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Consensus Clinical Recommendations for the Management of Dyslipidaemia in the African Population

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A B S T R A C T

Context: While there are many international guidelines on the management of dyslipidaemia, there is lack of clinical recommendations for the management of dyslipidaemia in the African population, considering its increasing prevalence and unique regional disparities. **Objective:** The objective of this consensus document was to provide original recommendations on dyslipidaemia management and to find gaps in the treatment and opportunities for improved lipid control for the population of Ivory Coast, West Africa. **Design:** A multidisciplinary panel of regional experts was convened and reached an original consensus on the clinical management of dyslipidaemia in the African population in February 2023. **Methods:** A panel of 12 experts in the fields of cardiology, endocrinology, and nephrology was formed from Ivory Coast, West Africa. The panel discussed a questionnaire based on existing guidelines. Recommendations were constructed in accordance with local and regional clinical practices. **Results:** The panel made recommendations on the diagnosis and management of dyslipidaemia in patients at risk for diabetes and cardiovascular disease in the Ivory Coast population. Atorvastatin was recommended as a high-intensity statin to reduce low-density lipoprotein cholesterol by more than 50% of clinicians. Additionally, recommendations were made on statin therapy in patients with atherosclerotic cardiovascular disease, diabetes, and chronic kidney disease. **Conclusion**: Regional practitioners, in addition to adhering to dyslipidaemia-management guidelines, need to consider dietary and lifestyle behaviours when formulating management strategies for dyslipidaemia. Clinicians must work with patients to create customised therapies. Greater consensus among regional experts across Africa can create a unified approach for the entire region.

Keywords: dyslipidaemia, clinical recommendations, cardiology, endocrinology, nephrology, atorvastatin

A R T I C L E I N F O

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Contents

1. Introduction

Dyslipidaemia refers to elevated levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and triglycerides (TG), and low levels of high-density lipoprotein cholesterol (HDL-C), or a combination of these.[1] Dyslipidaemia is a known risk factor for coronary artery disease, ischaemic heart disease and ischaemic stroke in both the developed and the developing world.[1] Cardiovascular diseases (CVDs) cause 13% of all deaths in the Sub-Saharan African population. Moreover, ischaemic heart disease is the leading cause of CVD mortality, followed by stroke and hypertension.[2]

As per a meta-analysis conducted in South Africa and published in 2021, the national prevalence of coronary heart disease and stroke was found to be 1.29% and 4.29% respectively, however, data on prevalence and incidence of these conditions based on population group, gender, and rural/urban residence is lacking.[3]

Due to rapid economic growth, changes in dietary patterns, and unhealthy lifestyle habits, the prevalence of dyslipidaemia has increased in low-income countries as well, such as those in the African sub-continent. Dyslipidaemia management requires special consideration of comorbidities while deciding the treatment to achieve the target lipid levels. As per a meta-analysis conducted in 2018, the prevalence of dyslipidaemia was 34.4% in patients with diabetes mellitus (DM), and 38% in patients with hypertension. The prevalence of low HDL-C concentrations was 39.5% in patients with DM.[4]

Major regional disparities are evident in the data for prevalence of dyslipidaemia. However, in the case of gender-wise distribution, there is an equal distribution of patients with dyslipidaemia observed between women and men.[4]

Multiple international guidelines exist to manage dyslipidaemia in high-risk patients, for example, guidelines published by the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS), as well as the ESC/EAS Guidelines for Management of Dyslipidaemia, 2019.[5] Another leading guideline includes the American College of Cardiology/American Heart Association (ACC/AHA) guideline on the primary prevention of atherosclerotic cardiovascular disease (ASCVD).[6]

In 2003, the South African Heart Association and the Lipid and Atherosclerosis Society of Southern Africa (LASSA) adopted the European guidelines and replaced the South African Lipid Guidelines that were published in 2000. In 2012, the South African Heart Association and the LASSA published the South African dyslipidaemia consensus statement for the intensive management of dyslipidaemia with the aim of reducing the burden of cardiovascular diseases in South Africa [7]. Considering the specific challenges faced by the African countries and availability of the new evidence, an expert panel met in February 2023 with the aim of adopting these guidelines to appropriately address the health care needs of the African population and achieve better healthcare outcomes. This consensus provides recommendations for the most up-to-date clinical management of dyslipidaemia in all regions of Africa.

2. Methodology

This paper was co-authored by a team of cardiology experts who were a part of the panel as well as corresponding authors. A multidisciplinary panel of regional experts was convened and reached a consensus on the clinical management of dyslipidaemia in the African population in February 2023. The panel consisted of 12 experts from Ivory Coast, West Africa, specialising in the fields of cardiology, endocrinology, and nephrology.

The experts considered the current state of dyslipidaemia management in the Ivory Coast based on their personal clinical expertise and other supportive data, including published studies and guidelines. The existing guidelines and current clinical observations were reviewed, and recommendations were formulated in alignment with these as well as local and regional clinical practices. The discussion was based on answers of the questionnaire on various aspects of dyslipidaemia management and daily clinical practice. The information thus collected through the questionnaire was collated and summarised, and the key findings were then analysed. The final version of the questionnaire included seven questions, the answers of which have been captured in this article as expert opinions (see Figure 1).

Recommendations on the Prevalence of Dyslipidaemia

The meta-analysis found that 25.5% of the general African population has elevated TC. Low HDL-C is found in about 37.4% of the general population. Elevated LDL-C is seen in 28.6% of patients while elevated TG is seen in 17% of patients in the general population.[4] A study conducted by Mohammed Obsa in 2022 found that the prevalence of dyslipidaemia is higher in East Africa (60.8%) and Southern Africa (53.1%) as compared to West Africa (46.7%) and Central Africa (21%).[8]

Expert opinion

There is limited data on the prevalence of dyslipidaemia in African countries. Dyslipidaemia, observed in both

underdeveloped and developed countries, is linked to rapid economic growth, changes in dietary patterns, and lifestyle modifications. In daily clinic practice in Ivory Coast, about 10-30% of cases are observed to be of dyslipidaemia. Overall, the prevalence of dyslipidaemia is greater than 20% of the total cases observed by doctors in their day-to-day practice.

In the general population in Africa, about 25% of cases show elevated TC levels, 37% show low levels of HDL-C, and 28% show elevated LDL-C. When it comes to elevated TG, it affects around 17% of individuals in the general population. Therefore, dyslipidaemia is relatively common in the African population, although the rates are lower than those in the Western world. Some regional disparities are also seen in Africa as the prevalence of dyslipidaemia appears to be higher in East Africa and Southern Africa.

Dyslipidaemia with comorbidities:
It is estimated that dyslipidaemia is observed in 46% of patients with hypertension, about 50% of patients with diabetes, 15% of patients with heart failure, 26% of patients with stroke, and 49% of patients with coronary artery disease.

Gender-Wise Prevalence of Dyslipidaemia

Evidence based on literature
A systemic review published in 2018 estimated the gender-wise distribution of dyslipidaemia. It was observed that an equal distribution exists among male and female patients.[4]

Expert opinion
As per expert opinion based on clinical practice, dyslipidaemia was found to be much more common in women. Dyslipidaemia is associated with a high risk of hypertension. According to the studies conducted in Ivory Coast, more women than men are observed among patients with hypertension. However, this does not necessarily mean that the prevalence of hypertension is higher in women compared to men. This perception could be influenced by a bias related to healthcare-seeking behaviour, where women may be more likely to visit a hospital than men. Overall, in the general population, an equal distribution between genders is commonly observed.

Risk Factors in Patients with Dyslipidaemia

Evidence based on literature
The common risk factors associated with dyslipidaemia encountered in clinical practice are:

- Obesity
- Sedentary lifestyle
- Smoking
- Family history
- Excessive alcohol consumption
- Lack of fruits and vegetables in the diet
- Type 2 DM (T2DM)
- Hypertension[4,8]

Expert opinion
As per the consensus of experts, the major risk factors associated with dyslipidaemia in patients in the Ivory Coast are obesity, hypertension, and T2DM. In addition, kidney disease, mainly nephrotic syndrome, is another factor for dyslipidaemia that should be considered while making a diagnosis in patients during routine clinical practice.

Criteria for Diagnosis of Dyslipidaemia

Evidence based on guidelines
As per the existing literature, the diagnosis of dyslipidaemia depends on blood tests. The standard laboratory evaluations for this purpose include TC, LDL-C, non-HDL-C and TG. Lipoprotein (a) and apolipoprotein B should also be considered when diagnosing dyslipidaemia.[9] Guidelines for the diagnosis of dyslipidaemia are given in Table 1. As per the South African dyslipidaemia guidelines consensus statement, the diagnosis and management of dyslipidaemia includes the following steps:

- A full lipogram (TC, HDL-C, LDL-C, and TG) is done for the initial diagnosis of dyslipidaemia.
- After initiating therapeutic lifestyle changes alone, follow-up testing is recommended every 6 months.
- After initiating pharmacotherapy, testing should be repeated at 8 (± 4) weeks and, thereafter, once the patient has achieved the goal, every 6 months.[6,7]

Expert opinion
The guidelines above were made as part of the consensus for the South African population and require an update to fit the current requirements of the population of the African continent. A fasting test known as lipid anomaly exploration is an important laboratory test for the diagnosis of dyslipidaemia. The lipid anomaly exploration test ideally requires the patient to fast for at least 12 hours before blood collection; however, 8 hours of fasting is also sufficient. As the main factor contributing to dyslipidaemia is cholesterol, all the therapeutic decisions including the choice of medicine (statins), their dose and therapeutic goals depend on cholesterol levels, specifically TC, HDL-C, and LDL-C. In routine clinical practice, clinicians have been using the Friedewald equation to calculate LDL-C levels in blood using HDL-C, TG and TC values.[10] However, it is recommended to get a direct LDL-C measurement instead. In addition, if a patient is recommended treatment or dietary changes to control their cholesterol levels, it is advised that a lipid re-evaluation be made at regular intervals after starting the intervention based on the risk level of the patient. The recommendation for duration for re-evaluation in high-risk patients is after one month of starting the intervention. However, for patients at mild-to-moderate risk, the reassessment should be made after 3 months of initiating intervention. For the rest, the reassessment can be made between 3 to 6 months of starting the intervention.

Diet and Carbohydrate Intake of the African Population

Evidence based on guidelines

The ACC and the AHA Guidelines recommend dietary changes to manage dyslipidaemia in patients with CVD (see Table 2). Figure 2 shows the energy contribution of fats, carbohydrates, and proteins in the diet of individuals in Africa in 2017.[12] From the figure above, it is evident that the total energy contribution of carbohydrates is 73.2% in the African population, and fats and proteins follow with lower contributions at 17.5% and 8.9%, respectively.[12]

Expert opinion

The recommendations above are based on the American population, with a different set of lifestyles and dietary habits. One of the major differences between the American and African populations is the carbohydrate intake. A joint consensus was reached that carbohydrates are an important and major part of the diet for the African population. Carbohydrates are necessary for their survival as major energy contributors. Therefore, it is recommended that special attention be given to eating behaviours and patterns before prescribing any lifestyle or dietary recommendation for dyslipidaemia in the African subcontinent. Here are some measures recommended to manage dyslipidaemia:

- Reduce the intake of refined carbohydrate
- Reduce the intake of trans fats
- Reduce the intake of saturated fats
- Increase dietary fibre
- Lose weight
- Engage in regular physical activity

Measures recommended to focus on triglyceride control are:

- Reducing alcohol consumption
- Using omega-3 supplements

Which patients will benefit from statin therapy?

Evidence based on guidelines

Statins are the most prescribed lipid-lowering drugs. They are divided into three classes based on their intensity of action, i.e., high-intensity, moderate-intensity, and low-intensity statins:

- High-intensity statins can lower LDL-C by over 50%
- Moderate-intensity statins can lower LDL-C by 30-50%
- Low-intensity statins can lower LDL-C by less than 30%[13]

According to the ESC guidelines, for patients with low-to-moderate risk, statin therapy should be started if LDL-C levels exceed 190 mg/dL. In the case of high-risk and very-high-risk patients, the LDL-C level threshold for starting statin therapy is 100 mg/dL and 70 mg/dL, respectively.[6]

As per ACC/AHA guidelines, there are three major higher-risk categories for initiating statin therapy for the primary prevention of ASCVD–patients with severe hypercholesterolemia (LDL-C levels ≥ 190 mg/dL [=4.9 mmol/L]), adults with DM, and adults 40 to 75 years of age. Patients with severe hypercholesterolemia and adults 40 to 75 years of age with DM are candidates for immediate statin therapy without further risk assessment. In other categories of adults 40 to 75 years of age, the 10-year ASCVD risk should guide therapeutic considerations. The higher the estimated ASCVD risk, the more likely the patient is to benefit from evidence-based statin treatment. [13]

Expert opinion

It should be noted that statin therapy should be prescribed based on the patient's risk, whether the patient has had a cardiovascular event or the consideration of their LDL-C level. Additionally, it's important to have a discussion with patients and involve them in the decision-making process. This helps identify patients who would benefit from statin therapy, including patients who have already had a cardiovascular event, patients with elevated LDL-C levels, patients with diabetes, and patients at very high cardiovascular risk. It's necessary to adopt an individualised approach for each patient and to monitor their progress accordingly.

In addition, the above-stated guidelines also proved the treatment goals and strategies for patients with moderate, high, and very high cardiovascular risk. However, it is recommended that, for patients at low cardiovascular risk, statin therapy should be initiated if they fail to achieve their target blood cholesterol levels after three months of strict lifestyle modifications.

Atorvastatin is the preferred statin of choice for lowering LDL-C levels in patients. It is a high-intensity statin capable of effectively reducing LDL-C. Doctors should prescribe atorvastatin at 80 mg and rosuvastatin at 20-40 mg per day to effectively reduce LDL-C. To reduce LDL-C by more than 50% in African patients, doctors should prescribe rosuvastatin at 20 mg or atorvastatin at doses between 40 mg and 80 mg.

Also, if the patient fails to achieve the target lipid levels with statin therapy alone, doctors are advised to prescribe fibrates or ezetimibe as an add-on treatment. This can help gauge the risks and benefits of initiating statin therapy and if additional therapy is needed.

Recommendations on Statin therapy for Patients with comorbidities

Evidence based on guidelines: Key recommendations of the 2019 ACC/AHA Guidelines on the Primary Prevention of Cardiovascular Disease to manage statin therapy in patients with comorbidities such as ASCVD and chronic kidney disease (CKD) are as follows:

- For all patients with ASCVD, high-intensity statin therapy is recommended, including in patients with acute coronary syndrome, stable or unstable angina, myocardial infarction, or a history of coronary revascularisation. In patients with very high risk and LDL-C levels higher than 70 mg/dL on maximal tolerated statin therapy, it is reasonable to add ezetimibe. Further, in patients at

very high risk whose LDL-C level remains higher than 70 mg/dL on maximally tolerated statin and ezetimibe therapy, adding a PCSK9 inhibitor is reasonable.

- For all patients with CKD, guidelines recommend moderate-intensity statin therapy with ezetimibe in adults 40 to 75 years of age with a greater than 7.5% risk of ASCVD and not undergoing dialysis or kidney transplant. If a patient is already undergoing dialysis and receiving a statin, statin therapy can be continued.[14]

In addition, the 2019 ESC/EAS guidelines recommend the management of dyslipidaemia in patients with diabetes as follows:

- In patients with T2DM at very high risk, an LDL-C reduction of ≥ 50% from baseline and an LDL-C goal of <1.4mmol/L (<55mg/dL) is recommended.
- In patients with T2DM at high risk, an LDL-C reduction of ≥ 50% from baseline and an LDL-C goal of <1.8mmol/L (<70mg/dL) is recommended.
- Statins are recommended in patients with type 1 DM who are at high or very high risk.
- Intensification of statin therapy should be considered before the introduction of combination therapy.[5]
- As per recent studies, atorvastatin is the most prescribed high-intensity statin because of its safety and tolerance in a wide range of patients. Atorvastatin is not associated with renal adverse effects up to the dose of 80 mg/day. In addition, it does not require dose adjustment in patients with renal impairment because of its pharmacokinetic profile.[15]

Expert opinion

The guidelines also mention the therapeutic choices and target cholesterol levels for patients who have dyslipidaemia along with DM, CKD or ASCVD. However, clinicians are recommended to make a note of existing co-morbidities.

In interventional cardiology for coronary cases, clinicians' preference is more towards atorvastatin 80mg. It should be noted that patient education is crucial in patients with high cardiovascular risk, diabetes, or CKD. All decisions should be taken after a mutual discussion between the doctor and the patient. Clinicians should exercise caution while prescribing statin therapy to patients with CKD. In patients with CKD on statin therapy, it's important to consider dosage adjustments based on the level of estimated glomerular filtration rate (eGFR) to ensure that the same approach is not applied in patients with morbid renal conditions. For example, for statins such as rosuvastatin, dose adjustments should be made according to eGFR.

Patients undergoing dialysis already have multiple cardiovascular risk factors. At this stage, there is no literature supporting the assumption that intensifying the treatment would necessarily reduce cardiovascular risk, as there are inherent risks associated with dialysis and CKD that come into play during the dialysis stage. Therefore, there is no need to intensify the treatment in patients undergoing dialysis as it may not work.

3. Results & Discussion

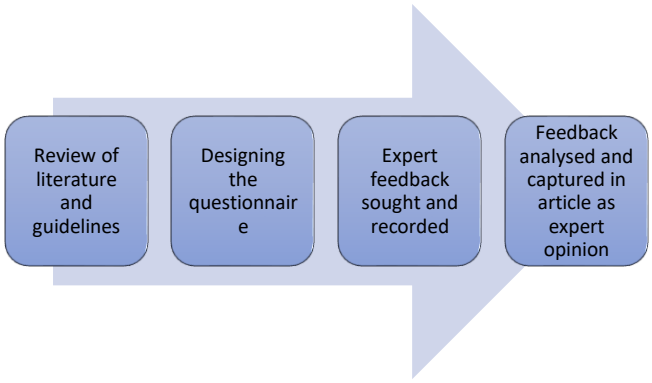

Figure 1: Representation of the study methodology

The diagram above illustrates the sequential steps taken to achieve the presented results.

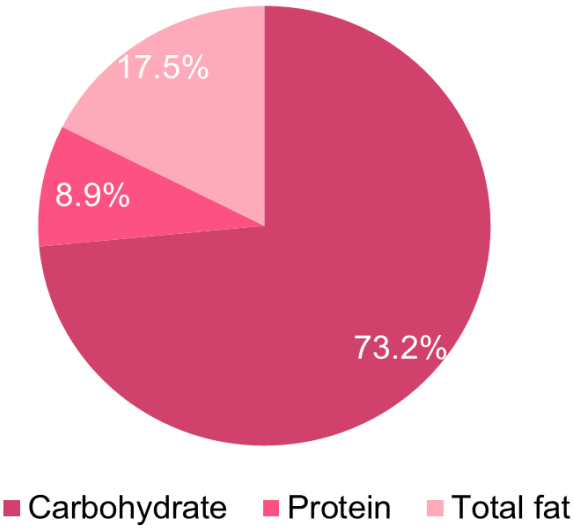

Figure 2: Contribution (%) of carbohydrates, proteins, and fats to total energy supply – based on the diet of African population[12]

This chart depicts the percentage of the total energy in the African diet that comes from carbohydrates, proteins, and fats.

Table 1: Lipid Profile Reference Range for Dyslipidaemia Diagnosis[11]

	Low	Optimal Value	Borderline High	High*	Very High*
Total Cholesterol	-	< 200 mg/dL	200-239 mg/dL	≥ 240 mg/dL	-

LDL	-	< 100 mg/dL	130-159 mg/dL	≥ 160-189 mg/dL	≥ 190 mg/dL
Triglycerides	-	< 150 mg/dL	150-199 mg/dL	≥ 200-499 mg/dL	≥ 500 mg/dL
HDL	< 40 mg/dL	40-59 mg/dL	-	≥ 60 mg/dL	-

Abbreviations: LDL: Low-density lipoprotein; HDL: High-density lipoprotein. *Values indicating dyslipidaemia.

Table 2: Recommendations for nutrition and diet according to 2019 ACC/ AHA[6]

COR	LOE	RECOMMENDATIONS
I	B-R	A diet emphasizing the intake of vegetables, fruits, legumes, nuts, whole grains, and fish is recommended to decrease ASCVD risk
IIa	B-NR	Replacement of saturated fat with dietary monosaturated and polyunsaturated fats can be beneficial to reduce ASCVD risk
IIa	B-NR	A diet containing reduced amounts of cholesterol and sodium can be beneficial in decreasing ASCVD risk
IIa	B-NR	It is reasonable to minimise the intake of processed meats, refined carbohydrates, and sweetened beverages to reduce ASCVD risk
III: Harm	B-NR	The intake of trans fats should be avoided to reduce ASCVD risk

Abbreviations: ACC: American College of Cardiology; AHA: American Heart Association; ASCVD: Atherosclerotic cardiovascular disease; COR: Class of Recommendation (I: Strong-suggested nutritional recommendation is recommended; IIa: Moderate-suggested nutritional recommendation is reasonable; III: No benefit- nutritional recommendation is not recommended); LOE: Level of Evidence (B-R: Moderate quality evidence from one or more randomized clinical trials; B-NR: Moderate quality evidence from one or more well-executed nonrandomized studies).

The table explains the nutritional recommendations designated with both Class of Recommendation and Level of Evidence. The COR indicates the strength of recommendation, encompassing the estimated magnitude and certainty of benefit in proportion to risk. The LOE rates the quality of scientific evidence supporting the intervention based on the type, and quantity.

5. Conclusion

Regional disparities in terms of risk among the large African subcontinent, with patients in certain regions being at greater risk of dyslipidaemia than others. Thus, the local and regional bodies in Africa should collaborate to create management strategies specific to the African population. The national and international guidelines should be reviewed in detail to adapt them to the needs of the African regions. Comorbidities should be considered while prescribing statins and deciding on the dose, duration of treatment, and target lipid levels. Special attention needs to be given to dietary habits, before deciding the target lipid levels, and initiating a statin therapy. A patient-doctor collaboration can help in the diagnosis of high-risk individuals and improve the overall treatment outcomes.

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