

Research Article
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Comparison between Home Cooked Meals and Dine-Out Meals Using both Glucose and Associated Energy via GH-Method: Math-Physical Medicine

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Introduction

In this paper, the author describes his research results for the comparison between home cooked meals versus dine-out meals using both postprandial plasma glucose (PPG) level and the relative energy associated with it.

Methods

Since 6/1/2015, the author has collected all of his meal-related data, including carbs/sugar amount, post-meal waking steps, finger PPG at two-hours after the first bite of food, country and location of each meal, and key contents of each meal. From 5/5/2018 to 6/11/2020, he collected his glucoses via a continuous glucose monitor (CGM) sensor device at 80-96 data per day. The difference of 16 between 80 and 96 is due to his measurements during sleep hours. Starting from 2/19/2020, he increased his night glucose measurements from every hour to every 15-minute interval.

In this particular study, he utilized the data from 2,366 meals within 768 days from 5/5/2018 through 6/11/2020. Since he collected 13 glucose data for each meal (every 15-minute time interval over a 3-hour period), these 13 data points are sufficient enough to create a “waveform”. These waveforms contain adequate characteristics of a wave, such as frequency, amplitude, and period (wavelength). He can then apply the frequency domain analysis of wave theory to convert, analyze, or interpret each PPG waveform for discovering many hidden information regarding diabetes and its impact on his overall health state.

In his food and meal database, he focuses on three major meal locations, i.e. home cooked meals, individual restaurant meals, and chain restaurant meals. He then combines both individual and chain into a new category of “Dine-out Restaurant meals”. Each category has certain key information, such as number of meals, average finger piercing PPG, average carbs/sugar amount, average post-meal walking steps, average sensor collected PPG, and peak sensor PPG. In this particular study, he concentrates on the CGM sensor collected PPG values, both average value and peak value. Finger PPG values are discrete data which cannot produce a “waveform”.

The degree of impact or damage on the human internal organs are actually due to the energy associated with different glucose

values, not the glucose directly. This situation is similar to a tsunami wave or an earthquake wave hitting a building. It is the energy associated with the wave which damages the building.

In this paper, he focuses on a direct comparison using glucose value and its associated energy in a “relative” level. Therefore, he omits the steps of integrating the energy theory with wave theory to conduct a frequency domain analysis. Instead, he applies a rudimentary physics concept of “**a glucose wave’s energy is directly proportional to the square of the glucose amplitude**”. He uses two glucose values, peak and average, in this simple calculation for comparison purposes. The reason for adding this “relative energy” term to his calculation is to aid in the understanding of impact or damage on the human organs due to these glucose associated energy.

Results

Figure 1 through Figure 5 display five distinctive meal locations. They are individual restaurant meals, chain restaurant meals, home cooked meals, dine-out restaurant meals, and total meals. Each location contains many key data, such as number of meals, carbs/sugar amount, post-meal walking steps, average finger PPG, five prominent values of sensor PPG waveform (opening, closing, maximum, minimum, and average), and time-series waveform. Readers can delve deeper into each of these five figures to find out more detailed information regarding each meal location.

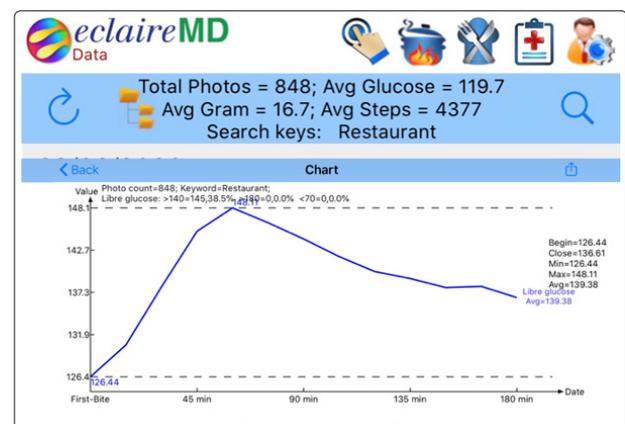


Figure 1: 848 dine-out restaurant meals location

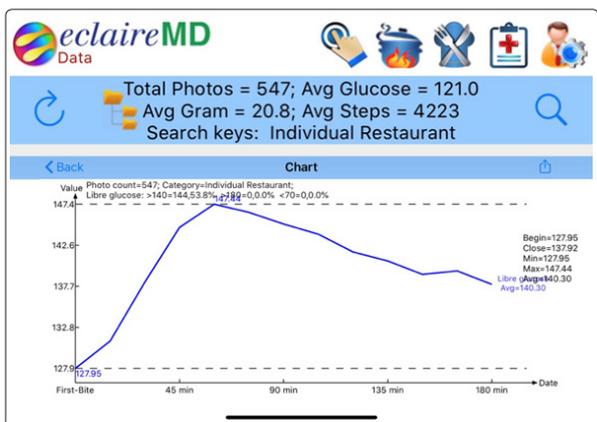


Figure 2: 547 individual restaurant meals location

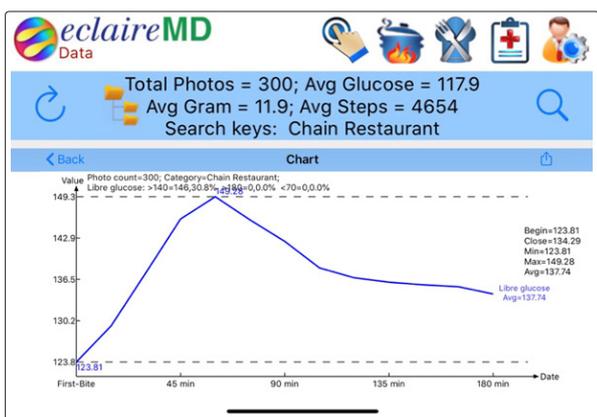


Figure 3: 300 chain restaurant meals location

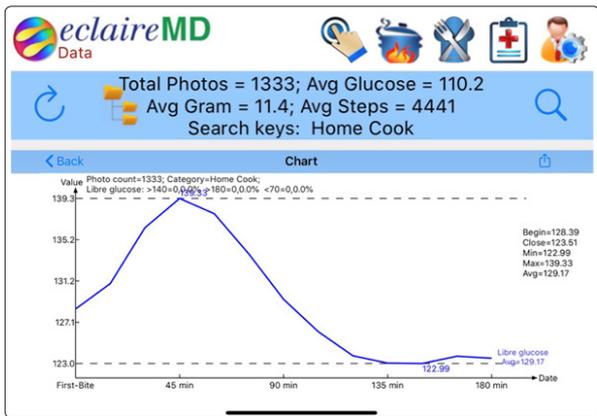


Figure 4: 1,333 home cooked meals location

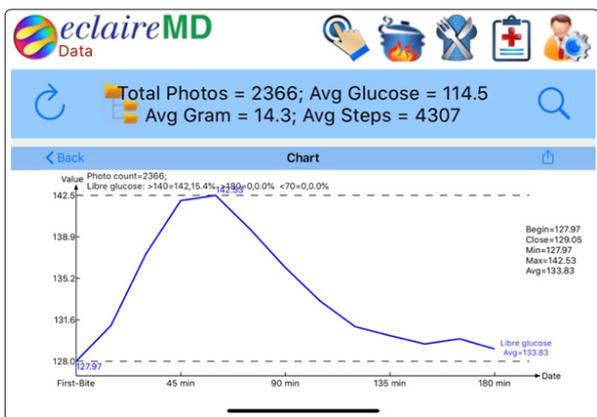


Figure 5: 2,366 total meals location

Figure 6 shows his summarized data table.

	Avg PPG	Avg PPG %	Avg Square	Avg Square %
Restaurant	139	100%	19427	100%
Individual	140	101%	19684	101%
Chain	138	99%	18972	98%
Home Cook	129	93%	16685	86%
Total	134	96%	17910	92%
	Peak PPG	Peak PPG %	Peak Square	Peak Square %
Restaurant	148	100%	21937	100%
Individual	147	100%	21739	99%
Chain	149	101%	22285	102%
Home Cook	139	94%	19413	88%
Total	143	96%	20315	93%

Figure 6: Summarized data table

Figure 7 illustrates two synthesized time-series waveforms within 180 minutes of these 5 location curves which are further grouped into two separate diagrams for better comprehension. For example, the gap between dine-out restaurant meals and home cooked meals are evident. However, individual restaurant and chain restaurant curves are within the vicinity, while the peak of chain restaurant meals is higher than the individual restaurant meals, but the average PPG values are vice versa.

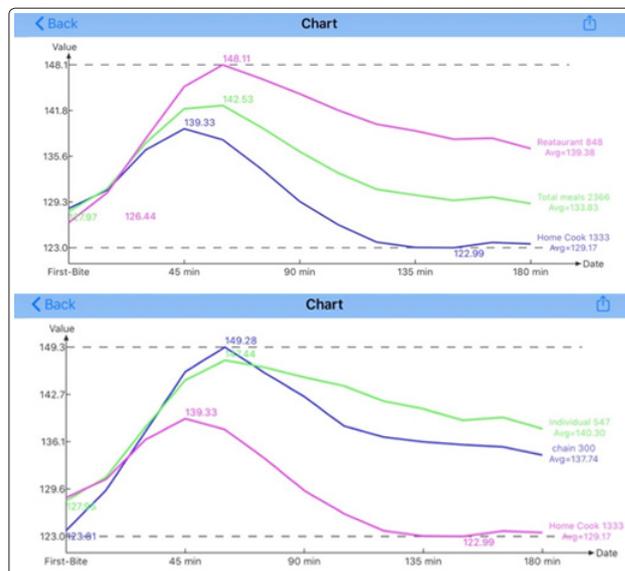


Figure 7: 2 time-series waveforms for comparison of 5 locations

Figure 8 is a bar chart diagram showing peak PPG and their normalized energy % of these five meal locations. Figure 9 is a bar chart diagram reflecting the average PPG and their normalized energy % of these five meal locations.

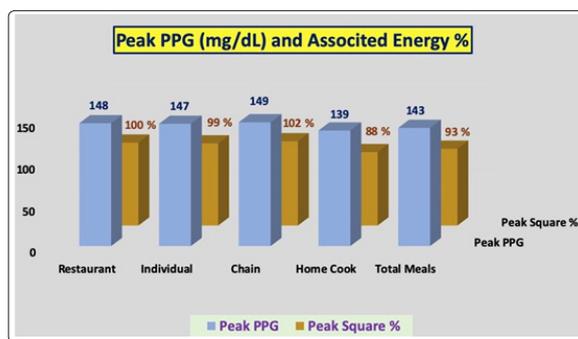


Figure 8: Peak PPG and associated energy %

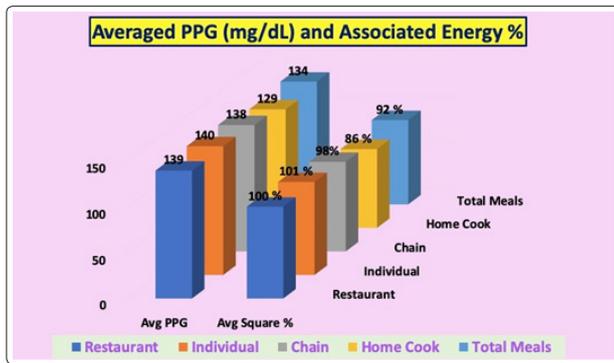


Figure 9: Average PPG and associated energy %

The author wants to repeat the numerical data from both Figure 8 and Figure 9 here. Each meal location contains four data: peak PPG mg/dL, peak energy %, average PPG mg/dL, and average energy %:

Dine-Out Restaurant Meals

148, 100%, 139, 100%

Individual restaurant meals

147, 99%, 140, 101%

Chain restaurant meals

149, 102%, 138, 98%

Home Cooked Meals

139, 88%, 129, 86%

Total meals

143, 93%, 134, 92%

In Figures 8 and 9, special attention should be focused on the comparisons between dine-out restaurant meals versus home cooked meals. The prominent finding is that eating at home would generate **14% less energy from average PPG** than dining out, while eating at home would generate **12% less energy from peak PPG** than dining out. It should be pointed out that eating at home would have 6% lower peak PPG and 7% lower average PPG than dining out.

Conclusions

The conclusion from this study of **eating locations is that eating at home is healthier than dining out at restaurants**. The main objective for many restaurants is to attract as many customers to make money. Therefore, the taste, presentation, and variety along with the environment become their ways and means to attract more patrons. Unfortunately, food nutritional ingredients and health concerns are not their top priority.

Although the above finding is not rocket science, the quantitative analysis and precision of the results are the strength of his GH-Method: math-physical medicine approach. A more scientific analysis approach with accurate results would provide a higher level of confidence and acceptability to diabetes patients.

Eating is one of life's most enjoyable activities and probably the hardest habit to change for most people. However, as a medical scientist, the author cannot stop searching for the truth and advising patients with precise information. By using his own 2+ years of data and meal comparison studies, his risk of having a stroke or cardiovascular disease can be reduced further by a range of 12%

to 14% if he is eating out less [1-4].

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