Patient and healthcare professional perspective on challenges in lipid profile management in dyslipidemia patients: Two separate cross-sectional surveys

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ABSTRACT

Dyslipidemia is one of the major causes of cardiovascular ailments. Despite the fact patients with dyslipidemia continue to increase due to dependent on patient-related factors. To comprehensively explore patients' knowledge, attitudes, and practices related to dyslipidemia, while also identifying challenges in lipid profile management among healthcare professionals. Two separate cross-sectional studies were conducted for 6 months (July–December 2021) in a tertiary care teaching hospital. The questionnaire (tool) for both surveys was prepared after a thorough review of the literature and then validated by a group of healthcare professionals. Eligible participants were enrolled after taking written informed consent. The current findings suggest poor knowledge, attitude, and practice of patients toward dyslipidemia and its management. Only 23.76% of healthcare professionals have attended seminars or continuing medical education on the management of dyslipidemia in the past year. It is surprising that only 37.62% of healthcare professionals surveyed know about the Lipid Association of India expert consensus statement on the management of dyslipidemia in Indians. Patient forgetfulness (66.37%) followed by the low education level of the patient (59.41%), side effects of the treatment (41.58%), high cost of the drugs (40.59%), and are the common reasons for noncompliance to the dyslipidemia therapy as reported by healthcare professionals. Patient-related factors contribute to major challenges in the management of dyslipidemia. The lack of awareness among healthcare professionals regarding dyslipidemia guidelines is attributed to the diversity in available guidelines and the limited applicability of Western-centric recommendations to Asian populations.

INTRODUCTION

Dyslipidemias, characterized by abnormal cholesterol and triglyceride levels, are prevalent and linked to increased cardiovascular diseases (CVDs) risk [1]. Lipid imbalances can result from genetics (primary) or lifestyle/environmental factors (secondary) such as diabetes, obesity, or an unhealthy lifestyle. It has been nearly 30 years since the global burden of dyslipidemias increased, making it the 8th leading risk factor for death in 2019 [2]. Multimodal therapy for dyslipidemia is defined and practiced due to the significance of dyslipidemia as a risk factor for atherosclerotic cardiovascular disease (ASCVD) [3]. This necessitates a shift towards comprehensive risk reduction, highlighting the importance of a multidisciplinary, team-based approach. Numerous guidelines on dyslipidemia management are issued by various professional organizations, including the American College of Cardiology (ACC)/American Heart Association (AHA), the Canadian Cardiovascular Society (CCS), and the European Society of Cardiology (ESC) [4]. In 2016, the Lipid Association of India (LAI) released a two-part consensus statement, followed by an updated third part in 2018 [5].

Recent research has advanced our understanding of dyslipidemias' molecular basis and genetics, and pharmacological options are expanding. Nonpharmacological measures (Diet and lifestyle) are also critical in the treatment

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of dyslipidemia. The ACC/AHA guideline promotes a heart-healthy diet, emphasizing fruits, vegetables, nuts, legumes, whole grains, and fish, while cautioning against sugar, trans fats, saturated fat, sodium, and red/processed meats. The Mediterranean diet is validated for its effectiveness. Maintaining a BMI of 20–25, achieving even modest weight loss, and engaging in 150 minutes of weekly physical activity all positively influence lipid profiles and overall heart health [4,6,7].

Statin therapy is central in managing hypercholesterolemia, reducing cholesterol synthesis, increasing LDL receptor expression, and stabilizing plaque along with other cholesterol-lowering treatments such as ezetimibe and PCSK9 inhibitors (Bempedoic acid, Inclisiran, and Icosapent ethyl) plays a pivotal role in managing hypercholesterolemia and reducing cardiovascular risk [4,7]. Monoclonal antibodies and new agents such as volanesorsen, bempedoic acid, evinacumab, and inclisiran are gaining approval for treatment. In addition, novel targets such as Lp(a) and ANGPTL3 are in development [1].

Amid evolving and sometimes contentious guidelines, clinicians face discord in deciding which to adopt. Factors such as personal biases, organizational endorsements, and evidence reliability come into play. This calls for an individualized treatment decision, including measuring secondary lipid variables for risk assessment, exploring emerging treatments for dyslipidemias, and adherence to both lifestyle changes and medication [1].

Despite these many developments, CVDs account for approximately 24% of all deaths among individuals aged 25–69 in India. Furthermore, there is a concerning trend of CVDs occurring at a younger age, with 10% of heart attacks happening in people under 40, and over 50% of cardiovascular deaths occurring in individuals under 70 in India. Disability-adjusted life-years lost due to coronary artery disease (CAD) are three times higher in India compared to developed countries. Dyslipidemia prevalence is notably higher in Asians, including Indians, characterized by low HDL cholesterol and high triglycerides [5].

Hence, the objectives of this study are: 1) To understand patient's knowledge, attitudes, and practices regarding dyslipidemia. 2) To identify the challenges in lipid profile management in dyslipidemia patients among healthcare professionals. The goal is to uncover challenges in the management of dyslipidemias, and trends in guideline selection and help bridge discord among healthcare professionals to enhance patient care.

METHODOLOGY

The identification of the challenges in dyslipidemia management was designed through a multistep process that started with two separate cross-sectional surveys which were conducted for 6 months (July 2021–December 2021) in a tertiary care teaching hospital.

Patient perspective survey

The patient survey questionnaire (tool) was prepared after a thorough review of the literature [8,9] and then validated by physicians, academic pharmacists, and clinical pharmacists.

Before collecting data from the field, a pretest was conducted with 20 respondents from the inpatients to identify questions that were confusing to participants, and other questions within the questionnaire that were probe biased. Final revisions were made to the questionnaire after removing the questions that failed to provide useful data. It was administered over a 3-month period (July 2021–September 2021). Eligible patients were dyslipidemia patients from general wards of tertiary care teaching hospitals who were 18 years of age or older and understood the local language (Kannada, Hindi, or Marathi). After signing an informed consent form, the questionnaire was administered by a pharmacist.

Healthcare professional perspective survey

The healthcare professional survey questionnaire (tool) was prepared after a thorough review of the literature and then validated by physicians, academic pharmacists, and clinical pharmacists. The survey questions were modeled from previously validated surveys in studies by de Ferranti SD *et al.* [10] and Brinton EA [11]. Survey questionnaires were prepared in Google Forms, which is easy to administer since healthcare professionals were busy. It was also administered over a 3-month period (October 2021–December 2021). The survey link along with a brief overview of the study was sent through WhatsApp to all healthcare professionals in the hospital. The healthcare professionals were targeted because of their likelihood to be directly involved in the management of CAD, ischemic heart disease, and dyslipidmia.

Sample size

The sample size was 383 for the patient survey, assuming an anticipated outcome frequency of 50% with a confidence interval of 95%. Convenience sampling was used to select the patients from the general medicine wards of tertiary care hospitals. A minimum sample size of 101 with a 20% dropout rate is required for the physician survey. Convenience sampling was used to recruit the healthcare professionals from the hospital.

Table 1. Patient demographic details

Sl. No.	Parameters	Number (N = 386)	Percentage
1	**Gender**		
	Male	197	51.04
	Female	189	48.96
2	**Age**		
	<30 years	9	18.13
	30–60 years	34	68.13
	>60 years	7	13.74
3	**Education level**		
	Illiterate	94	24.35
	Primary	101	26.17
	Secondary	137	35.49
	Higher studies	54	13.99

Table 2. Patient knowledge about dyslipidemia.

Sl. No.	Parameters	Number (N = 386)	Percentage
1	Heard about dyslipidemia/cholesterol	Yes (116)	30.05
2	Person developing dyslipidemia due to (Multiple choice)		
	Family history of dyslipidemia	16	4.15
	Obesity	82	21.24
	Age >50 years	115	29.79
	Eating too much of fatty food	99	25.65
	Stress	123	31.87
	Smoking	99	25.65
	Alcohol	90	23.32
	Lack of exercise	255	66.06
3	Has a physician or other health care professionals ever discussed your diet?	104 (Yes)	26.94
4	Heard or been told about LDL-C?	33	8.5
5	Has been informed about the cholesterol level?	69	17.88
6	Adults should limit their intake of fatty acids.	103	26.68
7	Inadequate treatment of dyslipidemia lead to CVDs.	164	42.49

Table 3. Patient attitude and practice toward dyslipidemia.

Sl. No.	Parameters	Classification (N = 386)	Number (%)
1	Last time checked body weight	< 3 month	54 (13.99%)
		3–6 months	81 (20.98%)
		6–12 months	112 (29.02%)
		>12 months	139 (36.01%)
2	Doing exercise regularly?	Yes	124 (32.12%)
		No	262 (67.88%)
3	Types of exercise? (N = 124)	Brisk walking	82 (66.13%)
		Running	22 (17.74%)
		Swimming	6 (4.84%)
		Cycling	3 (2.42%)
		Others	11 (8.87%)
4	Frequency of exercise? (N = 124)	7 days/week	16 (12.90%)
		3–5 days/week	31 (25.00%)
		2–3 days/week	33 (26.61%)
		Once a week	44 (35.48%)
5	Last time lipid profile test done?	< 3 months	2 (0.52%)
		3–6 months	34 (8.81%)
		6–12 months	72 (18.65%)
		>12 months	278 (72.02%)
6	Following diet plan as per physician?	Yes	94 (24.35%)
		No	292 (5.65%)

Table 4. Characteristics of the healthcare professional.

Parameters	Number (%) N = 101
Gender	
Male	53 (52.47%)
Female	48 (47.53%)
Age groups	
18–30 years	56 (55.45%)
30–50 years	41 (40.59%)
>50 years	4 (3.96%)
Health care professionals	
Physicians	59 (58.42%)
Pharm. D interns	40 (39.60%)
Clinical pharmacist	2 (1.98%)
Number of dyslipidemia patients encounter	4-5 Per day
Method used to stratify cardiovascular risks in dyslipidemia patients	
WHO risk predictor chart for South East Asian Indians	23 (22.77%)
ASCVD risk calculator	20 (19.80%)
Framingham risk score	5 (4.95%)
Not sure	53 (52.48%)
Have you attended a lecture or CME on the management of dyslipidemia in the past year?	24 (23.76%)

Data analysis

The data were entered into Microsoft Excel 2016 and subsequently imported into IBM SPSS Version 26.0 for analysis. Descriptive statistics were employed to summarize both continuous and categorical data at each respective time point.

STROBE guideline for the cross-sectional study was followed throughout the preparation of the manuscript.

ETHICAL APPROVAL

This research is a component of a broader investigation known as the "Impact of pharmacist's intervention on lipid profile in patients treated for dyslipidemia in a tertiary care hospital–A randomized controlled study." The study received approval from the Ethics Committee of KLE Academy of Higher Education and Research (KAHER), Belagavi, under Reference Number KAHER/EC/20-21/001/8. Furthermore, it has been registered with the Clinical Trial Registry of India, bearing Registration Number CTRI/2020/12/030065. Before conducting any participants' assessments, written informed consent was obtained.

RESULTS

Patient perspective survey

Out of 386 patients enrolled, 197 (51.04%) were male, and the remaining 189 (48.96%) were female. Most of them belonged to the age group 30–60 years, followed by <30 years, i.e., 68.13% and 18.13%, respectively. Twenty-four percent of
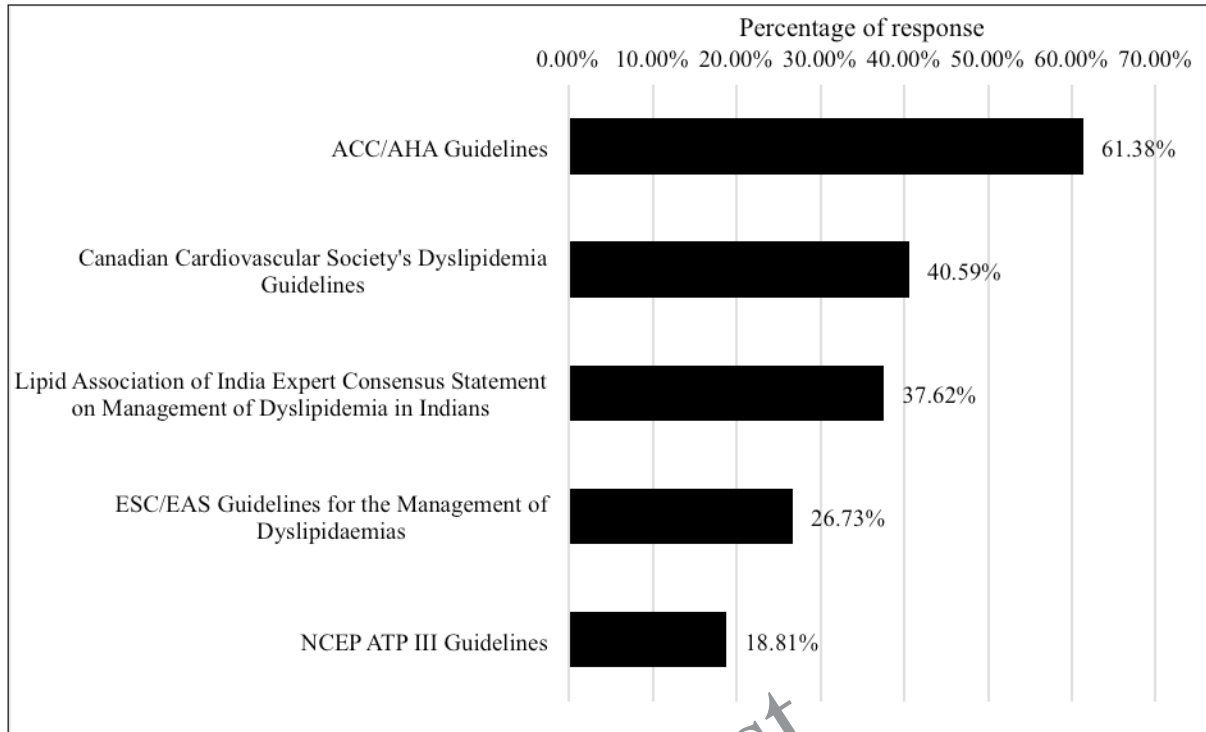
Figure 1. Awareness of dyslipidemia guidelines among healthcare professionals (N = 386).
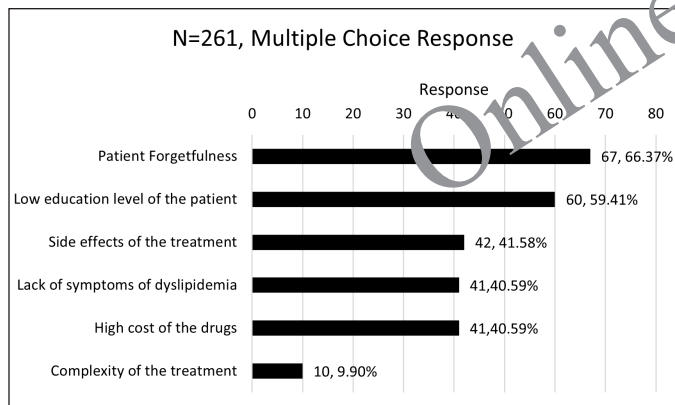

Figure 2. Reasons for noncompliance to the dyslipidemia therapy

them are illiterate and the remaining 76% have either primary or secondary or higher studies as shown in Table 1.

Patient knowledge

It is surprising that only 30.05% of them heard about the term dyslipidemia despite having the same disease. When asked what causes dyslipidemia, most of them answered lack of exercise (66.06%), followed by stress (31.87%) and the least (4.15%) said by family history of dyslipidemia (multiple choice response, Total response = 879).

Only 26.94% said that healthcare professionals discussed diet with them for dyslipidemia, and only 17.88%

were informed about cholesterol levels. 42.49% of them know that inadequate treatment of dyslipidemia leads to CVDs, as shown in Table 2.

Patient attitude and patient practice

Over a year, around 36.01% of the patients have not checked their body weight, and 72.02% have not done their lipid profile test. Only 32.12% of them are doing regular exercise out of which 35.48% are doing once a week. Most of them, around 66.13% preferred brisk walking as exercise as shown in Table 3.

Healthcare professional perspective survey

Characteristics of the healthcare professional

Out of 101 participants, 59 were physicians, 40 were Pharm. D interns, and 2 were working clinical pharmacists. On average they encounter 4–5 patients with dyslipidemia in their daily practice. Most of them are not sure (52.48%) which methods are used to stratify cardiovascular risks in dyslipidemia patients. However, 22.77% of them are using the WHO risk predictor chart for South East Asian Indians to stratify the cardiovascular risk in dyslipidemia patients. Only 23.76% of them attended lectures or continuous medical education (CME) on the management of dyslipidemia in the past years, as shown in Table 4.

Among all the respondents, most of them (61.38%) were aware of the ACC/AHA Guidelines for dyslipidemia followed by the CCS's Dyslipidemia guidelines (40.59%). It is surprising that only 37.62% of them know about the LAI expert

consensus statement on the management of dyslipidemia in Indians as shown in Figure 1.

On asking about reasons for noncompliance, most of them responded to patient forgetfulness (66.37%), followed by the low education level of the patient (59.41%) and the least said complexity of the treatment (9.90%). All the responses on the particular cause are listed in Figure 2.

DISCUSSION

Despite the evidence supporting the importance of lifestyle modification for patients with dyslipidemia, the practice of maintaining is quite low in the study. Dyslipidemia poses significant challenges due to the low education level of the patient, patient forgetfulness, side effects of the treatment, lack of symptoms, and high cost of the drugs. Lack of awareness of dyslipidemia guidelines among healthcare professionals coupled with low attendance in recent lectures or CME on the management of dyslipidemia in the past year further complicates the disease. While most of the patients get treatment for dyslipidemia, maintaining a healthy lifestyle remains a major concern. This could also be attributed to the Westernization of society and the increasing allure of young people towards the consumption of junk food. A similar conclusion was reached in a multicenter study conducted by Vispute *et al.* in India [12]. Conversely, making changes to one's lifestyle, such as regularly monitoring body weight, and lipid profile, and adhering to a diet plan prescribed by a physician, can also have a significant impact. Addressing the above challenges requires a healthcare model that includes healthy lifestyle modifications, patient education, the adoption of effective guidelines, and optimizing the patient journey that emphasizes population-based awareness campaigns and improves adherence among dyslipidemia patients. A similar model was also proposed in Germany and Brazil to manage CVDs [3,13]. 2019 ESC/EAS Guidelines recommend several strategies to encourage the adoption of healthy lifestyle changes which include the OARS method (open-ended questions, affirmation, reflective listening, and summarizing), SMART (Specific, Measurable, Achievable, Realistic, Timely) goal-setting approach, tailoring advice to the patient's culture, habits, and situation, continuous follow-up on goals and recording progress is recommended for effective behavior change management [14]. Karmakar *et al.* conducted a quasi-experimental intervention study among school teachers in West Bengal, India. The study revealed that receiving tailored health education and promoting lifestyle modifications, positively influenced behavioral characteristics, including physical activity and dietary habits [15].

The awareness of dyslipidemia guidelines among healthcare professionals does not show very encouraging results in our study. This might be due to various guidelines available on dyslipidemia management. Current recommendations such as ACC/AHA and ESC/EAS are primarily centered on Western populations and fail to account for the distinctive dyslipidemia patterns observed in Asian populations [5]. As of 2020, the LAI has issued a guideline titled "Lipid Association of India Expert Consensus Statement on Management of Dyslipidemia in Indians" focusing on Indian populations [5]. Surprisingly only 37.62% of the healthcare professionals know about the

guidelines. A major focus should be placed on contemplating guideline information through regular workshops or CME programs. Nevertheless, healthcare providers demonstrate expertise in controlling dyslipidemia through screening high-risk populations, early diagnosis, guide-based treatments, continuous follow-up, and the utilization of medication adherence aids.

Machaalani *et al.* [16] found that a poor level of knowledge is linked to CVDs [16]. In this study, low patient knowledge about dyslipidemia is associated with low adherence to treatment and lifestyle modifications. This is consistent with the studies conducted by Mohammad *et al* [17], Amarasekara *et al.* [18], and João Sérgio Neves *et al.* [19]. In this study, participants exhibited a superior understanding of risk factors compared to their awareness of dyslipidemia. This finding aligns with similar observations reported in other studies [19,20]. Although 42.49% of participants have reported that inadequate treatment of dyslipidemia leads to CVDs, only 24.35% of them are following the diet plan as per their physician. Scicchitano *et al.* [21] suggested the inclusion of Inclisiran, a novel drug that inhibits the mRNA transduction of the PCSK9 gene. With its sustained action and effective reduction of LDL-C, Inclisiran holds promise for potential integration into clinical practice for comprehensive dyslipidemia management [7,21]. In addition, 72.02% of participants have measured their lipid profile within the past year. As a result of low level of knowledge, almost one-third of participants reported exercising regularly and one-fifth of the participants were checking body weight within 3 months.

Nevertheless, the proportion of males and females was not significantly different in our study, which is consistent with the study conducted in Tehran province [20]. Most of the participants were in the age group of 30–60 years which is consistent with the studies conducted in Tehran province, and Iran [20,22].

One of the strengths of the study is the separate survey conducted for patients and healthcare professionals. However, the results should be interpreted with a few limitations, including a single-center study which may limit the generalizability of the results. Another limitation is the assessment of challenges through a questionnaire with included boundary restrictions.

CONCLUSION

Patient-related factors such as patient forgetfulness, low education level of the patient, and lack of symptoms of dyslipidemia contribute to major challenges in the management of dyslipidemia. The collaboration between healthcare professionals and patients, facilitated by the use of the aforementioned methodology to adhere to a healthy lifestyle, aims to control dyslipidemia among patients. Future studies should focus on strategies to tackle patient-related factors and facilitate the development of consensus guidelines for unifying patient management criteria for the Indian population to overcome the challenges in dyslipidemia management.

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AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the International Committee of Medical Journal Editors (ICMJE) requirements/guidelines.

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This research is a component of a broader investigation known as the "impact of pharmacist's intervention on lipid profile in patients treated for dyslipidemia in a tertiary care hospital—a randomized controlled study." The study received approval from the Ethics Committee of KLE Academy of Higher Education and Research (KAHER), Belagavi, under Reference Number KAHER/EC/20-21/001/8. Furthermore, it has been registered with the Clinical Trial Registry of India, bearing Registration Number CTRI/2020/12/030065. Prior to conducting any participants assessments, written informed consent was obtained.

DATA AVAILABILITY

All data generated and analyzed are included in this research article.

CONFLICTS OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

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USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declares that they have not used artificial intelligence (AI)-tools for writing and editing of the manuscript, and no images were manipulated using AI.

REFERENCES

1. Berberich AJ, Hegele RA. A modern approach to dyslipidemia. Endocr Rev. 2022;43:611. doi: https://doi.org/10.1210/ENDREV/BNAB037

2. Pirillo A, Casula M, Olmastroni E, Norata GD, Catapano AL. Global epidemiology of dyslipidaemias. Nat Rev Cardiol. 2021;18:689–700. doi: https://doi.org/10.1038/s41569-021-00541-4

3. Stahn A, Hanefeld M. [Multimodal therapy of dyslipidemia]. Clin Res Cardiol Suppl. 2011;6:10–6. doi: https://doi.org/10.1007/S11789-011-0031-5

4. Ballard-Hernandez J, Sall J. Dyslipidemia update. Nurs Clin North Am. 2023;58:295–308. doi: https://doi.org/10.1016/J.CNUR.2023.05.002.

5. Misra S, Lyngdoh T, Mulchandani R. Guidelines for dyslipidemia management in India: a review of the current scenario and gaps in research. Indian Heart J. 2022;74:341. doi: https://doi.org/10.1016/J.IHJ.2022.07.009

6. Agarwala A, Petersen KS, Jafari F, Kris-Etherton PM. Dietary management of dyslipidemia and the impact of dietary patterns on lipid disorders. Prog Cardiovasc Dis. 2022;75:49–58. doi: https://doi.org/10.1016/J.PCAD.2022.11.003

7. Borghi C, Fogacci F, Agnoletti D, Cicero AFG. Hypertension and dyslipidemia combined therapeutic approaches. High Blood Press Cardiovasc Prev. 2022;29:221. doi: https://doi.org/10.1007/S40292-022-00507-8

8. Kim Y, Lai B, Mehta T, Thirumalai M, Padalabalanarayanan S, Rimmer JH, et al. Exercise training guidelines for multiple sclerosis, stroke, and Parkinson's disease: rapid review and synthesis. Am J Phys Med Rehabil. 2019;98:613. doi: https://doi.org/10.1097/PHM.0000000000001174

9. Motl RW, Learmonth YC, Pilutti LA, Gappmaier E, Coote S. Top 10 research questions related to physical activity and multiple sclerosis. Res Q Exerc Sport. 2015;86:117–29. doi: https://doi.org/10.1080/02701367.2015.1023099

10. de Ferranti SD, Rodday AM, Parsons SK, Cull WL, O'Connor KG, Daniels SR, et al. Cholesterol screening and treatment practices and preferences: a survey of united states pediatricians. J Pediatr. 2017;185:99–105. doi: https://doi.org/10.1016/J.JPEDS.2016.12.078

11. Brinton EA. Understanding patient adherence and concerns with STatins and MedicatION discussions with physicians (ACTION): a survey on the patient perspective of dialogue with healthcare providers regarding statin therapy. Clin Cardiol. 2018;41:710. doi: https://doi.org/10.1002/CLC.22975

12. Vispute S, Mandlik R, Patwardhan V, Gondhalekar K, Khadilkar V, Khadilkar A. Prevalence and determinants of primary hypertension in urban and rural children from six Indian states: a multicenter study. Nutrition. 2022;103–4:111759. doi: https://doi.org/10.1016/J.NUT.2022.111759

13. Faria-Neto JR, Yarleque C, Vieira LF, Sakane EN, Santos RD. Challenges faced by patients with dyslipidemia and systemic arterial hypertension in Brazil: a design of the patient journey. BMC Cardiovasc Disord. 2022 May 21;22(1):237. doi: https://doi.org/10.1186/s12872-022-02669-8

14. Mach F, Baigent C, Catapano AL, Koskinas KC, Casula M, Badimon L, et al. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk: the task force for the management of dyslipidaemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS). Eur Heart J. 2020;41:111–88. doi: https://doi.org/10.1093/EURHEARTJ/EHZ455

15. Karmakar A, Bhattacharyya A, Biswas B, Dasgupta A, Bandyopadhyay L, Paul B. Effect of educational intervention on risk factors of cardiovascular diseases among school teachers: a quasi-experimental study in a suburb of Kolkata, West Bengal, India. BMC Public Health. 2023;23:2304. doi: https://doi.org/10.1186/S12889-023-17227-W

16. Machaalani M, Fakhry B, Zwaihed M, Mendelek K, Mahmoud N, Hammoud T, et al. Knowledge, attitude, and practice toward cardiovascular diseases in the lebanese population. Glob Heart. 2022;17:47. doi: https://doi.org/10.5334/GH.1138

17. Mohammad NB, Rahman NAA, Haque M. Knowledge, attitude, and practice regarding the risk of cardiovascular diseases in patients attending outpatient clinic in Kuantan, Malaysia. J Pharm Bioallied Sci. 2018;10:7. doi: https://doi.org/10.4103/JPBS.JPBS_227_17

18. Amarasekara P, De Silva A, Swarnamali H, Senarath UPUL, Katulanda P. Knowledge, attitudes, and practices on lifestyle and cardiovascular risk factors among metabolic syndrome patients in an urban tertiary care Institute in Sri Lanka. Asia Pac J Public Health. 2016;28:32S–40S. doi: https://doi.org/10.1177/1010539515612123

19. Neves JS, Newman C, Bostrom JA, Buysschaert M, Newman JD, Medina JL, *et al.* Management of dyslipidemia and atherosclerotic cardiovascular risk in prediabetes. Diabetes Res Clin Pract. 2022;190:109980. https://doi.org/10.1016/j.diabres.2022.109980

20. Koohi F, Khalili D. Knowledge, attitude, and practice regarding cardiovascular diseases in adults attending health care centers in Tehran, Iran. Int J Endocrinol Metab. 2020;18:101612. doi: https://doi.org/10.5812/IJEM.101612

21. Scicchitano P, Milo M, Mallamaci R, De Palo M, Caldarola P, Massari F, *et al.* Inclisiran in lipid management: a literature overview and future perspectives. Biomed Pharmacother. 2021;143:112227. doi: https://doi.org/10.1016/J.BIOPHA.2021.112227

22. Mazloomy SS, Baghianimoghadam MH, Ehrampoush MH, Baghianimoghadam B, Mazidi M, Mozayan MR. A study of the knowledge, attitudes, and practices (KAP) of the women referred to health centers for cardiovascular disease (CVDs) and their risk factors. Health Care Women Int. 2014;35:50–9. doi: https://doi.org/10.1080/07399332.2012.755980

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