Dyslipidemia Fact Sheets in Korea from the Korean Society of Lipid and Atherosclerosis (KSoLA)

The rapid economic development in Korea has led to significant changes in lifestyle and dietary habits, resulting in marked increase in chronic disease prevalence including dyslipidemia, hypertension, and diabetes. The Korean Society of Lipid and Atherosclerosis (KSoLA) is a nonprofit organization founded in 2001 from merging the Korean Society of Lipidology with the Korean Association for the Study of Atherosclerosis. The mission of our society is to prevent and to treat atherosclerotic cardiovascular disease and to improve public awareness on the importance of its management. In order to accomplish our mission, the KSoLA has developed the 3rd dyslipidemia fact sheets on the prevalence and management of dyslipidemia in Korea. Data in our fact sheets were based on the 2007-2018 Korea National Health and Nutrition Examination Survey (KNHANES) of the Korea Centers for Disease Control and Prevention (KCDC) and the National Health Insurance Service. In this edition, we have extended the analysis from the previous 2012-2016 to 2007-2018, modified the definitions of hypercholesterolemia and hyper-LDL-cholesterolemia, and analyzed independent of the hypertension and diabetes societies. We hope our nationwide statistics will increase the public awareness of dyslipidemia. Our mission can only be accomplished by active collaboration with healthcare professionals, and we strongly believe that the dyslipidemia fact sheets can foster our mission in public education.

President,
Sang Hong Baek

Chairman,
Joong-Yeol Park
## Contents

2 Dyslipidemia Fact Sheets in Korea from the Korean Society of Lipid and Atherosclerosis (KSoLA)

4 **Prevalence and Management of Hypercholesterolemia**
   5 Prevalence of Hypercholesterolemia
   8 Awareness Rate of Hypercholesterolemia
   9 Treatment Rate of Hypercholesterolemia
   10 Control Rates of Hypercholesterolemia

12 **Dyslipidemia in Korea, 2020**
   13 Lipid Profile in Korean Adults
   14 Prevalence of Dyslipidemia
   16 Prevalence of Hyper-LDL-cholesterolemia
   18 Prevalence of Hypertriglyceridemia
   20 Prevalence of Hypo-HDL-cholesterolemia
   22 Dyslipidemia in Adults with Obesity
   23 Dyslipidemia in Adults with Diabetes
   24 Dyslipidemia in Adults with Hypertension

25 **Treatment for Dyslipidemia**
   26 Treatment for Dyslipidemia
   28 Treatment for Hypertension and Diabetes Among Persons Treated for Dyslipidemia
   30 Changes in Prescriptions of Lipid-Lowering Drugs
   34 Changes in Monotherapy Regimen
   36 Changes in Dual Therapy Regimen

38 Summary and Conclusion
Prevalence and Management of Hypercholesterolemia

Definitions
Hypercholesterolemia was defined as total cholesterol ≥240 mg/dL or taking lipid-lowering drugs.

Data source
The estimates were derived from the 2007-2018 Korea National Health and Nutrition Examination Survey (KNHANES) and the National Health Insurance Service.

Subjects
Adults 20 years or older
Prevalence of Hypercholesterolemia


- Total, age-standardized*

* Age-standardized to 2005 population
Prevalence of Hypercholesterolemia


Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
In 2018, the prevalence of hypercholesterolemia in adults 20 years or older was 20.7%. "Nearly 1 out of 5 adults has hypercholesterolemia."


[Graph showing prevalence rates from 2007 to 2018]

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
Awareness Rate of Hypercholesterolemia

The awareness rate of hypercholesterolemia is 57.6%.

“Four out of 10 adults with hypercholesterolemia are unaware of their condition.”

Data source: Korea National Health and Nutrition Examination Survey [KNHANES] 2007-2018 / Age 20+ years
Treatment Rate of Hypercholesterolemia

Treatment rate

(%)  

Men  Women  Total

100

80

60

40

20

0


The treatment rate among adults with hypercholesterolemia is 48.1%. “Less than half of adults with hypercholesterolemia take medications.”

Data source: Korea National Health and Nutrition Examination Survey [KNHANES] 2007-2018 / Age 20+ years
Control Rates of Hypercholesterolemia

Control Rate among Adults with Hypercholesterolemia

[Graph showing control rates among adults with hypercholesterolemia from KNHANES IV (2007-2009) to KNHANES VII (2016-2018) for Men, Women, and Total.]

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
The control rate among adults with hypercholesterolemia is 41.3% for target total cholesterol level <200 mg/dL.

*Only 2 out of 5 adults with hypercholesterolemia achieve target cholesterol level.*

However, the control rate among adults treated for hypercholesterolemia is 84.1%.

**Control Rate among Adults Treated for Hypercholesterolemia**

<table>
<thead>
<tr>
<th>(%)</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>78.6</td>
<td>68.2</td>
<td>72.4</td>
</tr>
<tr>
<td>70</td>
<td>78.9</td>
<td>78.5</td>
<td>78.7</td>
</tr>
<tr>
<td>60</td>
<td>81.9</td>
<td>85.9</td>
<td>84.4</td>
</tr>
<tr>
<td>50</td>
<td>88.4</td>
<td>82.7</td>
<td>84.1</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
Dyslipidemia in Korea, 2020

Definitions
Hyper-low-density lipoprotein (LDL)-cholesterolemia was defined as serum LDL-cholesterol ≥160 mg/dL or taking lipid-lowering drug.
Hypo-high-density lipoprotein (HDL)-cholesterolemia was defined as serum HDL-cholesterol <40 mg/dL.
Hypertriglyceridemia was defined as serum triglyceride ≥200 mg/dL.

Dyslipidemia was defined as satisfying one of the definitions stated above.

Data source
The estimates were derived from the 2007-2018 Korea National Health and Nutrition Examination Survey (KNHANES) and the National Health Insurance Service.

Subjects
Adults 20 years or older
The mean serum total cholesterol levels in adults aged 20 years or older are 192 mg/dL in men and 194 mg/dL in women.
Prevalence of Dyslipidemia

Prevalence by Sex

Men
45.6%

Women
31.3%

Prevalence by Sex and Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>20~29</td>
<td>26.6</td>
<td>10.2</td>
</tr>
<tr>
<td>30~39</td>
<td>40.8</td>
<td>14.7</td>
</tr>
<tr>
<td>40~49</td>
<td>53.4</td>
<td>21.7</td>
</tr>
<tr>
<td>50~59</td>
<td>52.5</td>
<td>41.0</td>
</tr>
<tr>
<td>60~69</td>
<td>54.1</td>
<td>55.4</td>
</tr>
<tr>
<td>70+</td>
<td>52.5</td>
<td>46.7</td>
</tr>
</tbody>
</table>

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018
Four out of 10 adults aged 20 years or older have dyslipidemia. “About 5 out of 10 men and 3 out of 10 women have dyslipidemia.”
Prevalence of Hyper-LDL-cholesterolemia

Prevalence by Sex

Men: 17.4%

Women: 21.0%

Prevalence by Sex and Age (%)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>20~29</td>
<td>6.8</td>
<td>4.0</td>
</tr>
<tr>
<td>30~39</td>
<td>6.8</td>
<td>11.5</td>
</tr>
<tr>
<td>40~49</td>
<td>10.9</td>
<td>17.8</td>
</tr>
<tr>
<td>50~59</td>
<td>24.0</td>
<td>30.8</td>
</tr>
<tr>
<td>60~69</td>
<td>25.7</td>
<td>43.7</td>
</tr>
<tr>
<td>70+</td>
<td>23.5</td>
<td>38.8</td>
</tr>
</tbody>
</table>

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018
The prevalence of hyper-LDL-cholesterolemia among adults aged 20 years or older is 19.2%. It increases with age, where 1 out of 4 men and 2 out of 5 women aged 60 years or older have hyper-LDL-cholesterolemia.

“The prevalence of hyper-LDL-cholesterolemia is 3 times higher in women in their 50s than in their 40s.”

Prevalence by Age (Total)

Total

19.2%

Age 20+ years
Prevalence of Hypertriglyceridemia

Prevalence by Sex

Men
22.4%

Women
9.7%

Prevalence by Sex and Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>20~29</td>
<td>4.5</td>
<td>12.0</td>
</tr>
<tr>
<td>30~39</td>
<td>6.9</td>
<td>23.6</td>
</tr>
<tr>
<td>40~49</td>
<td>7.9</td>
<td>32.0</td>
</tr>
<tr>
<td>50~59</td>
<td>12.4</td>
<td></td>
</tr>
<tr>
<td>60~69</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>70+</td>
<td>13.4</td>
<td></td>
</tr>
</tbody>
</table>

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018
The prevalence of hypertriglyceridemia among adults aged 20 years or older is 16.1%. “Among adults 40–49 years, the prevalence of hypertriglyceridemia is 4 times higher in men than in women.”

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–29</td>
<td>8.5</td>
</tr>
<tr>
<td>30–39</td>
<td>15.7</td>
</tr>
<tr>
<td>40–49</td>
<td>20.1</td>
</tr>
<tr>
<td>50–59</td>
<td>19.4</td>
</tr>
<tr>
<td>60–69</td>
<td>17.4</td>
</tr>
<tr>
<td>70+</td>
<td>12.5</td>
</tr>
</tbody>
</table>
Prevalence of Hypo-HDL-cholesterolemia

Prevalence by Sex

Men
25.3%

Women
10.0%

Prevalence by Sex and Age

[ % ]

60

50

40

30

20

10

0

20~29
30~39
40~49
50~59
60~69
70+

(age)

Data source: Korea National Health and Nutrition Examination Survey [KNHANES] 2007-2018
The prevalence of hypo-HDL-cholesterolemia among adults aged 20 years or older is 17.7%.

“In women, the prevalence of hypo-HDL-cholesterolemia is twice as high in their 50s than in their 30s.”
Dyslipidemia in Adults with Obesity

Even within normal body mass index (18.5-22.9 kg/m²), 1 out of 4 adults has dyslipidemia.
Three out of 5 adults with abdominal obesity have dyslipidemia.
“About half of overweight or obese adults have dyslipidemia.”

Abdominal obesity is defined as waist circumference ≥90 cm for men and ≥85 cm for women.

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
Dyslipidemia in Adults with Diabetes

“The prevalence of dyslipidemia in adults with diabetes is 2 times higher than that of the adults without diabetes.”

Diabetes is defined as fasting plasma glucose ≥126 mg/dL, previously diagnosed, or taking glucose-lowering drugs.

Data source: Korea National Health and Nutrition Examination Survey [KNHANES] 2007-2018 / Age 20+ years
Dyslipidemia in Adults with Hypertension

"The prevalence of dyslipidemia in adults with hypertension is 1.8 times higher than that of the adults without hypertension."

Hypertension is defined as systolic/diastolic blood pressure ≥140/90 mmHg or taking antihypertensive medication.

Data source: Korea National Health and Nutrition Examination Survey (KNHANES) 2007-2018 / Age 20+ years
Treatment for Dyslipidemia

Definitions
Diagnosis of dyslipidemia is defined as ≥1 health insurance claim for dyslipidemia diagnosis (ICD-10 code E78) each year. Treatment is defined as ≥1 health insurance claim for dyslipidemia diagnosis and lipid-lowering drug prescription each year. Adherence to treatment is defined as the condition wherein lipid-lowering drugs were prescribed more than 290 days (80%) each year.

Data source
National Health Insurance Big Data 2002-2018

Subjects
Adults 20 years or older
Treatment for Dyslipidemia

Estimated Number of People Diagnosed, Treated, and Adherent to Treatment for Dyslipidemia

(Data source: National Health Insurance Big Data 2002-2018)
About 11.5 million Korean adults had dyslipidemia in 2018. The number of people adherent to treatment has markedly increased (60 times) over the last 16 years.

“Two out of 5 people with dyslipidemia adhere to lipid-lowering drugs.”
Treatment for Hypertension and Diabetes Among Persons Treated for Dyslipidemia

Estimated Number of People Treated for Dyslipidemia plus Hypertension and/or Diabetes

(×1000 persons)
8,000

2018

7,694

Treated for dyslipidemia (Total 100%)

1,988 (25.8%)
1,732 (22.5%)
853 (11.1%)
3,122 (40.6%)

Data source: National Health Insurance Big Data 2002-2018
Three out of 5 people treated for dyslipidemia take antihypertensive medications. One third of the people treated for dyslipidemia also take glucose-lowering drugs. “Three out of 4 people treated for dyslipidemia are concurrently treated for hypertension or diabetes.”
Changes in Prescriptions of Lipid-Lowering Drugs

Estimated Number of People With Dyslipidemia by Lipid-Lowering Drugs

2018
7,694 Treated for dyslipidemia (Total 100%)

- Statin 91.8%
- Ezetimibe 14.6%
- Fibrates 8.5%
- Omega-3 acid 5.9%
- Other <0.1%

Data source: National Health Insurance Big Data 2002-2018
Statins constitute 90% of pharmacological treatment for dyslipidemia. Number of people taking ezetimibe has been increasing since 2015 up to 14.6% in 2018. "Nine out of 10 people treated for dyslipidemia take statins."
Changes in Prescriptions of Lipid-Lowering Drugs

Estimated Number of People With Dyslipidemia by Treatment Strategy

(Data source: National Health Insurance Big Data 2002-2018)
Four out of 5 people treated for dyslipidemia take one lipid-lowering drug. Use of dual therapy is steadily increasing up to 18.6% in 2018. Proportion of triple therapy was only 1.1% in 2018. “In 2018, the proportion of monotherapy, dual therapy and triple therapy, respectively, was 80.3%, 18.6% and 1.1%.”
Changes in Monotherapy Regimen

Estimated Number of People Receiving Monotherapy by Lipid-Lowering Drugs

Data source: National Health Insurance Big Data 2002-2018
Most people (90%) receiving monotherapy took statins in 2018.

Age 20+ years
Changes in Dual Therapy Regimen

Estimated Number of People Receiving Dual Therapy by Lipid-Lowering Drugs

(x1000 persons)

2,000

1,500

1,000

500

0 6 0 0 6
0 <1 0 0 <1
0 7 9 13 18

32 17 6 9

2002 2003 2004 2005 2006 2007 2008 2009

Data source: National Health Insurance Big Data 2002-2018
Statins are included in 99% of dual therapy regimen. Statin plus ezetimibe was the most frequently used combination, accounting for 72% of dual therapy in 2018.
Summary and Conclusion

- In Korea, 2 out of 5 Korean adults aged 20 years or older have dyslipidemia. About 5 out of 10 men and 3 out of 10 women have dyslipidemia. The prevalence of dyslipidemia has increased with age in both sexes but more prominently in men aged 40 years or older and in women aged 50 years or older.
- The number of people adherent to lipid-lowering drugs has markedly increased (60 times) over the last 16 years. However, only 2 out of 5 people with dyslipidemia adhere to lipid-lowering drugs.
- One out of 5 adults aged 20 years or older has hyper-LDL-cholesterolemia, affecting more women than men. The prevalence has increased with age in both sexes. The proportion of women with hyper-LDL-cholesterolemia in their 50s is 3 times higher than that in their 40s.
- The prevalence of hypertriglyceridemia and hypo-HDL-cholesterolemia in men is approximately twice as high as that in women. Especially, the proportion of men with hypertriglyceridemia in their 40s is 4 times higher than that of women in the same age group.
- One out of 4 adults with normal body weight (BMI 18.5-22.9 kg/m²) has dyslipidemia. Three out of 5 adults with abdominal obesity and about half of overweight or obese adults have dyslipidemia.
- Two out of 3 people with diabetes have dyslipidemia, being twice as more common among people with diabetes than among non-diabetic adults. Nearly 9 out of 10 people with diabetes have dyslipidemia using a lower LDL-C cutoff of 100 mg/dL.
- Half of people with hypertension have dyslipidemia. The prevalence is 1.8 times higher among people with hypertension than among normotensive adults. Using a LDL-C cutoff of 130 mg/dL, the prevalence of dyslipidemia among people with hypertension is approximately 70%.
- Three out of 5 people treated for dyslipidemia take antihypertensive medications. One third of people treated for dyslipidemia takes glucose-lowering drugs. Taken together, 3 out of 4 people treated for dyslipidemia are concurrently treated for hypertension or diabetes.
- Statins constitute 90% of pharmacological treatment for dyslipidemia. Use of dual therapy for dyslipidemia steadily increased up to 18.6% in 2018. Statin plus ezetimibe was the most frequently used combination, accounting for 72% of dual therapy in 2018.
<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chairman</td>
<td>Joong-Yeol Park</td>
<td>University of Ulsan</td>
</tr>
<tr>
<td>Secretary General</td>
<td>Woo Je Lee</td>
<td>University of Ulsan</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Jae Hyeon Kim</td>
<td>Sungkyunkwan University</td>
</tr>
<tr>
<td>Director, Planning Committee</td>
<td>Sung Rae Kim</td>
<td>The Catholic University of Korea</td>
</tr>
<tr>
<td>Director, Scientific Committee</td>
<td>Cheol-Young Park</td>
<td>Sungkyunkwan University</td>
</tr>
<tr>
<td>Director, Publication Committee</td>
<td>Jaetaek Kim</td>
<td>Chung-Ang University</td>
</tr>
<tr>
<td>Director, Public Relations Committee</td>
<td>Soon Jun Hong</td>
<td>Korea University</td>
</tr>
<tr>
<td>Director, International Liaison Committee</td>
<td>Kee Ho Song</td>
<td>Konkuk University</td>
</tr>
<tr>
<td>Director, Insurance and Legislation Committee</td>
<td>Wang-Soo Lee</td>
<td>Chung-Ang University</td>
</tr>
<tr>
<td>Director, Education Committee</td>
<td>Sang-Hak Lee</td>
<td>Yonsei University</td>
</tr>
<tr>
<td>Director, Clinical Practice Guideline Committee</td>
<td>In-Kyung Jeong</td>
<td>Kyung Hee University</td>
</tr>
<tr>
<td>Director, Clinic Research Committee</td>
<td>Ki Hoon Han</td>
<td>University of Ulsan</td>
</tr>
<tr>
<td>Director, Basic Research Committee</td>
<td>Goo Taeg Oh</td>
<td>Ewha Womans University</td>
</tr>
<tr>
<td>Director, Food and Nutrition Committee</td>
<td>Jeongseon Kim</td>
<td>National Cancer Center</td>
</tr>
<tr>
<td>Director without Portfolio</td>
<td>Kyung Woo Park</td>
<td>Seoul National University</td>
</tr>
<tr>
<td></td>
<td>Young Mi Park</td>
<td>Ewha Womans University</td>
</tr>
<tr>
<td></td>
<td>Byung Wan Lee</td>
<td>Yonsei University</td>
</tr>
<tr>
<td>Auditor</td>
<td>Sang-Hyun Kim</td>
<td>Seoul National University</td>
</tr>
<tr>
<td></td>
<td>Jin Han</td>
<td>Inje University</td>
</tr>
<tr>
<td><strong>2020 President</strong></td>
<td>Sang Hong Baek</td>
<td>The Catholic University of Korea</td>
</tr>
<tr>
<td><strong>2020 Vice-president</strong></td>
<td>Goo Taeg Oh</td>
<td>Ewha Womans University</td>
</tr>
<tr>
<td><strong>Public Relations Committee</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Director</td>
<td>Soon Jun Hong</td>
<td>Korea University</td>
</tr>
<tr>
<td>Secretary</td>
<td>Hyung Joon Joo</td>
<td>Korea University</td>
</tr>
<tr>
<td>Members</td>
<td>Si-Hyuck Kang</td>
<td>Seoul National University</td>
</tr>
<tr>
<td></td>
<td>Hun-Jun Park</td>
<td>The Catholic University of Korea</td>
</tr>
<tr>
<td></td>
<td>Ji Cheol Bae</td>
<td>Sungkyunkwan University</td>
</tr>
<tr>
<td></td>
<td>So Young Bu</td>
<td>Daegu University</td>
</tr>
<tr>
<td></td>
<td>Sunghwan Suh</td>
<td>Dong-A University</td>
</tr>
<tr>
<td></td>
<td>Jihyun Ahn</td>
<td>Korea Medical Institute</td>
</tr>
<tr>
<td></td>
<td>Jong Shin Woo</td>
<td>Kyung Hee University</td>
</tr>
<tr>
<td></td>
<td>Sunki Lee</td>
<td>Hallym University</td>
</tr>
<tr>
<td></td>
<td>Eun Young Lee</td>
<td>The Catholic University of Korea</td>
</tr>
<tr>
<td></td>
<td>Chan Joo Lee</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>Jong Chul Won</td>
<td>Inje University</td>
</tr>
<tr>
<td></td>
<td>Han Saem Jeong</td>
<td>Korea University</td>
</tr>
<tr>
<td>Visiting Members</td>
<td>Hyeon Chang Kim</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>Hokyou Lee</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>Hyeok-Hee Lee</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>Jongmin Baek</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>So Mi Jemma Cho</td>
<td>Yonsei University</td>
</tr>
<tr>
<td></td>
<td>Ji Eun Heo</td>
<td>Yonsei University</td>
</tr>
</tbody>
</table>
DYSLIPIDEMIA
FACT SHEETS
IN KOREA, 2020

Updated version of ‘Dyslipidemia Fact Sheets in Korea, 2020’ is available
Online at www.lipid.or.kr
Copyright © 2020 the Korean Society of Lipid and Atherosclerosis.