SUMMARY

As the earth is round so is the worldwide population competing to be i.e **"Round".** However, figure zero is also round "0" which is very tiny and means nothing. So, neither of the choice to be is good. Our health and body is just like a life's path, with twist and turns and with little bumps.

As exploding prevalence of obesity is creating too much stress for all public and health care professionals, we need to set priorities, develop workable solutions and take stringent actions against it.

Reviewing all factors and underlying mechanisms ruling obesity, one ray of hope that is safe and sound, easy to use and incorporate is prebiotic Fructooligosaccharide. There is lot of literature and scientific evidence on Fructooligosaccharide and its health benefits. However, studies on role of Fructooligosaccharide in weight loss, gut flora and 6 gut hormones all together in a large sample size in Indian setup is not available Hence the present study was undertaken in 4 phases mentioned below and study entitled as:

"Acceptability Trials of Fructooligosaccharide (FOS) Added Popular Indian Recipes and Impact Evaluation of FOS Intervention in Modulating Gut Microflora, Gut Satietogenic Hormones and Anthropometric Indices of Young Obese Bank Employees of Urban Vadodara: A FAT – FIT Study"

PHASE I – SNAP-SHOTING THE PRESENCE OF OBESITY IN YOUNG BANKS EMPLOYEES OF URBAN VADODARA

- Screening the subjects from various banks of Vadodara city for their anthropometric measurements, body composition analysis, random blood sugar and blood pressure.

- To classify screened bank employees in various categories of BMI.
- Determining presence of obesity according to WC, WSR, WHR and Body- fat percentage in screened bank employees.
- Determining the presence of hypertension in screened bank employees.
- Associations and correlation amongst anthropometric and biophysical parameters of screened bank employees.

PHASE II–COMPARISON BETWEEN BASELINE PARAMETERS OF NON-OBESE AND OBESE BANK EMPLOYEES WITH REGARDS TO:

- Socio economic status (SES), anthropometric measurements, family medical history, personal medical history, defecation profile, personal habits, addiction profile, physical activity pattern, hunger and satiety scale, depression scores and dietary intakes of non obese and obese subjects.

- To study Gut-microflora of non-obese and obese subjects with regards to
  - *Bifidobacterium*, *Lactobacillus*, *Clostridium* and *Bacteriodes*

- To determine the baseline levels of six Gut-hormones namely,

  - Glucagon-like Peptide -1 (GLP-1) - Gut Incretin
  - Gastric Inhibitor Polypeptide (GIP) - Gut Incretin

- Peptide YY (PYY) - Anorexogenic hormone
- Ghrelin (Hunger hormone) - Orexogenic hormone
- Leptin (Energy Expenditure hormone) - Anorexogenic hormone
- Insulin - Anorexogenic hormone

- Correlation of weight with various parameters of non-obese and obese bank employees and regression analysis to identify strongest predictor of obesity.

PHASE III – TO STUDY IMPACT OF FOS INTERVENTION FOR 90 DAYS IN OBESE SUBJECTS: A RANDOMIZED CONTROL TRIAL

To Study how efficiently FOS supplementation in obese subjects for period of 90 days can change or modulate parameters in terms of:

- Anthropometric and biophysical measurements.
- Dietary parameters, hunger and satiety scores.
- Depression and Defecation profile.
- Fasting plasma levels of gut-hormones: GLP-1, GIP, PYY, Ghrelin, Leptin and Insulin post intervention.
- Gut-microflora: *Bifidobacteria, Lactobacillus, Clostridium, Bacteriodes* post intervention.
- Correlation of gut-hormones and gut-microflora with various parameters.
- Regression analysis for identifying strongest predictor or obesity in obese bank employees.
- Follow up data for time-point interval analysis.

PHASE IV– ACCEPTABILITY TRIALS OF FOS ADDED POPULAR INDIAN RECIPES

- Analyzing physical properties of FOS addition at varying levels in four popular Indian snacks having different cooking methods and comparing with their standard products namely:

  - *Dudhi Muthiya* - Steamed
  - *Vegetable Chilla* - Shallow fried
  - *Handwa* - Baked
  - *Veg. Mini Samosas* - Deep Fried

- Conducting the organoleptic evaluation of the developed products using 9 point Hedonic scale.

The results and major highlights of all the phases of the study are summarized below:

6.1: PHASE I

Phase-I was designed with an aim to snap-shot the prevalence of obesity in bank employees of urban Vadodara (A cross-sectional design). List of private banks was taken from the website of Indian Banks Association. Six banks (A total of 20 different branches) in different areas of Vadodara city were conveniently selected based on the permission obtained from the administration department to organize the health screening camp. People in the eligible age group were briefed on the objective and benefits of the study, and were motivated to participate by providing an informed consent. Proper record of the eligible members who refused to participate in the study was maintained. A total of six hundred and fifty (650) bank employees irrespective of age and gender were screened for their anthropometric measurements, Body fat percentage, Blood pressure and random blood sugar in sub-samples.

Salient Features of Phase II

6.1.1 Distribution of subjects according to gender and age

- Out of six hundred and fifty subjects screened, 74.77% were males and 25.23% were females.
- Out of these 53.08 % of the males and 59.69 % females were in the age group of 25-35 years respectively.
- 26.77% were in age range of 25 – 30 years and 42% were in age range of 26-30 years. Total 69% of bank employees were in age range of 25 - 35 years.

6.1.2 Classification of subjects according to the various categories of BMI

- Only 32 %of bank employees had normal BMI.
- Overall 7 % of bank employees were underweight.
- A total of 7% employees were in obesity-grade II category.
- Total 61% of bank employees had BMI above normal >23 kg/m^2.
- The prevalence of overweight and obesity was observed to be 20% and 34% respectively.
- The total mean BMI of the participants was 24.20 ± 4.20 kg/m^2 and according to Asia pacific classification, young bank employees were found to be overweight.
- No derangement was found in anthropometric parameters. However, SD for Weight, WC and HC was too high.
- With advancing age, increase in grades of anthropometric and biophysical parameters was observed for all young bank employees.
- 47.54% males, 12.92% females and Total 61% of bank employees were at increased risk of co-morbidities.

6.1.3 Prevalence of abdominal obesity and central obesity in bank employees

- According to cut offs for waist circumference and waist hip ratio given by WHO 32.92% of males, 10.77% female and total 44% of subjects showed the presence of abdominal obesity.

- 45.69% males, 56.31% females and total 56% were at risk of developing central obesity.

6.1.4 Distribution of subjects according to levels of body fat percent

- Level of fitness analyses revealed 45.08% of males and 13.23% of females' had excess of body fat mass respectively.
- Total 58% of bank employees had excess body fat.

6.1.5 Prevalence of hypertension in the bank employees

- Male bank employees had elevated SBP of 130.81 ± 13.59 mmHg according to JNC VIII classification.
- 68% of bank employees had elevated SBP.
- 42% of bank employees had elevated DBP.
- 69% of bank employees had hypertension (SBP/DBP together).
- Hypertension and higher body fat % both coexisted in 42% of bank employees ($\chi 2 - 11.11^{***}$).
- The probability of not developing HT was 31% higher in employees who could manage to reduce their body-fat % (OR-1.74%, RR–1.21% and RD / ARR–31%).

Conclusion

- ***From this phase it can be concluded that obesity prevalence and its associated risk of developing co-morbidities, like hypertension was found to be too high in bank employees of urban Vadodara.***

- ***Assessing and treating "Adiposity" at an early age and stage of prognosis will definitely help curtail obesity rates and its associated health disorders.***

6.2 PHASE II

This phase of study was designed to analyze comparative difference beetween non-obese and obese individuals with regards to their anthropometry profile, biophysical profile, medical history, family history of diseases, defecation profile, hunger and satiety, depression status, habituation profile, dietary intakes, gut satietogenic hormones (GLP-1, GIP, PYY, Leptin, Ghrelin and Insulin) using Luminex xMAP technology and gut microflora (*Lactobacillus, Bifidobacterium, Bacteroides and Clostridium*) and understand the correlations amongst these parameters. For achieving the desired objectives, a total of 300 bank employees were enrolled (150 non-obese and 150 obese) and screened based on inclusion and exclusion criteria. Verbal and written informed consent was obtained from all employees enrolled before initiating the study.

Salient Features of Phase II

6.2.1 Background information of obese and non-obese bank employees

- Majority of employees belonged to Hindu Religion – 95%, resided in unclear family – 71%, had education level of Graduate and above - 93% and financially belonged to category of Middle class – 93%.

6.2.2 Anthropometric and Biophysical profile of obese and non-obese bank employees

- No significant difference was observed in mean height of non-obese and obese employees.
- Obese employees had significantly higher percent difference as compared to non-obese for Weight – 37 %, BMI – 31 %, WC –22 %, HC –14 % and WHR – 8 % Obese employees had 27.85%*** (~28%) higher Body-fat and 28.35%*** (~28%) higher BMR. It was not that high too induce weight loss though.
- Probably it can be stated that with increase in 1% of body-fat, BMR gets elevated by 1%.

- Male employees in non-obese group had elevated SBP similar to obese employees.

6.2.3 Presence of abdominal (WC, WSR) and central obesity (WHR) in non-obese and obese bank employees

- Abdominal and central obesity was present in 40% and 41% of obese bank employees respectively.
- Abdominal and central obesity was also present in 6% and 14% of NON-OBESE employees.

6.2.4 Presence of Level of fitness according to body fat % in non-obese and obese bank employees

- 48 % of young obese employees had excess of body -fat %.
- 8% of NON-OBESE employees also had higher body-fat % (OR – 88.25; RR – 6.31; RD – 79.03).
- No statistical difference was observed in physical activity level of non-obese and obese bank employees.

6.2.5 Family medical history and personal medical history of non-obese and obese bank employees

- Higher percentage of young obese bank employees had family history of NCD's.
- 39 % of Obese Employees had Moderate - Strong Family History.
- However, 22.33% of NON-OBESE employees also had moderate – strong family history.
- 23% of obese employees reported locomotor disorder and flatulence followed by 20% and 13% with constipation and acidity.
- However, 38% of non obese employees had dental problems and 14% reported having GI disorders.

6.2.6 Habituation profile of non-obese and obese bank employees

- AERATED DRINKS was highest consumed product especially by non-obese employees as compared to obese. However, statistically the difference (1.66%) was not significant as values were very close.
- TEA was second highest product consumed by young obese employees.
- ALCOHOL was third highest product consumed by young obese employees.
- 28% of obese employees were highly habituated as compared to 16% of non-obese employees. This association was statistically significant (χ^2 - 17.53***).
- However, 21.33% of non-obese employees were moderately habituated as compared to 13% of obese employees (χ^2 - 9.24***).
- NON-OBESE EMPLOYEES: Results clearly reflect that with increase in degree of habituation there was increase in all anthropometric and biophysical parameters.
- It could be interpreted that development of obesity is directly proportional to degree of habituation.

6.2.7 Depression and Defecation profile of non-obese and obese bank employees

- 14% of Obese Employees had Mild Mood Disturbances. However, borderline to severe depression was more prominent in non-obese employees (10%).
- With respect to defecation profile more percentage of obese individuals reported

▪ Small quantity of stool	13.33%	NS
▪ Hard stools	20.33%	p<0.001
▪ Dark colored stools	46.67%	p<0.001
▪ Strong odor	13.33%	p<0.001
▪ Bad feeling after defecation	9.33%	p<0.001

- 11.67% of obese and 6% of non-obese bank employees were found to be constipated (χ^2 – 10.5, p<0.001).

- Degree of constipation revealed 10.67% of obese to be mild constipated and 5.33% of non-obese were moderate to severely constipated (χ^2 – 27.4, p<0.001).

6.2.8 Dietary profile, Hunger and Satiety scores of non-obese and obese bank employees

- Obese employees consumed significantly higher intakes of all macronutrients except fiber intake as compared to non-obese bank employees. Fat intake was exceptionally high by 96.40% from RDA.
- Non-obese employees consumed 11% lesser calories, 5% lesser proteins, 22% lesser CHO, 54% lesser soluble and total dietary fiber than RDA. Fat intake was 38.38% higher than RDA.
- No significant difference was observed between hunger scores of employees in both groups.
- Significant difference was observed in the satiety scores during meal time of lunch, evening and dinner.
- Probably obese individuals consumed excess amount of food to fullness and hence reported higher scores for delayed satiety.

6.2.9 Gut microbial profile of non-obese and obese bank employees

- The gut microbial profile of non-obese employees depicted predominantly higher colonization of *Bifidobacterium* by 4.27% and *Bacteroides* by 8.17%.
- However, colonization of gut in obese employees was dominated by higher counts pathogenic bacteria – *Clostridium* by 4.32% as compared to non-obese.
- No significant difference was observed in the counts of *Lactobacillus* in both the groups.

6.2.10 Gut Hormones of non-obese and obese bank employees

- Secretion of gut satietogenic hormones in obese employees was diminished by

  GLP -1 - 63.04% GIP - 58.42%

PYY- 41.16% Ghrelin- 56.14%

- Plasma insulin values were in normal range in both groups. However, percent difference for Insulin was +172.75% in obese bank employees.
- Similarly, Leptin being directly proportional to fat was almost +200% higher in obese employees as compared to non-obese.

6.2.11 Correlations of various parameters of non-obese and obese bank employees

- A positive significant ($p<0.001$) correlation of weight was observed with body fat ($r=0.459$), systolic blood pressure ($r=0.421$), diastolic blood pressure ($r=0.365$), defecation frequency ($r=0.241$), alcohol intake ($r=0.283$), tea consumption ($r=0.452$), severe habituation ($r=0.435$), total satiety scores ($r=0.418$), energy intake ($r=0.340$), protein ($r=0.463$), fat ($r=0.263$), Leptin ($r=0.667$) and Insulin ($r=0.539$).

- Significant ($p<0.001$) negative correlation of weight was observed with defecation odor ($r=0.249$), feeling after defecation ($r=0.337$), physical activity ($r=0.205$), total hunger scores ($r=0.307$), hunger scores at dinner time ($r=0.330$), depression ($r=0.233$), insoluble dietary fiber ($r=0.257$), soluble dietary fiber ($r=0.545$), total dietary fiber ($r=0.282$), High fiber fruits ($r=0.391$), moderate fiber fruits ($r=0.222$), *Bacteroides* ($r=0.258$), GLP-1 ($r=0.717$), GIP ($r=0.610$), PYY ($r=0.763$) and Ghrelin ($r=0.700$).

6.2.12 Stepwise Linear Regression analysis for identifying strongest predictor of obesity in non-obese and obese bank employees

- Gut hormone PYY alone was the strongest predictor of obesity to the accuracy of 58% in young bank employees. PYY along with intake of soluble dietary fiber could predict obesity with accuracy of 64%. Further, adding up factors like alcohol intake (67%), frequent tea consumption

(70%), fat intake (74%), *Bacteroides* counts (75%), Ghrelin (77%) and *Clostridium* counts (78%).

6.2.13 Non-obese of young bank employees at higher risk of developing NCD's – Future Liabilities for Healthcare

Elevated SBP (mmHg)	**127.11±12.75**	**(n=150)**
Abdominal obesity :	**5.67%**	**(n=17)**
Central obesity:	**13.67%**	**(n=41)**
Higher Body –fat%:	**08.33%**	**(n=25)**
Family History of NCD's:	**22.33%**	**(n=67)**
Aerated drinks	**45%**	**(n=136)**
Alcohol	**16%**	**(n=49)**
Moderate habituation	**21.33%**	**(n=64)**
Depression	**10%**	**(n=30)**
Constipation :	**6%**	**(n=18)**
Lower Intake of Fiber :	**54%**	**(RDA)**
Higher Fat Intake:	**38%**	**(RDA)**

Conclusion

''How easy for those who do not bulge and So difficult to not overindulge! ''

- ***This phase clearly demonstrates statistically significant difference between Obese phenotype and Non-obese phenotype***
- ***Adiposity was very prominent in obese phenotype and was attributed to intake of sugar sweetened beverages (aerated drinks and tea), alcohol and high dietary fat intake.***
- ***Effect of higher consumption of sugar sweetened beverage, alcohol and excess of dietary fat consumption induced statistically higher risk of developing NCDs in Non-obese phenotype Deranged defecation profile and dysbiosis was quite evident in obese phenotype.***
- ***Secretion of gut satiety hormones like GLP-1, GIP and PYY was attenuated in obese phenotype as compared to non-obese phenotype.***

- ***Reduced Leptin sensitivity and attenuated Ghrelin levels indicated development of resistance in obese phenotype as compared to Non-obese phenotype which is a classic hallmark of Obesity.***
- ***This comparative study highlighted the complexities of fine regulation of the underlying mechanisms and how they interact and influence each other.***
- ***It was possible to establish fasting baseline values of 6 gut hormones of non-obese and obese phenotype along with comparative data of gut flora and rest all parameters***

6.3 PHASE III

In Phase – III, 150 obese employees were enrolled who agreed to consume FOS (20g) or Placebo maltodextrin (10g) and comply with study protocol during intervention phase of 90 days. It was taken care that both the products provide an equal amount of calories – 30 kcals was provided by consuming 20g FOS and 10g Placebo maltodextrin. Obese employees were randomly divided into two equal groups of intervention: placebo arm – N=75 and experimental arm – N=75.

Bank employees who discontinued study were 5 (6.6%) from placebo arm and 3 (4%) from experimental arm. Total of 10.6% of employees dropped out of study and could not complete due to job transfer to different city. Results were collected for N=70 in placebo group and N=72 in experimental group of obese bank employees and are discussed under following heads:

Salient Features of Phase III

6.3.1 Effect of FOS supplementation on Anthropometric and Biophysical profile of obese bank employees

- **FOS intervention for 3 months proved effective in**
  - Reducing Weight (kg): 3.25%***
  - BMI (kg/m^2) 3.25%***
  - WC (cm) 2.31%***

- WHR 1.07%***
- Reducing Body-fat% 3.39%*
- SBP (mmHg) 1.51%**
- BMR and DBP NS

6.3.2 Effect of FOS supplementation on Dietary intakes, Hunger and Satiety scores of obese bank employees

- **Helped reducing intakes of:**
  - Energy 247 kcal/d 8.84%***
  - CHO 32 g/d 8.67%***
  - Fat 11.44 g/d 10.78%***
  - Soluble Fiber 0.58 g/d 10.82%***
  - Total Fiber 2.18 g/d 10.17%***
- No significant difference was observed in protein and insoluble fiber intake
- **Reducing Hunger pangs during meal time of**
  - Lunch – 14.76%***
  - Dinner - 03.83%***
- **Achieving Early Satiety during meal time of**
  - Lunch – 10.22%***
  - Dinner – 12.58%***

6.3.2 Effect of FOS supplementation on Depression, Defecation and flatulence profile of obese bank employees

- **Depression Reduced by 26.77%*** in experimental group**
- **Improvement in defecation profile was observed in terms of :**
  - Constipation reduced in 14% *** χ^2 = 15.40
  - Frequency of passing stool twice increased in 15% *** χ^2 = 12.97
  - Quantity of stool (bulk) increased in 8% ** χ^2 = 08.36

- Hardness reduced in 17%*** χ^2 = 18.85
- Foulness of odor reduced 8%** χ^2 = 07.73
- Feeling after defecation improved in 17%*** χ^2 = 17.52

- **Improvement in flatulence profile was observed in terms of:**
  - Foul odor of Flatulence reduced 13.38%***χ^2 = 15.08
  - Degree of Flatulence reduced by 11.25%***χ^2 = 17.01

6.3.4 Effect of FOS supplementation on gut hormones and gut microbial profile of obese bank employees

- **FOS intervention proved effective in sensitizing secretion of gut satietogenic hormones and increased levels of**
  - GLP-1 : 3.34%**
  - GIP : 0.77%*
  - PYY : 3.11%***
  - Ghrelin : 14.77%***

- **FOS intervention proved effective in sensitizing secretion of gut satietogenic hormones and reduced levels of**
  - Leptin : 5.87% ***
  - Insulin : 6.23%***
- **FOS intervention also proved to be effective in colonizing Gut of Obese employees with beneficial bacteria**
  - *Lactobacilllus* by 22.64%***
  - *Bifidobacterium* by 7.99%***

- *Clostridium* reduced significantly by 4.49%***
- No significant change was observed in counts of *Bacteroides*

6.3.5 Correlation of gut hormones and gut microflora with various parameters of obese bank employees

- To establish relationship between gut satietogenic hormones, gut flora and various other parameters the pearsons correlation data revealed significant negative correlation between GIP - SBP and PYY – DBP. Ghrelin negatively correlated with soluble dietary fiber and total fiber. *Bifidobacterium* counts positively correlated with GLP-1 and PYY. Leptin negatively correlated with *Bifidobacterium* and PYY

6.3.6 Stepwise Regression analysis for identifying strongest predictor of obesity

- Stepwise regression model summary revealed that, strongest predictor of obesity in Obese Population was BMR to the accuracy of 87%, Followed by GLP-1 to the accuracy of 88%. Obesity can be predicted to the accuracy of 90% when all factors like BMR, GLP-1, satiety scores for dinner, total fiber intake and depression scores are considered

Conclusion

- ***FOS is a promising agent in achieving or maintaining a healthy body weight, Improving defecation profile, healthy gut flora, modulating gut satietogenic hormones***

- ***Fructooligosaccharide has potential to modulate several metabolic aberrations and modulate underlying mechanism regulation appetite signalling pathways via gut flora and gut hormones through gut-brain axis.***

- ***This study also proves the existence of bidirectional mechanism and relationship between gut flora and gut hormones***

6.4 PHASE IV

As Fructooligosaccharides (FOS) have a potential to be added into various Indian cuisines, which can become a part of daily diet (staple food), there is a need for developing database of such FOS added popular recipes and study them for their feasibility and acceptability trials using scientific method. Hence, the present study attempted to determine the extent to which FOS can be added into another four popular Indian recipes with four different cooking techniques, namely steamed *Dudhi Muthiya*, shallow fried *Vegetable Cheela,* baked *Handwa* and deep fried *Veg. Mini Samosa*

For this section of study, FOS was added at varying levels of 5g, 10g, 15g, and 20g in selected four food products namely steamed *Dudhi Muthiya*, shallow fried *Vegetable Cheela,* baked *Handwa* and deep fried *Veg. Mini Samosa*. They were assessed for their physical and organoleptic properties.

Salient Features of Phase IV

6.4.1 Physical Properties at feasibility of 20g FOS addition

- **Dudhi Muthiya**
  - WAP % reduced by 50 %
  - Moisture loss was observed by 15.67 %
  - Highest percent yield of 18.22 %
  - Highest increase in bulk density of 0.86g/cc

- **Vegetable Cheela**
  - WAP % reduced by 25 %
  - Moisture loss - Nil
  - Highest percent yield of 12.10 %
  - Highest increase in bulk density of 0.81 g/cc
  - Spread ratio reduced by 25%

6.4.1 Physical Properties at feasibility of 15g FOS addition

Handwa

- WAP % reduced by 25 %
- Moisture loss was observed by 8.95%
- Highest percent yield of 4.96 %
- Highest increase in bulk density of 0.91 g/cc

Vegetable Mini Samosa

- Moisture retention was highest 21.03%
- Highest percent yield of 4.96%
- Highest increase in bulk density of 1.19 g/cc

6.4.2 Organoleptic properties of FOS added products at varying levels

Dudhi Muthiya

- Significant improvement was observed in all attributes at 20g of FOS addition ($p<0.001$)
  - *Taste* 16.64%
  - *Aftertaste* 15.02%

Vegetable Cheela

- Significant improvement was observed in all attributes at 20g of FOS addition ($p<0.001$)
  - *Taste* 18.44%
  - *Aftertaste* 16.17%
  - *Mouthfeel* 11.18%
  - *Texture* 6.48%
  - *Overall* 12.81%

Handwa

- Significant increase in most of the attributes was observed at highest level (20g) of FOS addition except *Color & Appearance* and *Texture* ($p<0.01$)

- **Vegetable Mini Samosa**

    - There was reduction in scores but no significant difference was observed in most of the sensory attributes upto 10g of FOS addition in *Vegetable Mini Samosa* as compared to standard product (NS)

Conclusion

- ***Feasibility of Fructooligosaccharide addition was possible upto to 20g in steamed, baked and shallow fried product.***
- ***Feasibility in Deep fired product was upto 10g.***
- ***FOS addition to base product increased percent yield and bulk density of all four products ranging from 4% - 18%.***
- ***Vegetable Cheela was the most appreciated product in terms of enhanced sensory attributes at 20g FOS addition, followed by Handwa and Dudhi Muthiya.***
- ***Vegetable Mini Samosa was rated similar to standard product at 10g FOS addition. Addition of FOS at higher levels >10g was not possible due to technological functionalities and calls for modification in recipe.***

MAJOR CONCLUSIONS

- Higher prevalence of obesity in young obese adults having stressful work profile and erratic timings are at higher risk of developing NCDs in near future.

- Obese phenotype definitely differs from non-obese phenotype with respect to significant statistical differences were observed in baseline comparable parameters selected for the study

- FOS is a promising supplement in achieving or maintaining a healthy body weight, improving defecation profile, healthy gut flora, modulating gut satietogenic hormones

- FOS relieves constipation which is the primary reason for dysbiosis and triggering point for GI aberrations.

- This study also proves the existence of bidirectional mechanism and relationship between gut flora and gut hormones

- Incorporation of FOS enhances organoleptic properties of Indian recipes upto 20g of addition with little modifications.

This study proves alternate hypothesis to be true.