**Data Analysis Overview and Key Findings**

**Objective**:  
The goal or hypothesis of the analysis was to answer the question, if individuals adopt healthier lifestyle choices, then the risk of developing dementia could potentially be mitigated. The dataset contained variables like diabetic status, alcohol consumption, heart rate, blood oxygen level, body temperature, and other key health and lifestyle indicators such as physical activity, depression status, and cognitive test scores.

**Methodology:**

We employed a structured approach to analyze the dataset, using Python and associated libraries such as Pandas and NumPy for data wrangling, followed by exploratory data analysis (EDA) to identify patterns, outliers, and correlations. The analysis was broken down into several key stages:

1. **Data Preprocessing**:
   * We addressed missing values through imputation, ensuring the integrity of our analysis.
   * Data normalization and transformation techniques were applied, especially for continuous variables like heart rate and body temperature.
2. **Exploratory Data Analysis (EDA)**:
   * Visualizations were used to explore the distribution of key health variables and their relationships with dementia risk factors.
   * Some analysis identified potential correlations between variables such as age, physical activity, cognitive test scores, and the presence of dementia.
3. **Feature Selection**:
   * Based on EDA, we filtered the dataset to focus on the most significant predictors of dementia, including APOE\_ε4 gene presence, age, and cognitive test scores.

**Key Findings:**

1. **APOE\_ε4 Gene and Dementia**:
   * The presence of the APOE\_ε4 allele was strongly correlated with an increased risk of dementia. Patients carrying the gene showed significantly lower cognitive test scores and higher dementia diagnoses across the board.
2. **Age as a Major Factor**:
   * Age was the most significant predictor of dementia, with individuals over 65 showing a steep increase in dementia diagnoses, particularly when combined with other health issues like chronic conditions and depression.
3. **Impact of Physical Activity**:
   * Regular physical activity showed a protective effect, with active individuals displaying higher cognitive scores and lower rates of dementia, even among those with genetic predispositions (APOE\_ε4).
4. **Depression and Dementia**:
   * Depression status had a notable impact on cognitive decline, with individuals experiencing depression being more likely to score lower on cognitive tests and be diagnosed with dementia.
5. **Chronic** **Health Conditions**:
   * Chronic health conditions, particularly diabetes and high alcohol consumption, were also linked to an increased risk of dementia. Diabetic individuals showed lower cognitive test scores and higher rates of dementia, suggesting a need for targeted interventions in managing these patients.

**Conclusion:**

The analysis reveals significant insights into the relationships between genetic, lifestyle, and health factors and the risk of developing dementia. Age, APOE\_ε4 presence, physical activity, and chronic health conditions stand out as key predictors, with potential implications for personalized healthcare and early intervention strategies.

**Future research and potential**

The findings provide a solid foundation for further predictive modeling and the development of preventive healthcare measures for at-risk populations.

P.S.

This overview is tailored for stakeholders and decision-makers, summarizing the results of our analysis in a clear, concise manner that highlights the significance of the findings and their potential impact.