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A study to assess the Corelation between body mass index and blood pressure among adults in selected community area at Bangalore, India

[1]Ms. Rubitha. A, MSc. Nursing, Department of Medical Surgical Nursing, Ramaiah Institute of Nursing Education and Research, MSRIT Post, MSR Nagara Bangalore, India- 560054.

[2]Mr. Yogendra Prabhu, Associate Professor, Department of Medical Surgical Nursing, Ramaiah Institute of Nursing Education and Research, MSRIT Post, MSR Nagara Bangalore, India-560054.

Corresponding Author: Ms. Rubitha. A, MSc. Nursing, Department of Medical Surgical Nursing, Ramaiah Institute of Nursing Education and Research, MSRIT Post, MSR Nagara Bangalore, India- 560054.

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Abstract

Background of the study: There is an increase in the prevalence rate of overweight and obesity across the globe. Blood pressure has been found to be increased among populations with high body mass index. Overweight and high blood pressure both have independent health consequences as they carry serious risk factors for several non-communicable diseases such as hypertension and stroke. Body mass index (BMI) positively associated with both systolic blood pressure (SBP) and diastolic blood pressure (DBP), weight loss significantly reduces blood pressure.

Objectives

- To find the relation between BMI and blood pressure,
- To find the association between BMI and socio-demographic variables
- To find the association between blood pressure and socio-demographic variables.

Materials and methods: A correlational descriptive study was conducted among 99 adults in the age group of 20-40 years at urban community area Bangalore. Non-probability convenient sampling technique was used to select the samples. Data was collected by using socio-demographic profile and biophysiological measurements. (Height, weight and blood pressure). The data was analyzed by using descriptive and inferential statistics.

Results: Present study results revealed that there was a negligible positive correlation between BMI and systolic blood pressure but it was not statistically significant ($r = 0.028$, $p = 0.780$). The study also revealed that a weak negative correlation between BMI and diastolic blood pressure but it was not statistically significant ($r=0.237$, $p=-0.018$). The study also found that there was a significant association between BMI and type of diet ($\chi2 = 9.795$, $p=0.044$) systolic blood pressure and nature of work ($\chi2 = 10.229$, $p= 0.037$).

Conclusions: The study concluded that, Body mass is a crucial factor that affects the level of blood pressure among adults. Key words: Body Mass Index, Blood Pressure, Systolic Blood Pressure and Diastolic Blood Pressure.

Introduction

Due to industrialization and urbanization, the standard of living continues to rise particularly in developing countries. This had led to weight gain and obesity, which are posing a threat to the health of citizens. Obesity is perhaps the most prevalent form of malnutrition in developing countries, both among adults and children.[1]

Obesity and its health consequences and consequent health burden is expected to reach epidemic proportions in developing countries like India. An increase in the dimension of this problem has been reported in the high socio□economic group in India.

The unnecessary accumulation of fat in the body resulting in increasing weight beyond that considered desirable with regard to age, height, and weight. It has become major public health issue and affecting the developing countries. Body mass index positively and independently associated with morbidity from blood pressure, cardiovascular disease, type 2 diabetes mellitus, and other chronic diseases. [2]

Blood pressure has been found to be increased among populations with high body mass index. Overweight and high blood pressure both have independent health consequences as they carry serious risk factors for several non-communicable diseases such as hypertension and stroke. [3]

Materials & methods

Study design: The study used correlational descriptive survey design.

Variables

Attribute variables: The socio-demographic variables in this study were; Age in years, gender, marital status, educational status, occupational status, monthly family income, type of family, type of diet, habits, exercise, nature of work, childhood history of obesity, known case of hypertension and known case of diabetes mellitus.

Study variables: Body mass index and Blood pressure

Setting of the study: The study was carried out in the urban community area at Bangalore.

Sample size: 99 adults in the age group of 20-40 years.

Sampling technique: non-probability convenient sampling technique was used to select samples based on selection criteria.

Inclusion and exclusion criteria

Inclusion criteria

• Adults who are in the age group of 20-40 years.

• Adults who are willing to participate in the study.

Exclusion criteria

• Adults who are not available at the time of data collection.

Development of the tool

After an extensive review of literature and discussion with the experts the socio demographic profile was developed. Calibrated manual weighing machine, stadiometer and calibrated sphygmomanometer were selected for measuring biophysiological variables.

Validity

The validity of the tool was done by 7 experts, as per the suggestions given by the expert's modification and changes were made in the final tool.

Reliability

The tool was tested for reliability using test□retest method and inter-rater method:

• Test-retest method was used for checking the reliability of weighing machine (r=0.76) and stadiometer (r =1).

• Inter-rater method was used for checking reliability of sphygmomanometer, SBP (r= 0.93) DBP (r = 0.84).

Ethical clearance

Ethical clearance was obtained from Ethics Committee of the institution.

Pilot study

Pilot study was conducted at urban community area at Bangalore. A total 10 samples were selected for the study, on completion of pilot study it was found that it was feasible to undertake the main study.

Data collection procedure

The data was collected in urban community area at Bangalore, after obtaining formal permission from concerned authorities. Subjects who met inclusion criteria were requested to answer the questions in research tool related to Socio - demographic profile and biophysiological measurements were recorded (weight, height, blood pressure).

Weight was measured by using calibrated manual weighing machine

• Measurement was taken before the meal. The calibrated manual weighing machine was placed at the floor and checked for its accuracy -zero level.

• The subject was instructed to empty the bladder, remove the extra clothing and stand straight over the manual weighing machine (Head upright and hands hanging by the side).

• The reading was documented in the data sheet.

Height was measured by using stadiometer

• The subjects were instructed to remove shoes and hair ornaments to a possible extent.

• The subjects were instructed to stand erect with heels together against the wall.

• The reading was documented in the data sheet.

Blood pressure was measured by using calibrated sphygmomanometer

• Student researcher ensured that subjects had not taken caffeine, exercised and smoked for at least 30 minutes before the measurement.

• Subjects were seated quietly for at least 5 minutes in a chair with feet on the floor and arm supported at heart level. For each subject, three times blood pressure was recorded by using same calibrated sphygmomanometer and stethoscope with 2 minutes of interval.

• The mean of three readings were taken for systolic blood pressure and diastolic blood pressure.

• The readings were documented in the data sheet.

Statistical method

Descriptive statistics

Frequency and percentage distribution were used to describe the sociodemographic variables. Mean and standard deviation were used to describe the bio-physiological measurements.

Inferential statistics

• Karl's Pearson correlation coefficient was used to find the relationship between BMI and blood pressure.

• Chi-square test was used to find the association between BMI, blood pressure and socio – demographic variables.

Results

The collected data was analysed according to the objectives of the study; the findings are presented below.

Frequency and percentage distribution of socio - demographic variables

It was observed that 56.6% of the subjects were in the age group between 20-30 years. 53.5% of the subjects were male. 62.6% of the subjects were married. 54.5% of the subjects had graduate level education. 39.4% of the subjects were private employees. 31.3% of the subjects

were having monthly family income less than 10,001 rupees. Majority (69.7%) of the subjects belong to nuclear family, 71.7% of the subjects were non-vegetarian, 76.6% of the subjects were not having the habits such as smoking, consuming alcohol and tobacco chewing, 96.7% of the subjects were not doing exercise regularly.

Majority (66.7%) of the subjects were doing sedentary work, 78.8% of the subjects were not having childhood obesity and all subjects were non- hypertensive and 93.9% of the subjects were not having diabetes mellitus.

Frequency and percentage distribution of body mass index (BMI) Blood pressure (SBP & DBP).

It was observed that 36.4% of the subjects were obese-class I (BMI = 25–29.9). Majority (68.7%) of the subjects were having optimal systolic blood pressure (SBP) and 57.6% of the subjects were having optimal diastolic blood pressure (DBP).

Mean and standard deviation of biophysiological measurements (BMI, systolic blood pressure and diastolic blood pressure).

It was observed that the mean score obtained for body mass index (BMI) was 24.12 with SD ± 3.866, for systolic blood pressure (SBP) the mean score was 112.51 with SD ± 9.755 and for diastolic blood pressure (DBP) the mean score was 74.95 with SD ± 6.772.

Correlation between body mass index, systolic blood pressure and diastolic blood pressure.

Correlation between body mass index, systolic blood pressure and diastolic blood pressure. There was negligible positive correlation between BMI and systolic blood pressure but it was not statistically significant (r = 0.028, p = 0.780) and weak negative correlation between BMI and diastolic blood pressure but it was not statistically significant (r = -0.237, p = 0.081).

Association between body mass index, blood pressure and socio-demographic variables.

Chi-square findings revealed that there was a significant association between BMI and type of diet ($\chi 2$ = 9.795, p=0.044). Similarly, there was a significant association between SBP and nature of work ($\chi 2$= 10.229 p=0.037).

Discussion

The findings obtained from the study are discussed as follows:

Objective: To find the relation between body mass index and blood pressure.

The present study revealed that there was negligible positive correlation between BMI and systolic blood pressure but it was not statistically significant (r = 0.028, p = 0.780), and there was weak negative correlation between BMI and diastolic blood pressure but it was not statistically significant (r=0.237, p=-0.018). The study findings contradicted by study conducted by Shabnam Joshi (2018) found that correlation between BMI and SBP (r=0.284, p=0.000) and BMI and DBP (r=0.232, p=0.001). Present study findings supported study conducted by Frederick Vuvor (2017) found that there was negligible positive correlation between BMI and BP (r=0.021, p=0.771)

Objective: To find the association between body mass index and socio- demographic variables.

The present study revealed that there was no association between BMI and socio□demographic variables except for type of diet ($\chi 2$ =9.795, p=0.044). The study findings are contradicted by study conducted by N.K Mungreiphy, satwanti Kapoor (2011) found that there was significant ($p<0.05$) association between age and body mass index (BMI). Present Study findings supported by study conducted by Israel Sunmola Afolabi (2020) found that

there is Significant ($p<0.001$) Association between education and body mass Index (BMI).

Objective: To find the association between blood pressure and socio-demographic variables.

The present study revealed no association between blood pressure and socio-demographic variables except for nature of work (has association with systolic blood pressure). The study findings are contradicted by study conducted by N.K. Mungreiphy, Satwanti kappor (2011) found that there was significant ($p<0.001$) association between age with systolic and diastolic blood pressure.

Conclusion

BMI and Blood pressure are significantly correlated. There is a need to modify the life style of adults in order to prevent obesity and high blood pressure which will go long way in preventing non-communicable diseases such as Hypertension and stroke.

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