ARTICLE ORIGINAL / ORIGINAL ARTICLE

PERCEPTIONS AND PRACTICES REGARDING HERBAL MEDICINE PRESCRIPTIONS AMONG PHYSICIANS IN GREATER BEIRUT

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Alaaeddine N, Khayat M, Alawieh H, Adibilly S, Adib S. Perceptions and practices regarding herbal medicine prescriptions among physicians in Greater Beirut. J Med Liban 2014 ; 62 (3) : 130-136.

ABSTRACT • AIMS AND OBJECTIVES : This survey aimed at assessing the perceptions of physicians regarding the appropriateness of prescribing herbal medicines (HM), their prescribing patterns and their knowledge regarding the interaction between HM and conventional drugs.

BACKGROUND : No data are currently available in Lebanon concerning the frequency of HM prescription and indications. HM poorly prescribed can affect the overall quality of health among patients taking conventional drugs.

METHODS : This descriptive survey study was conducted in the Greater Beirut area in Lebanon during May-June 2009. All Primary Health Care (PHC) physicians in private community-based solo practice were identified from the Lebanese Order of Physicians listing, contacted and invited to participate. Those who agreed had to complete a pre-piloted face-to-face questionnaire.

RESULTS : Of two hundred twelve participating physicians, 45% routinely prescribed HM to their patients. Between 64 to 67% prescribers believed that HM have more benefits, faster results and fewer side effects than conventional drugs. In addition, 58% thought that HM were less expensive, and 76% that they were easier to take than conventional drugs. More importantly, in a series of eight questions concerning the physicians' knowledge about the possible mechanism of drug-herb interactions, the general tendency was towards poor knowledge.

CONCLUSIONS : A good percentage of PHC physicians who routinely prescribe HM do not know their mechanism of action or their possible interactions with the conventional drugs. Knowledge about mechanism of drug-herb interactions should be an integral part of the medical curriculum.

RELEVANCE TO CLINICAL PRACTICE : The knowledge about HM should be an integral part of the medical curriculum as they are frequently prescribed by PHC physicians.

Keywords : herbal medicine interactions, conventional medicine, alternative therapies, Lebanon

Alaaeddine N, Khayat M, Alawieh H, Adibilly S, Adib S. Connaissances et attitudes des médecins à l'égard des préparations herbales dans le Grand Beyrouth. J Med Liban 2014 ; 62 (3) : 130-136.

RÉSUMÉ • BUTS ET OBJECTIFS : Estimer les connaissances des médecins en ce qui concerne l'interaction entre les préparations herbales (PH) et les médicaments conventionnels, et leurs opinions concernant l'efficacité, la sécurité et les avantages des PH.

CONTEXTE : Les connaissances des médecins et leur attitude à l'égard de l'emploi des PH sont susceptibles d'avoir une incidence sur la qualité globale de la santé chez les patients sous médication conventionnelle.

MÉTHODES : Étude transversale dans la région du Grand Beyrouth de mai à juin 2009 sur un échantillon non-aléatoire de 212 médecins de soins de première ligne susceptibles de rencontrer des patients sous traitement aux PH. L'enquête a utilisé un questionnaire préalablement piloté pour évaluer quantitativement les variables de l'étude.

RÉSULTATS : Parmi les 212 médecins inclus dans cette étude, 45% prescrivent systématiquement des PH à leurs patients et croient, 64 à 67% d'entre eux, qu'elles présentent plus d'avantages ainsi que des résultats plus rapides et des effets secondaires moins importants que les médicaments conventionnels. En outre, 58% pensent que ces préparations sont moins chères et 76% qu'elles sont plus faciles à prendre que les médicaments conventionnels. Plus important encore, dans une série de huit questions relatives aux connaissances des médecins sur les mécanismes d'interaction(s) possibles entre les PH et les médicaments conventionnels, la tendance générale est une connaissance lacunaire.

CONCLUSIONS : Bon nombre de médecins de première ligne prescrivent systématiquement des PH. La plupart d'entre eux ne connaissent pas le mécanisme d'action de ces préparations et leurs interactions possibles avec les médicaments conventionnels.

PERTINENCE EN PRATIQUE CLINIQUE : Nous croyons que la connaissance du mécanisme des PH et de leurs interactions potentielles devrait désormais être une partie intégrante du cursus médical au Liban, ainsi que des programmes de formation médicale continue (FMC).

Mots clés : médecine traditionnelle, médecine naturelle, interactions médicamenteuses, Liban, Moyen-Orient

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INTRODUCTION

Herbal medicines (HM) are natural products extracted from plants and known for their pharmacological effects by different cultures since a long time. Their use in medical care relies mostly on empirical experience and beliefs handed from one generation to another, and rarely on evidence-based data [1]. HM are prescribed or sold as remedies for various ailments whether mild or serious, acute or chronic [2-3]. HM use has increased over the last two decades in various places, both developed and developing countries [4-7]. Along with the rise in their use comes the risk of interaction with conventional medicines when prescribed [8-10]. The potential for interaction between herbs and prescription drugs is of concern because the pharmacokinetics of one or more medications taken simultaneously can be altered and can lead to clinically significant toxicities [11-15]. The public wrongly believes that HM, being "natural products," can only be safe and beneficial [16-17]. The misconception that HM are innocuous leads patients to neglect mentioning or discussing their usage with their physicians. Furthermore, physicians do not routinely ask patients if they are taking HM when prescribing conventional drugs, or vice versa [18-20].

Many of the pharmacokinetic interactions between conventional drugs and HM are due to cytochrome P450 enzymes being affected by the administration of either product. After co-administration, some drugs or herbs act as potent enzyme inducers, whereas others act as inhibitors [21-24]. This information is often overlooked or missing in physicians' professional background, even among those who prescribe HM.

In a previous study, we have shown that 61% of the Lebanese population is using different types of HM and that 60% of them have reported adverse effects [25]. The occurrence of adverse effects may be attributed either to the HM itself and/or to concomitant use of prescribed drugs [25]. In this setting, the HM-related attitudes and knowledge of physicians will affect the overall quality of health among patients exposed to HM [26-31]. This study assessed the perceptions of primary health care (PHC) physicians regarding the appropriateness of prescribing herbal medicines, their prescribing patterns and their knowledge regarding the interaction between HM and conventional drugs. HM prescription patterns were described by demographic and professional factors.

METHODS

Study design and procedures

This survey study was conducted in the Greater Beirut area, Beirut city and its suburbs, during May-June 2009. Because the topic of physicians' knowledge about HM effects, their adverse effects and mechanisms of interactions had never been formally studied in the past in Lebanon, this survey was considered as a pilot assessment. It was limited to PHC physicians in solo private practice exclusively in the Greater Beirut area. PHC physicians in solo practice are not subjected to therapeutic guidelines and standards which may be imposed on those practicing in hospital settings. About 40% of the entire Lebanese population lives in that area, where most advanced conventional care centers and headquarters of the most visible outlets of herbal products are located.

The study proposal was approved by the Ethical Committee of Saint-Joseph University Health Sciences Campus.

Listings obtained from the Lebanese Order of Physicians were used to locate and call PHC physicians providind their main professional address within the Greater Beirut to invite them into the study. Data are not well updated: it is not unusual that they would include names of physicians who are still in training, who migrated, changed their practice location, retired or even died, or phone numbers that have changed. The majority of PHC physicians located within Greater Beirut practice in hospital outpatient clinics. Of those with valid phone numbers and who confirmed that they were actually in solo PHC practice exclusively in Greater Beirut, 212 physicians accepted to participate. This figure corresponds to about half of PHC physicians with a primary professional address in the Greater Beirut area.

Participating physicians were assured that all identifiers would be removed from the survey questionnaire prior to data entry.

Study questionnaire

The survey used a questionnaire partially adapted from a previous publication by Clement *et al*., minus questions irrelevant to the social and legal context of Lebanon [32]. The questionnaire was conducted in English, with stem questions translated into Arabic to ensure complete understanding by physicians whose training was not done in English. An original version was piloted with about ten PHC colleagues in hospital-based practice, who offered a few remarks which led us to use synonyms which were easier to understand.

It was administered in a face-to-face interview which did not exceed 15 minutes. The categories of variables included in the questionnaire were:

1. Demographic and professional factors of physicians.
2. Perceived efficacy and safety of herbal medicines.
3. Knowledge of the mechanisms of drug-herb interactions.
4. Attitudes and beliefs regarding herbal preparations in comparison with conventional medicines.
5. Attitudes towards prescribing herbal medicines and advising patients about their use.

Statistical analysis

All data were entered and checked for quality and validity of the variables. Data were described as frequencies and percentages for categorical variables, and as means, standard deviations (SD), medians and range for non-categorical ones. Scores (the sum of the answers calcu-

TABLE I
CHARACTERISTICS OF PARTICIPATING PHYSICIANS

Variables	Number (%)	Mean ± CI
Sex		
Men	105 (49.5)	
Women	107 (50.5)	
Age (years)		49.18 ± 9.38
< 40	46 (21.7)	
41-50	71 (33.5)	
51-60	70 (33.0)	
> 60	25 (11.8)	
Years of medical practice		
1-5	3 (1.4)	
6-10	39 (18.4)	16.03 ± 6.26
11-15	64 (30.2)	
> 15	106 (50)	

CI: confidence interval

lated for each question) were constructed to summarize questions related to the same domain such as knowledge (the higher the better) and attitudes (the higher the more positive the attitude towards the use and benefits of HB). These two scores, as well as other stated variables, were subsequently analyzed as dependent variables, and compared by socio-demographic and professional factors using correlation analysis and Student's t test as appropriate. The comparisons were tested using chi^2 test (crosstab), Student's t test and orrelation tests, where a significant relation existed with a p-value < 0.05. Differences were considered statistically significant for a p-value ≤ 0.05. Data were analyzed using the Statistical Program for Social Sciences version 16 (SPSS, Chicago, Ill., USA).

RESULTS

Socio-demographic and professional characteristics of participants

A total of 212 physicians were included in this study, 105 males and 107 females. The median age was 48 years and the mean number of years of medical practice was 16 years.

Characteristics of participating physicians are summarized in Table I.

Attitudes regarding the use of herbal medicines among the surveyed physicians

Physicians' attitudes regarding the benefits of HM were almost evenly distributed as follows: about 40% believed that these medicines were beneficial in patients' care, about 31% were indifferent, and about 35% thought that they were not beneficial. Regarding the safety of HM, 33.5% of physicians believed that HM were not safer than conventional drugs, and 33% had no idea about their safety. A large group (43%) would not support patients' self-prescription of HM, and only 25.5% would favor such a decision. Overall, 43% of physicians believed that HM had the same activity as conventional drugs. These attitudes were all summed up in an overall score with higher grades indicating a more favorable attitude (mean = 3.9) towards HM; details are presented in Table II.

Knowledge about herbal medicines

In a series of eight questions assessing the physicians' knowledge about the possible mechanism of drug-herb interactions, the general tendency was towards poorer knowledge. On a scale from 0 to 18, 50% of the physicians scored 8 or less. These physicians seemed to be fully aware of the gaps they may have in their knowledge, as at least 80% acknowledge their need for more information at various levels (Table III).

General practices related to herbal medicines

In this group of physicians, 45% routinely prescribe HM to their patients. Regardless of their practice with herbal prescriptions, when faced with patients on conventional drugs who are already using HM, the advice most frequently given was to take these two types of remedies at different times (30%). However, medically questionable advices were also frequent: advice for concomitant use was signaled by 16.5%, while advice for concomitant use with a reduction in conventional drugs dosage was mentioned by 14%. Only 18% would advise their patients to stop herbal products while taking their prescribed medications. Among those physicians routinely prescribing HM (Table IV), the most frequently prescribed products were *Ginkgo biloba* (13.5%) and grape seeds extract (13%). The assumed properties of those products are listed in the Appendix. Details on medical practices of physicians with HM are summarized in Table V.

TABLE II
ATTITUDES REGARDING HERBAL MEDICINES AMONG THE SURVEYED PHYSICIANS

Attitudes N (Code)	Full Agreement (2)	Indifferent (1)	Total Disagreement (0)
Herbal medicine are beneficial in patients' care (**Q5**)	72 (34%)	65 (30.7%)	75 (35.3%)
Herbal medicines are safer than CD (**Q6**)	70 (33%)	71 (33.5%)	71 (33.5%)
Is supporting patients desire to use herbal medicines (**Q7**)	54 (25.5%)	67 (31.6%)	91 (42.9%)
Herbal medicines have equal activity as CD (**Q8**)	92 (43.4%)	50 (23.6%)	70 (33%)

Attitude Score: Mean = 3.9 ± 1.44; Median = 4 (Min 0 - Max 8) **CD** : conventional drugs

Attitudes and practices of physicians who routinely prescribe herbal medicines concerning concomitant utilization of conventional drugs

Among the 96 physicians who routinely prescribe HM, 34%, 43.4% and 33% believed that the HM have better benefits, faster results and fewer side effects respectively, than conventional drugs. In addition, 58% thought that HM are less expensive and 76% believed they are easier to take than conventional drugs. Practically all those physicians opted at different times to prescribe HM whether concomitant or not concomitant with conventional drugs. When asked about reasons for prescribing HM at the same time as conventional drugs, 35% mentioned the belief that the beneficial effects of HM are increased, but 27% did not mention thinking about any good reason. Regarding preference for prescribing HM at different times than conventional drugs, 85% mentioned the desire to avoid an increase in the side effects of one or both types of drugs, and 84% also wanted to avoid the mutual cancellation of beneficial effects. However, here also, 30% could not provide any particular reason at all for such a belief.

TABLE III
KNOWLEDGE ABOUT HERBAL MEDICATIONS AMONG PHYSICIANS

Answers (code)	N (%)
Perceived need for more knowledge regarding herbals (Q24)	
Not at all (0)	38 (17.9)
Somewhat (1)	68 (32.1)
Very much (2)	106 (50.0)
Metabolism is the most important mechanism in drug interaction (Q10)	
Correct (2)	93 (43.9)
Do not know (1)	43 (20.3)
Incorrect (0)	76 (35.8)
Only CYP 1,2,3 are involved in drug metabolism (Q9)	
Correct (2)	84 (39.6)
Do not know (1)	44 (20.8)
Incorrect (0)	84 (39.6)
Herbal medicines modulate conventional drugs metabolism (Q11)	
Correct (2)	40 (18.9)
Do not know (1)	78 (36.8)
Incorrect (0)	94 (44.3)
Herbal medicines do not improve the distribution of CD (Q13)	
Correct (2)	89 (42.0)
Do not know (1)	80 (37.7)
Incorrect (0)	43 (20.3)
Herbal medicines modulate the activity of CYP (Q12)	
Correct (2)	34 (16.0)
Do not know (1)	89 (42.0)
Incorrect (0)	89 (42.0)
Herbal medicines alter the therapeutic effects of CD (Q14)	
Correct (2)	50 (23.6)
Do not know (1)	81 (38.2)
Incorrect (0)	81 (38.2)
Herbal medicines do not cancel the side effect of CD (Q15)	
Correct (2)	76 (35.8)
Do not know (1)	107 (50.5)
Incorrect (0)	29 (13.7)
Some herbal medicines should never be used with CD (Q16)	
Correct (2)	75 (35.4)
Do not know (1)	50 (23.6)
Incorrect (0)	87 (41.0)

Knowledge Score: : Mean = 8.2± 0.34; Median = 8 (Min 0 - Max 18)
CD : conventional drugs **CYP** : cytochrome P450

Association between demographic and professional variables with knowledge, attitudes and usual prescription of herbal medicines

In the whole group, knowledge concerning HM and attitudes towards their utilization was not associated with age, gender or years of practice. Physicians prescribing HM seemed to be significantly yet only slightly older (50.5 years on average) than those not doing so (48 years) $p = 0.05$, see table VI. However, there were no significant differences in gender or mean years of practice between the group of physicians prescribing HM and those that do not (Table VII).

TABLE IV
MOST PRESCRIBED HERBAL MEDICINES BY PHYSICIANS

Most prescribed herbal brands/products* [N (%)]			
Laxatism	15 (15.15)	Ginseng	6 (6.06)
Ginkgo biloba	13 (13.50)	Vegetable charcoal	6 (6.06)
Grape seeds extract	13 (13.13)	St. John's wort	10 (10.10)
Arnica	13 (13.13)	Valerian	4 (4.04)
Phytosoya	11 (11.11)	Cascara	3 (3.03)
Garlic	8 (8.08)	Ananas	3 (3.03)
Brewer yeast	7 (7.07)	*Common names	

TABLE V
PRACTICES RELATED TO HERBAL MEDICINES AMONG PHYSICIANS

Practice	N (%)
Routine prescription of herbal medicines	
➢ Yes	96 (45.3)
➢ No	116 (54.7)
Advice to patient already using herbal medicines with conventional drugs	
➢ Stop the herbal medications	39 (18.4)
➢ Take them at different times	65 (30.7)
➢ Take them together	35 (16.5)
➢ Take them together and reduce the dosage of herbal medicines	43 (20.3)
➢ Take them together and reduce the dosage of conventional drugs	30 (14.2)

TABLE VI
ASSOCIATION OF DEMOGRAPHIC & PROFESSIONAL VARIABLES WITH THE PRESCRIPTION OF HERBAL MEDICINES BY PHYSICIANS

	Herbal medicine usual prescription		
	Yes N (%)	No N (%)	*p* value*
Men	49 (46.7)	56 (53.3)	*0.688*
Women	47 (43.9)	60 (56.1)	
Age (years)**	50.55 ± 8.67	48.04 ± 9.83	*0.052*
Years of practice**	16.40 ± 5.87	15.73 ± 6.57	*0.444*

* Significant *p* value: < 0.05 ** Mean ± SD (standard deviation)

TABLE VII
ASSOCIATION OF DEMOGRAPHIC & PROFESSIONAL VARIABLES WITH THE SCORES OF KNOWLEDGE & ATTITUDE

	Score of Knowledge	Score of Attitude
	Mean ± SD	
Men	7.99 ± 2.58	4.0 ± 2.48
Women	8.37 ± 2.51	3.82 ± 2.56
	p = 0.275	*p = 0.602*
	p value* **(Correlation coefficients)**	
Age (years)	*0.066* (– 0.127)	*0.177* (0.093)
Years of practice	*0.129* (– 0.104)	*0.707* (0.026)

* Significant *p* value: < 0.05

DISCUSSION

This study showed for the first time primary health care physicians' attitudes, practice and knowledge in Greater Beirut concerning HM. From the outset, these physicians' attitudes seemed to be evenly distributed between those agreeing to HM benefits and those not. However, these attitudes did not seem to be based on specific objective knowledge of HM potential benefits and harmful effects. In fact, the level of knowledge regarding the potential adverse interactions between HM and conventional drugs was quite low. This finding was previously shown by other investigators. A study conducted in Trinidad in 2005 showed that only 29 physicians out of 192 were able to identify herb-drug interactions [32]. In another study done in the department of emergency medicine in the University of California Irvine, the score of 142 participating physicians on the quiz that was intended to measure their knowledge on herbal toxicities and drug-herb interactions was only slightly higher than would have occurred from random guessing [33]. Over 100,000 deaths each year can be attributed to adverse drug interaction, of which many could be linked to the use of herbs [34-36].

The gap between primary health care physicians' attitudes and knowledge is not the same among all physicians. We think that younger physicians ($p = 0.05$), who are more oriented to evidence-based medicine, more likely to participate in local and international conferences, and more likely to improve their medical education through scientific reading, were also more aware of HM dangers and believed less in their benefits. Younger physicians were consistent with their perceptions, and prescribed HM slightly less than their older colleagues. There were no sex differences in practice in this study.

Overall, the prescription patterns of HM by primary health care physicians were not significantly affected either by skeptical attitudes or uncertain knowledge. No matter what their attitudes and knowledge were, physicians were still prescribing HM. There are similarities to this situation elsewhere in medical practice, most famously in the tendency to overprescribe antibiotics in viral infections despite adequate knowledge of their uselessness [37]. These situations are largely attributed to the desire of physicians not to contradict the expressed demands of patients, so as not to risk losing them. In the case of HM, it is a tribute to the major impact of mass-media advertisement which has created, in the space of a few years, a public demand for remedies which had existed in the past only in the less educated, less well-to-do segments of the population. This situation reflects the negligence of the health system in regulating practices and increasing awareness regarding the balance of advantages and dangers of prescribing HM [38].

There is another important gap through which unregulated HM utilization is gaining hold in the medical field in Lebanon. This is the quasi-absence of HM in the current medical curriculum and training programs of material covering the benefits and risks of HM. Physicians are not told to inquire about HM when seeing patients or to counsel about their potential dangers, despite the fact that their use in Lebanon is rapidly increasing. This gap in medical information and practice can also be found elsewhere [39-40]. In one survey, most physicians neglected to ask about HM utilization when prescribing conventional drugs. If not asked, patients do not volunteer information regarding this utilization which is largely perceived as "natural" and therefore benign [41]. In several studies, less than 45% of patients reported spontaneously discussing the use of herbal remedies with their doctors [42]. Ignorance or neglect concerning adverse interactions with conventional drugs puts patients in danger, and raises a serious ethical concern regarding medical practice. Fortunately, a large proportion of physicians in this survey was aware of their lack of adequate information about drugs-herbs interactions and expressed a desire to know more. This openness to further education should be seized by the Lebanese Order of Physicians and the Ministry of Public Health as an opportunity to counter, among health care providers, the misinformation spreading unabashed so far in Lebanon.

CONCLUSION AND RECOMMENDATIONS

The mechanism of drug-herb interactions and the resulted effects whether beneficial or deleterious should be an integral part of the medical curriculum. Medical doctors should be taught to routinely ask their patients about HM

use and to check for their potential effects on prescribed medications. Physicians should be targeted with continued medical education efforts to improve their awareness and modify their neutral, if not positive, attitudes towards herbal medicine. Efforts can include the distribution of printed material, conferences and workshops. At the end, there is a serious need for governmental interventions to curb the abusive marketing of potential dangerous substances in visual and printed media, and to restrict the conditions of importing and/or selling these herbal preparations in the open market.

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REFERENCES

1. Newman DJ, Cragg GM, Snader KM, The influence of natural products upon drug discovery. Nat Prod Rep 2000; 17 (3): 215-34.
2. Bisset NG. One man's poison, another man's medicine? J Ethnopharmacol 1991; 32 (1-3): 71-81.
3. Bisset NG. Uses, chemistry and pharmacology of *Malouetia* (*Apocynaceae*, subf. *Apocynoideae*). J Ethnopharmacol 1992; 36 (1): 43-50.
4. AlBraik FA, Rutter PM, Brown D. A cross-sectional survey of herbal remedy taking by United Arab Emirates (UAE) citizens in Abu Dhabi. Pharmacoepidemiol Drug Saf 2008; 17 (7): 725-32.
5. Siti ZM, Tahir A, Farah AI et al. Use of traditional and complementary medicine in Malaysia: a baseline study. Complement Ther Med 2009; 17 (5-6): 292-9.
6. Efthimiou P, Kukar M. Complementary and alternative medicine use in rheumatoid arthritis: proposed mechanism of action and efficacy of commonly used modalities. Rheumatol Int 2010; 30 (5): 571-86.
7. Shakeel M, Trinidade A, Ah-See KW. Complementary and alternative medicine use by otolaryngology patients: a paradigm for practitioners in all surgical specialties. Eur Arch Otorhinolaryngol 2010; 267 (6): 961-71.
8. Bush TM, Rayburn KS, Holloway SW et al. Adverse interactions between herbal and dietary substances and prescription medications: a clinical survey. Altern Ther Health Med 2007; 13 (2): 30-5.
9. Sunagane N, Aikawa M, Ohta T, Uruno T. [Possibility of interactions between prescription drugs and OTC drugs (2nd report) – interaction between levodopa preparation and OTC Kampo medicines for upset stomach]. Yakugaku Zasshi 2006; 126 (11): 1191-6.
10. Saw JT, Bahari MB, Ang HH, Lim YH. Potential drug-herb interaction with antiplatelet/anticoagulant drugs. Complement Ther Clin Pract 2006; 12 (4): 236-41.
11. Tirona RG, Bailey DG. Herbal product-drug interactions mediated by induction. Br J Clin Pharmacol, 2006; 61 (6): 677-81.
12. Izzo AA, DiCarlo G, Borrelli F, Ernst E. Cardiovascular pharmacotherapy and herbal medicines: the risk of drug interaction. Int J Cardiol 2005; 98 (1): 1-14.
13. Greenblatt DJ, von Moltke LL. Interaction of warfarin with drugs, natural substances, and foods. J Clin Pharmacol 2005; 45 (2): 127-32.
14. Ernst E, Pittler MH. Risks associated with herbal medicinal products. Wien Med Wochenschr 2002; 152 (7-8): 183-9.
15. Ernst E. Harmless herbs? A review of the recent literature. Am J Med 1998; 104 (2): 170-8.
16. Lynch N, Berry D. Differences in perceived risks and benefits of herbal, over-the-counter conventional, and prescribed conventional, medicines, and the implications of this for the safe and effective use of herbal products. Complement Ther Med 2007; 15 (2): 84-91.
17. Clement YN, Morton-Gittens J, Basdeo L, Blades A et al. Perceived efficacy of herbal remedies by users accessing primary healthcare in Trinidad. BMC Complement Altern Med 2007; 7: 4.
18. Low Dog T. The use of botanicals during pregnancy and lactation. Altern Ther Health Med 2009; 15 (1): 54-8.
19. Holst L, Wright D, Nordeng H, Haavik S. Use of herbal preparations during pregnancy: focus group discussion among expectant mothers attending a hospital antenatal clinic in Norwich, UK. Complement Ther Clin Pract 2009; 15 (4): 225-9.
20. Shakeel M, Trinidade A, McCluney N, Clive B. Complementary and alternative medicine in epistaxis: a point worth considering during the patient's history. Eur J Emerg Med 2010; 17 (1): 17-19.
21. Tomlinson B, Hu M, Lee VW. In vivo assessment of herb-drug interactions: possible utility of a pharmacogenetic approach? Mol Nutr Food Res 2008; 52 (7): 799-809.
22. Saxena A, Parijat Tripathi K, Roy S, Khan F, Sharma A. Pharmacovigilance: Effects of herbal components on human drugs interactions involving Cytochrome P450. Bioinformation 2008; 3 (5): 198-204.
23. Izzo AA, Ernst E. Interactions between herbal medicines and prescribed drugs: an updated systematic review. Drugs 2009; 69 (13): 1777-98.
24. Heinrich M, Modarai M, Kortenkamp A. Herbal extracts used for upper respiratory tract infections: are there clinically relevant interactions with the cytochrome P450 enzyme system? Planta Med 2008; 74 (6): 657-60.
25. Alaaeddine NM, Adib SM, Alawieh HM et al. Use of herbal medications and their perceived effects among adults in the Greater Beirut area. J Med Liban 2012; 60 (1): 45-50.
26. Sardesai VM. Herbal medicines: poisons or potions? J Lab Clin Med 2002; 139 (6): 343-8.
27. Fugh-Berman A. Herbal medicinals: selected clinical considerations, focusing on known or potential drug-herb interactions. Arch Intern Med 1999; 159 (16): 1957-8.
28. Klepser TB, Klepser ME. Unsafe and potentially safe herbal therapies. Am J Health Syst Pharm 1999; 56 (2): 125-38; quiz 139-41.
29. Brazier NC, Levine MA. Drug-herb interaction among commonly used conventional medicines: a compendium for health care professionals. Am J Ther 2003; 10 (3): 163-9.
30. Williamson EM. Drug interactions between herbal and prescription medicines. Drug Saf 2003; 26 (15): 1075-92.

31. Izzo AA, Ernst E. Interactions between herbal medicines and prescribed drugs: a systematic review. Drugs 2001; 61 (15): 2163-75.
32. Clement YN, Williams AF, Khan K et al. A gap between acceptance and knowledge of herbal remedies by physicians: the need for educational intervention. BMC Complement Altern Med 2005; 5: 20.
33. Suchard JR, Suchard MA, Steinfeldt JL. Physician knowledge of herbal toxicities and adverse herb-drug interactions. Eur J Emerg Med 2004; 11 (4): 193-7.
34. Heck AM, DeWitt BA, Lukes AL. Potential interactions between alternative therapies and warfarin. Am J Health Syst Pharm 2000; 57 (13): 1221-7; quiz 1228-30.
35. Gardiner P, Phillips R, Shaughnessy AF. Herbal and dietary supplement – drug interactions in patients with chronic illnesses. Am Fam Physician 2008; 77 (1): 73-8.
36. Jacobsen C, Semb S, Kromann-Andersen H, [Toxic hepatitis following consumption of the herbal medicinal product Cascara Sagrada]. Ugeskr Laeger 2009; 171 (46): 3367-9.
37. Ackerman S, Gonzales R. The context of antibiotic overuse. Ann Intern Med 2012; 157 (3): 211-2.
38. Alameddine M, Naja F, Abdel-Salam S, Maalouf S, Matta C. Stakeholders' perspectives on the regulation and integration of complementary and alternative medicine products in Lebanon: a qualitative study. BMC Complement Altern Med 2011; 11: 71.
39. Pirotta MV, Cohen MM, Kotsirilos V, Farish SJ. Complementary therapies: have they become accepted in general practice? Med J Aust 2000; 172 (3): 105-9.
40. Berman BM, Singh BB, Hartnoll SM, Singh BK, Reilly D. Primary care physicians and complementary-alternative medicine: training, attitudes, and practice patterns. J Am Board Fam Pract 1998; 11 (4): 272-81.
41. Vickers KA, Jolly KB, Greenfield SM. Herbal medicine: women's views, knowledge and interaction with doctors: a qualitative study. BMC Complement Altern Med 2006; 6: 40.
42. Eisenberg DM, Davis RB, Ettner SL et al. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. JAMA 1998; 280 (18): 1569-75.

APPENDIX

INDICATIONS OF HERBAL MEDICINES MOST COMMONLY PRESCRIBED BY PHYSICIANS IN GREATER BEIRUT

Common name / Botanical name	Indications
Ananas / *Ananas cosmocus*	Anti-inflammatory
Cascara / *Rhamnus purshiana*	Laxative
Vegetable charcoal	Treatment of poisoning, control of bloating and flatulence, supplementation for hemorrhage
Garlic / *Allium sativum L.*	Hypertension, antioxidant effects, anti-inflammatory effects, anti-cancer effects
Ginkgo / *Ginkgo biloba*	Memory loss, dementia, vertigo, impotence
Ginseng / *Panax ginseng*	Memory loss, sexual fatigue, cancer prevention
Grape seeds extract / *Vitis vinifera*	Inhibition of platelet aggregation; anti-inflammatory, interference with cancer cell growth and proliferation, cholesterol lowering
St. John's wort / *Hypercium perforatum L.*	Depression, mood and anxiety disorders
Arnica / *Arnica montana*	Anti-inflammatory, reduction of wound irritation
Phytosoya (isoflavones) / Phytoestrogens-plant derived compounds	Relief of menopausal symptoms, treatment of osteoporosis
Valerian / *Valeriana officinalis*	Anxiolytic, anticonvulsant, sleep enhancer