ASSESSMENT OF DIFFERENT COMMERCIALLY AVAILABLE BREADS AND ITS EFFECT ON BLOOD GLUCOSE LEVELS OF HEALTHY INDIVIDUALS.

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ABSTRACT

Background

Bread is one of the most commonly used breakfast food in India .The consumption also increased tremendously among children and adolescents as well as to some extent among adults. It was found that white bread raises the blood glucose levels and is not considered to be a healthy breakfast option specially for those with diabetes mellitus and those at risk of increased or borderline glucose intolerance.

Aim

To assess different commercially available breads and its effect on Blood Glucose Levels of Healthy Individuals.

Study Design

5 bread varieties were chosen (namely white, brown, multigrain, oats and tutty fruity bread).The samples were fed to 30 subjects and their effect on blood glucose was analysed. `

Place of study.

The study was conducted in BMN College of Home Science, Matunga, Mumbai, India.

Methodology

A pilot study was conducted on 30 samples to assess the Blood Glucose Levels of each type of bread. The subjects were then given bread-butter and the blood glucose response was re-tested at gap of 1 hour and 2 hour respectively. Each subjects were given 5 different varieties of bread for 5 consecutive days i.e White bread, Brown bread, Multigrain bread, Tutty Fruity bread and Oats bread. The average plasma glucose levels were analysed in the study.

Results: It was observed that oats bread was found to have the lowest spike post 1 hour (103.43mg/dl) while tutty fruity bread exhibited a very high blood glucose response (123.90mg/dl), in comparison to white bread (131.63 mg/dl).

Conclusion: Investigations proved that oats bread should be consumed by people to mitigate the metabolic syndrome due to stressful lifestyle. Also a healthy diet and exercise regime to be followed by subjects in the study.

Keywords- Bread, Blood Glucose Levels, baseline value, significance, post prandial glucose.

1. Introduction

The modern lifestyle has a number of advantages which include easing people's life, saving hundreds of people's life using newly developed medicine and vaccines. On the other hand modern lifestyle has several negative effects on health physically, psychologically and socially. One of these modern ways of living includes consumption of fast foods. This is due to a fast lifestyle, short specified time for eating and choosing unhealthy foods. Machines have known to save a lot of time but it's adversely affects physical health. Modern lifestyle increases the risk of obesity, consequently leading to increase risk of metabolic syndrome. Diet and physical activity is one of the most important factors that contribute to risk of various life threatening diseases. Earlier, most people would rely more on consumption of fruits and vegetables, thereby adding more nutritive value to the meal while reduced risk of various diseases. (www.ukessays.com)

Bread is one of the most consumed breakfast items in India. Therefore, bread was used as a part of the study. There are various types of bread in the market, that have been chosen as counterparts in the study. Breads are generally made up of wheat flour from which the bran and germ layers are generally removed in order to increase shelf life of the product. In order to achieve an increased shelf life the breads invariably undergo various processing procedures

like milling and grinding to produce a light coloured flour. Bread is a high carbohydrate based food which means that it generates highest spike in the blood glucose levels since it is a highly processed product (www.breadculture.org)

After a decade study by (Pearson, 2003), it was found that white bread raises the blood glucose levels and is not considered to be a healthy breakfast option specially for those with diabetes mellitus and those at risk of increased or borderline glucose intolerance, various other healthier cereal based bread alternatives were produced in the market. This included whole wheat bread, buns, brown bread, rye bread, corn bread, pita, breadsticks, gluten free, multigrain, ragi breads etc. to name a few. Strategies to optimize blood glucose and insulin responses to bread consumption include replacement of wheat flour with flour types rich in dietary fiber such as barley flour. Few of these breads have showed comparatively lower insulin response like multigrain bread, rye bread etc. with double the magnesium content as compared to white bread. While sweet buns and fruit breads increase blood glucose levels as compared to the rise in sugar levels produced by white bread.

2. Materials and Methods:

2.1 Subject selection: A pilot study was conducted on 30 samples to assess the Blood Glucose Levels of each type of bread. Subjects were selected by random sampling method aged 20-25 years.

2.2 Sample preparation: The subjects were then given bread-butter and the blood glucose response was re-tested at gap of 1 hour and 2 hour respectively. Each subjects were given 5 different varieties of bread for 5 consecutive days i.e White bread, Brown bread, Multigrain bread, Tutty Fruity bread and Oats bread. The average plasma glucose levels were analysed in the study. The average changes in plasma glucose levels over 120 minutes following the consumption of breads was presented.

2.3 Analytical methods

The fasting blood glucose levels were recorded by using a glucometer (Dr Morepen's Glucometer BG 03).

2.4 Statistical Analysis.

The results of all tests were analysed by comparing the average values using Anova tables**.**

3.RESULTS

Table 3.1: Blood glucose- fasting, post 1 hour, post 2 hour

Sr. No	TYPES OF BREADS	fasting Blood Glucose levels (mg/dl)	1hr Blood Glucose levels (mg/dl)	2hr Blood Glucose levels (mg/dl)	P value
1	**White**	91.20	131.63	99.80	0.00
2	**Brown**	93.19	117.23	98.84	0.00
3	**Multigrain**	91.87	120.90	99.70	0.35
4	**Tutty fruity**	91.87	123.90	99.70	0.35
5	**Oats**	93.33	103.43	99.92	0.01

Figure 3.1: Blood glucose- fasting, post 1 hour, post 2 hour

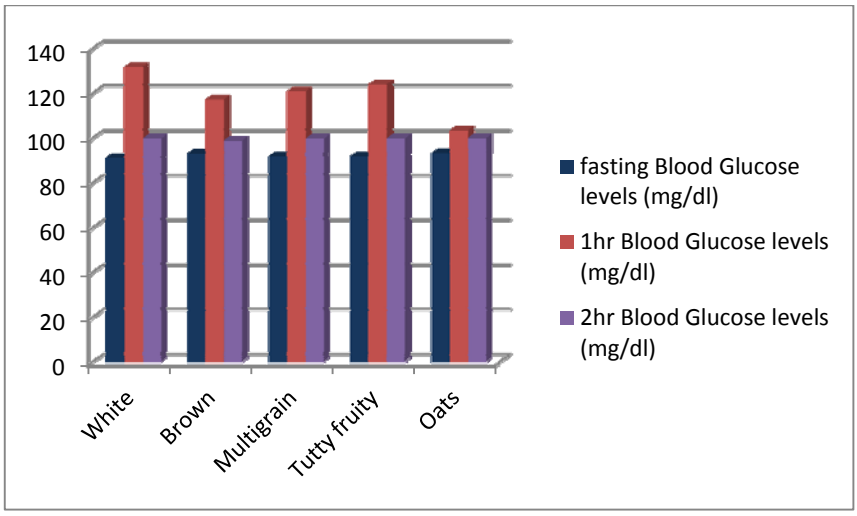

Table 3.1 describes the mean blood glucose levels of the five test breads –fasting, post 1 hour and post 2 hours. The mean fasting blood glucose for 5 consecutive days showed similar trend. The above mentioned table showed that white bread had the highest mean glucose response (131.63 mg/dl), after one hour and further declined to 99.80mg/dl in the next 2 hour. Tutty Fruity Bread showed the mean glucose response of 123.90 mg/dl post 1 hr with a reduction in blood glucose response to 99.70 mg/dl. Similar results were seen in subjects who

consumed multigrain breads but with reduction in blood glucose response by 3 mg/dl (i.e 120.90mg/dl) post 1 hour. The fasting and post prandial blood glucose response were found to be the same for both multigrain and tutty fruity breads. Contrary to these findings, the mean glucose response for oats bread was observed to be the least. i.e (103.43 mg/dl) amongst all other bread types, while brown bread showed moderate increase in blood glucose levels of 117.23 mg/dl in the study.

When fasting, 1 hr. and post-prandial blood glucose levels of White bread were compared with each other, the result was analysed, and was compared post one hr again thereafter within gap of 2 hour from baseline value showed the maximum significant difference statistically in response to blood glucose level at $P < 0.05$.

When fasting, 1 hr. and post-prandial blood glucose levels of brown bread were compared with each other, the result showed a significant difference in response of blood glucose levels at $P < 0.05$ after consuming oats breads between fasting and post prandial state by study sample.

When fasting, one hr. and post-prandial blood glucose levels of multigrain bread were compared considering time interval, the result showed a spike in peak of Blood Glucose Levels, post 1 hour in the study, thereafter within gap of 2 hour from baseline value showed a declining trend in the same which signifies a significant difference in response of Blood Glucose Levels at $P > 0.05$ after consuming multigrain bread statistically.

When fasting, 1 hr. and post-prandial blood glucose levels of tutty fruity bread were compared with each other, the result showed no significant difference in response to blood glucose levels at $P > 0.05$

When fasting, 1 hr. and post-prandial blood glucose levels of oats bread were compared with each other, the result showed a significant difference in response of blood glucose levels at $P < 0.05$ after consuming oats breads between fasting and post prandial state by study sample.

Figure 4.1 depicts the fasting, post 1 hour and post 2 hour results of mean blood glucose responses of the 5 commercially available breads. The graph represents the highest mean glucose response at 1 hour for white bread while lowest response was observed for oats bread. An exceptionally high blood glucose response for tutty fruity bread was observed when compared with all other types of bread. This was due to inclusion of tutty fruity pieces present in bread which are made of highly gelatinized sugar, which directly plays a

significant role in increasing the blood glucose responses. On the other hand, similarly high glucose response for multigrain bread might have contributed to the high amount of sugar added to breads in order to neutralize the taste of multigrain cereals.

Similar study conducted by (Pick, 1996)showed that oat bran concentrate bread products improved glycemic, insulinemic, and lipidemic responses. Total energy and macronutrient intakes were similar in both periods. Mean total dietary fiber intake was 19 g/day in the white bread period and 34 g/day (9 g soluble fiber per day from oat bran concentrate) in the oat bran concentrate period. Mean glycemic and insulin response areas (area under the curve) were lower ($P \leq .05$ and not significant, respectively) for the oat bran concentrate period than the white bread period. Another similar finding was observed in 2001 by Stitt et. al, was conducted on 7 different types of breads. It showed that the highest mean glucose value was produced by coarse white bread which was significantly higher than mean glucose AUC values for fruit bread($P<.0.01$).

4. DISCUSSION

For the study, 5 varieties of bread which are widely consumed were selected namely White, Brown, Multigrain, Tutty fruity and Oats bread. These breads (in combination with butter) were consumed by 30 subjects on each consecutive day under pilot study in order to evaluate the GL of breads post consumption. GI and GL of each preparation was calculated using statistical formula. The study was conducted on 30 healthy individuals between the age group of 20-25 years. The participants were given the 5 types of recipes which were prepared (one preparation each day). And their fasting blood glucose (FBS), and blood glucose after 1hr. & 2hrs. were taken respectively.

The results revealed that the fasting blood glucose levels (FBS) and post-prandial (PP) blood glucose levels of all the 5 preparations with different varieties of bread were in similar trend. Although there was a spike in the blood glucose levels post 1 hr. for all the 5 preparations (white, brown, multigrain, tutty fruity, oats bread). It was observed that oats bread was found to have the lowest spike post 1 hour (103.43mg/dl) while tutty fruity bread exhibited a very high blood glucose response (123.90mg/dl), in comparison to white bread(131.63 mg/dl). . Also it could be noted that breads that exhibit low GL values, therefore have a low `blood

glucose responses while breads having a higher GL comparatively exhibited a higher Blood Glucose Response.

5. CONCLUSION

Investigations proved that oats bread should be consumed by people to mitigate the metabolic syndrome due to stressful lifestyle. Also a healthy diet and exercise regime to be followed by subjects in the study.

6. REFERENCE

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