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DIETARY SUPPLEMENTS: TYPES, HEALTH BENEFITS, AND ROLE IN DISEASE MANAGEMENT

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ABSTRACT

With the growing awareness of preventative health care, nutritional adequacy and disease prevention, dietary supplements have come to play an ever-growing role in the contemporary healthcare and nutrition practice. They include vitamin based, mineral based, herbal preparations, probiotics, fatty acid-containing, protein supplements and other types of bioactive compounds that are commonly used to benefit physiological processes and health outcomes on the whole. The increasing global market of dietary supplements reflects the novel trends of consumerism, rise in the prevalence of chronic disease, ageing as well as an increase in the interest towards the personalisation of nutrition and wellness framework. This is what the review article aims at achieving, under the critical review of the major classes of dietary supplements, evaluation of reported health-benefits and dissection of how they can be used in conjunction with managing a disease, with new scientific knowledge. The review is based on the literature review design of narrative review and generalisation in the findings which is based on the peer-reviewed scholarly research, publications on healthcare and other credible sources of nutritional information. The available information demonstrates that dietary supplements can enhance the state of nutritional status, the health of the immune system, the metabolic state, oxidative stress, cardiovascular, skeletal, gastrointestinal, and neurological health problems when used properly. The role of dietary supplements in management of the major health conditions is given special attention which include cardiovascular diseases, diabetes, obesity, immune-related disorders and bone health conditions. Biological processes that are a part of supply action are also discussed in the review, and it has proved to interact nutrient intake and metabolic activities on clinical outcomes. Though the supplements may be used as a therapeutic supplement and complement to their conventional treatment therapies, there are some concerns on improper intake of supplements, overdose, product quality and an antagonistic interaction and absence of clinical data of some products. The results show that diet supplements in lieu of balanced nutritional foods and medical therapy are not possible but can be used as an aid to therapy under scientific evidence and medical guidelines. This review concludes that more regulatory checks, evidenced-based consumer education and ongoing clinical research are required to ensure that maximum benefits and minimum risks are achieved with the use of dietary supplement.

KEYWORDS: Dietary Supplements; Nutrition; Health Benefits; Disease Management; Preventive Healthcare; Functional Nutrition; Nutritional Therapy; Public Health.

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1. INTRODCTION

Global healthcare and nutrition have seen dietary supplements become a by-word over the last few decades after growing awareness on the importance of disease prevention, healthy living and nutritional adequacy (Muraguri, 2022). The rates of urbanisation, altered eating patterns, the ageing of the population and the increased rates of chronic illnesses have led to an increased interest in products that can benefit one and enhance the quality of life. The definition of dietary supplements can be broadly described as anything that allegedly supplements normal dietary intake and may include vitamins, minerals, amino acids, herbal extracts, probiotics, proteins, fatty acids, enzymes and various other bioactive compounds. They are usually taken in the form of concentrated products like tablets, capsules, powders, liquids, and soft gels to aid physiology and to treat nutritional deficiencies unlike conventional foods (Raiciu et al., 2026).

The rising popularity of dietary supplements are indicative of more general changes in the priorities of the general population health and consumer behaviour. The unhealthy eating habits of the modern population, including non-regularity in eating habits, consumption of processed foods, stress related to work, and physical activity are the culprits in questioning the inadequate intake of nutrients (Małgorzata Znyk and Kaleta, 2024). At the same time, health-care systems of all countries are experiencing increased prevalence of non-communicable illnesses such as cardiovascular diseases, diabetes, obesity, osteoporosis, immune-related diseases as well as metabolic diseases. As a result, the population is shifting towards preventive health practices, which do not rely on the conventional model of medical treatment but also entail the incorporation of nutritional treatment in day-to-day activities. Supplementary nutrition has therefore captured attention as products with the goal of maintaining health and as an additional aid, which might be useful in preventing and controlling an illness (Binns, 2018).

The scientific interest toward dietary supplements has grown significantly over the last ten years as researchers keep on exploring the mechanism of action and clinical implications of dietary supplements in a variety of health conditions (Djaoudene et al., 2023). The existing literature suggests that adequate supplementation may prefer immune homeostasis, enhance metabolic activity, improve antioxidant functional capability, support the health of the gastrointestinal system, support bone and decreased the risk of nutrient-related disorders of choice. Vitamins and minerals belong to the most researched groups, and their understanding is still based on their established physiological role, but there are new areas of research that are concerned with probiotics, plant-based compounds, omega-3 fatty acids, protein-based supplementation, and functional nutritional products (Dhiman et al., 2025). The recent progress of nutritional science and personalised medicine has intensified the keenness in comprehending how a precision approach to supplementation can impact health across varied groups.

Although consumed by a large group of people and becoming more and more commercially accessible, the efficacy and safety of dietary supplements remain the source of scholarly and clinical discussion. Despite the results of the various studies where positive changes have been reported with regard to specific supplements, results are not consistent among populations, dosages, and disease conditions. Concerns regarding inappropriate self-medication, overuse, false health claims, a mismatch between the quality of the product and the claims, contamination, and possible interactions with pharmaceutical treatment have also been brought up (Arora et al., 2025). Besides, not all commercially supplied supplements have strong clinical evidence that supports them, and it is a mystery if some of the supplements have therapeutic potential at all. Decreased barriers to supplements through internet solutions and self-reported and educated health have led to greater need for evidence-based criticism and greater regulation.

The concerns that define the use of the dietary supplements indicate that it is crucial to synthesize the available scientific data with a critical understanding that would allow us to take a balanced approach to the issue (Dwyer et al., 2018). Rather than being placed as substitutes to the normal diets or normal medical interventions, dietary supplements are increasingly being considered as supplementary interventions that can form part of the bigger health treatment programs as long as they are used in an adequate way (Lentjes, 2019). There is therefore an urgent need for health care providers, researchers, policymakers, and consumers to learn that they have classifications, biological roles, clinical uses and their limitations.

In this connection, this review paper attempts to provide an in-depth examination of dietary supplements by outlining its major classifications, assessing its possible health-promoting effects of such supplements and criticising its usage in the treatment of diseases. Other issues covered in the

review include backgrounds of action, emerging clinical evidence, safety issues as well as future direction of the research and practice aimed at making an elaborate understanding of the dynamic role played by the dietary supplementation in the contemporary healthcare systems.

2 LITERATURE REVIEW

2.1 Historical Literature on Dietary Supplements

Over the years dietary supplements have undergone substantial changes and have become a subject of immense study in the field of nutrition, the health of individuals and prevention. Nutritional supplements ideology, as Cannon and Leitzmann argue (2022), was known centuries ago; the ideology of nutritional supplements emerged in the twentieth century with the creation of the science of nutrition. The main efforts of early methods of nutritional supplementation concerned the avoidance of the development of nutrient deficiency disorders with the consumption of vitamins and minerals in their essential forms. This study by Awuchi et al. (2020) demonstrated the effects of nutrient inadequacy and health on diseases such as scurvy, rickets and iron-deficiency anaemia, which motivates scientists to investigate nutrition interventions. As further knowledge about human physiology emerged, dietary supplements started to change the direction of application as a product to correct deficiencies towards the more general perspective of promoting normal health and disease prevention.

The idea of dietary supplementation has been construed in varying manners in both academic and regulatory domains. Hassan et al., (2020) said that dietary supplements are the provisions that are ingested on top of normal daily intake of foods to enrich nutrients or portfolios of consistently active biologically that may aid in physiological activity and health care. These products are normally available in various forms, e.g. capsules, tablets, powders, liquids and concentrated extracts. They might contain vitamins, minerals, amino acids, fatty acids, herbal constituents, probiotics, enzymes, and specific nutritional elements. The rise in the category of supplements could be blamed on the change in scientific thinking as to the importance of nutrition in maintaining a healthy body, and soothing away illness.

History shows that dietary supplements have been developed in phases directly correlating to the development of health care and consumerism. Kefalas (2020) points to the view of nutritional supplementation in the mid-twentieth century: it was mostly connected with personal health programs aimed at decreasing deficit-related diseases. Over the following decades, the increasing economic growth, urbanisation, and better food availability led to a shift in focus that focused on deficiency prevention and maximising health and promoting wellness. The development of functional foods and preventive medicine also significantly fuelled interest in the nutritional products that could impact long-term health aspects instead of dietary considerations.

There is a swift but steady internalisation of nutritional science with medical practice, and the rise of intensive use of dietary supplements everywhere around the globe has been strongly influenced by the combination of the two. With the emergence of biomedical research came the growing evidence on the role of nutrients in immune regulation, control, oxidative stress reduction, and cell maintenance. Such advances encouraged medical practitioners and the patients to consider supplementation to the medical practice they had in maintaining their health and in nursing them through the conventional medical treatments. The rising popularity of chronic diseases worldwide resulted in the increasing interest in the usage of traditional vitamins and minerals, as well as herbal supplements, probiotics, omega -3 fatty acids, protein formulations and other bioactive substances (Jadhav et al., 2023).

The changing attitude of consumers towards preventive healthcare and individual health responsibility has also influenced the consumption of dietary supplements. Wickramasinghe et al. (2020) say that modern consumers are more demanding of nutritional solutions that comply with lifestyle objectives, healthy ageing, physical fitness, prevention of diseases, and enhance quality of life. The extreme usage of supplements has been realised in both developed and emerging economies due to the high level of technology and increased personal health awareness behind supplements. Nevertheless, there are also some issues connected with the quality of products, marketing assertions, safety, and scientific validation that can be outlined in terms of the historical literature.

The present scholarly debate is also shifting towards more evidence-based supplementation and the requirement of clinical effectiveness instead of commerciality. Scientists are still studying the role of various types of supplements in health and whether the perceived effects can be reproducible across the population and health conditions (Wierzejska, 2021). Consequently, the historical background of dietary supplementation is a good place to begin in understanding the current studies as well as the

increasing significance of vitamin pills/ tablets in the contemporary care system and treatment of diseases.

2.2 Literature on Types of Dietary Supplements

The growing concern to prevent healthcare and nutrition optimisation has led to the diversification and expansion of dietary supplements in the world of healthcare industry. Recent nutritional supplements are a heterogenous bunch of supplements created to provide without trouble with nutrients or other biologically active ingredients, which may be recuperative to a normal diet and may provoke in some way in influencing physiological functions. The existing literature has demonstrated that the dietary supplements differ greatly in terms of content, mode of action, target health effects and scientific support of using the supplements. The most commonly discussed major categories in terms of nutritional research and clinical research include vitamins, minerals, herbal supplements, probiotics, omega-3 fatty acids and protein-based supplements.

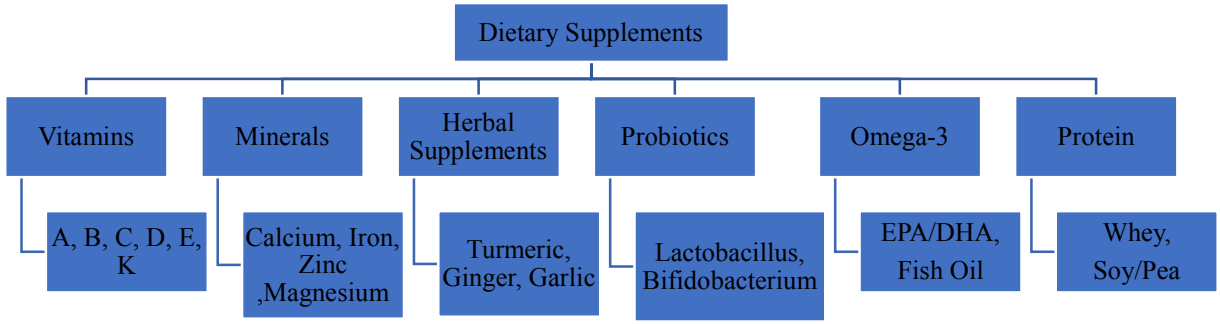


Figure 1: Classification of dietary supplements based on composition and functional use.

One of the most accepted and widely used types of dietary supplements is vitamins. They are organic compounds required in most of the biological processes like metabolism, immune, cell repair and energy. Modern and past studies always acknowledge vitamins to be essential elements in gaining and maintaining health and avoiding nutrient deficiency diseases. Andrès et al., (2024) determine that the fat-soluble vitamins include vitamin A, D, E and K, which are found to have a variety of functions, including but not limited to, vision, bones, antioxidant defence and blood clotting and the water-soluble vitamins, of which include B-complex vitamins and vitamin C, which have various functions, including but not limited to, metabolic claims, neurological effects, and immune action. In recent literature, there is a growing interest in the even wider uses of vitamin supplementation appropriate to non-deficiencies, specifically towards immune resiliency and benefits in chronic disease management.

Another significant group in the field of dietary supplementation is mineral supplements, which are still closely related to restoration of the structural and metabolic balance of the human organism. Some of the important minerals include calcium, magnesium, iron, zinc, potassium and selenium that are necessary in the development of bones, transportation of oxygen, enzyme activity, and immunity. Available research indicates that mineral supplementation could be useful in cases where there is an inadequacy in the dietary intake or there is an increase in physiological demand. Shoemaker et al. (2022) describe that combinations of calcium and vitamin D have been especially focused on in terms of their effects on retaining skeletal health, and iron supplementation has been extensively researched in terms of its ability to treat iron deficiency and associated diseases. However, literature has other concerns about the excess of mineral usage and the need to employ evidence-based supplementation actions.

The increase in popularity has been accompanied by the increasing use of herbal supplements due to increased people's eagerness towards natural and plant-based medicine (Safdar et al., 2022). Herbal supplements are based on botanicals and include bioactive compounds with the potential to have physiological actions via antioxidant or anti-inflammatory, metabolic or immunomodulatory pathways. Most commonly known examples of herbal supplements include turmeric, ginger, garlic, ginseng, and echinacea extracts, green tea extracts, and other extracts of medicinal plants. The existing literature suggests that the use of the chosen herbal products could be of benefit in health promotion and symptom management, though the inconsistency of the quality of products, lack of dose standardisation, and applicability in the population are concerns.

The connection between gut microbiota and the

overall health status has seen a growing interest in realising the usefulness of probiotics as a form of dietary supplements. Probiotics are live microorganisms that, when ingested in the appropriate amounts, may prove useful to the host (De Sire, et al., 2022). Research has determined the potential effectiveness of probiotics in the digestive tract, the immune system, nutrient absorption and microbial balance. The attention to probiotics and the scientific community regarding probiotics has increased tremendously with the emergence of microbiomes, particularly in gastrointestinal and immunology. Nonetheless, the reported results of research are changeable in regard to microbial strain, dosage and use.

The other widely researched category of supplements is the omega-3 fatty acids supplements, due to their potential effects on the cardiovascular, neurological and inflammatory. They are the unsaturated fatty acids that are commonly found in resources of fish oil and seafood, and have been known to work towards the health of the heart, preservation of cognitive functions and suppression of inflammatory actions. They are still under research in relative literature in relation to their effectiveness with respect to different health conditions and population groups.

Protein supplements can be defined as a rapidly expanding type of dietary supplementation, and they are often used to help with preserving muscle mass, muscle recovery, weight control, and healthy ageing. Karlund et al. (2019) state that protein supplementation has always been associated with sports nutrition, but has now been investigated with respect to a broader spectrum of healthcare problems, including clinical nutrition and metabolic support. The literature in the contemporary environment highlights this concept, that consumption of proteins would allow upholding the body mass and improving the performance as well as augmenting the nutritional adequacy in those with the superior physiological demands..

Table 1: Types of Dietary Supplements, Examples and Major Functions.

Type of Supplement	**Common Examples**	**Major Physiological Function**	**Common Use Area**
Vitamins	Vitamin A, B-complex, C, D, E, K	Promotes metabolism, immunity, vision, antioxidant defence and bones.	Correction of deficiencies, immunity, support of bones.
Minerals	Calcium, iron, zinc, magnesium, selenium	Development of bones, transportation of oxygen, enzyme activities and defense.	Blood, bone health, nutrition.
Herbal supplements	Turmeric, ginger, garlic, ginseng, echinacea	Antioxidant, anti-inflammatory and immunomodulatory actions	Whole body health, anti-inflammatory action.
Probiotics	Lactobacillus, Bifidobacterium	Maintain balance gut microbiota, digestion and immune signalling.	Intestinal health, gastrointestinal disorders.
Omega-3 fatty acids	Fish oil, EPA, DHA, flaxseed oil	Maintenance of lipid metabolism, cardiovascular functions and inflammation.	Cardiac, anti-inflammatory.
Protein supplements	Whey, casein, soy, pea protein	Restore muscle functions, healing, digestion and vital longevity.	Physical, fitness, nutrition, weight, dietary management, ageing.

Generally, contemporary and historical literature indicate that dietary supplements are part of a list of categories with varying physiological processes and potential applications to health. The tendency towards the growing popularization of them can be connected with the shifts in the scientific knowledge of nutrition and the growing interest to the preventative model of healthcare. Still, discrepancies in efficacy, safety profiles, or quality of evidence provide credibility to the value of critical assessment to the application of the supplements in various health settings.

2.3 Literature on Health Benefits

The use of dietary supplements has increasingly become an issue of great concern in nutrition and health studies, as it can be used in health promotion, disease prevention, and to improve body functioning (Bailey, 2020). Current studies show that, with correct use and according to evidence-based guidelines, dietary supplements may have constructive effects on numerous biological systems. Although the effects differ according to the kind of supplement, amount of the supplement used, the general health status and the period of usage, the researchers still explore the impact that nutritional supplementation produces on overall health and assists in supporting overall well-being. The most mentioned health benefits in the modern literature are immune support, which leads to metabolic regulation, cardiovascular functioning, skeletal well-being, antioxidant protection and nutritional adequacy.

Fiscal friendliness of dietary supplementation has been hotly discussed; one of the most significant results is the impact dietary supplementation has on

the support of the immune system. The interconnection between nutrient condition and immunity functions is a scientifically proven fact, particularly in the maintenance of immune cell functions and the continuous need to boost the immune functionality against vulnerability to physiological distress. According to Stefanache et al. (2023), immune regulation is usually linked to vitamins and minerals due to their role in the body in cellular and inflammatory defence processes. Nutritional deficiency has been mostly linked to a weak immune system, so researchers have delved into the question of whether there are certain supplements that can be taken in order to enhance the immune system. Other current discussions in the field of nutrition also suggest that normalcy of nutrient intake may play a part in promoting normal immune function, and specifically, groups that have increased physiological demands are a consequence of the same.

The second important area of interest that is critical and displayed in the literature is the effectiveness of dietary supplements on metabolic well-being and energy balance. Nutrients have complex metabolic activities that lead to the conversion of food into useful energy, the regulation of hormones and the management of cell functions (Chen et al., 2018). Other supplements have thus been researched on their effect on metabolic and physiological performance. However, a recent trend in research is the use of supplementation strategies to promote ageing, body composition, and metabolic stability as successful approaches to healthy ageing. The growing rate of obesity and lifestyle-related diseases in the world has been causing an increase in interest in the area of research of metabolic health to consider the nutritional interventions as supportive treatment measures for the maintenance of health.

One of the key research fields under active investigation that relates to dietary supplements has been cardiovascular health. In the literature, evidence suggests that the chosen supplements may aid in providing cardiovascular function due to the processes associated with the oxidative balance and lipid metabolism, as well as inflammatory control. According to Patted et al. (2024), the prospects to use omega-3 fatty acids, antioxidant molecules, and even nutritional intervention have been granted an important portion of scientific attention because of their potential to support the normal functioning of the heart and ensure the integrity of vessels. The recent surge in cardiovascular disease prevalence in the international population has spurred researchers to conduct research on the importance of nutritional interventions in complementing a more general preventive approach in health care. However, the literature also shows that outcomes are not similar in the literature and that the context of supplementation is to be considered within the context of the changes in diet and lifestyle.

According to Bogdanis and Giannaki (2023), bone and musculoskeletal health is another significant phenomenon in supplementation studies that is under research. To maintain healthy bones, one should ensure that one consumes enough nutrients that are involved in the metabolism and maintenance of minerals. The topic of augmentation and protection of skeletal integrity in relation to the effect of supplementation is frequently considered in literature, particularly in the case of ageing populations and patients with augmented food requirements. Calcium- and vitamin-based interventions are long-established in bone preservation and in solving the issues of nutritional deficiencies affecting aging skeletal system. Additionally, protein supplementation has also been receiving increased attention because of its potential in maintaining muscle mass and functional capacity over the period of different life stages.

Besides some of these physiological systems, there are also studies on diets supplements on their antioxidants and protective effects (Bogdanis and Giannaki, 2023). Oxidative stress has been cited as a very important biological process which is marked by ageing and the emergence of most health-related disorders. Hence, researchers continue to discuss the chances of employing them as aids to reducing oxidative imbalance and assisting the cells to be sustained with the help of certain dietary decisions. Antioxidants, plant-based supplements, and compounds have turned into a hot topic as tackling preventive health methods becomes increasingly popular (Ayaz et al., 2024).

The other major domain in the dietary supplementation studies has been in the digestive and gastrointestinal health. The increased amount of knowledge on the human microbiome has led to an increased interest in nutritional products that might help to keep the balance of all the processes and microbes. Probiotic supplement has also become intertwined with gastrointestinal health and interactions of processes in the digestive system and overall physiological effects in general. More scientific studies are required to explore the extent with which such interventions relate to long-term well-being and health.

Despite the broad expanse of the list of reported advantages, contemporary sources reiterate the

importance of looking at dietary supplements as a supplement to unified dietary patterns or treatment (Peacock et al., 2019). They can be extremely effective in the correct case, depending on the person-specific nutritional requirements and clinical evidence. Consequently, the existing studies are more inclined to adopt personalised and evidence-based strategies to supplementation to maximise the advantages and reduce the needless intake and the associated risks.

Table 2: Health Benefits of Major Dietary Supplements.

Health Benefit	Related Supplements	Possible Mechanism	Evidence Interpretation
Immune support	Vitamin C, vitamin D, zinc, selenium, probiotics	Promotes immune cell functions and inflammatory well-being.	Strengthier when there is insufficiency.
Metabolic regulation	Magnesium, chromium, vitamin D, protein	Helps in glucose metabolism, energy production and hormonal balance.	Moderate and condition-specific
Cardiovascular support	Omega-3 fatty acids, magnesium, antioxidants	Aids in maintenance of lipid levels, arterial activities and inflammation.	Variable across populations
Bone and muscle health	Calcium, vitamin D, magnesium, protein	Make bones minerals and muscles strong.	Relatively robust in terms of deficiency-risk groups.
Digestive health	Probiotics, prebiotics, fibre supplements	Helps the microbiota of the gut and the intestinal barrier.	Strain-specific and dose-dependent
Antioxidant protection	Vitamin C, vitamin E, selenium, polyphenols	Lessens oxidative stress and defenses against cells.	Compensation is dependent on base level.

2.4 Role in Disease Management

According to Mbata et al. (2024), the rising prevalence of chronic diseases and the rise in interest in preventive health care have greatly broadened the scope of dietary supplements' role in disease management research. The contemporary literature is only becoming increasingly sensitive to the concept that dietary supplements may become alternative disturbance modalities of conventional medical care and healthy lifestyles. Supplements are usually considered complementary therapies and can aid in improving nutritional status, physiologic functioning, and health outcomes in selected populations instead of substitutes that can replace prescribed therapies. As the role of scientific discussion in the management of diseases becomes the most popular issue, personalised nutrition and recruitment strategies, grounded on targeting of particular types of nutritional benefits, are becoming a more and more topical matter directly connected with the health status of individuals and their clinical needs.

One of the areas where research has been conducted extensively is the role of dietary supplements in the management of diabetes. From the perspective of Mangoulia et al. (2024), diabetes has been a serious global health concern due to its prolonged impact on metabolic well-being and complications. Depending on the available literature, nutritional supplementation can be used to enhance the process of maintaining nutritional balance as well as aiding in the metabolic balance of those individuals with disordered glucose control. The other nutrients and bioactive substances are studied regarding their effect on insulin-related pathways, oxidation equilibrium and metabolic activities. The linkage between supplementation and enhanced nutrition adequacy in diabetic groups has been a growing research area, especially in situations where there might be deficiencies of nutrients or dietary impediments. But the existing evidence is not clear, and scientists still underline that supplementation should be used as an addition and not as a substitute for existing treatment regimens and lifestyle change interventions (Mangoulia et al., 2024).

Barrea et al. (2019) said that obesity management also became an area of interest as a topic of research in dietary supplements. The recent rise in levels of obesity around the world has prompted exploration of ways of nutrition that could promote weight control and metabolism. Recent results show that the intake of the chosen supplements may have an indirect effect in the management of obesity through the increase of the nutrient adequacy, muscle mass preservation, regulation of peripheral pathways of the appetite and overall metabolic activity. Protein supplements, functional nutritional products and some bioactive compounds have been of interest as they can assist in body composition goals. Nonetheless, the literature has succeeded in highlighting the complex nature of obesity, and it is already known that the management of this condition should be multifactorial, entailing a balanced diet, physical activities, behaviour changes and medical practices rather than using supplements.

Another significant area of research in disease-oriented supplementation is cardiovascular disease. This implies that due to the increased burden of cardiovascular diseases in the world, there has been a lot of scientific attention on unravelling how

nutrition interventions can help in boosting heart health and reducing risk factors. The available literature discusses the possible manner in which the selected dietary constituents maintain normal lipid metabolism, slow or delay the inflammatory response and vascular functionality. Compounds related to nutrition cards that are linked to cardiovascular processes have been a subject of wide clinical interest due to their possible impact on long-term health care provision (Houston, 2018). In the meantime, the difference of evidence within the population and between doses occurs and appears to justify the relevance of the evidence-based interpretation of supplementation findings.

From the point of view of Venter et al. (2020), dietary supplements have also been widely debated with references to the immune-related conditions and immune system support. The growing interest in immune resilience has led to the development of studies on nutritional interventions, which could potentially regulate immune responses and maintain physiological balance. Available literature provides evidence that nutritional status has the most significant impact on immune mechanisms and environmental and biological stressor resistance. Diverse nutrients and active components are still under investigation with respect to their possible role in the mechanisms of immunology and recovery. Nevertheless, the most frequent caution scientists give against any overclaims in health activities is the fact that the way the immune system functions is determined by a number of factors which extend beyond the supplementation.

Another area of essential use of dietary supplements in managing disease is bone health and age-related musculoskeletal diseases. Demographic ageing, demographic increase, plus interest in mobility and quality of life, has triggered interest in nutritional interventions which may have the capacity to raise skeletal integrity and muscle tissue preservation (Agostini et al., 2023). The existing literature gives indications that adequate nutrition consumption can aid in maintaining structural integrity and regulating the outcome of healthy ageing. Protein and nutrient-based interventions are the focus of intense interest as they can help to alleviate physical functioning across different age groups.

A growing focus on dietary supplements has been appreciated in recent years in the vast endeavours of disease prevention and supportive healthcare (Adelowo, 2022). There has been a continuously increasing interest by scholars in the potential of nutritional interventions in engaging with the new concepts of personalised medicine, preventive health practices and models of patient-centred care. The advent of the so-called precision nutrition has contributed to the urge to decide how individuals would respond to supplementation based on the genetic, physiological, and lifestyle characteristics.

Though there is growing scientific interest and dietary supplements are becoming a mainstream practice, weaknesses have still been seen in the disease control role of dietary supplements in the literature. The differences in study design, dietary supplement composition, dose difference, duration of intervention, and diversity in population characteristics continued to lead to inconsistencies in the interpretation of evidence within the evidence base. Modern studies, therefore, serve to practice a stern basis of apprehensive application of dietary supplements in disease management systems and affirmatively advance additional research that seeks to lay out clinical directives.

2.5 *Research Gap*

The dietary supplement marketplace, with its mushrooming growth and increasing body of scientific literature, have greatly enhanced the familiarity with nutritional interventions and how they may enhance human well-being. Already the literature available has delved into detail in the types of dietary supplements, physiological role and applications in different health conditions. Various researches have found affirmative links between chooses of supplements and resultant activities engaging the immune performance, metabolism, heart, bone and wellbeing in general. Still, despite the augmented evidence base, essential gaps in the conceptual, methodology, and clinical knowledge remain within the study that have not been precisely addressed yet.

One of the critical shortcomings which have been identified in the available literature would be the difference in the outcomes of researches conducted by different individuals and different diseases. Though some studies show positive results with regard to supplementation, others have shown little results or even inconclusive results. The dissimilarities between the composition of supplements, dose, period of intervention, characteristics of the subjects, and the research study design usually make it hard to compare the results directly and restrict the generalisability of the findings. Subsequently, conclusions on the effectiveness of most dietary supplements have been inconclusive and need to be subjected to higher quality evidence.

The second significant gap relates to the type of current studies that is more likely to serve specific supplements separately in place of bigger interactions of dietary practices, life-style and health results. Most of the researches concentrate on particular nutrients or short-run impacts with little insight on the long-term health and practical applicability. Besides, existing literature is more inclined to solve the single diseases of interest, and not arrive at a consistent picture of how dietary supplements might be beneficial in most disease management scenarios.

There are also areas covered in the existing literature where the underexplored aspects of safety and regulation are not covered. Although dietary supplements are readily available, and the intake of these supplements is mostly considered as risk-free, there are several concerns that arise, including the quality of different products, inconsistent labels, excessive consumption, and even the impact such supplements have on the health care. With this fast commercial growth of the supplement industry have come further challenges of concerned standardisation and evidence-based consumer advice.

Additionally, the growth of the popularity of individualised nutrition and preventive health has created a demand of more potent evidence of individual responses to supplementation. The recent research has failed to offer concrete recommendation on the most benefiting group, under which circumstances the supplementation is effective and the disparities in the outcomes among a group of demographic and clinical groups.

In this way, up to now, there is still the need to have a comprehensive and critically integrated treatment that joins up the evidence available as far as the type of dietary supplement, to date, and health benefit and disease management use. Squeezing these gaps, it might contribute to establishing a more democratic attitude to the prospect of dietary supplementation and restriction along with the future studies, clinical and population health decisions.

2.6 Conceptual Framework

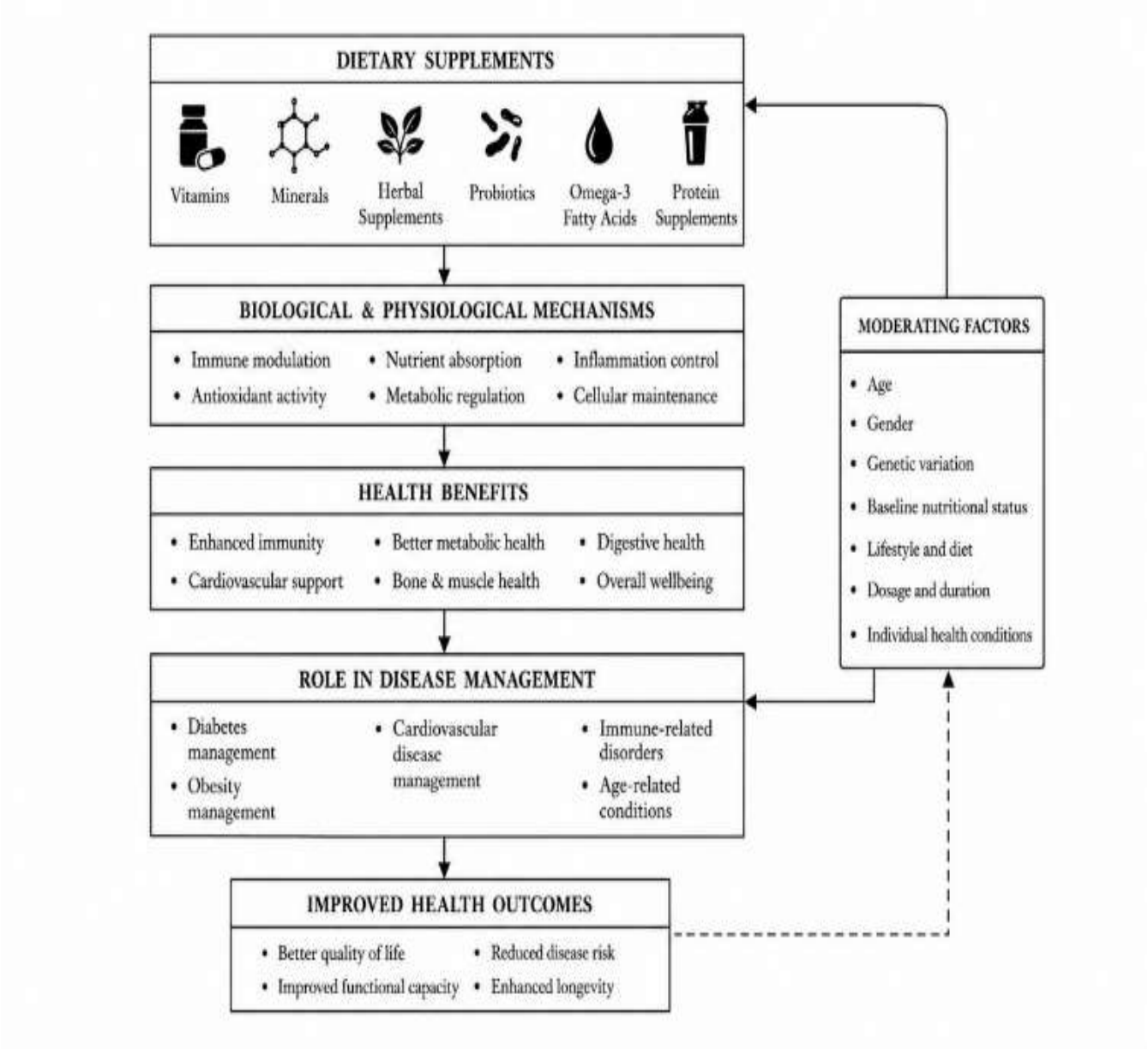


Figure 2: Conceptual framework of dietary supplements and their role in disease management.

On the basis of the synthesis of the existing literature, a conceptual flow was created to explain the connection between dietary supplements, biological and physiological processes, health outcomes, and their role in disease management outcomes. The framework offers a theoretical model of the potential role of various types of dietary supplements to human health in affecting various biological pathways and in turn serve larger healthcare goals (Wu et al., 2022). The framework considers dietary supplements as the main input factor and classifies them into six major categories, which include: vitamins, minerals, herbal supplements, probiotics, omega-3 fatty acids and protein supplements. These categories of supplements have been acknowledged in the available literature as widely used nutritional interventions which are designed to maintain normal physiological functioning and meet unique nutritional needs.

The second phase of the framework concentrates on biological and physiological processes in which supplementation can have an impact on health outcomes. Such processes are immune modulation, antioxidant activity, nutrition absorption, metabolic control, inflammation management and maintaining the cells. Available evidence indicates that these physiological reactions are the explanatory mechanisms that bridge between supplement consumption and health-related effects. The

framework also theorises that the activation of such mechanisms can lead to various health benefits such as improved immunity, better metabolic health, cardiovascular support, better digestive functioning, bone and muscle health maintenance and overall well-being. All these intermediate outcomes combine to make the environment that can potentially promote long-term health care and enhance preventive health care strategies.

Finally, the framework indicates how dietary supplements can be helpful in the management of diseases in the selected conditions, such as diabetes, obesity, cardiovascular diseases, immune-related diseases and age-related diseases. The framework also recognises the fact that moderating factors like age, gender, genetic variation, nutritional status, lifestyle behaviours, dosage, duration of use, and individual health conditions may impact the outcomes (Andreou and Papaneophytou, 2025). In general, the conceptual model offers a faceted perspective of the potential role of dietary supplements in enhancing health outcomes and facilitating disease management through proper application in combination with balanced nutrition, healthy lifestyle lifestyles, and evidence-based health interventions.

3 METHODOLOGY

3.1 Research Design

This paper takes a narrative review approach to analyse available scientific literature related to dietary supplements, their popular health-related benefits and their role in controlling diseases (Campos et al., 2024). Narrative review approach has been chosen as it offers some flexibility in the process of combining the evidence of various types of published research and gives a possibility to describe the findings in a wider context in relation to various health settings. Review studies, unlike the empirical studies, which incur primary data by conducting surveys, experiments, or clinical interventions to derive a primary data understanding, aim at collecting, analysing and synthesising prior evidence that has been published elsewhere to come up with an all-inclusive understanding of the topic chosen. The choice to use a narrative review method was informed by the wide and multidisciplinary research of dietary supplements. The literature relating to dietary supplements cuts across many fields of science, such as nutrition, medicine, public health, pharmacology, preventive healthcare, and clinical sciences. Consequently, a narrative approach offers a suitable form of integration of evidence in various supplement categories, health outcomes, and disease applications, along with the flexibility to analyse the information (Paparini et al., 2021). The purpose of the review is to critically analyse existing literature and outline patterns that are associated with the use of supplements on the basis of classification, biological action, disease treatment impacts, and overall health effects. The review is not trying to statistically integrate the findings or come up with combined effects but rather aim at thematic interpretation and the integration of evidence. In this way, the study will strive to bring a balanced perspective of the possible contribution as well as limitations of dietary supplements in the contemporary healthcare practice.

3.2 Data Sources and Search Strategy

To deliver academic rigour and comprehensivity, literature used in this review was determined as a result of structured searching of known scientific databases and recognised healthcare literature. Several databases were chosen in order to get a wide coverage of publications pertaining to nutrition, healthcare and clinical evidence. We used the Databases of PubMed, ScienceDirect, Scopus and Google Scholar, as they contain a vast array of peer-reviewed information in medical and nutritional sciences. Further supporting evidence in the form of selected reports and publications by recognised international health organisations was gathered where relevant. Search combinations were done using predefined keywords and search phrases that were related to the aims of this review. They were search terms, such as dietary supplements, nutritional supplementation, health benefits of dietary supplements, nutritional vitamins and disease management, probiotics, omega-3 fatty acids, preventive healthcare, clinical nutrition and, finally, dietary supplements safety (Businaro, 2022). And/or Boolean operators were used in searching the databases to enhance the precision of the search and found literature that covered more than one dimension of dietary supplementation. The literature that was recently published (within the last four years, between 2021 and 2026) was prioritised to ensure that the findings represent recent trends in nutritional science and healthcare practice. Nonetheless, the chosen previous articles were also incorporated where needed to give the theoretical understanding and historical insight into the development of dietary supplements. The searching strategy was developed in order to identify the evidence covering such aspects as supplement categories, mechanism of action, health benefits, disease management applications, safety concerns

and future healthcare implications.

3.3 Inclusion and Exclusion Criteria

Predetermined inclusion and exclusion criteria were used to select the literature to ensure consistency and the quality of evidence in this review (Shaheen et al., 2023). Historical studies were only included when they fulfilled one or both of the following criteria: had to be published in peer-reviewed academic journals, must deal with dietary supplements and health-related outcomes, must discuss disease management applications, must discuss biological mechanisms, or must discuss clinical and nutritional effectiveness. Articles in the English language were selected in order to make it consistent in interpretation and analysis.

Studies that included human populations and evidence that had been acquired through clinical studies, review studies and observational research were also given priority to studies that were involved in nutritional practice. The publications that dealt with significant types of supplements (vitamins, minerals, probiotics, herbal supplements, omega-3 fatty acids, and protein supplementation) were deemed as most relevant to the goals of this article (Lopes et al., 2023). Excluded studies included studies that were mainly opinion that did not include enough scientific description, duplicated publications, marketed only a commercial product or had insufficient methodological description. Articles that were not related to health outcomes or disease management were also not sorted out as final analysis. The use of these criteria facilitated the process of screening literature that would provide useful evidence to the aims of this review.

3.4 Data Extraction and Analysis

After finding and screening the literature, they were subsequently systematically reviewed to produce the information contained in the literature and bring together the findings into thematic categories. Information gathered was data extraction, which involved collecting information about the support classifications, mechanisms of action, reported health outcome, disease management use, safety issues and developments emerging in the field (Islam et al., 2018). The chosen research was analysed in comparison to detect the repetition of themes, similarities in the results, areas of disagreement, and gaps in the evidence. Feedback was synthesised in a narrative fashion as opposed to employing statistical aggregation techniques in order to generate a balanced interpretation of the current investigation.

The analytical tasks were to identify the evidence based on the goals of the review as well as to sort out the results into significant parts such as types of dietary supplements, their health benefits, use in the management of diseases, safety issues, and future perspectives. This thematic method allowed making comparisons between the various types of evidence and maintaining contextual information about the respective studies. This review will attempt to offer a bigger picture on the current scientific knowledge on dietary supplementation and its role in health care practice by synthesising the results of various sources of knowledge.

3.5 Ethical Considerations

It is a review study in which a primary data collection, personal contact with the participants, or a clinical intervention is not required. Thus, there was no need to have ethical approval from a research ethics committee. The entire content of this article was taken from already published academic works and sources on scientific knowledge. Good academic integrity was observed by being careful in the interpretation of evidence as well as in the responsible synthesis of the findings. The research is evidence-based and will strive to provide a balanced discourse by recognising both the beneficial and restrictive effects that the use of dietary supplements has. The practice promotes transparency and helps to establish responsibility in reporting scientific research involved in the review process.

4 DISCUSSION

4.1 Overview of Dietary Supplements

The literature reviewed shows that dietary supplements are a key component of the modern nutritional and health care systems. They are closely connected to the rising interest in preventive care, malnutrition, chronic diseases and interest in maintaining the health of older people over time (Andreou and Papaneophytou, 2025). Whilst always, supplements were used to rectify nutrient deficiencies, in recent years they have also played a crucial role in supporting immunity, metabolism, physical performance, healthy ageing and supportive disease management.

Consumer behaviour and clinical needs influence the use of dietary supplements. Healthcare products are prescribed for people that are not eating sufficient amounts of a particular food, or have a higher physiological need for it, or are on a special diet, or have a malabsorption problem, or are suffering from a disease that requires nutrition. Consumers typically take supplements as part of their self-care, fitness, beauty, wellness and prevention regimens.

The versatility of the supplement market's popularity for many ailments and ages is one of its attractions.

There are, however, a number of publications that suggest that supplements should not be used as a substitute for a whole diet and/or treatment. Their effectiveness will be determined by the baseline nutrition status, dosage, length of time taken, the quality of the supplements, age of the individual, lifestyle and disease status (Wu et al., 2022). It can be beneficial for a person who is low on a nutrient, but it might not be too beneficial for those who get enough nutrients from food. It should be appreciated that supplementation is not a routine health practice but has merely been found to be supportive.

4.2 Types and Health Benefits

There are several general types of dietary supplements available in the literature, such as vitamins, minerals, amino acids, proteins, probiotics, and herbal products and omega-3 fatty acids (Adelowo, 2022). The various categories come with varying levels of scientific evidence, health applications and physiological functions. The best known are the vitamins and minerals, and these are known to be involved in human physiology. Vitamins A, C, D, E, K and B-complex vitamins are all key in immunity, metabolism, antioxidants, bone health, vision, and neurological functions. Minerals like calcium, iron, zinc, magnesium, selenium and iodine are also critical for the growth of bones, transporting oxygen, assisting enzymes, regulating thyroid and immune system function.

Herbal supplements have experienced an increase in use with an increased demand for natural and health products. These include Turmeric, Ginger, Garlic, Green Tea Extract, Ginseng, echinacea and ashwagandha. They are frequently associated with antioxidant, anti-inflammatory, metabolic and immune supporting properties. But for other vitamins and minerals, there is more variation in evidence, in part, because of the variety of concentrations, extraction methods, formulations, and quality of herbal supplements (Agostini et al., 2023).

The probiotics have come into focus as an area of focus in research for gut microbiota and its association with digestive, immune and metabolic diseases. May contribute to a balance of microorganisms and aid gastrointestinal function (this effect is strain specific). Omega-3 fatty acids are well known for their heart health, anti-inflammatory effects and brain health. Protein supplements are popular in the realms of muscle recovery, weight management, sports nutrition and healthy ageing.

There is a diverse overall effect of dietary supplements, with no consistency. A number of supplements have good evidence in cases of deficiencies and in some clinical situations, others need further research. This means that the benefits of supplements can't be classified as a whole.

4.3 Biological Mechanisms

Several bio-mechanisms can be used to explain the potential benefits of dietary supplements. The easiest one is correcting a deficiency in nutrition (Houston, 2018). This lack of essential nutrients may impact on normal metabolic functions, immunity, tissue repair and normal levels of hormones. In the case of absolute or elevated level requirements, these functions can be restored by supplementation.

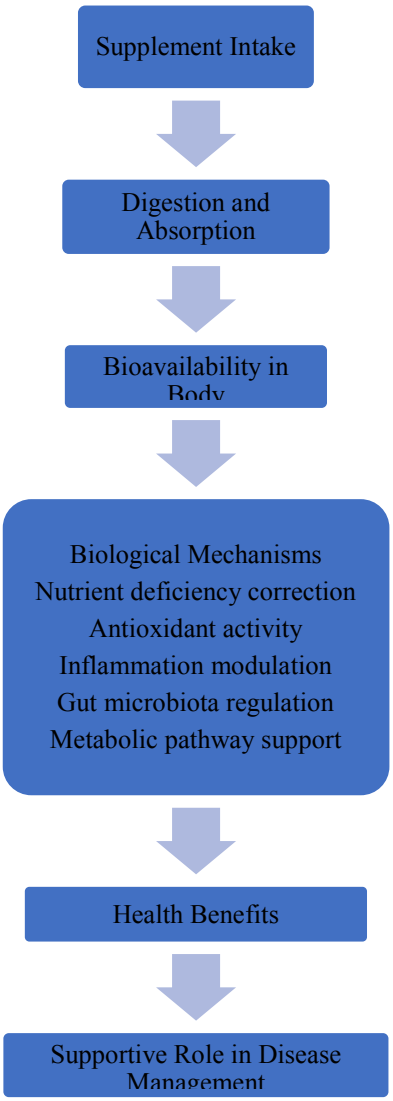


Figure 3: Biological mechanisms through which dietary supplements may influence health outcomes.

The second mechanism is antioxidant activity is extremely important. Some supplements, like vitamin C, vitamin E, selenium, polyphenols, and certain herbal substances may be beneficial in decreasing oxidative stress. Oxidative stress is related to ageing and there are some links between oxidative stress and chronic disease processes, and a possible benefit of antioxidant support from supplementation.

Control of inflammation is also crucial. Omega-3 fatty acids, some micronutrients and plant compounds contain natural chemicals and nutrients that impact inflammation pathways. Anti-inflammatory supplements are helpful because they have an impact on chronic low-inflammatory processes that are associated with cardiovascular disease, diabetes, obesity and other chronic diseases (Barrea et al., 2019). However, if it is biologically plausible, it does not necessarily mean that it can be clearly proven to be clinically beneficial and may not work for everyone.

Modulation of gut microbiota (probiotics and prebiotics) is the other important mechanism. These supplements may have an impact on the diversity of the gut microflora, gut barrier function, nutrient uptake and immune signalling. In addition, there is an interesting aspect of metabolic regulation; particularly, glucose metabolism supplements, lipid balance supplements, appetite control supplements and energy production supplements. In this context, magnesium, chromium, vitamin D, protein and omega-3 fatty acids are all nutrients that have been examined.

There are a number of ways that dietary supplements work and should be used with caution. Complementation should be done when there is a nutrition need, clinically indicated, or clinically supported.

4.4 Role in Disease Management

Based on the literature reviewed it has been concluded that the use of dietary supplements may be beneficial to control certain diseases among them chronic and nutrition-related diseases (Mbata et al., 2024). They need to be used along with medical treatments and lifestyle changes and are not a replacement for medicine prescribed by a doctor. They are most effective at correcting nutrient deficiencies, physiological levels, and/or when alleviating disease-induced nutrient deficiencies.

Some popular cardiovascular supplements mentioned include antioxidants, magnesium, omega-3 fatty acids and certain plant supplements. These can assist in promoting lipid metabolism, vascular function, control of blood pressure and balancing inflammation. Nevertheless, supplementing alone is not enough and should be used in addition to a good nutrition/diet, exercise, weight management and medical monitoring, as it is an important part of cardiovascular risk management.

Vitamin D, magnesium, chromium, omega 3 fatty acids and some herbal supplements are known to possess glucose-lowering, insulin sensitizing, antioxidant and nutritional effects, and are used in the study of diabetics and metabolic disorders (Peacock et al., 2019). Some evidence of possible benefits, especially in the case of deficiency; results have not been consistent. For this reason, supplements are not recommended to replace medication, self-monitoring of blood sugars, diet and lifestyle changes.

Yet another area where supplements are frequently marketed as an aid to obesity is in the management of the condition. Yet another location in which the supplements for obesity are promoted is as a part of obesity management. When used in conjunction with exercise and calorie reduction, protein supplements can aid in satiety, maintenance and body composition. There are other types of food that also have fibre, though, which can help to better control appetite. Weight loss in the long-term isn't a good approach to supplementing, though, because obesity can be influenced by behavioural, metabolic, genetic, environmental and social factors.

Common nutrients with regard to bone health are calcium, vitamin D, magnesium and protein. These nutrients may assist in maintaining bone mineralisation, muscle function and a healthy ageing process, especially during old age, or in those who are susceptible to vitamin and mineral deficiency. Immunity enhancing supplements (vitamin C, vitamin D, zinc, selenium, probiotics and herbal medicines) can be used to help maintain normal immune function; however, there is no justification for 'over-claiming' to prevent and treat illness.

Therefore, diet supplements should form part of the disease management but not as a cure all and should be based on evidence and condition specific.

Table 3: Disease-wise Role of Dietary Supplements.

Disease / Condition	Commonly Discussed Supplements	Supportive Role	Key Limitation
Cardiovascular diseases	Omega-3 fatty acids, magnesium, antioxidants, garlic	May aid lipid metabolism, blood pressure and inflammation equilibrium.	Independent of medication or lifestyle change.
Diabetes and metabolic disorders	Vitamin D, magnesium, chromium, omega-3, selected herbal supplements	May promote glucose metabolism, insulin sensitivity and oxidative homeostasis.	Evidence remains inconsistent
Obesity	Protein supplements, fibre supplements, functional nutrients	May help maintain satiety, muscle maintenance and body composition.	It is not nutritional supplements happening in isolation that result in sustainable weight loss.
Bone disorders	Calcium, vitamin D, magnesium, protein	Promotes the mineralisation of bones, muscle strength and healthy aging.	Dosage ought to be in relation to individual deficiency risk.
Immune-related conditions	Vitamin C, vitamin D, zinc, selenium, probiotics	Promotes healthy immune system and healing.	Keep prevention or cure claims to a minimum
Digestive disorders	Probiotics, prebiotics, fibre	Helps to maintain the balance and digestion of the gut microbiota	Making impact is strain-specific and dependent on individuals.

4.5 Safety Concerns and Regulatory Implications

Though considered safe, there are several issues that have been raised in the literature about dietary supplements. Too much is eating problem of too many. The higher the dosage, the more benefits will be reaped, however, with increasing doses, the fat soluble vitamins, minerals and concentrated herbal extracts can be toxic. Some nutrients may build-up the body and create a balance and/or toxicity problem.

Interactions with drugs is also a concern. Other bio-agents may influence the absorption, metabolism and/or excretion of some prescribed medicines, which may occur when taking herbal medicines (Chen et al., 2018). Especially when using certain long-term medications such as blood pressure medications, diabetes medications, an antidepressant or blood thinning medications. Therefore, it is crucial for people with chronic diseases, pregnant women, elderly and regular users of medication to get the expert opinion.

Product quality, labelling are still the important regulatory challenges. Purity, concentration, accuracy of ingredients and potential contamination are all variable for supplements. There may be ingredients in some products that are not included and/or misleading health claims. There are several differences between the regulations of dietary supplements in many countries compared to the regulations for pharmaceutical medicines, which means that dietary supplements are not as extensively tested before being available to consumers.

The concerns are that there is a need for increased quality control, labelling, safety monitoring and regulation of health claims. Consumer education is also required, since we can't guarantee that natural products are free of risk or that they are needed if they are, that they are safe and substantiated.

Table 4: Safety Concerns and Regulatory Issues.

Safety / Regulatory Issue	Explanation	Possible Consequence	Suggested Control
Excessive intake	High-dose vitamins, minerals or herbal extracts may exceed safe limits	Toxicity, imbalance or adverse effects	Professional guidance and dosage monitoring
Drug-supplement interactions	Some supplements may affect medicine absorption or metabolism	Reduced drug effect or increased side effects	Medication review by healthcare professionals
Product quality variation	Supplements may differ in purity, strength and composition	Unreliable outcomes or contamination risk	Quality certification and stronger regulation
Misleading health claims	Some products may overstate benefits	Consumer misinformation	Evidence-based labelling
Self-medication	Consumers may use supplements without medical advice	Delayed treatment or unsafe use	Public education and counselling
Weak regulatory control	Supplements may be less strictly tested than medicines	Market availability of poorly validated products	Post-market surveillance and safety reporting

4.6 Future Research Directions

Future study needs to focus on improving evidence on dietary supplements available, including the quality and consistency of the evidence. There is a need for additional high quality clinical trials to determine the long-term effectiveness, safety, dosage, and population-specific effects. Because of the wide variety of study designs, sample sizes, formulations, dosage and duration of studies available, it is impractical to do comparisons and make clear recommendations.

Personalised nutrition will also be a topic for further investigation. Supplements can influence individuals differently, and some might work for some people and not for others; they can depend on various factors such as age, genetics, diet, gut flora, lifestyle, medications used, and health. Additional research is needed to determine groups that might benefit the most and when some supplements are effective (Bogdanis et al., 2023). This would make targeted supplementation and evidence based supplementation easier as opposed to general supplementation.

Additional research also needs to be done to examine the drug-to-drug and drug-to-supplement interactions, particularly among individuals who are taking multiple drugs for chronic illness. Need more attention with herbal and multi ingredient products due to their broad usage and lack of standard clinical evidence. New technologies like digital health technologies and personalised dietary assessment technologies should also be explored for their association with safe supplementation in future studies.

There will be a greater emphasis on dietary supplements in preventive health care and disease support. They will be evaluated later with more evidence, regulation and professional advice, and responsibly used along with balanced nutrition and health care.

5 PRACTICAL IMPLICATIONS

5.1 Implications for Healthcare Professionals

The findings of this review have important implications for health professionals who will counsel patients about nutrition, be responsible for the care and management of diseases, offer patients

preventive services, and educate patients. As use of dietary supplements continues to rise, it is important for patient care providers to inquire of patients about the use of supplements in advance and be mindful that patients may not always be forthcoming about the supplements they are taking. Some people take vitamins, minerals, herbal remedies, probiotics, protein powder and other supplements without consulting a health professional and could be at risk of taking too much of a nutrient, as well as too little or also taking more than one at a time or too much of a mixture of nutrients in the same supplement.

The healthcare professional should consider the factors discussed above when evaluating a supplement: nutrition, health history, age, diet and lifestyle, and medications. Any recommendation for supplementation should be based on evidence and the clinical need and not be based on a generalised statement of a health claim. For instance, supplementation might be beneficial for people that have been identified to have a deficiency, have limited diets, pregnant women, are at increased risk because of age, have malabsorption disorder, or have a chronic disease and require nutritional support, etc. However, for individuals with good nutrition in their diet, too much of the supplement may not be of much benefit and may be unhealthy.

Yet another implication of this is the need for adequate counseling with the patient on appropriate expectations. Supplements should not be considered a replacement for a healthy diet, a prescription medicine or a prescription healthy lifestyle. As long as they are carefully chosen and given in the correct doses, for the right period and for the right health reasons, physicians might be able to inform patients about the advantages of supplements. While supplementation may be helpful along with medical treatment in a patient with certain cardiovascular disease, diabetes, obesity, immune disease or bone disease, it is not a substitute for medical treatment.

5.2 Implications for Consumers

This review points to the necessity to approach the use of dietary supplements responsibly, educating consumers and luring them by the side of the road. While supplements are easy to find in pharmacies, supermarkets, gyms, health spas, and the Internet, it doesn't guarantee they are safe or effective. Consumers may consider supplements as a natural way to be healthy and believe that the supplements are "safe to use. The evidence presented in this article indicates, however, that certain supplements can have either beneficial or harmful effects, depending upon the type, dosage, quality and interaction with the individual's health condition.

People should not take any physician's or social media advice or rely on any advertisement regarding supplements. Rather, consumption of supplements should be determined according to actual need for specific nutrients, when necessary, based on valid scientific data and medical advice. This is particularly relevant for the use of people who have a chronic disease, children, athletes, older adults, pregnant women and those who take regular medicine. Carefully read the labels on products, follow the dosage directions and avoid overuse as well as using low quality brands to reduce potential harm.

It is important to note, consumers are also reminded that supplements are not an alternative to a healthy eating and lifestyle. Eating a balanced diet is always the best choice of nutrients; if a supplement is necessary, it should be taken in order to correct specific nutrient deficiencies or to help meet specific health objectives. There is the risk of becoming complacent with the use of supplements and for them to become a distraction to other necessary lifestyle changes, such as eating healthier, exercising, sleeping well, managing stress and adhering to their medical treatment. So, if you want people to use supplements safely, evidence-based and not just what they think they should be taking, education for consumers is important.

5.3 Implications for Policymakers and Regulators

There are also policy implications regarding the results for policy makers and regulators. Due to the rapid growth of dietary supplement markets, issues such as product quality, product labels, safety and health claims have become problematic. In some countries, the regulation of dietary supplements does not correspond with that of a pharmaceutical medicine because in dietary supplements, bioactives can be present in high concentrations, and may have a physiological effect. This failure of regulation can lead to claims that lack substantiation, inconsistencies and quality of ingredients, contamination and unacceptable usage by consumers.

There is a need for the regulatory authorities to take steps to reinforce the quality control of supplements of foods, such as through the regulation of accurate labelling, transparency of ingredients, clarity of dosage and support for scientifically substantiated health claims. Product directions need to be easily understood by product users, such as uses, potential hazards, dosage instructions, and

warnings to susceptible users. In addition, enhanced monitoring after the product is marketed and available for consumers to identify adverse event, contamination and unsafe formulations is needed.

The policy makers there should also encourage public health education campaigns to raise awareness of consumers about their intake of supplements. These efforts can help to lessen the spread of misinformation and prompt people to consult a health professional before taking supplements to treat a disease. Health care, research, regulatory and industry collaboration is needed to promote the safe use of supplements.

Whereas the results of this review may be applicable to the use of a dietary supplement for health promotion and/or disease management, then it is only if used responsibly. Their advantages rely on evidence-based guidance, which is clearly set out in the regulatory environment, and consumer awareness and being part of a wider suite of actions to support improved health and nutrition.

6 LIMITATIONS OF THE REVIEW

This review gives a general review of the literature related to dietary supplements, what they are, their health benefits and how they can be used for managing disease. However, there are some disadvantages. The first is that it is a narrative review, not a systematic review nor a meta-analysis. It's therefore based on a thematic interpretation of published literature and not a sampling of the results from the studies. This may make it difficult to pinpoint the specific link between specific supplements and clinical responses.This can make it difficult to pinpoint the specific effects of specific supplements on clinical results.

Secondly, the evidence of dietary supplements is very heterogeneous. The studies differ in study design, sample size, population, dosage, formulation of the supplements, length of intervention and outcome measures. A few differences make it difficult to directly compare the results of studies. Whereas, for vitamins and minerals, there is often a stronger body of evidence when there is a deficiency, while the evidence in relation to herbals and multi-ingredient products is more inconsistent due to the lack of standardisation and variation in how they are prepared.

Thirdly, the focus of this review is on published scientific and academic literature. This enhances the academic reliability but does not necessarily indicate unpublished data, industry data, consumer usage patterns or out of study and research use of supplements. Therefore, the use of supplements among the general population could be more widespread and more complicated than what is seen in academic research.

One disadvantage is that there are often significant individual differences in response to dietary supplements. The effects of supplementation may vary from person to person, depending on various factors like age, sex, genetics, diet, lifestyle, medication usage, nutritional status and the diversity of gut microbiota. These factors are generally not taken into account in many studies and general recommendations, therefore, may not be applicable to all populations.

Also, the long-term safety of some supplements is not known, particularly those containing one or more herbs and/or concentrated extracts. While numerous studies are available for the short-term effects, long-term use and cumulative effects and interactions with prescribed medications are not as well represented. This makes it difficult to make conclusions about the long term safety and effectiveness.

Last but not least, country-to-country differences in regulation will create a barrier to quality and safety evaluations of supplements. Other products are also available, which are not as similar as the one mentioned above in terms of composition, dosage, purity and labelling requirements. Therefore, findings from research in one area might not necessarily be the same for the products in another area.

Though incomplete, this review is consistent with literature and offers a comprehensive overview on dietary supplements and their potential role and contribution in health promotion and supportive disease management. The restrictions also highlight the need for more in-depth, uniform and long-term research studies in this field.

7 CONCLUSION

As a result of the ever-changing landscape of nutrition, preventive healthcare and supportive disease management, dietary supplements are becoming a major player in today's nutritional arena. Today more than ever, vitamins and minerals, herbals, probiotics, bio-active products, protein and other products are used to keep people healthy and meet their nutritional needs and to prevent chronic diseases. This review has found that in some situations where nutritional intake is low, physiological needs are increased, or dietary intake is limited (such as in old age or certain disease conditions) it may be beneficial to take a supplement for certain nutrients.

From literature it is known that the supplements have various functions in the body. Vitamins and minerals are essential to all the above processes, as well as metabolism, immune function, bone growth, neurological function, and cell growth. Some of the omega-3 fatty acids are linked with cardiovascular and inflammatory pathways, and probiotics may positively affect digestive and immune system health. Herbal medicines and herbal medicines derived from plants might have antioxidant and anti-inflammatory properties, but these properties are not always reliable, and different preparations, doses, and purities are available. Protein supplements can be used in conjunction with a suitable diet and exercise to help maintain muscle mass, physical function, weight management and healthy ageing.

Food supplements appear to be supportive, rather than healing, in the management of diseases. They can help to manage some diseases such as cardiovascular disease, diabetes, obesity, immune and bone function disorders, especially if nutritional deficiency is a factor in the disease. However, supplements are not recommended to be used for diets, in a prescription or clinical treatment or lifestyle modification. The work based on the nutrition level of the individual, the quality of the supplement, dosage, time and the health condition.

The review also covers any safety and regulatory aspects pertinent to the subject. Contamination and interactions with drugs and supplements continue to be significant, as do excessive use, self-medication and low quality products and false claims. The risks call for more stringent regulations, better labelling, advice from professionals, consumer education. Healthcare providers should discuss the use of supplements with patients, and help reduce unnecessary and potentially harmful supplements.

Following a scientific approach, dietary supplements, properly chosen and used, can be a positive factor for health promotion and disease support. There is a need for more clinical trials of higher quality and longer duration, as well as personalised nutrition, dosage standardization and improving the assessment of herbal and multi-component products in clinical trials. Appropriate implementation of an evidence-based and well-designed approach to optimize the benefit and minimize risk of dietary supplements is important.

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