Valerian

Valeriana officinalis L. (syn. V. exaltata J.C. Mikan)
[Fam. Valerianaceae]

**OVERVIEW**

Valerian has a long history of use in western Europe as a sedative and sleep aid, with medicinal uses dating to Hippocrates’ time (ca. 460-377 B.C.E.). In the U.S., valerian root is widely used in sleep aids and sedatives in alcoholic tincture, aqueous infusions, and crude root powdered and dried extracts in capsules and tablets. Valerian is often combined with other herbs traditionally known to promote sleep (e.g., hops, passionflower, lemon balm, lavender, and chamomile). Three such combination products have been clinically studied and are described in the proprietary products section of this book. Valerian ranked 8th in total sales in mainstream retail outlets in the U.S. in 2000, with sales totaling approximately $17 million.

**PRIMARY USES**

- Anxiety
- Insomnia
- Sleep disorders
- Restlessness based on nervous disorders

**OTHER POTENTIAL USES**

- Increased mood related to enhanced sleep
- Fibromyalgia (in baths)

**PHARMACOLOGICAL ACTIONS**

Improvement of mild-to-moderate sleeping disorders without adverse effects on REM sleep, and without significant hangover effects.

**DOSAGE AND ADMINISTRATION**

No time limit has been set for the use of valerian by many authoritative sources. However, long term clinical trials (>30 days) have not been conducted.

**Internal**

**INFUSIONS:** 2–3 g of fresh or dried root per cup, once to several times daily.

**TINCTURE:** 1/2–1 tsp. (1–3 ml), once to several times daily.

**EXTRACTS:** Amount equivalent to 2–3 g of crude herb, once to several times daily

**External**

**BATH:** 100 g for 1 full bath; equivalent preparations.

**CONTRAINDICATIONS**

The World Health Organization (WHO) contraindicates the use of valerian for children under 12 years without medical supervision. However, German authorities note clinical use of valerian in pediatrics is permissible at age 3 and up, as long as valepotriate and baldrinal-free preparations are used.

**PREGNANCY AND LACTATION:** WHO contraindicates the use of valerian during pregnancy because safety during pregnancy has not been established clinically. WHO also contraindicates valerian during lactation due to the lack of research in this area.

**ADVERSE EFFECTS**

Unlike benzodiazepines, valerian appears to cause no residual morning sleepiness; however, it may slightly impair judgment and driving ability for 2–3 hours after intake. Chronic use of high doses of valerian (530 mg to 2 gm per dose, 5 times per day) over many years raises the possibility of withdrawal symptoms if the herb is abruptly discontinued. Rare adverse effects of valerian have included headache and stomach upset.

**DRUG INTERACTIONS**

Although many authors have speculated on potential interactions between valerian, alcohol, barbiturates, and benzodiazepines in humans, such interactions have not been documented. Experimental animal data shows valerian potentiation of benzodiazepines.

**CLINICAL REVIEW**

In 29 clinical studies on valerian (5,201 participants), all studies demonstrated positive effects for indications including anxiety, sleep disorders, and mood. The majority of clinical trials have consistently demonstrated that valerian is significantly more effective than placebo in improving sleep in persons with sleep
disturbances. Modern human studies have investigated its use in combination with hops, as an alternative to benzodiazepine to treat nonchronic and nonpsychiatric sleep disorders; its use in combination with hops as a sedative to treat disturbed sleep; its effects in combination with hops (Humulus lupulus) on driving safety; its use in combination with St. John’s wort (Hypericum perforatum) as an alternative to diazepam to treat symptoms of anxiety; and its use in combination with camphor, night-blooming cereus (Selenicereus grandiflorus), and hawthorn (Crataegus spp.) to treat functional cardiovascular disorders, hypotension, or meteorosensitivity. Two double-blind, placebo-controlled (DB, PC) studies concluded that valerian in combination with lemon balm (Melissa officinalis) improved sleep quality for insomniacs, and a third concluded it did not impair driving or operating heavy machinery. One randomized (R), DB, PC cross-over study found a valerian, hops, and lemon balm combination effective for individuals experiencing sleep difficulties. One R, DB, controlled study concluded that valerian did not adversely influence alertness, reaction time, or concentration. The approved modern therapeutic applications for valerian appear to be supported by its history of use in well established systems of traditional and conventional medicine, many supporting in vitro and in vivo pharmacological experiments in animals, extensive phytochemical investigations, and human clinical studies—all of which tend to show CNS depressant activities.

Clinical Overview
Valerian

Valeriana officinalis L. (syn. V. exaltata J.C. Mikan)  
[Fam. Valerianaceae]

OVERVIEW
Valerian has a long history of use in western Europe as a sedative and sleep aid, with medicinal uses dating back to Hippocrates’ time (ca. 460-377 B.C.E.). In the U.S., valerian root is widely used in sleep aids and sedatives in various forms including teas, tablets, and capsules. Often, valerian is combined with other herbs traditionally known to promote sleep including hops, passionflower, lemon balm, chamomile, and lavender.

USES
Anxiety; insomnia; sleep disorders; restlessness linked to nervous disorders; enhanced mood based on improved sleep.

DOSAGE
No duration limit has been set for the use of valerian.

INFUSION (tea): 2–3 g of fresh or dried root per cup, once to several times daily.

TINCTURE: 1/2–1 tsp. (1–3 ml), once to several times daily.

EXTRACTS: Amount equivalent to 2–3 g of crude herb, once to several times daily.

TEA OR DRY EXTRACT (sleep aid): Single dose 1/2 to 1 hour before bedtime, with earlier dose in evening if necessary. Adults: Proportion dose according to body weight, as tea infusion or dry extract; Children 3–12 years old: With professional supervision only.

CONTRAINDICATIONS
Consult with a healthcare provider before using in children under 12 years. German pediatric authorities claim that valerian may be used in children age 3 and up, provided the preparations are free of the active compounds valepotriates and baldrinal.

PREGNANCY AND LACTATION: Valerian should not be taken during pregnancy because its safety during pregnancy has not been established clinically. Valerian is contraindicated during breast-feeding because of the lack of research in this area. However, experimental animal data suggest safety of valerian extracts; no adverse effects on fertility or fetotoxicity have been observed.

Adverse Effects
Valerian is considered generally safe. Unlike benzodiazepines, valerian appears to cause little or no residual morning sleepiness. However, it may slightly impair judgment and driving ability for 2–3 hours after intake. Adverse effects may include headache and stomach upset, but these effects are rare.

Drug Interactions
Valerian may potentially interact with alcohol, barbiturates, and benzodiazepines, but these interactions have not been clinically proven in humans.

Comments
When using a dietary supplement, purchase it from a reliable source. For best results, use the same brand of product throughout the period of use. As with all medications and dietary supplements, please inform your healthcare provider of all herbs and medications you are taking. Interactions may occur between medications and herbs or even among different herbs when taken at the same time. Treat your herbal supplement with care by taking it as directed, storing it as advised on the label, and keeping it out of the reach of children and pets. Consult your healthcare provider with any questions.
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[Fam. Valerianaceae]  

OVERVIEW

Valerian has a long history of use in Western Europe as a sedative and sleep aid, with medicinal use dating to Hippocrates (ca. 460–377 B.C.E.) (Blumenthal et al., 2000). Valerian is used in countless preparations worldwide. In the U.S., for example, valerian root is known extensively as a dietary supplement in the form of alcoholic tinctures, aqueous infusions (teas), and as a crude-root, powdered and dried extract in capsules and tablets. Often, valerian is combined with other herbs traditionally known to promote sedation or sleep, e.g., hops (Humulus lupulus), passion flower (Passiflora incarnata), and lemon balm (Melissa officinalis) (Blumenthal et al., 1998). Three such combination products have been clinically studied and are described in the section of this book dealing with proprietary products. Valerian ranked eighth in total sales in mainstream retail outlets in the U.S. in 2000, with sales totaling approximately $17 million (Blumenthal, 2001).

Valerian root and two of its preparations, valerian root powder and valerian extract, are official in the United States Pharmacopeia (USP) 25th edition, and National Formulary (NF) 20th edition. Crude valerian root, fluid extract, alcoholic tincture, and ammoniated tincture were formerly official in the USP from 1820 through 1930 (Boyle, 1991; Lloyd, 1929) and the NF (Grieve, 1979; Leung and Foster, 1996). Valerian root is official in the national pharmacopoeias of Austria, France, Great Britain, Hungary, Russia, and Switzerland, among others (Blumenthal et al., 2000). In Germany, valerian is official in the German Pharmacopoeia, and approved in the Commission E monographs for its sedative and sleep-promoting activity (Blumenthal, et al., 1998).

DESCRIPTION

Valerian root extract consists of the fresh or carefully dried (below 40°C) subterranean parts of Valeriana officinalis L. (syn. V. exaltata J.C. Mikan) [Fam. Valerianaceae] (Blumenthal et al., 1998), including the rhizome, roots, and stolons. The whole dried root contains no less than 0.5% (v/m) volatile oil, and the cut dried root contains no less than 0.3% (v/m) volatile oil. The dried root contains no less than 0.17% of sesquiterpenic acids expressed as valerenic acid, calculated with reference to the dried drug (Ph. Eur. 2001). The NF requires dried valerian root to contain no less than 0.5% volatile oil, and not less than 0.05% valerenic acid (USP-NF, 1999). Valerian root dry extract consists of the native extractive yielded from comminuted valerian root, extracted in 70% alcohol, manufactured according to the German Pharmacopoeia monograph. The drug-to-extract ratio ranges from 3:1 to 6:1 (w/v) (DAB, 1999). The NF requires that the dry extract contain no less than 0.3% of valerenic acid, with a drug-to-extract ratio between 4:1 and 7:1 (USP, 2002).

PRIMARY USES

Neurology

- Anxiety: The World Health Organization (WHO) lists uses supported by clinical data, including as a mild sedative and sleep-promoting agent; a milder alternative or possible substitute for stronger synthetic sedatives (e.g., benzodiazepines); and for treatment of nervous excitation and sleep disturbances induced by anxiety (WHO, 1999). This indication is supported by numerous clinical trials (Bourin et al., 1997; Sousa et al., 1992; Kohnen and Oswald, 1988; Panijel, 1985; Boeters, 1969).

- Insomnia: The German Commission E approved the use of valerian for sleep disorders, insomnia, and restlessness based on nervous disorders (Blumenthal et al., 1998). The European Scientific Cooperative on Phytotherapy (ESCCOP) notes that valerian is used for “tenseness, restlessness, and irritability, with difficulty in falling asleep” (ESCCOP, 1997). These approved indications are supported by numerous clinical trials of varying size, design, and duration for various types of valerian preparations (i.e., valerian only, valerian with other sedative herbs, and valepotriate-only preparations) (Dominguez et al., 2000; Dorr, 2000; Donath et al., 2000; Cerny and Schmid, 1999; Rodenbeck et al., 1998; Schmitz and Jackel, 1998; Dressing et al., 1996; Orth-Wagner, 1995; Schultz et al., 1994; Dressing and Reimann, 1992; Lindahl and Lindwall, 1989; Balderer and Borberly, 1985; Leatherwood and Chauffard, 1985; Gessner and Klasser, 1984; Leatherwood et al., 1982).

OTHER POTENTIAL USES

- Increased mood related to enhanced sleep (Vorbach et al., 1996; Kamm-Kohl et al., 1984)
- Fibromyalgia (as bath) (Ammer and Melnizky, 1999)
DOSAGE

Internal
INFUSIONS: 2–3 g of fresh or dried root per cup, one to several times daily (Blumenthal et al., 1998).
TINCTURE: 1/2–1 teaspoon (1–3 ml), one to several times daily (Blumenthal et al., 1998).
EXTRACTS: Amount equivalent to 2–3 g of crude herb, one to several times daily (Blumenthal et al., 1998).
TEA OR DRY EXTRACT (sleep aid): Single dose 1/2 to 1 hour before bedtime, with an earlier dose in the evening, if necessary (ESCOP, 1997). For adults, the dose should be in proportion to body weight; use as a tea infusion or dry extract. Children from 3–12 years old should use valerian only under medical supervision (ESCOP, 1997).

External
BATH: 100 g for one full bath; equivalent preparations (Blumenthal et al., 1998).
INFUSION: 2–3 g, in 150 ml water (Blumenthal et al., 1998).

DURATION OF ADMINISTRATION
Many authoritative sources have set no time limit for the use of valerian (Blumenthal et al., 1998; ESCOP, 1997; WHO, 1999; Upton, 1999). Although long-term valerian use in European clinical practice indicates relative safety, clinical trials of longer than 30 days have not been conducted.

CHEMISTRY
Valerian contains over 150 chemical constituents, many of which are physiologically active. The primary active constituents can be divided into four categories: the essential oils and their sesquiterpenes (e.g., valerenic acid), the iridoids (iridoid esters: valepotriates, valtrate, acevaltrate, dihydrovaltrate, and isovaleroxyhydroxydihydrovaltrate [IVHD] and their degradation products [baldrinal and derivatives]), amino acids (arginine, GABA, glutamine, tyrosine), and alkaloids (Upton, 1999; Bruneton, 1999; Leung and Foster, 1996). The iridoids are chemically unstable and degrade in moisture, heat (above 40°C), or acidity (pH<3) to baldrinal and isopropylbaldrinal (Bruneton, 1999) and, therefore, are not found in most commercial preparations (Blumenthal et al., 1998). Other constituents include caffeic acid, chlorogenic acid, β-sitosterol, methyl-2-pyrrolketone, choline, tannins, gum, alkaloids, and resin (Bradley, 1992; ESCOP, 1997; Newall et al., 1996).

PHARMACOLOGICAL ACTIONS
Human
Coronary artery dilating and anti-arrhythmic effects. Valepotriates prevented the appearance of acute coronary insufficiency, abolished vasopressin-induced arrhythmia, provoked a short-lived increase in coronary blood flow, and had moderate positive inotropic and negative chronotropic effects (Petkov, 1979). In mice, valeranone, found in small quantities in valerian and in larger amounts in its relative, Nardostachys jatamansii, exerted weak hypotensive effects (Morazzoni and Bombardelli, 1995). In cats, intravenous injection of valerian extracts produced a significant increase in coronary blood flow, a transient fall in blood pressure, and a decrease in heart rate (Zhang et al., 1982). Spasmolytic. In guinea pig ileum, valerenic acid, valtrate, and valeranone exert a spasmolytic action through direct effects on smooth muscle (Hazelhoff et al., 1982; Wagner and Jurcic, 1979).
Sedative-hypnotic. In mice, intraperitoneal injections of valerenic acid, valerinal, and whole herb extracts produced significant sedation, ataxia, and anti-convulsant effects (Hendriks et al., 1981; Veith et al., 1986). Intraperitoneal injections of 100 mg/kg had sedative effects as strong as barbiturates, doses of 400 mg/kg led to death (Hendriks et al., 1985). In comparison with diazepam and chlorpromazine, valerian extract had weak anticonvulsive properties (Leuschn er et al., 1993). Valerian root extract (Valdispert®) reduced motility and increased thiopental-induced and pentobarbital-induced sleeping time (Capasso et al., 1996; Hiller, 1996; Leuschn er et al., 1993). The aroma of valerian root exerted sedative effects in mice (Buchbauer et al., 1992).
In rats, valerian had sedative effects on electroencephalogram (EEG) activity (Fink and Hoelzl, 1984). Valerian extract, but not its individual chemical constituents, significantly decreased glucose metabolism in the brain (Grusula et al., 1986). Valepotriates suppressed symptoms associated with diazepam withdrawal in rats (Andreatini and Leite, 1994). This has led some authors and clinicians to propose that valerian may be useful in treating benzodiazepine withdrawal syndrome in humans (Brinker, 2001; Rasmussen, 1997). Cats given 10 mg/kg of a valerian extract by gastric lavage had a significant decrease in restless, fearful, and aggressive behaviors (vonEickstedt, 1969). Unlike diazepam, valerian did not affect spontaneous ambulation, rearing, or approach-avoidance conflict in mice in a water-lick conflict test. However, valerian and imipramine significantly inhibited immobility induced by a forced swimming test in rats, and significantly reversed reserpine-induced hypoactivity in mice, leading researchers to conclude that valerian may be a useful antidepressant (Sakamoto et al., 1992).

In vitro
Valerian extracts containing amino acids and valerenic acid bind weakly with the GABA (A) receptor in rat brain assays (Ferreira et al., 1996; Holzl and Godau, 1989; Mennini et al., 1993). In rat brain cortex, aqueous extract of valerian inhibited the uptake and stimulated the release of GABA, leading to increased concentrations of GABA in synaptic clefts (Santos et al., 1994a; 1994b; 1994c); these effects may be due in part to the presence of GABA in valerian root extracts (Cavadas et al., 1995), or may be due to valerenic acid’s ability to inhibit GABA breakdown (Riedel et al., 1982; Wichtl and Bisset, 1994; Hendriks et al., 1981).
MECHANISM OF ACTION
Although the sedative effects of valerian have been demonstrated in human clinical studies, scientists have struggled to agree upon the single chemical compound responsible for valerian’s activity. Valerian’s effects on the central nervous system (CNS) have been attributed variously to valepotriates, their breakdown products (baldrinals), valerenic acid, valeranone, and other constituents in the essential oil (Wichtl and Bisset, 1994; Bradley, 1992; Houghton, 1988; Hendriks, *et al*., 1981, 1985; Hendriks, 1977; Holzl, 1998; Wagner, 1980). Multiple compounds may work together synergistically to produce a sedative effect (Upton *et al*., 1999; Houghton 1999; Weiss and Fintelmann, 2000). Animal studies show that valerenic acid may inhibit enzymes that break down GABA, thus increasing GABA levels and producing a CNS-depressing effect (Newall *et al*., 1996). An in vitro study to elucidate the sedative activity of valerian demonstrated that valerian extract LI 156 acted upon the melatonin receptor in a dose-dependent manner. This effect was not associated with valerenic acid (Fauteck *et al*., 1996).

CONTRAINdications
As a general precaution, the WHO contraindicates the use of valerian during pregnancy and lactation, and for children younger than 12 years without medical supervision (WHO, 1999). ESCOP also mentions these same precautions, but contraindicates valerian in children less than three years old. However, German authorities note that the clinical use of valerian in pediatrics is permissible beginning at age three, as long as valepotriate- and baldrinal-free preparations are used (Schilcher, 1997).

PREGNANCY AND LACTATION: ESCOP and the WHO contraindicate valerian during pregnancy due to fact that its safety during pregnancy has not been established clinically (ESCop, 1997; WHO, 1999). However, in pregnant rats given valepotriates for 30 days, there was no impact on fertility, no fetotoxicity, and no other adverse effect on mother or offspring (Tufik *et al*., 1994). Research on potential mutagenicity and carcinogenicity of valerian preparations has shown that official valerian preparations are extremely low in valepotriates and that these compounds are mostly destroyed in the extraction process (Bos *et al*., 1998; WHO, 1999).

ADVERSE EFFECTS
Unlike benzodiazepines, valerian appears to cause no residual morning sleepiness; however, it may slightly impair judgment and driving ability for two to three hours after intake (Gerhard *et al*., 1996). Chronic use of high doses of valerian (530 mg to 2 gm per dose, five times per day) for many years raised the possibility that withdrawal symptoms may occur if the herb is discontinued abruptly as documented in a case report of a 58 year-old man who had been taking valerian with numerous conventional drugs (Garges *et al*., 1998). An authoritative German pharmaceutical text (Hobbs, 1979), suggests that continued use may cause minor side effects e.g., headaches, excitability, and insomnia, but subsequent review by the German Commission E did not find sufficient basis to include these side effects in its official monograph on valerian originally published in 1985 and revised in 1990. Cytotoxic effects have been reported in vitro, but the compounds responsible for these effects (valepotriates) decompose rapidly during storage and following oral administration (Bos *et al*., 1998; Bounthanh *et al*., 1981). In a study of 23 patients taking a nonprescription valerian extract preparation (doses from 0.5 to 12.0 grams), no acute or subclinical evidence of liver damage was observed (Chan, 1998; Chan *et al*., 1995). The adverse effects of valerian include rare cases of headache and upset stomach (Leathwood and Chauftard, 1982; Leathwood *et al*., 1982; Schulz *et al*., 2001). However, an intentional overdose as high as 20 grams, 20 times the normal daily dose of powdered root in capsules (40–50 capsules at 470 mg per capsule), was not associated with significant morbidity. The patient was released from the hospital within 24 hours of admission (Willey *et al*., 1995). In one report of intentional abuse, a young adult drug user attempted to induce a psychoactive effect by injecting an alcoholic solution of valerian; he became ill, but recovered over the next three days ( Mullins and Horowitz, 1998).

DRUG INTERACTIONS
Animal studies suggest that valerian may potentiate the sedative effects of barbiturates (Brinker, 2001; Hendriks *et al*., 1981; Hiller, 1996; Leuschner *et al*., 1993; Sakamoto *et al*., 1992). Although some authors have speculated on potential interactions between valerian, alcohol, barbiturates, and benzodiazepines in humans, no such interactions have been documented (Braackow *et al*., 1972; Brinker, 2001; Miller, 1998). One study found no potentiating effects of valerian on alcohol’s impact on concentration, attentiveness, reaction time, or driving performance (Albrecht, 1995).

AMERICAN HERBAL PRODUCTS ASSOCIATION (AHPA) SAFETY RATING
CLASS 1: Herbs that can be safely consumed when used appropriately (McGuinn *et al*., 1997).

REGULATORY STATUS
BELGIUM: Oral use as Traditional Herbal Medicine (THM), accepted for specific indications (Bradley, 1992).
CANADA: Dried root in tablet, capsule, powder, extract, tincture, or tea bags labeled as THM indicated as sleep aid or sedative; requires premarket authorization and assignment of a Drug Identification Number (DIN) and conformance with the Valerian Labeling Standard (Health Canada, 1996).
EUROPEAN UNION: “Whole,” dried, underground parts containing no less than (NLT) 0.5% volatile oil, and “cut,” dried, underground parts (NLT 0.3% volatile oil; NLT 0.17% sesquiterpenic acids), official in European Pharmacopoeia (Ph. Eur., 2001).
FRANCE: Oral use as THM accepted for specified indications (Bradley, 1992). Dried root (NLT 0.5% volatile oil), official in French Pharmacopoeia (Upton, 1999).
GERMANY: Dried root, for preparation of tea infusion, tincture, or extract is an approved nonprescription drug of the German Commission E Monographs (Blumenthal *et al*., 1998). Tea infusion and hydro-alcoholic tincture forms are approved nonprescription drugs of the German Standard License monographs (Braun *et al*., 1986 and 1996). Extract or volatile oil for balneotherapy (bath therapy) is approved in the German Commission B8 Monographs (Wichtl and Bisset, 1994). Dry native extract, 3–6:1 (w/v), is official in German Pharmacopoeia (DAB, 1999). The mother tincture (and liquid dilutions) of dried root are official preparations of the German Homeopathic Pharmacopoeia (GHR, 1993).
ITALY: Dried root (NLT 0.5% volatile oil) official in *Italian Pharmacopoeia* (Ph. Ital. 1991).


SWEDEN: Classified as Natural Remedy for self-medication requiring advance application for marketing authorization. A valerian monograph is published in the Medical Products Agency (MPA) “Authorised Natural Remedies,” which lists four registered monopreparations, and 10 multiple-herb (with passionflower, lemon balm, or hops) preparations (MPA, 1997 and 2001; Tunón, 1999). Two valerian products (Baldrian-Dispert and Neurol) are regulated as *Pharmacetical Specialties, or conventional over-the-counter (OTC) drugs* (Tunón, 1999).

SWITZERLAND: Herbal medicine with positive classification (List D) by the *Interkantonale Konstrollstelle für Heilmittel* (IKS) and corresponding sales category D with sale limited to pharmacies and drugstores, without prescription (Morant and Ruppanner, 2001; Ruppanner and Schaefer, 2000). There are 62 valerian phytomedicines and 11 homeopathic preparations listed in the *Swiss Codex 2000/01* (Ruppanner and Schaefer, 2000). Dried root official in *Swiss Pharmacopoeia* 1997 (Meyer-Buchtel, 1999; Upton, 1999).

U.K.: General Sale List (GSL), Schedule 1, Table A (Bradley, 1992). Dried root (NLT 0.5% volatile oil) and powdered dried root (NLT 0.3% volatile oil) official in *British Pharmacopoeia* (Health Canada, 1996; Upton, 1999).

U.S.: Generally Recognized as Safe (GRAS) (US FDA, 1998). Dietary supplement (USC, 1994). Application for OTC approval for use as a nighttime sleep aid is pending (Pinco and Israelsen, 1994). Valerian root (NLT 0.5% volatile oil; NLT 0.05% valerenic acid) and powdered valerian (NLT 0.3% volatile oil; NLT 0.04% valerenic acid) are official in *U.S. National Formulary* (USP, 2002). Powdered valerian extract, 4-7:1 (w/w) (NLT 0.3% valerenic acid) added to NF 19 1st Supplement (USP, 2000). The mother tincture 1:10 (w/v), 55% alcohol (v/v), of fresh or dried root, is an OTC Class C drug official in *Homeopathic Pharmacopoeia of the United States* (HPUS, 1993).

**CLINICAL REVIEW**

Twenty-nine studies are outlined in the following table, “Clinical Studies on Valerian,” including more than 5,200 participants. All studies found positive effects for indications including anxiety, sleep disorders, and mood. Five studies (480 participants) report on the effectiveness of valerian for anxiety (Bourin et al., 1997; Sousa et al., 1992; Kohnen and Oswald, 1988; Panijel, 1984; Boetters, 1969). The majority of clinical trials have consistently demonstrated that valerian is significantly more effective than a placebo in improving sleep in persons with sleep disturbances (Baldrer and Borbely, 1985; Chauffard et al., 1982; Dressing et al., 1996; Donath et al., 2000; Dorn, 2000; Dressing and Riemann, 1992; Gesnner and Klasser, 1984; Jansen, 1977; Kamn-Kohl et al., 1984; Leathwood and Chauffard, 1982, 1985; Leathwood et al., 1982; Lindahl and Lindwall, 1989; Orth-Westgärtner et al., 1995; Rodenbeck et al., 1998; Schellenberg et al., 1994; Schmidt-Voigt, 1986; Schmitz and Jackel, 1998; Schulz et al., 1994; Vorbach et al., 1996). Modern human studies have investigated the use of valerian in combination with hops, as an alternative to benzodiazepine to treat nonchronic and nonpsychiatric sleep disorders (Schmitz and Jackel, 1998); its use in combination with hops as a sedative to treat disturbed sleep (Fussel et al., 2000; Vonderheid-Guth et al., 2000; Lataster et al., 1996; Vorbach et al., 1996; Kammerer, 1993); its effects in combination with hops on driving safety (Gerhard et al., 1996; Kammerer et al., 1996); its use in combination with St. John’s wort (*Hypericum perforatum*) as an alternative to diazepam to treat symptoms of anxiety (Panijel, 1985); and its use in combination with camphor, night-blooming cereus (*Selenicereus grandiflorus*), and hawthorn (*Crataegus spp.* ) to treat functional cardiovascular disorders, hypotension, or meteorosensitivity (Busanny-Caspari, 1986). Three double-blind, placebo-controlled (DB, PC) studies concluded that valerian in combination with lemon balm (*Melissa officinalis*) improved sleep quality for insomniacs (Dressing et al., 1996; Dressing and Reimann, 1992), and did not impair driving or operating heavy machinery (Albrecht et al., 1995). A randomized (R), DB, PC, crossover study found a combination of valerian, hops, and lemon balm helpful for individuals experiencing sleep difficulties (Lindahl and Lindwall, 1989). A recent R, DB, controlled study concluded that valerian did not adversely influence alertness, reaction time, or concentration (Kuhlmann et al., 1999).

The approved modern therapeutic applications for valerian appear to be supported by its history of use in well-established systems of traditional and conventional medicine, in *vivo* and in *vivo* pharmacological experiments on animals, extensive phytochemical investigations, and human clinical studies, all of which tend to show valerian’s central nervous system-depressant activities (Blumenthal et al., 2000).

**BRANDED PRODUCTS**

*Alluna™*: GlaxoSmithKline / One Franklin Plaza / Philadelphia, PA 19102 / U.S.A. / Tel: 888-825-5249 / www.gsk.com. Each tablet contains 500 mg valerian extract (4-6:1) with 120 mg hops extract (5-7:1).

*Euphyrose*: Roche Nicholas SA / 33 rue de l’Industrie / 74240 Gaillard / France / Tel: +33-04-50-87-7070. Six herbs, including *Ballota elatior*, *Crataegus monogyna*, *Euphorbia hirta*, *Hypericum perforatum*, *Passiflora incarnata*, and *Matricaria chamomilla*, are used in combination with hops (*Humulus lupulus*). Each tablet contains 330 mg extract (5-7:1).


*Harmonicum Much*: Prof. Dr. Much AG. Information on manufacturer and current product status unavailable.

*Hova*: Gebro Pharma GmbH / A-6391 Fieberbrunn / Austria / Tel: +43-53-54-5300-0 / Fax: +43-53-54-5300-0 / www.gbro.com / E-mail: pharma@gebro.com. Each tablet contains 60 mg valerian and 30 mg hop flower extract.

*Ivel®*: Kanoldt Arzneimittel GmbH / c/o Knoll AG / Knollstrasse 15 / 67080 Ludwigshafen / Germany / Tel: +49-06-21-5890 / Fax: +49-06-21-5892-896 / www.knoll.de / Email: info@knoll.de. Each tablet contains 500 mg valerian extract (4-6:1) with 120 mg hops extract (5-7:1).


capsule contains 530 mg valerian root with a guaranteed natural potency of 0.1% valerenic acids.

Novo-Baldripuran®: Novo-Nordisk A/S / Novo Allé / 2880 Bagsværd / Denmark / Tel: +44-4444-8888 / Fax: +44-4449-0555 / E-mail: webmaster@novonordisk.com. This product is no longer available.


Sedariston® Konzentrat: Steiner Arzneimittel / Postfach 450520 / 12175 Berlin / Germany / Tel: +49-03-07-10940 / Fax: +49-03-07-1250-12 / www.steinerarznei-berlin.de. Tablets each contain 50 mg of valerian and 100 mg of St. John’s wort.

Sedonium®: Lichtwer Pharma AG. Contains valerian extract LI 156.

Songha Night®: Pharmaton Natural Health Products / P.O. Box 358 / Ridgefield, CT 06877 / U.S.A. / Tel: 203-798-5771 / www.pharmaton.com / Email: askpharmaton@rdg.boehringer-ingelheim.com. Each coated tablet contains 120 mg valerian extract and 80 mg lemon balm extract.


Valdispert® forte: Solvay Arzneimittel GmbH. Each tablet contains 45 mg Valeriana officinalis radix dry aqueous alkaline extract (5–6:1), corresponding to 225–270 mg of dried root, standardized to contain 0.05 mg valeranic acid and acetoxylvaleranic acid.

Valerina Natt®: Pharbio Medical International AB / c/o Cederroth International AB / Box 715 / S-19427 Upplands Väsby / Sweden / Tel: +46-85-90-9630-0 / Fax: +46-85-90-9647-1 / Email: info@cederroth.com / www.pharbio.cederroth.com. Contains 100 mg valerian extract (4:1), corresponding to 400 mg dried root; 45 mg hops (Humulus lupulus) extract (8:5:1), corresponding to 382 mg dried strobile; 25 mg lemon balm (Melissa officinalis) leaf extract (6:5:1), corresponding to 162 mg dried leaf; and 275 mg of excipient materials.

Valmane®: Lyssia GmbH / c/o Solvay Arzneimittel GmbH. Each tablet contains 50 mg of a valepotriate mixture. Unable to verify current availability of product.

Valverde®: Ciba-Geigy AG / Novartis Consumer Health AG / Route de l’Etraz / CH 1260 Nyon 1 / Switzerland / www.consumer-health.novartis.com. This product is no longer available.


* American equivalents, if any, are found in the Product Table beginning on page 398.

**REFERENCES**


DAB: See: Deutsches Ärztebuch.


Kamermerer Ph. Phytotherapeutic hypotheses—does a combination of valerian and hops have a value in the modern drug repertoire? [in German]. Z Allg Med 1993:87:401-6.


Petrov V. Plants and hypnotics, antiinflammatory and coronaryolytic action. The ABC Clinical Guide to Herbs. 359
### Anxiety

<table>
<thead>
<tr>
<th>Author/Years</th>
<th>Subject</th>
<th>Design</th>
<th>Duration</th>
<th>Dosage</th>
<th>Preparation</th>
<th>Results/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sousa, 1992</td>
<td>Anxiety</td>
<td>R, DB, C n=80 adult patients with various anxiety syndromes</td>
<td>270 mg/day or 30 mg clobazam/day</td>
<td>Valdispert® or clobazam 30 mg/day</td>
<td>The valerian preparation was as effective and well-tolerated as clobazam, according to the Hamilton Anxiety Rating Scale and the Leeds anxiety questionnaire.</td>
<td></td>
</tr>
<tr>
<td>Kohnen and Oswald, 1988</td>
<td>Anxiety</td>
<td>DB n=48 adults placed in an experimental situation of social stress</td>
<td>100 mg valerian or 20 mg propranolol or a combination of the 2</td>
<td>Valerian extract (brand not stated)</td>
<td>The valerian preparation reduced subjective sensations of anxiety, but the study did not demonstrate any difference between groups.</td>
<td></td>
</tr>
<tr>
<td>Boeters, 1969</td>
<td>Anxiety</td>
<td>O n=70 hospitalized patients with dysregulation of the autonomic nervous system due to various etiologies</td>
<td>150–300 mg/day valepotriate mixture</td>
<td>Valmane®</td>
<td>Functional cardiac disorders, tachycardia, hypertension, sweating, restless legs, and other dysregulations were influenced positively by Valmane®. The preparation produced mildly sedative effects and was effective in treatment of restlessness and tension. Apart from mild daytime fatigue, no evidence of somatic adverse effects or psychotropic effects was observed.</td>
<td></td>
</tr>
</tbody>
</table>

### Combination Preparations

<table>
<thead>
<tr>
<th>Author/Years</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Bourin et al., 1997</td>
<td>Anxiety</td>
<td>R, PC n=182 patients diagnosed with adjustment disorder and anxious mood</td>
<td>2 tablets 3x/day</td>
<td>Euphytose® (six herbs including Crataegus, Ballota, Passiflora, Valeriana, Cola, and Paullinia)</td>
<td>Significant improvement in Hamilton anxiety scores comparing combination product to placebo (p=0.012).</td>
<td></td>
</tr>
<tr>
<td>Panijel, 1985</td>
<td>Anxiety</td>
<td>DB, C n=100 adults suffering from anxiety disorders</td>
<td>1 tablet/day (50 mg of valerian and 100 mg of St. John’s wort/day) or 2 mg diazepam 2x/day</td>
<td>Sedariston® Konzentrat (providing 50 mg of valerian and 100 mg of St. John’s wort)</td>
<td>The herbal combination was reportedly effective in 78% vs. only 54% of the diazepam group (p&lt;0.01). Side effects were reported by only 4% of those taking the herbs vs. 14% of those taking diazepam.</td>
<td></td>
</tr>
</tbody>
</table>
### Clinical Studies on Valerian (*Valeriana officinalis* L.) (cont.)

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Subject</th>
<th>Design</th>
<th>Duration</th>
<th>Dosage</th>
<th>Preparation</th>
<th>Results/Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominguez et al., 2000</td>
<td>Sleep</td>
<td>O, case study n=20 sleep questionnaires</td>
<td>2 weeks</td>
<td>1–3.470 mg capsules before bed</td>
<td>Nature’s Way® valerian root capsules</td>
<td>Global improvement at Week 2 was significantly better than at Week 1 (Wilcoxon rank test, p=0.005), perhaps reflecting a time-dependent or dose-response relationship. This case study suggests that valerian can be an agent for improving insomnia in a symptomatic population.</td>
</tr>
<tr>
<td>Donath et al., 2000</td>
<td>Sleep</td>
<td>R, PC, DB, CO n=16 men and women with previously established psychophysiological insomnia (ICSD-code I.A.1.) (mean age 49)</td>
<td>Single dose and 14 days vs. placebo with 13 day washout between</td>
<td>Two, 300 mg capsules dry extract of valerian 1 hour before bedtime vs. placebo</td>
<td>Sedonium® and placebo</td>
<td>No effects on sleep structure and subject sleep assessment were observed after a single dose of valerian. Sleep efficiency increased significantly after multi-dose treatment for both valerian and placebo, compared to baseline polysomnography. However, slow-wave sleep (SWS) latency was reduced after multi-dose treatment with valerian compared with placebo (13.5 vs. 21.3 min., p&lt;0.05). Compared to baseline, SWS percentage of time in bed was increased with valerian (8.1% vs. 9.8%, p&lt;0.05). An extremely low number of adverse events were observed during the valerian treatment period compared with the placebo period (3 vs. 18). Because valerian showed positive effects on sleep structure and sleep perception of insomnia patients, the authors suggest valerian can be recommended for treatment of patients with mild psychophysiological insomnia.</td>
</tr>
<tr>
<td>Dorn, 2000</td>
<td>Insomnia</td>
<td>R, DB, Cm n=70</td>
<td>4 weeks</td>
<td>Two, 300 mg tablets 30 minutes before bedtime or 5 mg oxazepam tablet</td>
<td>Sedonium® (LI 156)</td>
<td>In both groups, sleep quality improved significantly (p&lt;0.001), but no statistically significant difference could be found between groups (p=0.70). Effect varied between groups and was between 0.02 and 0.25, with a more favorable adverse effect profile of valerian compared to oxazepam. Primary outcome was measured by the factor “sleep quality”. Secondary outcomes were other sleep characteristics including well-being and anxiety (HAMA).</td>
</tr>
<tr>
<td>Vorbach, 1996</td>
<td>Sleep quality</td>
<td>C n=121 patients with non-organic sleep disturbances for at least 4 weeks</td>
<td>4 weeks</td>
<td>Two, 300 mg tablets/day</td>
<td>Valdispert® forte</td>
<td>Four standard rating scales were employed. Significant improvement in sleep quality, feeling of refreshment after sleep, and well-being during the day; no significant side effects reported. Results were observed after 2–4 weeks of use, with no acute effects during first days of study.</td>
</tr>
<tr>
<td>Schulz et al., 1994</td>
<td>Sleep</td>
<td>DB, PC n=14 elderly poor sleepers</td>
<td>1 week</td>
<td>405 mg 3x/day</td>
<td>Valdispert® forte</td>
<td>Subjects in valerian group had increase in slow-wave sleep and decrease in Stage I sleep. There was no effect on self-reported sleep quality, sleep onset time, REM sleep time, or time awake after onset of sleep.</td>
</tr>
<tr>
<td>Balderer and Borberly, 1985</td>
<td>Sleep</td>
<td>DB, PC n=18 healthy subjects with a history of sleep disturbances</td>
<td>3 weeks</td>
<td>450 or 900 mg extract 30 minutes before bed</td>
<td>Aqueous valerian root extract (brand not stated)</td>
<td>Valerian extract had mild sleep-promoting action without significant residual or “hangover” effect.</td>
</tr>
<tr>
<td>Leathwood and Chauffard, 1985</td>
<td>Sleep</td>
<td>R, PC, DB n=8 mild insomnia</td>
<td>1 night</td>
<td>450 mg and 900 mg</td>
<td>Aqueous valerian root extract (brand not stated)</td>
<td>Significantly decreased sleep latency; there was no further improvement with doubling the dose.</td>
</tr>
<tr>
<td>Gessner and Klasser, 1984</td>
<td>Sleep</td>
<td>R, DB n=11 adults</td>
<td>2 nights</td>
<td>1 or 2 capsules (60 or 120 mg)</td>
<td>Harmonicum Much® valepotriate preparation</td>
<td>Both dosages showed a decrease in sleep Stage 4 and a slight reduction of REM sleep, and slight increase of sleep Stage awake, 1, 2, and 3. Changes or Beta-intensity of EEG during REM sleep show stronger hypnotic effect for 120 mg dosage than for 60 mg dosage. Maximum effect was observed between 2 and 3 hours after medication.</td>
</tr>
<tr>
<td>Kamm-Kohl et al., 1984</td>
<td>Mood and sleep</td>
<td>PC n=80 hospitalized geriatric patients</td>
<td>2 weeks</td>
<td>6 tablets/day (482 mg valerian extract/day)</td>
<td>Valdispert® forte</td>
<td>Significant improvements in mood and behavioral disturbances, as well as sleep.</td>
</tr>
</tbody>
</table>

## Clinical Studies on Valerian (*Valeriana officinalis* L.) (cont.)

### Sleep (cont.)

#### Combination Preparations

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Subject</th>
<th>Design</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Fussehl et al., 2000</td>
<td>Sleep</td>
<td>PS</td>
<td>2 weeks</td>
<td>2 tablets in the evening (total of 500 mg valerian extract and 120 mg hops extract per day)</td>
<td>Ze91019 Alluna™ (US) Ivel® (Germany) ReDormin® (Switzerland)</td>
<td>Polysomnography data were recorded on baseline and after 2 weeks. Sleep latency was reduced statistically significantly while sleep efficiency increased. An increase in slow wave sleep was recorded. In a self-assessment, patients reported an improvement of feeling refreshed in the morning after 2 weeks. No adverse events were recorded.</td>
</tr>
<tr>
<td>Vonderheid-Guth et al., 2000</td>
<td>Sleep</td>
<td>R, SB, CO 2 studies n=12</td>
<td>1, 2, and 4 hours after application in each study, studies spaced 3 months apart</td>
<td>1st dosage: 1 tablet (500 mg valerian and 120 mg hops) vs. placebo; 2nd dosage: 3 tablets (total 1,500 mg valerian and 360 mg hops) vs. placebo</td>
<td>Ze91019 Alluna™ (US) Ivel® (Germany) ReDormin® (Switzerland)</td>
<td>The study concluded that pharmacodynamic responses could be repeated. The quantitative topographical EEG demonstrated a visible effect on the CNS, especially after intake of the high dosage of the valerian-hops combination.</td>
</tr>
<tr>
<td>Cerny and Schmid, 1999</td>
<td>Sleep</td>
<td>R, PC, DB, PG, MC n=95 healthy volunteers (58 women, 40 men)</td>
<td>30 days</td>
<td>3 tablets (total 360 mg valerian and 240 mg lemon balm [Melissa officinalis] combination) or placebo</td>
<td>Songha Night® coated tablets and placebo</td>
<td>Valerian/lemon balm group had significantly higher quality of sleep (33%) compared to placebo group (9%) (p=0.04).</td>
</tr>
<tr>
<td>Rodenbeck et al., 1998</td>
<td>Insomnia</td>
<td>PC n=15</td>
<td>4 weeks</td>
<td>500 mg valerian with 120 mg hops</td>
<td>Ivel® valerian and hops extract vs. placebo</td>
<td>There was a significant decrease in slow-wave sleep and an increase in Stage II sleep among those assigned to the herbal preparation.</td>
</tr>
<tr>
<td>Schmitz and Jackel, 1998</td>
<td>Sleep disorders</td>
<td>R, DB, C n=46 patients with sleep disorders according to the DSM-IV criteria</td>
<td>2 weeks</td>
<td>Two, tablets 200 mg valerian extract vs. 3 mg benzodiazapine</td>
<td>Hova® compared to benzodiazapine</td>
<td>Patients’ state of health improved during therapy with both agents and deterioration after cessation was reported for both groups. Withdrawal symptoms were reported only in benzodiazepine groups.</td>
</tr>
<tr>
<td>Dressing et al., 1996</td>
<td>Insomnia</td>
<td>DB, PC n=57 adults with insomnia</td>
<td>2 weeks</td>
<td>Two, tablets 160 mg valerian extract with 80 mg lemon balm extract each, 2×/day</td>
<td>Euvegal® forte valerian and lemon balm tablet vs. placebo</td>
<td>Sleep quality improved in valerian/lemon balm combination compared to placebo (p=0.02) and remained in effect one week after medication was discontinued (p=0.12).</td>
</tr>
<tr>
<td>Lataster et al., 1996</td>
<td>Sleep</td>
<td>MC, OL n=3,447</td>
<td>4–6 weeks</td>
<td>Dosage not stated</td>
<td>Valerian and hops extract (each tablet contains 500 mg valerian, 60 mg hops)</td>
<td>The efficacy of the combination was evaluated as good to very good by 75% of the physicians. The number of patients who slept through the night rose from 24.4% to 77.4%. The self-efficacy report of feeling rested upon awakening rose from 26.5% to 64.9%.</td>
</tr>
<tr>
<td>Orth-Wagner, 1995</td>
<td>Sleep</td>
<td>O n=225 patients with sleep difficulties</td>
<td>2 weeks</td>
<td>Two, tablets 1–3 times daily</td>
<td>Novo-Baldiparan®</td>
<td>89% noted improvements in ability to fall asleep, and 80% reported improvements in ability to sleep through the night; most also reported an improvement in overall well-being.</td>
</tr>
</tbody>
</table>

Clinical Studies on Valerian (*Valeriana officinalis* L.)

### Sleep (cont.)

#### Combination Preparations (cont.)

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Subject</th>
<th>Design</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Dressing and Reimann, 1992</td>
<td>Insomnia</td>
<td>DB, PC n=20 adults with insomnia</td>
<td>9 days</td>
<td>1 tablet (160 mg valerian with 80 mg lemon balm) or 0.125 mg Halcion®</td>
<td>Valerina Natt®</td>
<td>Both active treatments were equivalent and significantly better than placebo. The herbs caused less daytime sedation and impairment of mental functions.</td>
</tr>
<tr>
<td>Lindahl and Lindwall, 1989</td>
<td>Sleep difficulties</td>
<td>R, DB, PC, CO n=27 insomniacs</td>
<td>2 nights</td>
<td>400 mg/night</td>
<td>Valeriana forte valerian and lemon balm tablet vs. placebo</td>
<td>Of the 27 patients, 21 rated valerian-containing mixture as significantly more effective (p&lt;0.001) than the control preparation for sleep quality; 24 of 27 patients (89%) reported “improved sleep” and 12 of these patients (44%) reported “perfect sleep” after taking valerian-containing preparation. No adverse effects were observed.</td>
</tr>
<tr>
<td>Leathwood et al, 1982</td>
<td>Sleep</td>
<td>R, DB, PC, CO n=128</td>
<td>9 nights</td>
<td>400 mg</td>
<td>Hova®, or aqueous valerian extract, or placebo</td>
<td>Subjects had statistically significant (p&lt;0.05) decrease in subjective sleep latency and significant improvement in sleep quality. Improvement was most notable among people who were poor or irregular sleepers, and smokers. No detectable hangover effect was noted in the morning.</td>
</tr>
</tbody>
</table>

### Hazards in Driving and Operating Machinery

<table>
<thead>
<tr>
<th>Author/Year</th>
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<th>Duration</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Kuhlmann et al., 1999</td>
<td>Alertness, reaction time, and concentration</td>
<td>R, C, DB n=99 males and females in first segment and 91 in second segment</td>
<td>Single night plus 2 weeks of nighttime administration</td>
<td>600 mg LI 156 or flunitrazepam (1 mg) and placebo</td>
<td>LI 156 vs. flunitrazepam and placebo</td>
<td>Neither single nor repeated nighttime administration of valerian had adverse impact on reaction time, alertness, and concentration the morning after intake. Valerian subjects showed better improvement in psychometric performance than those on placebo, and significantly (p=0.4481) better than those on drug.</td>
</tr>
<tr>
<td>Mayer and Springer, 1974</td>
<td>Assess potential hazards in driving</td>
<td>R, DB, PC n=24 healthy volunteers</td>
<td>Acute</td>
<td>200 mg, 400 mg, or 150–200 mg</td>
<td>Valmane® (valepotriates with alcohol) and placebo</td>
<td>Demonstrated a dose-dependent increase in concentration abilities in volunteers; when given in combination with alcohol, the preparation did not affect blood alcohol levels, have sedative effects, and/or affect driving performance.</td>
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</tbody>
</table>

### Combination Preparations

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Gerhard et al., 1996</td>
<td>Assess potential hazards in driving or operating machinery</td>
<td>C, Cm n=80 healthy adults</td>
<td>One night (single oral administration with observation on the following morning)</td>
<td>1.5 g dried extract or 4 g fluid extract</td>
<td>2 Valverde® herbal combinations (containing valerian and hops) and a syrup of valerian were compared to flunitrazepam and placebo (brands not stated)</td>
<td>Objectively measurable impairment of performance on morning after medication occurred only in flunitrazepam group. In addition, 50% of the volunteers in flunitrazepam group reported mild side effects, compared with only 10% from other groups. Examination of acute effects of plant remedies 1–2 hours after administration revealed very slight, but statistically significant impairment of vigilance and retardation in the processing of complex information.</td>
</tr>
<tr>
<td>Kammerer et al., 1996</td>
<td>Driving safety</td>
<td>R, DB, CO n=18</td>
<td>21 days</td>
<td>2 tablets after dinner (total of 1,000 mg valerian extract and 120 mg hops extract per day), or placebo</td>
<td>Valerian and hops extract (each tablet contains 500 mg valerian, 60 mg hops)</td>
<td>The study concluded that the combination did not produce significant adverse effects and did not impair psychometrically measured fitness and subjective state of health. In addition, no significant interaction with alcohol is to be expected.</td>
</tr>
<tr>
<td>Albrecht et al., 1995</td>
<td>Driving ability and combination with alcohol</td>
<td>R, DB, PC n=54</td>
<td>3 weeks</td>
<td>2 tablets 2x/day or placebo</td>
<td>Euvegal® forte (each tablet contains 160 mg valerian root extract and 80 mg lemon balm leaf extract)</td>
<td>Traffic safety was evaluated using psychometric tests. The treatment group showed no difference in driving ability compared to placebo, and treatment did not potentiate the effect of alcohol consumption. The study concluded that Euvegal® does not cause impairment of the operation of machinery or the driving of vehicles.</td>
</tr>
</tbody>
</table>