1. Introduction
Current understanding and development regarding coronary atherosclerosis are predicated on the understanding of the normal coronary anatomy. There are several postmortem studies regarding dimensions of coronary arteries. However there are only few studies regarding real life dimensions. Size of the coronary artery is an important predictor of outcome after percutaneous coronary interventions (PCI) and coronary artery bypass graft surgery (CABG). Coronary artery dimensions are influenced by age, sex, anatomic variation, left ventricular hypertrophy or dilatation and body mass index. It has been shown that men have larger coronaries than women. Left ventricular hypertrophy and dilated cardiomyopathy are also associated with larger coronaries. Only limited data is available about coronary artery dimensions in an Indian population. The aim of this study was to determine coronary artery dimensions in Rural Indian population with angiographically normal arteries.

2. Method
We studied 179 patients who had coronary angiography and were included in our study. Quantitative coronary angiography dimensions, Body surface area, and reference diameter were assessed. The average weight was 67.16 6.31 kg (range 80.00–48.00 kg), height was 165.18 6.80 cm (range 182.00–139.00 cm) and BMI was 24.59 1.48 kg/m² (range 31.30–21.26 kg/m²). The proximal vessel size in relation to BSA was not statistical significant different between Rural Indians and Caucasians (p value > 0.05). The proximal vessel diameter was indexed to body surface area there was no statistical difference between male and female (p value > 0.05). The computed value of proximal coronary artery diameter unadjusted for individual body surface area, when compared to Caucasians showed that Caucasians have larger coronary artery dimensions than Rural Indians. But when the proximal vessel diameter was indexed to body surface area there was no statistical significant difference between Rural Indians and Caucasians (p value > 0.05).

3. Results: We studied 179 patients out of which 101 were males and 78 females and the mean age of the patients was 51.70 +/- 9.35 years (range 23–76 years). Physical and demographic parameters were assessed. The average weight was 67.16 6.31 kg (range 80.00–48.00 kg), height was 165.18 6.80 cm (range 182.00–139.00 cm) and BMI was 24.59 1.48 kg/m² (range 31.30–21.26 kg/m²). Mean body surface area was 1.75 0.11 m² (range 1.36–1.99 m²).

The right coronary artery was dominant in 59.83%, with co-dominance in 23.14% and left dominance in 17.03%. When the diameter of vessels in males and females was taken together the left main was largest in size followed by proximal LAD, proximal RCA & proximal LCX respectively (3.86 +/- 0.44 mm, 3.12 +/- 0.23 mm, 3.08 +/- 0.37 mm, 2.87 +/- 0.37 mm). When the vessel diameter was indexed to body surface area there was no statistical difference between male and female (p value > 0.05). The computed value of proximal coronary artery diameter unadjusted for individual body surface area, when compared to Caucasians showed that Caucasians have larger coronary artery dimensions than Rural Indians. But when the proximal vessel diameter was indexed to body surface area there was no statistical significant difference between Rural Indians and Caucasians (p value > 0.05).

Conclusions: We found that coronary artery size when indexed to body surface area is not statistically different in Rural Indian males and females as compared to Caucasians. However with a smaller body habitus of Rural Indians have smaller coronary arteries.

Original Research Paper

CORONARY ARTERY DIMENSIONS IN NORMAL RURAL INDIANS

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Background: Diameter of coronary artery is an important predictor of outcome after percutaneous coronary interventions and coronary artery bypass graft surgery. There is very limited data available about coronary artery dimensions in a rural population.

Aims: To study the normal dimensions of the coronary artery segments in Rural Indians without coronary artery disease by using quantitative coronary angiography and also to compare the dimensions in Rural Indians with Western.

Material and method: 179 patients who have undergone coronary angiography with entirely normal coronary angiogram were included in our study.

Results: This study showed the diameter of vessels in males and females when taken together the left main was larger in size followed by proximal LAD, proximal RCA & proximal LCX respectively (3.86 +/- 0.44 mm, 3.12 +/- 0.23 mm, 3.08 +/- 0.37 mm, 2.87 +/- 0.37 mm). When the vessel diameter was indexed to body surface area there was no statistical difference between male and female (p value > 0.05). The computed value of proximal coronary artery diameter unadjusted for individual body surface area, when compared to Caucasians showed that Caucasians have larger coronary artery dimensions than Rural Indians. But when the proximal vessel diameter was indexed to body surface area there was no statistical significant difference between Rural Indians and Caucasians (p value > 0.05).

Conclusions: We found that coronary artery size when indexed to body surface area is not statistically different in Rural Indian males and females as compared to Caucasians. However with a smaller body habitus of Rural Indians have smaller coronary arteries.
Quantitative coronary angiography (QCA) has been developed to assess the coronary artery dimensions in Indians without coronary artery disease using quantitative coronary angiography and also to compare the normal dimensions of the coronary artery segments during life by this prospective study we attempted to establish a database for coronary artery size during life based on visual estimates or thereby vitiating the validity of these observations in estimating preservation, fixation & analysis of the epicardial coronary arteries been the various factors involved in the procurement, weight & lumen size of the coronary arteries have been made from arteries in post mortem studies. Several correlations between heart studies. There have been numerous reports on the size of coronary either injection studies in post mortem specimens or dissection artery anatomy in various studies. Many of these studies were and ethnic/racial factors have all been correlated with the coronary not well understood. Genetic factors undoubtedly play an normal population. The determinants of coronary artery size are 4. Discussion The dimensions of the coronary arteries are highly variable in the normal population. The determinants of coronary artery size are not well understood. Genetic factors undoubtedly play an important role. Age, sex, body weight, BSA, weight of the heart and ethnic/racial factors have all been correlated with the coronary artery anatomy in various studies. Many of these studies were either injection studies in post mortem specimens or dissection studies. There have been numerous reports on the size of coronary arteries in post mortem studies. Several correlations between heart weight & lumen size of the coronary arteries have been made from these studies. The inherent fallacy of these studies has however been the various factors involved in the procurement, preservation, fixation & analysis of the epicardial coronary arteries thereby vitiating, the validity of these observations in estimating the true dimension of coronary arteries.

There have been very few estimates of normal (undiseased) coronary artery size during life based on visual estimates or electronic caliper measurements from cine-angiographic films. In this prospective study we attempted to establish a database for normal dimensions of the coronary artery segments during life by using quantitative coronary angiography and also to compare the dimensions in Indians without coronary artery disease with western estimates of coronary artery size.

Quantitative coronary angiography (QCA) has been developed with the purpose of geometric assessment of epicardial coronary artery abnormalities since visual interpretation of coronary angiograms is inherently flawed & observer dependent. Several studies have validated the accuracy of digital quantitative estimation of coronary dimensions. We applied the principles of quantitative coronary angiography for assessment of angiographically normal coronary artery seg-ments in 179 patients who had undergone cardiac catheterization & angiography for evaluation of symptoms suggestive of coronary artery disease.

Coronary artery size in Indians has been reported to be significantly smaller when compared to that of the western population. This has been attributed to body habitus, build & BSA. Lip et al. reported that though the unadjusted angiographically estimated mean diameters of various coronary artery segments in the western population among Caucasians were higher than those of Indian Asians, there was no statistically significant difference when the same values were compared and expressed as mean coronary artery diameter per unit BSA. They concluded that the smaller size of the coronaries in Indian Asians is attributable to their smaller BSA. Similar findings have been reported by Dhawan et al. who compared the cross sectional coronary area derived from angiographically estimated coronary diameter among Asian and Caucasian patients.

Table 2 Comparative studies showing coronary artery dimensions when indexed to BSA (in mm).

<table>
<thead>
<tr>
<th>Coronary artery</th>
<th>Present study</th>
<th>AIIMS study</th>
<th>Birmingham study</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left main</td>
<td>2.10 +/- 0.23</td>
<td>2.10 +/- 0.23</td>
<td>2.10 +/- 0.23</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>PLAD</td>
<td>1.88 +/- 0.21</td>
<td>1.88 +/- 0.21</td>
<td>1.88 +/- 0.21</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>PLCX</td>
<td>1.70 +/- 0.23</td>
<td>1.70 +/- 0.23</td>
<td>1.70 +/- 0.23</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>PRCA</td>
<td>1.64 +/- 0.22</td>
<td>1.64 +/- 0.22</td>
<td>1.64 +/- 0.22</td>
<td>&gt;0.05</td>
</tr>
</tbody>
</table>

In our study it was found that male patients had statistically significant larger coronary artery dimensions compared to that of females unadjusted for individual BSA (p value < 0.05). When the vessel diameter was indexed to BSA there was no statistical difference between male and female (p value > 0.05). This finding contradicts the traditional belief of females having smaller coronary artery compared to males. Our finding differs from the finding of Elagovan et al. who have found that females have smaller dimension of coronary artery after correction for BSA. Dhall et al. is also studied histomorphic analysis of human coronary arteries and found similar findings. Even O’Connor NJ et al. found that females have smaller coronary artery diameter and related to more perioperative mortality.

The computed value of proximal coronary artery diameter unadjusted for individual body surface area in the present study when compared to Caucasians showed that Caucasians have larger coronary artery dimensions than Rural Indians but when the proximal vessel diameter was indexed to BSA there was no statistical significant difference between Rural Indians and Caucasians (p value > 0.05). This finding is in concordance with the observations of Lip et al.

5. Conclusions We found that the indexed size of coronary arteries in Rural Indian males and females of rural population is the same. The traditional belief of Indians having smaller coronary arteries is not entirely true. We found that coronary artery size when indexed to BSA was not statistically different in Rural Indians as compared to Caucasians. It is also independent of gender. Rural Indians have small size coronary artery because of their smaller body surface area. This has great relevance to the performance and results of interventional procedures like angioplasty and coronary artery bypass graft surgery.
References:


