispensaries across Mumbai city from the areas of kandivali, borivli, and currey road. The participant chosen for study were in age group of (24-50) and total participants were 35 out of which 21 were females and 14 were males. The sampling technique used was purposive sampling.

The data was collected using pre and post questionnaire which included background information like Personal information of all subjects i.e. patients name, gender, address, telephone no, age, occupation, monthly income, religion etc. Anthropometric measurements like height, weight, BMI and physical activity and food frequency questionnaire, medical and family history were collected. As the participants were not well educated the questionnaire was not filled by them they were verbally asked questions in preferred language by participants. After which nutrition education was given in guideline format and recipe sheet which was then explained to them verbally. After the initial meeting, the participants were again called for follow-up depending upon their convenience; from charkop dispensary six participants had a follow-up individually twice after explaining the guidelines first time. Fourteen participants from babrekar nagar dispensary also had a follow up thrice in groups and individually on different days after initial education was given. Eight participants from eksar road dispensary had a follow up in group of 2 and individually only once after initial meeting. And seven participants from currey road dispensary had a follow up twice individually. All the nutrition and lifestyle education was given by preferred mode of understanding i.e. (reading, demonstration, listening) by participants. During follow up the participants were asked if they were following the guidelines and education and recipes given to them initially. And doubts and query of every participant was solved. After 2 months the post questionnaire was again introduced with same format and procedure as done at the time of collecting pre questionnaire and then it was checked if their biochemical parameters, eating habits, physical activity had improved in order to prevent type 2 diabetes or other heart and kidney related problems.

The Ethical Committee approval for this study was taken from the Ethical Committee-Seva Mandal Education Society (S.M.E.S Institution) of Dr. B.M.N College Of Home Science.

## RESULTS AND DISCUSSIONS

### Demographic profile

The subjects in the present study belonged to three religions viz. Hindu, Christian and Muslims. There were 32 participants who belonged to the Hindu religion, 2 from the Christian religion and only 1 was found to be from the Muslim religion. The high percentage of Hindu participants was evident because the area in which the dispensaries were located majorly had Hindu residing population.

The mean age of the participants was  $42.73 \pm 4.74$  years, while the mean height of 21 females was seen to be  $155.764 \pm 4.39$  cms. And that of 14 males was  $164.14 \pm 4.24$  cms. The mean weight of the participants prior to the lifestyle modification of female was reported to be  $64.67 \pm 3.61$  kilos and that of male was  $70.00 \pm 10.8$  and mean BMI was found to be  $26.7 \pm 1.67$  and  $25.9 \pm 3.50$  of female and males respectively.

The common occupations amongst the subjects were found to be Business class, service class and Housewives. Majority of participants i.e. 19% were housewives 13% were employed and rest 3% were from business community.

The participants were primarily found to be from the medium socio economic group from the point of view of the average monthly income of the participants being between 10,000 -15,000 INR. However out of 35 subjects 19 of the subjects i.e. the housewives reported that they would not like to be considered in any of the range of monthly income as their complete expenditure was dependent on their spouses and children in some cases.

### Lifestyle pattern of participants

Since the subjects were within the medium socio economic status and hence the lifestyle modification that were introduced was within the affordable range. The life style modification that was incorporated was such that the subjects are restricted to certain diet and encouraged to do more physical activity. There was no introduction of high priced supplements or elite foods to be consumed.

It was found that out of 35 participants 15 of them are having family history of diabetes and rest 20 participants did not show any family history of diabetes or pre diabetes.

Prior to lifestyle education given to participants it was found that 7 participants out of 35 were looking after their condition in which 6 of them doing exercise and 1 participant taking medicine and rest 28 found to do neither exercise nor taking medication.

Amongst 35 subjects, 16 subjects reported that the weight was gained, while only 8 subjects reported that they have lost weight and 11 subjects were found to maintain weight after the onset of pre diabetes amongst the subjects.

This indicated that the subjects were more prone to gain weight rather than lose some as a consequence of pre diabetes amongst them.

### Impact of nutrition education on food consumption pattern

The guidelines to prevent type 2 diabetes provided to the participants included that the participants should have more of whole grains and high protein food and less processed foods in their diet. As mentioned in the above figure, the participants were seen to be consuming more of Bajra, Bengal pulses, non-vegetarian foods, nuts and oilseeds and less of bread, vegetables and fruits and other processed foods after receiving guidelines on lifestyle modification in the pre-diabetic patients.

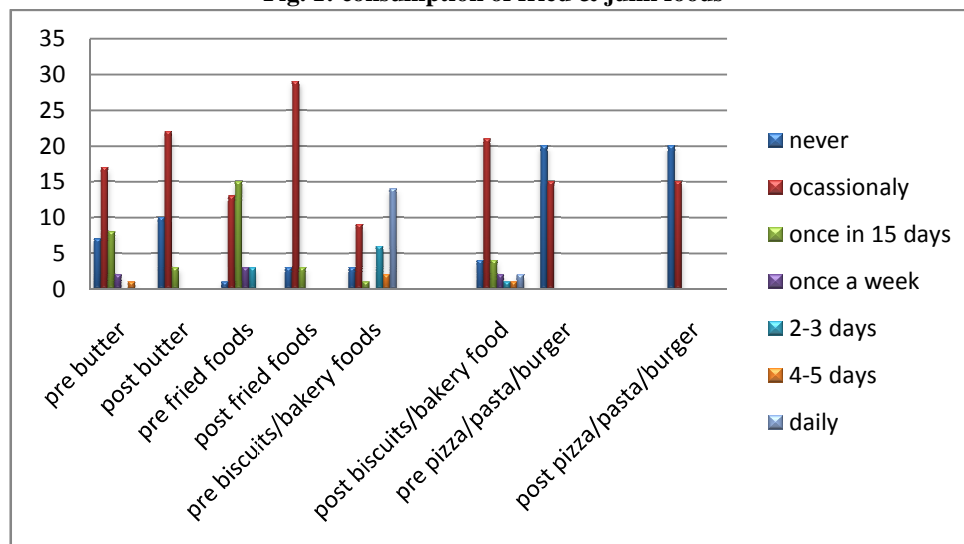
The consumption of whole grains was seen to increase considerably after the guidelines were given to the participants. The importance of eating whole grains which are a major source of fibre and protein in the diet of pre-diabetic or diabetic patients was explained that whole grains play an important role in lowering the risk of chronic diseases, such as coronary heart disease, diabetes, and cancer, and also contribute to body weight management and gastrointestinal health<sup>4</sup>.

The results of a study suggested that high consumption of whole-grain and whole grain bread is related to lower levels of blood sugar<sup>5</sup>.

Also in the present study it was found that that consumption of home-made dairy products like curd, buttermilk, milkshake (suggested to take without sugar), paneer cheese was seen to increase from never to once in 15 days and occasionally. And rest ice-cream, butter, buffalo milk were seen to decrease. The participants were encouraged to consume buttermilk, curd, milkshake and cheese occasionally as these are low fat and high in calcium.

Although calcium in dairy products has shown to help in weight loss, additional factors in milk such as whey protein, conjugated linoleic acid, branched chain amino acids, and sphingolipids are also thought to contribute<sup>6</sup>.

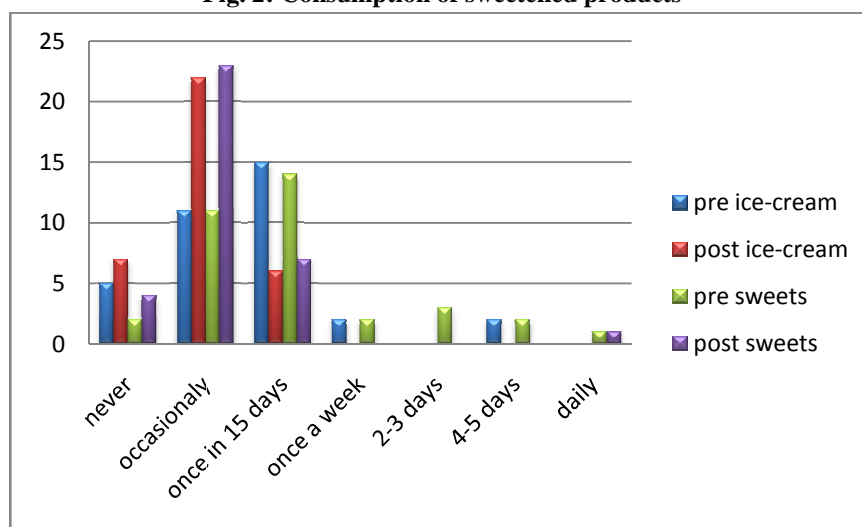
Fig. 1: consumption of fried & junk foods



The consumption of fried foods, bakery foods and was seen to be reduced in post as people who use to consume these foods frequently have shown to either completely stop it or consume it occasionally. The overall consumption of butter was also seen to reduce. However the junk food i.e. pizza, burger etc was seen to be same in pre and post.

Current dietary recommendations advise reducing the intake of saturated fatty acids (SFAs) to reduce coronary heart disease (CHD) and diabetes risk, This expert panel reviewed the evidence and reached the following conclusions: the evidence from epidemiologic, clinical studies is consistent in finding that the risk of CHD and other non-communicable diseases risk is reduced when SFAs are replaced with polyunsaturated fatty acids (PUFAs)<sup>7</sup>.

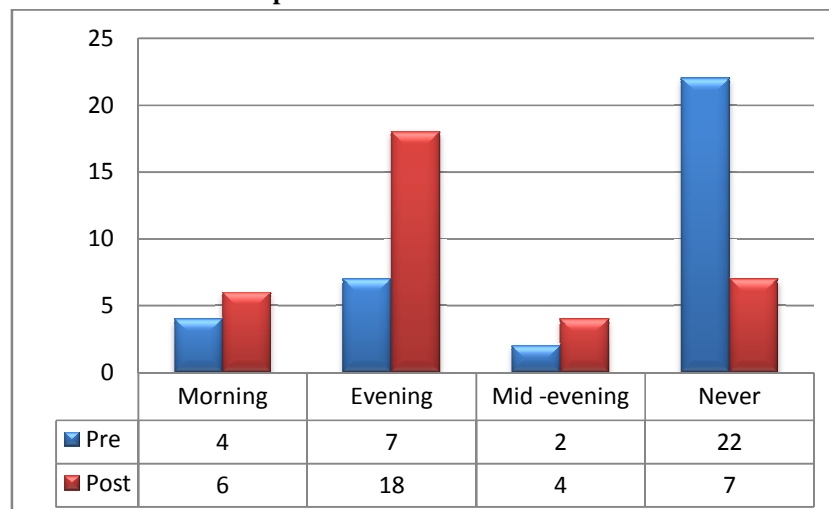
**Fig. 2: Consumption of sweetened products**



In the present study the overall consumption of sweetened products by the participants was seen to reduce from frequently i.e. 2-3 days or 4-5 days to occasionally eating of sweetened products.

Certain studies also say that controlling the intake of sugar sweetened products represents an important component of lifestyle management for weight control and maintenance. Limiting sugar sweetened products may also confer favorable benefits on T2DM and cardiovascular risk such as improving lipid profiles and insulin sensitivity and reducing blood pressure, inflammation, and accumulation of visceral adiposity<sup>8</sup>.

**Fig. 3: Percentage of participants being involved in daily exercise pre and post nutritional intervention**



The participants were asked to increase their physical activities and more number of participants to be involved in some or the other type of physical activity other than the normal daily chores. As described in the above figure, the participants were seen to be involved in certain activities like yoga, jogging or brisk walking. The number of participants who reported never being involved in any kind of physical activity was substantially reduced and participants involved in evening physical activity was seen to have increased.

The overall impact of nutritional education on food consumption and physical activity was seen to have a positive outcome and hence the blood sugar level of participants was seen to be reduced to a major extent. As shown in (Table 1)

**Table 1 Change in biochemical parameters of the participant's pre and post lifestyle modification**

Biochemical parameters	Means $\pm$ S.D	T value	P value
Pre: Fasting blood sugar	114.89 $\pm$ 7.7	2.880	0.007
Post: Fasting blood sugar	111.49 $\pm$ 8.5		
Pre: Post lunch blood sugar	162.74 $\pm$ 15.16	3.909	0.000
Post: Post lunch blood sugar	153.89 $\pm$ 10.87		

The p value of fasting blood sugar was 0.007 and that of post lunch blood sugar was seen to be 0.000 which is highly significant.

### SUMMARY AND CONCLUSION

The present study was led by an objective to see whether there is any difference in blood sugar level of pre diabetic patients after giving nutrition education about lifestyle changes and eating patterns. The study involved 35 participants out of which 21 were women and 14 were male.

The impact of nutrition education given to participant had a positive result on blood sugar level, it was seen to significantly reduce as the p value of FBS was seen to be 0.007 and that of PLBS was seen to be 0.000 which was highly significant.

The overall knowledge of the participants towards eating pattern was improved as it was seen that frequency of cereals, pulses, nuts and oilseed was seen to increase while consumption of bread and other fried and junk food was seen to reduce in post intervention.

Participants who reported never being involved in any kind of physical activity was substantially reduced and participants involved in the physical activity in the time of evening was seen to be increased.

The present research would like to conclude that the participants were seen to be at a better lifestyle after nutrition education was provided to them. The participants were seen to eating healthy, eating homely food, going for more physical activity and thus showed significant results by improving their anthropometric and biochemical parameters especially blood sugar levels.

And importantly, health care systems should recognize "pre diabetes" as a disease and to use this term to promote programs that is culturally and geographically appropriate. Further research is needed to determine how early interventions should be implemented and sustained.

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