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Differences Between Herbal and Nonherbal Users in Dental Practice

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Purpose. *The purposes of this study were to describe basic demographics and health belief differences between herb users and nonherb users, any potential herb-drug interactions, and examine the association between dental chart noted and questionnaire self-reported use of herbal remedies.*

Methods. *A 3-part survey instrument was administered to a convenience sample of 149 individuals at a dental clinic and two dental practices. The first part ascertained demographic information and prescription drug use using open-ended and closed-ended questions. The second part listed 51 individual/combination herbs and the third part assessed healthcare behavior using a 5-point Likert scale. A chart audit compared written responses between a patient's medical/dental history chart and his/her survey on herbal use. Descriptive analyses and MANOVA were used to examine the relationship between herbal users and nonusers.*

Results. *Eighty participants (54%) reported using some form of herbs. They were characterized as mostly female (71%), who were less likely to disclose herbal usage to practitioners ($p < .05$), believed in herbal effectiveness ($p < .05$), and reported a more positive perceived level of health status compared to nonusers ($p = .02$). Although herb users reported a willingness to disclose use of herbs to health practitioners, only three patients had any written documentation of their herb use in their medical/dental health chart ($p = .0001$). Fifty-five herb users were also taking prescription drugs (69%) that could potentially lead to herb-drug interactions.*

Conclusion. *The findings provide supportive evidence that dental hygiene practitioners need to be aware of their patients' use of herbs. Knowing potential risks, side effects, and possible drug interactions is necessary for patient management and each patient's oral health.*

Keywords: Herbal remedies, herb-drug interactions, alternative medicine, public health

Introduction

Alternative medicine has become a significant public health concern among health care professionals.¹⁻¹³ More than one-half of the US adult population uses some form of alternative therapy to treat actual or perceived ailments and/or to prevent perceived threats to their general health.⁵ Alternative therapy encompasses a wide variety of methods including reflexology, acupuncture, megavitamin therapy, folk remedies, and herbal remedies. Herbal remedies or herbal medicines are defined

as the use of preparations and medications derived from botanical components such as roots, leaves, and flowers to promote healing.⁹ These components can be used in raw, pill, or capsule form. The current study focused on the use of herbal remedies.

In the first US national survey on the number of people using herbal therapies, Eisenberg documented an almost 10% increase from 2.5% in 1990 to 12.1% in 1997 among those who used herbal therapies.⁵ Since the time of Eisenberg's study, other analyses have found similar results in the increase of herbal use among people in the United States.¹⁴⁻¹⁶

Issues related to quality control, safety, and effectiveness are major concerns with herbal medicine. Today, there is an aggressive push to collect data on popular herbal remedies, their efficacy, and their potential adverse effects when used either alone or with other medications, or medical treatments. Several long-term studies to answer these questions have been undertaken in the United States with the support of the National Center for Complementary and Alternative Medicine (NCCAM), a component of the National Institute of Health, in collaboration with various universities around the country.^{13,17} With herbal sales now estimated to be a \$4 billion a year industry, health professionals increasingly turn to researchers to provide scientific information on herbal efficacy and safety.¹⁸

Although there are numerous studies regarding medical patients using herbal remedies, there is an absence of studies examining the impact of herbal remedies on dental patients. In dentistry, medications are prescribed for many reasons, including treating oral disease and preventing infections after surgical procedures such as tooth extractions. Therefore, maintaining a current medical history of each patient is vitally important. It has been stated that the most common cause of prescription drug related interactions is the dental practitioner's lack of information about the patient's medical history;^{14,21} including whether or not the patient is using dietary supplements and herbal remedies. Some herbs have the potential to interact with other medications, which can affect dental management and treatment.

People choose to use herbal remedies for a number of reasons. According to a Harvard University informal survey, one in three dental patients acknowledged using one, or a combination of, herbal medication(s).³ Therefore, the purposes of this study were: to describe the basic demographics and health belief differences between herb users and nonherb users; to address any potential drug-herb interactions; and to examine the association between dental chart noted and questionnaire self-reported use of herbal remedies.

Review of the Literature

The use of herbal plants extends back to the Neanderthal period.⁸ For thousands of years, people have used herbs to cure and prevent disease, especially in Europe and Asia where, to date, physicians still prescribe natural remedies.¹⁹⁻²² By the 1900s, with advanced conventional medicine, the use of herbs began to diminish in the United States.²³ With a rising interest in holistic health, herbal remedies have steadily regained public acceptance and popularity from the 1960s to present.^{1,8,18}

The requirements for monitoring the safety and efficacy of herbal medicines is not the same as for prescription drugs. Unlike prescription drugs, herbal medicines are not required to undergo extensive research to demonstrate safety, efficacy, and quality control. In 1994, under tremendous pressure from consumers and health food stores, Congress passed the Dietary Supplement Health and Education Act (DSHEA), which defined herbal remedies as dietary supplements.^{4,8,22} Still, there is no FDA review or approval of these supplement products and their ingredients. Food additives are submitted to a more rigorous approval process than herbal products.^{10,24} Under the DSHEA, the responsibility falls on the consumer to alert the FDA with questions about a product's safety. Once alerted, the FDA must prove the product unsafe before any restrictions can be placed on the product.^{8,22,24} By 1998, the FDA required that labels on herbal products must inform consumers that the herbal manufacturer's product "is not intended to diagnose, treat, cure, or prevent any disease."^{22,24} Statements that once said, "decreases blood pressure" were changed to "promotes vascular health."

The newest proposed ruling regarding herbal products (2003) by the FDA states that dietary supplement manufacturers are now required to follow good manufacturing practices in the way they manufacture, pack, and store their products. This will ensure accurate labeling and unadulterated products as well as enforce better quality control and testing of manufactured dietary supplements and their ingredients.²⁵ This is a big step since quality control on herbs has been difficult in the past. Herbs can vary from batch to batch as a result of herb plant variation. Batches of herbal plants may become tainted during the processing stages of cultivation, harvesting, and storing. In some herbal plants, different parts of the plant (stem, leaves, or roots) contain varying degrees of potency or toxicity when processed.^{2,6,7} If the poisonous part of a plant is processed, the results could be toxic.

Although most herbs are relatively safe, the concern here is that most reported reactions caused by herbs are usually mild and may be overlooked by the people who took them as well as healthcare practitioners.^{2, 26, 27} Common reactions include: headaches, diarrhea, nausea, dermatitis, allergic reactions, dizziness, palpitations, photosensitivity, insomnia, tiredness, agitation, and sedation.^{2,4,7,8,26-30} In higher doses, herbal remedies may cause severe symptoms, and may include hematomas, hepatotoxicity, abdominal distention, and liver disease.^{2,4,7,8,26-29}

Another important concern is patient disclosure of herbal use. Research on patient disclosure of herbal use in the United States has been contradictory. Several empirical survey research studies on herbal use disclosure reveal that approximately 50 to 70% of patients do not consult their general practitioners about their herbal use.^{3,5,11} Identified reasons for lack of disclosure of herbal use relates to the patient's perception of a poor or negative attitude of healthcare practitioners regarding herbal use and a general lack of communication between healthcare practitioners and their patients.^{2,5,7,9,23,31} Most patients do not disclose herbal use to their healthcare providers believing herbals, as dietary supplements, are naturally safe.^{2,26,27}

In contrast, a recent survey conducted by Klepser et al¹⁴ found that herb users were actually open to disclosing their herbal use to their physicians and believed that it was important for their physicians to be aware of their herbal use. However, the investigators did not report if those patients were currently revealing herbal information to their physicians.¹⁴ A national survey conducted by the Consumers Union in 2000¹⁵ found that 60% of the respondents who reported using herbals disclosed their use to their doctors, and felt comfortable doing so. These respondents further reported that 55% of their doctors expressed approval of the use of alternative therapies, while 40% were neutral, and 5% disapproved. The results from this national survey suggest that physicians in the United States may be changing their attitudes toward herb use when compared to previous studies on the attitudes of medical physicians on alternative medicine.^{14,15}

Despite practitioners' concerns about herbal safety, efficacy, and disclosure, over-the-counter herbal remedies remain a multi-billion dollar enterprise. In several studies, most Americans reported that they would first try self-medication with over-the-counter medications and herbal remedies before visiting a physician for simple conditions such as nausea, headaches, and allergies.^{1,4,5,16,26-30,32,33}

In an attempt to more fully understand or describe the characteristics of individuals who are more likely to practice self-care, researchers have examined health-related belief measures.³⁵⁻³⁷ One health belief measure is the Health Locus of Control (HLC), which has been used to determine the type of control one exhibits in their behavioral approach and decision-making on health-related issues.^{34,35,44} A person's HLC originates from an individual's perception regarding their health condition and their health behaviors. Individual perceptions include the level of self-esteem and self-awareness, how much importance is placed on their health, and the benefits of taking certain actions. Other factors such as age, demographics, income, and education can also affect how a person behaves and makes decisions concerning health-related issues.

The HLC identifies three main dimensions of perception. Although an individual may appear to exhibit all three perceptions at different times, one dimension of perception usually dominates the other two in decision making. The first HLC dimension is internal control. These individuals exhibit a strong sense of empowerment in their own health outcomes. Duffy found individuals with a strong dimension of internal control tend to be more proactive in applying what they believe to be a healthy lifestyle.^{36,37} The second HLC dimension is external control. These individuals generally rely on "powerful others" to make decisions concerning their health or recovery from illness. Duffy found these individuals to be passive and

compliant. Thus, they believe management of their health is beyond their personal control, and they rely on the provider to make decisions for them.³⁶ Last, the chance HLC or fatalistic dimension perceives health as predetermined by bad luck, chance, or fate. Strategies used in this perception are usually prayers or lucky charms with little regard for professional advice.^{36,37}

Furnham and Smith,³⁵ and Astin⁴³ used a health belief measure to study behaviors among patients visiting a homeopath and patients visiting a general practitioner. These researchers reported that internal control and being proactive over their health decisions were important to herbal users, particularly to subjects in Furnham and Smith's study.³⁵ Those who used herbal medicine generally sought methods that were aligned with their health belief and the belief that the body is capable of healing itself. At this time, no studies on herbal use by dental patients and health beliefs have been reported.

With an increasing number of people educating themselves and actively seeking unconventional remedies without involving their health care providers, the issue and concern of herbal use safety continues to intensify.^{1,2,4-7,11,38} The issue of quality control makes drug-herb interactions less predictable and possibly less recognizable for individuals who self-medicate and for their health care providers.³⁹ Although most drug-herb interactions are not clearly understood, herbal remedies can increase, decrease, or inactivate the effectiveness of prescription drugs.^{4,39-42} For example, several studies found that St. John's wort greatly compromises the action of two prescription drugs, indinavir, an HIV protease inhibitor drug, and cyclosporin, an immunosuppressor drug used to prevent organ transplant rejection.^{29,40,42} The indinavir drug was quickly eliminated from the body by St. John's wort, whereas cyclosporin was inactivated.

Methods and Materials

The purposes of this study were: to describe the basic demographics and health belief differences between herb users and nonherb users; to address any potential drug-herb interactions; and to examine the association between dental chart noted and questionnaire self-reported use of herbal remedies in a dental setting.

A survey was developed to collect data regarding respondent demographics, prescription and/or herbal products used, and individual health belief systems. The clarity of the questionnaire was established using a convenience sample of 10 subjects at the University of Missouri-Kansas City (UMKC) dental clinic. Some questions were phrased to capture the same issue in both negative and positive statements to ensure reliability in interpretation and to gather information of patient knowledge of herbs. Results were used to improve item clarity in order to reduce error variance. The UMKC Institutional Review Board approved the survey and administration techniques.

The population studied was a convenience sample drawn from the dental school general clinic patient population and two private general dental practices. These sites were chosen because of their distinct differences in demographics according to age, ethnicity, education, and annual income. The sample group included 153 adult dental patients. A sample size of 150 subjects was determined to be sufficient to provide stable estimates for multivariate analyses.⁴⁵ In the waiting room of each site, a single investigator approached each patient as they signed in to receive dental treatment and invited them to participate in the study. At each site, over a 2 ½ week data collection period, 51 dental patients completed a written survey questionnaire and seven declined to participate. In all, during a visit at one of the three sites, 153 individuals signed a consent form to participate and completed the written questionnaire, regardless of their herbal use.

After the subjects completed the written questionnaire, the investigator conducted a chart audit. At each site, the primary investigator used a standardized form to record the dental/medical history of each patient. All data was coded to maintain confidentiality.

Nonusers were defined as subjects who had not used herbal remedies in the past year. Herbal users were defined as subjects that were currently using or had used an herbal therapy or a combination of herbal therapies in the past year.

This study was comprised of two components: a 3-part questionnaire and a chart audit. The questionnaire covered two basic areas: (a) demographic information; (b) herbal and prescription drug use. A chart audit was used to determine if

updates on prescription, over-the-counter, and herbal medications were recorded in the permanent dental record, who updated the subject's medical history, subject's dental treatments, and any known allergies.

The written questionnaire was developed to elicit information on dental patients' herbal use, demographics (socioeconomic status, education, geographic region, age, gender, and health care status), and health belief locus of control. The first part of the questionnaire consisted of open-ended and closed-ended questions on demographic information, current prescription medication use, and for what condition the medication was being taken. The second part listed 37 specific herbal remedies in alphabetical order, 14 herbal combinations, and an "Other" column for any herbal remedies and combinations not listed. The third part consisted of 35 items to measure six subscales of health belief and patient attitudes toward herbs using a 5-point Likert scale (1=strongly agree, 5=strongly disagree). The six subscales of health belief seen in Table I are as follows: 1) Internal Locus of Control (LOC)-8 items; 2) External LOC-8 items; 3) Chance LOC-6 items; 4) Health Threat LOC-4 items; 5) Effectiveness LOC-2 items; and 6) Disclosure LOC-4 items. Three additional items were also included to measure the perception of health status, herbal safety, and prescription drug safety.

Table I. Six Health Loci of Control Subscales and Health Status and Herbal and Prescription Safety Items

Internal Locus of Control

- 1) I believe self-care is unrelated to stress.
- 2) I believe people who perform self-care stay healthy.*
- 3) I believe people can't prevent illness.*
- 4) I believe people can't do much when sick.
- 5) I believe anyone can learn prevention.*
- 6) I believe poor health is due to carelessness.
- 7) I believe confidence contributes in the ability to cure oneself.*
- 8) I believe getting sick is your own fault.

External Locus of Control (*)

- 1) I believe doctors help patients feel better.
- 2) I believe recovery requires medical care.
- 3) I believe check-ups with physician help to stay healthy.
- 4) I believe people are helped a great deal by doctors in staying healthy.
- 5) I believe doctors don't help patients.
- 6) I believe doctors relieve/cure few problems.
- 7) I believe doctors rarely help sick people.
- 8) I believe doctors do little to prevent illness.

Chance Locus of Control

- 1) I believe good health is a matter of luck.*
- 2) I believe getting well is related to chance.
- 3) I believe lucky people don't get sick.
- 4) I believe staying well is unrelated to chance.*
- 5) I believe health requires no bad luck.*
- 6) I believe recovery is unrelated to luck.

Health Threat

- 1) I believe nothing can be done for some illness
- 2) I believe seriousness of disease is overstated.
- 3) I believe some diseases just wipe you out.
- 4) I believe some problems are serious or fatal.

Effectiveness (*)

- 1) I believe that herbal therapies improve my health.
- 2) Members of my family believe that herbal therapies can improve my health.

Disclosure(*)

- 1) My physician should be aware of my use of herbal therapies.
- 2) My dental practitioners should be aware of my use of herbal therapies.
- 3) If asked about drugs, I would tell my physician about my herbal use.
- 4) If asked about drugs, I would tell my dental practitioner about my herbal use.

Health Status(*)

- 1) Would you say that your health in general is

Safety (*)

- 1) Herbal therapies are safe for me to take.
- 2) Prescription drugs are safe for me to take.

* Items used in the analysis

Survey items in the third part of the questionnaire were adapted from three different sources. Eight items on safety, effectiveness, and patient disclosure belief were taken from Klepser.¹⁴ One item was taken from a study by Astin⁴³ investigating possible predictors of alternative health care use. The item was used in this study to describe patients' perceived level of health status. Twenty-six items were used from Lau and Ware's research on the construct of the health belief model.³⁴ Results from their analysis ascertained four distinct health-specific loci of control subscales (internal, external, chance, and health threat).

This study set out to extend previous work by looking at dental patients and herbal use. Hypotheses of this study are as follows:

There will be a difference between herbal users and nonherbal users with respect to demographics (education, economics, race, gender, and age) and health belief system as measured by health locus of control items (internal, external, and chance control);

There will be potential herb-drug interactions among herb users using prescription drugs; and that

There will be a difference between dental chart noted and questionnaire self-reported use of herbal remedies as measured by comparing written documentation in the health history form to survey questionnaire.

Data from this study were analyzed in the following manner. Chi-square analysis (i.e., comparing observed frequencies to expected frequencies) was used to examine the association between self-reported use by the written questionnaire and self-reported use of herbs as determined by the written medical history from the chart audit. Differences between herbal users and nonusers with respect to demographics: gender, age, ethnicity, education, income, and health belief system were compared using chi-square analysis.

The MANOVA statistical test was used to compare herbal users and nonusers across subscale scores. The relationship between a patient's self perceived health status and the use or the nonuse of herbs was examined using the Mann-Whitney U statistical test.

Results

Of the 153 surveys obtained from dental patients at three dental treatment sites, 149 (97%) were used for analysis. Four subjects were removed due to unavailability of charts for conducting the chart audit and one subject also did not complete the survey because of shortage of time before the appointment.

Fifty-three percent of the sample identified themselves as herbal users (Table II). There was a significant difference in gender ($p < .001$) among herb users with the use of herbs significantly higher among women (71%) compared to men (29%). Additional analyses detected no differences between herbal users and nonusers with respect to the remaining demographic data collected: age, ethnicity, education, region, and income.

Table II. Characteristics of Herbal Users and Nonusers

Demographic Variables	Herbal Users n (%)	Nonusers n (%)	p-value
* Statistically significant (p<.05)			
** n does not total 149 due to missing data			
<u>GENDER</u>			
Female	57 (71)	31 (45)	0.01*
Male	23 (29)	38 (55)	
<u>AGE**</u>			
18-29 years	12 (15)	4 (6)	0.24
30-39 years	11 (14)	12 (17)	
40-49 years	24 (30)	21 (30)	
50-59 years	17 (21)	13 (19)	
>59 years	15 (19)	18 (26)	
<u>ETHNICITY</u>			
Caucasian	65 (65)	52 (75)	0.64
African American	8 (10)	9 (13)	
Native American	2 (3)	4 (6)	
Hispanic	3 (4)	1 (1)	
Asian/Pacific	2 (3)	2 (3)	
Islander			
Other		1 (1)	
<u>EDUCATION**</u>			
< High school	3 (4)	1 (1)	0.92
High school diploma	24 (30)	22 (32)	
2-year college/vocational	22 (28)	16 (23)	
Baccalaureate	18 (23)	23 (33)	
Post graduate	12 (15)	6 (9)	
<u>ANNUAL INCOME, \$**</u>			
0-23,000	16 (20)	15 (22)	0.87
23,001-40,000	20 (25)	17 (25)	
40,001-60,000	14 (18)	14 (20)	
> 60,001	24 (30)	20 (29)	

One of the primary purposes of this study was to characterize herbal users and nonusers as a function of health belief system. Internal consistency estimates of reliability (Cronbach's α) were calculated for each of the defined subscales. Effectiveness, External Locus of Control and Patient Discloure subscales had acceptable reliability coefficients ($\alpha = .67; .77; .78$, respectively). Therefore, all items in these original subscales were maintained. Analysis of the remaining subscales showed some items did not contribute to the scales' internal consistency as shown in ^{Table III}. Consequently, items were deleted from subscales Internal Locus of Control (LOC) and Chance LOC to increase the reliability coefficient (Table I). The Health Threat LOC had a reliability coefficient of -0.07 for the original items and did not show consistency among any items. This subscale was omitted from subsequent analyses.

MANOVA was conducted to examine differences across health belief subscales as a function of herbal use. There was a statistically significant difference across health belief subscales (Hotellings $T = .347$, $p = .0001$) as seen in Table IV. The

overall η^2 of .26 suggests that there was a large meaningful difference across subscales means of herbal users and nonusers in overall beliefs. To determine the mean for each subscale, the negative items from the Likert scale were inverted to be positive items. Then each reported score in the subscale was added and divided by the total number of items. Univariate follow-up analyses were used to examine health beliefs by subscales between herbal users and nonusers. These analyses showed that the subscale Herb Effectiveness largely influenced the overall differences between groups. The herb user group had a lower mean on the effectiveness subscale (4.7; sd 1.5) than the nonuser group (6.0; sd 1.2), illustrating a stronger belief in the effectiveness of herbs in improving their health ($p < .0001$, $\eta^2 = .20$). No differences were found between users and nonusers with respect to Internal LOC, External LOC, Chance LOC, and Patient Disclosure subscales.

Table IV. Health Behaviors and Belief Subscales

Subscale (number of items used)	Herbal user Mean (sd)	Nonuser Mean (sd)	Range of Scores	(p-value)	(η^2)
Effectiveness Subscale (2)	4.7 (1.5)	6.0 (1.2)	(2.0-10.0)	(0.00)*	0.20
Internal Locus of Control Subscale (4)	11.8 (1.8)	12.1 (1.9)	(4.0-20.0)	(0.37)	0.01
External Locus of Control Subscale (8)	25.5 (2.9)	25.6 (2.5)	(8.0-40.0)	(0.91)	0.00
Chance Locus of Control Subscale (3)	12.6 (1.8)	12.3 (2.2)	(3.0-15.0)	(0.36)	0.01
Disclosure Subscale (4)	7.6 (2.5)	7.0 (2.2)	(4.0-20.0)	(0.12)	0.02
Overall score					0.26

1 = Strongly agree; 2 = Agree; 3 = No opinion; 4 = Disagree; 5 = Strongly disagree
 * Statistically significant ($p < .05$)

A logistic model was subsequently fitted with herbal use modeled as a function of seven selected predictor variables to produce odds ratios. Table V presents the b weights, standard error, significance, and odds ratio with 95% CI for the final logistic model. The results supported gender ($p \leq .001$), herb effectiveness ($p \leq .001$), and patient disclosure ($p \leq .005$) as significant predictors of herbal use.

Table V. Logistic Regression Model for Hebal Usage

Predictor Variables	b Weights	S.E.	Sig.	Odds Ratio (95% CI)
Gender	-1.53	.49	0.001*	4.67 (1.80, 12.40)
Effectiveness	-.98	.26	0.001*	2.56 (1.60, 4.40)
Disclosure	.30	.11	0.005*	0.73 (0.59, 0.91)
Internal Locus of Control	.02	.12	0.89	1.02 (0.80, 1.30)
External Locus of Control	.15	.10	0.15	1.16 (0.95, 1.41)
Chance Locus of Control	-.05	.13	0.74	0.96 (0.74, 1.24)
Health Status Perception	-.11	.26	0.69	0.90 (0.54, 1.50)
Constant Value	2.11	2.98	0.48	8.24

* Statistically significant, $p < .05$

The odds of females using herbal remedies were 4.67 times greater than for males (95% CI = 1.80, 12.40). In this study, 71% of herbal users were females compared with 29% males. The odds of herbal use were 2.56 times greater for each increase in score level unit for those who believed in herbal effectiveness (95% CI = 1.60, 4.40). Sixty percent of herbal users believed that herbs do improve overall health compared to only 12% of nonusers. In addition, 59% of herbal user respondents believe family members agree that herbs improve health compared to 20% of nonusers. Finally, the odds of patients' willingness to disclose herbal use to health practitioners were significantly less for users than nonusers (OR .73; CI= 0.59, 0.91). The findings revealed only 3 of the 80 herb users (3.8%) reporting use of herbals actually had documentation of their herbal use in their dental record (Table VI). This difference was statistically significant ($X^2 = 68.45, p \leq .001$).

Table VI. Self-Reported Versus Documentation of Herb Use in Dental Record Among Herb Users

	n(%)
Herb users with no documentation of herbal usage in dental record.	77 (96.2)
Herb users with documentation of herbal usage in dental record.	3 (3.8)

p ≤ .001

This study identified five herbs most frequently used: echinacea, ginseng, garlic, ginkgo biloba, and St. John's wort, respectively. Table VII documents the number of potential herb-drug interactions of the herbal users. Of the 88 herbal users, 55 were also taking prescription drugs. A total of 24 various potential herb-drug interactions were recorded. Subjects taking echinacea were also taking prescription medications that were not contraindicated with the herbs. Likewise, subjects taking synthroid and gastrointestinal drug therapies were taking herb remedies that were not contraindicated.

Table VII. Possible Herb/Prescription Drug Interactions Among Herbal Users

Herbal Group	Prescription Drug Group	Number of herb users with potential herb/drug interactions
Ginseng	• Cardiovascular therapy	2
	• Hormone therapy	1
	• Analgesic therapy	3
Garlic	• Anticholesterol therapy	4
	• Analgesic therapy	2
Gingko biloba	• Cardiovascular therapy	2
	• Antidepressant therapy	3
	• Analgesic therapy	2
St John's wort	• Cardiovascular therapy	2
	• Antidepressant therapy	2
	• Hormone therapy	1

Discussion

The focus of this study was to describe basic demographics and health belief differences between herb users and nonherb users, to address any potential herb-drug interactions, and to examine the association between dental chart noted and questionnaire self-reported use of herbal remedies. One of the most significant findings of this study was the lack of documentation in the dental record compared to self-reported herbal use as reported by study participants in the written survey. Chart audits revealed that more than 96% of herbal users did not have any written documentation of herbal use in their dental chart. These findings are similar to the findings reported from several other studies.^{3,5,11,14} When study participants were asked whether physicians and dental practitioners should be made aware of the use of herbal therapies, a majority responded positively. However, less than 4% had documentation of their herbal use in their dental chart. The discrepancy between the lack of documentation and the willingness to disclose the use of herbs may be due to several reasons identified by this study and previous studies.

First may be the perception of patients that herbal remedies may not be considered medications.^{4-10,21,28} It is possible that herbal users view herbal remedies like over-the-counter dietary supplements and vitamins. Most medical histories do not separate traditional prescription medicine from alternative medicine. If this is the case, voluntarily disclosing herb use to healthcare practitioners may not seem relevant to herb users. Also, researchers have hypothesized that a lack of trust between the patient and their provider could cause the patient to feel uncomfortable in disclosing their use of herbals.^{3,7,9,11,23,31} If the patient perceives disapproval from healthcare providers about their use of herbs, the patient becomes less likely to disclose using them. In this study, the written questionnaire specifically asked the patient to disclose any herbs being presently taken, and that may be one reason for the large number of herbal use disclosures in the surveys compared to their medical charts. Patients may be more willing to disclose the use of herbs if asked directly by their healthcare practitioner. However, this study did not ask the provider if they asked patients about herbal use during the medical history review or updates.

Regarding differences between groups with respect to demographics and health belief system, the only demographic variable that was significant was gender, with women reporting higher use of herbals than men. This finding supports several studies that reported women as more likely than men to use herbal remedies.^{5,33,43} Traditionally, women tend to be greater health seekers than men, so it is not surprising to find women more willing to try herbal remedies.⁵ Interestingly, in this study two male subjects commented that they were not sure why they were taking herbal remedies, but that their wives included them into their daily regimen along with their prescription or vitamin therapy. These results seem to support the theory that women are more likely to be herbal users and look for preventive therapies.

The seven predictors: Internal LOC, External LOC, Chance LOC, health status, herb effectiveness, herb disclosure, and safety of herbs and prescriptions used in this study had been previously identified as predictors of herbal use by other investigators, however study results were mixed. Results from this study, along with Vincent and Furnham (1996), Eisenberg et al (1998), Klepser et al (2000), and Palinkas and Kabongo (2000), found gender, herbal effectiveness, and herbal disclosure to be good predictors of herbal use. However, Furnham and Forey (1994), Eisenberg et al (1993), and Astin (1998) did not. With the remaining predictors, evidence for whether or not health belief loci of controls and health status perception predict herb users was also found to be equivocal.^{5,35,43,44}

Reasons for no differences between the herb users and nonherb users health belief loci of controls are difficult to ascertain in the current study. Future studies might include a personal interview that could help the researcher extrapolate greater information about health belief loci of control in both groups.

Perhaps health behavior is more complex and in-depth and intertwines with certain cultural beliefs that these questions on health behaviors are not capable of fully explaining. It would seem that predicting use of herbals is multifaceted, which is why the results are mixed among studies. Further studies are needed to identify additional predictors of herbal use.

Another finding of particular interest in this study was the potential for adverse associations between herbals and/or drugs and certain dental procedures. Results from this study showed that 54 herbal users (68%) were scheduled to receive some sort of invasive dental treatment (restorations, periodontal surgery and maintenance, root canals, and tooth extractions) with many of these treatments requiring the use of local anesthetic. Because many of these dental treatments involve bleeding, herbal use such as ginkgo biloba, garlic, and ginseng should be of concern to the practitioner due to their potential for causing excessive bleeding. Although, no research has actually examined the interaction of local anesthetic and herbal remedies, warnings related to potential interactions between general anesthetic agents and herbal remedies have been explicit. The American Society of Anesthesiologists (2000) issued a warning in 1999 on the risk for herb-anesthesia interactions for surgery patients and the importance of including herbal remedies as part of the medical history. Herbal remedies such as valerian, ginseng, ginkgo biloba, and several others have been known to interfere or increase effects of anesthesia as well as complicate preoperative preparations to surgery.^{11,46,47}

Potential herb-drug interactions for study participants are shown in Figure 1. Results from this study revealed that 55 study participants, more than half of those using herbal remedies, were also using prescription drugs (69%). Because this study only examined the five most commonly used herbals and five most commonly used prescription groups, the potential for interactions was limited to these herbals and prescription drug groups. With the exception of the herb echinacea, there were potential herb-drug interactions with the following herbs: ginseng, garlic, ginkgo biloba, and St. John's wort. These herbs have potential interactions mostly with cardiovascular and analgesic therapies. Participants in this study taking antiarrhythmia, antihypertension, diuretics, beta-blockers, anticoagulant, and calcium channel blockers medications were categorized as using Cardiovascular therapy. Cardiovascular drugs, when used with ginseng, ginkgo biloba, and St. John's wort, have been reported to increase antiplatelet effects, exacerbate effects, or augment and decrease effects of certain medications.^{6,28,39} Participants taking non-steroidal anti-inflammatory drugs (NSAIDs) and aspirin were categorized as using analgesic therapy. Concomitant use of analgesic therapies with herbs such as ginseng, garlic, or ginkgo biloba have been shown to increase antiplatelet effects and cause further damage to the gastrointestinal area.^{6,8,11,39,46} Other potential drug interactions of concern in this study were concomitant use of antidepressants with St. John's wort or ginkgo biloba. Interactions include increased sedation effects and possible decrease of threshold with certain antidepressants used in treating patients for seizures.^{6,8,48}

Herb	Organ system affected	Conventional drug that may interact with herb	Potential interaction
<u>Echinacea:</u> Phagocyte action stimulating immune system	Pulmonary-allergic/immunologic; Kidney	Anabolic steroids, methotrexate, amiodarone, ketoconazole	Hepatotoxicity, immunosuppression with continuous use (6-8 wks); contraindicated for autoimmune disease, contact dermatitis
<u>Garlic:</u> Anti-hyperlipidemic, hypotensive, fight infections, preventing cancer	Allergic /immunologic effects; Endocrine system, Gastrointestinal,	Anticoagulant, aspirin, NSAIDs, glucose control drugs	Allergic reactions, contact dermatitis, nausea/vomiting, inhibition of iodine uptake, hypo and hyperglycemia; prolongation of bleeding, potential anticoagulation
<u>Ginkgo:</u> Enhance cognitive function, dilates arteries, capillaries, and veins	Central Nervous System; Gastrointestinal	Antiplatelet, anticoagulant	Bilateral subdural hematomas, headaches, dizziness, vertigo, prolongation of bleeding time
<u>Ginseng:</u> Builds resistance to stress, aphrodisiac, anti-hyper lipidemic,	Central Nervous System, Cardiovascular; Endocrine system, Gastrointestinal,	Oestrogens, corticosteroids, monoamine oxidase inhibitor and serotonin reuptake inhibitor	Nausea, vomiting, diarrhea, nervousness, palpitations, insomnia, mood changes, depression, confusion or hallucinations, uterine bleeding, postmenopausal bleeding, mastalgia, hypertension, interferes with diuretic action of furosemide, may alter blood glucose levels, prolongation of bleeding time, potential anticoagulation, confusion and sedation
<u>St. John's wort:</u> Anti-depressant, sedative	Central Nervous System, Cardiovascular; Gastrointestinal	Serotonergic agents, tranquilizers, psychoactive or mood-altering drugs combined oral contraceptives, cyclosporin, digoxin, tetracyclines, iron, thyroxine, aged meats and cheese that contain tyramine.	Dizziness, confusion, tiredness, diarrhea, agitation, sedation, hypertension, breakthrough bleeding with oral contraceptives, decreased concentration in serum for cyclosporin, digoxin; phototoxicity/ photosensitivity; orthostatic hypotension, prolongation of anesthetic agents

Figure. 1 Potential Herb/Drug Interactions
 Winslow and Kroll 1998; Vann 1998; Vickers and Zollman 1998; Biron 1999; Karimi 1999; Cheng et al 2002

Certain limitations of this study must be acknowledged when the implications of study results are considered. The generalizability of the results in this study is limited by the small sample size and the fact that participants were from a single metropolitan area. In addition, the potential for bias, as a result of the self-report survey design, also must be considered in interpreting the results.

Further studies are needed to examine other potential predictors of herbal use such as religion and spiritual beliefs. Personal interviews may be a way to extrapolate additional information as well as clarify ambiguity with health-specific loci of controls. Soliciting information from herbal users on actual reactions and side affects would help practitioners and patients gain a better understanding of how herbal usage impacts the body. Changes in the work environment such as asking clients of any herbal use and documenting its use may contribute to greater information on behaviors of herbal users as well as assessing the information for potential adverse affects and reactions.

Conclusion

The survey findings do provide and contribute a better understanding of those who use herbs, specifically within a dental practice setting. Understanding behaviors and characteristics of those who are likely to use herbs is essential for recording and maintaining comprehensive health histories. In an era when so many people are self-diagnosing and self-medicating, it is the healthcare practitioner's responsibility to help patients become better informed to make safe and appropriate health related choices. Finding out the kind and reasons for herbal use will help dental hygiene practitioners inform patients of any possible harmful interactions that they may not be aware of while supporting individuals in their beliefs and attitudes about herbs. Dental hygienists should provide dental patients with information of potential drug-herb interaction, adverse reactions, and side effects especially with those requiring tooth extraction, periodontal surgery, and other complex dental treatments where bleeding and anesthetics are a concern.

To treat the new population of self-medicating patients, healthcare professionals need to be open and receptive to patients' health-related beliefs. By communicating and asking patients whether they use herbal remedies, practitioners can then responsibly advise or inform patients of potential interactions involving their dental treatment or drug-herb interactions.

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Notes

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