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ASSESSMENT OF THE KNOWLEDGE, ATTITUDE, AND PRACTICE OF SUDANESE COMMUNITY PHARMACISTS, IN KHARTOUM STATE, ABOUT POSITIVE LIFE STYLE CHANGES, NUTRITION AND DIETARY SUPPLEMENTS

Nahla Noor Aldeen Hamoda Abd Alaziz[1]* and Kamal Addin Mohammad Ahmad Idris[2]

[1]School of Pharmacy, Ahfad University for Women, Omdurman, Sudan.

[2]Department of Pharmacy Practice, Faculty of Pharmcy, University of Gezira, Wad Medani, Sudan.

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***Corresponding Author**
Nahla Noor Aldeen Hamoda Abd Alaziz
School of Pharmacy, Ahfad University for Women, Omdurman, Sudan.

ABSTRACT

Background: Based on the new responsibilities advised by pharmaceutical care practice and accepted by pharmacists, they have to counsel customers on positive life style changes, food, and its nutritional elements. **Main study objective**: Assessment of the knowledge, attitude and practice of Sudanese community pharmacists, in Khartoum State, about positive life style changes, food, nutrition and dietary supplement. **Materials and Methods**: A structured, self-administered, pre-piloted questionnaire of (30) questions was used to address 327 community pharmacists from Khartoum State, Sudan. **Results:** Majority (81.6%) of respondents were young ≤ 30 years, females were (80.4%). Majority (65.8%) had an experience of 1-5 years. Only (25.7%) of respondents have been taught a course on food and nutrition during their undergraduate studies. Respondents' knowledge about lifestyle changes, nutrition and dietary supplements was average (49.9%). Statistically significant differences (P-value < 0.05) between age variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement were detected. No Statistically significant differences were detected between sex and level of respondent's education variables and pharmacist's knowledge of above mentioned subjects. Majority (93.3%) reflected positive attitudes towards counseling patients on positive life style changes, food, nutrition and dietary supplement, and majority (89%) of respondents routinely practiced it. **Conclusion and recommendations**: Study results revealed that knowledge of studied Sudanese community

pharmacist regarding positive life style changes, food, nutrition and dietary supplement was average. It is recommended that pharmacists receive more education, training, and updating to upgrade their knowledge on life style changes, food, nutrition and dietary supplement.

KEYWORDS: Sudanese, Community, pharmacists, nutrition, lifestyle, changes.

1. INTRODUCTION

The pharmaceutical care (PC), as a new mode of pharmacy practice, has put new professional responsibilities on the pharmacists. It signified the shift of pharmacy practice from a drug product –oriented one, to a patient- oriented practice. According to Fawz Frhan, ‘’Pharmacy’s role is traditionally about the supply of medicines, but in recent years, the shift towards services has meant new opportunities to talk about diet and lifestyle, alongside medicines’’.[1] Since the advent of the (PC) mode of pharmacy practice, the role of the pharmacists in the medical field has, accordingly, grown well beyond only dispensing functions, and expanded to clinical trials, health economics, patient educations, health promotion, counseling, and others. Among those new accepted pharmacists' responsibilities is: The active role in health promotion, such as educating patient on healthy lifestyle changes.[2] What is enforcing this responsibility is the recent global increase in the aging population, co-morbidities, and the escalating rates of chronic non- communicable diseases (cardiovascular, obesity, high blood pressure, diabetes and cancer); stemming from life style and nutritional changes, which led to a 50 % increase in hospitalization and even deaths, that negatively impacted the overall health economies.[3,4]

The World Health Organization (WHO) reported that, developing countries, including Sudan, are witnessing a big increase in non-communicable chronic lifestyle diseases.[5]

Surveyed community pharmacists in one Sudanese study, expressed acceptance, willingness, and favored educating and advising patients on life style changes and health promotion in general, if provided with proper training and barriers to that practice are mitigated, reduced or removed.[6]

Patients shall, accordingly, be educated about life style changes such as maintaining optimal advised weight for diabetics and hypertensive patients, smoking cessation, reduction of alcohol consumption, and regular exercise, advising them to adhere to their medications’ etc. All these measures are important for actualizing the intended pharmacotherapy outcomes, to

motivate patients to move towards a state of optimal health; which usually happens when the practicing pharmacist combines both education and counseling.[7,8]

To actualize or meet those goals of health promotion, pharmacists have to have sufficiently high level of comprehensive knowledge about, ideal body weight, Body Mass Index, nutritive values of common native food of their area of practice, and its nutritional contents, including, but not limited to, vitamins and minerals. Inadequate or over-nutrition are found to be the cause for more than two thirds of chronic non-communicable diseases; such as diabetes and cardiovascular diseases.[9]

Studies had shown that the level of knowledge about nutritional needs of different individuals considering: (age, sex, illness, physical strains, job), of global Healthcare professionals, including community pharmacists, is poor; and they accordingly need more education and training.[10-12]

Pharmacists' knowledge about nutritional contents of Sudanese food is also critically important for the detection, control, and correction of any possible food-drug interactions ; which quite often may put the patients at risk, or negatively impact the effectiveness of the medication, whether prescribed or Over The Counter (O.T.C)which were reported to be relatively high.[13-15] In one Sudanese study, community pharmacists the level of knowledge about drugs interactions with Sudanese food and beverage was found to be unsatisfactory.[15]

Add to that, pharmacists are supposed to acquire the competencies to prepare, inspect and administer Total Parenteral Nutrition (TPN) in hospitals. Some pharmacists specialize in nutrition support. They study the physiochemical compatibilities of parenteral solutions.[16-17]

Moreover, in recent years, due to the increasing consumers' awareness of good dieting for a healthy life, they are used to visiting pharmacies seeking information about food supplements. A report by Grand View Research, Inc., June 2016, expects global market of dietary supplements to reach USD 278.02 billion by the year 2024.[18]

This phenomenon is more prevalent in developing countries and is increasing possibly due to food scarcity, poor food quality, increase in aging population, and higher consumers' health awareness.[19]

As commonly known, food and its nutritional elements have important effects in the promotion and maintenance of good health and prevention of chronic diseases. Pharmacists are supposed to be up to this mission, as they are the only healthcare team members who are most easily accessible to patients, and who always have records for patients who usually visit different medical specialty members and settings.[20]

As recognized by The WHO, the type of diet, and its contents, is part of the major modifiable determinants of chronic diseases such as obesity, diabetes, cardiovascular diseases, cancer, osteoporosis and dental diseases.[21]

By promoting appropriate diets and dietary supplements (DS) use, coupled with the subsequent education and advice about them, the community pharmacist can be an important heath care provider who has an effective role in the prevention and management of chronic disease conditions. Therefore, pharmacists need to acquire and maintain a comprehensive and updated knowledge about food, nutrition and dietary supplements, ideal body weight and relevant exercise.

Many previous studies had shown that pharmacists were routinely asked for information or advice about DS from consumers.[22-23]

In the Baseline Natural Health Products (NHPs) Survey (2005) it was reported that 47% of Canadians think that consumers do not have enough information to make informed decisions regarding NHPs, 18% of Canadians view pharmacists as primary sources of information on NHPs and 43% completely trust the NHP information provided by their pharmacist.[24] Despite these expectations, several studies have shown that, pharmacists mostly do not feel confident in answering patients' questions about Complementary Alternative Medicine (CAMs) and in introducing and recommending these products to their customers. In addition, they rate their own knowledge about CAMs as inadequate due to lack of knowledge or inadequate undergraduate education on food supplement products.[25]

In order to be able to provide informed advice about nutrition and dietary supplements, pharmacist must have appropriate levels of education and knowledge in this area.[26]

In The UK, Australian Universities and also across the United States, no compulsory nutrition specific units are included in the majority of pharmacy undergraduate courses.[27]

In another study conducted in Canada in 2007 to assess herbal knowledge among pharmacy students it was found that prior exposure to herbal education was related to higher test scores, but pharmacy schools' curricula contents on NHP constitute a small portion.[28]

In a national survey, 92% of Canadian pharmacists asserted that, they that feel the study of herbal medicines should be mandatory in the undergraduate pharmacy curriculum.[2] This may emphasize the need for incorporating more nutrition education into the pharmacy curriculum to complement current pharmacy education, as it affects the knowledge, attitude and practice of community pharmacist relating to nutrition and dietary supplements, which consequently, affect the level of community pharmacists' advice to patients regarding them. Based on all the above it was decided to conduct this study under the title:
Assessment of the knowledge, attitude and practice of Sudanese community pharmacists, in Khartoum State, about positive life style changes, food, nutrition and dietary supplement.

2. MATERIALS AND METHODS

2.1 Study design

This is a descriptive cross-sectional study conducted between Dec 2017 and April 2018 in Khartoum state, Sudan. Data collection was carried out using self-administrated pre structured and pre piloted questionnaires consisting of 30 closed end questions.

2.2 Population and study area

The study was conducted on (327) registered community pharmacists practicing in Khartoum state, the capital city of Sudan which consists of three main cities, Khartoum, Omdurman and Khartoum North (Bahri).

2.3 Sample size and sampling procedure

According to the Directorate of Pharmacy, Ministry of Health of Khartoum state, the total number of register pharmacists in Khartoum State was 2195.[29] The sampling size was calculated at 95% confidence level and 5% confidence interval and was found to be (327)community pharmacists. Pharmacists were randomly selected from three towns (199) Khartoum city, (55) from Omdurman city, and (70) Khartoum North city.

2.4 Data collection form

The questionnaire was used as data collection tool. It was developed to collect information about community pharmacists' knowledge, attitude and practice toward positive life style

changes, nutrition and dietary supplements after thorough review of the previous literature.[30-31]

Pilot testing was carried out with 30 pharmacists to test the clarity of questions, length of questionnaire, readability and reliability. Results from the pilot testing were not included in the final analysis of the data. The final form of the questionnaire consists of 30 questions divided in to 4 sections.

1. Section one which is composed of eight (8) questions was intended to collect Socio - demographic information of respondents such as age, sex, marital status, academic qualifications, place of undergraduate pharmacy studies, area of practice, years of experience as community pharmacist in practice, and whether practicing as a full- timer or part-timer.
2. The second section was composed of seven (7) questions to figure out the attitude and practice of the respondent pharmacists regarding positive life style changes, nutrition and dietary supplements.
3. The third section which consisted of twelve (12) questions was intended to investigate the respondent pharmacists' general knowledge about different natural and dietary source of vitamins including common traditional Sudanese dietary food, side effects, and drug interactions, RDA, and Body Mass Index (BMI), to objectively measure their knowledge.
4. Community Pharmacists' professional role and responsibilities were assessed in this fourth section which consisted of three (3) questions where pharmacists were asked about their opinion to include nutrition courses in pharmacy schools undergraduate curricula and to have continuing education on nutrition**.**

2.5 Statistical analysis

Data were analyzed using Statistical Package for Social Sciences version 20 (SPSS 20) after all data were coded and entered. Frequencies and percentages of pharmacist's responses were used to express results. The Chi-Square test was used to find the association between the demographic variables and level of knowledge. A significance level of $P \leq 0.05$ was considered significant differences.

2.6 Ethical approval

All community pharmacists included in the study were pre-informed of the purposes and the nature of the research by the researchers; and were also informed to feel free to participate or

refrain. Verbal informed consent was obtained from all the participants, prior to handing over of the questionnaire forms. Moreover they were informed that their free participation by filling the questionnaire form will be considered as a written consent.

3. RESULTS

The response rate was (100%), Results were expressed in frequencies and percentages. Tables and figures were used to ease understanding of results.

Table (1): Respondents' socio-demographic characteristics.

Socio-demographic characteristics	Frequency	Percent
1-Age		
< 25 years	76	23.2%
26 – 30 years	191	58.4%
31 – 35 years	37	11.3%
≥ 36 years	23	7%
2-Sex		
Female	263	80.4%
Male	64	19.6%
3-Marital Status		
Divorced	5	1.5%
Married	87	26.6%
Single	235	71.9%
4-Academic Qualifications		
Bachelor	191	58.4%
Master	131	40.1%
Ph.D	5	1.5%
5-Place of undergraduate pharmacy studies		
Abroad	10	3.1%
Sudan	317	96.9%
6-Years of experience		
1 – 5	215	65.8%
6 – 10 years	74	22.6%
≥ 11 years	38	11.6%
7-Town of practice		
Khartoum	199	60.9%
Khartoum North	70	21.4%
Omdurman	55	16.8%
8-practicing as a full- timer		
Yes	136	41.6%
No	191	58.4%

Table 2: Attitude and practice of respondents regarding positive life style changes, food, nutrition and dietary supplement.

Questions	No.	%
1-Do you receive questions about positive life style changes or nutrition and dietary supplements from patients		
Yes	262	80.1%
No	65	19.9%
2-Do you counsel the patient/consumer about the importance of positive life style changes ?		
Yes	291	89%
No	36	11%
3-Do you ask the patients if they are taking other drugs or supplements (medication history), in order detect and correct any possible drug –interactions, duplications etc. ?		
Always	80	24.5%
Never	3	0.9%
Rarely	49	15%
Sometime	195	59.6%
4-Do you consider variation of dietary habits and types of diets patient usually consume when you counsel patient about drug nutrient interactions.		
Always	70	21.4%
Never	21	6.4%
Rarely	60	18.3%
Sometime	176	53.8%
5-What is/are the barrier/s that may not allow you to counsel patient about positive life style changes, nutrition and dietary supplements?		
a-lack of knowledge	28	8.6%
b-La ck of time for counseling	175	53.5%
c-Lack of expertise in counseling	57	17.4%
d-Lack of patient demand for counseling	124	37.9%
e-Lack of privacy for counseling	98	30%
f-Lack of interest in counseling	37	11.3%
6-Do you feel confident when you advise patients about positive life style changes or nutrition and dietary supplements?		
Yes	304	93.3%
No	22	6.7%
7-Is it important to counsel patients about positive life style changes?		
a-When the patients is overweight or obese	142	43.4%
b-When the patient is diabetic	178	54.4%
c- When the patient has anxiety or depression	22	6.7%
d- When the patient is Alcohol and/or tobacco consumer	29	8.9%
e- When the patient has Irritable bowel syndrome	109	33.3%
f- When the patient has Renal and/or hepatic dysfunctions	103	31.5%
ALL	51	15.6%

Table3: Knowledge of respondents regarding positive life style changes, food, nutrition and dietary supplement.

	Frequency	Percent
Have you been taught a course of food and nutrition during your undergraduate course?		
No	242	74.3%
Yes	84	25.7%
*If you answered with Yes, was it practically helping you in educational advice to patients? (N = 84)		
No	12	14.3%
Yes	72	85.7%
Total	84	100%

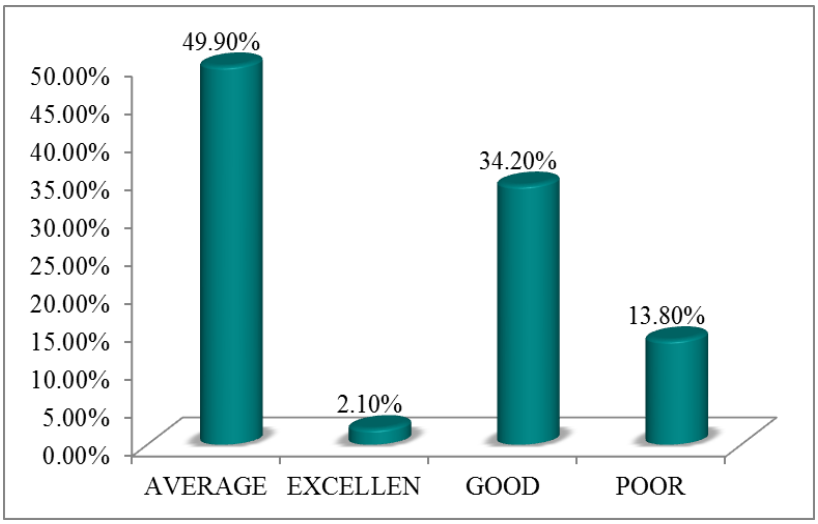

Figure 1: Respondents' self- rating of their knowledge.

Table 4: Knowledge of respondents regarding positive life style changes, food, nutrition and dietary supplement.

Question	Frequency	Percent	Question	Frequency	Percent
Which of these vegetables contain high vitamin A			Does the concomitant consumption of Foul Masri and oral ciprofloxacin affect the absorption of the later?		
Rigla(Portulaca)	261	79.8%	I don't know	101	30.9%
Carrot	49	15.0%	No	132	40.3%
Sweet potato (Bambay)	12	3.7%	Yes	94	28.7%
Tomato	5	1.5%	Total	327	100%
Pumpkins (Garaa, Dibbaa)	0	0%	Black or dark stools (Melena) are a common side effect of iron supplements that may be the harmless result of unabsorbed iron.		
Total	327	100%	I don't know	34	10.4%
Which of these foods contain high potassium contents?			No	54	16.5%
Banana	288	88.1%	Yes	239	73.1%

Sweet potato(Bambay)	26	7.9%	Total	327	100%
White Beans (loubia-fasolia)	0	0%	Garlic (Toom) increases the possibility of bleeding when concomitantly used with warfarin		
Salmons	6	1.8%	I don't know	91	27.8%
Foul Masri	4	1.2%	No	69	21.1%
Bamys (okra)	2	.6%	Yes	167	51.1%
Total	327	100%	Total	327	100%
Can you write the formula for the calculation of the Body mass index (BMI) for adults?			The most concentrated source of vitamin B12 is red Meat.		
Correct	83	25.4%	I don't know	72	22%
missed	181	55.3%	No	73	22.3%
wrong	63	19.3%	Yes	182	55.7%
Total	327	100%	Total	327	100%
Does Millet (Dukhun) contain higher carbohydrates contents than Sourghm (zura)?			Body mass index of 25-30 indicate obesity		
I don't know	80	24.5%	I don't know	55	16.8%
No	88	26.9%	No	118	36.1%
Yes	159	48.6%	Yes	154	47.1%
Total	327	100%	Total	327	100%
Pregnant and breast feeding ladies over 18years, require at least 1000mg of Calcium per day					
I don't know	65	19.9%			
No	49	15.0%			
Yes	213	65.1%			
Total	327	100%			

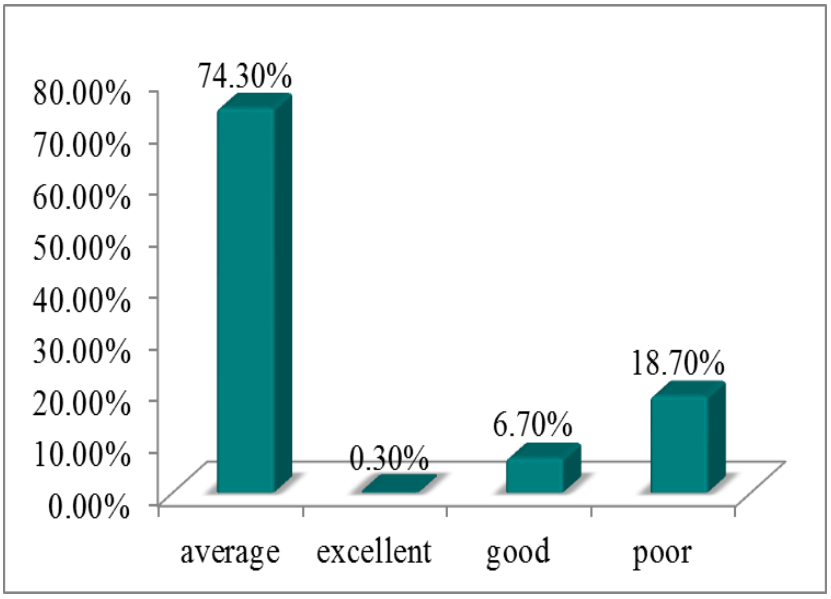

Figure 2: Respondents' knowledge score.

Table 5: Respondents' opinion about Community Pharmacists' professional role and responsibilities regarding positive life style changes, food, nutrition and dietary supplement.

Questions	Frequency	Percent
1-the community pharmacist should be able to council patients about positive life style changes and possible drug interactions between conventional medicines, dietary supplements, and about drug-food interactions.		
Agree	322	98.5%
Disagree	5	1.5%
2-Do you agree that nutrition courses should be included in pharmacy schools undergraduate curricula?		
Agree	320	97.9%
Disagree	7	2.1%
3-Do you agree that continuing education on nutrition should be mandatory ?		
Agree	294	88.9%
Disagree	33	10.1%
*If you agree, what is/are the topic area/s that you would like to have education on:		
a-side effects/adverse events	234	71.7%
b-patient counseling	232	70.9%
c-general nutrition course	255	78.0%
d-Food-drug interactions	198	60.6%
e- Therapeutic use of dietary supplements	250	76.5%
f-efficacy of herbal medicines	274	83.8%
g-Nutrition for specific population groups (e.g: pregnant, pediatric, ESRD)	234	71.6%

Table 6: Age impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	poor	
AGE	< 25 years	Count	58	0	2	16	76
		%	76.3%	0.0%	2.6%	21.1%	100.0%
	26 – 30 years	Count	144	1	18	27	190
		%	75.8%	0.5%	9.5%	14.2%	100.0%
	31 – 35 years	Count	29	0	1	7	37
		%	78.4%	0.0%	2.7%	18.9%	100.0%
	≥ 36 years	Count	11	0	1	11	23
		%	47.8%	0.0%	4.3%	47.8%	100.0%
Total		Count	242	1	22	61	326
		%	74.2%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 20.862[a] p value =.013.

Cross-tabulation revealed that there were statistically significant differences between age variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value < 0.05).

Table 7: Sex impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	Poor	
	FEMALE	Count	196	0	15	51	262
		% within SEX	74.8%	0.0%	5.7%	19.5%	100.0%
	MALE	Count	46	1	7	10	64
		% within SEX	71.9%	1.6%	10.9%	15.6%	100.0%
Total		Count	243	1	22	61	327
		% within SEX	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 6.996[a] p value = 0.321

Cross-tabulation revealed that there were no statistically significant differences between sex variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 8: Marital Status impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	poor	
MARITAL STATUS	DIVORCED	Count	3	0	1	1	5
		%	60.0%	0.0%	20.0%	20.0%	100.0%
	MARRIED	Count	63	0	3	21	87
		%	72.4%	0.0%	3.4%	24.1%	100.0%
	SINGLE	Count	177	1	18	39	235
		%	75.3%	0.4%	7.7%	16.6%	100.0%
Total		Count	243	1	22	61	327
		%	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 5.548[a] p value = 0.476.

Cross-tabulation revealed that there were no statistically significant differences between marital Status variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 9: Academic qualification impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	poor	
ACADEMIC QUALIFICATION	BACHELOR	Count	144	0	11	36	191
		%	75.4%	0.0%	5.8%	18.8%	100.0%
	MASTER	Count	96	1	11	23	131
		%	73.3%	0.8%	8.4%	17.6%	100.0%
	PHD	Count	3	0	0	2	5
		%	60.0%	0.0%	0.0%	40.0%	100.0%
Total		Count	243	1	22	61	327
		%	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 4.138[a] p value =0.658.

Cross-tabulation revealed that there were no statistically significant differences between academic qualification variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 10: Place of under graduation studies impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	poor	
PLACE OF UNDERGRADUATION	ABROAD	Count	6	0	2	2	10
		%	60.0%	0.0%	20.0%	20.0%	100.0%
	SUDAN	Count	237	1	20	59	317
		%	74.8%	0.3%	6.3%	18.6%	100.0%
Total		Count	243	1	22	61	327
		%	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 3.027[a] p value = 0.388.

Cross-tabulation revealed that there were no statistically significant differences between place of under graduation variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 11: Years of experiences impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			Average	excellent	good	poor	
YEARS OF EXPERIENCE	.00	Count	1	0	0	1	2
		% within EXPERIENCE	50.0%	0.0%	0.0%	50.0%	100.0%
	1.00	Count	163	1	10	37	211
		% within EXPERIENCE	77.3%	0.5%	4.7%	17.5%	100.0%
	2.00	Count	56	0	9	9	74
		% within EXPERIENCE	75.7%	0.0%	12.2%	12.2%	100.0%
	3.00	Count	22	0	3	13	38
		% within EXPERIENCE	57.9%	0.0%	7.9%	34.2%	100.0%
Total		Count	242	1	22	60	325
		% within EXPERIENCE	74.5%	0.3%	6.8%	18.5%	100.0%

Chi-Square = 14.879[a] p value = 0.094.

Cross-tabulation revealed that there were no statistically significant differences between years of experience variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 12: Town of practice impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			average	excellent	good	poor	
TOWN	0	Count	1	0	0	2	3
		% within TOWN	33.3%	0.0%	0.0%	66.7%	100.0%
	KHARTOUM	Count	146	1	13	39	199
		% within TOWN	73.4%	0.5%	6.5%	19.6%	100.0%
	NORTH	Count	59	0	2	9	70
		% within TOWN	84.3%	0.0%	2.9%	12.9%	100.0%
	OMDURMAN	Count	37	0	7	11	55
		% within TOWN	67.3%	0.0%	12.7%	20.0%	100.0%
Total		Count	243	1	22	61	327
		% within TOWN	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 12.480[a] p value =.188.

Cross-tabulation revealed that there were no statistically significant differences between town of practice variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 13: Time practice impact on respondent's knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			average	excellent	good	poor	
FULL-TIMER		Count	0	0	0	1	1
		%	0.0%	0.0%	0.0%	100.0%	100.0%
	0	Count	1	0	0	0	1
		%	100.0%	0.0%	0.0%	0.0%	100.0%
	NO	Count	144	0	10	35	189
		%	76.2%	0.0%	5.3%	18.5%	100.0%
	YES	Count	98	1	12	25	136
		%	72.1%	0.7%	8.8%	18.4%	100.0%
Total		Count	243	1	22	61	327
		%	74.3%	0.3%	6.7%	18.7%	100.0%

Chi-Square = 7.762[a] p value =0.558.

Cross-tabulation revealed that there were no statistically significant differences between time practice variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

Table 14: Nutrition courses impact on respondents' knowledge regarding positive life style changes, food, nutrition and dietary supplement.

			SCORE				Total
			average	excellent	good	poor	
NUTRITION COURSES	NO	Count	181	0	16	49	246
		% within SCORE	74.5%	0.0%	72.7%	80.3%	75.2%
	YES	Count	62	1	6	12	81
		% within SCORE	25.5%	100.0%	27.3%	19.7%	24.8%
Total		Count	243	1	22	61	327
		% within SCORE	100.0%	100.0%	100%	100.0%	100.0%

Chi-Square = 4.034[a] p value =.258.0

Cross-tabulation revealed that there were no statistically significant differences between nutrition courses variables and pharmacist's knowledge regarding positive life style changes, food, nutrition and dietary supplement (P-value > 0.05).

4. DISCUSSION

Many dietary supplements are available in the market in Sudan. This leads to an increase in their demand, selling, consumption and availability in community pharmacies. Furthermore, with evolution of pharmacists role in the community as an essential health care providers that

should have sufficient knowledge to consult costumers about DS and educate public about positive life style changes and their impacts on their life, this study is conducted to explore the general knowledge, attitude, practice of Sudanese community pharmacists about dietary supplements and positive life style changes.

A total of 327 community pharmacists participate in this study, the predominant age group being (26 – 30 years) (58.4%), and majority 215 (65.8%) had from1-5years of experience as practicing pharmacist. Compared to the study conducted in Palestine and Jordan, the results regarding the range of age and years of experience of community of pharmacists were almost, very close.[32,33] Females represented a big majority 263(80.4%) of the respondents. This finding is consistent with data obtained by federal ministry of health which report that the majority of registered Sudanese pharmacists are females.[29] This is similar to reports by studies from Qatar and Kuwait,[34, 35] and contrary to other part of the world where males are the majority.[33, 36, 37]

This female respondents dominance could be attributed to the fact that, females are usually more serious about their academics than male, and this explains their higher intake in pharmacy school and graduation than males.[38]

With respect to academic qualification, 191 (58.4%) of respondents had Bachelor of Science in pharmacy and most of them had earned them in Sudan 317 (96.9%). This could be attributed to the wide availability of pharmacy schools in Sudan, both public and privet as a results of establishment of more than fifteen new pharmacy colleges in the last three decades which encouraged those who are interested to study pharmacy to study in Sudan.[15, 39]

Regarding attitude and practice of respondents about positive life style changes and nutrition and dietary supplements, majority (80.1%) of respondents indicated that they receives questions from patients about positive life style changes, nutrition and dietary supplements. In a Previous study conducted in Sudan to evaluate the consumer needs and perceptions about expanded roles of community pharmacists, it was reported that community pharmacists were cited by consumers as the second preference (22.3%) for advice in health problems after doctors (72.6%).[40]

Most of pharmacy customers expect the pharmacist to be able to provide them with suitable heath care advices and to recommend the suitable DS products to their condition.[22,23, 41]

In addition to the wide and easy accessibility of pharmacists that provide consultation, without appointment or charge.[42]

Moreover, a high percentage of community pharmacists 291 (89%) in this study asserted that they council the patient about the importance of positive life style changes. As life style changes may not be felt important and may be marginalized by many patients, community pharmacists are in an ideal position to act as readily available information resource on life style changes.

[43,44] Therefore, they could counsel patients to achieve ideal body weight, proper diet and exercise in addition to educating patients regarding the various strategies for smoking cessation. This could greatly improve proper medications' uses, enhance therapeutic outcomes and improve patient's quality of life. Previous six survey studies indicated that community pharmacists had positive perception of their role in providing smoking cessation services, and the self-reported involvement in Sudan was found to be 76%.[45] Several studies showed that respondents appreciated the idea of receiving weight management services by community pharmacists.[46-49] More than half of community pharmacists in this study 195 (59.6%) declared that they sometimes ask patients if they are taking other drugs or supplements in order to detect and correct any possible drug interactions or duplications. In literature, the reliability of pharmacists to detect interaction between DS and conventional medication has been recognized as an important issue.[26] Previous studies reported that some patients use complementary and alternative medicine products as alternatives to or concomitantly with their prescribed medications.[34] Moreover, many patients thought that the DS are safe and free of side effects; therefore, drug interactions and adverse effects may not be known or understood by the patient and even the pharmacists.[50-52]

176 (53.8%) of respondents asserted that they sometime consider variation of dietary habits and types of diets patient usually consume when they counsel patients about drug nutrient interactions, which indicates another gap in Sudanese pharmacists counseling skills.

Sudan is a very large country with a unique cultural variation among its population, this plays an important role in the diversity of dietary habits and types of diets the patients usually consume. Therefore, pharmacist should consider this variation during patient counseling and should be vigilant in detecting and monitoring any potential drug-nutrient interactions that could have profound influence on drug effect. Therefore, it is much more favorable if the

nutrition courses in their undergraduate curricula include selected topics about the nutritional contents and value of traditional Sudanese food and their drug interaction.

The most significant pharmacists' barriers that may not allow them to counsel patient about positive life style changes, nutrition and DS in this study are lack of time for counseling 175 (53.5%), and more interestingly, lack of patient demand for counseling 124 (37.9%). This may imply that many pharmacists may make incorrect assumptions about the actual patient's knowledge and needs for reliable and up-to-date information about life style changes and DS. In addition this may give an insight that informs of an increase in the awareness of community about the importance of positive life style and nutrition in general and their role in prevention of diseases and improving health and wellbeing. Many patients may believe that dietary supplements are completely safe, and they may not be aware of possible adverse effects associated with their use and the potential interactions that may occur between their medication and dietary contents/ supplements which may result in undesired consequences. In other studies, most significant pharmacist's barrier to communicate with patients on DS, is lack of accurate and accessible information, lack of scientific evidence availability, lack of training, lack of reimbursement, legal concerns and suggestion of DS products by pharmacies' staff.[53-56].

According to study respondents own self- assessment, a big majority 304 (93.3%) of them felt confident when they advise patients about positive life style changes, nutrition and dietary supplements. This finding is similar to that reported by some Palestinian survey authors.[32] According to other previous studies, pharmacists were not confident enough to provide such information to their customers. In addition, it was also reported in some studies that customers were not always satisfied with the information they receive from pharmacists.[54,57-60] Previous studies also showed that this customers dissatisfaction may arise due to lack of some factors such as knowledge of specific DS products, information particulars provided and understanding of the advantages of DS for general health maintenance.[61-64]

In a study conducted by Newland et al. in Scotland, it was found that community pharmacists do have a role to play in delivering weight management programs, but the majority were confident in provision of healthy dieting advice, while more than half felt they need more training in this area.[65]

In The UK the Association For Nutrition (AFN) has developed core competencies in nutrition due to recognition for increased role of pharmacists in provision of dietary advice and the lack of training in diet and health in pharmacy schools.[66]

More than half of the respondent pharmacists thought that, it is important to counsel patients about positive life style changes when they are diabetics 178(54.4%). Generally, the perception of consumers regarding some suggested areas for advice in community pharmacies such as smoking cessation and weight and healthy dieting was shown to be low, as these roles were unexpected to be done or seen before in community pharmacies or not needed by customers.[40] Being an accessible health care provider, the community pharmacist should be involved in promoting these services that will have positive impact on general heath of patients and enhance wellness to society.

It was observed that only a minority 84 (25.7%) of respondents had a course on food and nutrition during their undergraduate pharmacy courses. Out of this number (85), a majority 72 (85.7%) thought that this courses practically helped them in delivering educational advice to patients.

This obviously points to the critical need for nutritional education in teaching curricula in pharmacy schools in order to make the pharmacists well prepared and have the basic knowledge regarding nutrition that will lead to a positive influence on their daily practice and therefore great influence on general public health. This suggestion is also supported by another analysis conducted In The UK, Australian Universities, and also across the United States, asserting that the majority of those courses didn't include any compulsory nutrition specific units.[67, 68]

When they were asked to self - rate their own knowledge about dietary supplements (DS) and positive life style changes, about half of the respondents (49.9%) rated their own knowledge to be average. Many pharmacists feel they have insufficient knowledge and/or inadequate education about CAM/DS that may not help them from providing quality information to their patients about these products.[69-73]

This Lack of respondent pharmacists knowledge can be referred to a variety of factors as shown in some previous studies including wide variation in CAM courses and topics to be

covered during syllabus provided by pharmacy school in different institutions and no institutional rules to teach CAM courses in the pharmacy curriculum.[74, 75]

In this study, 10 questions were used to assess respondents' knowledge about DS and positive life style changes, including natural sources of vitamins from some famous Sudanese local food, BMI**,** drug nutrients interactions. The score is calculated based on correct answers, and the results showed that the majority of the respondents (74.3%) have an average knowledge score, Figure 2. This results is consistent with the results obtain by respondents when they were asked to self rate their own knowledge.

In a previous survey by Sweileh et al,2013; the actual testing scores reported by the majority of pharmacists were poor, while they rated their own knowledge as good.[76] lack of knowledge about drug-food interactions among health care professionals was also shown by other studies.[77-79]

The average results of the respondents knowledge regarding some famous local Sudanese food nutritional contents and interactions, pointed to the importance of introducing nutrition education and training in the under graduate pharmacy schools curricula.[80] It also suggested that greater efforts are required to increase the knowledge of community pharmacists of dietary supplements and positive life style changes in order to improve their role in improving patients' health. The reasons for this average knowledge test score warrants further studying.

Fortunately, the current study data indicated that Sudanese community pharmacists were conscious of their professional role and responsibilities regarding dietary supplements and positive life style changes. Almost all the respondents 322 (98.5%) agreed that the pharmacist should be able to council patients about positive life style changes and possible drug interactions between conventional medicines, dietary supplements, and about drug-food interactions. One of the bright things noticed in this study is that a very big majority of the respondents 320 (97.9%), agreed that nutrition courses should be integral parts of pharmacy schools undergraduate curricula, while a big majority of respondents 294 (88.9%) also asserted that continuing education on nutrition should be mandatory. Regarding topic area/s on which they would like to have education on, the results reveled that the respondents were very interested to have education on a wide range of topics as shown by the closed percentage

of selected topics (Table 5), and the most selected topics were efficacy of herbal medicine (83.8%).

As shown in Table, 6, there is a statistically significant difference in knowledge score based on age, (p value =0.013) similar to Palestine survey[32], no differences were found in knowledge score between males and females. Whereas female pharmacists were shown to have superior knowledge scores than males in one Qatari survey.[34] One interesting finding is the absence of significant difference between knowledge score of those who have a nutrition courses during their undergraduate study and those who had not taken it.

5. CONCLUSION AND RECOMMENDATIONS

It is clear that Sudanese community pharmacists appear to be aware about their professional responsibilities as competent authority in counseling patients about DS and positive life style changes. Overall, their current state of knowledge was average which may not be adequate in meeting the patients' demands for this area of healthcare. Therefore, community pharmacists still need more education and training about positive life style changes, food, nutrition and dietary supplement including natural sources of vitamins, safety, drug interaction potentials, side effects and efficacy of herbal remedies in order to be more qualified and well equipped to face the challenge of providing optimal pharmaceutical care and counseling for their patients to improve their patient's outcome.

Undergraduate pharmacy courses may fall short or even lack addressing the real needs of practicing pharmacists about DS and positive life style changes to provide adequate counseling and education to their patients. More courses that focus on local Sudanese food nutritional values and herbal medicine are recommended to cover wide range of diversity that may be encountered among patients.

The results of this study suggest that there is significant scope to improve pharmacist knowledge through continuing professional pharmacy-education programs that may play a significant role in improving pharmacists' knowledge regarding DS and positive life style changes, in addition to providing activities revolving around professional practice.

6. AKNOWELEDGMENT

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7. CONFLICT OF INTEREST

Authors have no conflict of interest to declare.

8. REFERENCES

1. Fawz Frhan. http://www.pharmaceutical-journal.com/opinion/blogs/food-as-medicine-the-importance-of-nutrition-in-disease/2.
2. McClinchy J, Willials J, Gordn L, et al. Dietary advice and collaborative working: Do pharmacists and allied health professionals other than dietitians have a role? Healthcare, 2015; 3: 64-77.
3. Egger G, Dixon J. Beyond Obesity and Lifestyle : A review of 21 st Century Chronic Disease Determinants. BioMed Res Inter, 2014, Article ID 731685. http://dx.doi.org/10.1155/2014/731685.
4. Murphy T. Lifestyle diseases are worrying killers in developing countries. Humanosphere, December, 2014.
5. World Health Organization (WHO) ESCOSOC/UNESCWA/WHO Western Asia Ministerial Meeting ‘’Addressing non-communicable disease and injuries’’ major challenges for sustainable development in 21st century‘’ (Hosted in Doha by the Government of Qatar, 10-11 May 2009)
6. Mohamed SS-E, Mahmoud AA, Ali AA. Involvement of Sudanese community pharmacists in public health activities. Int J Clin Pharm, 2013; 35(3): 393-400.
7. Stamper MB, Huf JE, Mansen EB, et al. Primary prevention of coronary heart disease in women through diet and life style. N Engl J Med, 200; 6(3): 16-22.
8. Ezzati M, Riboli M. Behavioral and dietary risk factors for non-communicable diseases. N Engl J Med, 2013; 369: 954-064.
9. Nicholas L. Roberts D, Pond D. The role of the general practitioner and the dietitian in patient nutrition management. Asia Pac J Clin, 2003; 12(1): 3-8.
10. Macdiarmid JI, Gatenby SJ, Manson PM. The pharmacist as a nutrition educator? An assessment of nutritional knowledge and undergraduate training of community pharmacists. J Hum Nutr Diet, 1993; 6(1): 39-47. DOI: 10.1111/j.1365-277X.1993.tb00346.x.
11. DiMaria-Ghalili R A, Mirtallo LM, Tobin BW, et al. Challenges and opportunities for nutrition education and training in the health care professions: intra-professional and inter-professional call to action. Am J Clin Nutr, 2014; 99: 1184S-1193S.

12. Waddington F, Naunton M, Kyle G, et al. A systematic review of community pharmacists therapeutic knowledge of dietary supplements. Int J Clin Pharm, 2015; 37(3): 439-46. doi:10.1007/s11096-015-0092-5.
13. Ali AA, Abdallah AA. Evaluation of attitudes of the community pharmacists toward warfarin interactions. Sudan Med Monit, 2014; 9(1): 35-38. DOI: 10.4103/1858-5000.144661.
14. Ahmed FMO. Evaluation of prescribing pattern in pediatric outpatient at Albuluk Pediatric Hospital. IJIPSR, 2015; 3(4): 244-252.
15. Tokka ASA, Idris KAMA. Assessment of the awareness, knowledge, attitude, and practice of Sudanese community pharmacists, in Khartoum state, about drug –interaction. WJPR, 2017; 6(4): 409-426.
16. Tucker A, Ybarra J, Bingham A, et al. Standards of practice for Nutrition Support Pharmacists Task Force; American Society for Parenteral and Enteral Nutrition. American society for parenteral and enteral nutrition (A.S.P.E.N) standards of practice for nutrition support pharmacists. Nutr Clin Pract, 2015; 30(1): 139-146.
17. Katoue M, Al-Taweel D. Role of the pharmacist in parenteral nutrition therapy: challenges and opportunities t implement pharmaceutical care in Kuwait. Pharmcy Practice, 2016; 14(2): 680. Doi:10.18549/PharmPract.2016.02.680.
18. Grand View Research. Dietary Supplements Market Size Worth $278.02 Billion By 2024. Februarty 2018. https://www.grandviewresearch.com/press-release/global-dietary-supplements-market.Accessed 20.2.18
19. NASDAQ. Global Nutrition and Supplements Market: History, Industry Growth, and Future Trends by PMR, January 27, 2015; 08: 46 ET.
20. Rich E, Libersky J, Parchman M. Coordinating Care for adults with Complex Care Needs in patient-centered medical home: Challenges and Solutions. AHRQ, Agency for Healthcare Research and Quality, AHRQ Publication No 12-0010 January 2012.
21. Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases (2002: Geneva, Switzerland)
22. Kwan D, Boon HS, Hirschkorn K, et al. Exploring consumer and pharmacist views on the professional role of the pharmacist with respect to natural health products: a study of focus groups. BMC Compl Altern Med, 2008; 8: 40.
23. Braun L, Tiralongo E, Wilkinson J, et al. Perceptions, use and attitudes of pharmacy customers on complementary medicines and pharmacy practice. BMC Compl. Altern Med., 2010; 10: 38.

24. Baseline Natural Health Products Survey Among Consumers, submitted March 2005. Accessed at http://www.hc-sc.gc.ca/dhp-mps/alt_formats/hpfbdgpsa/pdf/pubs/eng_cons_survey_e.pdf, May 20, 2017.
25. -Mehralian G, Yousefi N, F Hashemian F, H Maleksabet H*:* Knowledge, Attitude and Practice of Pharmacists regarding Dietary Supplements : A Community Pharmacy- based survey in Tehran. IJPR, 2014; 13(4): 1457-1465.
26. Boon H, Hirschkorn K, Griener G, Cali M. The Ethics of Dietary Supplements and Natural Health Products in Pharmacy Practice: A Systematic Documentary Analysis. Int J Pharm. Pract, 2009; 17: 31-38.
27. Macdiarmid J, Gatenby S, Mason M. The Pharmacist as a Nutrition Educator? An Assessment of Nutritional Knowledge and Undergraduate Training of Community Pharmacists. J Hum Nutr Diet, 1993; 6(1): 39-47.
28. Johnson T, Boon H, Jurgens T et al. Canadian Pharmacy Students' Knowledge of Herbal Medicine. Am J Pharm Educ, 2008; 72(4): 75
29. The Federal Ministry of Health, Federal General Directorate of Pharmacy; Annual pharmaceutical statistical report, 2014; 51.
30. Bebeci E, Papajani V. Knowledge and awareness of nutional supplements and drug interactions and the role of pharmacist in intervention, Faculty of Pharmacy, University of Medicine, Tirana, Albania, 2015. Available at: https://www.semanticscholar.org/paper/KNOWLEDGE-AND-AWARENESS-OF-NUTRITIONAL-SUPPLEMENTS-Bebeci-Papajani/9b0cdf5552dba8046140d02b9b604edde4ad7767.
31. Boggs SAC, Massey LK, Armstrong JE, et al. Education of Rural Community Pharmacists to Provide Nutrition Information. Department of Food Science and Human Nutrition and College of Pharmacy, Washington State University, Spokane WA 99204-0399. Am J Pharm Educ, 1996; 60: 353-358.
32. Shraim NY, Shawahna M, Sorady MA, et al. Community pharmacists' knowledge, practices and beliefs about complementary and alternative medicine in Palestine. Shraim et al. BMC Complement Altern Med., 2017; 17: 429. DOI 10.1186/s12906-017-1940-8
33. Shilbayeh SA. Exploring knowledge and attitudes towards counseling about vitamin supplements in Jordanian community pharmacies. Pharmacy Practice (Internet), 2011; 9(4): 242-251.
34. Awaisu A, Kheir N, Ibrahim MI, et al. Knowledge, attitudes, and practices of community pharmacists on generic medicines in Qatar. Int J Clin Pharm, 2014; 36(2): 394–404.

35. Awad AI, Al-Ajmi S, Waheedi MA. Knowledge, perceptions and attitudes toward complementary and alternative therapies among Kuwaiti medical and pharmacy students. Med Princ Pract, 2012; 21(4): 350–4.
36. Al-Arifi MN. Availability and needs of herbal medicinal information resources at community pharmacy, Riyadh region, Saudi Arabia. Saudi Pharm J, 2013; 21(4): 351–60.
37. Mehralian G, Yousefi N, Hashemian F, Maleksabet H. Knowledge, attitude and practice of pharmacists regarding dietary supplements: A community pharmacy-based survey in Tehran. Iran J Pharm Res., 2014; 13(4): 1457–65.
38. Federal Ministry of Health –Sudan, General Directorate of Pharmacy, Pharmaceutical Statistical Report, 2007; 40-42.
39. Idris KAMA, Fadl Elmula RAM, Assesment of the knowledge, attitude and practice of Sudanese community pharmacists on the safe disposal of leftover medications. WJPR, 2018; 7(11): 124-147.
40. Mahmoud AAE, Ali AA, Mohamed SS-E. Expanded roles of community pharmacists in Sudan :consumer s needs and perceptions, *World* J Pharm Pharm Sci., 2014; 3(6): 18875-1888.
41. Williamson M, Tudball J, Toms M, Garden F and Grunseit A. Information use and needs of complementary medicines users. Sydney: NPS, 2008; 1-78.
42. Goel P, Ross-Dengan D, Berman P, Soumerai S. Retail pharmacies in Developing Countries :A Behavior and intervention Framework. Soc Sci Med, 1996; 42: 115-1161.
43. Lenz TL, Stading JA. Lifestyle Modification Counseling of Patient with Dyslipidemia by Pharmacists and Other Health Professions. J Am Pharm Assoc, Nov-Dec, 2005; 45(6): 709-13.
44. Pharmacists for Quality Healthcare. Your Pharmacist. American Pharmacists Assn. Available at: : https://www.google.com/search?q=Pharmacists+for+Quality+Healthcare.+Your+Pharmacist.+American+Pharmacists+Assn&ie=utf-8&oe=utf-8&aq=t&rls=org.mozilla:en-US:official&client=firefox-a&channel=fflb
45. Mohamed SS, Mahmoud AA, Ali AA. Involvement of Sudanese community pharmacists in public health activities. Int J Clin Pharm, 2013; 35(3): 393–400. doi: 10.1007/s11096-012-9745-9
46. Fakih S, Hussainy S, Marriott J. Women pharmacy consumers' experiences with weight loss treatment across Victoria, Australia. Int J Clin Pharm, 2013; 35(6): 1120-9.

47. Weidmann AE, Cunningham S, Gray G, Hansford D, Bermano G, Stewart D. Views of the Scottish general public on community pharmacy weight management services: International implications. Int J Clin Pharm., 2012; 34(2): 389-97.
48. Ahrens R, Hower M, Best A. Effects of weight reduction interventions by community pharmacists. J Am Pharm Assoc, 2003; 43(5): 583-9.
49. Veronica GP, Coles C, Logan BN, Davis L. The LIFE project: A community-based weight loss intervention program for rural African American women. Fam Community Health, 2010; 33(2): 133-43.
50. Boullata JI, Barber JR. A perspective on drug-nutrient interactions. In: Boullata JI, Armenti VT, 2 eds. Handbook of Drug Nutrient. Totowa, NJ: Humana Press, 2004.
51. Blendon RJ, DesRoches CM, Benson JM, Brodie M, Altman DE. Americans' views on the use and regulation of dietary supplements. Arch Intern Med, 2001; 161: 805–10.
52. Tsai H, Lin HW, Simon Pickard A, Tsai HY, Mahady GB. Evaluation of documented drug interactions and contraindications associated with herbs and dietary supplements. Medscape website. www.medscape.com/viewarticle/773337. Accessed October 2, 2017.
53. Hosseini S, Darbooy S, Tehrani Banihashemi S, Naseri S, et al. Counterfeit medicines: Report of a cross-sectional retrospective study in Iran. Public Health, 2011; 125: 165-171.
54. Brown CM, Barner JC and Shah S. Community pharmacists' actions when patients use complementary and alternative therapies with medications. J Am Pham Assoc, 2005; 45: 41-47.
55. Tiralongo E, Wallis M. Attitudes and perceptions of Australian pharmacy students towards Complementary and Alternative Medicine–a pilot study. BMC Compl Altern Med, 2008; 8: 2. DOI: 10.1186/1472-6882-8-2.
56. Kanjanarach T, Krass I, Cumming RG. Australian community pharmacists' practice in complementary medicines: A structural equation modeling approach. Patient Educ Couns, 2011; 83: 352-359.
57. Koh HL, Teo HH and Ng HL. Pharmacists' patterns of use, knowledge, and attitudes toward complementary and alternative medicine. J Altern Compl Med, 2003; 9: 51-63.
58. Dolder C, Lacro J, Dolder N and Gregory P. Pharmacists' use of and attitudes and beliefs about alternative medications. Am J Health Syst Pharm, 2003; 60: 1352.
59. Harvey KJ. A review of proposals to reform the regulation of complementary medicines. Aust Health Rev., 2009; 33: 279-287.
60. Mehralian G, Rangchian M and Rasekh HR. Customers' priorities and satisfaction with community pharmacies: The case of Tehran. Int J Clin Pharm, 2014; 36: 707-715.

61. Philipp R, Thorne P. Would complementary and alternative medicine be welcomed in the workplace? Public Health, 2008; 122: 1124-1127.
62. Kaliyaperumal K. Guideline for conducting a knowledge, attitude and practice (KAP) study. AECS Illumination, 2004; 4: 7-9.
63. Nicole B, Virginia DS, Jon W, Pene W. Rural Australian community pharmacists' views on complementary and alternative medicine: a pilot study. BMC Compl Altern Med., 2011; 11: 1-9.
64. AbuRuz S, AlGhazawi M and Snyder A. Pharmaceutical care in a community based practice setting in Jordan: where are we now with our attitudes and perceived barriers? Int J Pharm Pract, 2012; 20: 71-79.
65. Newlands, R.S.; Watson, M.C.; Lee, A.J. The provision of current and future healthy weight management (HWM) services from community pharmacies: A survey of community pharmacists' attitudes, practice and future possibilities. Int J Pharm Pract, 2011; 19: 106–114.
66. Association for Nutrition. Workforce Competence Model in Nutrition; Association for Nutrition: London, UK, 2012. Available at : http://www.associationfornutrition.org/Default.aspx?tabid=300
67. Macdiarmid J, Gatenby S, Mason M. The Pharmacist as a Nutrition Educator? An Assessment of Nutritional Knowledge and Undergraduate Training of Community Pharmacists. J Hum Nutr Diet., 1993; 6(1): 39-47.
68. Boggs S, Massey L. Armstrong J. Lassey W. Joseph J. Education of Rural Community Pharmacists to Provide Nutrition Information. Am J Pharm Educ, 1996; 60: 353-8.
69. Semple SJ, Hotham E, Rao D, Martin K, Smith CA, Bloustien GF. Community pharmacists in Australia: barriers to information provision on complementary and alternative medicines. Pharm World Sci., 2006; 28(6): 366–73.
70. Kanjanarach T, Krass I, Cumming RG. Exploratory study of factors influencing practice of pharmacists in Australia and Thailand with respect to dietary supplements and complementary medicines. Int J Pharm Pract, 2006; 14(2): 123–8.
71. Nathan JP, Cicero LA, Koumis T, Rosenberg JM, Feifer S, Maltz F. Availability of and attitudes toward resources on alternative medicine products in the community pharmacy setting. J Am Pharm Assoc, 2005; 45(6): 734–9.
72. Howard N, Tsourounis C, Kapusnik-Uner J. Dietary supplement survey of pharmacists: personal and professional practices. J Altern Compl Med., 2001; 7(6): 667–80.

73. Bushett NJ, Dickson-Swift VA, Willis JA, Wood P. Rural Australian community pharmacists' views on complementary and alternative medicine: a pilot study. BMC Complement Altern Med., 2011; 11: 103.
74. Brooks PM. Undergraduate teaching of complementary medicine. Med J Aust., 2004; 181(5): 275.
75. Owen D, Lewith G. Teaching integrated care: CAM familiarization courses. Med J Aust, 2004; 181(5): 276–8.
76. Sweileh W, Abu Arrah E, Abu Taha A, et al. Dispensing practices, attitudes and knowledge of pharmacists towards herbal products in Palestine. Ibnosina J Med BS, 2013; 5(3): 123–30.
77. Ali A A A, Abdallah AA. Evaluation of attitudes of the community pharmacists toward warfarin interactions. Sudan Med Monit, 2014; 9(1): 35-38.
78. Lasswell AB, Deforge BR, Sobal J, et al. Family medicine residents' knowledge and attitudes about drug-nutrient interactions. J Am Coll Nutr, 1995; 14: 137-43.
79. Couris R.R, Tataronis G.R., Dallal G.E., Blumberg J.B., Dwyer J.T., Assessment of healthcare professionals' knowledge about warfarin-vitamin K drug-nutrient interactions. J Am Coll Nutr, 2000; 19: 439-445.
80. DiMaria- Ghalili R, Miratallo JM. Challenges and opportunities for nutrition education and training in the health care profession: intra-professional and inter-professional call to action. Am J Clin Nutr, 2014; 99(5): 1184S-1193S.