ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 12, Issue, 01, pp.9295-9300, January, 2020

DOI: https://doi.org/10.24941/ijcr.37486.01.2020

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

A STUDY TO ASSESS THE CORRELATION OF ANTHROPOMETRIC MEASUREMENTS WITH SEVERITY OF CORONARY ARTERY DISEASE AMONG CAD PATIENTS VISITING OPDS IN SELECTED TERTIARY CARE HOSPITAL, LUDHIANA, PUNJAB

***Mrs. Babita Rani and Ms. Jyoti Sharma**

M.Sc. Medical Surgical Nursing, Nursing Tutor Department of Medical Surgical Nursing, DMC&H, College of Nursing, Malakpur, Ludhiana

ARTICLE INFO

Article History:
Received 15th October, 2019
Received in revised form
18th November, 2019
Accepted 09th December, 2019
Published online 30th January, 2020

Key Words:
Anthropometric measurements, Severity, CAD.

ABSTRACT

Background: Obesity has been regarded as an independent risk factor for coronary artery disease and may be associated with more severe coronary artery disease (CAD). Approximately 10-12 million deaths occur every year due to CAD. The ralationship between anthropometric measurements and CAD severity is uncertain and debatable. **Objectives:** -The study was carried out to assess and correlate anthropometric measurements with severity of Coronary Artery Disease.

- To find out association of severity of Coronary Artery Disease with socio demographic variables.
- TO develop and disseminate IEC guidelines among CAD patients.

Methodology: This study was conducted to assess the correlation of Anthropometric measurements with severity of Coronary Artery Disease among CAD patients visiting OPDs in tertiary care Hospital Ludhiana, Punjab. Total 100 subjects were selected by convenience sampling technique. Self structured and standardized questionnaire were used to assess the correlation of Anthropometric measurements with severity of Coronary Artery Disease. Data was collected from subjects by self report and Bio-physiological methods.

Results: The result of present study showed that most of subjects i.e. 54% were from age group of more than 58 years in which 63% were males and 37% were females. It was found that females had more severity of CAD than males where of the subjects 42% had level II severity of CAD i.e. 24.6-68 according to Gensini score. **Conclusion:** The study findings showed that there is a statistically non significant weak positive correlation of WC, HC, WHR and WHtR with severity of CAD whereas it showed statistically non significant weak negative correlation of Height, Weight and BMI with severity of CAD.

Citation: Mrs. Babita Rani and Ms. Jyoti Sharma. **2019.** "A study to assess the correlation of anthropometric measurements with severity of Coronary Artery Disease among CAD patients visiting OPDs in selected tertiary care hospital, Ludhiana, Punjab.", *International Journal of Current Research*, 12, (01), 9295-9300.

INTRODUCTION

Coronary artery disease is the most common form of heart disease which occurs when a plaque (hardening of the arteries) build up in the walls of arteries that supply to the heart. The risk factors for coronary artery disease (CAD) can be non-modifiable and modifiable. The non- modifiable risk factors for coronary artery disease (CAD) are Family history of CAD, increasing age, gender and modifiable are Cigarette smoking, Tobacco use, Hyperlipidemia, Diabetes, Metabolic syndrome, Obesity, Physical inactivity and Hypertension. Globally, Coronary Artery Disease (CAD) is the leading cause of death, 7.2 million deaths occurring worldwide every year.

****Corresponding author:*** **Mrs. Babita Rani,**
M.Sc. Medical Surgical Nursing, Nursing Tutor Department of Medical Surgical Nursing, DMC&H, College of Nursing, Malakpur, Ludhiana.

Cardiovascular disease would be the largest cause of death in India by 2020 as per World Health Organization (WHO) report. According to well known radiologist Harsh Mahajan, India will have more than 4.77 million deaths in a year due to cardiovascular diseases and 2.58 million deaths due to coronary artery disease (CAD) by 2020. Many evidences from the epidemiological studies show a link between the higher body weight and increased risk of coronary artery disease (CAD). Overweight and obesity has occurred globally, and there are a currently more than one billion overweight adults, 300 million are obese. Hypertension exerts force against the artery walls. Overtime, extra pressure can damage arteries, making them more vulnerable to the narrowing and plaque buildup. Similarly high blood glucose from diabetes can damage blood vessels and nerves. Smoking is also one of the risk factor for coronary artery disease. Nicotine and carbon monoxide causes platelets in blood to clump together, spasm in coronary arteries that can damage the lining of arteries, leading

to a build-up of fatty material which narrows the arteries and leads to coronary artery disease (CAD). It also lowers good cholesterol and reduces amount of oxygen. Moreover lack of physical activity can worsen other risk factors for atherosclerosis such as Hyperlipidemia, and obesity. Obesity has been regarded as an independent risk factor for coronary artery disease (CAD) by the American Heart Association (AHA) and investigators of the Framingham Heart study in the 1980s and 1990s and there is a positive linear relationship between obesity and CAD. So no one can neglect the obesity simply as the cosmetic problem affecting certain individual but should consider as a serious matter which threatens the valuable human life. Obesity is primarily measured in anthropometric measurements. Anthropometric measurements are the set of non- invasive quantitative techniques of determining an individual's body fat composition by measuring, recording and analyzing the specific dimensions of the body. Different methods exists for the evaluation of obesity, body mass index (BMI), waist circumference, neck circumference, waist/hip ratio and waist/height ratio are the clinical tools to evaluate the obesity and fat distribution.

Overweight is defined as the body weight that exceeds the acceptable rate for a particular person based on individual age, height and body framework and obesity is defined as a BMI greater than or equal to 30 kg/ metre squares. In some studies, there is a positive correlation between the anthropometric measurements and severity of Coronary artery disease. The severity of coronary artery disease (CAD) can be captured using coronary angiography. It is the minimal invasive procedure used to visualize the inside, or lumen of blood vessels and organ of the body with the particular interest of the arteries, veins and heart chamber. Historically coronary artery disease (CAD) has been categorized as single, double and triple vessel and left main disease with luminal stenosis of either ≥50% (left main) or ≥70% (other major epicardial vessels) used to define significance. Few studies have examined the association of body mass index (BMI) and coronary artery disease in patients undergone coronary angiography.

Body mass index (BMI) is the most easily measured and commonly used surrogate measure of obesity. Obesity is measured in BMI which is a person weight divided by the square of his /her height in meters. A person with body mass index of 30 or more generally considered obese and person with body mass index equal to or more than 25 is considered as overweight. According to Asian criteria, body mass index is <18.5 considered as underweight, 18.5-22.9 is normal, 23-24.9 is overweight, 25-29.9 is pre-obese, ≥30 is obese, 30-40 is obese type1, 40.1-50 is obese type 2 and >50 is considered as obese type 3. The waist hip ratio is used for the evaluation of body fat distribution. Waist circumference is more strongly associated with central fat distribution; neck circumference is an index of central obesity as it associates independently with visceral adiposity and body mass index and measured in standing position. A number of studies proved that anthropometric characteristics as a predictor of coronary artery disease (CAD). In 2008, the L. Yang and H. Kuper proved that the waist circumference was associated with increased coronary artery disease (CAD) risk whereas height, weight and hip circumference were not associated with coronary artery disease (CAD). Obesity was strongly related to coronary artery disease (CAD) and after mutual adjustment waist hip ratio was more closely related to coronary artery disease (CAD).

In 2014, Anne B. Gregory and Kendra K. Lester showed that there is positive correlation between waist/hip ratio and severity of coronary artery disease (CAD). Another study conducted by Virendra C. Patil, G.P. Parale in 2011 showed that BMI, waist/hip ratio, waist/height ratio and waist circumference had partial positive correlation with coronary artery disease (CAD). However, the relationship between BMI and severity of coronary artery disease is uncertain and debatable. So the aim of the study is to explore the relationship between anthropometric measurements with severity of CAD.
Several anthropometric measurements such as height, weight, BMI, waist to hip ratio, waist to height ratio, waist circumference and neck circumference are used as indicators of obesity. This measures the significant association between different anthropometric measurements and CAD. Most of the studies have shown linear relationship between anthropometric measurements and severity of coronary artery disease (CAD).
Thus the relationship between anthropometric measurements and severity of coronary artery disease (CAD) can be complex. So it is essential to determine the anthropometric measurements which are more associated with coronary artery disease (CAD). Therefore, the study is undertaken to correlate the anthropometric measurements with coronary artery disease (CAD) and also to determine the clinical outcome. During the clinical posting researcher observed the increase in number of CAD patients. As a researcher we felt a need to assess the correlation of Coronary Artery Disease among CAD patients visiting OPDs. We had been posted in the Hero DMC Heart Institute and we had seen number of patients visiting OPDs diagnosed with Coronary Artery Disease having several risk factors but obesity is the independent risk factor that might be responsible for the severity of CAD. Hence the study is undertaken to correlate the Anthropometric measurements with CAD.

MATERIALS AND METHODS

Research Approach: A quantitative research approach had been used to assess the correlation of Anthropometric measurements with severity of Coronary Artery Disease among CAD patients visiting OPDs in selected tertiary care hospital Ludhiana, Punjab.

Research Design: A descriptive correlational design was used to assess the correlation of Anthropometric measurements with severity of Coronary Artery Disease among CAD patients visiting OPDs in selected tertiary care hospital Ludhiana, Punjab.

Research Setting: This study was conducted in OPDs of tertiary care hospital Ludhiana, Punjab.

Target Population: The target population for conducting research study was comprised of CAD patients with ≥18 years of age visiting OPDs in tertiary care hospital Ludhiana, Punjab.

Sample and Sampling Technique

Sample Size: The sample size of the study was taken to be N=100.

Sampling technique: A convenience sampling technique was used to select the sample for the study.

Inclusion and Exclusion Criteria

Inclusion criteria

The study subjects those who were

•Adults ≥18 years of age
•Diagnosed with recent CAD ≤6 months undergone angiography.
•Visiting OPDs in tertiary care hospital.

Exclusion criteria: The study subjects those who were not willing to participate in the study.

Description of tool

Part A: It includes general information and demographic profile such as age, gender, marital status, habitat, religion, educational status, occupation, type of family, personal habits.

Part B: It includes information about past medical history, family history, present illness history and laboratory test (cholesterol mg/dl).

Part C: Anthropometric measurements includes reading of weight, height, Body Mass Index, waist circumference, hip circumference, waist to hip ratio, waist to height ratio.

Part D: The tool used to measure the severity of CAD is Gensini score.

Method of data collection

Data was collected from subjects by self report (interview schedule) and Bio-physiological methods. It took an average of 10-15 minutes for each subject.

RESULTS

- Most of the subjects i.e. 54% were from age group of >58 years, i.e. 63% were males and 37% were females.
- Most of the subjects i.e. 51% were living in rural areas and 49% in urban areas.
- Most of the subjects i.e. 56% were educated up to metric and more than half of the subjects i.e. 52% were non-working, 52% were residing in nuclear family
- In personal habits, 72% subjects were vegetarian, 94% had no history of smoking and 80% had no history of alcohol consumption.
- Most of subjects i.e. 87% had previous history of hospitalization among them 63.2% were hospitalized due to angina.
- The present study revealed that highest mean i.e. 164.6±9.6 is seen in height followed by WC i.e.100.0±10.6, then HC i.e.99.1±10.65, further weight i.e.72.19±13.54and then BMI i.e.26.91±5.4 followed by WHR i.e. 1.97±9.6 and WHtR i.e. 1.23±6.33.
- The study revealed that a statistically non-significant weak negative correlation of weight, height and BMI.
- The study revealed that a statistically non-significant weak positive correlation of WC, HC, WHtR and WHR.
- In Mean distribution of subjects as per Gensini score, it shows that males had mean Gensini score 42.98±36.35, females had mean Gensini score 56.76±37.99 and total subjects had mean Gensini score 48.08±37.38.
- Majority of males 41.3% had Gensini score of >0-24.5. Majority of the Females 43.2% had Gensini score 24.6-68. Most of the females32.4% had the Gensini score of >68. Most of the total subjects 42% had Gensini score of 24.6-68.

Table 1. Frequency distribution of subjects according to clinical profile

Sample profile	f(%)
Previous medical illness	
Yes	75(75)
No	25(25)
If yes, specify (n=75)	
DM	47(62.6)
HTN	22(29.3)
Others*	06(08.0)
Previous hospitalisation	
Yes	87(87)
No	13(13)
If yes ,Specify (n=87)	
ACS	06(6.8)
Angina	55(63.2)
CABG	05(5.74)
PTCA	17(19.5)
Others**	04(4.5)
History of smoking	
Yes	06(06)
No	94(94)
If yes, then type of smoking (n=6)	
Cigarette	05(83.3)
Biddi	01(16.6)
Frequency of smoking	
≤10	04(66.6)
>10	02(33.3)
Duration of smoking (in years)	
0-5	02(33.3)
6-10	01(16.6)
>10	03(50)
History of alcohol consumption	
Yes	20(20)
No	80(80)
If yes, then alcohol quantity (n=20)	
¼ bottle	13(65)
½ bottle	06(30)
¾ bottle	01(05)
Duration of alcohol (in years)	
0-5	09(45)
6-10	05(25)
>10	06(30)
Sample profile	f(%)
Duration of diagnosis (in months)	
0 - 2	55(55)
2.1-4	29(29)
4.1-6	16(16)
Family history	
Yes	22(22)
No	78(78)
Cholesterol levels(mg/dl)	
≤200	83(83)
>200	17(17)

* *Hypothyroidism, CKD, Depression* ** *SOB , Asthma, Cardiomyopathy*

DISCUSSION

The finding of present study showed that age group ≥ 58 years are more prone to coronary artery disease i.e. 54%. Out of which more than one third i.e. 63% were male and 37% were female where female had more severity than males. There is a statistically non- significant weak positive correlation of WC, HC, WHR and WHtR with severity of CAD. There is a statistically non- significant weak negative correlation of

Table 2 a. Mean distribution of subjects a per Anthropometric measurements

N=100

Anthropometric measurements	Male (n=63) mean ± SD	Female (n=37) mean ± SD	Mean deviation ± SD	Total mean ± SD
Weight(Kg)	75.71±13.52	66.14±11.38	10.54±8.43	72.19±13.5
Height(cm)	168.61±10.07	158.72±7.02	7.34±6.19	164.6±9.6
BMI(Kg/m^2)	26.96±4.64	26.33±4.66	3.99±3.73	26.91±5.4
WC(cm)	101.10±10.19	98.29±11.25	7.99±6.93	100.0±10.6
HC(cm)	99.68±10.30	95.48±18.53	8.28±6.65	99.1±10.65
WHR	1.009±0.026	1.001±0.040	1.91±9.50	1.97±9.6
WHTR	0.600±0.063	0.615±0.076	1.24±6.21	1.23±6.33

Table 2(b) Correlation of Anthropometric measurements with severity of CAD

N=100

Anthropometric measurements	Mean±SD	r value	P value
Weight(Kg)	72.19±13.54	-.034	0.741^{NS}
Height(cm)	164.6±9.6	-.012	0.909^{NS}
BMI(Kg/m^2)	26.91±5.4	-.017	0.870^{NS}
WC(cm)	100.0±10.6	.056	0.577^{NS}
HC(cm)	99.1±10.65	.041	0.683^{NS}
WHR	1.97±9.6	.015	0.884^{NS}
WHtR	1.2±6.33	.015	0.879^{NS}

Significant at p<0.05 NS=Non significant

Table 3. Association of severity of Coronary Artery Disease with selected socio-demographic variables N=100

Socio-demographic variables	CAD severity			f	χ^2 Statistics
	Level I f	Level II f	Level III f		
Age (in years)					
18-37	03	03	01	07	χ^2 = 0.567 df = 4 p =0.550^{NS}
38-57	10	19	10	39	
≥58	22	19	13	54	
Gender					χ^2 = 0.155 df = 2 p=0.152^{NS}
Male	26	25	12	63	
Female	09	16	12	37	
Dietary pattern					
Vegetarian	24	29	19	72	χ^2= 0.774 df= 4 p=0.657^{NS}
Non-vegetarian	10	10	05	25	
Eggetarian	01	02	00	3	
Religion					χ^2=0.327 df= 2 p=0.324^{NS}
Hindu	17	14	12	43	
Sikh	18	27	12	57	
Habitat					χ^2=0.914 df= 2 p=0.914^{NS}
Rural	17	21	13	51	
Urban	18	20	11	49	
Education status					
Illiterate	07	08	03	18	χ^2=0.261 df= 8 p=0.111^{NS}
Metric	14	19	19	55	
Higher secondary	05	07	00	12	
Graduate or above	06	07	02	15	
Working status					χ^2=0.498 df= 2 p=0.494^{NS}
Working	18	21	09	48	
Non-working	17	20	15	52	
Type of family					χ^2=0.284 df= 2 p=0.282^{NS}
Nuclear	17	25	10	52	
Joint	18	16	14	48	
Socioeconomic status					
Upper class	01	01	00	02	χ^2=0.882 df= 4 p=0.805^{NS}
Upper middle	24	28	15	67	
Lower middle	10	12	09	31	
Cholesterol (mg/dl)					χ^2=0.564 df= 2 p=0.554^{NS}
≤200	28	36	19	83	
>200	07	05	05	17	

Significant at p<0.05 NS=Non significant

Height, Weight and BMI with severity of CAD. Majority of the subjects i.e. 42% lie in a severity level II having Gensini score 24.6 – 68. A similar study conducted by Rumana J Khan, Danielle J Harvey, Bruce N Leistikow, KMHS Sirajul Haque and Christine P Stewart (2015) in Bangladesh. Finding revealed that the highest proportion of both male and female cases belong to age group more than 55 years. The risk estimated for CAD however were mostly larger in females.

This study also suggested that WC and WHtR values were showing positive correlation with the risk of CHD. Another similar study showed by Hamid Sharif Khan, Asim Javed, Sohail Aziz, Jahanzeb Ali (2011) in Pakistan concluded that the prevalence of obesity is 23% in female and 13% in males with age group of 25 to 64 years. Female are at higher risk of developing cardiovascular disease.

One more study showed that by M. Siavash, M. Sadeghi, F. Salarifar, M.Amini, F. Shojaee-Moradie(2008) in university of surrey, Guilford, UK. Their findings revealed that WHtR measurements as an index of CAD risk. It also correlate that CAD in men is predominately higher in male than female. Objective 1:- To assess and correlate Anthropometric measurements with severity of Coronary Artery Disease. The findings of present study revealed that 42% subjects had Gensini score 24.6 – 68 (level II), 35% had Gensini score >0 – 24.5 (Level I), 23% had Gensini score of >68. It shows that there is a statistically non significant weak negative correlation of weight (r= -0.034), height (r= -0.012) and BMI(r= -.017) with severity of CAD. Statistically was found non-significant. There is a statistically non significant weak positive correlation of WC(r=0.056), HC(r=0.041), WHR(r=0.015), WHTR(r=0.015).

A similar study was conducted by Premtim Rashiti, Ibrahim Behluli, Albiona Rashiti Bytyqi (2017) conducted a study in Kosovar to assess the correlation between severity of Coronary Artery Disease and waist Hip-Ratio as a measurement of obesity as severity of Coronary Artery Disease .The study was conducted on 82 patients. Patient in CAD group had mean waist/height ratio of 1.76±7.56 and those in the non CAD had mean waist /height ratio of 0.57± 0.08. Patient in the CAD group had a mean waist/hip ratio of 0.93± 0.06 and those in the CAD group had a mean waist/hip ratio of 0.88 ± 0.07. Thirty seven patients (45.1%) had no coronary artery disease,15 (18.3%) had mild disease,14 (17.1%) had moderate disease and 16 (19.5%) had a severe disease .There was significant positive correlation between waist/hip ratio and presence of CAD in patients . The another supporting study conducted by Amir Farhang Zand Parsa, Bahareh Jahanshahi (2011) conducted a study is the relationship of body mass index to severity of coronary artery disease different from that of waist to hip ratio and severity of coronary artery disease. This study was a cross sectional, prospective study where 414 patients with suspected coronary artery disease in whom coronary angiography was performed were enrolled. In this study, finding showed a negative correlation between the severity of CAD with BMI according to both SYNTEX and Duke scores.

Objective 2:- To find out association of severity of Coronary Artery Disease with selected socio-demographic variables.

The findings of present study revealed that majority of subjects i.e. 54 belongs to ≥58 years of age, among them 22 falls in level I, 19 in level II and 13 in level III. In gender more than half of the subjects i.e. 63 were male, among them 26 falls in level I, 25 in level II and 12 in level III. In dietary pattern majority of subjects i.e. 72 were vegetarian among them 29 falls in level II, 24 in level I and 19 in level III. In habitat majority of subjects i.e. 51 belonged to rural habitat among them 21 falls in level II, 17 in level I and 13 in level III. In educational status majority of subjects i.e. 55 were metric passed among them 19 falls in level II, 19 in level III and 14 in level I. In working status majority of subjects i.e. 52 were non-working among them 20 falls in level II, 17 in level I and 15 in level III. Majority of subjects i.e. 83 had cholesterol level 50-200 mg/dl, among them 36 falls in level II, 28 in level I and 19 in level III. Statistically was found non-significant. A similar study was conducted by Rumana J Khan, Danielle J Harvey, Bruce N Leistikow, KMHS Sirajul Haque and Christine P Stewart conducted a study to find the relation between obesity and CHD in Bangladesh. The study included 189 hospitalized CHD cases (133 men and 52 women) and 201 controls. Finding of this study revealed the highest proportion of both male and female cases belong to age group 50-59 years. The highest percentage of male and female of CAD cases were from rural areas where the mean age 53.1 for men and 51.9 for women. Both total obesity and abdominal adiposity were associated with development of CAD and since measurement of WC and BMI are inexpensive, both should be included in the clinical setting for CAD risk assessment for this group of population. The supporting study was conducted by Ashwini (2016) conducted a comparative study on metabolic profile, anthropometric parameters among healthy adults to evaluate the association between vegetarian diet and cardiovascular risk among healthy adults 90 volunteer ages +19 out of which 46 non vegetarian and 44 vegetarian were recruited. Hip circumference was lower among vegetarian as compare to non vegetarian HDL was lower among vegetarian. Study showed no correlation was found between Body Mass Index and PFI score and positive correlation was observed between Body Mass Index and waist hip ratio in both age groups.

Conclusion

- It was found that females had more severity of CAD than males.
- Most of subjects (42%) had level II severity of CAD i.e. 24.6 - 68 according to Gensini Score.
- There is a statistically non-significant weak positive correlation of WC, HC, WHR and WHtR with severity of CAD.
- There is a statistically non-significant weak negative correlation of Height, Weight and BMI with severity of CAD.

Recommendation

The following recommendations are made on the basis of the findings of the present study.

- A similar study may be replicated on the large sample to validate or generalize the findings.
- A comparative study may be carried to assess the severity of CAD and anthropometric measurements among male and female.
- A comparative study may be carried to assess and correlate the anthropometric measurements among healthy and CAD patients.

REFERENCES

Adedoyim RA., Mbada CE., Bisiriyu LA., Adebayo RA., Balogun MO., Akintomide AO., 2008. Relationship of Anthropometric indicators with blood pressure levels and risk of hypertension in Nigerian Adults. IJGM:33-40.

Ammouri AA., Tailakh A., Isac C., Kamanyire JK., Muliira J., Balanchandran. 2016. Knowledge of coronary heart disease risk factors among a community sample in oman. *Sultan QaboosUniv Med J.,* 6(2); 189-196.

Ashwini. 2016. A comparative study on metabolic profile, anthropometric parameters among healthy adults to evaluate the association between vegetarian diet and cardiovascular protective role.int *J Res Med Sci.* 4(6): 2240-2245.

British heart founder importance of heart disease available from at https://www.bhf.org.uk>conditions >com.

Burgos MS., Burgos LT., Camargo MD., Franke SIR., PRA D, Borges TS. et al., 2013. Relationship between anthropometric measures and cardiovascular risk factors in children and adolescents. *Arq Bras Cardiol*., 101(4): 288-296.

Cassani SLR., Nobri F., Pazin- Filho A., Schmidt A. 2009. Relationship between coronary artery disease and anthropometry in Cohort of Brazilian Men: A cross sectional study. ajh104-109.

Corral AR., Somers VK., Johnson JS., Jensen MD., Thomas RJ., Squires RW. et al., 2007. Diagnostic performance of body mass index to detect obesity in patient with coronary artery disease. *European Heart Journal*., 28: 2087-2093.

Eckel RH. 1997. Obesity and heart disease: a statement for health care professionals from the nutrition committee, American Heart Association. Circulation 96: 3248-3250.

Farhang Amir, Jahanshahi Bahareh. 2015. Is the relationship of body mass index to severity of coronary artery disease different from that of waist to hip ratio and severity of coronary artery disease? *Paradoxical findings. Cardiovascular journal of Africa.* 26(1).

Flint AJ., Rexrode KM., Hu FB., Glynn RJ., Caspard, Manson JE., Willett WC. et al., 2010. A prospective study among men and women in body mass index, waist circumference and risk of coronary heart disease. *Obes Res Clin Pract., 4(3): e171- e181.*

Gray RS., Fabsitz RR., Cowan LD., Lee ET., Welly TK., Jablonski KA. et al., 2000. Relation of generalized and central obesity to cardiovascular risk factors and prevalent coronary heart disease in a sample of American Indians. *International Journal of obesity*. 24: 849-860.

Gregory AB, Lester KK, Gregory DM, Twells LK, Midodzi WK, Pearce NJ. The relationship between body mass index and the severity of coronary artery disease in patients referred for coronary angiography. Cardiology Research and practice 2017; 6: 548167.

Gupta V., Singla R., Bedi M. 2016. Correlation of anthropometric parameters with blood pressure: an anthropometric study in North Indian Haryanvi Males. *Int J Anat Res.,* 4(2):2485-2489.

Kang MK., Chang HJ., Kim YJ., Park AR., Park S., Jang Y. et al., 2012. Prevalence and determinants of coronary artery disease in first degree relative of premature coronary artery disease. *Coronary Artery Dis*., 23(3): 167-173.

Kaur H. 2013. A Co – Relational study on Self Care of Heart Failure and Health Related Quality of Life among Congestive Heart Failure Patients seeking treatment in selected hospital, College of Nursing, DMC&H, Ludhiana, Punjab.

Kaur H. et al., 2017. A Study to Assess the Factors Influencing Pre – Hospital Delay in Seeking Medical Treatment among Patients with Acute Myocardial Infarction in a selected hospital, College of Nursing, DMC&H, Ludhiana, Punjab, 2013.

Kaur P. 2017. A Study to assess the Effectiveness of Coronary Risk Reduction Discharge Training Programme (CRR-DTP) on Self Care Behavior and Post Discharge Problems Among Percutaneous Coronary Intervention (PCI) Patients in a selected hospital, College of Nursing, DMC&H, Ludhiana, Punjab.

Khan Hamid Sharif, Javed Asim , Aziz Sohail, 2011. "Relationship between BMI and Severity of coronary artery disease in female population of Pakistani origin." Pakistani Heart Journal. 44(1).

Khan RJ., Harvey DJ., Leistikow BN., Haque KMHSS., Stewart CP., 2015. Relationship between obesity and coronary heart disease among urban Bangladeshi men and women. *IntegrObes Diabetes*., 1(3): 49-55.

Mackay J, Mensah G. 2004. "The Atlas of Heart Disease & Stroke. Geneva World Health Organisation.

Nwegbu MM. 2012. Defining obesity using three anthropometric parameters, being components of two diagnostic criteria, amongst Nigerian women JDMMS June, 2(1):15-18.

Oliveira MAM., Fagundes RLM., Moreira EAM., Trindade EBS., Carvalho T. 2010. Relation between anthropometric indicators and respectives for cardio vascular disease. Arq Bras Cradiol 94(4): 451-457.

Patil VC., Parale GP., Kulkarni PM., Patil HV. 2011. Relation of anthropometric variables to coronary artery disease risk factors. *Indian J Endocr Metab.,* 15: 31-37.

Ramchandra MR., Kadam PS., Salunkhe. 2013. A study to evaluate the effectiveness of structured teaching programme on knowledge regarding prevention of Coronary Artery Disease among adults in Kale Village Karad. Index Copernicus value., 4: 2319-2338.

Rashiti Premtim, Behluli Ibrahim, et al., 2017. Assessment of the correlation between Severity of Coronary Artery Disease and Waist- Hip Ratio Open Access Maced J Med Sci. 2017 Nov 30; 5(7):929-933: 10. 3889/oamjms. Dec 15; 211

Reddy KK., Reddy KN., Ras AP., Naik JL., Basha DP. 2012. Association of anthropometric measurements with BP in Urban adult females, Andhra Pradesh, J life sci. 4(2):107-111.

Ringqvist I., Fisher LD., Mock M. 1983. Prognostic valve of angiographic indices of coronary artery disease from the Coronary Artery Surgery Study (CASS). *Journal of clinical investigation*,71 (6):1854-1866.

Roger VL., Go AS., Lloyd-Jones D. M. et al., 2011. Heart disease and stroke statistics-2011 update: a report from the American Heart Association, Circulation; 125 (1): 2-220.

Sekhri T., Kanwar RS., Chugh P., Chhillar M., Aggrawal R., Sharma YK. et al., 2014. Prevalence of risk factors for coronary artery disease in an urban Indian population. BMJ open 4:005346.

Siavash M., Sadeghi M., Salarifar F., Amini M., Moradie F. 2008. Comparison of body mass index and weight height ratio in predicting definite coronary artery disease. *Ann Nutr Metab* 53: 162-166.

Suddarth's & Brunner. 2010. Textbook of Medical – Surgical Nursing. Management of patients with coronary vascular disorder.13thed. Vol.1. Wolters Kluwer.P. 731.

Yang L, Kuper H, Weiderpass E, 2008. Anthropometric characteristics and predictors of coronary heart disease in women. *J Intern Med*., 264 :39-49.

****