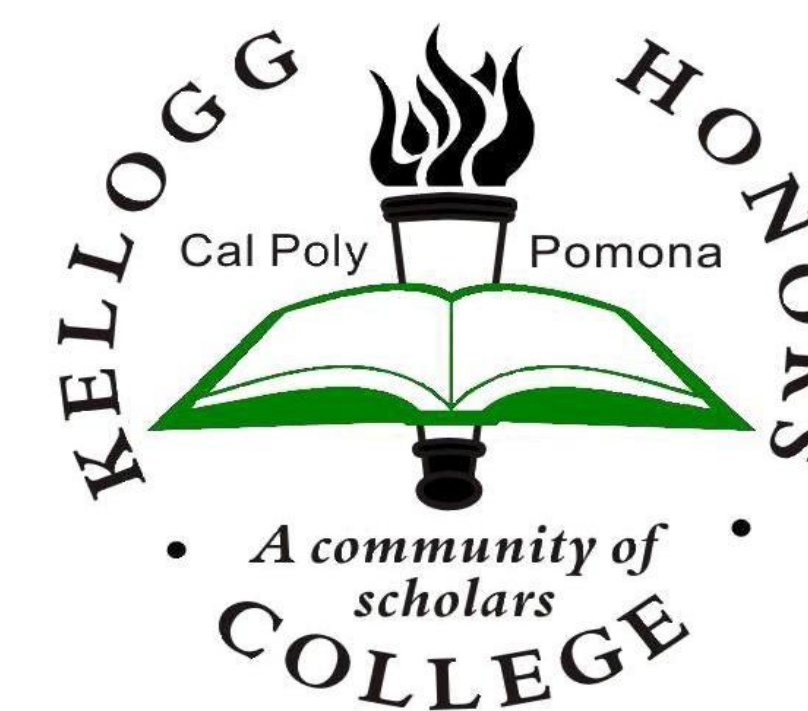


Effects of Different Cooking Methods on the Metabolism and Glycemic Response of Resistant Starches



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Abstract

This study is an examination of the effect of resistant starch from pasta on blood sugar levels in healthy individuals. Resistant starch 3 is found in starchy foods such as potatoes and pasta that have been cooked and then cooled. Health blogs, newspapers and magazines have recommended eating cold or reheated pasta to decrease the glycemic response and claiming it to be the healthy alternative. The primary objective of the study is to determine the degree to which resistant starch 3 raises blood sugar levels and if there is any difference from freshly cooked pasta. Twenty-two college students made three visits to consume freshly cooked pasta, cooled pasta and then reheated pasta. During each visit, their fasting blood glucose levels were taken and their postprandial glucose levels were recorded 20 minutes after eating the pasta. Using SPSS software we found that the results had no significant difference in postprandial glycemic response for any of the three groups (p -value <0.05). In addition, there were no significant differences between age, sex, BMI or participants who were taking supplements during the study (p -value <0.05). This research gives a closer inquiry into the misconception that the resistant starch produced in cold or reheated pasta contributes to a lower glycemic response.

Purpose

To compare the glycemic responses to pasta that has been consumed freshly cooked, cooled and reheated in healthy individuals.

Methods

Participants were a sample of healthy Cal Poly Pomona students. The Institutional Review Board approved the study protocol (IRB protocol # 16-212).

After the participants signed the consent form and filled out the screening questionnaire, they visited three times. On the first visit the participant's fasting blood glucose was measured using a finger-prick blood glucose monitor, then consumed 50 g of freshly cooked pasta. The participant's blood glucose was measured 20 minutes postprandial and recorded in the excel document. On the second visit, the fasting blood glucose was measured and the participant consumed 50g of pasta that had been cooked then cooled once. The participant's blood glucose was measured 20 minutes postprandial and recorded in the excel document. On the third visit, fasting blood glucose was measured and the participant consumed 50g of pasta that had been cooked once, cooled and then reheated. The participant's blood glucose was measured 20 minutes postprandial and recorded in the excel document.

Results

Table 1. Participant characteristics

	Mean \pm SD
Age (year)	26.2 \pm 5.16
Body weight (lb)	148.6 \pm 30.69
BMI (lb/inch ²)	23.5 \pm 3.15

Table 2. Postprandial Glycemic Response Statistics

	Regular Pasta	Cold Pasta	Reheated Pasta
N	22	22	22
Mean	17.183	24.477	17.227
SEM	3.2246	3.2984	3.2296
Median	15.500	20.750	19.250

Table 3. Variances for Sex Between Groups

	Sig (2-tailed)	Mean Difference	SEM
Regular	0.197	-8.4545	6.3322
Cold	0.755	-2.1364	6.7428
Reheated	0.644	3.0909	6.5826

Table 4. Variances for Age Range Between Groups

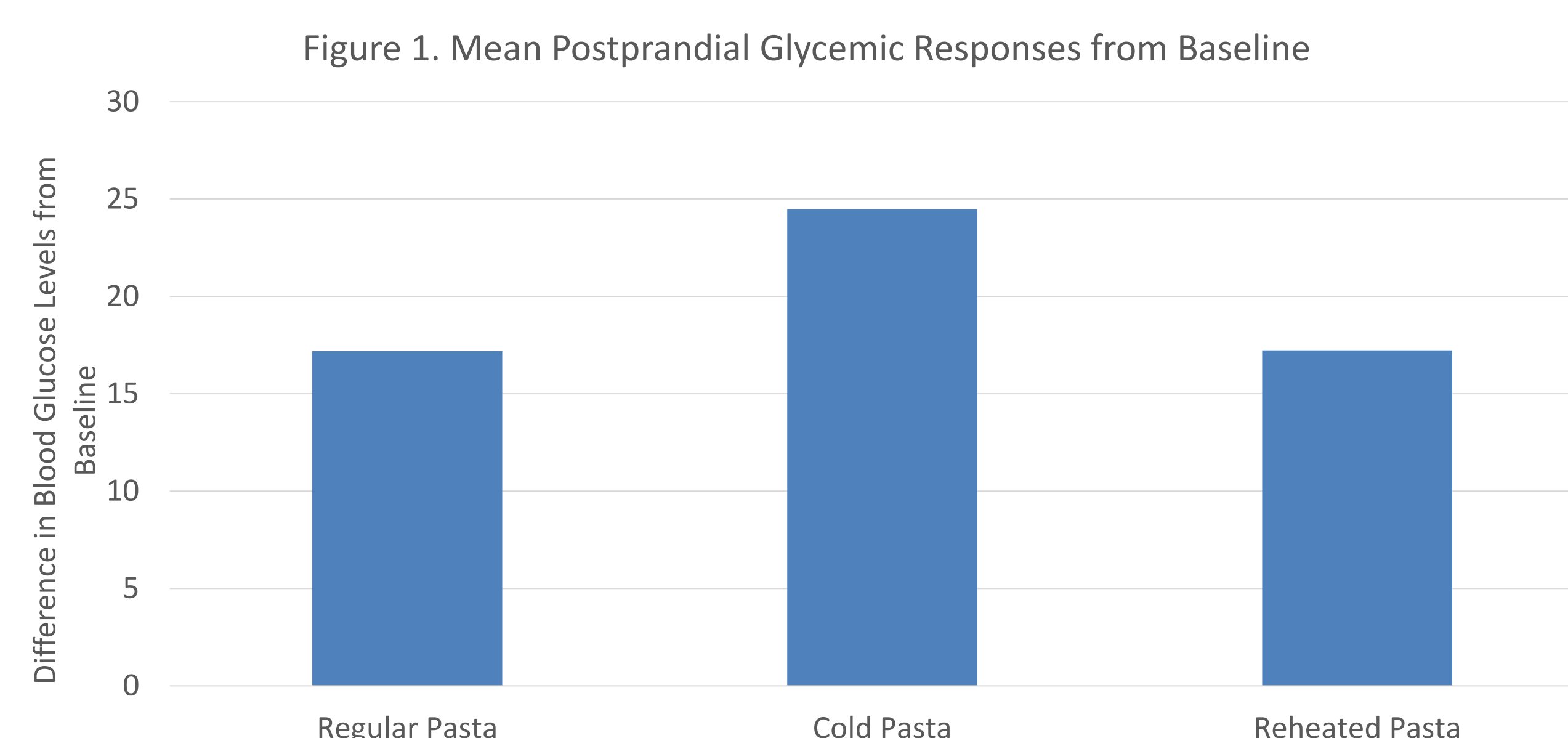
	Sig (2-tailed)	Mean Difference	SEM
Regular	0.414	5.8190	6.9737
Cold	0.336	6.9857	7.0863
Reheated	0.241	8.2952	6.8588

Table 5. Variances for BMI Between Groups

	Sig (2-tailed)	Mean Difference	SEM
Regular	0.223	9.5529	7.5897
Cold	0.283	8.6412	7.8302
Reheated	0.307	8.0588	7.6886

Table 6. Variances for Supplement Use Between Groups

	Sig (2-tailed)	Mean Difference	SEM
Regular	0.076	-11.8750	6.3348
Cold	0.789	1.9018	7.0131
Reheated	0.873	1.1161	6.8750



Discussion

A total of twenty-two participants from Cal Poly Pomona completed all three days of the study. The results demonstrate that there is no statistically significant difference (p -value <0.05) between the glycemic responses of the three different pastas. The mean glycemic response for the freshly cooked (regular) pasta was 17.183 similar to the mean glycemic response of the reheated pasta at 17.227. The mean glycemic response to the cold pasta was 24.477. When we compared the differences between sex, age, supplement use by participants and BMI range there were no significant differences (p -value <0.05). Therefore we fail to reject the null hypothesis. One possibility of having no significant differences between the glycemic responses is that the resistant starch 3 (RS3) formed in the pasta that has been cooked and cooled is still metabolized at the same rate as the starch in freshly cooked pasta. A statistical test of the variation between subjects showed that there was significant variation between individual glycemic responses to consuming the pasta, meaning that the statistical group analysis may not be representative of individual responses.

The primary limitation of the study was that the sample size was small, which may skew the data and amplify particularly high or low glycemic responses. In addition, a larger sample size may result in less variation between the individual participants and therefore, provide a more clear trend. In addition, future studies could test both regular and whole wheat pasta to see if there is a difference in the RS3 starch formed when cooked pasta is cooled and reheated. Another study would be necessary to examine any differences in obese versus healthy individuals. An important aspect of this study was that contrary to claims in health magazines, news articles and blogs, the results did not show a significant decrease in postprandial glycemic response when consuming cooled or reheated pasta. Further studies need to be done for more accurate results.

Conclusion

Our findings suggest that consuming starches formed from preparing fresh, cold and reheated pasta does not result in significant differences in glycemic response. More studies need to be done to examine the effects of resistant starches on metabolism in humans.