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Knowledge, Attitudes and Practice About Vitamin Supplements Counseling in Libyan Community Pharmacies

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ABSTRACT

Pharmacists play an important role in the healthcare system and have a greater impact on the outcome of public health programs. Patients who seek vitamin advice presume the role of community pharmacists including the recommendation of effective vitamin supplements. This study aimed to evaluate knowledge, attitudes and professional practices of Libyan community pharmacists in counselling patients about the safe consumption of vitamins. A cross-sectional study was conducted in pharmacies located in Tripoli, Libya between October 2023 and February 2024. Data collection was carried out using semi-structured self-administrated questionnaire. A total of 235 pharmacists participated in this study. The majority (75.3%) of pharmacists believed that a balanced diet is more achievable by eating healthily than by vitamins supplements. 76.6% of participants believed that chronic consumption of certain vitamins would not shorten life spans, while 65.5% agreed that vitamin supplements could be toxic or might contain unlabeled harmful ingredients. Less than half of pharmacists (35.3) were aware that some antioxidant vitamins have been verified to be of unproven value, or may even cause cancer. 80% of pharmacists would recommend vitamins on a regular basis without prescription, the majority agreed that counselling on vitamin supplements is part of their role in pharmaceutical care (94.5%), in addition to providing relevant information to other healthcare professionals (76.6%). Moreover, responses to specific knowledge questions, such as the interactions of vitamins with drugs or the recommended dietary allowance of vitamins for infants, children, and pregnant women, were negative. Furthermore, only a minority of pharmacists (48.5%) would recheck the accuracy of dose regimens in prescriptions and 50.6% of participants would follow up patients to record any consequences of vitamins consumption. The questionnaire revealed satisfactory awareness of community pharmacists about their role in counselling; however, further programmes to update their knowledge are mandatory to emphasise the importance of vitamin supplements as part of complementary medicine, and their exclusion from being considered as merely over the counter (OTC) products.

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Introduction

Vitamins are micronutrients the human body requires for optimal cell development/growth, as well as countless metabolic functions/processes [1,2]. Briefly, vitamins are distinguishably grouped into fat-soluble vitamins (A, D, E, and K) and water-soluble vitamins (B-complex and C) based on their absorption potential in either fat (non-polar medium) or water (polar medium), in addition to the region of their physiological activity [3].

Vitamins as micronutrients have assumed outstanding public health importance. As a result, there continues to be an increase in evidence regarding their physiological function and associated health implications of their deficiencies in diets. For instance, as vitamin A deficiency has been implicated to be the leading cause of blindness and high risk of death from common illnesses such as diarrhea in children, it has been classified by the World Health Organization (WHO) as a public health problem affecting children in South Asia and sub-Saharan Africa [4].

As studies regarding food-sourced vitamins increases by the day, there is a need for continuous synthesis to update existing information. To supplement existing information, this project discussed food-sourced vitamins for consumer diet and health needs, scoping from vitamin absorption, metabolic functions, utilization, to balancing nutritional requirements and establishing a balance between food-sourced vitamins and dietary supplements. WHO recommended dietary supplements may be useful to improve health in some patients. According to the US FDA, a dietary supplement (DS) is a product that intended to supplement a person's diet, it's generally consisted of at least one or more of the following dietary ingredients,

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vitamin, minerals, herb, or other botanicals and amino acid by increasing the daily consumptions of an extract metabolite concentration, constitute or combinations of these medication. The vitamin supplement (VS) industry is reported under the category of the fastest growing industry in the world [5,6].

Worldwide, the market of VS is projected to grow at a calculated annual growth rate of around 6.8% during 2014 to 2020, increasing from a market rate of US$37.4 billion in 2013 to US$59.6 billion in 2020 [7]. Contributing to this industry's growth are increased popular awareness of the relation between disease and diet, aging of population, busier lifestyle, interest in health wellness, and adoption of preventive healthcare practices [8]. These factors, in turn, have led to consumers relying on vitamins as DSs to achieve the recommended number of vitamins in their diets [9]. In fact, extensive usage of supplements is often a cause of alarm because of potential adverse effects such as neurologic disturbances, gastrointestinal symptoms, hepatotoxicity, birth defects, and drug interactions, which incurs liabilities of health-care professionals [10,11].

In health care professional training programs many healthcare professionals learn about the role that vitamin supplements play in the prevention and treatment of chronic diseases such as osteoporosis, heart disease, cancer and neural tube defects [12]. Excessive and inappropriate use of medicines has been recognized as a public health problem resulting in an increased likelihood of adverse drug event, drug interaction, inappropriate drug prescribing, and increased cost [13].

Research, which included 161,808 healthy postmenopausal women in the Women's Health Initiative program, discovered that those who used multivitamins had an analogous latent for mortality or emerging cardiovascular disease, cancer of the lung, colon/rectum, breast, and/or endometrium compared to those who did not use vitamins [14].

Reliable with these outcomes, other studies have proven weak substantiation to support the endorsement of multivitamins as antioxidant protection against cancers or cardiovascular disease [7,15]. Jointly, these verdicts support the American Heart Association recommendations of a balanced diet, somewhat than the supplements of questionable usefulness and safety, especially in patients without chronic health conditions or circumstances requiring vitamin replacement [9,14]. Despite the widespread use of supplements, it is obvious that only a logical and optimal use of supplements can ensure appropriate improvement in the health of the consumers of these products [16].

Hence, community pharmacists could play an important role in the awareness, knowledge and attitude of patients regarding the use of vitamin supplements. However, numerous studies have pointed to deficiencies in pharmacist-patient communication regarding health products and nutritional choices. Some studies have suggested the need for effective training to promote improved healthcare outcomes. According to Hadi et al. [17,18], patients who seek nutrition and vitamin advice presume the role of community pharmacists include recommendation of effective vitamin and nutritional products. However, the professional responsibilities of pharmacists with respect to product and advice on nutrition is not well established. Many studies confirmed that consumers usually seek their pharmacist's opinion, knowledge, advice, and even recommendation regarding safe and proper use of VSs [19]. On the contrary, studies also show that few consumers feel that pharmacists are inadequate to counsel them regarding DS [19,20]. This associates with the outcomes of another research that reveal pharmacists' own embarrassment dealing with DS inquiries and feeling inadequately knowledgeable about DS [21,22].

Consequently, this project aimed to assess the awareness of community pharmacists in Libya towards recent vitamin related efficacy and safety issues and to evaluate their attitudes and professional practice behavior in counselling patients about vitamin supplements.

Methods

Study design and setting

Between October 2023 and February 2024, cross-sectional descriptive-designed research was organized in pharmacies situated in Tripoli, Libya. The sampling amount was well-defined as any registered pharmacists who work in community pharmacies. Pharmacists were randomly selected from different geographical locations; with a target sample of 250 pharmacists from different pharmacies. Pharmacists on duty from each visited pharmacy was invited to participate in the survey.

Data collection

Data collection was carried out using a semi-structured self-administrated questionnaire. The questionnaire design was centered on the most recent evidence-based information about vitamins, and was intended to examine the frequency of dispensing vitamin supplements based on proper counselling practice in Pharmaceutical Care (113). Questionnaire for assessment of knowledge, attitude, and practices toward VSs was adopted from similar studies conducted previously (114). The questionnaire was written and conducted in English, which is the primary language of pharmacy colleges in Libya.

For the purpose of our analysis, the questions of questionnaire were classified into one of the following categories: 1) basic knowledge; advanced knowledge (recent literature); 2) professional practice behaviours; and 3) attitudes and beliefs towards pharmaceutical care services.

Data analysis

All data were coded, entered and analyzed using the Statistical Package for Social Sciences (SPSS) (version 17.0; SPSS Inc., Chicago, IL). The responses of the pharmacists to each questionnaire item were expressed as frequencies and their corresponding percentages. The total score for each question category was estimated by calculating the mean and standard deviation of the responses from each subgroup. The overall score out of 100% was rated as unsatisfactory (<50%), satisfactory

(50–60%), good (>60–<70%), very good (70–<80%), or excellent (80–90%) knowledge. Moreover, mean or individual scores above 70% in the behaviour or attitude questions were considered to reflect more positive trends towards the statements.

Results

Demographics

Of the total 250 questionnaires, only 15 (6%) were returned unusable, giving a response rate of 94%. As shown in Table 1, with respect to gender, 28.1% were men while 71.9% were women. The predominant age group being between 20 and 29 years of age (45.1%), followed by 30 to 39 years (39.2%).

With respect to education levels in pharmaceutical practice, Majority of the participants had the highest qualification of Bachelor of Science in pharmacy (80.4%). The pharmacists who participated in this study had a wide range of experience in practice, ranging from less than a year up to than 20 years, for years of practice, 41.3% of the surveyed pharmacists had 1–5 years of experience as pharmacists, 25.1% had 6–10 years of experience, 18.3% were under the one-year experience, while 8.5% had 11-15 years of experience.

Table 1. Demographic characteristics of survey participants (n=235)

Characteristics	Categories	N	%
Gender	Male	66	28.1
	Female	169	71.9
Age group	20-29 years old	106	45.1
	30-39 years old	92	39.2
	40-49 years old	32	13.6
	50–59 years old	4	1.7
	Above 60	1	0.4
Level of education	Diploma in pharmacy	41	17.5
	Bachelor of science in pharmacy	189	80.4
	Master of science in pharmacy	5	2.1
	Doctor of pharmacy	0	0
Years of experience	< 1	43	18.3
	1-5	97	41.3
	6-10	59	25.1
	11-15	20	8.5
	16-20	10	4.3
	> 20	6	2.5

General and up to date knowledge about vitamins

Table 2 present the results of basic and advanced knowledge assessments for the pharmacists of survey questions.

The majority (75.3%) of the pharmacists believed that a balanced diet is more achievable by eating healthily than by supplementing with vitamins. In parallel, 70.2% acknowledged that the dose consistency of vitamins may be significantly decreased by the abuse of plant pesticides, while 78.3 % agreed that natural vitamins are processed differently in the body compared to those obtained from synthetic sources. Of note, 76.6% of participants were not aware that the chronic consumption of certain vitamins has been proven to shorten the human life span; however, 65.5 % agreed that vitamin supplements could be toxic or contain unlabelled harmful ingredients.

Strikingly, less than half (35.3%) of pharmacists were aware that a number of antioxidant vitamins have been verified as having no health benefits or may even cause cancer. However, the majority (90.2%) agreed that some life style related factors may cause the depletion or reduce the absorption of vitamins, such as high dietary fat intake (65.1%), low fruit and vegetable intake (97.6%), regular use of NSAIDs (55.7%), low physical activity (66.5%) and/or smoking (82.1%).

Table 2. The frequencies and percentages of the correct responses to knowledge questions by pharmacists (n = 235).

Statement (correct answer)	Correct		Incorrect		I don't know	
	N	%	N	%	N	%
Total balanced diet is more achievable by eating healthily than by multivitamin supplements.	177	75.3	51	21.7	7	3
The dose consistency of vitamins is significantly decreased by the abuse of plant pesticides	165	70.2	66	28.1	4	1.7
Vitamins supplements may contain unlabelled toxic ingredients	154	65.5	73	31.1	8	3.4
Chronic consumption of certain vitamins has been proven to shorten lifespan.	50	21.3	180	76.6	5	2.1
A growing body of research evidence supports the causality of different types of cancer by multivitamins, which are often employed as antioxidants in routine practice.	83	35.3	146	62.1	6	2.6
Natural vitamins are processed differently in the body from those obtained from synthetic resources.	184	78.3	48	20.4	3	1.3
A proportion of up to 90% of a vitamin supplement may be lost in faeces.	84	35.8	146	62.1	5	2.1
Some lifestyle issues may reduce the absorption of vitamins or may even cause the complete depletion of vitamins.	212	90.2	23	9.8	0	0
Chronic consumption of some drugs may cause a significant depletion of vitamins.	186	79.2	47	20	2	0.8
Serious drug interactions and side effects can be potentiated due to concomitant consumption of vitamin supplements and drug therapy	182	77.4	46	19.6	7	3
Knowledge of exact Recommended Dietary Allowances (RDA)for each vitamin	101	43	124	52.7	10	4.3
Knowledge of specific signs and symptoms of each vitamin deficiency.	163	69.4	67	28.5	5	2.1

Of the total 186 pharmacists (79.2%) who agreed with the statement that drugs induce vitamin depletion, likewise, out of 182 pharmacists (77.4%) who agreed on the potential of serious negative interactions between vitamins and other drugs. In contrast, 46 pharmacists (19.6 %) did not agree on the validity of such interactions with supplements. According to the respondent self-assessment, 69.4 % of pharmacists felt they had sufficient information about the manifestations of vitamin

deficiency. Cracking at the corners of the mouth could indicate vitamin B2 deficiency, Dandruff could indicate biotin deficiency, Conjunctival dryness could indicate vitamin A deficiency and Poor concentration could indicate B12 deficiency.

In comparison, more than half of the survey respondents (52.7%) declared that they had limited knowledge on the Dietary Reference Values for vitamins. Therefore, their responses to subsequent specific knowledge questions, such as the RDA of vitamins for infants, children, pregnant and lactating women, were negative. With regard to pharmaceutical manufacturing knowledge, only 35.8 % of pharmacists declared awareness of a potential of up to 90% loss of vitamin supplement content in faeces due to poor bioavailability. Collectively, the average score of all respondents in the knowledge assessment was 61.74%, which is rated as good knowledge.

Professional practice behaviour of pharmacists with respect to dispensing and counseling about vitamin supplements

Table 3 shows the results of the pharmacist counselling and dispensing behaviours evaluated in this study. The pharmacists obtained a mean score of 65.75 (SD=11.45) which may be considered representative of a moderately positive behavioural attitude with respect to counselling patients about vitamins.

Table 3. Counselling behaviours of pharmacists with respect to vitamin supplements (n = 235).

Statement	Agree		Disagree	
	N	%	N	%
I often verify the indications of vitamins for prophylactic or therapeutic purposes if prescription is available	166	70.6	69	29.4
I recommend vitamin supplements very often and even without prescription	188	80	47	20
I usually evaluate potential drug interactions with concomitant medications	146	62.1	89	37.9
I counsel the patient/ consumer about the side effects of megavitamins consumption in large doses.	173	73.6	62	26.4
I review the patient profile to rule out contraindications of vitamin supplements	175	74.5	60	25.5
Regularly consult references covering all RDA for infants, children, male, female, pregnant and lactating women, the elderly, in addition to renal and other chronic diseases.	124	52.8	111	47.2
I routinely recheck the prescribed dose according to specific RDA before dispensing a prescription	114	48.5	121	51.5
I would like to ask consumers questions to re-evaluate the signs and symptoms of vitamin deficiency to ensure correct vitamin supplement choice	151	64.3	84	35.7
I am keen to follow up the patients who are continually using vitamins to record any bad or beneficial effects	119	50.6	116	49.4
I counsel the patient/consumer about the significance of natural sources of vitamin	169	71.9	66	28.1
I remind the patient/consumer to read specific usage instructions	210	89.4	25	10.6
Adjusting food content and quantities to avoid vitamin toxicity	149	63.4	86	36.6
Proper storage and cooking of fruits and vegetables	154	65.5	81	34.5
Daily requirements of water	145	61.7	90	38.3
Cessation of smoking	142	60.4	93	39.6

In general, the majority of pharmacists declared their adherence to several counselling items, in accordance with good pharmaceutical care practice, namely indications (72.8%), interactions (62.1%), side effects of megavitamins consumption in large doses (73.6%), contraindications (74.5%), usage instructions (89.4%) and essential life style issues (>60%). Only 48.5% would recheck for the accuracy of dose regimens in prescriptions according to specific age or patient category RDA. In parallel, 64.3% may confirm the true signs and symptoms of vitamin deficiencies by initiating an open dialogue with the patient or his/her family. Furthermore, 50.6% would follow up the patient to record any positive or negative effects based on their choice of vitamin supplements. As shown in Table 3, 70.6 % of pharmacists declared that they verify the indications of vitamins for prophylactic or therapeutic purposes if a prescription is available, while 80% stated that they would also recommend vitamins very often, even without prescription.

The respondents were asked to estimate the frequency of the most regularly dispensed vitamin products in their pharmacies. Pharmacists' responses arranged according to frequency were as follows: multivitamins (n=133, 85.3%), vitamin C (n=102, 65.4%), vitamin E (n=58, 37.2%), vitamin D (n=109, 69.9%), vitamin A (n=24, 15.4%) and vitamin B12 (n= 48, 30.8%), (see figure 6) and the data is summarised in Table 4.

Table 4. The frequencies and percentages of dispensed vitamins by pharmacists (n=156)

Vitamin product	F	%
Multi vitamin	133	85.3
Vitamin C	102	65.4
Vitamin E	58	37.2
Vitamin A	24	15.4
Vitamin D	109	69.9
Vitamin B12	48	30.8

The most frequently cited clinical conditions in which vitamins would be recommended as OTC medicines were hair and nail loss, pregnancy, loss of appetite and elderly related complaints (See table 5).

Table 5. Clinical conditions cited by pharmacists for dispensing vitamin supplements as OTC medicines (n=166)

Clinical Conditions	F	%
Hair and Nail loss	28	16.9
Pregnancy	22	13.3
Loss of Appetite	18	10.9
Elderly condition	15	9
Cold	12	7.2
Weight gain	9	5.4
Anaemia	5	3
Diabetes	5	3
General Malaise	4	2.4
Prophylactic antioxidant	3	1.8
Heavy Smoking	2	1.2
Increasing immunity	2	1.2
Miscellaneous (unspecified patient / consumer requests)	41	24.7

Heavy smoking and increasing immunity were among the less common indications. Other conditions are presented in Table 6. Over half of the pharmacists (71.9%) believed that it is important to counsel patients about natural sources of vitamins. The main reason for counselling about natural food sources of vitamins was cited as "natural sources are safer" (47.9%), as shown in Table 7. Out of the total 169 pharmacists who recommended

natural sources, 23.1% believed that it is essential to benefit from balanced meals and 13.6% believed that it is better for general health. In comparison, 11.8% of pharmacists believed that natural sources are less expensive, while only 3.6% were concerned about over dosage as a result of repeated vitamin supplementation combined with daily food intake.

Table 6. Reasons reported by pharmacists who responded positively to counselling patients about natural sources of vitamins (n=169)

Reasons	F	%
Natural sources are safer	81	47.9
Are better for general health	23	13.6
It is important to benefit initially from routine meals	39	23.1
Less expensive than synthetic products	20	11.8
To prevent over dosage of certain vitamins	6	3.6

General attitudes towards and beliefs about pharmaceutical care regarding vitamin supplements

The majority of pharmacists believed that counselling on vitamin supplements is part of their role in pharmaceutical care (94.5 %), The reasons for the agreement statement are shown in table 16 and figure 8.
Table 7. General attitudes and beliefs of pharmacists towards pharmaceutical care and vitamin supplements (n=235).
60.4% Pharmacists are the most qualified health professionals, Vitamins are not always OTCs (27.9%) and Lack of other trained professionals (11.7%) and addition that pharmacists should provide updated information about vitamin products to other members of the health care team (76.6%). 55.7 % of pharmacists indicated that they would dispense all vitamins without prescription. 84.3 % of the pharmacists agree the vitamin supplement products should be sold only in pharmacy setting, Reasons for agreement, to concern about legal issues (33.3%), more control on pricing and cost (20.2%), because it is a medicine (3.5%) and no specified reasons (35.9%). In general, pharmacists displayed positive trends in their beliefs and perceived concepts towards pharmaceutical care and vitamin supplements (mean score, 77.2, SD=15.1; Median 76.6).

Discussion

This study was conducted in Tripoli, Libya under community pharmacy settings, with the main objectives being to evaluate the knowledge, professional practice behaviour and attitudes of pharmacists towards counselling about vitamin supplements, which are becoming the most common OTC items worldwide [23].
This study has showed that, although pharmacists displayed satisfactory basic knowledge, very few pharmacists were aware that researchers are thinking more cautiously about recommendations regarding multivitamin usage under certain conditions, based on considerable research in the past ten years [24]. In fact, more than two-thirds of participants (76.6%) were not informed that the chronic consumption of certain vitamins has been proven to shorten the human life span, and 62.1% of participants that were not informed that some vitamins may cause cancer. These findings may be ascribed to a lack of continuing professional development, and/or generally less interest in updating knowledge about "medicines without prescription" than prescribed ones [25].

Table 7. General attitudes and beliefs of pharmacists towards pharmaceutical care and vitamin supplements (n=235).

Statement	Agree		Disagree		No response	
	N	%	N	%	N	%
Pharmacists can dispense all vitamin supplements without prescription	131	55.7	94	40	10	4.3
Vitamin supplement products should be sold only in pharmacy settings, Reasons for agreement	198	84.3	25	10.6	12	5.1
Because it is a medicine	7	3.5				
Because it is safer for patients	14	7.1				
Concern about legal issues	66	33.3				
More control on pricing and cost	40	20.2				
No specified reasons.	71	35.9				
Pharmacist may be liable for the safety and manufacturing quality issues related to vitamin supplements sold at his/her pharmacy	209	88.9	24	10.2	2	0.9
Providing information about vitamins to the general public is part of a pharmacist's professional responsibility in pharmaceutical care. Reasons for agreement:	222	94.5	9	3.8	4	1.7
Pharmacists are the most qualified health professionals	134	60.4				
Vitamins are not always OTCs.	62	27.9				
Lack of other trained professionals.	26	11.7				
Pharmacists may be more responsible for a particular type of vitamins.	149	63.4	81	34.5	5	2.1
Pharmacists should provide updated information and seminars to other healthcare professionals	180	76.6	35	14.9	20	8.5

Moreover, pharmacists' scores in perceived knowledge of vitamins' drug interactions, side effects and depletion with concomitant prescribed medication was high (77.4 %). However, yet their actual knowledge base was modest. Similar results were obtained from pharmacists in Kuwait, who seemed to be more educated about the uses of herbal products, and less informed about their side effects and interactions [26].
Evidently, most respondents in the current survey were not aware about the potential differences in the

bioavailability achieved from various vitamin products, and the possibility of up to 90% loss in faeces due to poor manufacturing quality. Actually, only 35.8% of pharmacists agreed on the acknowledgement of such a statement.

A possible explanation for this is the conceptual belief that dietary supplements, including vitamins, are exempted 10 from many bioequivalence regulations worldwide, and consequently the laws in Libya in this area are still unresolved. In contrast, many pharmacists (84.3%) agreed that the sale of such products should be confined to pharmacy settings, and pharmacists (88.9%) may be legally liable to their safety and quality standards despite oversights in current regulations. This was also reported by Canadian pharmacists, who felt that approval for the sale of natural or dietary supplements should be granted by Health Canada, based on numerous stratums of evidence relating to safety and efficacy, particularly due to their perceived lack of governmental regulation.

Fortunately, the current survey data indicated that Libyan pharmacists (>70%) were conscious of their professional role in patient counselling, namely proper indications, usage instructions, contraindications, significance of natural vitamin sources and the potential adverse effects of megavitamin consumption. However, they were less likely (<70%) to provide advice on potential interactions with concomitant medications (62.1%). Similar findings were obtained in previous studies in which pharmacists reported that they never or rarely asked their patients about the concomitant use of Complementary and alternative medicine (CAM) or herbal remedies [25]. Another gap in the counselling skills of pharmacists was identified when more than half of participants admitted to not routinely rechecking vitamin prescriptions for correct dosage regimens in accordance with specified RDA values for various ages, gender, life events (such as pregnancy) and clinical conditions (such as renal disease). This would explain their negative attitudes toward reviewing references that are periodically updated to cover all RDA values. Again, this was reflected in their poor responses to specific RDA inquiries in the survey questionnaire.

Based on the current state of knowledge and evidence-based literature concerning multivitamins, it is essential that pharmacists, being the most accessible healthcare members, routinely establish an open dialogue with their customers to ensure a clear distinction between harmful and useful CAM therapies, including vitamins and any other non-prescribed medications.

It is interesting to note the high response rate by pharmacists in this study (94%). This could be attributed to a number of factors including; (a) a remarkably positive attitude by Libyan pharmacists towards pharmaceutical care and its professional career prospects, (b) an increase in consumer demand for vitamin, herbal and dietary products as a result of more assertive advertising and marketing campaigns, (c) that this is a pioneering study within Libya and generated considerable interest and/ or (d) I was committed and interested in the project and I was extremely proactive in managing and following up on the questionnaires.

Although the results of this study are interesting, there are several important limitations that should be considered when interpreting the data. First, this study was performed at a single site (Tripoli; the capital city of Libya). Therefore, the results may not be representative of the views of pharmacists who work in areas outside of Tripoli.

Moreover, the responses of pharmacists to the frequency of commonly dispensed vitamin types to various patient subgroups are entirely reflected by their knowledge and attitudes. This may deviate from the actual sales rate according to patients/consumers requests and personal choices. We acknowledge that this theme merits further large-scale investigation of population perspectives and awareness about the misuse of vitamins.

Further evaluation on the impact of this survey towards increasing the awareness of pharmacists about the safety of vitamins is warranted. Finally, although pharmacists in our community displayed positive beliefs in the usefulness of vitamins and their role in pharmaceutical care, further research is needed to extensively appraise their knowledge, attitudes and extent of awareness about other forms of CAM, for which pharmacists may play a crucial role in counselling society.

Conclusions

According to the results of this study, it is clear that pharmacists in Libya appear to have basic foundation knowledge about vitamins. However, their level of knowledge about VSs needs to be improved to meet consumer's needs in the pharmaceutical. Libyan pharmacists are less aware about exact dosages, drug interactions, side effects and professional counselling on vitamin supplements using high quality literature sources. Overall, their current state of knowledge was less than optimal in meeting the patient demands for this area of healthcare. This result indicates a need for developing specific modules about complementary medicine, including vitamin and mineral supplementation, through pharmacy colleges as part of the curriculum for under-graduate pharmacy students. Further attempts should be pursued in developing regular refresher programmes on multivitamins for registered and practicing pharmacists. In conclusion, the Libyan ministry of health must create regulations and laws to guarantee that most vitamin and mineral supplements are not defined as OTC products and, thus, should be regularly evaluated to ensure higher manufacturing and production standards.

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