
The Pattern of Dietary Supplements

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ABSTRACT

Background: Dietary supplements have become increasingly popular worldwide, with millions of people using them to maintain or improve their health. However, the knowledge, attitude, and practice of dietary supplement use among young and adults remain poorly understood.

Objectives: This study aimed to determine the knowledge, attitude and practice of dietary supplement use among consumers.

Methods: This study employed a quantitative data collection and analysis methods. A nationally representative survey of adults ($n = 720$) was conducted to collect quantitative data on dietary supplement use, demographics, health status, and health behaviors. In-depth interviews ($n = 360$ male and 360 female) were conducted with adult dietary supplement users to collect data on their experiences, motivations, and perceptions of dietary supplement use.

Results: The survey results showed that 73.2% of adults reported using dietary supplements, with vitamins, minerals, and omega-3 fatty acids being the most commonly used supplements. Multivariate analysis identified several predictors of dietary supplement use, including higher education level, higher income, and engagement in healthy behaviors. The qualitative interviews revealed that young and adults using dietary supplements for various reasons, including maintaining overall health, to prevent chronic diseases, and to enhance physical performance.

Conclusion: This study provides new insights into the knowledge, attitude, and implications of dietary supplement use among young and adults. The findings suggest that dietary supplement use is common among adults, and that certain demographic and health-related factors are associated with dietary supplement use. The study's results have implications for public health practice, policy, and research, highlighting the need for evidence-based guidance on dietary supplement use, as well as further research on the safety and efficacy of dietary supplements.

INTRODUCTION

The global consumption of dietary supplements has witnessed a remarkable increase over the past few decades, largely fueled by heightened public awareness about the importance of nutrition, wellness, and disease prevention. This trend has been further reinforced by the rising prevalence of chronic illnesses such as obesity, diabetes, cardiovascular diseases, and age-related conditions, prompting many individuals to turn to dietary supplements as a convenient way to fill nutritional gaps and support overall health. According to the U.S. Food and Drug Administration (FDA), dietary supplements are products intended for ingestion that

contain a "dietary ingredient"—which may include vitamins, minerals, herbs or other botanicals, amino acids, enzymes, and various other substances—used to supplement the diet and enhance nutritional intake. The Dietary Supplement Health and Education Act (DSHEA) of 1994 legally defines and regulates these supplements in the U.S., assuring consumer access to a wide range of such products, though with minimal pre-market testing requirements compared to pharmaceuticals¹.

In recent years, the global dietary supplement market has grown to exceed \$140 billion in value, reflecting not only consumer demand but also a proliferation of products across various categories and health claims. In India, too, the popularity of dietary supplements has been on the rise. Multivitamins and mineral supplements are among the most commonly used, often prescribed or purchased over-the-counter (OTC) in both urban and rural settings. A number of studies have shown that people are increasingly incorporating supplements into their lifestyles, either for general health maintenance or specific health needs such as pregnancy, recovery from illness, or age-related deficiencies. The elderly, in particular, are high consumers of dietary supplements, often using them to manage or prevent chronic conditions like osteoporosis, immune dysfunction, and age-related macular degeneration. However, the use of supplements is not limited to older adults; people across all age groups, including the youth, are using them to enhance physical performance, improve cognitive function, lose weight, or simply as part of a health-conscious lifestyle².

Despite their perceived benefits, the use of dietary supplements raises several concerns. One of the primary issues is the lack of stringent regulation and quality control in many parts of the world, including India. Unlike prescription medications, dietary supplements are not subject to rigorous clinical testing before entering the market. This has led to wide variability in product quality, with some supplements failing to meet label claims or containing harmful contaminants such as heavy metals, banned substances, or undeclared pharmaceuticals³. Additionally, many consumers are unaware of the risks associated with excessive or inappropriate supplement use. Taking high doses of certain vitamins or combining multiple supplements can lead to toxicity or serious health complications. For example, excessive intake of vitamin A has been associated with liver damage and birth defects, while herbal supplements like St. John's Wort can interfere with prescription medications and reduce their effectiveness. Such risks are especially pronounced among the elderly, who often take multiple prescription drugs and may unknowingly combine them with supplements, increasing the potential for dangerous drug-supplement interactions⁴.

Another significant issue is the knowledge gap among consumers regarding the safe and effective use of supplements. Decisions to use dietary supplements are often influenced by various sources including family, friends, television, social media, and the internet—sources that may not always provide accurate or evidence-based information. While healthcare professionals like doctors and pharmacists can play an essential role in guiding safe supplement use, studies have shown that many individuals do not consult with medical professionals before starting supplements. Moreover, people often do not disclose their supplement use to their physicians, which further increases the risk of interactions and adverse effects. This problem is compounded by marketing practices that make bold health claims without sufficient scientific backing, misleading consumers into believing in the universal safety and efficacy of such products⁵.

Given the growing reliance on dietary supplements and the potential health implications associated with their misuse, it becomes crucial to study how consumers perceive and use

these products. In the Indian context, where regulatory oversight may be less robust and public health education varies widely across regions, understanding consumer knowledge and practices is especially important. Such a study would provide insights into how well-informed users are about the benefits, risks, proper dosages, and possible interactions of the supplements they consume. It would also shed light on the motivations behind supplement use—whether it is driven by medical advice, peer influence, or commercial advertising—and help identify gaps in awareness that could be addressed through targeted education campaigns⁶.

Therefore, this study aims to explore the patterns of dietary supplement use in India, focusing specifically on consumer knowledge, attitudes, and behaviors. It seeks to examine the extent to which individuals understand what supplements they are taking, why they are taking them, and whether they are using them safely and effectively. By doing so, the research will contribute valuable data to inform public health strategies, guide policy decisions regarding supplement regulation, and ultimately promote more informed and safer consumption of dietary supplements in the Indian population.

RESEARCH METHODOLOGY

This research adopts a **quantitative approach**, aimed at systematically assessing consumer knowledge and practices regarding dietary supplement usage among adults. **Across-sectional study design** was employed to collect data at a single point in time, providing a snapshot of the participants' supplement consumption patterns, knowledge levels, and related health outcomes.

Study Area and Participants

The study was conducted in **Prayagraj**, a district in the Indian state of **Uttar Pradesh**, which is administratively divided into **75 districts**, of which Prayagraj was **purposely selected** for its diverse urban population. Prayagraj comprises **23 blocks** and **8 sub-divisions**, including **80 municipal wards** and **5 municipal zones**. Within this setup, **Civil Lines**, a prominent and centrally located area within the Prayagraj Municipal Corporation, was chosen purposively as the study site due to its accessibility and representative population.

The **study population** consisted of **adult residents of Prayagraj**, aged **between 18 and 60 years**, who were approached for participation from May 2023 onwards.

Sample Size Calculation

The sample size was determined using the formula:

$$n = z^2 \cdot p \cdot q / E^2 \quad n = \frac{\{z^2 \cdot p \cdot q\}}{\{E^2\}} \quad n = E^2 z^2 \cdot p \cdot q$$

Where:

- $z = 1.9$ $z = 1.9$ (standard normal deviate for 95% confidence level)
- $p = 0.49$ $p = 0.49$ (anticipated prevalence based on existing literature)
- $q = 1 - p = 0.51$ $q = 1 - p = 0.51$
- $E = 0.05$ $E = 0.05$ (margin of error)

Substituting the values:

$$n = 1.9^2 \cdot 0.49 \cdot 0.51 / 0.05^2 \approx 720 \quad n = \frac{\{1.9^2 \cdot 0.49 \cdot 0.51\}}{\{0.05^2\}} \approx 720$$

The sample size was equally distributed among **males (n = 360)** and **females (n = 360)** to ensure gender representation.

Sampling Technique

A **stratified random sampling method** was used to select participants from the ward-level list of residents:

- The **first participant** was selected using the **currency note method** (choosing a random serial number).
- Subsequent participants were selected using a **random number table**.
- If the selected individual was unavailable or declined to participate, the **next eligible person on the list** was approached.

This technique helped ensure randomness while maintaining logistical feasibility in fieldwork.

Exclusion Criteria

Participants were excluded from the study if they met any of the following criteria:

- Individuals **below 18 years of age**
- Individuals **diagnosed with non-communicable diseases** such as diabetes mellitus, cancer, cardiovascular diseases, or any other chronic conditions, as these could bias the perception and usage of dietary supplements.

RESULT

The all data collected was compiled and using statistical analysis following result was concluded.

Table 1: Socio-demographic Profile of Study Population

Socio-demographic profile of study population			
		Frequency	Percentage
Age group	Upto 25	196	26.2%
	26 – 40 years	448	59.9%
	41 – 60 years	102	13.6%
	Above 60 years	2	0.3%
Gender	Female	443	59.2%
	Male	305	40.8%
Marital status	Married	504	67.4%
	Unmarried	244	32.6%
Education	Graduate or Post Graduate	516	69.0%
	High school certificate	24	3.2%
	Intermediate or Post high school diploma	8	1.1%
	Primary school certificate	17	2.3%
	Professionals or honours	183	24.5%
Occupation	Clerical, shop owners, farmer	8	1.1%
	Profession	480	64.2%
	Semi profession	68	9.1%
	Unemployed	192	25.7%
Family income per day (in Rupees)	<100	43	5.7%
	>2000	614	82.1%
	1000-999	45	6.0%

	500-749	32	4.3%
	750-999	14	1.9%
Socio-economic status	Lower middle	137	18.3%
	Upper	32	4.3%
	Upper lower	8	1.1%

Table 1 indicated the socio-demographic profile of the study population indicates that the majority of respondents were young adults aged 26–40 years, accounting for nearly 60% of the participants. Females represented a higher proportion (59.2%) compared to males (40.8%), and most individuals were married (67.4%). Educationally, a large segment (69%) had completed graduate or postgraduate studies, and a significant number (64.2%) were engaged in professional occupations. In terms of income, the majority (82.1%) reported a daily family income of over ₹2000, reflecting a relatively affluent group. Most respondents fell under the lower middle socio-economic category (18.3%). Overall, the sample was characterized by a well-educated, professionally active, and financially stable population, predominantly composed of young and middle-aged adults.

Table 2: Uses of Dietary Supplements

Uses of dietary supplements		Frequency	Percentage
Usage of any dietary supplements in the past	No	349	46.7%
	Yes	399	53.3%
Do you consider taking dietary supplements to be helpful for you	No	202	27.0%
	Yes	546	73.0%

Table 2 shows that 53.3% of participants had used dietary supplements, while 46.7% had not. Additionally, 73% believed that dietary supplements are helpful, indicating a positive perception among the majority of respondents.

Table 3: Reasons Behind Taking Dietary Supplements

Reasons Behind Taking Dietary Supplements	Frequency	Percentage
Compensation Of Deficiency	134	17.9%
Compensation Of Deficiency, During Pregnancy and Lactation	16	2.1%
Compensation Of Deficiency, To Alloy Fatigue, During Pregnancy and Lactation	8	1.1%
During Pregnancy and Lactation	8	1.1%
During Pregnancy and Lactation, Not Taking Supplements	8	1.1%
Maintenance Of General Health	154	20.6%
Maintenance Of General Health, Compensation of Deficiency	84	11.2%
Maintenance Of General Health, Compensation of Deficiency, During Pregnancy and Lactation	15	2.0%
Maintenance Of General Health, Compensation of Deficiency, To Alloy Fatigue	23	3.1%

Maintenance Of General Health, Compensation of Deficiency, To Alloy Fatigue, To Improve Appetite	29	3.9%
Maintenance Of General Health, Compensation of Deficiency, To Alloy Fatigue, To Improve Appetite, During Pregnancy and Lactation	7	.9%
Maintenance Of General Health, Compensation Of Deficiency, To Improve Appetite	15	2.0%
Maintenance Of General Health, Compensation of Deficiency, To Improve Appetite, During Pregnancy and Lactation	8	1.1%
Maintenance Of General Health, To Alloy Fatigue	8	1.1%
Maintenance Of General Health, To Improve Appetite	46	6.1%
Maintenance Of General Health, To Improve Appetite, Others	8	1.1%
Not Taking Supplements	58	7.8%
Others	74	9.9%
To Alloy Fatigue	21	2.8%
To Improve Appetite	24	3.2%

The data from Tables 3 provide insights into the reasons for using dietary supplements, consultation with physicians, and patterns of regular consumption. The most commonly reported reason for taking dietary supplements was the maintenance of general health, followed by compensation for nutritional deficiencies. Some participants also mentioned other factors such as fatigue, appetite improvement, and pregnancy or lactation as contributing reasons. However, a small portion reported not taking supplements at all. When it came to medical consultation, only 54.5% of respondents sought advice from a physician before using supplements, indicating that nearly half used them without professional guidance. Regarding usage patterns, regular intake was relatively low, with only 19% consuming supplements consistently. The majority either did not take them at all (53.5%) or did so irregularly (26.6%), reflecting a need for increased awareness and guidance on consistent and appropriate supplement use.

Table 4: Regular consumptions of dietary supplements

Regular consumption of Dietary supplements	Frequency	Percentage
No response	7	0.9%
I take them but not regular	199	26.6%
No	400	53.5%
Yes	142	19.0%

The study presents a detailed profile of dietary supplement usage among participants (Table 4). The majority of respondents (53.3%) reported using dietary supplements, with 73% believing they are helpful. The primary reasons for taking supplements included maintaining general health (20.6%) and compensating for deficiencies (17.9%). A significant portion (54.5%) consulted a physician before using supplements, though over half (53.5%) did not consume supplements regularly. Regarding knowledge, 31% of respondents were unaware of potential side effects, indicating a need for greater awareness. In terms of form, most participants consumed supplements in powder (18%) or capsule (14.6%) form. When asked

about the number of different types of supplements taken, 61% used just one type. Most respondents (74.9%) took supplements once daily, with smaller percentages using them twice daily or less frequently. These findings highlight the widespread use of supplements, the need for proper education on side effects, and the variety in consumption patterns among users.

Table 5: Types of Supplements Intake

Different types of supplements intake	Frequency	Percentage
No response	14	1.9%
More than Two	39	5.2%
No supplement	73	9.8%
One	456	61.0%
Two	166	22.2%

The data reveals that the majority of respondents, 61.0%, reported taking one type of supplement. This is followed by 22.2% who indicated they take two different supplements. A smaller portion, 9.8%, reported not taking any supplements at all, while 5.2% stated they consume more than two types. Only 1.9% of the participants did not provide a response.

Overall, these results suggest that supplement intake is common among the respondents, with most individuals opting to take at least one or two types regularly. The relatively low percentage of those taking more than two supplements or none at all indicates a moderate approach to supplement use within the population.

Table 6: Duration of usage of Supplements

Duration of usage of supplements	Frequency	Percentage
No response	14	1.9%
1-2month	344	46.0%
3-6month	144	19.3%
6-9months	30	4.0%
Not taking supplements	73	9.8%
Over a year	143	19.1%

The table 6 presents data on the **duration of supplement usage** among respondents, revealing varied patterns of intake over time. Nearly half of the participants (46.0%) reported using supplements for a short-term period of 1 to 2 months, indicating that many individuals might be in the early stages of trying out supplements or using them for specific short-term goals.

A smaller but significant portion, 19.3%, have used supplements for 3 to 6 months, while 19.1% reported long-term use extending beyond a year, suggesting a committed group of users. Only 4.0% indicated a usage period of 6 to 9 months, which might reflect a transitional phase or less common duration among users. Additionally, 9.8% of respondents reported not taking any supplements, and 1.9% did not provide a response.

Overall, the data suggests that supplement use is common, with most users having relatively recent or short-term experience, while a notable minority maintains long-term usage habits.

Table 7: Side Effects are using Supplements

Side effects after stopping the use of supplements	Frequency	Percentage
No response	14	1.9%
No	636	85.0%
Yes	98	13.1%
Total	748	100.0%

The table 7 outlines responses regarding **side effects experienced after stopping the use of supplements**. A large majority of participants, 85.0%, reported **no side effects**, suggesting that for most individuals, discontinuing supplement use does not result in noticeable adverse effects.

However, 13.1% of respondents did experience **side effects**, indicating that a minority may face health-related challenges or bodily reactions when stopping supplements. Only 1.9% did not respond to the question. These results imply that while side effects are not common, they are not entirely negligible and may warrant further attention or investigation, particularly for long-term or heavy supplement users.

Table 8: Different Types of Supplements Knowledge

Knowledge of different types of dietary supplements use		
	Frequency	Percentage
Digestive enzymes	75	10.0%
Multi vitamins	435	58.2%
Vitamin B	124	16.6%
Vitamin C	125	16.7%
Probiotics	100	13.4%
Omega 3	104	13.9%
Others	210	28.1%

The table 8 presents data on respondents' **knowledge of different types of dietary supplements**, showing that awareness varies across supplement types. The most commonly recognized supplements are **multivitamins**, known by 58.2% of participants, highlighting their widespread popularity and general acceptance in health routines.

Vitamin C (16.7%) and **Vitamin B (16.6%)** follow as the next most commonly known individual vitamins. Other supplements like **omega-3 (13.9%)**, **probiotics (13.4%)**, and **digestive enzymes (10.0%)** are known by a smaller portion of respondents, indicating more limited awareness or possibly less frequent use.

Additionally, 28.1% of participants indicated knowledge of **other supplements**, suggesting that a diverse range of lesser-known or more specialized supplements are also recognized. Overall, the data reflects a strong familiarity with general supplements, particularly multivitamins, while awareness of more specific or niche supplements remains moderate.

Table 9: Practice and Effect of Supplements

Practice and Effects of Supplements			Have you seen Changes after taking supplements				Total	
				No	No response	Yes		
How Long you are taking supplements for your health	No response	N	14	0	0	0	14	
		%	100.0%	0.0%	0.0%	0.0%	100.0%	
	1-2month	N	0	93	0	251	344	
		%	0.0%	27.0%	0.0%	73.0%	100.0%	
	3-6month	N	0	23	0	121	144	
		%	0.0%	16.0%	0.0%	84.0%	100.0%	
	6-9months	N	0	7	0	23	30	
		%	0.0%	23.3%	0.0%	76.7%	100.0%	
	Not taking supplements	n	0	8	65	0	73	
		%	0.0%	11.0%	89.0%	0.0%	100.0%	
	over a year	n	0	16	0	127	143	
		%	0.0%	11.2%	0.0%	88.8%	100.0%	
	Total		n	14	147	65	522	748
			%	1.9%	19.7%	8.7%	69.8%	100.0%
P value			<0.001, S					

This table presents the relationship between the duration of supplement use and the perceived effects (i.e., whether users noticed changes after taking supplements), offering insights into both practice and outcomes. A statistically significant association was observed, as indicated by a P-value of <0.001, showing that the duration of supplement use is significantly related to whether individuals reported changes in their health.

Among those who have been taking supplements for 1–2 months, 73.0% reported noticing changes, while 27.0% did not. This trend strengthens with longer usage; for instance, 84.0% of those who used supplements for 3–6 months and 76.7% of those in the 6–9 months category reported changes. The highest rate of perceived effectiveness was seen among individuals taking supplements for over a year, with 88.8% noting positive changes.

In contrast, 89.0% of those not taking supplements reported no changes, which is expected. Notably, no respondents across all supplement-using durations selected "No response" or "Yes" without clarification, implying clear feedback. The consistent increase in positive

responses with longer durations of supplement use suggests a potential cumulative or time-dependent benefit, reinforcing the notion that supplements may require continued use to produce noticeable effects.

DISCUSSION

The study offers significant insights into the knowledge, attitude, and practices related to dietary supplement use among adults in Prayagraj. While the majority held a positive attitude toward supplements and viewed them as essential for maintaining good health, knowledge levels varied—with some participants understanding the benefits and risks, while others lacked awareness about potential side effects and interactions.

Practice patterns revealed that while over half had used supplements at some point, regular use was relatively low. Notably, many participants did not consult healthcare professionals before beginning supplement use, and a portion relied on non-scientific sources like friends or online platforms for information. Despite this, positive outcomes such as increased energy, mental clarity, and general well-being were reported, although some also experienced adverse effects, including negative interactions with medications.

CONCLUSION

The study provides valuable insights into the knowledge, attitude, and practice of dietary supplements among doctors and families. For doctors, while many demonstrated a solid understanding of the benefits and risks of dietary supplements, the findings reveal a need for additional education and training to ensure they are fully equipped to offer informed guidance to their patients. Regarding families, the study highlights that although many households use dietary supplements, there is a significant need for enhanced education and awareness surrounding their safe and effective use, as some may not fully understand the potential risks or interactions. The findings emphasize the importance of healthcare professionals in educating both individuals and families, ensuring they make informed choices. This underscores the need for a comprehensive approach to promoting the safe use of dietary supplements, with an emphasis on evidence-based information. As an NGO, the commitment to empowering consumers with accurate, reliable information about dietary supplements is vital in fostering safe practices. Ultimately, the study's results have important implications for clinical practice, public health policy, education, and research, emphasizing the critical need for widespread education and training to ensure the safe and effective use of dietary supplements.

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