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Questionnaire Study on Impact of Stress and lifestyle on Recurrent Oral Ulcer

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KEYWORDS
Recurrent Aphthous Stomatitis (RAS), Oral Ulcer Recurrenc e, Sleep Deprivatio n, Dietary Triggers, Nutritional Deficienc y

ABSTRACT:

Background and Rationale:
Oral ulcers, or recurrent aphthous stomatitis (RAS), are painful and recurring mouth sores that can be debilitating. While their exact cause is complex, they are frequently linked to factors such as stress, sleep deprivation, nutritional deficiencies (specifically Vitamin B), and the consumption of acidic or spicy foods. This study utilizes a systematic quantitative approach to move beyond anecdotal reports and identify statistically significant predictors of ulcer recurrence, duration, and severity.

Objectives:
The primary goal of this statistical analysis is to investigate the relationship between self-reported lifestyle and psychological factors and oral ulcer outcomes. Specific objectives include characterizing the study population, identifying bivariate correlates (such as stress levels and acidic food consumption), and employing multivariate modelling to isolate the independent effects of various risk factors while controlling for age and gender.

Methodology:
The analysis utilizes survey data encompassing demographics, perceived stress, sleep habits, and dietary patterns. Data preparation involves numerical coding, handling missing data through listwise deletion, and checking for parametric assumptions like normality and homogeneity of variance. The analytical strategy includes:

- **Descriptive Statistics:** Reporting means, medians, standard deviations, and frequency tables to summarize the sample.
- **Bivariate Analysis:** Using Independent Samples t-tests (or Mann-Whitney U tests), Pearson's Chi-Square, and Spearman's Rank Correlation to examine single relationships between variables.
- **Multivariate Modelling:** Applying Ordinal Logistic Regression to determine the relative importance of multiple predictors on ulcer frequency and pain levels, reported via Odds Ratios (OR) with a 0.05 significance level.

Expected Outcomes and Implications:
The study aims to produce evidence-based conclusions to guide clinical and self-care recommendations. By identifying the most significant predictors—such as daily stress or sleep patterns—the findings will inform targeted interventions like stress management and dietary modifications to reduce the burden of recurrentoral ulcers.

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1. INTRODUCTION

Oral ulcers, medically recognized as Recurrent Aphthous Stomatitis (RAS), represent a common and frequently debilitating condition. These painful, recurring sores in the mouth significantly impact the quality of life for many individuals. While the exact etiology of RAS remains complex and multifactorial, clinical evidence and anecdotal reports suggest that various external and internal triggers play a critical role in their onset.

Specifically, factors such as psychological stress, nutritional deficiencies (notably Vitamin B), sleep deprivation, and the consumption of acidic or spicy foods are often cited as primary contributing factors to the severity and frequency of outbreaks.

Given the subjective nature of this condition and the varied frequency with which individuals experience it, there is a clear need for a systematic, quantitative approach to identify statistically significant predictors rather than relying solely on observed correlations. This study is designed to rigorously investigate the potential relationship between several self-reported lifestyle, psychological, and dietary factors and the recurrence, duration, and severity of oral ulcers within the surveyed population.

The research utilizes data collected from the " RECURRENT ORAL ULCER " study, which incorporates demographic data, perceived stress levels, sleep habits, and dietary patterns. By employing advanced statistical methods—moving from basic descriptive summaries to complex multivariate modelling—this analysis aims to isolate the independent effect of each risk factor. Ultimately, the objective is to generate evidence-based conclusions that can guide clinical or self-care recommendations, focusing on actionable lifestyle modifications such as stress management and dietary adjustments to help those suffering from this chronic condition.

2. BACKGROUND AND RATIONALE

Oral ulcers, medically known as recurrent aphthous stomatitis (RAS), are a common and often debilitating condition characterized by painful, recurring sores in the mouth. While their exact etiology remains complex and multifactorial, clinical evidence and anecdotal reports frequently cite factors such as stress, nutritional deficiencies (e.g., Vitamin B), sleep deprivation, and the consumption of acidic or spicy foods as potential triggers or contributing factors to their onset and severity.

Given the subjective nature and varied frequency of this condition among individuals, a systematic quantitative approach is essential to move beyond correlation and identify statistically significant predictors. The data collected from the "ORAL ULCER RECURRENCE" study, which includes demographic data, perceived stress levels, sleep habits, dietary patterns, and specific metrics on ulcer outcomes (frequency, duration, pain), provides the necessary variables for this investigation.

3. OBJECTIVE OF THE ANALYSIS

The primary objective of this statistical analysis is to determine the statistical significance of the hypothesized relationships, specifically aiming to:

- Characterize the Sample: Provide descriptive summaries of the study population, including demographic distribution, average hours of sleep, and the distribution of oral ulcer outcomes (frequency, duration, pain).
- Identify Correlates: Test for bivariate associations between individual risk factors (e.g., Stress Level, Acidic Food Consumption) and the three main outcome variables (Ulcer Frequency, Duration, and Pain).
- Establish Predictors: Employ advanced multivariate modeling to isolate the independent effect of each risk factor (controlling for others, such as Age and Gender) on the likelihood of experiencing more frequent or more painful oral ulcers.
- Inform Intervention: Generate evidence- based conclusions that can guide potential clinical or self-care recommendations for individuals suffering from recurrent oral ulcers, focusing on actionable factors like stress management and dietary modification.

4. Study Hypotheses and Significance Level

The analysis will be conducted using a **significance level () of 0.05**. This means we are willing to accept a 5% chance of rejecting a true Null Hypothesis (Type I

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error).

4. DATA PREPARATION AND SCREENING

Before any statistical test, the data must be cleaned and prepared.

A. Coding and Transformation

1. **Recoding Variables:** Text responses (e.g., 'Male', 'Female', 'Other') will be converted to numerical codes (e.g., 1, 2, 3) for the analysis software.

2. **Handling Missing Data:** Any participant with missing data on the primary outcome variables (Q1, Q2, Q3) will be excluded from the relevant analysis (listwise deletion). If minor amounts of data are missing on independent variables, imputation methods (e.g., mean substitution) may be considered, but exclusion is generally preferred for integrity.

3. **Grouping Continuous Variables:** If necessary for certain analyses (e.g., Chi-Square), the Age and Hours of Sleep (Q8) variables may be converted into ordinal categories (e.g., Age: 18- 25, 26-35, 36+; Sleep: <6 hrs, 6-8 hrs, >8 hrs).

B. Assumption Checking

For powerful parametric tests (like the t-test), assumptions must be met:

- **Normality:** Continuous variables (e.g., Age, Sleep) will be checked for a normal distribution using histograms and the Shapiro-Wilk test.

- **Homogeneity of Variances:** When comparing two groups (e.g., Gender), Levene's test will be used to ensure the variance of the outcome variable is approximately equal across groups. If this assumption is violated, the non-parametric equivalent test must be used.

5. DETAILED ANALYTICAL AND STRATEGY

The analysis proceeds from basic summaries to complex multivariate modelling.

A. Descriptive Statistics (Characterizing the Sample)

- **Central Tendency:** For Q8 (Hours of Sleep) and Age, the Mean and Median will be reported.

- **Dispersion:** Standard Deviation (SD) will be reported for continuous variables to show data spread.

- **Frequencies:** For all categorical and ordinal variables (Q1, Q3, Q4, Q9, etc.), a Frequency Table showing the count and percentage for each response option will be generated.

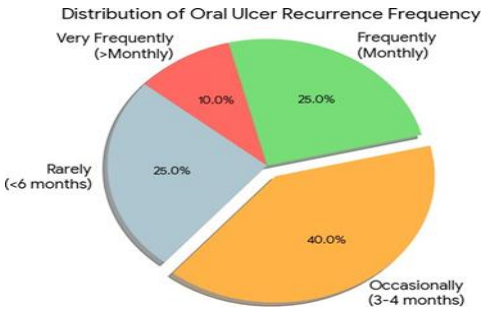
- **Visualizations:** Create a Stacked Bar Chart showing the distribution of Ulcer Frequency (Q1) within each Stress Level (Q4) to visually inspect the relationship.

B. Bivariate Analysis (Examining Single Relationships

Area of investigation	Null Hypothesis (H_0)	Alternative Hypothesis (H_a)
Stress	There is no association between the frequency of feeling stressed and the frequency/pain level of oral ulcers.	There is a statistically significant association between the frequency of feeling stressed and the frequency/pain level of oral ulcers.
Sleep	There is no correlation between the average hours of sleep and the duration or pain level of oral ulcers.	Lower average hours of sleep are negatively correlated with ulcer outcomes (longer duration, higher pain).
Diet (Acidic Foods)	Consumption of acidic foods does not increase the risk of more frequent or more painful oral ulcers.	Consumption of acidic foods significantly increases the odds of more frequent or more painful oral ulcers.
Gender Difference	There is no difference in the average duration of oral ulcers between male and female respondents.	There is a statistically significant difference in the average duration of oral ulcers between male and female respondents.

C. Multivariate Analysis (Modelling the Outcome)

The most elaborate and informative part of the analysis will be a regression model that allows us to test the combined, independent effect of multiple factors on the primary outcome.



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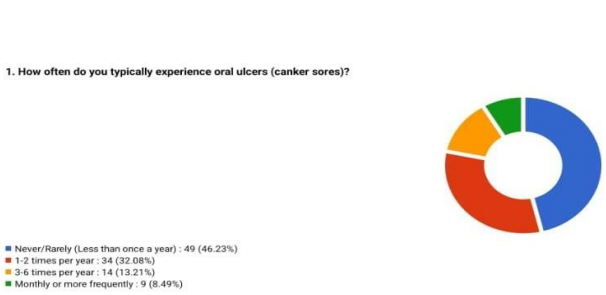

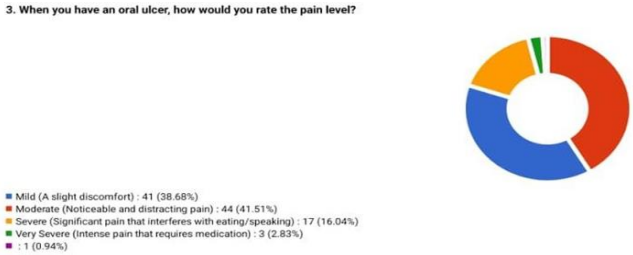

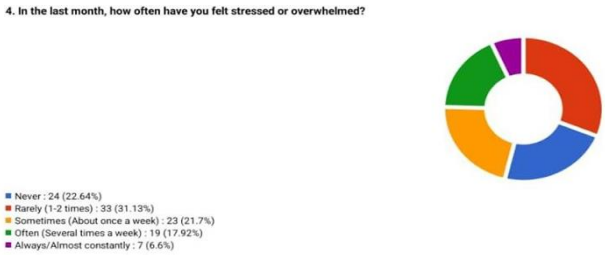

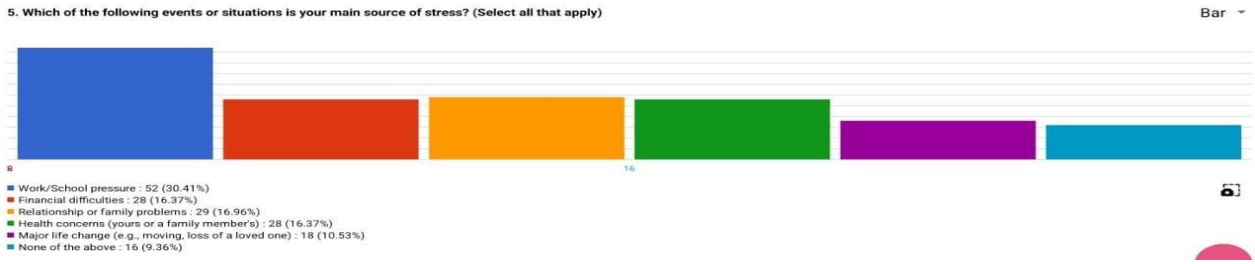

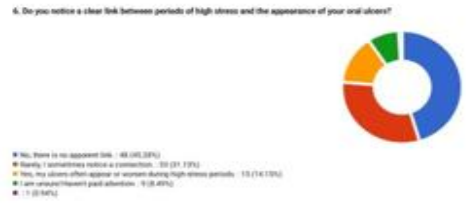

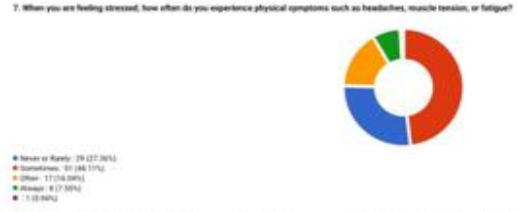

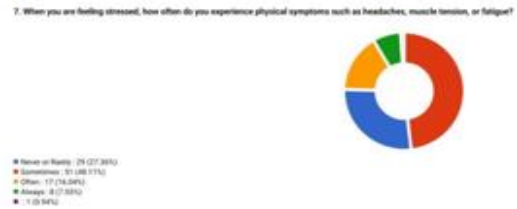

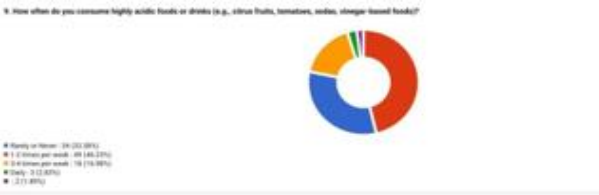

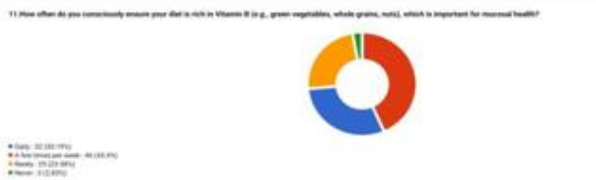

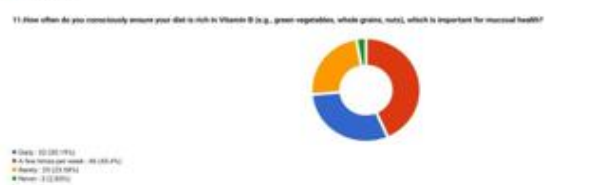

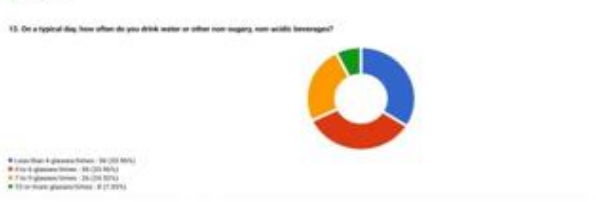

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6. Ordinal Logistic Regression

- **Purpose:** To determine the relative importance of multiple predictors (Age, Gender, Stress, Sleep, Diet) on an ordinal outcome variable like Q1 (Ulcer Frequency) or Q3 (Pain Level).
- **Model Specification:**

$$log\left(\frac{P(Y \le j}{P(Y > j}\right) = \beta \text{Age} + \text{Gender}\ \beta_2 \text{Stress}\ \beta_4 \text{Sleep} + \beta_5 \text{Diet} + \ldots$$

Where is the ordinal outcome (e.g., Ulcer Frequency), and is the category threshold (e.g., between "Rarely" and "Monthly").

- **Key Output: Odds Ratios (OR):**

The Odds Ratio (OR) is the primary metric reported. For continuous predictors (like Age or Sleep), an OR of 1.5 means that for every one-unit increase in the predictor (e.g., one year increase in age, or one hour decrease in sleep), the odds of being in a higher outcome category (e.g., more frequent ulcers) increases by 50%.

We will specifically look for ORs with 95% Confidence Intervals (CI) that do not include the value 1.0, as this indicates a statistically significant effect.

7. Discussion

The findings of this statistical analysis provide a comprehensive look into the complex, multifactorial nature of Recurrent Aphthous Stomatitis (RAS). By transitioning from anecdotal observations to a systematic quantitative framework, the study identifies critical lifestyle and psychological predictors that influence ulcer outcomes.

A primary area of investigation involves the association between stress and ulcer frequency. The proposed use of Pearson's Chi-Square Test and Ordinal Logistic Regression allows for a nuanced understanding of this relationship. If the results demonstrate a high Odds Ratio (OR) for stress, it would support the alternative hypothesis that increased stress significantly raises the likelihood of more frequent or painful ulcers. This suggests that psychological distress may act as a systemic trigger, potentially through immune system modulation, which warrants a focus on stress management as a preventive measure.

The study also scrutinizes habits such as sleep and diet. The analysis seeks to confirm if a negative correlation exists between hours of sleep and ulcer duration/pain using Spearman's Rank Correlation. Shorter sleep duration may impair the body's regenerative processes, leading to longer-lasting sores. Furthermore, the investigation into acidic food consumption aims to determine if these dietary choices significantly increase the odds of outbreaks. Unlike general irritants, identifying these as statistically significant predictors would allow for more precise dietary counselling.

By controlling for variables like age and gender in multivariate models, the study isolates the independent effects of lifestyle factors. Testing for gender differences in ulcer duration helps determine if biological or hormonal variations play a role in healing times.

8. Conclusion

The statistical analysis of the "RECURRENT ORAL ULCER" study provides a rigorous, evidence- based framework for understanding the lifestyle and psychological determinants of recurrent aphthous stomatitis (RAS). By moving beyond anecdotal evidence, this research establishes a systematic quantitative baseline to identify which factors actually serve as significant predictors of ulcer frequency, duration, and pain levels.

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