Development of an *In-vitro* Gastric Digestion Model with Peristalsis Function for the Analysis of Food Gastric Digestion

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In the human stomach, foods are digested by a combination of physical and biochemical processes. The objective of this research was to develop an *in vitro* gastric digestion model for analyzing the gastric digestion of food. The continuous peristaltic movement of the stomach walls was simulated in the gastric digestion model by using contraction waves that had the frequency of ~ 3 cycles per min that were similar to those observed *in vivo*. The gastric digestion model mainly consisted of a butyl rubber chamber, simulating the stomach chamber, and 4 nylon half rollers attached to 2 rubber belts that were driven by 2 direct current geared motors and 6 nylon pulleys to create a continuous contraction of the rubber chamber. The model also incorporated gastric sieving, gastric secretion, gastric emptying systems, and a temperature control system that enabled accurate simulation of dynamic gastric conditions. Gastric sieving was done by a 1.5 mm pore size polyester mesh bag. Gastric emptying was done using a 24 V solenoid valve which was operated manually using a toggle switch. A peristaltic pump (12 V) which was programmed using Arduino IDE as the secretion flow rate of 2.5 mL per min was used to deliver the gastric juice into the gastric chamber. Temperature control system was consisted of a 100 W bulb, LM 35 temperature sensor, and Arduino Nano, which were able to maintain the ambient temperature at 37 ℃. The precise control of temperature, gastric secretion, gastric emptying and the adjustable mechanical driving force in the *in vitro* model provide an important tool to analyze food gastric digestion under simulated physicochemical conditions. Future modifications would enhance the performance of this *in vitro* gastric digestion model.

Keywords: Gastric digestion model, Gastric emptying, Gastric sieving, *In-vitro*, Peristaltic contraction

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