Extended Essay Outline

Title

Abstract

Introduction
Research Question

What is the correlation between MSG (Monosodium Glutamate) and its effects on human physiologies (obesity, metabolic syndrome) in Thai population?

Background Information/Purpose of the experiment (how the research question has arisen)
- A. What is MSG (biological theory/theoretical basis)
- B. Significance of the investigation
- C. Information about Thailand
  - a. Culture
  - b. MSG Production
  - c. Compare to other countries
- D. Effects of MSG on human physiologies (dispute)
  - a. Studies of MSG and human health
    - i. Obese women had greater appetite for higher concentrations of MSG in their food because of less sensitivity to MSG taste due to "higher taste detection threshold". **(Pepino et al.)**
    - ii. According to the data, there is a positive correlation between MSG intake and obesity, which may be due to "differences in the sensory perception of and/or preference for MSG". **(Pepino et al.)**
  - b. Obesity
    - i. WHO's definition of obesity and key facts
    - ii. "Abnormal or excessive fat accumulation that presents a risk to health" **(Obesity and Overweight)**
    - iii. "42 million children under the age of 5 were overweight or obese in 2013"
    - iv. BMI:
      1. $BMI \geq 25 \ kg/m^2$ is overweight
      2. $BMI \geq 30 kg/m^2$ is obesity
    - v. Overweight and obesity are linked to more deaths worldwide than underweight. Most of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high-income and most middle-income countries)

Pilot Survey (as part of the method)
1. Pilot survey done when and on whom (which group of people)
   - a. Calculate BMI value and look into their MSG intake
2. Significance of survey

Methodology
Objectives of study
1. To verify whether MSG has an impact on human health, particularly on obesity
2. To establish a relationship between MSG on human health in the Thai population
3. To compare MSG intake and human health in Thai population with Chinese population

Investigation
    A. Studies on MSG on general population, Chinese population, Thai population
        a. What do these studies suggest about the effects of MSG?
        b. Use studies/experiments (resources to show)
    • Studies and experiments show that MSG affects:
        o Obesity
        o Nervous System
        o Bone density
        o Metabolic syndrome

Hypothesis
Greater intake of MSG will have an impact of obesity, measured by BMI value > 25kg/m^2.

Variables (for pilot survey)

Materials required
    • Thais ages 30-50 (of different occupations)
    • At least 30 Thai participants (for accuracy, better results and avoid bias)
    • Survey (example of survey used)
    • Have a control group of those whom do not consume MSG (?)

Procedure (collecting data and analyzing)
    A. Pilot Survey
        a. 3-days survey (explain the reason of choosing this method of study)
    B. What is in the survey *(give a small diagram of how the survey looks like)*
        a. Basic information (age, height, weight, types and frequency of exercise, alcohol consumption, smoke)
        b. Daily intake (includes carbs, proteins and fats)
        c. Question whether food contains MSG or not (Yes, No, Not Sure)
    C. Explain the method used to obtain information on MSG and why (refer to a study)
    D. Select certain information from the survey to create data-base
        a. Use information such as carbs, proteins, fats and calories intake as controls
        b. Find the average amount of MSG intake and create quartiles

Ethical Considerations
    A. No personal information (name, address etc.) was asked and publicized
    B. Participants were debriefed about the survey
        a. Asked to fill as complete as possible

Statistical analysis
    A. Divide participants into Quartile(s), and compare to find whether MSG is correlated with obesity
        a. T-test/Chi-square

Data Collection and Processing
    A. Construct a graph from survey (only processed data, raw data in the appendix)
        a. Send surveys out to the countryside and city dwellers
        b. Calculate BMI (kg/m^2)
    B. Second resource studies and reconstruct data, selecting certain information

<u>**Analysis and Interpretation**</u>
Results
    A. Produce data from information collected from surveys
        a. Graphs
        b. Tables
    B. Data base information from outside studies
        a. Thai population and what does it say
        b. Compare results
        c. Compare to the general population

Data analyzing and interpretation
    A. Compare survey results/data with data from outside resources
        a. Correlation between MSG and obesity?
        b. Other correlations other than MSG found that could affect human health
    B. **Obesity** (secondary resource + data base + survey)
        a. Reconstruct graphs from secondary resources (focusing on BMI, obesity and MSG intake g/day)
            i. Chinese participants
            ii. Thai participants
            iii. World statistics
        b. Asian cut-off point BMI value for overweight/obese is ≥ 23 kg/m^2
        c. Animal models on rats → positive correlation between intake of MSG and obesity
        d. Use survey collected to compare results and make connections
            i. Reconstructed Data
            ii. Graphs
            iii. Analysis
    B. **Metabolic syndrome** (secondary resource + from survey)
        a. What characteristics define metabolic syndrome
        b. A study shows prevalence of metabolic syndrome in rural Thai population
        c. Use survey collected to compare results and make connections
            i. Data
            ii. Graphs
            iii. Analysis

<u>**Discussion**</u>
Evaluation
    A. The study carried out: was it effective?
        a. The procedures used
        b. Weaknesses and Improvements on methods
    B. Limitations
        a. BMI may overestimate overweight/obesity in some subgroups
        b. Longitudinal study to provide more information on dietary patterns and food consumptions trends overtime

<u>**Conclusion**</u>
    A. Talk about background research
        a. Factors
    B. MSG effects on human physiology
        a. Is it safe?

C. What actions and improvements can be done to improve Thai National Health (with/without the effects of MSG)

Bibliography