

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

3

4 **ABSTRACT**

5 **Background**

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

11 **Aim**

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

14 **Study Design**

15 5 bread varieties were chosen (namely white, brown, multigrain, oats and tutty fruity
16 bread).The samples were fed to 30 subjects and their effect on blood glucose was analysed. `

17 **Place of study.**

18 The study was conducted in BMN College of Home Science.

19

20 **Methodology**

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

26 **Results and conclusion:** It was observed that oats bread was found to have the lowest spike
27 post 1 hour (103.43mg/dl) while tutty fruity bread exhibited a very high blood glucose

28 response (123.90mg/dl), in comparison to white bread(131.63 mg/dl). Investigations proved
29 that oats bread should be consumed by people to mitigate the metabolic syndrome due to
30 stressful lifestyle. Also a healthy diet and exercise regime to be followed by subjects in the
31 study.

32 **Keywords-** Bread, Blood Glucose Levels.

33 **1. Introduction**

34 Bread is one of the most consumed breakfast items in India. Therefore, bread was used as a
35 part of the study. There are various types of bread in the market, that have been chosen as
36 counterparts in the study. Breads are generally made up of wheat flour from which the bran
37 and germ layers are generally removed in order to increase shelf life of the product. In order
38 to achieve an increased shelf life the breads invariably undergo various processing procedures
39 like milling and grinding to produce a light coloured flour. Bread is a high carbohydrate
40 based food which means that it generates highest spike in the blood glucose levels since it is a
41 highly processed product. (www.breadculture.org)

42 After a decade study by Pearson in 2011, it was found that white bread raises the blood
43 glucose levels and is not considered to be a healthy breakfast option specially for those with
44 diabetes mellitus and those at risk of increased or borderline glucose intolerance, various
45 other healthier cereal based bread alternatives were produced in the market. This included
46 whole wheat bread, buns, brown bread, rye bread, corn bread, pita, breadsticks, gluten free,
47 multigrain, ragi breads etc. to name a few. Strategies to optimize blood glucose and insulin
48 responses to bread consumption include replacement of wheat flour with flour types rich in
49 dietary fiber such as barley flour. Few of these breads have showed comparatively lower
50 insulin response like multigrain bread, rye bread etc. with double the magnesium content as
51 compared to white bread. While sweet buns and fruit breads increase blood glucose levels as
52 compared to the rise in sugar levels produced by white bread.

53

54 **2. Materials and Methods:**

55 **2.1 Subject selection:** A pilot study was conducted on 30 samples to assess the Blood
56 Glucose Levels of each type of bread. Subjects were selected by random sampling method
57 aged 20-25 years.

58

59 **2.2 Sample preparation:** The subjects were then given bread-butter and the blood glucose
60 response was re-tested at gap of 1 hour and 2 hour respectively. Each subjects were given 5
61 different varieties of bread for 5 consecutive days i.e White bread, Brown bread, Multigrain
62 bread, Tutty Fruity bread and Oats bread. The average plasma glucose levels were analysed
63 in the study. The average changes in plasma glucose levels over 120 minutes following the
64 consumption of breads was presented.

65

66 **2.3 Analytical methods**

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

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70 **2.4 Statistical Analysis.**

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

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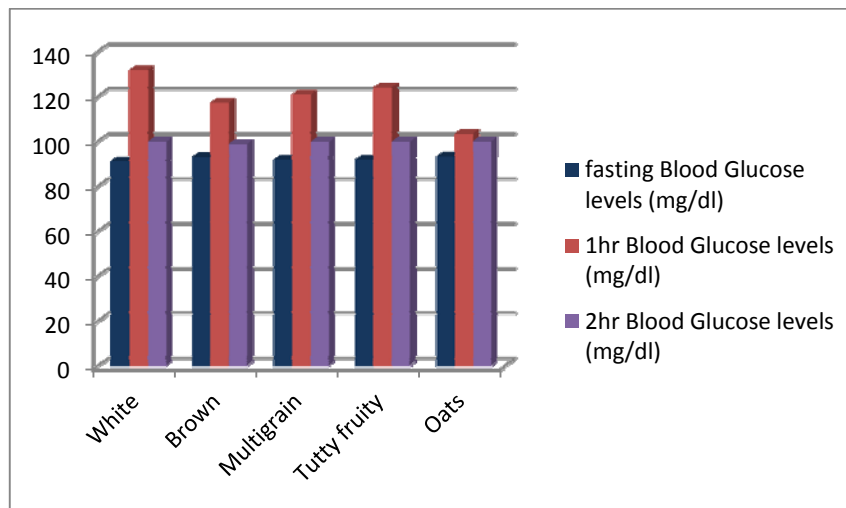
73 **3.RESULTS**

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

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

75

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



77

78 Table 3.1 describes the mean blood glucose levels of the five test breads –fasting, post 1 hour
79 and post 2 hours. The mean fasting blood glucose for 5 consecutive days showed similar
80 trend. The above mentioned table showed that white bread had the highest mean glucose
81 response (131.63 mg/dl), after one hour and further declined to 99.80mg/dl in the next 2 hour.
82 Tutty Fruity Bread showed the mean glucose response of 123.90 mg/dl post 1 hr with a
83 reduction in blood glucose response to 99.70 mg/dl. Similar results were seen in subjects who
84 consumed multigrain breads but with reduction in blood glucose response by 3 mg/dl (i.e
85 120.90mg/dl) post 1 hour. The fasting and post prandial blood glucose response were found
86 to be the same for both multigrain and tutty fruity breads. Contrary to these findings, the
87 mean glucose response for oats bread was observed to be the least. i.e (103.43 mg/dl)
88 amongst all other bread types, while brown bread showed moderate increase in blood glucose
89 levels of 117.23 mg/dl in the study.

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

97 glucose response for multigrain bread might have contributed to the high amount of sugar
98 added to breads in order to neutralize the taste of multigrain cereals.

99 Similar study conducted in 1996 by Pick et.al showed that oat bran concentrate bread
100 products improved glyceemic, insulinemic, and lipidemic responses. Total energy and
101 macronutrient intakes were similar in both periods. Mean total dietary fiber intake was 19
102 g/day in the white bread period and 34 g/day (9 g soluble fiber per day from oat bran
103 concentrate) in the oat bran concentrate period. Mean glyceemic and insulin response areas
104 (area under the curve) were lower ($P \leq 0.05$ and not significant, respectively) for the oat bran
105 concentrate period than the white bread period. Another similar finding was observed in 2001
106 by Stitt et. al, was conducted on 7 different types of breads. It showed that the highest mean
107 glucose value was produced by coarse white bread which was significantly higher than mean
108 glucose AUC values for fruit bread($P < 0.01$).

109 **4. CONCLUSION**

110 The results revealed that the fasting blood glucose levels (FBS) and post-prandial (PP) blood
111 glucose levels of all the 5 preparations with different varieties of bread were in similar trend.
112 Although there was a spike in the blood glucose levels post 1 hr. for all the 5 preparations
113 (white, brown, multigrain, tutty fruity, oats bread). It was observed that oats bread was found
114 to have the lowest spike post 1 hour (103.43mg/dl) while tutty fruity bread exhibited a very
115 high blood glucose response (123.90mg/dl), in comparison to white bread(131.63 mg/dl).
116 However, the post-prandial blood glucose level values of all the 5 breads were found to be
117 within the normal range (i.e. < 140 mg/dl), these preparations thus can be consumed by
118 healthy individuals. Investigations proved that oats bread should be consumed by people to
119 mitigate the metabolic syndrome due to stressful lifestyle. Also a healthy diet and exercise
120 regime to be followed by subjects in the study.

121

122 **5. REFERENCE**

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