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УДК [612.397.81+612.397.23]:316.774

L. V. C. S. De Mel

Scientific Supervisor: Associate Professor A. V. Litvinchuk

Educational Establishment
"Gomel State Medical University"
Gomel, Republic of Belarus

PUBLIC AWARENESS OF CHOLESTEROL AND OMEGA-3 FATTY ACIDS

Introduction

This report investigates public awareness and practices related to cholesterol and Omega-3 fatty acids. The objective was to evaluate knowledge levels, identify common misconceptions, and highlight gaps between public awareness and evidence-based scientific understanding. The findings aim to support healthcare professionals in designing targeted educational interventions [1–3].

Goal

The aim of this study was to assess public understanding of cholesterol metabolism and the physiological roles of Omega–3 fatty acids. Furthermore, it examines the perceived relationship between dietary fats and cardiovascular risk, as well as awareness of practical dietary strategies for lipid management.

Material and methods of research

An online survey was conducted among participants aged 18 to 60+ years. Demographic variables included gender, educational level, and family medical history. Secondary data were obtained from sources which included ScienceDirect and publications from the National Institutes of Health (NIH).

The results of the research and their discussion

Survey results indicate that while general awareness of cholesterol-related diseases exists, detailed scientific understanding remains limited. Many respondents primarily associated cholesterol with cardiovascular diseases, atherosclerosis, and diabetes (Figure 1).

Cholesterol

Cholesterol is a vital biological molecule involved in membrane structure, hormone synthesis, and cellular signaling. However, elevated low-density lipoprotein (LDL) and oxidized LDL (oxLDL) are recognized as significant contributors for cancers. Cholesterol levels have a dual effect on the immune response depending on the concentration.

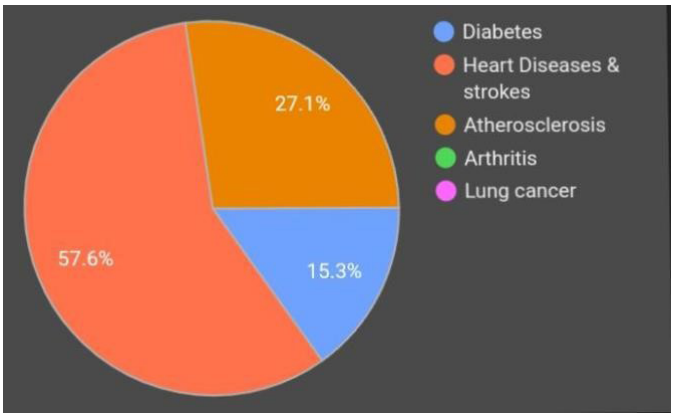


Figure 1 – Public opinion on the health problem most strongly linked to cholesterol

While cholesterol is essential, high serum levels are associated with an increased risk of cancer progression (e.g., breast, ovarian, and colorectal cancers). For instance, gefitinib-resistant nonsmall cell lung cancer cell lines possess higher cholesterol lipid raft concentrations than gefitinib-sensitive cell lines.

Inflammatory conditions, such as arthritis, may indirectly affect lipid balance by reducing highdensity lipoprotein (HDL) levels and promoting vascular damage. Additionally, elevated remnant cholesterol is associated with an increased risk of atherosclerotic cardiovascular disease (ASCVD), including peripheral artery disease, myocardial infarction, and ischemic stroke, particularly in individuals with Type 2 diabetes due to poor glycemic control and postprandial lipemia.

Omega-3

Long-chain polyunsaturated fatty acids (n-3 PUFAs), including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are essential dietary fats. They play a critical role in antiinflammatory processes and maintaining cell membrane viscosity. They are also vital for fetal development, cardiovascular function, and the prevention of Alzheimer's disease.

Although many respondents reported consuming Omega-3 supplements, most lacked knowledge regarding their specific compositions and functional differences (Figure 2). EPA contains 20 carbon atoms with 5 double bonds and is found in high concentrations in cold-water oily fish. In contrast, DHA contains 22 carbon atoms with 6 double bonds, making it more flexible and a main contributor to membrane fluidity. DHA is especially abundant in algae.

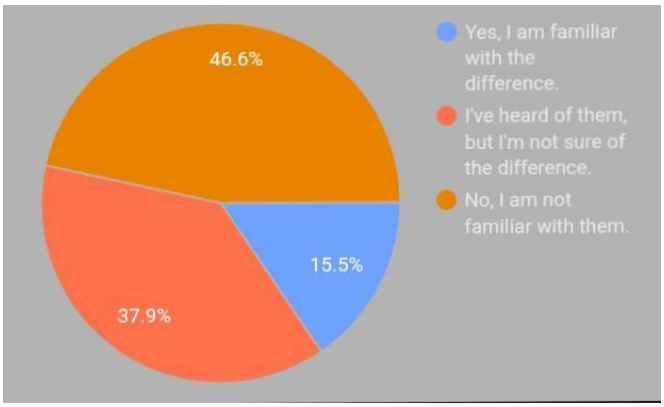


Figure 2 – Public awareness regarding the difference between EPA & DHA

Regarding markers of atherosclerosis, EPA's effects on flow-mediated dilation (FMD) are endothelial-dependent, whereas DHA's effects appear to be independent. While both EPA and DHA

decrease triacylglycerol (TAG) levels, DHA specifically tends to slightly increase HDL and LDL particle size. DHA is also more efficient at reducing blood pressure, heart rate, and platelet aggregation than EPA.

Fish oils improve cardiovascular health by altering lipid metabolism, decreasing arrhythmia, modulating platelet function, and inhibiting inflammatory pathways. EPA is specifically associated with anti-inflammatory compounds that aid joint health and mood regulation, whereas DHA is essential for brain development, cognitive function, and retinal health.

Conclusion

This study highlights a significant gap between general awareness and detailed scientific understanding of cholesterol and Omega-3 fatty acids. While participants recognize broad health associations, their knowledge of the underlying mechanisms and specific dietary management is limited. Strengthening public education with evidence-based nutritional information is essential for improving long-term public health.

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УДК 534.7:615.471

S. Fathima, C. S. B. B. Shanthikumara

Scientific supervisor: PhD, Associate Professor V. A. Bannyi

Educational Establishment
"Gomel State Medical University"
Gomel, Republic of Belarus

SOUND TRANSMISSION IN THE STETHOSCOPE: ACOUSTIC ANALYSIS OF SOUND AMPLIFICATION IN A MEDICAL STETHOSCOPE

Introduction

Auscultation remains one of the most fundamental diagnostic methods in clinical medicine. The stethoscope, invented in the early nineteenth century by René Laennec, allows physicians to evaluate cardiovascular and respiratory sounds transmitted through the human body. Despite the development of modern imaging technologies, the stethoscope continues to be widely used due to its simplicity, portability, and diagnostic value.

Heart sounds and lung sounds are mechanical vibrations produced within the body and transmitted through tissues to the chest wall. These vibrations are typically within the frequency range of 20–1000 Hz, with most cardiac sounds occurring between 50–200 Hz. Efficient transmission of these sounds is essential for accurate auscultation.

The acoustic performance of a stethoscope depends on several physical factors including diaphragm properties, tubing length, internal air column resonance, and chest-piece design. Modern acoustic stethoscopes such as the Littmann Classic III are engineered to enhance sound amplification and reduce external noise.

However, the physical mechanisms governing sound transmission through the stethoscope system remain an interesting topic of investigation in biomedical physics. Understanding these acoustic characteristics can improve diagnostic accuracy and inform the development of more efficient medical instruments [1–5].