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Compliance to Evidence-Based Dietary Management Practices for COVID-19 by Pakistani Dietitians

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ABSTRACT

Aim. This study aims to examine the role of evidence-based dietary recommendations practiced by dietitians in clinical settings for COVID-19.

Methods. Secondary data was collected by gathering evidence-based literature from credible organizations and literature sources regarding dietary guidelines on the management of COVID-19. Quantitative data were collected through a questionnaire comprising 20 general questions and filled by 62 participants (4 males and 58 females). The questionnaire was designed to examine the recommended dietary practices. Descriptive statistics were used to determine the alignment of dietitians' knowledge and practices with the literature.

Results. Although there is a need to improve the approaches and gain more evidence-based knowledge, it is satisfactory to know that dietary guidelines and approaches provided by practicing dietitians or nutritionists in local clinical settings in Pakistan are based on evidence.

Conclusion. The study emphasizes the importance of integrating validated dietary guidelines into clinical nutritional practice for both preventive and therapeutic care. Future research should focus on assessing the long-term effectiveness of these dietary interventions and exploring gaps in their consistent implementation across diverse clinical settings.

Keywords: clinical dietitians, COVID-19, dietary guidelines, evidence-based practice, nutrition, well-balanced diet

Highlights

- Practicing dietitians in Pakistan emphasized home-cooked, healthy foods as effective dietary practices during the COVID-19 pandemic.
- Participants had varied views on the use of multivitamins and minerals supplements for immune support.
- Dietitians proposed evidence-based dietary strategies for both symptomatic and asymptomatic patients.

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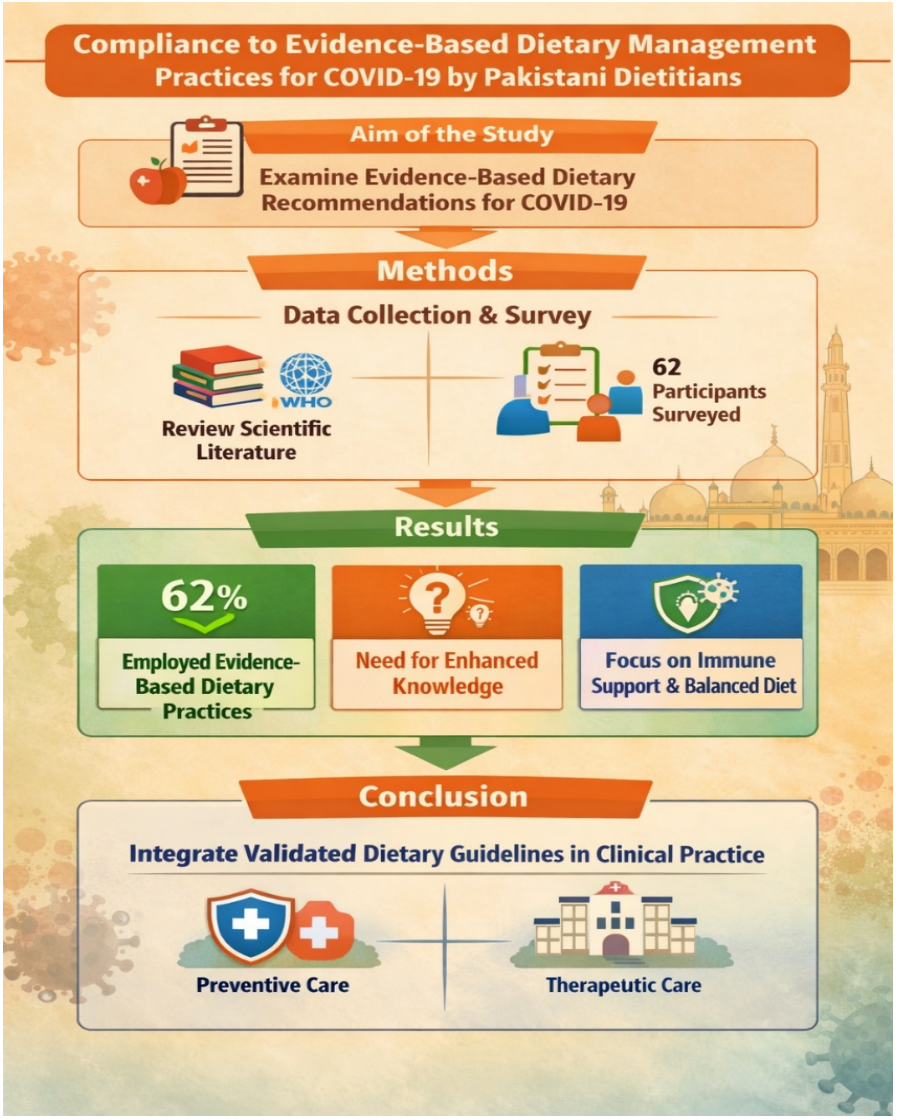
GRAPHICAL ABSTRACT



1. INTRODUCTION

COVID-19, or coronavirus disease 2019, is a contagious respiratory disease caused by the severe respiratory disorder SARS-CoV-2 [1]. It has been transmitted to many countries including Pakistan. It was first recognized in December 2019 in Wuhan, China. Afterwards, it spread at an astonishing rate, worldwide. The rapid transmission of the virus is due to various factors, such as patients who remain asymptomatic, or who are in the initial symptomatic stage. It also includes the lack

of assessment in many countries. By March 2020, the World Health Organization (WHO) had declared the spread of COVID-19 as a pandemic. Almost 1,436,198 cases of COVID-19 had been reported, out of which almost 85,000 resulted in death by April 2020.

A large number of cases from China had been exposed to the virus with clinical statistics as follows: almost 80% of patients showed slight symptoms, 15% had an acute infection, while the remaining 5% suffered from chronic diseases. The death rate was stated as 2.3%. In Italy, it was 7.2% [2].

In Pakistan, the first case of the novel coronavirus was reported in Karachi in February 2020. By April 2020, almost 54,700 suspected cases of COVID-19 had been reported in the country, out of which 4690 were tested positive, that is, 8.6% of cases. In 4690 cases, almost 15% of the patients recovered (727 cases), while 1% experienced severe symptoms (45 cases), and the mortality rate was 1.4% (66 cases). Most of the cases were from Punjab (49%), while Sindh had a 26% incidence rate, according to the report of April 2020. Khyber Pakhtunkhwa had 13% of the total cases but had the lowest mortality rate, that is, 3.5% [3].

The infectious COVID-19 also affected the majority of the healthcare staff as well. In Pakistan, 138 healthcare experts were tested positive. So, to deliver health facilities for COVID-19 affected patients, those who had other health conditions, and those with restricted access to medical services and facilities proved to be challenging for the health system in Pakistan. This is because it required immediate preventive measures to be adopted by the population and the healthcare sector, so as to reduce the rate of incidence across Pakistan [4].

The COVID-19 pandemic proved to be a serious health hazard all over the world. Hence, the importance of adequate nutrition in maintaining a healthy immune system against the virus cannot be underestimated. Health, age, sex, medicine, and lifestyle all have an impact on an individual's nutritional status. A person's nutritional status was considered as a credible measure of resistance to illness during the COVID-19 pandemic. Research implies that strengthening the immune system of the body is imperative for survival in the long-run. It is critical to have adequate iron, zinc, and vitamins (A, B6, E, B, B12, and C) to keep the immune system functioning effectively. Vitamin C aids in the development of a healthy immune system. A well-balanced diet provides a healthy immune system capable of fending off the virus's attacks. One should maintain a healthy lifestyle through exercise and an adequate intake of fresh fruits, vegetables, meat, nuts, and whole grains [5].

Furthermore, diverse nutritional components influence gut microbial makeup which, in turn, regulate the immunological responses of the body. Researchers discovered that food packaging or food alone is not a cause of viral infection, but hygienic dietary standards should always be followed to reduce the possibility of infection. People who consume a well-balanced diet tend to be healthier, with stronger immune systems and a decreased risk of chronic infections and illness [6].

In Pakistan, in the industrial and commercial sectors specifically, the spectrum of dietetics and nutrition is expanding. Dietitians monitor their clients' well-being and then offer advice about which meals to eat depending on their findings. Pakistanis suffer from a severe nutritional deficit, for instance, deficiencies of iron, zinc, calcium, and vitamins A, C, D, E, and B complex.

Nutritional inadequacies are a widespread problem. Both children and mothers suffer from serious nutritional deficits. As a result, dietitians need to conduct research to detect and manage various illnesses through diet. They also need to develop health and nutrition plans to promote good eating patterns. Depending on the current weight, dietary practices, health history, and activity level, a trained dietitian creates a balanced eating plan for the specific client.

Generally, dieticians play a very important role in the health sector of Pakistan because they examine, identify, and manage diet-related health issues. Community members benefit from their efforts to improve health and prevent sickness. Similarly, they can provide guidelines regarding the management of COVID-19 to help the public in the prevention of its spread through diet.

During the viral pandemic, dietitians and healthcare professionals provided advice on the necessity of drinking water, tea, and milk, as well as eating other water-containing meals for the management of COVID-19. Water consumption recommendations differ greatly. Children require 4 - 5 cups of water per day, adolescents (9 - 18 years) require 7 - 11 cups per day, and older individuals require 9 - 13 cups per day

This study aims to examine how beneficial and effective the evidence-based dietary management guidelines proved to be for COVID-19, as perceived by the dietitians. The specific objectives are as follows:

- To gather recurrent evidence in the literature on various dietary guidelines in the management of COVID-19.
- To assess the evidential knowledge of dietitians/nutritionists regarding different dietary approaches for the management of COVID-19.
- To determine the perceived effectiveness of evidence-based dietary management guidelines for COVID-19.

2. METHODOLOGY

This research is based on a descriptive framework and the data was collected in two phases.

Phase 1: In the first phase, secondary data was collected through evidence-based literature compiled by reputable organizations including World Health Organization, the British Dietetic Association, the National Institute for Health and Care Excellence, US Department of Agriculture, and the Dietitians Association of Australia on the preventive and therapeutic measures for COVID-19. Correspondingly, COVID-19 comorbidities and their management, physical activity, adjunct therapies, and goals of management were also considered, as recommended by these organizations.

Phase 2: In the second phase, cross-sectional survey was generated through Google forms and distributed among 62 practicing clinical dietitians selected through convenience sampling and approached via social media platforms. The survey was composed of a questionnaire based on the dietary guidelines recommended in the gathered evidence-based literature. The five-point Likert scale was used as a scale of measurement in the close-ended questionnaire.

Quantitative data was analyzed through IBM SPSS to compute descriptive statistics. Data analysis was displayed using tables and figures. The results were then analyzed and compared to assess how similar the dietary practices recommended by

clinical dietitians are with COVID-19 preventive and therapeutic guidelines assembled from reputable organizations' evidence-based literature.

Only practicing clinical dietitians were approached for data collection. No data was collected from COVID-19 patients or the general public. Self-medication and herbal remedies for COVID-19 therapeutic or preventive measures were not investigated in this study.

2.1. Ethical Considerations

All participants willingly joined and took part in the research with full knowledge about its purpose and the nature of their participation. Informed consent was obtained from them before filling in the questionnaire. Researchers safely handled and stored the research data and results only for research purposes to avoid improper disclosure of information obtained from and about research participants. To establish the integrity of the research procedure and develop trust with the participants, as well as to uphold ethical standards, their privacy was protected. The identity of the participants and their information were kept confidential while collecting and analyzing the data. The research ethics approval form is given below in Figure 1.

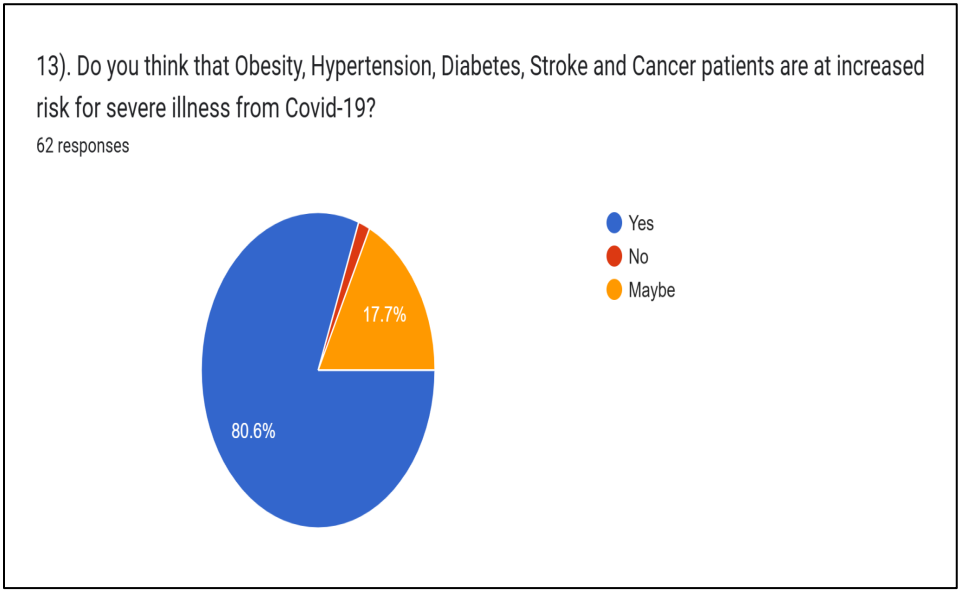


Figure 1. Dietitian's Knowledge on Comorbidity as Risk Factor for COVID-19 Severity

3. RESULTS

Dietary recommendations and guidelines for COVID-19 suggested by highly reputable organizations are given below in Table 1. These were gathered for the evidenced-based literature.

In total, 62 Pakistani dietitians participated in the survey. Approximately 93.7% of participants were female and the remaining 6.3% were male. Further, 82.3% of participants had clinical experience ranging from 1 month to 9 years, while 51.6% had dealt with COVID-19 patients.

Table 1. Dietary Recommendations by Reputable Organizations

Organization (Date of Publication)	Dietary Recommendations for COVID-19	Foods to be Avoided	Foods to be Taken	COVID-19 Comorbidities and their Management	Physical Activity and Adjunct Therapies	Goal of Management
eatrightpro.org (7-May-20)	Include foods from all five food groups; fruits, vegetables, whole grains, lean proteins, and low fat or fat-free dairy. Plan meals that freeze well. Use fresh, frozen, or canned fruits and vegetables.	N/A	Canned peas, beans, and lentils. Frozen or canned fruits and veggies. Nuts, dried fruits, and cereals. Grains like oats, quinoa, rice, pasta, and whole wheat bread. Dried herbs such as dill, basil, and parsley.	N/A	N/A	To plan, prepare and store healthful homemade meals while under quarantine during the Covid 19 pandemic
emro.who.int (27-Mar-20)	Eat fresh unprocessed foods daily. Avoid overcooking fruits and vegetables to prevent vitamin loss. Drink 8-10 cups of water daily. Consume unsaturated fats rather than saturated fats. Reduce salt and sugar intake. Avoid eating out.	Processed meats. Trans fats present in fast foods, fried foods, frozen pizza, pies, cookies, and margarine. Soft drinks and fruit juices.	Fruits, nuts, vegetables, whole grains legumes, and meat. White meat and fish. Low-fat dairy. Iodized salt	Avoid sugar salt and fat to lower the risk of overweight, obesity, heart disease, stroke, diabetes, and cancer.	Counseling & psychosocial support	To improve health and strengthen the immune system to lower the risk of chronic illness and infectious diseases.

Organization (Date of Publication)	Dietary Recommendations for COVID-19	Foods to be Avoided	Foods to be Taken	COVID-19 Comorbidities and their Management	Physical Activity and Adjunct Therapies	Goal of Management
euro.who.int (27-Mar-20)	Prepare home-cooked meals. Be mindful of portion sizes. Follow good food hygiene practices. Limit salt, sugar, and fat intake. Steam, grill, or sauté instead of frying foods. Ensure adequate fiber intake. Stay hydrated. Avoid Alcohol.	Foods containing partially hydrogena-ted oils Alcoholic beverages	Long lasting fresh and frozen fruits and vegetables Dried and canned pulses Whole grains and starchy roots Dried fruits, nuts, and seeds Eggs Canned fish and veggies Reduced-fat, shelf-stable milk	N/A	150 minutes of moderate-intensity or 75 minutes of vigorous-intensity physical activity per week. Practice meditation to remain calm.	To consume a healthy, nutritious diet and remain physically active which supports a healthy immune system.
bda.uk.com (16-Mar-20)	Eat a variety of foods to maintain a healthy balanced diet. Maintain good hygiene practices to avoid infection. To support immune function, including copper, folate, iron, selenium, zinc, and vitamins A, B6, B12, C, and D-rich foods in your diet.	N/A	N/A	N/A	Vitamin D supplements along with a well-balanced diet during winters are suggested.	To eat the right diet and keep well physically and mentally to prevent or recover from Covid 19.
dietitiansaustralia.org.au	Purchase shelf-sta-	N/A	Fruits and vegetables	N/A	N/A	To consume a nutrient-rich diet

Organization (Date of Publication)	Dietary Recommendations for COVID-19	Foods to be Avoided	Foods to be Taken	COVID-19 Comorbidities and their Management	Physical Activity and Adjunct Therapies	Goal of Management
(11-Jun-20)	ble foods from major food groups. Choose fresh, frozen, or canned fruits and vegetables. Recommended protein sources include · Canned soup and fish, legumes, nuts, and seeds. Long-life Milk (UHT or powdered milk) is recommended. Use herbs and spices to flavor food and reduce salt intake.		Soup, fish, and legumes. Nuts, seeds, and nut butter UHT or Powdered Milk Whole grains such as rice, quinoa, rolled oats, and cereals.			that ensures optimum immune system function.
ncbi.com (21-Nov-20)	Include foods from all food groups Take a healthy diet for a strong immune system. Try to consume fresh fruits and vegetables daily	Try to avoid sugar, salt, and saturated fat.	Whole grains, nuts, and healthy fats. Fresh fruits and vegetables. Lean meat, fish, and dairy	N/A	N/A	To maintain good hygiene practices and to decrease the risk of hypertension and diabetes which can aggravate symptoms of COVID-19.

Organization (Date of Publication)	Dietary Recommendations for COVID-19	Foods to be Avoided	Foods to be Taken	COVID-19 Comorbidities and their Management	Physical Activity and Adjunct Therapies	Goal of Management
nice.org.uk (17-Dec-20)	Use vitamin-D supplements or include foods rich in vitamin D to improve the body's immune system	N/A	Oily fish, poultry Eggs and dairy products Fortified cereals	N/A	N/A	To maintain bone and muscle health and strengthen the body's immune system which helps prevent respiratory viral infection.
Krause (17-May-16)	Promote adequate intake of nutrients. Take dietary vitamins and mineral supplements. Try to take home-cooked food.	Alcohol Spices particularly red and black Coffee and other caffeinated beverages.	Complex carbohydrates. Nutrient-dense foods i.e. (milkshakes, lean proteins, eggs). Wheat, rice, barley. Fresh fruits and veggies. Nuts and dry fruits.	N/A	Emphasize regular exercise and physical activity. Provide resources to psycho-social barriers.	Good nutrition helps defend against infectious diseases, prevents complications, and supports a healthy immune system.
Understanding nutrition (Apr-15)	Take all nutrients for optimal functioning of the immune system.	N/A	Protein-rich foods Omega-3 fatty acids Vitamin A, D, C, and E rich foods e.g. eggs, cheese, liver Whole grain breakfast cereals, pulses, green vegetables, and poultry.	N/A	N/A	To identify factors that protect people from infectious diseases and describe the role of nutrition in immunity.

Approximately 61.3% of dietitians strongly recommended eating a well-balanced diet to prevent COVID-19 infection, as indicated in Table 2. Further, 66.1% strongly agreed on including all major 5 food groups (grains, meat, dairy, fruits, and vegetables) in the diet, while combating COVID-19 infection. All participants had different opinions when asked about the increased risk of severe COVID-19 illness in people with vitamin A and D deficiencies, as compared with healthy individuals. The responses were as follows: (strongly disagree: 1.6%, disagree: 3.2%, neutral: 32.3%, agree: 30.6%, strongly agree: 32.3%)

Almost all participants believed that a person who eats at restaurants and food stalls regularly and anyone who has high sugar, high saturated fat, and trans-fat intake in their diet are at a higher risk of contracting COVID-19. However, 8.1% disagreed, 29% remained neutral, and 38.7% agreed on the benefits of limiting salt, sugar, saturated fat, and trans-fat intake for COVID-19 infection. Moreover, 66.1% of respondents recommended Vitamin D supplements to combat pneumonia in COVID-19 patients (Table 2).

Tab1e 2. The Perceptions and Knowledge of Pakistani Dietitians Regarding COVID-19

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
How useful do you think a well-balanced diet can be for Covid-19 prevention?	4.8	1.6	4.8	27.4	61.3
Do you think all five major food groups should be included in the diet while fighting against Covid-19 infection?	1.6	1.6	8.1	22.6	66.1
On a scale of 1 to 5, do you think that people who have Vitamin A and D deficiencies are at increased risk for severe illness from Covid-19 than healthy individuals?	1.6	3.2	32.3	30.6	32.3
Do you think that limiting the salt, sugar and saturated/trans fats will be helpful against Covid-19 infection?	3.2	8.1	29.0	38.7	21.0
Based on the scale of 1 to 5, do you think that Vitamin D can be used as a supplementary therapy in patients to boost up innate immunity and to combat mild to moderate Covid-19 pneumonia?	1.6	4.8	27.4	38.7	27.4

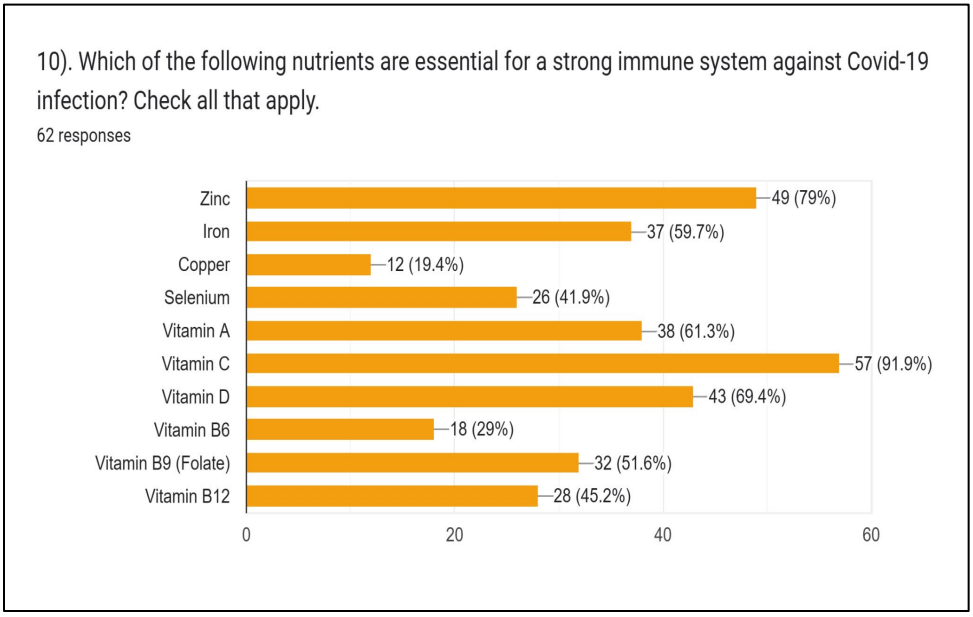


Figure 2. Dietitian's Knowledge on Nutrients Necessary for Strong Immune System in COVID-19

When asked about essential micronutrients for a strong immune system, 91.9% selected Vitamin C and 79% selected zinc. Other nutrients, iron (59.7%), Vitamin A (61.3%), Vitamin D (69.4%), Vitamin B6 (29%), folate (51.6%), and Vitamin B12 (45.2%) were also recommended by the participants, as presented by Figure 2. Comorbidities were considered a risk factor for COVID-19 by 80% of the dietitians (Figure 1).

Based on the findings, it can be concluded that Pakistani dietitians have effective and evidence-based knowledge about the management of COVID-19. Dietitians and nutritionists are well-versed in the benefits of a well-balanced diet in combating COVID-19. Although there is a need to improve the approaches and gain more evidential knowledge, it is satisfactory to know that dietary guidelines and approaches provided by practicing dietitians or nutritionists in local clinical settings in Pakistan are based on evidence in the literature. Hence, they prove to be practical and successful.

4. DISCUSSION

This research aimed to gather evidence from the literature on various dietary practices for the management of COVID-19. Correspondingly, the nutritional knowledge of dietitians was assessed regarding COVID-19 prevention and treatment, which are recommended currently in the local clinical settings to the general public. The study concluded that a balanced diet that contains all five major food groups is recommended for COVID-19 management. This study supports the dietary practices of dietitians, as indicated by the results. Data analysis suggests that most of the practicing dietitians of Pakistan recommend the nutritional guidelines that aid in the management of COVID-19.

As evidence suggests, a well-balanced nutritious diet can help to boost the immune system, which is the key objective in fighting COVID-19. A well-proportioned nutritious diet provides a healthy immune system capable of fending off the virus's attacks. People who consume a well-balanced diet tend to be healthier, with stronger immune systems and a decreased risk of chronic infections and illnesses [4]. After evaluating the responses, the majority of the dietitians supported this dietary practice while dealing with COVID-19 patients, as well as healthy individuals, as shown in Table 2.

Research also proves that a poor nutritive status, inactive routine, and obesity are linked with a declining immune system which increases the risk of COVID-19 and increases the severity of its symptoms. An individual's nutritional status is dependent on several factors but it is not restricted to age, gender, physical activity, disease, and medications [4].

Most of the studies recommend the intake of fresh food from the basic five food groups: starchy carbohydrates, healthy fats, dairy, protein, and fruits and vegetables. Fruits and vegetables are high in fiber, antioxidants, and water content, all of which help to prevent diseases like hypertension, obesity, and diabetes, which are some of the most serious COVID-19 consequences. To reduce the intake of saturated and trans fats, approximately one-third of the organizations and societies suggested to avoid salt, fat, and sugar and also encouraged reductions in sugary drinks, other sugar-rich foods, red meat servings, and other animal-based foods [7].

So, it is important to develop healthy and balanced nutritional patterns incorporating all the major food groups in daily dietary regime [8]. The majority of the dietitians supported this evidence, recommending a micronutrient-rich diet, along with essential and healthy macronutrients, including carbohydrates, proteins, and healthy fats.

With dietary administration, food safety and appropriate handling of food items are also mandatory [4]. Additionally, WHO prefers protein sources including lentils, legumes, fish, nuts and seeds, and dairy products in a COVID-19 patient's diet. WHO also recommends cooking meals at home while following good hygiene practices, limiting salt and sugar, and drinking enough water [9].

The COVID-19 infection always harms the patients that have weak immune systems. Moreover, as proposed by the British Dietetics Association, inadequate protein consumption, particularly that of essential amino acids (arginine, glutamine, leucine, isoleucine, and valine), is associated with low production of antibodies and immune cell proliferation, which can have negative and deteriorating effects on a person's immune system. This validates the claim that a low protein diet increases the risk of COVID-19 infection. Consequently, strengthening the immune system by taking moderate, wholesome, and healthy food is the main goal of diet management [8]. As indicated by the results depicted in Figure 2, the respondents recommended essential micronutrients for a strong immune system, strengthened by taking vitamins (A, C, B6, B9, B12) and minerals (such as zinc, selenium, iron, and copper-rich foods) in the diet. These micronutrients can be obtained through natural food sources and via supplements for those patients who remain deficient in them. Similarly, it was considered that micronutrient deficiencies may lead to a weak immune system, which further increases the risk of fatal diseases like

COVID-19 [10]. The respondents accepted this theory and strongly agreed with it, as indicated in Table 2.

Vitamin D has a prominent role in modifying the immune system. Research has also highlighted its preventive and therapeutic qualities that have a significant role in treating respiratory diseases, such as influenza and COVID-19. A recent evidence-based research distinguished the defensive effect of a Vitamin D-rich diet against the risk of COVID-19 and increased mortality rate [10]. Table 2 shows the agreement of the respondents with the findings of this study. Hence, supplemental Vitamin D is recommended for the patients suffering from severe COVID-19 pneumonia.

Adjunct therapies such as meditation, psychosocial support, and counseling, [11] as well as physical activity, also improve health and strengthen the immune system, thus lowering the risk of chronic illnesses and infectious diseases [12]. Regular exercise and psychosocial support as aide treatments for COVID-19 are also recommended by well-known nutritional book Krause [13]. In this study, the majority of the dietitians supported this evidence and suggested physical activity and counseling to the public to help reduce the risk of other diseases, for instance, weight gain, diabetes, and elevated blood pressure, due to a sedentary lifestyle and unhealthy food choices.

Overall, to reduce the risk of the viral COVID-19 infection, one must implement a healthy lifestyle with diet, exercise, and well-balanced eating habits. Numerous studies showed that for the improvement of the immune system, it is considered ideal to incorporate certain nutrients in the diet that have abundant antioxidant qualities, including the following food sources: fresh fruits and vegetables, soy, nuts, and omega-3 fatty acids. There is also a need to limit the intake of high caloric, high sugar, and high salt foods. In contrast, carbohydrate-rich diets should be avoided as they may become the foundation of unhealthy weight gain and obesity. In short, dietary status is the main factor that determines the outcome of the COVID-19 patients [14, 15].

As the evidence suggests, an increased intake of macronutrients during quarantine can also cause micronutrient deficiencies which may lead to obesity and a weakened immune system, thus making a person more vulnerable to the viral COVID-19 infection. Consequently, it is substantial to adopt healthy and well-adjusted dietary patterns containing a variety of minerals, antioxidants, and vitamins, along with a balanced proportion of macronutrients, low GI carbohydrates, lean proteins, and unsaturated fats [8].

On the whole, these results build on existing evidence in the literature and support the dietary guidelines of COVID-19 management as recommended by the dietitians of Pakistan. The data contributes to a clearer understanding of the current nutritional knowledge of the experts in this field. It assures that the dietary guidelines and approaches provided by practicing dietitians or nutritionists in local clinical settings in Pakistan remain effective, evidential, and fruitful.

The participants used the retrospective recall method while filling the survey which may have caused some accuracy problems due to recall bias. To conclude, the research highlights that dietary guideline from local dietitians in Pakistan are effective and evidence-based. While improvements and further understanding are needed due to the evolving nature of COVID-19 variants, it's reassuring that Pakistani dietitian possess effective knowledge to manage the virus.

Author Contribution

Maira Tanveer: data curation, formal analysis, investigation, project administration, visualization, writing-original draft. **Izma Azhar:** data curation, formal analysis, investigation, visualization, writing-original draft. **Mahnoor Maqsood:** investigation, writing-original draft. **Nafeesa Ismail:** investigation, writing-original draft. **Rabia Sagheer:** investigation, writing-original draft. **Umar Bacha:** methodology, supervision, writing-review and editing. **Afifa Tanweer:** conceptualization, methodology, supervision, writing-review and editing

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

Data supporting the findings of this study will be made available by the corresponding author upon request.

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Generative AI Disclosure Statement

The authors did not used any type of generative artificial intelligence software for this research.

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