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A self-controlled trial to assess the impact of competitive spirit on weight, waist circumference and HbA1c among the followers of Dixit lifestyle participating in 90 days weight loss and diabetes reversal challenge

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Abstract: *Background:* 'World free of obesity and diabetes' campaign ' began in 2013. As a part of it "90 days weight loss and Diabetes reversal challenge" for motivating the followers, a trial was organized to see impact of this competitive spirit. *Objective:* To assess the impact of competitive spirit on weight, waist circumference and HbA1c among the followers of Dixit Lifestyle. *Method:* 544 participants submitting reports at the start and end of 3 months were selected for the analysis in this "90 days weight loss and Diabetes reversal challenge" trial. *Results:* Average weight loss for overall 544 participants was 4.12 kg, waist circumference loss was 2.29 inches and average HbA1c reduction was 0.428 gm%. While average weight loss for 223 Diabetic participants was 4.35 kg, waist circumference loss was 2.31 inches and average HbA1c reduction was 0.92 gm%. 80 Diabetics converted to Pre-diabetic and 10 to Non-diabetics status at the end of "90 days weight loss and Diabetes Reversal Challenge". While from the 253 Pre-diabetics, 59 became Non-diabetics. Among 223 diabetics, medicines were reduced in 44 and stopped in 16. *Conclusion:* It was observed that, competitive spirit among the followers of Dixit Lifestyle had a positive impact on weight loss, inch loss and reduction in HbA1c. Also it was seen that Dixit Lifestyle caused a significant reduction in requirement of anti-diabetic molecules or drugs.
Keywords: Competitive spirit, Dixit lifestyle, Weight loss challenge, HbA1c, Weight, Waist circumference.

Introduction

Diabetes is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long term damage, dysfunction, and failure of different organs, especially the eyes, kidneys, nerves, heart, and blood vessels [1-2].

The prevalence of diabetes in India and world is on rise in last few decades. Same is true for obesity. The main drivers of the T2DM epidemic are the global rise in sedentary lifestyle, high calorie diets and population aging, which have quadrupled the incidence and prevalence of T2DM. It's rising prevalence and presence in rural communities indicates that changed lifestyle factors are instrumental for this surge [3]. About 10% adults in India have T2 diabetes and 10% are pre-diabetic [4]. This disease is assumed to be a lifelong chronic disease requiring medication. The most recent position statement issued by the ADA regarding standards of medical care in diabetes and a consensus statement by the American College of Endocrinology (ACE) and the American Association of Clinical Endocrinologists (AACE) recommend lifestyle intervention as the preferred treatment option for pre-diabetes and newly diagnosed diabetes up to 3 months, as it has been shown to be safe and highly effective, reducing the progression to type 2diabetes by more than 40% [5-6].

There have been attempts to find out ways by which the possibility of diabetes mellitus can be delayed or prevented by lifestyle modifications or by medicines. But we have to understand that this is a lifestyle disease. There have been reports about clinical

remission of diabetes by reduction of food intake, and/or use of medication. Food restriction may be done with bariatric surgery, or by restricting food intake by health education and scheduling smaller meals, intermittent fasting etc [7-9]. Now there is some evidence on 2-meal a day regime with 45 min exercise in the form of walking at least 4.5 km(Dixit Lifestyle),as a part of 'World free of obesity and diabetes' campaign [10-14].

Study Rationale: Present study was conducted with an objective to determine whether competitive spirit among the followers of Dixit Lifestyle has an impact on Weight loss, inch loss, and reduction in HB1Ac and reduced requirement of Anti-Diabetic molecules/ dose. T2DM remission is achievable by limiting to two-meals-a-day coupled with some mandatory exercise which is a part of diabetes management in any standard treatment guidelines. If this is feasible, a very cost-effective and sustainable solution will be available to counter the advancing wave of T2DM in India. The hypothesis of insulin resistance causing T2DM is plausible. Meal frequency limitation will likely limit the insulin spikes and thus reduce the cause for insulin resistance and ultimately reduction of the resulting incidence of obesity [15-16]. Diabetes mellitus is a lifestyle disease. This study was conducted with an attempt to find out a solution for a lifestyle disease in the form of lifestyle modification.

Study Objectives:

- *Primary objective:* To determine if competitive spirit has an impact on weight loss, reduction in waist circumference (inch loss) and reduction in HB1Ac levels after completion of 3 months challenge.
- *Secondary objective:* To determine if Dixit Lifestyle causes reduction in requirement of anti-diabetic molecules/doses after completion of 3 months challenge.

Material and Methods

This self-controlled preventive trial was conducted from 1st August 2023 to 31st October 2023 as a part of "90 days weight loss and Diabetes Reversal challenge". Study was commenced after the Institutional Ethics Committee clearance. Followers of Dixit Lifestyle from all over the world fulfilling inclusion and exclusion criteria were briefed about the "90 days weight loss and Diabetes Reversal challenge" and those who gave consent were included in the study. A total of 648 participants were enrolled into the study, were divided into Non-Diabetic, Pre-Diabetic and Diabetics Groups. Out of these, 544 participants who submitted their reports before the start and at the end of 3 months were selected for the analysis.

Criteria for Selection of cases: Individuals following Dixit Lifestyle who are;

1. Non-Diabetics.
2. Pre-Diabetics.
3. Diagnosed with type 2 diabetes with HbA1C >6.5% and/ ortaking anti-diabetic medications.
4. Diagnosed type 2 diabetes patients with HbA1C >6.5% but not taking anti-diabetic medications.

Sample size: Assuming a 20% remission rate with no lifestyle intervention, while that with the Dixit Lifestyle intervention to be 70% and a dropout rate of 10%, minimum sample size of 32 was calculated using Open Epi sample size calculator[17]. A total of 648 participants, in which 253 diabetics, 298 pre-diabetics and 97 non diabetics were enrolled in this study.

Inclusion Criteria:

- Those diagnosed with T2DM at least 1 month before the initiation of our study, belonging to the age group of 30-70years, without any complications were selected.
- Patients with HbA1C>6.5%, taking anti-diabetic medications/ insulin treatment.
- Patients with HbA1C>6.5%, not taking any treatment.
- The candidates who could self-report/ report their daily findings with assistance of family member in Dixit Lifestyle WhatsApp Group.

Exclusion Criteria:

- Patients with cardiovascular disease, nephropathy, retinopathy, neuropathy diabetic foot, and also T2DM in pregnancy.
- Those who did not give consent.

- Those who could not do physical activity/ exercise for any reason of physical or feasibility issues.

Method:

- The Patients were divided into Non-Diabetic, Pre-Diabetic and Diabetic WhatsApp Groups. Daily motivational messages, videos were shared on the WhatsApp groups to motivate and increase the competitive spirit of the participants. Participants were asked to fill Google forms on daily basis and send screenshot of activities done during the day. Those who failed to post such screenshots were called for reasons for not following routine. Every week innovative competitions were organized with attractive prizes.
- The selected participants were asked to provide previous records of investigations and treatment taken for diabetes.
- The patients were asked to continue the ongoing treatment by their treating diabetologist along with the lifestyle intervention given in the study. Those who haven't started anti-diabetic medications at the time of study were given choice of choosing only lifestyle intervention prescribed in the campaign, for the remission of their diabetes. •The selected patients were explained about Dixit lifestyle; which is only two-meal a day without any energy-giving drink or snack in between. All participants were monitored for reduction of anti-diabetic molecules as the HbA1C levels decreases. Care was taken that all the participants sustain the lifestyle intervention by following Dixit Lifestyle.
- They were asked to do exercise in the form of walking for at least 4.5 km in 45 minutes. Daily diary or digital records were used for monitoring this reported activity. HbA1C was measured each month by HPLC method in a standard one allotted NABL accredited laboratory.
- Other covariates like weight, waist size, BP were measured as per standard methods. Fasting insulin was measured before and after trial period of 3 months. Any patient showing clinical or lab signs of deterioration was discontinued and referred to standard treatment regimen.

Data Analysis:

- Data was entered systematically in master sheet by using Microsoft Excel 2019.
- Data was presented in tabular and graphical format, in the form of frequency and percentage.
- Data was analyzed by applying chi square test, frequency & percentage for quantitative data and standard error of difference between two proportions qualitative data in OpenEpi Statistical Software.

Results

A total of 44 participants fulfilling inclusion and exclusion criteria were included in the final analysis of the study. Majority i.e. 207 (38.05%) belonged to 40-50 years age group followed by 172 (31.62%) from the age group of 50-60 years (Table No. 1). There were 317 (58.27%) males and 227 (41.73%) females in this study (Table No. 2). Participants from as many as 7 Countries participated in this study which included India, USA, Vietnam, Kenya, Denmark, Canada and Australia. From India, people from 15 States participated in this study, majority being from Maharashtra.

Table-1: Age Group wise Distribution of participants

Sr. No.	Age Group	Frequency	Percentage (%)
1	20-30	8	1.47
2	30-40	86	15.81
3	40-50	207	38.05
4	50-60	172	31.62
5	60-70	66	12.13
6	70-80	5	0.92
Total		544	100

Table-2: Gender wise Distribution of participants

Sr. No.	Gender	Frequency	Percentage (%)
1	Male	317	58.27
2	Female	227	41.73
Total		544	100

Out of the total 544 participants, 68 (12.5%) were Non-Diabetics, 253 (46.5%) Pre-Diabetics and 223 (41%) were Diabetics at the start of this study. Average weight loss for 544 participants was 4.12 kg and waist circumference loss was 2.29 inches. Average HbA1c reduction was 0.428 gm% (Table No. 3).

Table-3: Effects of 90 days weight loss and Diabetes Reversal Challenge on participants

		Challenge Start	Challenge End	Difference
For Total count=544, Where reports available for T0 & T3	Total weight (kg)	41373.34	39131.71	2241.63
	Avg. Weight (kg)	76.05	71.93	4.12
	Total HbA1c	3554.7	3321.81	232.89
	Avg. HbA1c	6.534	6.106	0.428
	Total Inch Loss	21635.42	20506.36	1129.06
	Avg. Inch Loss	39.99	37.7	2.29

Note: This is calculated for a total of 544 participants who filled the progress tracker at the start and at the end of the challenge. PD is considered when 5.7<= HbA1c<6.5 or FI>10; ND is considered when HbA1c<5.7 and FI<=10; T0= Start of the challenge (baseline); T3= End of the challenge.

Table-4: Effects of 90 days weight loss and Diabetes Reversal Challenge on Diabetic status

Status at the start of trial (T0)	Status at the end of 3 months (T3)		
Diabetics	**#Total DB**	**#DB to PD**	**#DB to ND**
	223	80	10
Pre diabetics	**#Total PD**	**#PD to ND**	
	253	59	

Out of 544 participants, 80 Diabetics converted to Pre-Diabetic status and 10 to Non-Diabetics status at the end of "90 days weight loss and Diabetes Reversal Challenge" While from the 253 Pre-diabetics, 59 became Non-diabetics (Table No. 4). Average weight loss for 223 Diabetic participants was 4.35 kg and waist circumference loss was 2.31 inches. Average HbA1c reduction was 0.92 gm% (Table No.5). Out of these, in 44 (19.74%) Diabetics medicines were reduced and in 16 (7.18%). Diabetics medicines were stopped completely (Table No.6).

Table-5: Effects of 90 days weight loss and Diabetes Reversal Challenge on Diabetic participants

		Challenge Start	Challenge End	Difference
For Total count=223 out of 544, Where reports available for T0 & T3	Total weight (kg)	16904.74	15935.81	968.93
	Avg. Weight (kg)	75.81	71.46	4.35
	Total HbA1c	1719.81	1514.29	205.52
	Avg. HbA1c	7.71	6.79	0.92
	Total Inch Loss	8869.2	8432.88	436.32
	Avg. Inch Loss	40.13	37.82	2.31

Table-6: Effects of 90 days weight loss and Diabetes Reversal Challenge on Anti diabetic medicines in Diabetic participants (n=223)

Anti diabetic medicines	Frequency	Percentage (%)
Reduced	44	19.74%
Stopped	16	7.18%
No change	163	73.08%
Total	223	100%

Discussion

Recent evidences have shown that, Type 2 Diabetes Mellitus can reverse with lifestyle modification. In our study, 648 participants following Dixit lifestyle enrolled for "90 days weight loss and Diabetes reversal challenge" however out of them 544 who submitted their reports before the start and at the end of 3 months were included for the final analysis. It was observed that weight loss, waist circumference loss and average HbA1c reduction in 223 Diabetic participants was comparatively more than the overall 544 participants, i.e. 4.35 kg, 2.31 inches and 0.92 gm% versus 4.12 kg, 2.29 inches and 0.428 gm% respectively. Out of 544 participants, 80 Diabetics converted to Pre-Diabetic status and 10 to Non-Diabetics status at the end of "90 days weight loss and Diabetes Reversal Challenge." From the 253 Pre-Diabetics, 59 became Non-Diabetics. Out of these, in 44 Diabetics medicines were reduced and in 16 Diabetic participants medicines were stopped completely. Competitive spirit among the followers of Dixit Lifestyle had a positive impact on weight loss, inch loss and reduction in HbA1c. Also it was seen that Dixit Lifestyle has caused a significant reduction in requirement of anti-Diabetic molecules.

In a quasi-experimental, multicentre study conducted in Maharashtra by Ashtekar S et al, to evaluate effect of 2-only-daily-meals with exercise (2-OMEX) popularly known Dixit Lifestyle, it was observed that there is a noticeable and statistically significant change due to 2-OMEX lifestyle intervention of about seven months in all three outcomes (reduction in HbA1c, OHA generic count and weight) as compared to the conventional arm. The 2-OMEX intervention showed that HbA1c was reduced by 0.94 gm% (95%CI: -1.60 to –0.56). Weight reduction was more pronounced in the 2-OMEX (F: 1.90 kg and M: 1.82 kg) as compared to the conventional arm (F: 0.88 kg and M: 0.83 kg), and both the within-arm-declines were statistically significant. The decline in body weight was 2.57% in the 2-OMEX arm and 1.26% in the conventional arm [14].

In a similar study conducted by Crandall JP et al also known as United States Diabetes Prevention Study (DPS) among randomly selected more than 3,000 overweight adults with impaired glucose tolerance to groups to either receive placebo, metformin or join the lifestyle interventional groups as a part of prevention strategy of weight loss in Type 2 Diabetes Mellitus. It was discovered that participants in the lifestyle intervention group showed a 67% reduction in the chance of acquiring type 2 diabetes mellitus with a low-calorie, low-fat diet and moderate-intensity exercise for 150 minutes per week. This study demonstrated that patients could dramatically lower their risk by engaging in preventive approaches [18].

In a nine-month pilot study, a sequential, multiple assignment, randomized trial led by DariaIgudesman et al; it was found that three months of dietary intervention, regardless of the distribution of macronutrients or calorie restriction, led to weight loss in adults with T1D who had been living with the disease for ≥1 year and had a body mass index of 27–39.9 kg/m2. The intervention also improved or maintained HbA1c levels without worsening hypoglycemia. While adjusted body fat percentage remained unchanged, on average (P =.21), adjusted weight and HbA1c (n = 38) dropped by -2.7 kg (95% CI -3.8, -1.5, P <.0001) and -0.91 percentage points (95% CI -1.5, -0.30, P =.005), respectively. After adjustment, hypoglycemia indices did not change (n = 28, P >.05). Significant variability was seen in all outcomes, including weight change (57.9% were re-randomized mainly because of loss of <2% body weight [19]. This is similar to Dixit Lifestyle where there is no calorie restriction.

According to a study by Yuxin Fan et al., among Chinese individuals, changes in body weight, BMI, and general adiposity indicators are less strongly related with the risk of type 2 Diabetes than abdominal adiposity indicators, waist circumference, and its change [20]. Unlike our findings, a study by Keyi Si et al. found that lean people who intentionally used weight loss strategies (WLSs) gained more weight and were at a higher risk of developing diabetes than those who made an effort to lose weight but did not use WLSs; the latter group gained less body weight and was at a lower risk of developing Diabetes [21].

The results of the Finnish Diabetes Prevention Study (FDPS) [22] and the American Diabetes Prevention Program Outcomes Study (DPPOS) [23] show that the advantages of changing one's lifestyle can persist for up to 23 years.

Conclusion

It was observed that, competitive spirit among the followers of Dixit Lifestyle had a positive impact on weight loss, inch loss and reduction in HbA1c. Also it was seen that Dixit Lifestyle has caused a significant reduction in requirement of anti-diabetic molecules.

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