

The GH-Method

Re-evaluation of FPG & PPG Predictions and their Major Contributing Factors Using Frequency-Domain Analysis of GH-Method: Math-Physical Medicine (No. 021)

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Abbreviations: FPG: fasting plasma glucose; PPG: postprandial plasma glucose

1. INTRODUCTION

The author aims to reconfirm his prior research on FPG and PPG predictions and their influencing factors, such as body weight, carb/sugar intake, exercise, using frequency-domain analysis in addition to time-domain and spatial analysis.

2. METHODS

The author collected 18,000 data points for the FPG study and 64,000 data points for the PPG study during a 1,046-day period (6/1/2015 - 4/12/2018). These data encompass measured and predicted PPG values along with 19 influencing factors. He initially employed both time-domain and spatial analyses, leading to the following two conclusions:

First, Predicted FPG vs Measured FPG demonstrated 99.9% prediction accuracy, 98% correlation, with a major contribution (over 90%) from the major influential factor, body weight.

Second, Predicted PPG vs Measured PPG exhibited 99.8% prediction accuracy, 83% correlation, with significant contributions from combined carbs/sugar intake and exercise (around 80%), 10% from weather, and 10% from remaining 16 secondary factors.

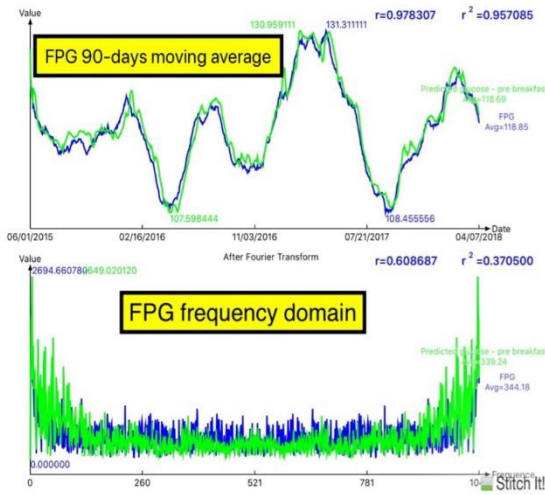
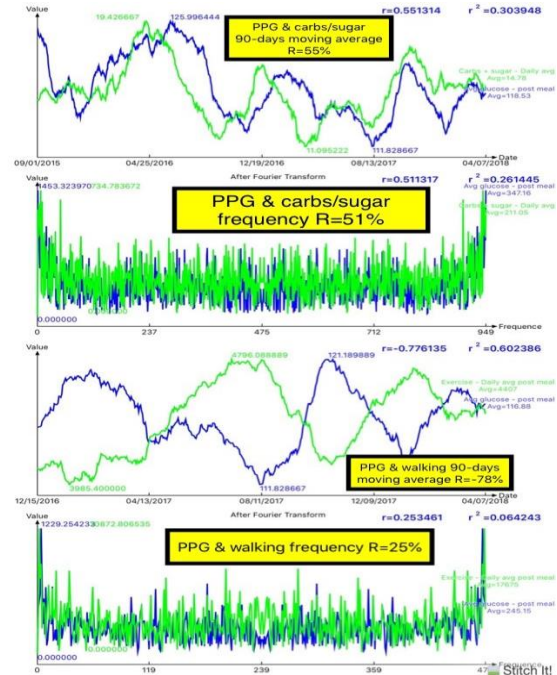
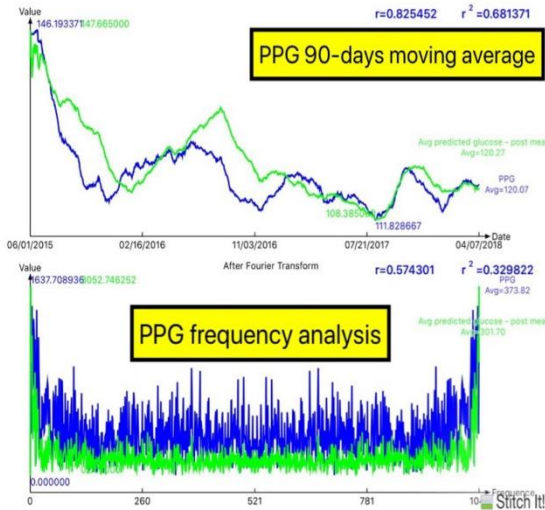
In this study, the author expanded his previous research by utilizing Fourier

Transform technique to convert those "macro-scaled" time-series waveforms (including glucose, body weight, diet, exercise, and weather) into frequency-domain waveforms for comparison.

3. RESULTS

For FPG time-series analysis, there were high prediction accuracy and correlation (99.9% and 98% in a 90-day moving average calculation). A similar conclusion was drawn from the frequency-domain analysis, showing a 61% correlation between predicted FPG and measured FPG. In the analysis of weight vs FPG, there was a 65% correlation in the time-domain and 43% correlation in the frequency-domain. Spatial analysis indicated that 94% of data points fell within a +/- 20% range of the defined linear equation between weight and FPG. Notably, the amplitude of the body weight wave was smaller than that of the FPG wave.

In the time-domain analysis of PPG, the prediction accuracy was 99.8%, and correlation stood at 83%. The frequency-domain analysis also demonstrated a strong 57% correlation between predicted PPG and measured PPG. In the influential factors analysis of carbs/sugar and exercise vs. PPG, time-domain analysis indicated +55% and -78% correlations, while frequency-domain analysis showed 51% (high) and 25% (moderate) correlations, respectively.



4. CONCLUSION

The results from the frequency-domain analysis, in both predicted FPG vs. measured FPG and body weight vs. FPG, reaffirm the author's previous findings from time-domain and spatial analyses regarding FPG.

Similarly, the frequency-domain analysis results for predicted vs. measured PPG and the influence of carbs/sugar and exercise on PPG confirm the author's previous findings using time-domain and spatial analyses for PPG.

Predictive medical abilities are of utmost importance. The ability to forecast the severity of symptoms and identify influential factors of diseases enables us to proactively prevent the occurrence of diseases and effectively manage symptoms.

