



A Cross-sectional Study on Utilization of Herbal Medications for Anxiety in the Lebanese Population: Usage Patterns and Implications for Harmonizing Mental Health

Mohammad Assi¹, Sahar Nasser^{1*}, Rasha Almoussawi¹, Faten Hamed¹, Rima Boukhary¹ and Jana Wattar¹

¹Lebanese International University, Lebanon

Abstract:

Background: Anxiety is a highly prevalent mental health issue worldwide, but it is also notably prevalent in Lebanon, where herbal medications and plants are commonly used as complementary or alternative treatments to manage anxiety. Lebanese citizens have undergone various disasters, starting with the economic crisis in 2019, the Beirut port explosion in 2020, and the COVID-19 pandemic, which led to several mental disorders such as anxiety, unipolar depression, and insomnia.

Objective: This study aimed to measure the prevalence and patterns of herbal medications and plant usage for anxiety among the Lebanese population, as well as to explore the factors influencing the decision to use herbal remedies, patient perspectives, and potential implications for mental health support.

Methods: A cross-sectional study was conducted to assess the prevalence of anxiety and the usage of herbal medications and plants among 501 Lebanese outpatients (General Population) aged 20 years and older at Lebanese community pharmacies within Beirut, Mount Lebanon, South, North, Beqaa. Data was collected through personal face-to-face and online structured interviews and surveys, capturing information on herbal medications and plants usage, sources of recommendations, patient perspectives, and perceived efficacy and safety of herbal medications and plants for anxiety.

Results: The study revealed that anxiety was a prevalent medical condition among Lebanese outpatients, with more than 50% reporting anxiety through various symptoms. Furthermore, 27.34% of Lebanese patients had consumed herbal medications, with a notable proportion advising others to use herbal remedies for anxiety. The sources of recommendations for herbal medication usage included mass media, pharmacists, and personal reading/internet. Additionally, a considerable percentage of patients expressed beliefs in the effectiveness and safety of herbal remedies for anxiety while also indicating a lack of awareness regarding potential side effects.

Conclusion: The findings of this study underscore the need for increased awareness, education, and regulatory oversight in Lebanese pharmacists regarding anxiety management using herbal medications and plant-based treatments. This includes public education campaigns, healthcare provider training, and regulatory oversight. Prioritizing patient counseling and further research is essential to assess the efficacy and safety of these treatments within the Lebanese context. This integrative approach, blending traditional practices with evidence-based mental health care, could drive policy changes and improve mental health outcomes in Lebanon.

Keywords: Traditional herbal medicines, Generalized anxiety disorder, Sleep disorders, Sedative, Anxiolytic, Safety, Athletes, Pharmacovigilance, Health belief model.

© 2024 The Author(s). Published by Bentham Open.

This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International Public License (CC-BY 4.0), a copy of which is available at: <https://creativecommons.org/licenses/by/4.0/legalcode>. This license permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

*Address correspondence to this author at the Lebanese International University, Lebanon; E-mail: sahar.nasser@liu.edu.lb

Cite as: Assi M, Nasser S, Almoussawi R, Hamed F, Boukhary R, Wattar J. A Cross-sectional Study on Utilization of Herbal Medications for Anxiety in the Lebanese Population: Usage Patterns and Implications for Harmonizing Mental Health. Open Public Health J, 2024; 17: e18749445342434. <http://dx.doi.org/10.2174/0118749445342434241021111304>



Received: July 29, 2024
Revised: October 01, 2024
Accepted: October 08, 2024
Published: December 02, 2024



Send Orders for Reprints to
reprints@benthamscience.net

1. INTRODUCTION

Anxiety is a globally prevalent mental health concern and a leading cause of disability worldwide [1, 2]. It not only manifests as psychological stress but also contributes to a higher risk of cardiovascular and cerebrovascular diseases and physical symptoms such as headaches, uncontrolled trembling, and sweating [3]. Although anxiety is a normal emotional response to stress, it becomes pathological when disproportionate to the stressor. Anxiety disorders (AD), which include generalized anxiety disorder (GAD), are characterized by excessive fear, avoidance behaviors, and significant impairment in daily life [3]. GAD, in particular, has gained attention due to its association with heightened arousal, muscle tension, and autonomic symptoms, leading to substantial distress [4].

In conflict-affected countries, including Lebanon, the prevalence of anxiety disorders is notably higher than in regions without such chaos [5, 6]. Lebanon, a middle-income country, has faced an unprecedented economic and political crisis since 2019, resulting in severe shortages of essential goods, including medications for chronic diseases and mental health conditions like anxiety [6]. In addition to economic challenges, traumatic events such as the Beirut port explosion in 2020 further exacerbated anxiety levels among the Lebanese population [6, 7]. National epidemiological surveys indicate that anxiety disorders affect 16.7% of the Lebanese population, with women more likely to suffer from anxiety than men [5]. The financial instability and the ongoing healthcare crisis, worsened by the COVID-19 pandemic, have led to limited access to conventional pharmaceuticals, including those for mental health, spurring demand for alternative treatments like herbal remedies [6, 7].

Herbal medicines, which have been used for centuries, are increasingly recognized as complementary or alternative treatments for anxiety, particularly in regions where healthcare access is constrained [8, 9]. In Lebanon, herbal remedies are commonly used to manage mild to moderate symptoms of anxiety, reflecting a broader global trend towards natural treatments [9]. While herbal medicines offer potential benefits, their effectiveness and safety, especially regarding anxiety and other mental health conditions, have not been thoroughly explored. The mechanisms of action of many phytochemicals remain poorly understood, and further research is necessary [10, 11].

Pharmacists play a pivotal role in counselling patients about herbal medicines, yet many feel unprepared to provide adequate advice [12]. A study revealed that only 34% of pharmacists felt confident in counselling patients on herbal remedies, with many rarely discussing potential side effects or herb-drug interactions [13]. This highlights the need for more comprehensive education and training for pharmacists, enabling them to offer better guidance to patients seeking alternative treatments for anxiety and other health conditions [13-15].

Given the unique socio-economic challenges facing

Lebanon and the rising use of herbal medicines, this study aims to explore the prevalence and patterns of herbal medication use among Lebanese individuals, particularly in managing anxiety. It will also examine the factors influencing this use and evaluate the role of healthcare professionals, especially pharmacists, in supporting patients in their use of herbal treatments.

1.1. Aim of the Study

For all the mentioned issues, we have conducted this cross-sectional study to explore the pattern of using herbal medicine in treating anxiety and reducing its health consequences. On the other hand, the study is conducted to evaluate the user's knowledge, attitude, and practice associated with herbal medicine and anxiety. Furthermore, it is very essential to measure the importance of community pharmacist role in herbal medicine use, spreading knowledge, and warning herbal medicine users about special requirements, expected side effects, and dosage instructions.

1.2. Ethics approval

The study protocol was approved by the Institutional Review Board of the Lebanese International University (2023RC- 006-LIUSOP). The collection and processing of the data in this study complied with data protection and privacy. Written informed consent from the patients or their caregivers was obtained. This study is an observational investigation and doesn't have any physiologic, psychological, or social risks to the participants.

2. METHODS

2.1. Study Design and Setting

It is performed between March and May 2023 to assess and measure the prevalence of anxiety and the use of herbal medicine as a primary therapy, adjunct to conventional therapy, or alternative to conventional treatment. The study data includes individuals aged 20 years and older who arrived at the community pharmacy and agreed to fill out the questionnaire with absolute confidentiality after they were informed that the aim of the questionnaire was for awareness and academic research. The investigators chose the pharmacies randomly, where they ensure that they are distributed all over the country. Participants who visited the pharmacy had an equal chance to fill out the questionnaire with the absence of any scale or specific measurement.

Medications, sociodemographic and clinical characteristics were collected from patients *via* Face-to-Face Interviews and a well-structured survey was offered to them to gather data *via* Online Google Platform Surveys. All collected data and the statistical calculations were performed and documented using SPSS (Statistical Package for Social Science). Descriptive statistics are used to describe independent variables. One-way ANOVA analysis followed by a T-test (binary logistic regression) was performed to capture information on herbal medications and plants' usage, sources of recommendations, patient perspectives, and perceived efficacy and safety of herbal medications and plants for anxiety.

2.2. Study Participants

Study participants are Lebanese outpatients and currently have any medical condition or chronic disease, are taking one medication or any conventional treatment for a health condition, or have been taking herbal products or supplements during the last 12 months. The participants also answered if they take any medication for any acute or chronic illness and whether or not they have any idea about the probability of developing herbal-drug interactions or any potential to develop toxicities attributed to the combination of both. In this study, we didn't prioritize patients who visit the pharmacy frequently over patients who rarely seek medical care at the pharmacy. This means that all participants had the same opportunity to fill out the questionnaire.

2.3. Data Collection Tool

The following sociodemographic information was answered by participants: age, gender, nationality, area and type of residence, educational level, work status, marital status, monthly income, and the availability of health insurance contracts [16]. The other section of the survey included the clinical and medical profile of the patient who had answered about the current medical condition, comorbidities, conventional treatment for current health condition, and adherence to lifestyle requirements based on the medical status of the patient [17]. A third section was related to anxiety information and the impact of this mental disorder on the sleeping pattern and hours of sleep. The last section included herbal substances used in the last 12 months, source of recommendation for herbal medication use, reporting any adverse event while consuming herbal medication, physician consultation and reaction about herbal product usage, herbal product advice, and patient's general knowledge of herbal supplements and plants. The questionnaire included as well some information targeting the pharmacist's role in educating, managing, and avoiding drug-related problems associated with herbal medicine use.

2.4. Sample Size Calculation

Sampling statistics where a high prevalence of knowledge of Herb-Drug Interactions (HDIs) among Lebanese outpatients were reported to be around 50%. Estimating the Lebanese Population size in 2023 to be around 5,353,930 [7], with the power to provide a 95% confidence interval with a 5% confidence limit [9]. So, according to this information, we calculated a minimal sample size based on an application called Epi-info 7, and for the confidence interval 95%, it has shown that the recommended minimal sample size we should consider is 384.

2.5. Data Management and Statistical Analysis

Descriptive statistics were used to describe the demographic and clinical characteristics of Lebanese patients. Categorical variables were reported using numbers and percentages, whereas continuous variables

were presented using means (M) and standard deviations (SD). The association of HDIs with each Lebanese patient's demographic and clinical characteristics was tested using Tukey's range test to find means that are significantly different from each other, Pearson's test for categorical variables, and One-Way ANOVA analysis followed by a T-test for continuous variables. All variables in the bivariate analysis with a p-value <0.05 were included in the logistic regression model unless they were strongly correlated. Therefore, the binary logistic regression allowed the assessment of relationships between the binary dependent variable (consuming herbal medications use/not consuming herbal medications), the usage patterns of different types of herbal products or supplements, and the current usage of conventional treatment. Thus, it was possible to identify the significant contributing factors to HDIs.

2.6. Ethics Approval and Consent to Participate

The study protocol was approved by the Institutional Review Board of the Lebanese International University (2024ERC-029-LIUSOP). The collection and processing of the data in this study complied with data protection and privacy.

We confirmed that the research was done in accordance with the Ethical Principles for Medical Research Involving Human Subjects, outlined in the Helsinki Declaration, though the study posed no harm to the participants.

3. RESULTS

The study revealed that anxiety was a prevalent medical condition among Lebanese outpatients (General Population and Athletes), with a significant proportion reporting anxiety and various symptoms. Furthermore, a substantial percentage of Lebanese patients had consumed herbal medications, with a notable proportion advising others to use herbal remedies for anxiety. The sources of recommendations for herbal medication usage included mass media, pharmacists, and personal reading/internet. Additionally, a considerable percentage of patients expressed beliefs in the effectiveness and safety of herbal remedies for anxiety while also indicating a lack of awareness regarding potential side effects. Although the study highlighted interestingly the knowledge of the herbal anxiolytic side effects, it failed to assess the management held by the patients in order to relieve such side effects.

3.1. Patients' Socio-demographics Characteristics and Medical Condition

The study comprised 501 Lebanese outpatients (General Population and Athletes) from 5 different governorates (Beirut, Mount Lebanon, South, North, Beqaa) around Lebanon. Study participants had a mean age (\pm standard deviation (SD)) of 50.248 years with a range from 20 to 50 and above; 58.9% of patients were female and 41.1% of patients were men. 56.9% percent of Lebanese patients were single, 54.7% had difficulty

sleeping and most of them (55.9%) were smokers and 70.5% didn't consume alcohol and live in urban areas (72.5%), mostly in Beirut (35.5%). 61.7% of participants

were classified as having a sedentary lifestyle, whereas 38.3% were categorized as having a healthy and active lifestyle (Table 1).

Table 1. Distribution of Lebanese patients according to socio-demographic characteristics.

Characteristic	Frequency (%)
Ages	-
20-30	183 (36.5%)
30-40	80 (15.9%)
40-50	76 (15.1%)
+50	96 (19.1%)
Sex	-
Male	206 (41.1%)
Female	295 (58.9%)
Nationality	-
Lebanese	444 (88.6%)
Non-Lebanese	57 (11.4%)
Area of Residence	-
Bekaa	61 (12.2%)
Mount Lebanon	133 (26.5%)
Beirut	178 (35.5%)
South	76 (15.2%)
North	53 (10.6%)
Type of Residence	-
Urban	363 (72.5%)
Rural	138 (27.5%)
Educational Level	-
Primary Education	23 (4.6%)
High School	57 (11.4%)
University	421 (84%)
Work Status	-
Healthcare provider	180 (35.9%)
Non-healthcare provider	321 (64.1%)
Marital status	-
Single	285 (56.9%)
Married	166 (33.1%)
Divorced	41 (8.2%)
Widowed	9 (1.8%)
Monthly income	-
Less than \$ 100	171 (34.1%)
\$100-\$500	199 (39.7%)
\$600-\$1000	87 (17.3%)
More than \$1000	44 (8.8%)
Health Insurance	-
NSSF	134 (26.7%)
COOP	48 (9.6%)
Private	150 (29.9%)
Army	28 (5.6%)
None	132 (26.3%)
Smoking status	-
Yes, current smoker	280 (55.9%)
Yes, previous smoker	41 (8.2%)
No, not a smoker	180 (35.9%)
Alcohol Consumption	-
Yes, current alcohol consumer	114 (22.8%)
Yes, Previous alcohol consumer	34 (6.8%)

(Table 1) contd....

Characteristic	Frequency (%)
No, I don't consume alcohol	353 (70.5%)
Lifestyle	-
Healthy and Active	192 (38.3%)
Sedentary	309 (61.7%)
Do you have difficulty in sleeping?	-
Yes	274 (54.7%)
No	227 (45.3%)
Are you athletic?	-
Yes	210 (41.9%)
No	291 (58.1%)
Do you have Frequent visits to Physicians?	-
When needed	323 (64.5%)
Periodically	62 (12.4%)
Never	323 (64.5%)
Do you have Frequent visits to pharmacies?	-
When needed	346 (69.1%)
Periodically	60 (12%)
Never	95 (19%)
How many times do you do lab tests?	-
When needed	323 (64.5%)
Periodically	94 (18.8%)
Never	84 (16.8%)
Have you ever been tested for herbal substances in your blood tests?	-
Yes	106 (21.2%)
No	395 (78.8%)

Note: Assessing Anxiety Prevalence and Herbal Usage and Herbal-Drug Interactions (HDIs) Related Knowledge.

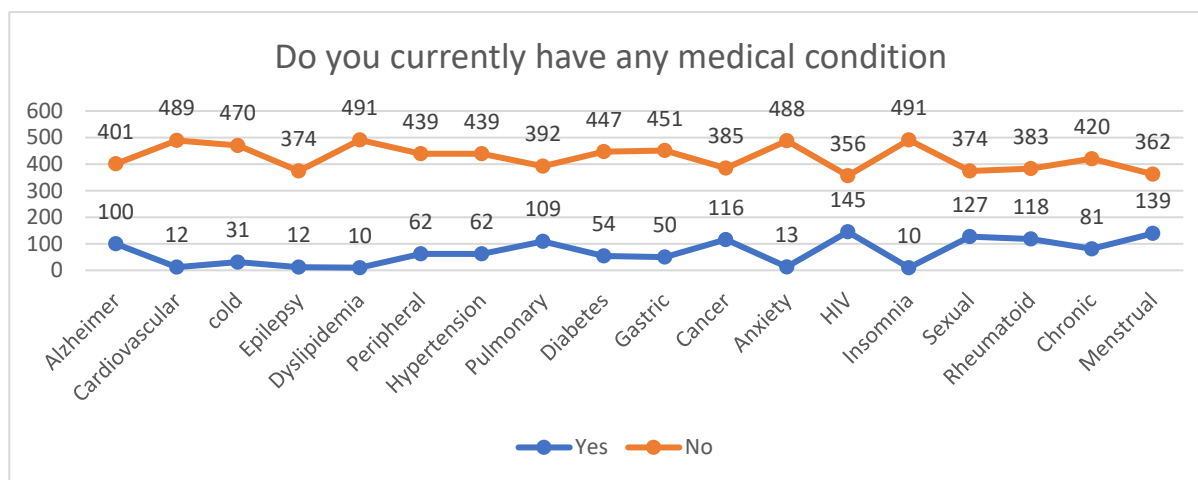


Fig. (1). Distribution of lebanese patients according to their medical condition.

The respondents (46.7%) have consumed herbal medications during the last 12 months. Our study found that 54.7% percent of Lebanese patients have difficulty sleeping, and the most common medical conditions they are suffering from are anxiety (29.14%, n=146), menstrual symptoms (pain) (27.74%, n=139), insomnia, common cold symptoms (25.34%), gastric diseases (23.35%, n= 117), and hypertension (21.75%, n= 109) (Fig. 1).

The most frequently prescribed medications as (87.62%, n= 439) anti-inflammatory drugs for neuropathic

pain, (84.23%, n=422) anxiolytics for anxiety and (61.077%, n=306) analgesics for relieving pain, (26.74%, n=134) for cold medications, (25.14%, n=126) PPIs for gastric diseases, (23.35%, n=117) ant-inflammatory medications, (20.95%, n=105) antihypertensive medications (Fig. 2).

Most of the Lebanese populations (27.34%, n=137) use herbal products or plants as pills for relaxation from insomnia and depression (24.75%, n=124), herbal products or plants in food for the treatment of insomnia

and (21.35%, n=107) depression. Other uses of herbal products or plants in food as supportive for diarrhoea relief issues, so that the majority of Lebanese patients represented 28.94%, 26.74% of Lebanese patients using herbal products in food as protection from common cold and flu 26.34% of Lebanese patients use herbal products

in food as a relief for constipation issues, and 5.94% use herbal products in food as supportive for weight loss and killing pain, as well as 25.54% use these herbal products in food as a treatment for gastric problems and bowel diseases, whereas (25.34%) use them as a treatment of diabetes (Table 2).

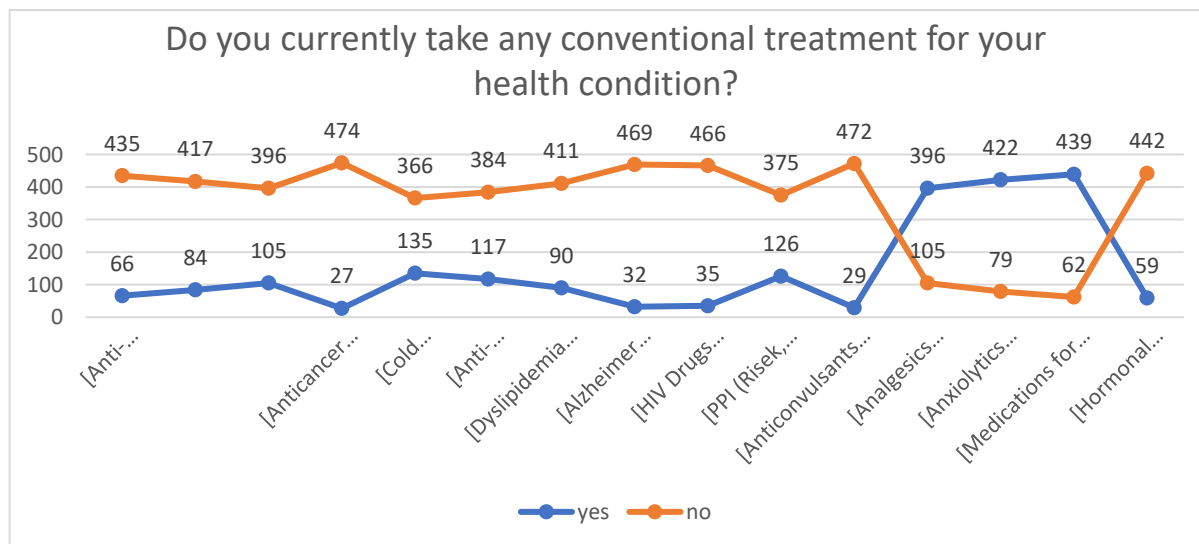


Fig. (2). Distribution of lebanese patients according to their conventional medical treatment.

Table 2. Herbal products use purposes by lebanese patients as a supplement medication or in food.

Uses of Herbal Products by Lebanese Patients	Yes, I use it as an herbal supplement medication N (%)	Yes, I use it in food N (%)	No, I don't use it N (%)
Treatment of Dermatologic conditions (Skin diseases, allergy conditions or cosmetics reasons)	133 (26.54%)	92 (18.36%)	276 (55.08%)
Treatment of hypertension.	104 (20.75%)	91 (18.16%)	306 (61.07%)
Treatment of Diabetes.	77 (15.36%)	127 (25.34%)	297 (59.28%)
Treatment of kidney diseases.	119 (23.75%)	84 (16.76%)	298 (59.48%)
Treatment of gynecological diseases or sexual problems.	109 (21.75%)	107 (21.35%)	285 (56.88%)
Treatment of gastric problems and bowel diseases (Gas flatulence, gastritis, ulcers, Irritable Bowel Diseases).	154 (30.73%)	128 (25.54%)	219 (43.71%)
Supportive for weight gain.	108 (21.55%)	111 (22.15%)	282 (56.28%)
Supportive for weight loss.	123 (24.55%)	130 (25.94%)	248 (49.50%)
Supportive for aphrodisiac (increase sexual desire or pleasure).	100 (19.96%)	104 (20.75%)	297 (59.28%)
Supportive for constipation relief issues.	141 (28.14%)	132 (26.34%)	228 (45.50%)
Supportive for diarrhea relief issues.	129 (25.74%)	145 (28.94%)	227 (45.30%)
Supportive for relieving or killing pain.	141 (28.14%)	130 (25.94%)	230 (45.90%)
Protection from common cold/flu.	165 (32.93%)	134 (26.74%)	202 (40.31%)
Protection from Alopecia or dandruff.	136 (27.14%)	116 (23.15%)	249 (49.70%)
Protection from Infections.	134 (26.74%)	121 (24.15%)	246 (49.10%)
Protection from Dyslipidemia and Cardiovascular disease.	129 (25.74%)	100 (19.96%)	272 (54.29%)
Protection from osteoporosis.	125 (24.95%)	105 (20.95%)	271 (54.09%)
Relaxation from Insomnia.	137 (27.34%)	124 (24.75%)	240 (47.90%)
Relaxation from Depression.	137 (27.34%)	107 (21.35%)	257 (51.29%)
Relaxation from Muscle spasms.	142 (28.34%)	109 (21.75%)	250 (49.90%)
Energy booster: Increase energy and endurance.	145 (28.94%)	114 (22.75%)	242 (48.30%)
Energy booster: Improving athletic performance	129 (25.74%)	114 (22.75%)	258 (51.49%)
Energy booster: Not being detected in blood tests.	120 (23.95%)	116 (23.15%)	265 (52.89%)

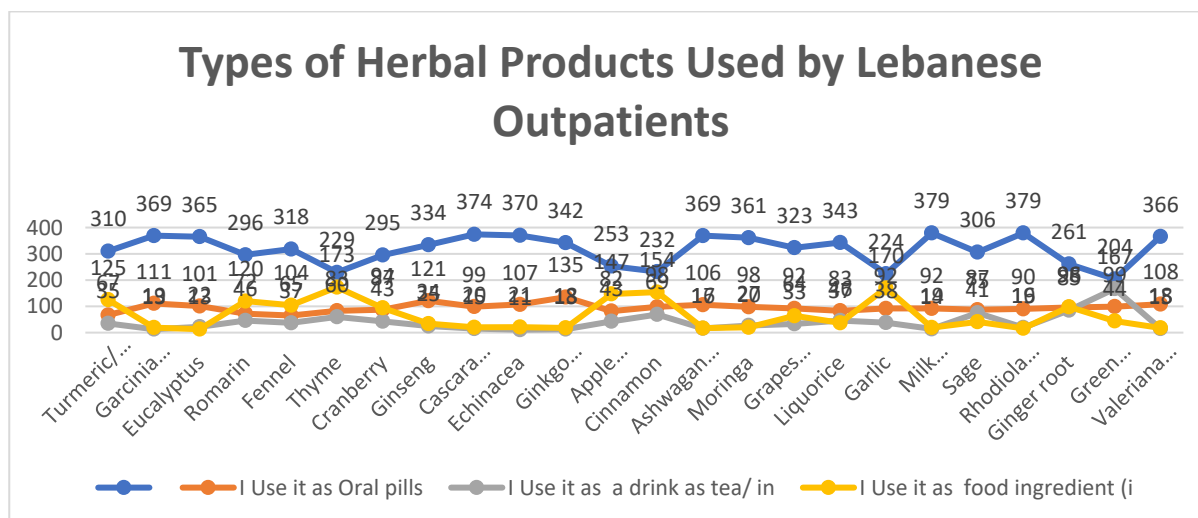


Fig. (3). Types of herbal products used for medicinal purposes and their percentage distributions.

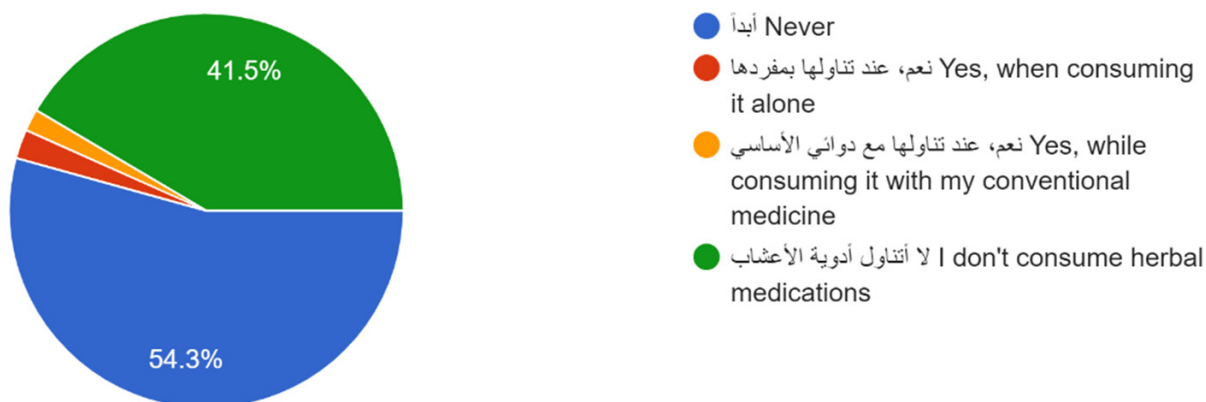


Fig. (4). Adverse events after consuming herbal medications by lebanese patients during the last 12 months.

The “F-value” of 200.69 and a very low “P-value” of 0.000) $P < 0.001$) suggest that there are significant differences in means among the types of herbal product usage, there are significant differences in means among these groups ($F = 321.21$, $p < 0.001$) are observed. Herbal plants or products used as food ingredients in cooking as a flavouring ingredient mostly by Lebanese patients are thyme (34.53%), Garlic (33.93%), Cinnamon (30.73%), Apple Cider Vinegar (30.73%), Curcumin or Turmeric (24.95%), Romarin or Rosemary (23.95%), while the herbal medications as oral pills used by Lebanese patients are Ginkgo biloba (26.94%), Panax Ginseng (24.15%), Garcina cambogia (22.15%), Valeriana officinalis root (21.55%), Echinacea (21.35%), Ashwagandha (21.15%) (Fig. 3).

Furthermore, 54.3% of Lebanese patients did not experience any adverse events or side effects when consuming herbal plants or medication alone, while (2.4%) admit that they experienced adverse events when

consuming herbal plants or medication alone; on the other hand (1.8%) experienced adverse events when consuming it with their conventional medication (Fig. 4).

Finally, 38.52% of Lebanese patients agree that natural and herbal medicine have side effects, 35.12% of Lebanese patients neither agree nor disagree that natural medicine is more effective than conventional therapy. In comparison (33.93%) agree that natural medicine is more effective than conventional therapy. In addition, 46.10% of Lebanese patients agree that herbal medicines are beneficial in healthcare management, and (40.71%) of Lebanese patients agree that herbal supplements should be used as a substitute for medications after proper sports training, nutrition and recovery practices. About 37.32% of Lebanese patients agree and 30.73% neither agree nor disagree that herbal supplements can interact with other medications and supplements that you may be taking.

Furthermore, 44.51% of Lebanese patients agree that there is scientific research supporting the use of herbal

supplements, 37.52% agree and 35.92% neither agree nor disagree that there are potential long-term health effects of consuming herbal supplements, 32.93% agree that the use of herbal supplements or herbal plants should be limited only to patients who have failed conventional therapy. In addition, 32.93% agree that herbal medicine is safer than conventional medicine, 39.32% of Lebanese patients agree that they are aware of the potential risks and side effects associated with herbal supplements or plants they use, 36.72% of Lebanese patients agree that they know the exact daily amount or dose of herbal supplement they should take for their condition, 40.51% of Lebanese patients agree that when taking any conventional medication along with the herbal supplement, the herbal supplement and conventional medication may interact together, 41.91% of Lebanese patients agree that herbal supplements should be regulated and controlled by the Ministry of Health and regulatory bodies to ensure safety and efficacy, 40.71% of Lebanese patients agree that there is a need for education about the risks and benefits of herbal supplements to be revealed to the population, 41.51% of Lebanese patients agree that herbal supplements have a health protective effect, 43.71% of Lebanese patients agree that herbal supplements have a disease curative effect, 38.32% of Lebanese patients agree that herbal supplements or herbal plants do not provide treatment but can only be supportive and therapy is provided only with conventional medicines.

Moreover, 29.34% agree that herbal supplements or

herbal plants have no side effects, 38.72% of Lebanese patients agree that herbal supplements or herbal plants do not interact with drugs, and can be used at the same time, 38.12% of Lebanese patients agree that the use of herbal supplements or herbal plants can be dangerous, as they will affect the action of existing drug therapy, 37.12% of Lebanese patients agree that herbal supplements or herbal plants can be used as a last option to treat diseases, 33.53% of Lebanese patients agree that it is worth trying herbal supplements or herbal plants before visiting the physician, 37.32% agree that herbal supplements or herbal plants are not to be used in critical conditions. 41.71% of Lebanese patients agree that herbal supplements can be taken as a desire to boost energy and endurance, 31.73% agree that herbal supplements can help increase sports performance without being detected in blood tests, 42.51% of Lebanese patients agree that they should ask any pharmacist, or physician about any herbal supplement or herbal plant before using it alone or with conventional treatment, 41.12% of Lebanese patients agree that they should research the ingredients and dosage of herbal supplements on internet before taking them, 44.11% of Lebanese patients agree that they should purchase their herbal supplements from a source, like a certified sports coach or a pharmacy, 44.51% of Lebanese patients agree that they like to receive consultancy on herbal supplement or herbal plant to know more about how do they act and interact with the body, 35.52% of Lebanese patients neither agree nor disagree that they would purchase herbal supplements from an online source or herbalist (Table 3).

Table 3. General attitudes and behaviors of lebanese patients towards the use of herbal medications or products.

Patients' attitudes and behaviors towards the use of herbal products					
General attitudes and behaviors towards herbal medications	Strongly agree N (%)	Agree N (%)	Neither agree nor disagree N (%)	Disagree N (%)	Strongly disagree N (%)
Natural and herbal medicine have side effects	119 (23.75%)	193 (38.52%)	147 (29.34%)	31 (6.18%)	11 (2.19%)
Natural medicine is more effective than conventional therapy.	89 (17.76%)	170 (33.93%)	176 (35.12%)	46 (9.18%)	20 (3.99%)
Herbal medicines are beneficial in healthcare management.	117 (23.35%)	231 (46.10%)	133 (26.54%)	15 (2.99%)	5 (0.99%)
Herbal supplements should be used as a substitute for medications after proper sports training, nutrition, and recovery practices.	99 (19.76%)	204 (40.71%)	136 (27.14%)	42 (8.38%)	20 (3.99%)
Herbal supplements can interact with other medications and supplements that you may be taking.	128 (25.54%)	187 (37.32%)	154 (30.73%)	20 (3.99%)	12 (2.39%)
There is scientific research supporting the use of herbal supplements	114 (22.75%)	223 (44.51%)	142 (28.34%)	16 (3.19%)	6 (1.19%)
There are potential long-term health effects of taking herbal supplements.	97 (19.36%)	188 (37.52%)	180 (35.92%)	23 (4.59%)	13 (2.59%)
The use of herbal supplements or herbal plants should be limited only to patients who have failed conventional therapy.	78 (15.56%)	165 (32.93%)	170 (33.93%)	61 (12.17%)	27 (5.38%)
Herbal medicine is safer than conventional medicine.	100 (19.96%)	165 (32.93%)	176 (35.12%)	40 (7.98%)	20 (3.99%)
I am aware of the potential risks and side effects associated with herbal supplements or plants I use.	94 (18.76%)	197 (39.32%)	178 (35.52%)	21 (4.19%)	11 (2.19%)
I know the exact daily amount or dose of herbal plants or herbal supplements I should take for my condition.	85 (16.96%)	184 (36.72%)	179 (35.72%)	33 (6.58%)	20 (3.99%)

(Table 5) contd....

Patients' attitudes and behaviors towards the use of herbal products					
General attitudes and behaviors towards herbal medications	Strongly agree N (%)	Agree N (%)	Neither agree nor disagree N (%)	Disagree N (%)	Strongly disagree N (%)
When taking any conventional medication along with herbal supplement, the herbal supplement and conventional medication may interact together.	106 (21.15%)	203 (40.51%)	164 (32.73%)	16 (3.19%)	12 (2.39%)
Herbal supplements should be regulated and controlled by the Ministry of Health and regulatory bodies to ensure safety and efficacy.	157 (31.33%)	210 (41.91%)	112 (22.35%)	12 (2.39%)	10 (1.99%)
There is a need for education about the risks and benefits of herbal supplements for general population.	172 (34.33%)	204 (40.71%)	107 (21.35%)	10 (1.99%)	8 (1.59%)
Herbal supplements got a health protective effect.	100 (19.96%)	208 (41.51%)	166 (33.13%)	18 (3.59%)	9 (1.79%)
Herbal supplements got a disease curative effect.	87 (17.36%)	219 (43.71%)	162 (32.33%)	24 (4.79%)	9 (1.79%)
Herbal supplements or herbal plants do not provide treatment but can only be supportive and treatment is provided only with conventional medicines.	97 (19.36%)	192 (38.32%)	164 (32.73%)	39 (7.78%)	9 (1.79%)
Herbal supplements or herbal plants have no side effects.	84 (16.76%)	147 (29.34%)	175 (34.93%)	62 (12.37%)	33 (6.5%)
Herbal supplements or herbal plants do not interact with drugs and can be used at the same time.	80 (15.96%)	141 (28.14%)	194 (38.72%)	58 (11.57%)	28 (5.58%)
The use of herbal supplements or herbal plants can be dangerous, as they will affect the action of existing drug therapy.	97 (19.36%)	191 (38.12%)	165 (32.93%)	30 (5.98%)	18 (3.59%)
Herbal supplements or herbal plants can be used as a last option to treat diseases.	92 (18.36%)	186 (37.12%)	176 (35.12%)	31 (6.18%)	16 (3.19%)
I think it is worth trying herbal supplements or herbal plants before visiting the physician.	89 (17.76%)	168 (33.53%)	160 (31.93%)	58 (11.57%)	26 (5.18%)
Herbal supplements or herbal plants should not be used in the treatment of serious diseases.	96 (19.16%)	187 (37.32%)	159 (31.73%)	38 (7.58%)	21 (4.19%)
Herbal supplements can be taken as a desire to boost energy and endurance.	92 (18.36%)	209 (41.71%)	171 (34.13%)	20 (3.99%)	9 (1.79%)
Herbal supplements can help increase sports performance without being detected in blood tests.	96 (19.61%)	159 (31.73%)	188 (37.52%)	37 (7.38%)	21 (4.19%)
I ask any pharmacist, or physician about any herbal supplement or herbal plant before using it alone or with conventional treatment.	136 (27.14%)	213 (42.51%)	126 (25.14%)	19 (3.79%)	7 (1.39%)
I research the ingredients and dosage of herbal supplements on internet before taking them.	105 (20.95%)	202 (41.12%)	152 (30.33%)	27 (5.38%)	15 (2.99%)
I purchase my herbal supplements from a source, like a certified sports coach or a pharmacy.	116 (23.15%)	221 (44.11%)	127 (25.34%)	21 (4.19%)	16 (3.19%)
I like to receive consultancy on herbal supplements or herbal plant to know more about how do they act and interact in my body.	122 (24.35%)	223 (44.51%)	122 (24.35%)	12 (2.39%)	7 (1.39%)
I purchase herbal supplements from an online source or herbalist	76 (15.16%)	148 (29.54%)	178 (35.52%)	52 (10.37%)	47 (9.38%)

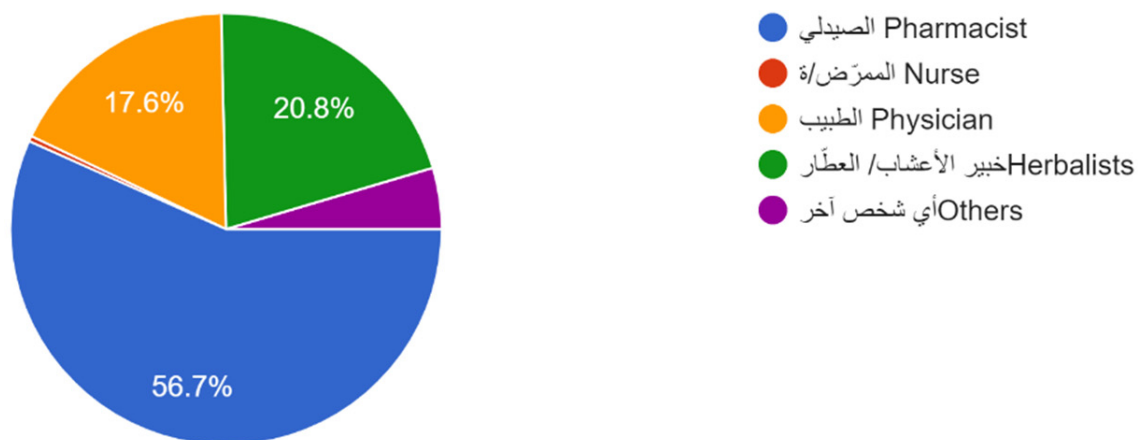


Fig. (5). Distribution of sources of information about herbal plants or herbal supplements and its usage with conventional medication.

3.2. Assessing the Role of Pharmacists in Harmonizing Patients' Mental Health

These results show that 56.7% of Lebanese patients consider that the pharmacist should provide all the source of information about herbal plant or herbal supplement and its usage with conventional medication, while 20.8% of Lebanese patients consider the herbalist as the provider source of information about herbal plant or herbal supplement and its usage with conventional medication, 17% consider the physician and 0.4% consider the nurse, while 4.6% consider others (Fig. 5).

4. DISCUSSION

4.1. Anxiety Prevalence and Herbal Usage

The results of this study showed that 23.95% of the Lebanese population use Romarin or Rosemary as a flavouring ingredient in cooking.

Rosemary (*Rosmarinus officinalis* L.) is an evergreen shrub native to the Mediterranean region and naturalized throughout much of Europe [16]. The linear leaves resemble small, curved pine needles and are fragrant when crushed. Bluish flowers are borne in axillary clusters. Leaves are used to flavour baked potatoes or meat dishes [18]. Rosemary is used in folk medicine as a galactagogue or to treat renal colic and dysmenorrhea, mood and nervous system disorders, and physical and mental fatigue [19]. It is also used to relieve symptoms caused by respiratory disorders and to counteract hypercholesterolaemia [20]. This plant has been found to have several biological activities, such as antioxidant, anti-inflammatory, antimicrobial and anti-cancer properties, as well as being useful for anxiety, stress, and memory [21]. Rosemary extract is often used in aromatherapy to treat anxiety-related conditions and increase alertness [18]. The infusion of leaves (2 g into 100 mL of hot water) has been evaluated on adult male mice to test its effect on anxiety/fear, depression-like behaviour, memory/learning, and cerebral and liver cholinesterase [19]. Authors, using LC-MS analysis, identified 16 compounds in rosemary such as rosmarinic acid, caffeic acid, and 7-O-glucuronide as major components [18]. Data of behavioural tests revealed that daily oral administration of rosemary to adult mice significantly reduced both the anxiety ($p < 0.05$), the depression-like behaviour ($p < 0.05$), and the cholinesterase isoforms activity ($p < 0.05$), while memory/learning was unaffected [19]. Noori Ahmad *et al.* (2016) evaluated the effect of the hydroalcoholic extract of *R. officinalis* L. on anxiety in 50 mice randomly divided into five groups (the control group received normal saline; the positive control group received 1 mg/kg diazepam; and the experimental groups received doses of 100, 200, and 400 mg/kg body weight of rosemary extract) [22]. Results of the elevated plus maze test showed that rosemary extract dose-dependently increases the mice spending time and the entries number of mice in plus maze open arms (indicating less stress) and that the dose of 400 mg/kg was similar to diazepam [22].

Authors investigated the effects of these non-volatile

components of rosemary on CNS function, and they found that at doses 10–100 mg/kg, rosmanol, cirsimaritin, and salvigenin elicited anxiolytic effect on mice in both elevated plus maze and light/dark tests [23]. Moreover, since the anxiolytic activity was not ameliorated by flumazenil but was inhibited by pentylenetetrazol, authors suggested that a possible mechanism of action is likely to be mediated *via* GABAA receptors at a site other than the high-affinity benzodiazepine binding site [24].

In a clinical study, inhalation of rosemary and lavender essential oil sachets reduced anxiety, and, in particular, rosemary increased focus and concentration and promoted a sense of clarity [25]. Solhi *et al.* (2013) demonstrated the effectiveness of rosemary in the improvement of sleep and reduction of insomnia in a clinical trial of 81 patients with opium withdrawal syndrome divided into a control group (treated with methadone and placebo for 4 weeks) and a case group (treated with methadone and rosemary capsules filled with 300 mg of dried powdered leaves) [26].

The authors proved that rosemary can be used to boost prospective and retrospective memory, reduce anxiety and depression, and improve sleep quality [27]. A very recent study investigated the effect of rosemary tea consumption on the plasma levels of anxiety and depression biomarkers in twenty-two healthy volunteers aged between 20 and 50 years old [27]. The tea was prepared from 5 g of dried 25 rosemary in 100 mL boiled water, and the main polyphenols were found to be rosmarinic acid, caffeic acid derivatives, luteolin-3-O-(2"-O-acetyl)-b-D-glucuronide, luteolin-3-O-glucuronide, rosmarinic acid-3-O-glucoside, nepitrin, syringic acid, feruloylnepitrin, luteolin-7-O-rutinoside, caffeic acid, vanillic acid, and luteolin. The tea was administered once a day for ten days, and results indicated the anxiolytic and/or antidepressant effects of rosemary tea consumption since it increases the level of the most reliable depression biomarker, including brain-derived neurotrophic factor and TNF- α [23].

Another herbal product or plant used as an oral pill by the Lebanese population is Valeriana officinalis root (21.55%). Valerian (*Valeriana officinalis* L.) is a perennial herbaceous plant native to Europe and Asia [28, 29]. In traditional phytotherapy, valerian is also used to treat cramps, tachycardia, headache, colitis, toothache, and hypertension [30]. Over 150 chemical constituents have been identified in valerian extract, and many of them are physiologically active, such as alkaloids, terpenes, free amino acids, organic acids, valepotriates, and flavones [29, 31]. The main alkaloids (0.01–0.05% of root dry weight) found in valerian's root are actinidine, chatinine, valerianine, valerine, alpha-methylpyrrol ketone, and naphthyridin methyl ketone [29, 32]. Terpenes and organic acids represent 0.2–2.8% of root dry weight, and they are mainly composed of valeric, isovaleric, valerenic, isovalerenic, and acetoxyvalerenic acids; bornyl acetate; bornyl isovalerenate; 1-pinene; 1-comphene; 1-borneol; terpineol; valeranone; and cryptofauronol [29, 32]. Other important active compounds are valepotriates (iridoid molecules), which are exclusively found in valerian extracts [29, 33].

Valerian is a mild sedative and sleep-promoting agent, often used as complementary or alternative medicine in the treatment of anxiety-induced sleep disturbance [29, 34]. Constituents of *V. officinalis* roots, such as valepotriates and valerenic acid, activate GABAergic system and, to a lesser extent, the serotonergic system, which is both involved in sleep promotion and regulation [31]. It was demonstrated, using the elevated plus maze method, that a significant reduction occurred in 26 anxious behaviour of rats when valerian-extract- (3 mL/kg) or valerenic-acid (75 µg/kg) exposed subjects were compared to the ethanol control group (1 mL/kg) [34]. In a randomized, controlled trial conducted by Aliakbari and Rafieian (2018) on eighty patients, it was shown that *Valeriana officinalis* improves the quality of sleep in patients with chronic heart failure [28]. However, five meta-analysis reviews published in 2000, 2006, 2007, 2010, and 2020 revealed that the effect of *V. officinalis* in treating sleep problems and associated disorders might vary, and in some cases, the outcomes do not support its use in treating insomnia [35-37]. Stevinson and Ernst (2000) analyzed nine randomized, placebo-controlled, double-blind trials measuring the effect of valerian on sleep in human participants [38].

The meta-analysis of 18 randomized placebo-controlled trials published by the author [39] showed that *Valeriana* spp. interventions reduced sleep latency over placebo by only 0.70 min. The authors [40] performed a meta-analysis on sixty studies to evaluate the effectiveness of *Valeriana* spp. (*V. officinalis* and *Vedulis*) to improve sleep quality and reduce anxiety. Results produced inconsistent outcomes, most probably due to the quality of herbal extracts; therefore, authors suggest that it may be necessary to revise the quality control processes, including standardization methods and shelf life of valerian extracts [41].

4.2. Herbal Drug Interactions (HDIs) related Knowledge

Patients at high risk for HDIs who also take drugs with narrow therapeutic indexes should be monitored more closely for herb-drug interactions, especially when a new drug is added or discontinued [42]. The overall prevalence of HDIs among Lebanese patients can be when using herbal products either in food such as Thyme-Anticoagulants/ Antiplatelet Drugs, which slow blood clotting and causes a risk of bruising and bleeding, Garlic-Anticoagulant/ Antiplatelet (warfarin/ aspirin) developed platelet disorders and/or haemorrhage (Fig. 2 and Fig. 3). So, patients using warfarin should be cautioned regarding the possible risk of increased bleeding with ingestion of garlic [43], garlic- analgesics (paracetamol), which causes changes in paracetamol pharmacokinetics [43], cinnamon-antihypertensive which increase the effects of antihypertensive drug and causes hypotension [44], another HDI is Cinnamon- Analgesics/Dyslipidaemia drugs can increase the risk of liver damage [45], Cinnamon-Antidiabetics can cause hypoglycaemia [44], Apple cider vinegar- Antihypertensive (Furosemide) which increases

the effect of Furosemide causing a decrease in potassium levels [45], Curcumin/turmeric-Anticoagulant (Fluindione), which increases the risk of bleeding [45], Romarin/Rosemary-Antihypertensives (Hydrochlorothiazide/ furosemide), which increases hydrochlorothiazide and furosemide clearance [44], or when using herbal products as herbal oral pills medications such as Ginkgo biloba - PPIs (Omeprazole) which decreased omeprazole blood concentration [45], Ginkgo biloba - Ibuprofen causes death due to cerebral haemorrhage (Inhibition of platelet aggregation) [45], Ginkgo biloba - Anticoagulant (warfarin) which increases warfarin levels [45], Ginseng-Anticoagulant (warfarin) which increases anticoagulant effect [44], Ginseng- Insulin which has a synergistic action that increases insulin effects [44] Ginseng- anxiolytic (Midazolam) which reduces the effect of midazolam, Garcinia Cambogia -Antidiabetics which causes hypoglycaemia [44] Garcinia Cambogia- Anticoagulants/ Antiplatelet drugs which slows blood clotting that increases the risk of bruising and bleeding [44], Valeriana root- Alprazolam/Benzodiazepines/Narcotics which increases sedative effects of Alprazolam, benzodiazepines and narcotics [34], Echinacea- Caffeine and anxiolytic (Midazolam), which increases systemic clearance of oral caffeine and IV Midazola [44], Ashwagandha-Benzodiazepines/Anticonvulsants/Barbiturates which increase sedative effects of benzodiazepines and narcotics [46], Ashwagandha-Warfarin, clopidogrel which increases the risk of bleeding or when using herbal products as a drink such as Caffeine/Green tea- Folic acid which decreases folate blood concentration [46], Green tea-warfarin which 28 increases the risk of bleeding [46], Ginger root-antihypertensives (Nifedipine), which potentiates antiplatelet effects of nifedipine [46], Sage- anticoagulant/ antiplatelet (Warfarin/ Clopidogrel), which increases anticoagulant effect of warfarin and reduces plasma levels of clopidogrel [45], Sage-dyslipidaemia drugs (Rosuvastatin) in which plasma clearance of rosuvastatin is reduced by >57% [46].

There are studies investigating the awareness and knowledge of herbal products by patients, athletes, and pharmacists in various medical branches and health problems [47]. However, there is no study in Lebanon evaluating the use of herbal products by Lebanese patients and athletes in terms of the examination of Pharmacokinetic and Pharmacodynamics HDIs. In addition, this study will contribute to the development of effective strategies for patient education and healthcare professionals to enable healthcare providers to deliver better guidance and advice regarding HDIs for their patients. According to Lebanese patients' attitudes towards herbal medications or products, 33.93% agree that natural medicine is more effective than conventional treatment, while only 9.18% of them disagree, and 32.93% of Lebanese patients agree that herbal medicine is safer than conventional medicine, while 7.98% disagree. Also, 29.34% of Lebanese patients agree that herbal supplements or herbal plants have no side effects, whereas 12.37% disagree. This can negatively affect the

treatment process of the patients, as well as lead to dangerous consequences in terms of drug interactions and side effects. Considering herbal products completely safe and using them without the advice of a doctor or pharmacist may cause negative consequences [48]. Because some plants may have toxic components and many herbal products also interact with drugs [49]. The most famous Herb-drug interaction is garlic and green tea with warfarin, which is used as an anticoagulant and has serious interactions that can alter blood haemostasis and anticoagulation by interacting with these herbal products [45]. This interaction can be obviously observed with Lebanese patients since 33.33% of Lebanese patients consume caffeine/ green tea and, 33.93% consume garlic as the herbal product in food, in which 16.76% use anticoagulant or platelet as a conventional treatment.

For this reason, it is necessary to raise awareness of Lebanese patients, athletes, physicians and pharmacists in order to provide the best treatment conditions and to prevent possible damages [50]. It is extremely important for healthcare professionals to have comprehensive training in phytotherapy and to have sufficient knowledge and skills in terms of increasing effectiveness in treatment and preventing unwanted results [51]. One of the important issues regarding the use of herbal products is from which sources patients learn about these products [44]. In general, it is observed that 29.1% of Lebanese patients do not consult their doctors about this issue. In our study, when the Lebanese patients were asked if they did any research before using herbal products, 41.12% of the patients stated that they did research.

In our study, 28.14% of Lebanese patients agree with the view that herbal supplements or herbal plants do not interact with drugs and can be used at the same time, but 11.57% of the remaining patients disagreed with this view and 38.72% of them remained undecided or don't know.

These results actually suggest that patients do not have enough information about toxic plants or their toxicity in inappropriate use.

Similarly, in the present study, 32.93% of the Lebanese patients agreed with the opinion that the use of herbal supplements or herbal plants should be limited only to patients who have failed conventional therapy, while 12.17% of them disagreed and 33.93% of them don't know. These results suggest that some patients consider herbal products quite safe and ignore possible side effects. However, the use of complementary therapies and herbal products in patients taking conventional medications for long term or chronic diseases should be used under the supervision of a doctor. Considering Lebanese patients' positive attitudes towards the knowledge of pharmacokinetics and pharmacodynamics of herbal products, most of the Lebanese patients expressed a good knowledge about this issue.

The results of our study show that 39.32% of Lebanese patients are aware of the potential risks and side effects associated with herbal supplements or plants they use, 36.72% of Lebanese patients know which exact daily amount or dose of herbal plant or herbal supplement I

should take for their condition, 40.51% of Lebanese patients know that there is an interaction when taking any conventional medication along with the herbal supplement, 41.91% of Lebanese patients agree that herbal supplements should be regulated and controlled by the Ministry of Public Health (MOPH) and regulatory bodies to ensure safety and efficacy, 38.32% of Lebanese patients agree that herbal supplements or herbal plants do not provide treatment but can only be supportive and treatment is provided only with conventional medicines, 38.12% of Lebanese patients agree that the use of herbal supplements or herbal plants can be dangerous, as they will affect the action of existing drug therapy; 37.32% of Lebanese patients agree that herbal supplements or herbal plants should not be used in the treatment of serious diseases.

4.3. Role of Pharmacists in Harmonizing Patients' Mental Health

Mental Health Lebanese patients are willing to be more educated about herbal products use since 40.71% of Lebanese patients agree that there is a need for education about the risks and benefits of herbal supplements, and 42.51% of Lebanese patients ask any pharmacists, or physicians about any herbal supplement or herbal plant before using it alone or with conventional treatment, 41.12% of Lebanese patients research the ingredients and dosage of herbal supplements on internet before taking them, 44.51% of Lebanese patients like to receive consultancy on herbal supplement or herbal plant to know more about how do they act and interact in their body. Another study concerning the knowledge of athletes about herbal products shows that 17% of collegiate female athletes have used herbal supplements such as "Guarana", "Ashwagandha", "Caffeine", "Purple Willow Bark", "Cayenne", "Pepper", and "Ginger root", which are believed to increase mental vigilance, stimulate fat-burning metabolism, and improve muscle performance [14].

Other plants such as *Tribulus terrestris*, *Ginkgo biloba*, *Rhodiola rosea*, *Cordyceps sinensis* have demonstrated benefits on muscle growth and strength in active men, while others have shown no effect on muscle performances [15]. Whereas in this study, 28.94% of Lebanese patients and, especially the athletes, use these herbal supplements mostly the Ashwagandha (21.15%), ginger root (16.96%), caffeine/green tea (33.33%) as energy booster in order to increase energy and endurance, and 28.34% for relaxation from muscle spasms after sport exercises and 41.71% of them agree that herbal supplements can be taken as a desire to boost energy and endurance, also 31.73% agree that herbal supplements can help increase sports performance without being detected in blood tests. Moreover, Ashwagandha can cause false positive results in benzodiazepine, thyroxine, and digoxin drug tests, which can trigger false positive results that may affect certain lab test results [52]. Moreover, in the literature, we discuss the pharmacists' knowledge, their experience of customer-reporting adverse reactions and their awareness of these reactions could play a vital role in identifying and reporting these reactions [53]. Almost an enormous number of patients have failed to mention correctly the known adverse events of each herbal anxiolytic, and this would be adjusted

and improved by pharmacist training workshops and community campaigns to spread knowledge and education.

Our study agrees with the literature part that more than half of the pharmacists were not aware of potential herb-drug interactions, and an even larger majority did not receive complaints from the customers about herbal medicines. So, in our study, we recommend strategies to prevent HDIs among Athletes and the Lebanese Population that can be taken by the Lebanese Ministry of Public Health (MOPH), Lebanese Hospitals, and Lebanese Pharmaceutical Companies. In contrast to the literature, 56.7% of Lebanese patients get their source of information about herbal plants or supplements and their usage with conventional medication, while only 20.7% 32 of Lebanese patients refer to the herbalist. Moreover, in this study, the patients' first choice to purchase herbal supplements from the pharmacy or certified sports coach was 44.11%, while purchasing from an online source or herbalist was 29.54% as the 2nd choice, which is the opposite to the literature. This reflects the trustworthiness of Lebanese patients in their pharmacists, so pharmacists need enhanced education on pharmacokinetic and pharmacodynamics mechanisms, drug metabolizing enzymes and transporters playing significant roles in herb-drug mechanisms in order to provide objective and evidence-based information on the benefits and risks of herbal medicines which might affect the general knowledge and awareness of the targeted population for better patient care and benefit in the future [54]. Patient education and healthcare professionals play a crucial role in raising awareness and providing guidance on herb-drug interactions. The study also highlights the high prevalence of anxiety among the Lebanese population and herbal product use in Lebanon, driven by factors such as the unaffordability of synthetic medications and the economic crisis. Tens of articles assess the association between external, governmental, and financial threats and the widespread incidence of anxiety along with the use of herbal products as anxiolytics. These studies have confirmed that such events have influenced society to need anxiolytics as a therapy, and they aimed for herbal products as a first-line choice. On the other hand, several related articles have highlighted the adverse events accompanied by herbal medicine use as anxiolytics but this issue was weekly addressed in our study, and the participants have shown a very weak knowledge about the adverse events since they missed almost all of the correct information while answering this part.

CONCLUSION

The findings mentioned above have magnified the importance of herbal medicine and its widespread use and several indications among Lebanese people suffering from anxiety. The results have also shown that almost all the study participants are aware of the herbal remedies appropriate use, potential adverse reactions, and interactions with conventional therapies. Still conducting awareness campaigns, spreading education, and guiding patients are mandatory and extremely needed. Not to forget that the pharmacist's role in patient's education and drug utilization is the golden standard for optimal health outcomes and the pharmacist is the assigned specialist for

such service. Pharmacy students can conduct awareness campaigns in their community, or they can distribute flyers including herbal medicine use and administration as anxiolytics. From the other hand, governmental regulations should facilitate herbal remedies dispensing by classifying them as over the counter drugs. As well, the drug information center of Lebanon (order of pharmacy) should play an important role in training community pharmacists by conducting lectures or workshops so that the pharmacist can be the herbal drug expert and the adopted consultant.

LIMITATIONS

The study design has met the study requirements but the sample size was not enough in order to generalize the results to the whole population. The findings of the study as well have failed to draw a true association between the external factors of the country and the herbal medicine used for anxiety. We couldn't find any similar article that assesses the external threats with the use of herbal medicine as anxiolytics. We couldn't find more valuable outcomes that could strengthen the study or magnify our study benefits. What is truly missed from the questionnaire is the management adopted in treating the adverse events accompanied by the herbal medicine administration.

AUTHOR'S CONTRIBUTION

M.A.: Study conception and design; R.A.: Data collection; S.N.: Analysis and interpretation of results; F.H.: Article revision and follow-up; R.B. and J.W.: Manuscript draft was presented by.

LIST OF ABBREVIATIONS

SPSS	=	Statistical Package for Social Science
HDIs	=	Herbal Drug Interactions
MOPH	=	Ministry of Public Health

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study protocol was approved by the Institutional Review Board of the Lebanese International University, Lebanon, Lebanon (2024ERC-029-LIUSOP).

HUMAN AND ANIMAL RIGHTS

All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

A written informed consent from the patients or their caregivers.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

We would like to thank all the Lebanese pharmacists in community pharmacies for their help in passing the surveys and data entry. We would also like to thank all the doctors in the School of Pharmacy at Lebanese International University for their vital assistance throughout this study.

REFERENCES

- [1] Silverman WK, Field AP. Anxiety disorders in children and adolescents. Cambridge University press 2011. <http://dx.doi.org/10.1017/CBO9780511994920>
- [2] McIntyre E, Saliba AJ, Wiener KKK, Sarris J. Prevalence and predictors of herbal medicine use in adults experiencing anxiety: A critical review of the literature. *Adv Integr Med* 2015; 2(1): 38-48. <http://dx.doi.org/10.1016/j.aimed.2015.04.002>
- [3] Burstein M, Beesdo-Baum K, He JP, Merikangas KR. Threshold and subthreshold generalized anxiety disorder among US adolescents: Prevalence, sociodemographic, and clinical characteristics. *Psychol Med* 2014; 44(11): 2351-62. <http://dx.doi.org/10.1017/S0033291713002997> PMID: 24384401
- [4] Kogadeeva M, Zamboni N. SUMOFLUX: A generalized method for targeted ¹³C metabolic flux ratio analysis. *PLOS Comput Biol* 2016; 12(9): e1005109. <http://dx.doi.org/10.1371/journal.pcbi.1005109> PMID: 27626798
- [5] Baxter A J, Scott K M, Vos T, Whiteford H A. Global prevalence of anxiety disorders: A systematic review and meta-regression *Psychological medicine* 2013; 43(5): 897-910.
- [6] Obeid S, Lahoud N, Haddad C, et al. Factors associated with anxiety among the Lebanese population: The role of alexithymia, self-esteem, alcohol use disorders, emotional intelligence and stress and burnout. *Int J Psychiatry Clin Pract* 2020; 24(2): 151-62. <http://dx.doi.org/10.1080/13651501.2020.1723641> PMID: 32031427
- [7] El Houry J, Ghandour L, Charara R, Adam L, Maalouf F, Houry B. The Beirut explosion psychological impact study: An online cross-sectional population survey. *Traumatology* 2022; 28(4): 491-502. <http://dx.doi.org/10.1037/trm0000353>
- [8] Blake MJ, Trinder JA, Allen NB. Mechanisms underlying the association between insomnia, anxiety, and depression in adolescence: Implications for behavioral sleep interventions. *Clin Psychol Rev* 2018; 63: 25-40. <http://dx.doi.org/10.1016/j.cpr.2018.05.006> PMID: 29879564
- [9] Tilburt J, Kaptchuk TJ. Herbal medicine research and global health: An ethical analysis. *Bull World Health Organ* 2008; 86(8): 594-9. <http://dx.doi.org/10.2471/BLT.07.042820> PMID: 18797616
- [10] Kinrys G, Coleman E, Rothstein E. Natural remedies for anxiety disorders: Potential use and clinical applications. *Depress Anxiety* 2009; 26(3): 259-65. <http://dx.doi.org/10.1002/da.20460> PMID: 19123457
- [11] Carr A, Santanello C. Pharmacists' knowledge, perceptions, and practices regarding herbal medicine. *Innov Pharm* 2019; 10(3): 10.
- [12] Popović Z, Matic R, Bojović S, Stefanović M, Vidaković V. Ethnobotany and herbal medicine in modern complementary and alternative medicine: An overview of citations in the field of I&C medicine 2001-2013. *J Ethnopharmacol* 2016; 181: 182-92. <http://dx.doi.org/10.1016/j.jep.2016.01.034> PMID: 26807912
- [13] World Fact Book of the United States Central Intelligence Agency. Lebanon demographics profile 2014. Available from <http://www.indexmundi.com/Lebanon/>
- [14] Onder G, Lattanzio F, Battaglia M, et al. The risk of adverse drug reactions in older patients: Beyond drug metabolism. *Curr Drug Metab* 2011; 12(7): 647-51. <http://dx.doi.org/10.2174/138920011796504563> PMID: 21495971
- [15] Minich DM, Bland JS, Katke J, et al. Clinical safety and efficacy of NG440: A novel combination of rho iso-alpha acids from hops, rosemary, and oleanolic acid for inflammatory conditions This article is one of a selection of papers published in this special issue (part 1 of 2) on the Safety and Efficacy of Natural Health Products. *Can J Physiol Pharmacol* 2007; 85(9): 872-83. <http://dx.doi.org/10.1139/Y07-055> PMID: 18066133
- [16] Ferlemi AV, Katsikoudi A, Kontogianni VG, et al. Rosemary tea consumption results to anxiolytic- and anti-depressant-like behavior of adult male mice and inhibits all cerebral area and liver cholinesterase activity; phytochemical investigation and *in silico* studies. *Chem Biol Interact* 2015; 237: 47-57. <http://dx.doi.org/10.1016/j.cbi.2015.04.013> PMID: 25910439
- [17] Mattalia G, Sökand R, Corvo P, Pieroni A. Blended divergences: Local food and medicinal plant uses among Arbëreshë, Occitans, and autochthonous Calabrians living in Calabria, Southern Italy. *Plant Biosyst* 2020; 154(5): 615-26. [CrossRef]. <http://dx.doi.org/10.1080/11263504.2019.1651786>
- [18] Ulbricht C, Abrams TR, Brigham A, et al. An evidence-based systematic review of rosemary (*Rosmarinus officinalis*) by the natural standard research collaboration. *J Diet Suppl* 2010; 7(4): 351-413. <http://dx.doi.org/10.3109/19390211.2010.525049> PMID: 22432564
- [19] Noori Ahmad Abadi M, Mortazavi M, Kalani N, Marzouni HZ, Kooti W, Ali-Akbari S. Effect of hydroalcoholic extract of *Rosmarinus officinalis* L. Leaf on anxiety in mice. *J Evid Based Complementary Altern Med* 2016; 21(4): NP85-90. <http://dx.doi.org/10.1177/2156587216642101> PMID: 27055822
- [20] Achour M, Ben Salem I, Ferdousi F, et al. Rosemary tea consumption alters peripheral anxiety and depression biomarkers: A pilot study in limited healthy volunteers. *J Am Coll Nutr* 2021; 1-10. [CrossRef]. PMID: 33565922
- [21] Abdelhalim A, Karim N, Chebib M, et al. Antidepressant, anxiolytic and antinociceptive activities of constituents from *Rosmarinus officinalis*. *J Pharm Pharm Sci* 2015; 18(4): 448-59. <http://dx.doi.org/10.18433/J3PW38> PMID: 26626245
- [22] McCaffrey R, Thomas DJ, Kinzelman AO. The effects of lavender and rosemary essential oils on test-taking anxiety among graduate nursing students. *Holist Nurs Pract* 2009; 23(2): 88-93. <http://dx.doi.org/10.1097/HNP.0b013e3181a110aa> PMID: 19258850
- [23] Solhi H, Salehi B, Alimoradian A, et al. Beneficial effects of *rosmarinus officinalis* for treatment of opium withdrawal syndrome during addiction treatment programs: A clinical trial. *Addict Health* 2013; 5(3-4): 90-4. PMID: 24494164
- [24] Nematollahi P, Mehrabani M, Karami-Mohajeri S, Dabaghzadeh F. Effects of *Rosmarinus officinalis* L. on memory performance, anxiety, depression, and sleep quality in university students: A randomized clinical trial. *Complement Ther Clin Pract* 2018; 30: 24-8. <http://dx.doi.org/10.1016/j.ctcp.2017.11.004> PMID: 29389474
- [25] Rafieian M, Aliakbari F. The effectiveness of *Valeriana officinalis*

- on sleep disturbance in patients with chronic heart failure. *Int J Pharm Investig* 2018; 8(3): 145-50.
http://dx.doi.org/10.4103/jphi.JPHI_43_18
- [26] Motti R, de Falco B. Traditional herbal remedies used for managing anxiety and insomnia in Italy: An ethnopharmacological overview. *Horticulturae* 2021; 7(12): 523.
<http://dx.doi.org/10.3390/horticulturae7120523>
- [27] Jiang X, Zhang JC, Liu YW, Fang Y. [Studies on chemical constituents of valeriana officinalis]. *Zhong Yao Cai* 2007; 30(11): 1391-3.
PMID: 18323205
- [28] Janot MM, Guilhem J, Contz O, Venera G, Cionga E. [Contribution to the study of valerian alkaloids (Valeriana officinalis, L.): Actinidine and naphthylidylmethylketone, a new alkaloid (author's transl)]. *Ann Pharm Fr* 1979; 37(9-10): 413-20.
PMID: 547813
- [29] Torssell K, Wahlberg K, Alnäs Å, *et al.* Isolation, structure and synthesis of alkaloids from Valeriana officinalis L. *Acta Chem Scand* 1967; 21(1): 53-62.
<http://dx.doi.org/10.3891/acta.chem.scand.21-0053> PMID: 4291658
- [30] Patočka J, Jakl J. Biomedically relevant chemical constituents of Valeriana officinalis. *J Appl Biomed* 2010; 8(1): 11-8. [CrossRef].
<http://dx.doi.org/10.2478/v10136-009-0002-z>
- [31] Fu AZ, Jiang JZ, Reeves JH, Fincham JE, Liu GG, Perri M III. Potentially inappropriate medication use and healthcare expenditures in the US community-dwelling elderly. *Med Care* 2007; 45(5): 472-6.
<http://dx.doi.org/10.1097/01.mlr.0000254571.05722.34> PMID: 17446834
- [32] Murphy K, Kubin ZJ, Shepherd JN, Ettinger RH. Valeriana officinalis root extracts have potent anxiolytic effects in laboratory rats. *Phytomedicine* 2010; 17(8-9): 674-8.
<http://dx.doi.org/10.1016/j.phymed.2009.10.020> PMID: 20042323
- [33] Bent S, Padula A, Moore D, Patterson M, Mehling W. Valerian for sleep: A systematic review and meta-analysis. *Am J Med* 2006; 119(12): 1005-12.
<http://dx.doi.org/10.1016/j.amjmed.2006.02.026> PMID: 17145239
- [34] Taibi DM, Landis CA, Petry H, Vitiello MV. A systematic review of valerian as a sleep aid: Safe but not effective. *Sleep Med Rev* 2007; 11(3): 209-30.
<http://dx.doi.org/10.1016/j.smrv.2007.03.002> PMID: 17517355
- [35] Stevinson C, Ernst E. Valerian for insomnia: A systematic review of randomized clinical trials. *Sleep Med* 2000; 1(2): 91-9.
[http://dx.doi.org/10.1016/S1389-9457\(99\)00015-5](http://dx.doi.org/10.1016/S1389-9457(99)00015-5) PMID: 10767649
- [36] Fernández-San-Martín MI, Masa-Font R, Palacios-Soler L, Sancho-Gómez P, Calbó-Caldentey C, Flores-Mateo G. Effectiveness of Valerian on insomnia: A meta-analysis of randomized placebo-controlled trials. *Sleep Med* 2010; 11(6): 505-11.
<http://dx.doi.org/10.1016/j.sleep.2009.12.009> PMID: 20347389
- [37] Shinjyo N, Waddell G, Green J. Valerian root in treating sleep problems and associated disorders a systematic review and meta-analysis. *J Evid Based Integr Med* 2020; 2515690X20967323.
- [38] Meraya AM, Banji OJF, Khobrani MA, Alhossan A. Evaluation of herbal medications use among elderly with chronic disorders in Saudi Arabia. *Saudi Pharm J* 2021; 29(6): 603-8.
<http://dx.doi.org/10.1016/j.jsps.2021.04.021> PMID: 34194267
- [39] Shrank WH, Avorn J. Educating patients about their medications: The potential and limitations of written drug information. *Health Aff (Millwood)* 2007; 26(3): 731-40.
<http://dx.doi.org/10.1377/hlthaff.26.3.731> PMID: 17485751
- [40] Poudel A, *et al.* Herbal medicine uses and its association with adherence and medication-related problems among chronic kidney disease patients in Nepal. *BMC Complement Altern Med* 2019; 19(1): 69.
PMID: 30922270
- [41] Herb-drug interactions in patients with potentially inappropriate medications in primary care, nursing home and hospital settings: A systematic review and a preliminary study Available from <https://pubmed.ncbi.nlm.nih.gov/33669162/>
- [42] Awortwe C, Bruckmueller H, Cascorbi I. Interaction of herbal products with prescribed medications: A systematic review and meta-analysis. *Pharmacol Res* 2019; 141: 397-408.
<http://dx.doi.org/10.1016/j.phrs.2019.01.028> PMID: 30660822
- [43] Medication safety in polypharmacy. Geneva: world health organization. 2019. Available from <https://www.who.int/citations-detail-redirect/WHO-UHC-SDS-2019.11>
- [44] Ernst E. Herbal remedies for anxiety - a systematic review of controlled clinical trials. *Phytomedicine* 2006; 13(3): 205-8.
<http://dx.doi.org/10.1016/j.phymed.2004.11.006> PMID: 16428031
- [45] Cuzzolin L, Zaffani S, Benoni G. Safety implications regarding use of phytomedicines. *Eur J Clin Pharmacol* 2006; 62(1): 37-42.
<http://dx.doi.org/10.1007/s00228-005-0050-6> PMID: 16328317
- [46] Dubrall D, Just KS, Schmid M, Stingl JC, Sachs B. Adverse drug reactions in older adults: A retrospective comparative analysis of spontaneous reports to the German Federal Institute for drugs and medical devices. *BMC Pharmacol Toxicol* 2020; 21(1): 25.
<http://dx.doi.org/10.1186/s40360-020-0392-9> PMID: 32293547
- [47] Zazzara MB, Palmer K, Vetrano DL, Carfi A, Onder G. Adverse drug reactions in older adults: A narrative review of the literature. *Eur Geriatr Med* 2021; 12(3): 463-73.
<http://dx.doi.org/10.1007/s41999-021-00481-9> PMID: 33738772
- [48] Toklu HZ, Hussain A. The changing face of pharmacy practice and the need for a new model of pharmacy education. *J Young Pharm* 2013; 5(2): 38-40.
<http://dx.doi.org/10.1016/j.jyp.2012.09.001> PMID: 24023452
- [49] Das B, Ramasubbu SK, Agnihotri A, Kumar B, Rawat VS. Leading 20 drug-drug interactions, polypharmacy, and analysis of the nature of risk factors due to QT interval prolonging drug use and potentially inappropriate psychotropic use in elderly psychiatry outpatients. *Ther Adv Cardiovasc Dis* 2021; 15: 17539447211058892.
<http://dx.doi.org/10.1177/17539447211058892> PMID: 34841978
- [50] Leguelinel-Blache G, Castelli C, Rolain J, *et al.* Impact of pharmacist-led multidisciplinary medication review on the safety and medication cost of the elderly people living in a nursing home: A before-after study. *Expert Rev Pharmacoecon Outcomes Res* 2020; 20(5): 481-90.
<http://dx.doi.org/10.1080/14737167.2020.1707082> PMID: 31899986
- [51] Martin P, Tamblyn R, Benedetti A, Ahmed S, Tannenbaum C. Effect of a pharmacist-led educational intervention on inappropriate medication prescriptions in older adults. *JAMA* 2018; 320(18): 1889-98.
<http://dx.doi.org/10.1001/jama.2018.16131> PMID: 30422193
- [52] O'Connor MN, Gallagher P, O'Mahony D. Inappropriate prescribing. *Drugs Aging* 2012; 29(6): 437-52.
<http://dx.doi.org/10.2165/11632610-000000000-00000> PMID: 22642779
- [53] Mann FD, Krueger RF, Vohs KD. Personal economic anxiety in response to COVID-19. *Pers Individ Dif* 2020; 167: 110233.
<http://dx.doi.org/10.1016/j.paid.2020.110233> PMID: 32834283
- [54] Allameh M, Orsat V. Herbal anxiolytics: Sources and their preparation methods. *Food Rev Int* 2023; 39(8): 4992-5020.
<http://dx.doi.org/10.1080/87559129.2022.2043895>