



# Coronary Angiography Findings in Patients at Robert Wolter Monginsidi Hospital, Manado, Indonesia

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## ABSTRACT

**Background:** Acute coronary syndromes at young age would subsequently lead to morbidity and mortality in productive age. This study was intended to identify coronary angiography findings difference in young and old patients. **Methods:** A descriptive study using medical record of patients who underwent coronary angiography at Robert Wolter Monginsidi Third Level Hospital, Manado, between December 2014 and June 2015 was done. The defined angiography findings in this study is artery with significant stenosis (stenosis  $\geq 70\%$ ) and sum of blood vessels with significant stenosis (vessel score). Patients were categorized into young age group ( $\leq 45$  years old) and old age group ( $> 45$  years old). Results were presented in descriptive tables. **Results:** Among 133 patients, stenosis was mainly found in left anterior descending artery (LAD) in both groups (37.5% in young age and 72.6% in old age group). No significant stenosis in left main coronary artery (LMCA) in young age group whereas there were 10.3% cases in old age group. Normal/ non – significant angiograms were higher in young age group compared to old age group (62.5% versus 20.5%). The proportion of patients with triple-vessel disease were higher in old age group compared to young age group (27.4% versus 6.3%). **Conclusion:** LAD artery stenosis was the most common stenosis found in both groups. Most patients in young age group had normal angiograms, whereas old age group had a higher percentage of triple-vessel disease and stenosis in LMCA.

**Keywords:** Acute coronary syndrome, coronary angiography, stenosis, young adult

## ABSTRAK

**Latar Belakang:** Sindrom koroner akut di usia muda akan menyebabkan morbiditas dan mortalitas pada usia produktif. Studi ini bertujuan untuk mengetahui perbedaan gambaran angiografi koroner pada pasien berusia muda dan tua. **Metode:** Studi deskriptif data rekam medik pasien yang menjalani angiografi koroner di Rumah Sakit Tingkat III Robert Wolter Monginsidi Manado, dari Desember 2014 hingga Juni 2015. Pasien dibagi menjadi kelompok usia muda ( $\leq 45$  tahun) dan kelompok usia tua ( $> 45$  tahun). Gambaran angiografi yang dicatat adalah arteri dengan penyempitan signifikan (stenosis  $\geq 70\%$ ) dan jumlah pembuluh darah yang mengalami penyempitan signifikan (skor pembuluh darah). Hasil disajikan secara deskriptif. **Hasil:** Dari 133 pasien, penyempitan yang paling banyak dijumpai adalah *left anterior descending artery* (LAD) (37,5% pada kelompok usia muda dan 72,6% pada kelompok usia tua). Penyempitan signifikan *left main coronary artery* (LMCA) tidak ditemukan di kelompok usia muda, sedangkan di kelompok usia tua terdapat pada 10,3% kasus. Angiogram normal/ non – signifikan lebih banyak pada kelompok usia muda dibandingkan kelompok usia tua (62,5% berbanding 20,5%). *Triple-vessel disease* lebih sering dijumpai pada kelompok usia tua dibandingkan kelompok usia muda (27,4% berbanding 6,3%). **Simpulan:** LAD merupakan arteri koroner yang paling banyak mengalami penyempitan di kedua kelompok. Mayoritas kelompok usia muda memiliki angiogram normal, kelompok usia tua memiliki persentase *triple-vessel disease* dan penyempitan LMCA lebih tinggi. **Kurniawan, Daniela Angeline, Janry Antonius Pangemanan. Gambaran Hasil Angiografi Koroner Pasien di Rumah Sakit Robert Wolter Monginsidi, Manado, Indonesia**

**Kata kunci:** Angiografi koroner, sindrom koroner akut, stenosis, usia muda

## INTRODUCTION

Cardiovascular disease is the leading cause of death in the world. In 2008 there were approximately 17.3 million deaths and 7.3 million of them were due to coronary heart disease (CHD).<sup>1</sup> CHD is the leading cause of death in the  $\geq 60$  years old age group, is

also the second highest cause of death in the 15 – 59 years age group.<sup>2</sup> In the last decade, cardiovascular disease increased up to two-fold in low to medium economic country.<sup>1,3</sup> In 2001, 26% of deaths in Indonesia was caused by CHD and the number is likely to increase.<sup>4</sup>

Data showed an increase of CHD incidence amongst young aged patients.<sup>3,5-8</sup> Approximately 5 – 10% incidence of myocardial infarction occurs in  $< 46$  years old.<sup>9</sup> Increased prevalence of smoking, dyslipidemia, alcohol and drugs abuse, together with sedentary lifestyle are risk factors for CHD in young

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age, besides conventional risk factors, such as hypertension, diabetes mellitus, and obesity.<sup>1,3,5-11</sup> In Southeast Asia, the incidence of acute myocardial infarction (AMI) in < 40 year-olds is 7%, the world's highest are found in Middle East countries with 11.2% followed by African and South Asian countries with 9.7% and 8.9%, respectively.<sup>3</sup> Younger age and atypical symptoms cause misdiagnosis of CHD; subsequently give lower incidence rate than actual figure.<sup>6</sup>

CHD in young patients has a shorter hospital stay, lower mortality rate, and has better outcomes after revascularization compared to older patients.<sup>5,9,12,13</sup> CHD mortality rate in patients aged < 45 years old ranged from 2.1 – 14.6 per 100,000 for male and 2 per 100,000 for female.<sup>14</sup> However, uncontrolled risk factors will lead to significant morbidity and mortality.<sup>6</sup>

Indonesia still lack adequate data on coronary artery disease in young adults, this study was intended to determine the prevalence and difference of coronary angiography findings among young and old patients.

### METHODS

This is a descriptive cross-sectional study using secondary data from patients who underwent coronary angiography at Robert Wolter Monginsidi Third Level Hospital, Manado, North Sulawesi between December 2014 and June 2015. Exclusion criteria is patients with unavailable/incomplete medical record. Patients were categorized into two age groups, ≤ 45 years old (young age group) and > 45 years old (old age group).<sup>8,9,12,15</sup>

**Table 1.** Patients' characteristics

Characteristics	N = 133	%
<b>Sex</b>		
Male	99	74.4
Female	34	25.6
<b>Age Group</b>		
≤ 45 years old	16	12.0
> 45 years old	117	88.0
<b>Artery Distribution</b>		
Right Dominant	95	71.4
Co-dominant	34	25.6
Left Dominant	4	3.0

Lumen stenosis of > 50% at the Left Main Coronary Artery (LMCA) was considered significant, whereas ≥ 70 % stenosis at the Left Anterior Descending Artery (LAD), Left Circumflex Artery (LCX), or Right Coronary Artery (RCA) was considered significant.<sup>15,16</sup> Vessel score was defined as the number of blood vessels with ≥ 70% stenosis, based on the number of coronary arteries with significant stenosis, LMCA not included.<sup>15</sup> Normal angiography / non-significant CAD indicated that there was no coronary artery with ≥ 70% stenosis. Single vessel disease (1VD) indicated that there was 1 coronary artery with stenosis ≥ 70%, double vessel disease (2VD) showed that there were 2 coronary arteries with stenosis ≥ 70%, and triple vessel disease (3VD) indicated that there were 3 coronary arteries with stenosis ≥ 70%.

Data was analyzed descriptively using SPSS 15.0 for Windows, presented in tables and charts.

### RESULTS

A total of 136 patients underwent coronary angiography at Robert Wolter Monginsidi Third Level Hospital, Manado, North Sulawesi between December 2014 and June 2015, only 133 patients had complete data needed and were included in this study.

From the 133 patients, 99 (74.4%) male, the youngest was 28 years old and the oldest was 84 years old with mean age 59.98 ± 11.59 years old (**Table 1**).

The majority of patients (71.4%) had coronary artery with right dominant distribution. The most significant stenosis was LAD (91 cases -

68.4%), followed by RCA with 59 cases (44.4%) and LCX with 52 cases (39.1%), 12 cases (9.0%) with significant stenosis at LMCA.

Patients were categorized into two groups, 16 (12.0%) patients were ≤ 45 years old and 117 (88.0%) patients were > 45 years old. There were 10 (62.5%) male and 6 (37.5%) female in the young age group, and 89 (76.1%) male and 28 (23.9%) female in the old age group.

Angiography findings described in this study is the artery with significant stenosis and the number of blood vessels with significant stenosis (vessel score). Most stenosis was found in LAD in both groups, 37.5% in ≤ 45 years old and 72.6% in > 45 years old. No significant stenosis in LMCA was found in young age group, while significant LMCA stenosis was found in 10.3% among old age group (**Table 2**).

A proportion of 62.5% patients in the group age ≤ 45 years old had normal/ non-significant angiography results, whilst in the group age > 45 years old there were only 20.5% cases. The proportion of patients with triple vessel disease in the old age group was higher than the young age group, i.e. 27.4% versus 6.3%, respectively (**Table 3**).

### DISCUSSION

The percentage of young patients in this study is 12.0%, whereas at Cipto Mangunkusumo Hospital, Jakarta was 22.4%.<sup>15</sup> These results is higher than in Thailand<sup>9</sup> (5.8%) or Japan<sup>7</sup> (1.6%). The most significant stenosis in both groups was found mostly in LAD : 37.5% in young age group and 72.6% in old age group. Some studies have also found that the most

**Table 2.** Coronary artery stenosis distribution based on age group

Lesion Location	Age Group			
	≤ 45 years old (N=16)		> 45 years old (N=117)	
	n	%	n	%
LMCA - Left Main Coronary Artery	0	0	12	10.3
L A D - Left Anterior Descending Artery	6	37.5	85	72.6
LCX - Left Circumflex Artery	2	12.5	50	42.7
RCA- Right Coronary Artery	3	18.8	56	47.9

**Table 3.** Vessel score based on age group

Vessel Score	Age Group			
	≤ 45 years old (N = 16)		> 45 years old (N = 117)	
	n	%	n	%
Normal/ Non – significant CAD*	10	62.5	24	20.5
Single vessel disease	2	12.5	27	23.1
Double vessel disease	3	18.8	34	29.1
Triple vessel disease	1	6.3	32	27.4

\*Coronary artery disease



frequent significant stenosis was in LAD.<sup>8,12,15</sup>

This study showed that 62.5% in young age group had normal/ non-significant angiograms, this result was consistent with other studies, Alizadehasl, *et al*,<sup>15</sup> found most (43.8%) young patients had normal angiograms and Tungsubutra, *et al*,<sup>9</sup> found that non-significant CAD was higher in the young patients. But other studies found 1VD was the most frequent compared to normal angiogram in young age group.<sup>7,8,15</sup> Similar results was shown by other studies with different age limitation.<sup>5,7,11</sup> The difference of these results can be caused by the different definitions of significant obstruction on angiography. Normal angiography result indicated that ACS in young age may be caused by non-atherosclerosis causes. Approximately, 20% of CHD in young adults is not associated with coronary artery atherosclerosis.<sup>17</sup> It was presumably caused by embolism, anomaly, coronary vasospasm, thrombosis, coronary trauma, or hypercoagulable state.<sup>6,15,17</sup> High prevalence of smoking in young age was suspected to be related to thrombosis and vasospasm which subsequently play a major role in the pathogenesis of coronary obstruction in young patients.<sup>7</sup>

The  $\leq 45$  year-old group also had lower percentage of 3VD (6.3%) compared to  $> 45$  year-old group (27.4%). This result was similar

to other studies.<sup>8,15,18</sup> Higher percentage of normal / non-significant angiogram and 1VD in young age group showed less severe and less extensive coronary artery disease.<sup>17</sup> Atherosclerosis is a gradually evolving process begins in youth and continues to progress over time.<sup>17,19</sup> Other studies also found less diffuse atherosclerotic lesion in young patients compared to older age group.<sup>8,4,15,18</sup> Schoenenberger *et al* found a higher prevalence of cardiovascular risk factors in patient aged  $> 35$  years compared to patients aged  $\leq 35$  years (dyslipidemia 57.1% and 44.0%, hypertension 57.7% and 17.8%, also diabetes 20.0% and 6.3%, respectively).<sup>18</sup> Atherosclerosis progression is accelerated by risk factors, led to increased risk of CVD event in older age.<sup>20</sup> Berry, *et al*, found that patients with high lifetime risk had higher coronary artery calcium prevalence (16.6% versus 9.8% in men; 7.1% versus 2.3% in women), and significantly greater incidence of coronary artery calcium progression (22.3% versus 15.4% in men; 8.7% versus 5.3% in women) compared to patients with low lifetime risk.<sup>19</sup> Tomizawa, *et al*, showed that diabetes mellitus was highly related with obstructive and extensive CAD with Odd Ratio (OR) 12.0 (95% CI 6.1–24.4), while dyslipidemia and hypertension are also related to obstructive CAD with OR 4.4 (95% CI 2.4–8.3) and 5.7 (95% CI 3.4–10.3), compared to patient with no disease.<sup>21</sup> The duration of disease also affects

the severity and the extent of coronary artery disease, Srinivasan, *et al*, showed a higher mean syntax score, vessel score, and coronary collateral grade in patients with duration of diabetes between 5 and 10 years compared to patients with duration of diabetes less than 5 years.<sup>22</sup>

The limitations of this study are the relatively small number of subjects, especially in the young age group, lack of distinct secondary datas, such as the risk factors for coronary CHD, electrocardiography results, and patients' clinical manifestations. Further study is needed to find the risk factors and CHD characteristics in young patients in Indonesia.

### Conclusion

LAD artery stenosis was the most common stenosis found in both groups. The majority in young age group had normal angiography results. The old age group had higher percentage of triple vessel disease and stenosis in LMCA.

### Conflict of interest

All authors have no conflict of interest.

### Acknowledgments

The authors thank Adi Sugih Arto, MD, director of R.W. Monginsidi Hospital and all staff of R.W. Monginsidi Hospital catheterization laboratory for the support in this study.

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