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Level of knowledge about dyslipidemia screening in clinical laboratories in Portoviejo, Ecuador

Nivel de conocimiento sobre el tamizaje dislipidemia en laboratorios clínicos de Portoviejo en Ecuador

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ABSTRACT

Dyslipidemias are associated with the atherosclerotic process, and it has been shown that the control of these alterations reduces the incidence of episodes of ischemic origin. The purpose of this research was to assess the level of knowledge about the diagnosis of dyslipidemia according to international recommendations and strategies, through a survey of health personnel involved both in performing the tests and in the indication of the study of dyslipidemia. A total of 60 people were surveyed, more than half were in their second decade of life, and a little less than half had less than a year of work experience. The majority were laboratory technicians and doctors, but very few had fourth-level studies. More than half practiced their profession in different health centers in the province of Manabí, and some teachers and students from the Faculty of Health Sciences of the Manabí Technical University participated. The respondents had levels of knowledge valued from medium to low when they were consulted about the basic lipid profile for the correct diagnosis of it, about the concept of atherogenic cholesterol (non-HDL), about the users to whom the profile should be measured lipid as a screening test and on the conditions that affect the pre, post and analytical phases of the lipid profile.

Keywords: dyslipidemias, primary dyslipidemias, diagnosis strategy for dyslipidemias.

RESUMEN

Las dislipidemias están asociadas con el proceso aterosclerótico, y se ha demostrado que el control de dichas alteraciones consigue disminuir la incidencia de episodios de origen isquémico. La presente investigación tuvo como finalidad evaluar el nivel de conocimientos sobre el diagnóstico de dislipidemia según recomendaciones y estrategias internacionales, a través de una encuesta a personal de la salud involucrado tanto en la realización de las pruebas como en la indicación del estudio de dislipidemias. Se encuestaron un total de 60 personas, más de la mitad tenía edades comprendidas en la segunda década de vida y un poco menos de la mitad tenía menos de un año de experiencia laboral, la mayoría eran laboratoristas y médicos; muy pocos contaban con estudios de cuarto nivel. Más de la mitad ejercían su profesión en diferentes centros de salud de Manabí y participaron algunos docentes y estudiantes de la Facultad de Ciencias de la Salud de la Universidad Técnica de Manabí. Los encuestados tuvieron niveles de conocimiento valorados de medio a bajo cuando se les consultó sobre el perfil lipídico básico para el diagnóstico correcto de la misma, sobre el concepto de colesterol aterogénico (no-HDL), sobre los usuarios a los que debe medirse el perfil lipídico como prueba de escrutinio y sobre las condiciones que afectan las fases pre, pos y analítica del perfil lipídico.

Palabras clave: dislipidemias, dislipidemias primarias, estrategia para el diagnóstico de dislipidemias.

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INTRODUCTION

The regular consumption of junk food among university students contributes to an increased risk of dyslipidemia, underscoring the importance of adequate knowledge and effective screening practices in clinical laboratories to enable early detection and prevention of lipid disorders (Gallardo & García, 2024). Dyslipidemias were defined as alterations in lipid metabolism characterized by abnormal lipid concentrations, both excess and deficiency, which were directly associated with the development of the atherosclerotic process. Control of these alterations has been shown to reduce the incidence of ischemic events. The etiological diagnosis of dyslipidemias was particularly relevant, given that the associated cardiovascular risk varied according to the type of lipoprotein altered and its concentration. This necessitated the availability of simple diagnostic algorithms based on lipid metabolism parameters accessible in most clinical laboratories, to guide the initial diagnosis and, if the necessary resources were unavailable, to recommend further studies at specialized centers (Segura et al., 2013; Díaz & García, 2013; Lobos et al., 2014). However, it was recognized that not all dyslipidemias presented the same atherogenic potential, since the cardiovascular risk differed according to the lipoprotein fraction involved and its plasma level (Pencina et al., 2014).

In recent years, several studies have demonstrated that therapeutic intervention for these metabolic disorders significantly reduced the incidence of ischemic events, particularly by controlling plasma concentrations of low-density lipoprotein (LDL) cholesterol (Warnick et al., 2008; Goff et al., 2014). However, it remains recognized that dyslipidemias do not constitute a homogeneous group, as the associated cardiovascular risk varies depending on the type of lipoprotein altered and its concentration (Pedro-Botet et al., 2018; Sabatine et al., 2018; Cholesterol Treatment Trialists ' Collaboration, 2019).

Similarly, its diagnosis was considered relevant not only as a cardiovascular risk factor, but also as a manifestation of other pathologies, as it can reflect chronic deficiency states or identify acute processes, such as pancreatitis associated with hyperchylomicronemia syndromes.

Globally, dyslipidemia was recognized as a metabolic disorder primarily associated with an excessive increase in lipids in the bloodstream, which favors vascular obstruction and the development of cardiovascular diseases, with a significant impact on morbidity and mortality rates.

Diagnostic strategies were based on international recommendations and scientific guidelines aimed at the early identification of the disorder, also considering the influence of eating habits, alcohol and tobacco consumption, and other behavioral factors. A greater impact was observed in men than in women (Uribe-Risco et al., 2020; Escobar et al., 2022). In the Ecuadorian context, diseases derived from dyslipidemia accounted for 13.6% of mortality, with a greater impact on vulnerable populations, particularly older adults (Uribe-Risco et al., 2020). In the province of Manabí, a high prevalence of the disorder was identified, associated with inadequate cultural eating patterns, excessive carbohydrate consumption, and the coexistence of pathologies such as diabetes, obesity, and metabolic syndrome.

Dyslipidemias are generally asymptomatic in their initial stages, with a high prevalence in developed countries, and can be diagnosed through routine laboratory tests (Uribe-Risco et al., 2020). Their causal relationship with cardiovascular disease and their high morbidity and mortality justify their clinical importance (Lobos et al., 2014). These alterations are frequently associated with other pathologies such as type 2 diabetes mellitus, gout, alcoholism, thyroid disorders, renal dysfunction, and the use of certain medications (Segura et al., 2013). International research has confirmed that dyslipidemia is linked to increased cholesterol and triglycerides and decreased HDL cholesterol, chronically contributing to the development of atherosclerosis (Díaz et al., 2013; Pencina et al., 2014; Goff et al., 2014). Furthermore, it was established that the control of pre-analytical and analytical factors was fundamental for an adequate diagnosis, including fasting, exercise, alcohol consumption, pregnancy, breastfeeding, smoking, pharmacological treatment, and intraindividual biological variability (Warnick et al., 2008; Pencina et al., 2014).

The reduction of LDL cholesterol concentrations was associated with a proportional decrease in cardiovascular events, even in populations over 75 years of age (Pedro- Botet et al., 2018; Sabatine et al., 2018), unlike what was observed in other risk factors such as hypertension or diabetes, where intense therapeutic reduction could be detrimental (Cholesterol Treatment Trialists ' Collaboration, 2019). In Manabí, previous research reported a high frequency of hyperlipidemias, particularly hypertriglyceridemia and mixed hyperlipidemias, with a greater impact on the female gender (Sabatine et al., 2017). The etiological diagnosis of dyslipidemias allowed differentiation between primary and secondary origins, recognizing that, in most cases, the lipid alteration was the result of the interaction between genetic and environmental factors,

which highlighted the importance of establishing standardized diagnostic criteria and the use of available resources in each center for adequate diagnostic guidance.

From this perspective, the clinical laboratory and the level of knowledge of healthcare personnel played a necessary role in the accurate identification of dyslipidemias. Control of the pre-analytical and analytical phases, as well as the use of appropriate reference values for diagnostic interpretation, were essential. Recognizing the risks associated with dyslipidemia also strengthened public awareness of its impact on health and its relationship to cardiovascular and metabolic diseases (Pozo, 2016; Díaz-Toro et al., 2017). Therefore, the objective of this study was to evaluate the level of knowledge of healthcare personnel in Manabí regarding the diagnosis of dyslipidemias according to international recommendations.

METHODOLOGY

A qualitative and quantitative study was conducted using a cross-sectional, descriptive, and prospective design. The study focused on analyzing the pre-analytical and analytical aspects of dyslipidemia diagnosis in comparison with current international recommendations. The study was carried out between June and August 2021 in Manabí, including health centers and the workplaces of healthcare personnel involved in ordering, performing, and interpreting diagnostic tests.

The study population consisted of healthcare personnel from the province of Manabí, and the sample comprised participants who met the inclusion criteria. Data collection was conducted through a literature search covering the last six years and the application of a structured survey, developed by the authors and the supervisor based on international references and consensus guidelines on dyslipidemia (Candás et al., 2019). The instrument was validated by experts from the Faculty of Health Sciences at the UTM.

The level of knowledge was classified as optimal (70–100%), medium (50–69%), and low (<50%). Data were tabulated and analyzed using descriptive statistics. The project was approved by the Bioethics Committee of the Faculty of Health Sciences and was conducted in accordance with the principles of the Declaration of Helsinki and international ethical guidelines, ensuring confidentiality and respect for the participants.

RESULTS AND DISCUSSION

Regarding the sociodemographic, professional, and academic characteristics of the 60 health workers from the province of Manabí included in the study, the information is presented in an integrated manner in Table 1. The results showed that 57% of the respondents were in the age range between 20 and 27 years, demonstrating a predominance of the young population.

Table 1. Sociodemographic, professional, and academic characteristics of the health personnel participating in the study

Dimension	Category	Result
Age	20–27 years	57% of respondents
	28–31 years	Minority (lower distribution)
	32–37 years	Minority
	38–41 years	Minority
	42–47 years	Minority
Professional experience	< 1 year	34.9%
	1–5 years	34.9%
	Only pre-professional internships (students)	14%
Profession/dedication	Students	27%
	Bioanalysts/laboratory professionals	33%
	Physicians/surgeons	40%
Level of education	Undergraduate degree (third level)	88%
	Graduate degree (postgraduate/fourth level)	12%
Academic – professional status	Predominance of basic professional training	The majority without a fourth-level education
	General profile	Predominantly young staff, with low work experience and third-level education

Regarding work experience, 34.9% reported less than one year of professional experience, another 34.9% had between one and five years of experience, and 14% were students whose only experience came from pre-professional internships, which were not considered formal work experience. These data reflected a professional profile characterized by youth and limited work

experience, a condition that, according to previous studies, is often associated with greater motivation for learning and acquiring skills, while older and more experienced professionals tend to develop a more objective and critical view of their professional practice (Carrillo-García et al., 2013).

From an occupational and educational perspective, Table 1 showed that 27% of the participants were students, 33% were laboratory personnel, and 40% were physicians. Furthermore, only 12% had postgraduate degrees. This finding was significant because dyslipidemias are generally asymptomatic conditions, detected by biochemical alterations in cholesterol, triglycerides, and lipoproteins, particularly LDL, which directly influence endothelial dysfunction and the formation of atherosclerotic plaques. In this context, both physicians and laboratory technicians require a solid understanding of the pre-analytical, analytical, and post-analytical processes that affect laboratory results and contribute collaboratively to the accurate diagnosis, prognosis, and treatment of patients.

Furthermore, the results reflected limited postgraduate training among the surveyed personnel, which is particularly relevant in the healthcare sector, where postgraduate education is a fundamental component for strengthening professional, scientific, and ethical competencies, in accordance with scientific and technological advances and the social responsibility inherent in the practice of health professions (Carrillo-García et al., 2013). Finally, Table 1 showed that the healthcare professionals worked in different healthcare centers in Manabí, and that 40% were also affiliated as faculty or students from the Faculty of Health Sciences at the UTM, demonstrating the connection between the clinical and academic spheres in the context of the study.

According to the PAHO/WHO, more people die each year from cardiovascular diseases (CVDs) than from any other cause, and more than three-quarters of deaths related to heart disease and stroke occur in low- and middle-income countries (PAHO, 2020). The risk of developing CVD increases in contexts characterized by unhealthy diets, with low consumption of fruits and vegetables and high consumption of salt, sugars, and fats; therefore, the study of dyslipidemia as a risk factor and its early diagnosis through routine laboratory tests, as well as its correct interpretation, are essential in this context.

In this study, when respondents were asked about the concept of dyslipidemia, the majority

(93%) correctly answered that these disorders correspond to alterations in lipid metabolism characterized by abnormal lipid concentrations, both in excess (hyperlipidemia) and in deficiency (hypolipidemia), demonstrating a high level of understanding of the concept. In fact, the 2018 recommendations of the Spanish Society of Laboratory Medicine's working group, "Strategies for the Diagnosis of Dyslipidemia," reiterated that these alterations are strongly associated with the atherosclerotic process and that controlling them reduces the incidence of ischemic events (Candás et al., 2019).

To identify cardiovascular risk, it was necessary to consider the classification of dyslipidemias, which, according to Vaucher et al. (2014), were classified according to their lipid phenotype or etiology. Thus, three main groups were identified based on lipid phenotype: hypercholesterolemias, characterized by an increase in plasma cholesterol concentration; hypertriglyceridemias, defined by an increase in plasma triglycerides; and mixed dyslipidemias, with simultaneous elevation of both. Alterations manifested solely with an increase in plasma cholesterol were termed pure hypercholesterolemias, while decreased plasma lipid concentrations were termed hypolipidemias, the most frequent being hypocholesterolemia, which could be primary (nutritional) or secondary (of genetic origin).

Figure 1 presented the responses related to the determinations used for the initial evaluation of the lipid profile in dyslipidemia, and according to the recommendations of the Spanish Society of Clinical Biochemistry and Molecular Pathology (SEQC), it was indicated that the measurement of plasma cholesterol concentration should be carried out together with the determinations of LDL cholesterol, HDL and triglycerides (Esteban et al., 2013).

Fifty-four percent of respondents were familiar with the four basic lipid profile tests, indicating a moderate level of knowledge about the basic lipid profile for the correct diagnosis of dyslipidemia. Less than half (41.7%) responded positively regarding the determination of LDL in diagnosis, demonstrating a low level of awareness about the relevance of this test. According to Spanish epidemiological data (Guallar-Castillón et al., 2012), mortality from ischemic heart disease is directly related to LDL concentration, and it has been shown that available therapies capable of reducing LDL by 2 mmol/L (77.4 mg/ dL) can decrease the risk of severe cardiovascular disease by approximately 50% (Collins et al., 2016).

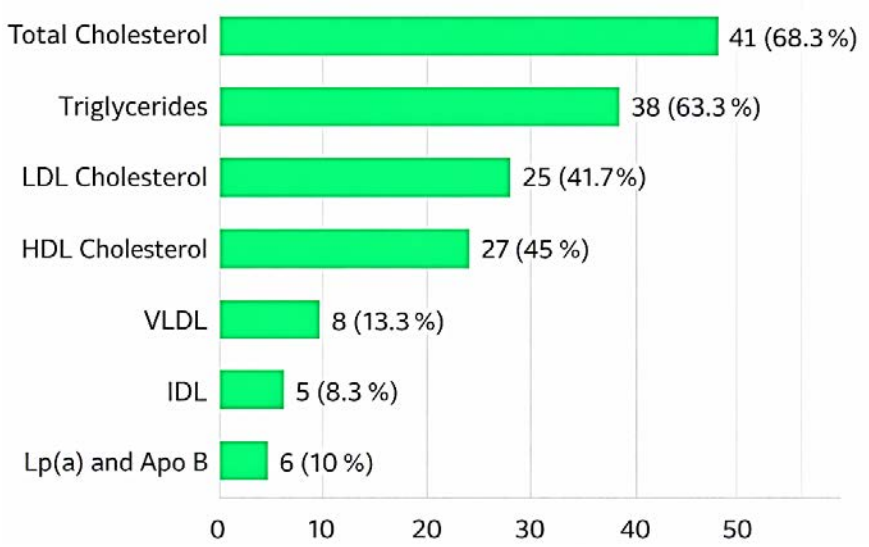

Figure 1. Determinations of a health examination to evaluate the lipid profile of dyslipidemia.

Experts also considered that other parameters, such as Lp (a) and apoB, could be useful in specific clinical situations, but they were not part of the basic lipid profile (Pedro-Botet et al., 2018). Therefore, it was essential to have simple diagnostic algorithms that included lipid metabolism parameters available in most clinical laboratories to make an initial diagnosis of the type of dyslipidemia. In cases where the appropriate diagnostic tools were not available, it was recommended that the study be expanded to centers with the necessary resources to establish the diagnosis.

Figure 2 presents the responses to the question about the meaning of non-HDL cholesterol, where only 35% of respondents answered correctly, reflecting a low level of knowledge about this concept. According to Pedro-Botet et al. (2018), non-HDL cholesterol includes intermediate-density lipoprotein (IDL) cholesterol and cholesterol associated with LDL, VLDL, and Lp (a), that is, all atherogenic cholesterol. Similarly, Candás et al. (2019) indicated that measuring non-HDL cholesterol is useful for estimating cardiovascular risk.

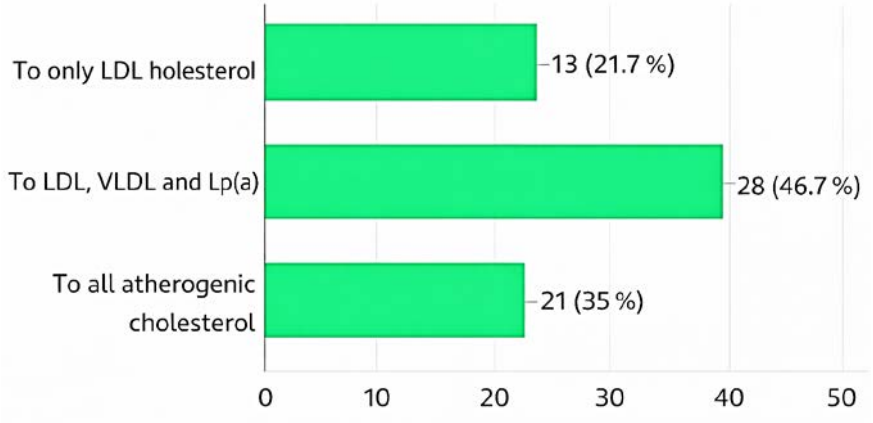

Figure 2. Answers to which includes cholesterol non-HDL.

When asked about the etiological classification of dyslipidemias (Figure 3), most respondents correctly answered that they were classified as primary and secondary. However, it was relevant that 20% of participants indicated that dyslipidemias were classified solely based on environmental factors or the presence of other diseases or disorders (such as hypothyroidism, diabetes, or liver disease), which corresponds exclusively to secondary dyslipidemias, thus omitting those of genetic origin.

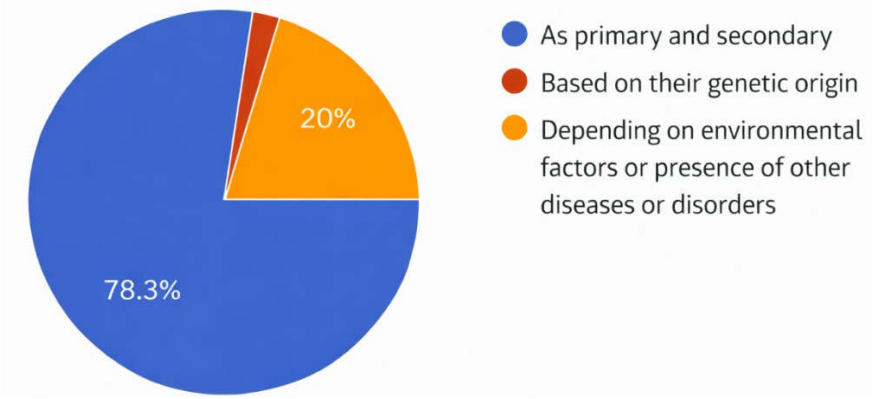

Figure 3. Classification of dyslipidemias according to their etiology.

In accordance with these findings, Candás et al. (2019) noted in their 2018 Recommendation that the etiological diagnosis of dyslipidemias was fundamental, given that the associated cardiovascular risk varied according to the type of altered lipoprotein and its concentration. The authors indicated that primary dyslipidemias develop mainly due to genetic

causes, affecting approximately 5–10% of the general population, with the majority being of polygenic origin, that is, resulting from the interaction of multiple genetic variants and dietary, medical, and environmental factors. They also highlighted the existence of monogenic dyslipidemias, caused by mutations in a single gene, which exhibit Mendelian inheritance patterns of autosomal dominant, codominant, or autosomal recessive inheritance, reinforcing the need for accurate etiological classification for proper clinical assessment and cardiovascular risk evaluation.

Figure 4 presents the responses to the question regarding which individuals should have their lipid profile measured as a screening test. 53.3% of respondents indicated that it should be performed on patients with established cardiovascular disease, associated atherosclerotic processes, or ischemic origin, while 48.3% indicated that it should be applied to subjects with cardiovascular risk factors, among other response categories.

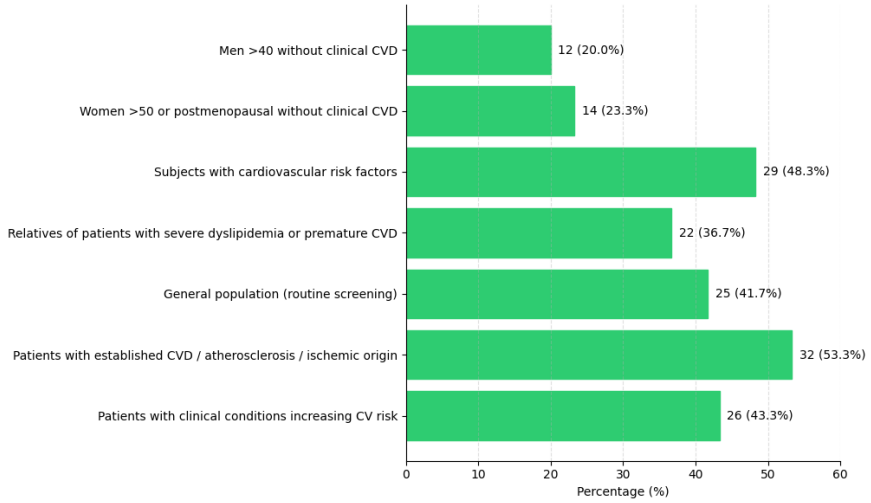

Figure 4. Population groups eligible for lipid profile screening for cardiovascular risk assessment.

According to Pedro-Botet et al. (2020), dyslipidemia screening in individuals without clinical cardiovascular disease should be performed in all men over 40 years of age and in all women over 50 years of age or postmenopausal, especially when other cardiovascular risk factors are present. The authors also indicated that this screening should be carried out in relatives of

patients with severe dyslipidemia or premature cardiovascular disease. Furthermore, they emphasized that analytical testing for possible dyslipidemia is always indicated in patients with established cardiovascular disease or when cardiovascular risk factor screening is deemed necessary, and should be considered in clinical situations where dyslipidemia could contribute to an increased cardiovascular risk.

Botet et al. (2020) noted that pre-analytical variation refers to changes experienced by any laboratory variable in a subject due to the influence of various conditions, modifiable or not, which could affect measurement results and induce errors in their interpretation. To reduce this variability, the authors recommended systematically recording the subject's conditions before any variable analysis. They also indicated that the sources of pre-analytical variation affecting the lipid profile were multiple and depended on factors related to the individual (intraindividual variations), as well as on the characteristics of the blood sample obtained and the conditions under which it was collected and stored.

Figure 5 revealed a low to moderate level of knowledge regarding the aspects that should be known about the patient for the proper assessment of cardiovascular risk associated with dyslipidemia. Among the individual-related conditions included modifiable factors such as fasting, diet, body weight, physical exercise, coffee and alcohol consumption, as well as medication use, and non-modifiable factors such as pregnancy and the presence of other diseases. In this context, the importance of knowing these elements for each patient, along with their medical history, personal history of cardiovascular disease, family history of lipid metabolism disorders or premature cardiovascular disease, and the type of dyslipidemia, was highlighted as an essential component for a correct assessment of cardiovascular risk.

Figure 6 shows the sources of variability biological intraindividual that can influence the diagnosis of dyslipidemias according to the survey, and health examination can determine a level of knowledge of medium to I'm below that.

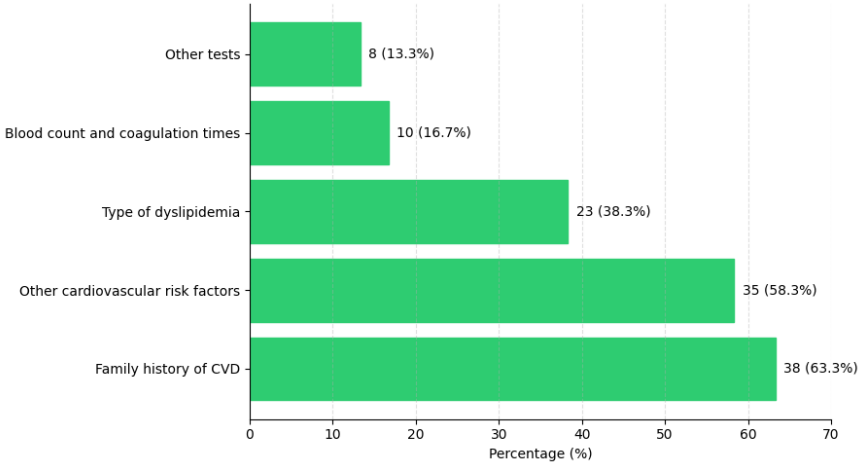

Figure 5. Knowledge of health personnel about clinical variables relevant to the assessment of cardiovascular risk associated with dyslipidemia.

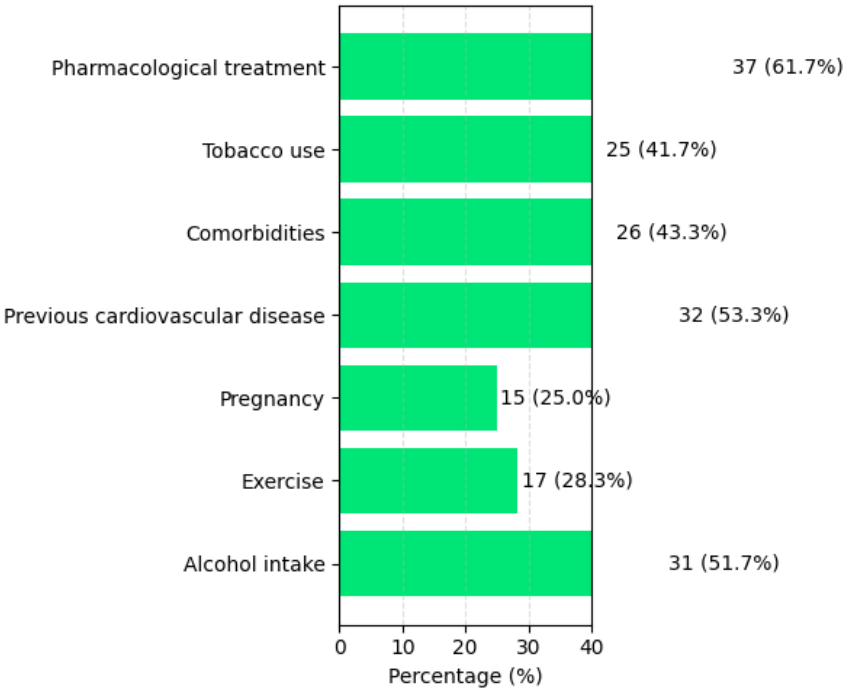

Figure 6. Sources of intraindividual biological variability that influence the diagnosis of dyslipidemias according to the respondents.

As can be seen, pharmacological treatment was the most frequent factor, present in 61.7%

of participants, suggesting a high disease burden and the need for continuous therapeutic management. Similarly, a history of previous cardiovascular disease (53.3%) and alcohol consumption (51.7%) was identified in more than half of the cases, highlighting the coexistence of modifiable and non-modifiable risk factors in this population.

Furthermore, a considerable proportion of participants presented with comorbidities (43.3%) and tobacco use (41.7%), both recognized as factors that increase cardiovascular risk and can negatively influence clinical prognosis. In contrast, physical exercise (28.3%) and pregnancy (25.0%) were reported less frequently, which could reflect specific demographic characteristics of the sample or lower exposure to these factors within the study context.

A high prevalence of cardiovascular risk factors was observed, which underlines the importance of comprehensive prevention strategies, lifestyle control, and optimization of pharmacological treatment in this population.

Figure 7 shows that 81.7% of respondents agree that fasting is an important aspect for conducting lipid studies. Traditionally, lipid profile measurement is recommended after an 8 to 10 h fasting; however, in the absence of known hypertriglyceridemia, this practice has been questioned. In this regard, the 2016 guidelines published by the European Atherosclerosis Society and the European Society of Clinical Biochemistry and Laboratory Medicine established specific recommendations regarding the necessity of fasting for lipid profile determination (Nordestgaard et al., 2016). These guidelines indicate that obtaining fasting samples is indicated when triglyceride concentrations exceed 443 mg/dL; however, the question arises of how to apply this recommendation when the individual lipid levels being evaluated are previously unknown.

On the other hand, it is recognized that, in samples not obtained in a fasting state, total cholesterol and HDL cholesterol results are considered valid, and triglyceride concentrations may increase, potentially indicating chylomicronemia. As reported by Pedro-Botet et al. (2018), when the lipid profile of fasting subjects was compared with that of non-fasting subjects, the latter showed an increase in triglycerides, accompanied by a decrease in total cholesterol, LDL cholesterol, and non-HDL cholesterol. In contrast, HDL levels, apolipoproteins AI and B, and lipoprotein(a) did not show significant changes in the absence of fasting.

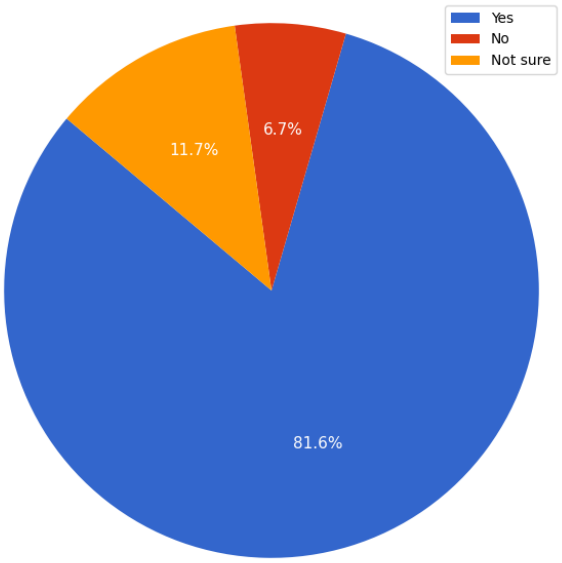

Figure 7. Answers to the importance of fasting in the lipids study.

Fasting is an important consideration, especially when glucose or other biochemical parameters requiring it are to be measured in the same sample. In the context of this study, the standard practice is to obtain samples after fasting; however, when this is not the case, this condition must be clearly stated in the analytical report.

Table 2 shows that the level of knowledge about the factors that could prevent errors in the pre-analytical phase was low in most of the respondents, which was evidenced by the reduced percentages of recognition of several key conditions, such as repeating the analysis after two weeks (33.3%), the patient's prior rest before the extraction (23.3%), waiting after a mild illness (16.7%) or performing the second extraction in the same position (15.1%).

These results were consistent with those reported by Pedro-Botet et al. (2020), who identified multiple pre-analytical conditions related to the individual, sample collection, and preservation as determining factors in the measurement of lipid profile components, highlighting the need to apply specific recommendations to minimize these sources of variability.

Table 2. Knowledge of healthcare personnel regarding pre-analytical and post-analytical factors that influence the measurement and interpretation of the lipid profile in the diagnosis of dyslipidemias

Dimension	Evaluated condition	Response percentage (%)
Pre-analytical	Keep the patient on their usual diet and stable weight in the weeks before the test.	48.3
	Perform the second blood draw in the same posture as the first.	15.1
	Discontinue non- essential medication.	36.7
	Wait at least 3 weeks after a mild illness.	16.7
	Patient rest for 5 min, at least before blood sampling.	23.3
	Keep tourniquet time as short as possible.	31.7
	Use EDTA or heparin plasma and apply equivalence correction with serum.	60.0
	Do not freeze samples if they are not analyzed immediately.	40.0
	Use methods with defined imprecision, bias, and maximum allowable error.	43.3
Post-analytical	Definition of reference values by percentiles (age and sex) in a healthy population.	63.3
	Recognition of ideal cHDL values above the reference interval.	18.3
	Recognition of ideal cLDL values below the reference interval.	33.4

Likewise, limited knowledge was evident regarding relevant technical aspects, such as the use of plasma anticoagulated with EDTA or heparin and its correction for serum equivalence (60.0%), the use of methods with imprecision and bias control (43.3%), and the failure to freeze samples when they are not analyzed immediately (40.0%), reflecting weaknesses in the understanding of metrological processes in the clinical laboratory.

Additionally, the integrated results of the post-analytical dimension also showed a low level of knowledge regarding fundamental aspects for the correct interpretation of the lipid profile, such as the validity of the Friedewald equation under specific triglyceride conditions (20.0%), and the recognition of ideal HDL cholesterol (18.3%) and LDL cholesterol (33.4%), which revealed limitations in the clinical interpretation of the results. Although a higher percentage of correct answers was observed in identifying the need to establish percentile reference values according to age and sex in healthy populations (63.3%), the data as a whole reflected a fragmented understanding of the comprehensive diagnostic process for dyslipidemias, which encompasses the

pre-analytical, analytical, and post-analytical phases.

The results confirmed that healthcare personnel's knowledge of the pre- and post-analytical factors influencing the measurement and interpretation of lipid concentrations was predominantly medium to low, which compromised the quality of dyslipidemia diagnosis. In the healthcare setting, a lack of opportunities for process control, limited feedback on professional performance, monotonous tasks, complex work, and insufficient promotion of continuous professional development are common, contributing to deficiencies in knowledge and the appropriate use of available technology (Endalamaw et al., 2024).

While dyslipidemias were the main risk factor for cardiovascular disease, not all presented the same atherogenic potential, making their correct identification essential. In this process, the clinical laboratory played a fundamental role, requiring rigorous control of the pre-metrological, metrological, and post-metrological phases, as well as the use of appropriate reference values. When dyslipidemia was suspected, it was considered necessary to repeat the analysis after at least two weeks and, once confirmed, to comprehensively evaluate the personal and family medical history, prioritizing the exclusion of secondary dyslipidemias, as these are the most frequent, in order to adequately estimate the associated cardiovascular risk.

CONCLUSIONS

The study population consisted mainly of young adults in their twenties with limited work experience, predominantly laboratory technicians and physicians, with few professionals holding postgraduate degrees. Most participants worked at various health centers in Manabí, along with faculty and students from the Faculty of Health Sciences at UTM. The results showed a high level of knowledge regarding the concept and classification of dyslipidemias; however, significant gaps were identified in key aspects for their diagnosis and clinical management, such as the basic lipid profile, atherogenic cholesterol (non-HDL), and the criteria for using the lipid profile as a screening test. Furthermore, a low level of knowledge was observed regarding the influence of the pre-analytical, analytical, and post-analytical phases on the interpretation of the lipid profile, particularly concerning the control of these phases and the ideal values of HDL and LDL, which highlights the need to strengthen the training and continuous education of health personnel in these critical components for proper diagnosis and clinical decision-making.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHOR CONTRIBUTIONS

Conceptualization: Aron R. Zamora and Ivón Howland. **Data curation:** Katiuska K. Chávez and Danny X. Narváez. **Formal analysis:** Aron R. Zamora, Katiuska K. Chávez, and Danny X. Narváez. **Investigation:** Aron R. Zamora, Katiuska K. Chávez, Danny X. Narváez, and Ivón Howland. **Methodology:** Aron R. Zamora and Ivón Howland. **Supervision:** Ivón Howland. **Validation:** Aron R. Zamora and Ivón Howland. **Writing – original draft:** Aron R. Zamora, Katiuska K. Chávez, Danny X. Narváez, and Ivón Howland. **Writing – review & editing:** Aron R. Zamora, Katiuska K. Chávez, Danny X. Narváez, and Ivón Howland.

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