

DETERMINANTS OF DIETARY SUPPLEMENT USE AND SAFETY AWARENESS AMONG ADULTS: A MIXED-METHODS CROSS-SECTIONAL STUDY

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ABSTRACT

Rather than being used specifically for therapeutic purposes, people frequently use diet supplements to maintain their general health and meeting their perceived nutritional requirements, although they may be influenced by social recommendations, media exposure and knowledge of potential health risks. The current study explored dietary supplement usage, perceived benefits, awareness about the safety of dietary supplements, adverse effects reported, and behavioral influences among adults in Multan (Pakistan). A cross-sectional survey design was employed in this study to evaluate 72 adults (aged 18-45 years) who were sampled through convenience sampling. Data were gathered by the structured questionnaire which was taken in paper and online. Data were summarized by descriptive statistics and exploratory comparisons to describe supplement-use patterns and associated perceptions. In total, 45 participants (62.5%) used supplements while 27 participants (37.5%) did not use supplements. General wellness and peer recommendations were frequently reported in motivations among participants, providing reasons for use. 52.8% of respondents reported a difference after consuming supplements. 63.9% said they were aware of potential risks, but 16.7% said they had adverse effects and 19.4% said they did not know if they were aware of potential risks. Peer influence and media influence were reported by 47.2% and 44.4% of the participants, respectively. Some respondents also believed that workload impacted supplement-related activities. There was no significant difference in supplement use between age groups ($\chi^2=1.880$, $p=.598$). The findings reported here reflect the use of supplements and safety concerns of this convenience sample.

Keywords: Dietary supplements; Supplement use; Safety awareness; Adverse effects; Peer influence; Multan, Pakistan

1. Introduction

Dietary supplements are popular to make up for perceived deficiencies in the diet, to boost physical performance, or for general wellbeing. They are used in vitamins, minerals, herbal products, protein preparations, and other products used for health care (Intarakamhang & Prasittichok, 2022; Mishra et al., 2023). But taking supplements isn't always a sign of proper use, adequate nutritional knowledge or

awareness of potential risks. Personal beliefs, perceived health needs, recommendations from friends and family, and information gathered online can be factors that influence a decision (Allehdan et al., 2023; Amin et al., 2023). In recent years, research has shown that there is significant variation in the use of supplements among populations. There have been studies on differences based on age, education, health status, lifestyle and other sociodemographic

factors, which suggest that supplement use is influenced by individual and wider social factors (Fravel et al., 2023; Sierpiński et al., 2025; Gauch & Smollich, 2025). There is also international evidence to indicate that motivations go beyond identified clinical deficits to encompassing general health and wellness, appearance and lifestyle. Thus, it is important to understand the reasons why adults are taking supplements in order to create a sound public-health education (Kaczoruk & Szpak, 2025; Lam et al., 2026). One of the key issues is if consumers have the necessary knowledge to make informed decisions. Accepting a supplement or thinking it's a good idea doesn't always imply comprehending suggested dosage, contraindications, potential negative impacts, or interactions with drugs. In the context of health literacy related to supplements, a distinction should be made between knowledge and health behaviors, and knowing about a product should not be interpreted as a demonstration of safe behavior (Karbownik et al., 2021; Hartford Kvæl et al., 2022). With consumers being unsure about the reliability of information and product quality, as well as health claims, decisions can be even more complicated. Other environments such as social and social media are also relevant. Promotional information and unsupported claims can sometimes make it easy to mistake advice or information presented in online content for scientifically supported information, rather than opinion (Obstfeld & Lohmann, 2025; Vojvodić et al., 2025). The attitudes and behaviors around supplements could then be affected by peer recommendations and media coverage, especially for younger adults. In Pakistan, locally relevant evidence is required to see how the adults do approach the use of supplements and safety. In this study, therefore, the usage of dietary supplements, perceived benefits, awareness about the possible adverse effects, negative experiences and the effect of peers, newspapers and workload on the usage of dietary supplements among adults of Multan was discussed. The study calls for a conversation about these factors to determine where improvements in health communication and informed decision-making could help.

2. Materials and Methods

2.1. Study Design and Setting

This was an exploratory cross-sectional study which employed quantitative data from questionnaires and qualitative data from open-ended responses of adults in Multan, Punjab, Pakistan. Paper-based questionnaires were used in educational institutions, and community questionnaires were used online via Google forms. The research examined the use of dietary supplements, supplement-related risk awareness, misconceptions, and attitudes about how social networks and media impact supplement-related decisions.

2.2. Study Population

The respondents were adults aged 18-45 years of Multan, Pakistan. The recruitment was planned to be based on the premise of getting people from different backgrounds of education and occupation (students, homemakers, employment, and other people from the community). The population chosen was to examine supplement use patterns and safety concerns among adults with potentially varying educational backgrounds and access to health information.

2.3. Inclusion/Exclusion Criteria

Those who were between the age group of 18-45 years, belonging to the targeted population in Multan, could understand the questionnaire and could fill it were included, and those who gave informed consent before participating were included. Current dietary supplement users and non-users were all eligible and were then compared in terms of awareness and perceptions related to dietary supplements. Participants under the age of 18 or over the age of 45, who refused informed consent or who were unable to give informed consent, and who were not within the target population were excluded. However, questionnaires with missing data were not removed if there was enough data to perform the specific analysis; if not, then the response could be included in an analysis of a specific variable. If excluding a participant(s) is done based on incomplete responses, then report this based on the actual data cleaning procedure.

2.4. Sampling and Recruitment

Non-probability convenience sampling method was used in recruitment of participants in the study settings which included educational institutions and community. There was no financial or other incentive for participation, and no one was forced to participate in this. The original sample size was to be about 100 participants, with 72 participants included in the final sample for analysis. The study was exploratory and not based on a formal power calculation. Therefore, it was interpreted cautiously, and it was not inferred that the results would be representative of the general adult population of Multan or Pakistan.

2.5. Data Collection Instrument and Procedures

A structured questionnaire was used for data collection, which was administered through both paper and online. The questionnaire was piloted for usability before implementing and included sociodemographic information, food supplement intake, risk perception, misconceptions, social and media influences, workload and safety-related behaviors. The sociodemographic data comprised age, sex, education level, occupation, and time devoted. Questions of supplements included current use, previous use, type of supplements consumed, frequency of use, reasons for use, and sources of acquisition. Other questions evaluated participants' awareness of possible adverse effects and interactions with drugs and supplements, beliefs regarding the safety of supplements that label them as "natural," and perceptions about supplement doses. Participants were also asked about the influence that peers, family members, social media, and ads had on their decision. Open-ended questions aimed to understand the motivations for supplement use, trust in product brands, and perceptions of supplement safety. The validation of the questionnaire, language, and procedure for the usability test should be reported following the procedure carried out in the study.

2.6. Study Variables and Outcomes

The main outcome was current dietary supplement use, which was defined as a binary variable (current users versus non-users) based

on the operational definition in the questionnaire. Secondary outcomes were self-reported knowledge of dietary supplements, awareness of potential risks, endorsement of supplement-related misconceptions, perceived peer and media influence, and safety-related behaviors, such as consulting healthcare professionals, and checking product labels and certification information when assessed. Where suitable questionnaire items and pre-defined scoring rules were available, a composite knowledge or awareness score was to be computed. The final report should include the following information: What items were scored, how they were scored, how to handle responses that were unclear, and any scores for classification. Self-reported risk awareness was differentiated from information on risks as awareness does not necessarily reflect accurate understanding.

2.7. Statistical Analysis

IBM SPSS Statistics package (version 26.0) was used for analysis. Descriptive statistics, chi-square or Fisher's exact tests, independent-samples t-tests or Mann-Whitney U tests, and Spearman's correlation were performed as appropriate; where possible, 95% confidence intervals were calculated using the Wilson score method. Where it was feasible, binary logistic regression was considered and statistical significance was defined at $p < 0.05$ (two-sided).

3. Results

3.1. Participant Characteristics and Prevalence of Dietary Supplement Use

All 72 adults (18-45 years) were analyzed. Most of the participants were young adults (86.1%, aged 18-25 years). The remaining participants were aged 26-32 years ($n = 2$, 2.8%), 33-40 years ($n = 3$, 4.2%), and 40-45 years ($n = 5$, 6.9%). Overall, 45 participants (62.5%; 95% confidence interval [CI]: 51.0-72.8%) reported current dietary supplement use, whereas 27 (37.5%; 95% CI: 27.2-49.0%) reported no current use. The results suggest that the use of supplements was a common practice amongst the respondents of this convenience sample. However, the lack of generalizability for the wider adult population is due to the predominance of younger adults and the non-probability sampling method. The age

distribution of participants is summarized in Table 1 as is the prevalence of supplement use.

Table 1. Participant characteristics and prevalence of dietary supplement use

Characteristic	Category	n	%
Age group (years)	18-25	62	86.1
	26-32	2	2.8
	33-40	3	4.2
	40-45	5	6.9
Current dietary supplement use	Yes	45	62.5
	No	27	37.5

Values are presented as frequencies and percentages. The 95% CI for current supplement use was 51.0-72.8%.

3.2. Reasons for Supplement Use, Perceived Benefits, and Reported Adverse Effects

When asked about the reason for taking the supplement, the most common responses (n = 40) were general wellness (n = 20, 50.0%), peer recommendation (n = 16, 40.0%), and other reasons (n = 4, 10.0%). The results indicated that among the reported responses, personal health goals and recommendations from social networks were significant factors. But 40 participants did report a reason for use while 45 did report being current users, which is a difference that needs to be verified. Concerning

benefits perceived, 38 participants (52.8% [95% CI: 41.4–63.9%]) reported a difference as related to supplementation; 25 participants (34.7%) perceived no difference, and nine participants (12.5%) were unsure. 12 participants (16.7% [95% CI: 9.8–26.9%]) reported adverse effects, 51 (70.8%) reported no adverse effects, and nine (12.5%) were unsure. The results presented herein are based on self-reported experience and are not meant to suggest a causal relationship between supplement use and adverse experiences. The distributions are given in Table 2.

Table 2. Reasons for supplement use, perceived benefits, and reported adverse effects

Variable	Response	n	%
Reason for use*	General wellness	20	50.0
	Peer recommendation	16	40.0
	Other reasons	4	10.0
Perceived difference	Yes	38	52.8
	No	25	34.7
	Uncertain	9	12.5
Reported adverse effects	Yes	12	16.7
	No	51	70.8
	Uncertain	9	12.5

Reason-for-use percentages are based on 40 recorded responses.

3.3. Awareness of Supplement-Related Risks and Misconceptions

Forty-six participants (63.9% [95% CI: 52.4–74.0]) said they were aware of some potential risks associated with their supplements. There were 12 participants (16.7%) who did not have awareness, and 14 participants (19.4%) were uncertain. Of those who were aware of possible risks, 41 out of 46 (89.1%) were worried about the possible interactions between supplements and medication. Thirty-one (67.4%) besides 28

(60.8%) participants reported concerns about sleepiness and falling asleep, respectively. Regarding supplement-related misconceptions, ten participants (13.9%; 95% CI: 7.7-23.7%) reported endorsing the specified myths, 42 (58.3%; 95% CI: 46.8-69.0%) did not endorse them, and 20 (27.8%; 95% CI: 18.8-39.0%) were uncertain. The results indicated that there was a dual nature to this awareness; one of potential risks, and another of uncertainty for

certain beliefs associated with supplements. The results are summarized in Table 3.

3.4. Peer Influence, Media Exposure, and Workload

Thirty-four participants (47.2% (95% CI: 36.1–58.6)) reported peer influence on supplement-related decisions, while 32 (44.4%) reported no peer influence and six (8.3%) were unsure. Likewise, 32 of the participants (44.4% [95% CI: 33.5–55.9%]) said that media had an influence

on their health-related decisions, while 34 (47.2%) did not feel any influence, and 6 (8.3%) were not sure. Regarding workload, 29 participants (40.3%; 95% CI: 29.7–51.8%) reported an impact, 24 (33.3%) reported no impact, and 19 (26.4%) selected “maybe.” The descriptive results show that social and information factors were important for some patients. Distributions are shown in Table 3 and compared with other indicators of supplementation in Figure 1.

Table 3. Risk awareness, misconceptions, and reported influences among participants

Variable	Response	n	%
Risk awareness	Yes	46	63.9
	No	12	16.7
	Uncertain	14	19.4
Supplement-related myths	Yes	10	13.9
	No	42	58.3
	Uncertain	20	27.8
Peer influence	Yes	34	47.2
	No	32	44.4
	Uncertain	6	8.3
Media influence	Yes	32	44.4
	No	34	47.2
	Uncertain	6	8.3
Workload impact	Yes	29	40.3
	No	24	33.3
	Maybe	19	26.4

Values are presented as frequencies and percentages.

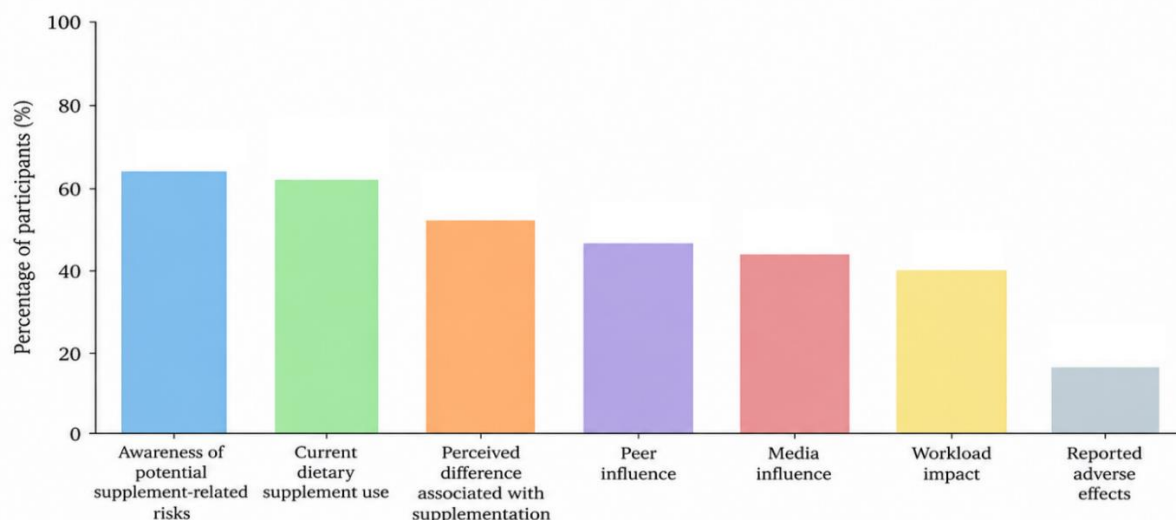


Figure 1. Selected dietary supplement use and safety indicators among participants. Bar chart showing the percentage of participants reporting awareness of potential supplement-related risks (63.9%), current dietary supplement use (62.5%), a perceived difference associated with supplementation (52.8%), peer influence (47.2%), media influence (44.4%), workload impact (40.3%), and reported

adverse effects (16.7%). Each bar represents a separate survey item; the indicators are not mutually exclusive.

3.5. Association Between Age Group and Dietary Supplement Use

Of those who were 18-25 years old, 39 (62.9%) reported current supplement use. The corresponding proportions were 50.0% (1/2) among those aged 26-32 years, 33.3% (1/3) among those aged 33-40 years, and 80.0% (4/5) among those aged 40-45 years. When age group was analyzed using the Pearson chi-square test, no statistically significant association was found (Table 4) ($\chi^2(3) = 1.880$), $p = 0.598$, and Cramér's $V = 0.162$. During a sensitivity analysis of participants aged 18-25 versus those older than 25, 39 of 62 (62.9%) and 6 of 10 (60.0%) participants respectively reported using

supplements. The reported Pearson chi-square test was not statistically significant ($\chi^2(1) = 0.031$), $p = 0.860$; the reported two-sided Fisher's exact test was not statistically significant ($p = 1.000$). The results of these tests are not a statistically significant representation of the age group association for this sample. However, the low numbers in older age groups make it difficult to be exact about the numbers and the reliability of the asymptotic chi-square approximation. It is suggested that an exact test for the four-category comparison be considered. The age-specific distributions are shown in Table 4 and Figure 2.

Table 4. Dietary supplement use by age group and reported association tests

Age group (years)	Users, n (%)	Non-users, n (%)	Total, n
18-25	39 (62.9)	23 (37.1)	62
26-32	1 (50.0)	1 (50.0)	2
33-40	1 (33.3)	2 (66.7)	3
40-45	4 (80.0)	1 (20.0)	5
Total	45 (62.5)	27 (37.5)	72
Statistical analysis		Test statistic	p-value
Pearson chi-square: four age groups		($\chi^2 = 1.880$), $df = 3$	0.598
Pearson chi-square: 18-25 versus >25 years		($\chi^2 = 0.031$), $df = 1$	0.860
Fisher's exact test: 18-25 versus >25 years		Exact test	1.000

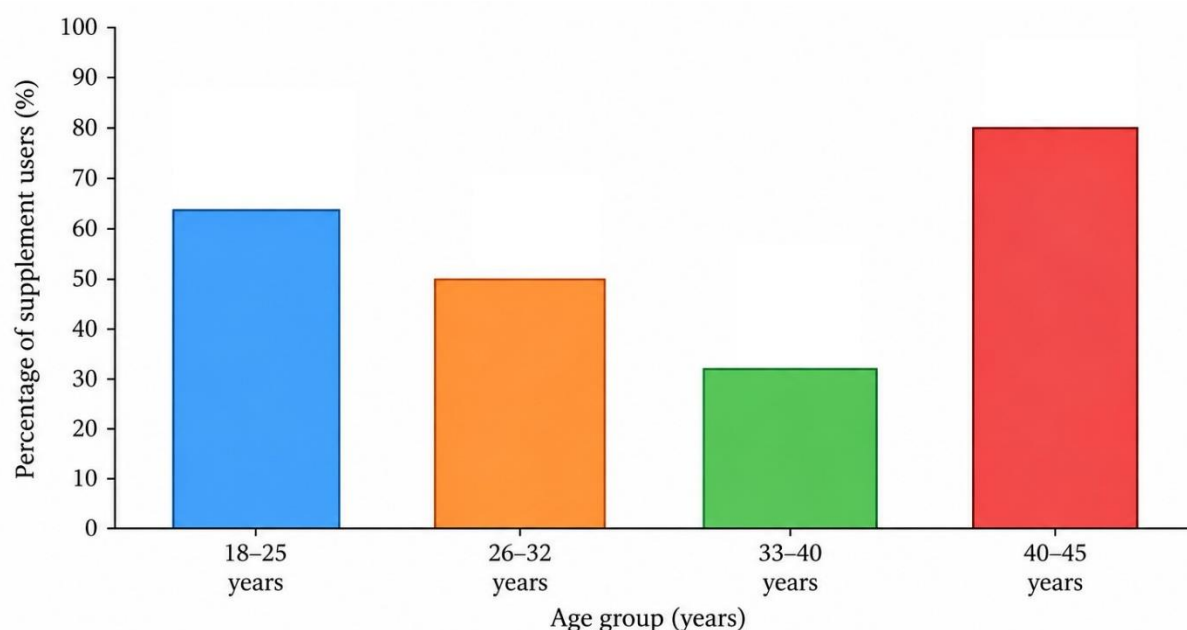


Figure 2. Dietary supplement use by age group. Bar chart showing the proportion of participants reporting current dietary supplement use within each age category: 18-25 years (62.9%; 39/62), 26-32

years (50.0%; 1/2), 33-40 years (33.3%; 1/3), and 40-45 years (80.0%; 4/5). Sample sizes should be displayed alongside percentages because small numbers in older age groups limit the precision of the estimates.

3.6. Associations Between Supplement Use, Knowledge, and Safety-Related Behaviors

The descriptive data that were available indicated that 63.9% had indicated awareness of possible risks associated with the use of supplements and 13.9% had endorsed the misconceptions indicated and 27.8% were unsure. These overall percentages do not indicate any differences in knowledge or awareness between current supplement users and non-users. Likewise, the literature available here does not provide evidence of the effect on participants of higher risk awareness on consulting health care providers, reading product labels, or evaluating potential drug-supplement interactions. A participant level comparison should be made between the answers to these questions and the appropriate variables on the questionnaires. If an adequately specified model can be justified from the underlying data, then multivariable logistic regression could be used to examine the factors that are independently associated with current supplement use. From the descriptive results alone however regression coefficients, adjusted odds ratios, confidence intervals and model-fit statistics cannot be reported. In the current findings, therefore, there are no independent predictors of supplement use or behavior related to safety.

3.7. Qualitative findings of decisions about supplement use

The qualitative component aimed to uncover the reasons for the consumption of supplements, the safety of the supplements, the trust in supplements, and the effect of social media and recommendations. The quantitative results show that general wellness, peer recommendation and peer influence are prominent recorded motivations, with 47.2% of the participants saying they were influenced by peers and 44.4% saying they were influenced by media. These patterns were served as appropriate topics for qualitative interpretation and will not define qualitative themes. For a full thematic analysis, it is necessary to include the actual open-ended responses, a description of

the coding process, the themes that emerged, and anonymized illustrative quotes. Specific themes and participants' quotations are not reported here as these are not available in the outputs supplied.

3.8. Summary of Principal Findings

62.5% of 72 participants were currently using dietary supplements. Fifty percent of the 40 responses that reported a reason for use were general wellness, and 40 percent was peer recommendation. However, the awareness of the risks associated with supplements was self-reported at 63.9%, 13.9% endorsed the mentioned misconceptions and 27.8% were uncertain. 47.2% of participants reported that peer influence was present, and 44.4% reported that media influence was present. For reported age-group analyses, there were no significant associations reported in this study, but there were few age categories to interpret. Further analysis of individual-level data is needed to establish if there is an association between knowledge, misconceptions, sex, age, ethnicity and social influences on supplement use and on safety-related behaviors.

4. Discussion

The study focused on the dietary supplement consumption practices, perceptions of safety awareness, misconceptions, and perceived social influences of 72 adults in Multan, Pakistan. Sixty-two percent of participants reported using supplements, and 63.9% were aware of the potential risks. But 27.8 percent were not sure about misconceptions about supplements, indicating that awareness of supplement-related misconceptions is not a proxy for how much people know about supplement safety. The findings of the current study are like those obtained in Pakistan and other countries (Walczyk & Białek, 2026). The prevalence of multivitamin use was reported in Rawalpindi (66.9%) and in Islamabad (Shahzad et al., 2022) and 58% of adults consumed dietary supplements in Saudi Arabia (Al Turki et al., 2025; Alhumaid et al., 2026). Likewise, in the west of Saudi Arabia, 70.5% of the respondents

indicated supplement consumption (Alshehri et al., 2025; Alruwaili et al., 2026). A study in Lahore also found that the consumption of multivitamins and self-medication practices were common (Ghaznawi et al., 2026). These comparisons indicate that supplementation is prevalent in various populations in general, but they cannot be directly compared because of variations in sample, age distribution, product definition, and reference time periods. Among the most common reasons for supplement use in the current study were general wellness and peer recommendations. This is in line with Al Turki et al. (2025) who reported health promotion and symptom management as motivations. Elsayhori et al. (2023) also studied the prevalence of supplement use, knowledge, attitudes, and practices of students, and noted that some understanding of factors affecting supplement use was crucial. However, the results of the current study are descriptive, and do not prove an independent effect of peer recommendations on supplement consumption. 47.2% of the respondents reported social influence and 44.4% reported social media influence. These results are important in the context of the evidence of online supplement promotion. Of the 154 videos reviewed, Raffoul et al. (2024) report that 97% of all of the ones with claims of weight loss, muscle building, or detox were scientifically unsound. Devanaboyina and Khatri (2026) also explored the possible association between social media promotion, health literacy, and unsupervised supplement usage. These results help in increasing consumers' health claims evaluation skills on the internet. The accuracy of the information participants encountered, however, was not directly examined in the present study, and a statistical link between media exposure and supplement use was not established. 63.9% indicated some knowledge of possible risks, 16.7% stated they had experienced negative effects, and 19.4% stated they did not know what the risks of supplements were. Ten people (13.9%) agreed with the following misconceptions and 27.8% were not sure. This uncertainty is crucial as supplements may lead to side effects and interact with drugs. Cadwallader et al (2022) highlighted the need to have a discussion with patients about the safety of supplements, product quality,, and potential

interactions. The same gaps in knowledge regarding dosage and safety were reported by Alshehri et al. (2025). Thus, health communication should target both awareness and specific actions, such as seeking information on the product and talking to health care providers about supplement use. There was no significant difference found between age group and supplement use. The absolute numbers of older age categories were small, however, and restricted the ability to make statistical conclusions and the confidence in the estimates. This should not, therefore, be viewed as a finding that age is not associated with supplement use. Furthermore, the sample was limited and convenience sampling was used making the results not representative of all adults in Multan or Pakistan. The study presents preliminary descriptive evidence and has certain limitations, such as a small sample, potential selection and self-reporting biases, and limited evidence of quantitative–qualitative integration.

Conclusion

This study aimed to give a general overview of the use of dietary supplements, their perceived benefits, awareness of safety and the social influences among adult population of Multan, Pakistan. 62.5% of the participants reported using supplements and general wellness, and peer recommendations were cited as reasons for supplement use. Nearly two-thirds of respondents said they knew about potential risks, but some said they experienced adverse effects or were unsure about the safety of supplements. Peer and media influence was also observed, emphasizing the need for easily accessible, reliable and scientifically sound advice on the selection and dosage of supplements, adverse effects, and possible interactions with medications. There was no statistically significant difference found between the use of supplements and age group, but small and unevenly distributed sample size limits interpretation. Larger and representative samples, and validated questionnaires, should be used in future studies to explore determinants to supplement use and safety knowledge. Consumers may make more informed choices regarding the use of health supplements after public health education and

consultation with qualified health care professionals.

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