

1. Adverse reactions to dietary supplements containing red yeast rice: assessment of cases from the Italian surveillance system. Mazzanti G, Moro PA, Raschi E, Da Cas R, Menniti-Ippolito F.

Br J Clin Pharmacol. 2017 Apr;83(4):894-908. doi: 10.1111/bcp.13171. Epub 2017 Jan 19.

AIMS: Red yeast rice (RYR) is contained in dietary supplements for patients with dyslipidemia. RYR supplements contain monacolin K, which is chemically identical to lovastatin, a licensed drug with a well-known risk profile. We aim to describe the safety profile of RYR by analysing spontaneous reports of suspected adverse reactions (ARs). METHODS: Within the Italian Surveillance System of Natural Health Products, suspected ARs were collected and evaluated by a multidisciplinary group of experts to assess causality using the WHO-UMC system or the CIOMS/RUCAM score, for hepatic reactions. The public version of the WHO-Vigibase was also queried. RESULTS: From April 2002 to September 2015, out of 1261 total reports, 52 reports concerning 55 ARs to RYR dietary supplements were collected. ARs consisted in myalgia and/or increase in creatine phosphokinase (19), rhabdomyolysis (1), liver injury (10), gastrointestinal reactions (12), cutaneous reactions (9) and other reactions (4). Women were involved in 70% of cases. In 13 cases, the reaction required hospitalization, and 28 patients were taking other medications. Dechallenge was positive in 40 reactions (73%), rechallenge was positive in 7. Causality resulted as certain (1), probable (31, 56%), possible (18, 34%), unlikely (3) or unassessable (2). Similar distribution emerged from the WHO-Vigibase. CONCLUSIONS: The potential safety signals of myopathies and liver injury raise the hypothesis that the safety profile of RYR is similar to that of statins. Continuous monitoring of dietary supplements should be promoted to finally characterize their risk profile, thus supporting regulatory bodies for appropriate actions.

DOI: 10.1111/bcp.13171

PMCID: PMC5346868 [Available on 2018-04-01]

PMID: 28093797 [Indexed for MEDLINE]

2. A Case of Oxalate Nephropathy: When a Single Cause Is Not Crystal Clear. Marques S, Santos S, Fremin K, Fogo AB.

Am J Kidney Dis. 2017 Nov;70(5):722-724. doi: 10.1053/j.ajkd.2017.05.022. Epub 2017 Jul 21.

Hyperoxaluria can result in oxalate nephropathy with intratubular calcium oxalate crystallization and acute tubular injury. Primary inherited enzymatic deficiency or secondary causes such as excessive dietary intake, enteric increased absorption, or high doses of vitamin C, which is metabolized to oxalate, may underlie hyperoxaluria and oxalate nephropathy. We report a case of acute kidney injury due to oxalate nephropathy in a patient using chelating therapy with oral ethylenediamine tetra acetic acid (EDTA), intravenous supplementation with vitamin C, and chronic diarrhea and discuss the potential kidney damage these factors can cause in particular settings. To our knowledge, this is the first report suggesting an association between oral EDTA and oxalate nephropathy.

DOI: 10.1053/j.ajkd.2017.05.022

PMID: 28739328 [Indexed for MEDLINE]

3. Hepatotoxicity of Herbal Supplements Mediated by Modulation of Cytochrome P450. Brewer CT, Chen T.

Int J Mol Sci. 2017 Nov 8;18(11). pii: E2353. doi: 10.3390/ijms18112353.

Herbal supplements are a significant source of drug-drug interactions (DDIs), herb-drug interactions, and hepatotoxicity. Cytochrome P450 (CYP450) enzymes metabolize a large number of FDA-approved pharmaceuticals and herbal supplements. This metabolism of pharmaceuticals and supplements can be augmented by concomitant use of either pharmaceuticals or supplements. The xenobiotic receptors constitutive androstane receptor (CAR) and the pregnane X receptor (PXR) can respond to xenobiotics by increasing the expression of a large number of genes that are involved in the metabolism of xenobiotics, including CYP450s. Conversely, but not exclusively, many xenobiotics can inhibit the activity of CYP450s.

Induction of the expression or inhibition of the activity of CYP450s can result in DDIs and toxicity. Currently, the United States (US) Food and Drug Administration does not require the investigation of the interactions of herbal supplements and CYP450s. This review provides a summary of herbal supplements that inhibit CYP450s, induce the expression of CYP450s, and/or whose toxicity is mediated by CYP450s.

DOI: 10.3390/ijms18112353

PMCID: PMC5713322

PMID: 29117101

4. The effects of dietary and herbal phytochemicals on drug transporters. Li Y, Revalde J, Paxton JW.

Adv Drug Deliv Rev. 2017 Jul 1;116:45-62. doi: 10.1016/j.addr.2016.09.004. Epub 2016 Sep 13.

Membrane transporter proteins (the ABC transporters and SLC transporters) play pivotal roles in drug absorption and disposition, and thus determine their efficacy and safety. Accumulating evidence suggests that the expression and activity of these transporters may be modulated by various phytochemicals (PCs) found in diets rich in plants and herbs. PC absorption and disposition are also subject to the function of membrane transporter and drug metabolizing enzymes. PC-drug interactions may involve multiple major drug transporters (and metabolizing enzymes) in the body, leading to alterations in the pharmacokinetics of substrate drugs, and thus their efficacy and toxicity. This review summarizes the reported *in vitro* and *in vivo* interactions between common dietary PCs and the major drug transporters. The oral absorption, distribution into pharmacological sanctuaries and excretion of substrate drugs and PCs are considered, along with their possible interactions with the ABC and SLC transporters which influence these processes.

DOI: 10.1016/j.addr.2016.09.004

PMID: 27637455 [Indexed for MEDLINE]

5. Patients on psychotropic medications and herbal supplement combinations: clinical considerations.

Tang SW, Tang W, Leonard BE.

Int Clin Psychopharmacol. 2017 Mar;32(2):63-71. doi:10.1097/YIC.000000000000158.

Populations using herbs and herbal preparations are widespread and growing. As many herbal ingredients exert actions on psychotropic drug targets, psychiatrists should be well informed and aware of potential drug-drug interactions in clinical practice. Reliable and clinically useful information in this area, however, is fragmented, if not deficient. This paper reviewed the clinical aspects of herb-drug interactions, focusing in particular on the monoamine oxidase enzyme and P450 cytochrome enzyme-inhibitory properties of herbs and their potential interference with psychotropic drug actions and clinical judgement.

DOI: 10.1097/YIC.000000000000158

PMID: 27902536 [Indexed for MEDLINE]

6. Intestinal and Hepatocellular Transporters: Therapeutic Effects and Drug Interactions of Herbal Supplements. Stieger B, Mahdi ZM, Jäger W.

Annu Rev Pharmacol Toxicol. 2017 Jan 6;57:399-416. doi:10.1146/annurev-pharmtox-010716-105010. Epub 2016 Sep 14.

Herbal supplements are generally considered safe; however, drug disposition is influenced by the interactions of herbal supplements and food constituents with transport and metabolic processes. Although the interference of herbal supplements with drug metabolism has been studied extensively, knowledge of how they interact with the drug transport processes is less advanced. Therefore, we describe here specific examples of experimental and human interaction studies of herbal supplement components with drug transporters addressing, for example, organic anion transporting polypeptides or P-glycoprotein, as such interactions may lead to severe side effects and altered drug efficacy. Hence, it is clearly necessary to increase the awareness of the clinical relevance of the interference of herbal supplements with the drug transport processes.

DOI: 10.1146/annurev-pharmtox-010716-105010

PMID: 27648763 [Indexed for MEDLINE]

7. Yogi Detox Tea: A Potential Cause of Acute Liver Failure. Kesavarapu K, Kang M, Shin JJ, Rothstein K.

Case Rep Gastrointest Med. 2017;2017:3540756. doi: 10.1155/2017/3540756. Epub 2017 Oct 24.

We present a case of acute fulminant liver failure from a liver detoxification tea. We present a 60-year-old female with weakness, lethargy, scleral icterus, jaundice, and worsening mental status. She drank herbal tea three times a day for 14 days prior to symptom development. Liver tests were elevated. Remaining laboratory tests and imaging were negative for other etiologies. An ultrasound-guided liver biopsy showed submassive necrosis. A literature search on the ingredients shows six ingredients as having hepatotoxic effects and remaining ingredients as having very sparse hepatoprotective data. Healthcare professionals should discuss herbal medication and tea use and report adverse effects.

DOI: 10.1155/2017/3540756

PMCID: PMC5674495

PMID: 29204300

8. Liver toxicity mechanisms of herbs commonly used in Latin America. López-Gil S, Nuño-Lámbarri N, Chávez-Tapia N, Uribe M, Barbero-Becerra VJ.

Drug Metab Rev. 2017 Aug;49(3):338-356. doi: 10.1080/03602532.2017.1335750. Epub 2017 Jul 4.

Mexico owns approximately 4500 medicinal plants species, a great diversity that position it at the second place after China. According to the Mexican health department, 90% of common population consumes them to treat various diseases. Additionally, herbal remedies in Latin America (LA) are considered a common practice, but the frequency of use and the liver damage related to its consumption is still unknown. Despite the high prevalence and indiscriminate herbal consumption, the exact mechanism of hepatotoxicity and adverse effects is not fully clarified and is still questioned. Some herb products associated with herb induced liver injury (HILI) are characterized by presenting a different chemical composition that may vary from batch to batch, also the biological activity of many medicinal plants and other natural products are directly related to their most active component and its concentration. There are two main biological components that are associated with liver damage, alkaloids, and flavonoids, which are frequent constituents of commonly used herbs. The interaction with the different cytochrome P-450 isoforms, inflammatory, and oxidative activities seem to be the main damage pathway involved in the liver. It is important to know the herbal adverse effects and mechanisms involved; therefore, this article is focused on the beneficial and deleterious effects as well as the possible toxicity mechanisms and interactions of the herbs that are frequently used in LA, since the herb-host interaction may not always be the expected or desired depending on the clinical context in which it is administered.

DOI: 10.1080/03602532.2017.1335750

PMID: 28571502 [Indexed for MEDLINE]

9. Dramatic and early response to low-dose steroid in the treatment of acute eosinophilic myocarditis: a case report. Chen YW, Chang YC, Su CS, Chang WC, Lee WL, Lai CH.

BMC Cardiovasc Disord. 2017 May 8;17(1):115. doi: 10.1186/s12872-017-0547-9.

BACKGROUND: Eosinophilic myocarditis encompasses a variety of etiologies and the prognosis varies. For patients with a hypersensitive response to medications, high-dose corticosteroids and discontinuation of culprit medications are the main treatments. **CASE PRESENTATION:** We reported a young man with biopsy-proven eosinophilic myocarditis which was possibly induced by Chinese herbal medicine. His heart failure and left ventricular hypertrophy improved soon after low-dose corticosteroid. **CONCLUSION:** Low-dose corticosteroid may be effective in selected patients with eosinophilic myocarditis. Early echocardiographic follow-up is mandatory for evaluation of the clinical response.

DOI: 10.1186/s12872-017-0547-9

PMCID: PMC5422902

PMID: 28482853 [Indexed for MEDLINE]

10. Anthracycline-Induced Cardiotoxicity in Young Cancer Patients: The Role of Carnitine. Armenian SH.

Ann Nutr Metab. 2016;68 Suppl 3:10-14. Epub 2016 Dec 9.

While the increased rates of survival in childhood cancers have increased progressively in recent decades, many childhood cancer survivors will have at least one chronic health condition within 40 years of age. In this regard, cardiovascular complications have emerged as a leading cause of long-term morbidity and mortality in long-term survivors of childhood cancer, likely due to exposure to anthracycline chemotherapy, and outcomes in patients with anthracycline-related cardiomyopathy remain poor. Some progress has been made in understanding the mechanisms at the basis of anthracycline-related cardiomyopathy, which appear to involve generation of reactive oxygen species, leading to mitochondrial dysfunction, followed by myocyte apoptosis and maladaptive left ventricular remodeling. Even if several guidelines currently exist for monitoring cancer patients treated with cardiotoxic therapies who are at high risk for heart failure, much work remains to be done in finding reliable markers for screening for cardiac dysfunction. Studies from our group have identified alterations in L-carnitine in cancer survivors. While additional investigations are needed, preliminary studies suggest a role for carnitine in primary prevention (during treatment) and secondary prevention (to improve function after treatment).

DOI: 10.1159/000448322

PMID: 27931027 [Indexed for MEDLINE]

11. Phytochemical compounds in sport nutrition: Synephrine and hydroxycitric acid (HCA) as examples for evaluation of possible health risks. Bakhiya N, Ziegenhagen R, Hirsch-Ernst KI, Dusemund B, Richter K, Schultrich K, Pevny S, Schäfer B, Lampen A.

Mol Nutr Food Res. 2017 Jun;61(6). doi: 10.1002/mnfr.201601020. Epub 2017 May 2.

Numerous food supplements contain phytochemical compounds as active ingredients. Although such supplements are often perceived by consumers as being risk-free, the safety of many of them is currently uncertain. The present review provides two examples for risk assessment for phytochemical ingredients that are used in certain supplements marketed for sportspeople-synephrine (extracted from fruits of *Citrus aurantium*) and hydroxycitric acid (HCA, isolated from fruits of *Garcinia cambogia*). Animal and human studies, as well as case reports, provide evidence for cardiovascular effects due to ingestion of high synephrine doses, especially in combination with caffeine and physical exertion. A dose of up to 6.7 mg synephrine/day, however, which is equivalent to the median dietary intake from conventional foods in Germany, is presumed to represent a safe intake from supplements. In subchronic animal studies, administration of high doses of certain HCA-containing preparations led to testicular toxicity (i.e., testicular atrophy and impaired spermatogenesis), yielding a no observed adverse effect level of 389 mg HCA/kg bw/day. In view of lack of adequate human data on the safety of HCA preparations, particularly with respect to the human male reproductive system, substantial uncertainties exist regarding the safety of supplements containing high amounts of HCA.

DOI: 10.1002/mnfr.201601020

PMID: 28271601 [Indexed for MEDLINE]

12. Toxicants in folk remedies: implications of elevated blood lead in an American-born infant due to imported diaper powder. Karwowski MP, Morman SA, Plumlee GS, Law T, Kellogg M, Woolf AD.

Environ Geochem Health. 2017 Oct;39(5):1133-1143. doi: 10.1007/s10653-016-9881-6. Epub 2016 Oct 4.

Though most childhood lead exposure in the USA results from ingestion of lead-based paint dust, non-paint sources are increasingly implicated. We present interdisciplinary findings from and policy implications of a case of elevated blood lead (13-18 mcg/dL, reference level <5 mcg/dL) in a 9-month-old infant, linked to a non-commercial Malaysian folk diaper powder. Analyses showed the powder contains 62 % lead by weight (primarily lead oxide) and elevated antimony [1000 parts per million (ppm)], arsenic (55 ppm), bismuth (110 ppm), and thallium (31 ppm). These metals are highly bioaccessible in simulated gastric fluids, but only slightly bioaccessible in simulated lung fluids and simulated urine, suggesting that the primary lead exposure routes were ingestion via hand-mouth transmission and ingestion of inhaled dusts cleared from the respiratory tract. Four weeks after discontinuing use of the powder, the infant's venous blood lead level was

8 mcg/dL. Unregulated, imported folk remedies can be a source of toxicant exposure. Additional research on import policy, product regulation, public health surveillance, and culturally sensitive risk communication is needed to develop efficacious risk reduction strategies in the USA. The more widespread use of contaminated folk remedies in the countries from which they originate is a substantial concern.

DOI: 10.1007/s10653-016-9881-6

PMID: 27704308 [Indexed for MEDLINE]

13. Rapid Determination of Aconitum Alkaloids from Human Urine by UHPLC-HRMS. Li S, Chen D.

J Anal Toxicol. 2017 Sep 1;41(7):611-617. doi: 10.1093/jat/bkx045.

Aconitum alkaloid poisoning is a type of poisoning caused by accidental ingestion and clinical use of herbal drugs in many countries. In this study, we developed an in-syringe dispersive micro solid-phase extraction (DMSPE) method for selective extraction of aconitine, benzoylaconine and aconine from human urine using a type of polymer material. All of the parameters influencing the extraction efficiency such as the type and amount of sorbent, the extraction time and the desorption solvent and volume in DMSPE were carefully investigated and optimized. Using DMSPE method, the absence of evaporation and centrifugation steps reduced the consuming time of sample preparation. Samples were analyzed by ultra high-performance liquid chromatography-high-resolution mass spectrometry on an HSS T3 analytical column. The results showed that the DMSPE method yielded fewer relative and absolute matrix effects, which reduced the sample to sample variability in human urine. The limits of detection and limits of quantitation of this method were determined to be 0.08-0.1 and 0.2-0.3 µg/L, respectively. The average recoveries of the analytes were between 88.6% and 107.2% with the intra- and interday precisions ranging from 2.1% to 6.4% and from 5.9% to 13.9%, respectively. The method presented here is an efficient, low-cost and selective extraction of aconitine, benzoylaconine and aconine from human urine.

DOI: 10.1093/jat/bkx045

PMID: 28873976 [Indexed for MEDLINE]

14. Post-mortem findings in 22 fatal Taxus baccata intoxications and a possible solution to its detection. Reijnen G, Bethlehem C, van Remmen JMBL, Smit HJM, van Luin M, Reijnders UJL.

J Forensic Leg Med. 2017 Nov;52:56-61. doi: 10.1016/j.jflm.2017.08.016. Epub 2017 Aug 25.

BACKGROUND: The yew (*Taxus baccata*) is a common evergreen tree containing the toxin taxine B. Between 42 and 91 g of yew leaf is lethal to a 70-kg adult. The objective of this article is to present an overview of findings in fatal yew intoxications. **METHODS:** A search using MeSH terms was performed in PubMed for yew intoxications in the period between January 1960 and August of 2016. **RESULTS:** We describe a total of 22 cases. Fatal intoxications can be divided into intoxications by leaves, by pulp, by bark and by yew tea. Recognizing yew tea intoxication is difficult since tea no longer contains any botanically recognisable parts. In autopsy and external examination no characteristic findings are reported, regarding the presence of parts of plants. **CONCLUSIONS:** Indications for yew tree intoxications at a post-mortem examination and autopsy are limited to finding parts of yew tree. The absence of recognisable parts can result in yew intoxications being overlooked. Therefore toxicological screening is recommended in unexplained deaths.

DOI: 10.1016/j.jflm.2017.08.016

PMID: 28865388 [Indexed for MEDLINE]

15. A Word of Caution When Prescribing High-Dose Vitamin D. Gorris MA, Arora H, Lieb DC, Aloji JA.

Am J Med. 2017 Apr;130(4):e129-e130. doi: 10.1016/j.amjmed.2016.10.025. Epub 2016 Nov 25.

DOI: 10.1016/j.amjmed.2016.10.025

PMID: 27894737 [Indexed for MEDLINE]

16. Adverse events associated with interactions with dietary and herbal supplements among inpatients. Levy I, Attias S, Ben-Arye E, Goldstein L, Schiff E.

Br J Clin Pharmacol. 2017 Apr;83(4):836-845. doi: 10.1111/bcp.13158. Epub 2016 Nov 25.

AIMS: Dietary and herbal supplements (DHS) are commonly used among inpatients and may cause interactions with drugs or other DHS. This study explored whether adverse events were actually associated with such interactions and examined specific characteristics among inpatient DHS users prone to such adverse events. **METHODS:** This was a cross-sectional study of 947 patients hospitalized in 12 departments of a tertiary academic medical centre in Haifa, Israel. It evaluated the rate of DHS use among inpatients, the potential for interactions, and actual adverse events during hospitalization associated with DHS use. It also assessed whether DHS consumption was documented in patients' medical files. Statistical analysis was used to delineate DHS users at risk for adverse events associated with interactions with conventional drugs or other DHS. **RESULTS:** In 17 (3.7%) of the 458 DHS users, an adverse event may have been caused by DHS-drug-DHS interactions. According to the Drug Interaction Probability Scale, 14 interactions 'probably' caused the adverse events, and 11 'possibly' caused them. Interactions occurred more frequently in older patients ($P = 0.025$, 95% CI: 2.26-19.7), patients born outside Israel ($P = 0.025$, 95% CI: 0.03-0.42), those with ophthalmologic ($P = 0.032$, 95% CI: 0.02-0.37) or gastrointestinal ($P = 0.008$, 95% CI: 0.05-0.46) comorbidities, and those using higher numbers of DHS ($P < 0.0001$, 95% CI: 0.52-2.48) or drugs ($P = 0.027$, 95% CI: 0.23-3.77). **CONCLUSIONS:** Approximately one in 55 hospitalizations in this study may have been caused by adverse events associated with DHS-drug-DHS interactions. To minimise the actual occurrence of adverse events, medical staff education regarding DHS should be improved.

DOI: 10.1111/bcp.13158

PMCID: PMC5346861 [Available on 2018-04-01]

PMID: 27759172 [Indexed for MEDLINE]

17. Medicinal Plants from North and Central America and the Caribbean Considered Toxic for Humans: The Other Side of the Coin. Alonso-Castro AJ, Domínguez F, Ruiz-Padilla AJ, Campos-Xolalpa N, Zapata-Morales JR, Carranza-Alvarez C, Maldonado-Miranda JJ.

Evid Based Complement Alternat Med. 2017;2017:9439868. doi: 10.1155/2017/9439868. Epub 2017 Nov 2.

The consumption of medicinal plants has notably increased over the past two decades. People consider herbal products as safe because of their natural origin, without taking into consideration whether these plants contain a toxic principle. This represents a serious health problem. A bibliographic search was carried out using published scientific material on native plants from Mexico, Central America, and the Caribbean, which describe the ethnobotanical and toxicological information of medicinal plants empirically considered to be toxic. A total of 216 medicinal plants belonging to 77 families have been reported as toxic. Of these plants, 76 had been studied, and 140 plants lacked studies regarding their toxicological effects. The toxicity of 16 plants species has been reported in clinical cases, particularly in children. From these plants, deaths have been reported with the consumption of *Chenopodium ambrosioides*, *Argemone mexicana*, and *Thevetia peruviana*. In most of the cases, the principle of the plant responsible for the toxicity is unknown. There is limited information about the toxicity of medicinal plants used in Mexico, Central America, and the Caribbean. More toxicological studies are necessary to contribute information about the safe use of the medicinal plants cited in this review.

DOI: 10.1155/2017/9439868

PMCID: PMC5688365

PMID: 29234446

18. Trends in botanical dietary supplement use among US adults by cancer status: The National Health and Nutrition Examination Survey, 1999 to 2014. Li C, Hansen RA, Chou C, Calderón AI, Qian J.

Cancer. 2017 Dec 6. doi: 10.1002/cncr.31183. [Epub ahead of print]

BACKGROUND: Patients with cancer may use botanical dietary supplements (BDS) in an attempt to manage the side effects of chemotherapy, yet evidence about BDS use among patients with cancer is limited. The authors examined trends in BDS use among US adults according to cancer status and patient characteristics. **METHODS:** A serial, cross-sectional study was conducted using data from the National Health and Nutrition Examination Survey from 1999 through 2014 ($n = 43,644$). Self-reported cancer diagnosis history and any BDS use in the preceding 30 days were determined. The prevalence of BDS use was calculated in each cycle for respondents with and without cancer, both overall and by patient

characteristics. Simple linear regression models were applied to test for trends in BDS use at a 2-sided P value < .05. Multiple logistic regression models were performed to identify the patient factors associated with BDS use. The results were weighted to represent national estimates. RESULTS: The prevalence of BDS use was greater among participants who had cancer compared with participants who did not have cancer, but trends remained stable during 1999 through 2014 for both groups. Trends in BDS use declined in patients with cancer who were older (Ptrend = .047), had a low annual family income (Ptrend = .028), and had a lower education level (Ptrend = .004). Among the respondents without cancer, trends in BDS use declined in those who were middle-aged (Ptrend = .025), non-Hispanic whites (Ptrend = .025), those with a lower education level (Ptrend = .011), and those who were not receiving prescription medication (Ptrend = .036). Patient age, sex, race/ethnicity, income, education, and health conditions were associated with BDS use. CONCLUSIONS: The overall use of BDS remained stable during 1999 through 2014 for US adults with and without cancer, but it varied by individual characteristics.

DOI: 10.1002/cncr.31183

PMID: 29211315

19. Use of nutritional supplements by Danish elite athletes and fitness customers. Solheim SA, Nordborg NB, Ritz C, Berget J, Kristensen AH, Mørkeberg J.

Scand J Med Sci Sports. 2017 Aug;27(8):801-808. doi: 10.1111/sms.12704. Epub 2016 Jun 5.

The nutritional supplement (NS) industry is one of the fastest growing in the world, and NS use in Denmark is among the highest in Europe. However, the exact use in elite athletes and fitness customers targeted for doping control is unknown. Information from 634 doping control forms obtained in 2014 was evaluated (elite athletes: n = 361; fitness customers: n = 273). The majority of female (92.6%) and male (85.0%) elite athletes and female (100.0%) and male (94.0%) fitness customers declared using one or more NS. The use of non-ergogenic NS was more prevalent in women than in men and in younger (15-34 years) compared with older (35-49 years) subjects, but it was less prevalent in intermittent compared with endurance and power/strength sports. Additionally, fitness customers who tested positive for doping also reported using more NS than subjects testing negative, indicating an association between NS and doping abuse. The present results demonstrate a very high prevalence of NS usage in both elite athletes and fitness customers. This highlights the importance of a strong national regulation of NS to avoid contamination of NS with doping substances.

DOI: 10.1111/sms.12704

PMID: 27264018 [Indexed for MEDLINE]

20. Influence of pharmacological education on perceptions, attitudes and use of dietary supplements by medical students. Stanojević-Ristić Z, Stević S, Rašić J, Valjarević D, Dejanović M, Valjarević A.

BMC Complement Altern Med. 2017 Dec 11;17(1):527. doi: 10.1186/s12906-017-2031-6.

BACKGROUND: The ready availability and use of dietary supplements (DS) by the public means that healthcare professionals require education in this area. In the Republic of Serbia, education related to use of DS is included in undergraduate medical training and it is therefore important to assess the effectiveness of this education. The aim of our survey was to investigate the influence of pharmacological education on the use, attitudes and perceptions of risks associated with DS among medical students. METHODS: Medical students at the University of Kosovska Mitrovica participated in the survey. Three hundred eighty questionnaires were distributed, yielding a response rate of 89% (n = 334). Data were categorized by year of study, completion of a one-year course in pharmacology and having passed the final exam. The results were compared between 192 (58%) medical students educated in pharmacology (MSEP) and 142 (42%) medical students not educated in pharmacology (MSNEP). The questionnaire was divided into 4 parts: socio-demographic and lifestyle/behavioral characteristics, use of DS, attitudes about efficacy, safety and perception of risk due to DS use. Chi-square test, Student's t-test, and Mann-Whitney U test were used for statistical analysis. RESULTS: About 53% of respondents used some form of DS. Attitudes regarding the safety of DS consumption showed a difference between the groups. MSEP were more likely to agree that DS have the potential to cause adverse reactions (Likert scale mean 4.1 vs. 3.5, p < 0.001) as well as interactions with conventional drugs (Likert scale mean 4.2 vs. 3.2, p < 0.001) than MSNEP. Finally, MSEP ranked St. John's wort and ginkgo as the most dangerous DS, but creatine and vitamin C were both ranked as relatively safe. Conversely, MSNEP considered ginkgo and vitamin C the most harmful DS, claiming that omega-3

fatty acids and vitamin D had the least hazardous side effects. **CONCLUSION:** Our results showed that pharmacological education gives young medical students a better understanding of the risks of DS-drug interactions and potential adverse effects. However, their overall attitudes and perception of risk indicate the need for further education.

DOI: 10.1186/s12906-017-2031-6

PMCID: PMC5725837

PMID: 29228948 [Indexed for MEDLINE]

21. Dietary Supplement Use, Knowledge, and Perceptions Among Student Pharmacists. Axon DR, Vanova J, Edel C, Slack M.

Am J Pharm Educ. 2017 Jun;81(5):92. doi: 10.5688/ajpe81592.

Objective. To compare dietary supplement use between student pharmacists and the general population, and assess knowledge, attitudes toward use, and dietary supplement effectiveness; and to explore how student pharmacists view their education on dietary supplements. **Methods.** Paper questionnaires administered to student pharmacists collected data about their use, knowledge, and attitudes of dietary supplements. Use was compared to the 2007 National Health Interview survey findings. **Results.** Of 179 students who responded, 52% had used at least one dietary supplement in their lifetime versus 25% in the general population. Students perceived supplement label information as unhelpful, research into supplements inadequate, and supplements non-essential to health. Students thought supplement knowledge was important but their education was inadequate. **Conclusion.** Dietary supplement use was higher in this sample of student pharmacists than the general population. Student pharmacists had limited knowledge and need more education on dietary supplements.

DOI: 10.5688/ajpe81592

PMCID: PMC5508091

PMID: 28720920 [Indexed for MEDLINE]

22. The Prevalence of Dietary Supplement Use among College Students: A Nationwide Survey in Japan. Kobayashi E, Sato Y, Umegaki K, Chiba T.

Nutrients. 2017 Nov 15;9(11). pii: E1250. doi: 10.3390/nu9111250.

To clarify the prevalence of dietary supplement use among college students, we conducted Internet-based nationwide questionnaire surveys with 157,595 Japanese college students aged between 18 to 24 years old who were registrants of Macromill Inc. (Tokyo, Japan). Among the 9066 respondents (response rate 5.8%), 16.8% were currently using dietary supplements. The prevalence of dietary supplement use did not differ significantly between males (17.1%) and females (16.7%). However, it increased according to their grade (13.1% to 20.5%), and it was higher in medical and pharmaceutical college students (22.0%) compared to others (16.7%). The main purpose of dietary supplement use was for the health benefits in both males and females. Other reasons were to build muscle in males, and as a beauty supplement and for weight loss in females. According to the purpose of dietary supplement use, the most commonly-used dietary supplements were vitamin/mineral supplements in both males and females, then protein and weight loss supplements in males and females, respectively. Although most students obtained information about dietary supplements via the Internet, they typically purchased the supplements from drug stores. Of the students surveyed, 7.5% who were currently using or used to use dietary supplements experienced adverse effects, with no significant difference between genders (8.8% in male, 7.0% in female). In conclusion, the prevalence of dietary supplement use increased with grade among college students in Japan. Some of them experienced adverse effects. Education may be important to prevent adverse effects resulting from supplement use in college.

DOI: 10.3390/nu9111250

PMCID: PMC5707722

PMID: 29140269