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Research Article

The study explores the link between BMI and diabetes and hypertension, examining the influence of lifestyle on public health

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Abstract

Objective:

The purpose of this study is to examine the body mass index (BMI) and prevalence of diabetes and prevalence of hypertension, as well as the effects of lifestyle on adult health.

Methodology:

This study was conducted in an adult group. Data included BMI measurements, medical history (diabetic and hypertension), physical activity level, and stress level. Statistical analyses were conducted to assess the relationship between BMI and risk factors.

Results:

Results showed that 55.5% of diabetic patients and 48.5% of hypertensive patients exceeded the normal range. Furthermore, 87% of participants did not operate on physical activity associated with higher BMI and increased risk of metabolic disease.

Conclusion:

This study showed that higher BMI is associated with increased risk of diabetes and hypertension. Physical inactivity and stress were also identified as factors in increased BMI and lower health outcomes. These findings highlight how important it is to induce a healthier lifestyle and weight management strategy to prevent chronic disease.

Introduction

In today's world, obesity and obesity are a major challenge for public health. The Body Mass Index (BMI) is a common, non-invasive device in which the weight condition is calculated by calculating the weight ratio. It is often used to estimate the risk of chronic diseases such as diabetes, hypertension, and cardiovascular disease. However, there are certain restrictions on BMI. You can't measure your overall weight only and distinguish between fat, muscle, or bone mass. As a result, muscular individuals may be misclassified as overweight. Furthermore, factors such as age, gender, physical activity, and lifestyle have a major impact on BMI and general health.

Methodology

Study Design: This study was conducted as a cross-sectional study to investigate the relationship between body mass index (BMI), diabetes, hypertension, and lifestyle factors in adults.

Population and Sample: This study included an adult group consisting of 56.5% women and 43.5% men. Participants were 11 to 60 years of age and older, with the highest prevalence (27%) among age groups of 31 to 40 years.

Data Collection:

- BMI data were calculated by measuring weight (kg) and height (m) using the standard formula: the standard formula, which divides the weight of kilograms by the height of a square knife.
- A history of medical treatment including diabetes and hypertension was recorded.
- Lifestyle factors such as physical activity (active or inactive), nutritional patterns, and stress levels were assessed.

Instruments and Analysis Techniques:

- BMI was measured using the standard formula: weight (kg)/height (m^2).
- Data on physical activity and stress were collected by questionnaires.
- Statistical analyses were conducted to assess the correlations with BMI, diabetes, hypertension, and lifestyle factors.

Results

The findings of this study revealed the following:

1. Gender and age distribution:

- 56.5% of participants were women, while 43.5% were male.
- The majority of participants (27%) were 31-40 years.
- Those under the age of 10 were not included in the study.

2. BMI Status:

- 39% of participants had normal BMI.
- 36.5% were classified as overweight.
- There were no cases of underweight people.

3. Medical history:

- 48.5% of participants had hypertension.
- 55.5% had a history of diabetes.

4. Physical activity patterns:

- Only 13% of participants had regular physical activity.
- 87% indicated no physical activity.

5. Stress Level:

- The stress levels were almost balanced.
- 49.5% of participants were stressed.
- No 50.5% stress was reported.

Discussion:

The results of this study showed that higher BMI is associated with an increased risk of metabolic diseases such as diabetes and hypertension. Results showed that 55.5% of diabetic patients and 48.5% of hypertensive patients exceeded the normal range. These results are consistent with previous studies showing that obese or obese people are at a higher risk of developing chronic disease.

Physical activity and BMI:

This study also showed that 87% of participants were physically inactive, which is associated with higher BMI levels. This is consistent with previous trials showing that sitting lifestyles contribute significantly to increased BMI and significantly to obesity-related health problems.

Stress and BMI:

Results also showed that 49.5% of participants experienced stress. Stress can contribute to a higher BMI by causing hormonal changes, emotional excess food, and reduced physical activity.

BMI limit:

Despite its usefulness as a temporary screening tool, this study confirms that BMI does not reflect body composition (fat, muscle, or bone mass). People with a lot of muscle mass can be classified as overweight or obese, even if they are healthy.

Conclusion

The results of this study showed that higher BMI is associated with an increased risk of chronic diseases such as diabetes and hypertension. Results showed that 55.5% of diabetic patients and 48.5% of hypertensive patients exceeded the normal range. Furthermore, physical inactivity was identified as a key factor in increasing BMI. This study highlighted the importance of an active lifestyle to reduce BMI and prevent metabolic diseases, as 87% of participants were physically inactive. Furthermore, stress was perceived as an influence factor, highlighting 49.5% of participants. This can contribute to increased BMI through hormonal changes and emotional excess food. Finally, this study highlights the boundaries of BMI. Since BMI only distinguishes fat and muscle total weight, it is recommended to use complementary indicators such as waist perimeter and waist to hip ratio (WHR) for clinical reviews for a more accurate assessment of metabolic health.

BMI, or Body Mass Index, is a measure that calculates weight in relation to height to estimate body fatness, despite primarily assessing weight rather than fat directly. It's favored for its simplicity, cost-effectiveness, and non-invasive nature, allowing for easy regular checks. BMI is linked to potential health risks and mortality associated with obesity, making it a valuable tool for identifying health concerns on a broad scale and tracking public health trends.[1]

BMI is a widely used indicator of health, highlighting risks associated with being underweight or obese. Studies show that extreme BMI values are linked to shorter lifespans and higher risks of diseases like type 2 diabetes, heart disease, and other conditions. Reducing BMI by 5-10% can significantly lower the risks of metabolic syndrome and related diseases. Despite its usefulness, BMI is not a standalone diagnostic tool but a part of a broader assessment of health.[1,4]

BMI's accuracy can vary due to factors like muscle density and racial background. Muscular individuals might be classified as obese despite being healthy, and some ethnic groups face higher health risks at lower BMIs. It's also not suitable for pregnant women. Thus, while BMI is a useful guideline, it should be considered alongside other health indicators.[5]

BMI screening links underweight status to risks like anemia, weakened immunity, osteoporosis, and infertility, prompting doctors to run tests for malnutrition. Conversely, a high BMI raises the likelihood of heart disease, diabetes, certain cancers, and mental health issues. However, these conditions can occur regardless of BMI, influenced by genetics and lifestyle factors. In cases of potential overweight, doctors may conduct blood tests to evaluate metabolic and lipid levels, underlining the importance of a comprehensive health assessment beyond BMI alone.[8]

BMI and hypertension Obesity, particularly in individuals aged 25-50, is linked to increased serum triglycerides and LDL cholesterol, with a significant correlation found in those aged 25-39. Studies, including the Bogalusa Heart Study, show that childhood obesity, especially in girls, leads to persistent hypercholesterolemia. Research from 1973 to 1991 involving 3179 children highlighted that girls with high cholesterol levels experienced greater BMI increases during development. These findings suggest cholesterol

levels can indicate obesity risks, emphasizing the need for public health efforts targeting youth to promote healthy growth and prevent metabolic and cardiovascular diseases.[9]

BMI and mortality A U.K. study by Bhaskaran et al. revealed a J-shaped correlation between BMI and all-cause mortality, highlighting increased risks for those with a BMI over 25 kg/m2. This relationship holds for both communicable and non-communicable diseases and across smokers and non-smokers. Specifically, obesity could shorten the life expectancy by about 4.2 years for 40-year-old male non-smokers and 3.5 years for females, compared to those of healthy weight.[9]

BMI and waist circumference Studies, including those by Chinedu et al. and Romero-Corral et al., show a strong correlation between BMI and waist circumference in assessing obesity, highlighting the link between these measurements. However, while BMI is specific, its sensitivity in detecting obesity is low, especially in elderly populations, and it may not accurately reflect body fat percentage as compared to measures like bioelectric impedance analysis (BIA). Waist circumference has been found to be a more precise indicator of body fat percentage in males. The ongoing debate emphasizes that both BMI and waist circumference have their strengths and weaknesses in evaluating obesity.[9]

BMI and waist-to-hip ratio Research by Bener et al. and Dalton et al. suggests waist circumference is the most accurate obesity measure for both genders, with the waist-to-hip ratio being especially relevant for men as the second-best indicator. Studies involving Australian participants showed no significant differences among BMI, waist circumference, and waist-to-hip ratio in predicting obesity and related chronic conditions, highlighting the importance of considering multiple factors in obesity assessment.[9]

BMI and muscle mass the study by Kyle et al. highlights the limitations of BMI, particularly for athletes with high muscle mass and the elderly, who may have a misleading fat-to-muscle ratio. Despite a normal BMI, individuals can have varying levels of fat-free mass, with some athletes incorrectly classified as obese. Additionally, BMI does not account for sex differences in body composition or the impact of specific conditions like pregnancy or osteoporosis. European research using DXA scans showed that BMI inaccurately classified 7% of women and 8% of men as obese. This underscores the need for more nuanced

measures of body composition beyond BMI.[9]

When using BMI for adults, it's important to recognize its limitations. BMI measures overall weight rather than directly measuring body fat, making its accuracy influenced by age, gender, ethnicity, and muscle mass. It cannot distinguish between fat, muscle, or bone mass, nor does it account for fat distribution. For example, older adults may have more body fat at the same BMI as younger individuals, and women generally have higher body fat than men at the same BMI. Athletes might have higher BMIs due to increased muscle mass.[1,7]

Obesity in older adults significantly elevates the risk of numerous health problems, including higher mortality rates, cardiovascular diseases, type 2 diabetes, certain cancers, joint and respiratory issues, mental health conditions, and overall reduced physical and life quality.[1,7]

BMI children and adolescents, BMI interpretation must consider age, gender, height, and stage of sexual development due to the unique growth patterns in this age group. While a high BMI in obese children (≥95th percentile for age) reliably indicates excess body fat, the significance of BMI values in overweight children (85th to 94th percentile) can vary, potentially reflecting either overweight or obesity. The interpretation differs from adults, with children's BMI assessments being age and gender-specific, to accurately reflect changes in body composition.[1,7]

In adults, BMI categories are standardized for those aged 20 and older, regardless of gender, with specific ranges identifying underweight, normal weight, overweight, and obese statuses. This universal applicability supports BMI's role as an initial tool for obesity screening, although it may not fully capture individual differences in fat distribution, genetics, and overall health. For children and adolescents, BMI interpretations are adjusted for age and gender differences, using percentiles to categorize weight status relative to peers, acknowledging the dynamic nature of growth and development.[1,7]

In children and adolescents aged 2 to 20, BMI is adjusted for age and gender, reflecting body composition changes. Their weight status is categorized by percentile rankings: underweight (less than the 5th percentile), healthy weight (5th to less than the 85th percentile), overweight (85th to less than the 95th percentile), and obese (95th percentile or greater). BMI acts as a preliminary screening tool, with further health assessments

considering diet, physical activity, and family history.[1,7]

Risks of being underweight (BMI below 18.5) can lead to health issues like vitamin deficiencies, anemia, reduced immunity, osteoporosis, malnutrition, growth delays in children, hormonal imbalances, and fertility issues in women. It may also indicate underlying conditions such as anorexia, requiring professional healthcare advice.[11]

Overweight and obesity occur when calorie intake exceeds expenditure, with factors including genetic predisposition, unhealthy dietary choices, sedentary lifestyles, emotional eating, and insufficient sleep contributing to weight gain.[12]

Alternative body fat measurements like skinfold thickness, bioelectrical impedance, and dual-energy X-ray absorptiometry can offer more precise body fat analysis but may be impractical for routine use due to cost, complexity, and accessibility issues. While BMI is a commonly used indicator, it has limitations, including inaccuracies for those with high muscle mass, physical disabilities, unusual height, or varying ethnic backgrounds.[11]

Bariatric surgery is an option for significant weight issues or metabolic conditions, requiring adherence to specific guidelines. Costs in India range from 2.5 to 5 million rupees, making health insurance like the Star Comprehensive Insurance Plan, which covers surgery and related expenses, crucial for financial protection.[6]

BMI is a practical indicator for identifying potential weight issues but isn't a direct measure of body fat or a diagnostic tool. It's useful for initial screening in both adults and children. To calculate BMI, you can use the formula: weight in kilograms divided by height in meters squared for metric, or 703 times weight in pounds divided by height in inches squared for imperial.[1,2]

However, BMI's focus on weight can sometimes lead to judgment and stigma, especially in healthcare settings, potentially affecting the quality of care. Doctors use BMI alongside other assessments like skinfold thickness, dietary habits, physical activity, and family health history to evaluate an individual's health and provide guidance.[3,10]

Excess weight poses significant health risks, increasing the burden on the heart, and the risk of conditions like hypertension, dyslipidemia, type 2 diabetes, certain cancers, and more. These risks highlight the

importance of managing weight through healthy lifestyle choices.[3]

The aim of BMI measurement is to quickly assess body composition and weight-to-height ratio, acting as a preliminary screen for weight-related health categories. Objectives include evaluating health risks, analyzing potential health issues, monitoring weight changes, informing public health strategies, aiding clinical decisions, and promoting weight management awareness.

BMI categorizes individuals as underweight (<18.5), normal weight (18.5-24.9), overweight (25-29.9), or in one of three obesity classes (Class I: 30-34.9, Class II: 35-39.9, Class III: ≥40), with each category indicating varying health implications and needs for dietary or lifestyle adjustments.

Category	**Percentage**
Gender: Female	56.49999999999999
Gender: Male	43.5
Age: Below 10 years	0.0
Age: 11-20 years	1.0
Age: 21-30 years	12.5
Age: 31-40 years	27.0
Age: 41-50 years	21.5
Age: 51-60 years	14.499999999999998
Age: 60 and above years	23.5
BMI Status: Normal	39.0
BMI Status: Overweight	36.5
BMI Status: Underweight	0.0
Medical History: None of them	0.0
Medical History: Others	0.0
Medical history: hypertension	48.5
Medical history:Diabetes	55.50000000000001
Food Habit: Non Vegetaria	100.0
Food Habit: Diet food	0.0
Food Habit:Vegetarian	0.0

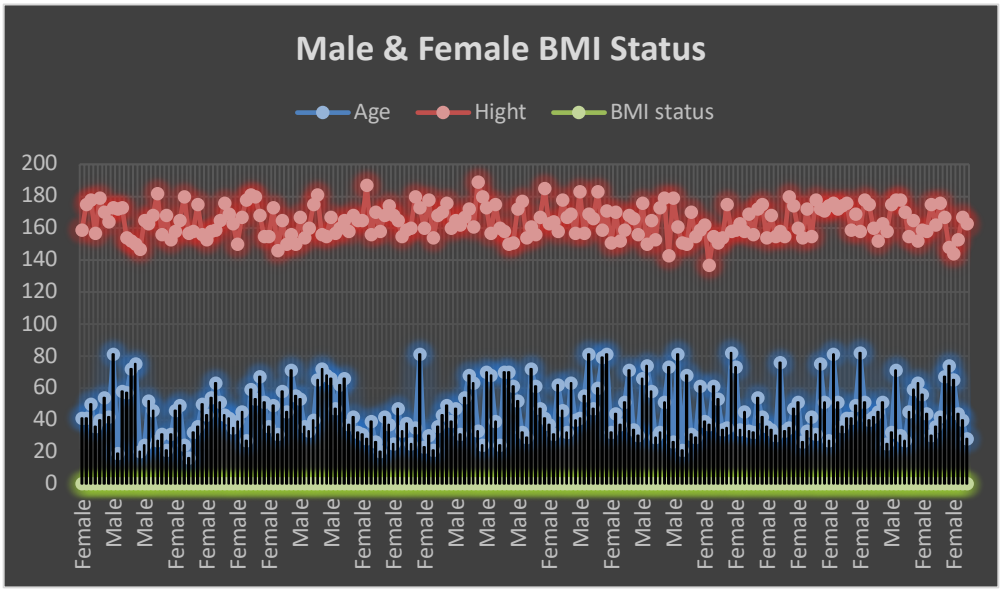
Social Behaviors:None of them	0.0
Social Behaviors:others	0.0
Work Habit:Student	0.0
Work Habit:Housewife	31.5
Work Habit: hospital/paramedical	0.0
Work Habits:Retired/Not working	0.0
Work Habit:Others	0.0
Exercise Pattern: yes	13.0
Exercise Pattern: No	87.0
Food Pattern: Mixed	99.0
Food Pattern: Rice	0.0
Food Pattern: More vegetables	0.0
Food Pattern: More non-vegetarian	0.0
Food Pattern: Roti	0.0
Food Pattern: Others	0.0
Breakfast: Before 9 AM	46.5
Breakfast: After 9 AM	3.0
Breakfast: Brunch	28.999999999999996
Breakfast: Doesn't eat	0.0
Lunch: 12.30-2 PM	70.0
Lunch: Brunch	27.500000000000004
Lunch: No lunch	0.0
Dinner: After 10 PM	33.5
Dinner: 9-10 PM	57.99999999999999
Dinner: 8-9 PM	4.5
Dinner: Doesn't take	0.0
Dinner: Before 8 PM	0.0
Stress: Yes	49.5
Stress: No	50.5
Stress: None	0.0

Appendices

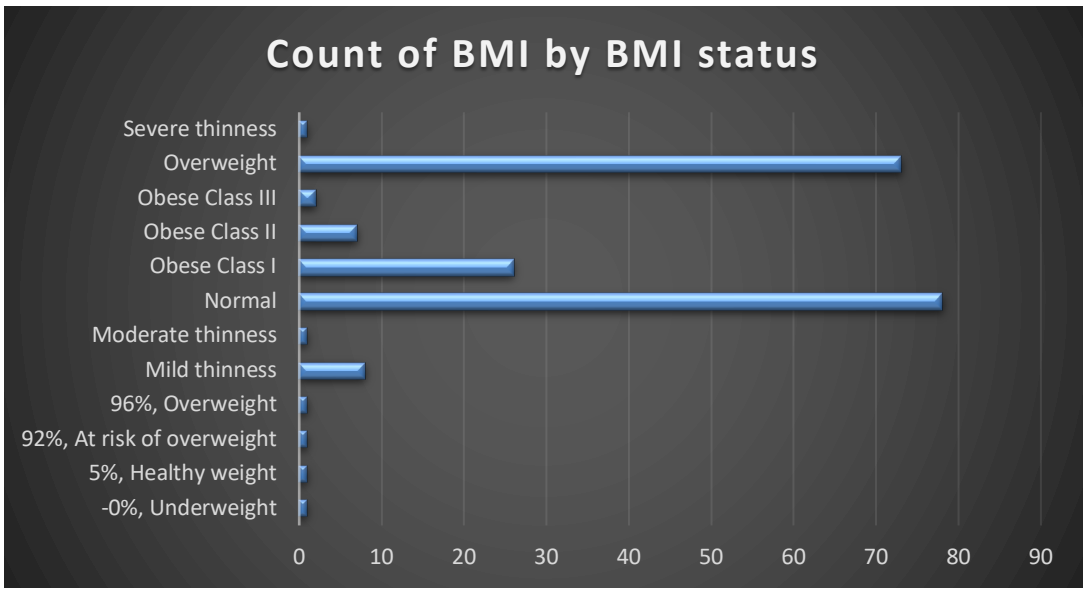
Conclusion:

The majority of participants (56.5%) are female, with the remaining 43.5% being male.

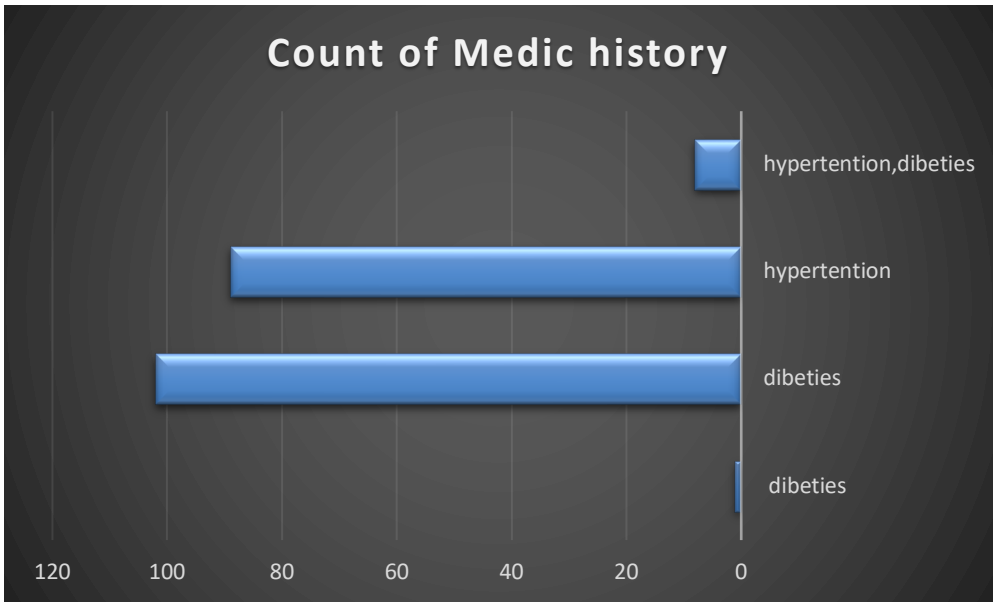
The majority of participants (27%) are aged 31-40, with no participants under 10 years old.



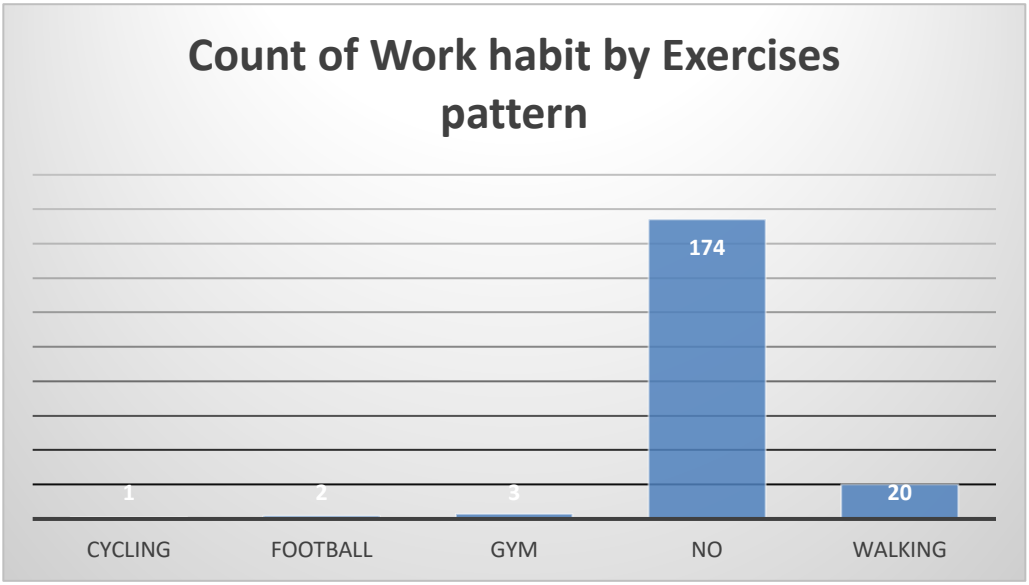
Most individuals have a normal BMI (39%) or are overweight (36.5%), with no cases of underweight individuals.



The majority of participants, 48.5%, and 55.5%, have a medical history characterized by hypertension and diabetes.



The study reveals that only 13% of individuals engage in physical exercise, while 87% do not engage in any form of physical activity.



The stress levels are nearly balanced, with 49.5% of individuals experiencing stress

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