

## CENTRAL OBESITY AS A PREDICTOR OF CORONARY ARTERY OCCLUSION

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### Abstract

**INTRODUCTION:** Central obesity is one of the coronary artery diseases (CAD) risk factors that has been regarded, recently. There are several methods for measuring abdominal obesity. We used abdominal diameter index (ADI) as an index of abdominal obesity and studied its relation to CAD.

**METHODS:** 180 patients [90 male and 90 female] with CAD were studied in Shahid Chamran Hospital affiliated to Isfahan University of Medical Sciences. Patients were stratified as normal group (without significant occlusion of CAD) and group with coronary artery diseases (over than 75% occlusion in at least one of the coronary arteries: LMA, LAD, RCA, LCX). People with diabetes, hypertension, hyperlipidemia, foot paralysis, edema, hypertriglyceridemia and ascitis were excluded. ADI was compared between groups. The relationship between ADI and coronary artery occlusion was tested in patients with CAD.

**RESULTS:** The mean of ADI in patients with CAD was significantly higher than normal group ( $0.52 \pm 0.85$  versus  $0.41 \pm 0.082$  in men and  $0.51 \pm 0.15$  versus  $0.42 \pm 0.07$  in women, respectively) ( $P < 0.05$ ). Significant correlation was seen between ADI and coronary artery occlusion only in women ( $P < 0.05$ ). ADI had not any significant correlation with hyperlipidemia, diabetes, high blood pressure, sex, and smoking.

**CONCLUSION:** It seems that ADI, as an index of central obesity might be included as an independent predictor of CAD. This hypothesis needs large follow up studies to be tested in future.

**Keywords:** Abdominal diameter, central obesity, waist to hip ratio, coronary artery disease.

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### Introduction

Coronary Artery Diseases (CAD), as a disease with a numerous modifiable and un-modifiable risk factors while in most societies, ranks the first among all known causes of death.

This in one hand makes severe arbitrary and in the other hand it rises to lose of productivity and other economic issues.<sup>1</sup>

The incidence of CAD has increased among the South Asian nations which is majorly due to the incidence of atherosclerotic dyslipidemia, and Diabetes Mellitus type -2 (DM-2).<sup>2</sup>

Obesity is in the other hand associated with many of CAD risk factors such as; atherosclerotic

Dyslipidemia, hypertension, DM,<sup>3-4</sup> and metabolic syndrome,<sup>5-7</sup> and in the other hand is directly linked with CAD.<sup>7-9</sup>

Therefore, obesity specially if central or abdominal is concerned as a main and modifiable risk factor for CAD.<sup>10-13</sup>

In fact, obesity now, regarded as a pandemic problem, which about almost half of the world's population in various degrees are overweighted or obese.<sup>14</sup>

Some studies have demonstrated that central obesity has a stronger link (association) with CAD risk factors than total obesity.<sup>15-16</sup>

In order to evaluate abdominal fat, various standards such as; waist and hip circumference, Sagittal

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Abdominal Diameter (SAD), Waist to Hip Ratio (WHR), Abdominal Diameter Index (ADI), is used. Depending on their easiness and cheapness in assessing, and in the case of confirming their link with CAD, they can be considered in prevention of CAD diseases through controlled diets,<sup>15</sup> changing life style.<sup>4</sup> Many researches haven't considered the link between ADI and CAD yet.

In this research, the link of ADI as a detector for central obesity, with CAD, in the case of Ischemia patient who were under angiography, have been surveyed.

### Materials and Methods

This research is a explanatory, analytic, observational study and sectional (periodic inspection) study which figured out for assessing connection between Abdominal Diameter Index (ADI) [the proportion of abdominoanterior postural to waist circumference], and atherosclerosis.

180 Patient (90 men and 90 women) who had approached for coronary artery angiography to Shahid Chamran Hospital of Isfahan for typical chest pain have been chosen. The people who suffered from Diabetes, Hyper Lipidemi, high blood tension, foot paralysis or abdominal ascitis have been excluded from the research. The sampling method was "convenience sampling". In the morning of Approached day Cholesterol test, Triglyceride and FBS after 12 hours fasting was given. Then after consulting the patients and convincing them, their right abdominoanterior and postural waist circumference measured. So the patient lied down in Supine mood in a flat and tight surface. By a ruler a vertical line from the center of abdomen, to the wall near to the patient, was drawn. And the distance between this spot

and flat surface equaled with abdominoanterior postural circumference. Then hip circumference was measured.

Then through information gathering form, the needed data's and also the scales are recorded. After that in the same day the patients being under angiography by cardiologist the occlusion and none occlusion and also the obstruction rate of them in each coronary branches are determined and recorded.

The people under survey divided in two groups. A group with Artery occlusion that representing at least obstruction  $\geq 75\%$  in the main coronary arteries like Right and Left coronary artery (RCA, CAD) and circumflex(CX). And other groups the people with normal coronary artery (with no occlusion in above mentioned branches).

According to statistic consultation and pilot study results, 180 people as a sample circumference have been taken into account and then via SPSS program the Mean, Standard Deviation, and Abdominal Diameter Index, and other indexes have been measured. The central Indexes and spreading in normal and diseased group in the separated gender distinguished. The theories by Logistic registration, t-test and Pearson correlation test were evaluated. In comparison  $P < 0.05$  are considered meaningful.

### Results

180 patients (90men&90women) with an average age of  $55.46 \pm 13.23$  surveyed and these results concluded.

In males, the average of ADI in the group of people suffering from coronary artery occlusion was 0.52 and the normal group 0.41 comparing Abdominal Diameter Index (ADI) between these two groups with  $\pm$  test showed a meaningful statistic deviation.

**Table 1:** Comparison of The group with coronary artery occlusion and the group with normal coronary artery according to ADI in separated genders

Gender	ADI* The group with normal coronary artery	The group with coronary artery occlusion	P Value
Male	0.41± 0.082	0.52 ± 0.85	0.043
Female	0.42 ± 0.07	0.51 ± 0.15	0.040

\* Abdominal Diameter Index

**Table 2:** Comparison of The group with coronary artery occlusion more than 75% and the people with occlusion less than 75% according to average ADI and gender separation

Gender	ADI* The group with less than 75% coronary artery occlusion	The group with $\pm 75\%$ Occlusion of coronary artery	P Value
Male	0.48± 0.09	0.42 ± 0.08	0.043

Female	0.49 ± 0.06	0.44 ± 0.12	0.042
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\* **Abdominal Diameter Index**

The average of ADI in men with occlusion of more than 75%, at least in one of the main coronary arteries was 0.42 and in males with occlusion less than 75% equaled with 0.48 which was statistically meaningful (P = 0.043).

Also the average of ADI in women with occlusion of more than 75%, at least in one of the main coronary arteries was 0.44 and in females with occlusion less than 75% equaled with 0.49 which was statistically meaningful (P = 0.42) (Table 2).

Finally, the link between ADI and coronary artery occlusion evaluated via logistic and Gershen tests that in the case of males there was no meaningful difference (P = 0.139), but in females this connection statistically was meaningful (P = 0.016).

With entering the people who suffering from Diabetes, hypertension, hypercholesterolemia, hypertriglyceride, into survey and considering link between ADI with these risk factors, it has been concluded that ADI had no meaningful link with hyperlipidemia, diabetes, hypertension, gender (sex), family background, and cigarette smoking (P > 0.05), while there was a link with age (P = 0.005). As the people was older the index increases as well.

### Discussion

This survey was carried in order to determine the link between ADI, as a criterion for central obesity, and coronary artery occlusion and confirming it as an independent risk factor for Coronary Artery Disease.

In addition to above mentioned matter, the most significant thing was determining the link between ADI with other coronary artery risk factors like diabetes, hypertension, gender (sex), family background and age.

Various researches in considering the link between Anthropometric sizes especially WHR with CAD, its risk factors, its mortality has been done, and the relation between central obesity and them has demonstrated.<sup>17-24</sup>

Of course, all the researches do not confirm the link of WHR and ADI. However, not more researches on the connection between CAD and ADI have been done.

Through an intellectual research on middle aged French men without any sign of CAD there was a connection between these risk factors and their sudden death. In the research of Turkkator and et al, CAD in comparison with other Anthropometric sizes had powerful link with CAD risk factors.<sup>26</sup> In American men, ADI in comparison with WHR and WTR

[waist to thigh ratio] has a powerful relation with sudden coronary death. The coronary artery occlusion risk hasn't been considered yet.<sup>27</sup>

In another research that the link between Anthropometric sizes and the coronary artery occlusion risk in American middle - aged men carried out, on the contrary with our research and in the case of males not any link between ADI and the coronary artery occlusion was discovered. ADI had a good connection with coronary artery occlusion in female.<sup>28</sup>

Kahn et al, via a research on 217 IHD bedridden patients and 261 controls showed that ADI in men and women in proportion to other anthropometric sizes had a powerful link in patient's outcome, and was appropriate as a simple, inexpensive and method for evaluating the mood the IHD patients.

In Kahn's research without Adjustment for age, generation, BMI, the ADI in comparison with WHR had a strength link with sudden death. In this research CAD epidemic and its connection with ADI hadn't been regarded.<sup>29</sup>

In 2005 a research in Isfahan carried out that showed there was a meaningful link between WHR and the coronary artery occlusion in both sexes. This effect was apart from other factors

influencing CAD.<sup>30</sup>

In this research the WHR had link with the coronary artery risks including: hyper Lipidemi, diabetes, hypertension, gender (sex), and age. While in our research Abdominal Diameter Index only had a link with age and had no connection with other risk factors. In our research in the case of male gender there wasn't any remarkable between ADI and Coronary artery occlusion. The link in female gender was only meaningful. While in former research WHR in both sexes had a role as a main risk factor.

According to the findings of this research, generally it seems that in our region, style, nutrition habits, the activities and life style has caused the ADI, to be considered as a risk factor only in female gender, and in male gender there was no remarkable risk. Among the CAD risk factors only the age has a link with this Index.

That is to say that along with aging this Index clearly appears that causes reduction in this Index's preventive value. Also this Index had no meaningful connection with diabetes, hypertension, and hyperlipidemi.

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