Original Paper

Perceived Effectiveness of Acupuncture: Findings From the National Health Interview Survey

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ABSTRACT

Background: Knowledge of perceived benefit from acupuncture treatment is important to predict who is using acupuncture, to inform physicians of the possible benefits of acupuncture, to determine where rigorous research should be focused, and to help policy makers predict future demand.

Objectives: To determine the proportions of survey respondents who reported perceived effectiveness of acupuncture treatment for specific conditions; and to determine the association of specified demographic variables with perceived effectiveness.

Design, Setting, and Participants: Publicly available data from 31,044 noninstitutionalized US adults who participated in the 2002 National Health Interview Survey, a cross-sectional in-home computer-assisted interview.

Outcome Measures: The proportions of participants reporting "any help" and "great help" for perceived effectiveness across conditions treated and per condition treated; and the association of the subgroups within age, sex, and body mass index (BMI), along with the subgroups Asian race and Chinese ethnicity, with "any help" of acupuncture treatment across conditions treated.

Results: Of the 1,274 respondents who reported having consulted an acupuncturist, 329 had used acupuncture in the last 12 months; 276 had used acupuncture to treat a specific condition. A total of 86% of respondents reported being helped by acupuncture, while 45% reported being greatly helped across conditions treated. In an examination of specific conditions treated, the range for "any help" was 98% to 67%, and 98% to 7% in the "great help" outcome. Older age and obesity were negatively associated with perceived effectiveness statistically but not clinically. Asian race and Chinese ethnicity were not statistically significantly associated with perceived effectiveness.

Conclusions: Acupuncture is perceived to be effective by most respondents who used it to treat a specific condition. Older age and obesity are negatively associated with perceived effectiveness, but not at a clinically significant level. A larger sample of Asian and Chinese subgroups is needed to determine if there is an association of these subgroups with perceived benefit.

Key Words: Acupuncture, Effectiveness, Survey

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INTRODUCTION

ACUPUNCTURE, IN USE FOR AT LEAST 2000 years, is part of the traditional medicine of China.[1] Currently, acupuncture is considered to be a complementary/alternative medicine (CAM) treatment in the United States. Acupuncture is a provider-based treatment with media visibility and National Institutes of Health–supported research activity.[2] In 2002, the National Health Interview Survey (NHIS) contained an Alternative Health/Complementary and Alternative Medicine Supplemental questionnaire to ascertain the use of various CAM treatments and the characteristics of users. Included in the questionnaire were questions to determine perceived benefits of the use of various CAM modalities for specific conditions. The alternative medicine supplement covered 27 different CAM treatments including acupuncture.

Knowledge of perceived benefit for specific medical conditions and across all conditions treated is important because this information can help health care providers predict which patients are using acupuncture, as patients do not necessarily disclose use of acupuncture to their physicians;[2] it informs physicians of the possible benefits of acupuncture; it helps determine where rigorous research should be focused in acupuncture therapy by providing preliminary data; and it helps policy makers predict future demand.

Our analysis of the CAM portion of the 2002 NHIS differs from previous analyses by providing a detailed description of the perceived benefit for the conditions for which acupuncture was used, along with a description of the association of the demographic covariates with perceived benefit. The NHIS analysis by Burke et al[2] provided a great deal of information on sociodemographics and mentioned perceived benefit across all conditions treated by acupuncture.

Other NHIS analyses focused on the prevalence of use in subpopulations. Barnes et al[3] reported on the percentage of use of CAM across modalities, conditions for which CAM was used, and sociodemographics.[3] Tindle et al[4] examined trends in CAM use. Graham et al[5] and Grzywacz et al[6] reported on the prevalence of CAM use based on age, race, and ethnicity. Grzywacz et al[7] reported on the use of CAM for mental health in older adults. Bruno and Ellis[8] described herbal use among elderly individuals, while Kennedy[9] reported on the prevalence of herb and supplement use in adults. Quandt et al[10] studied CAM use in persons with arthritis. Finally, Pagan and Pauly[11] assessed the relationship of CAM use and the cost of conventional care.

Our work takes advantage of the NHIS national random sample methodology (31,044 participants) to report US population estimates across all conditions treated and for specific conditions treated by acupuncture. National projections are important in guiding research and public health policy. The CAM use survey by Eisenberg et al[12] of 1539 randomly sampled participants is an enduring influence in CAM research. Their population estimates of out-of-pocket expenditures for CAM are frequently quoted. Our choice of covariates to study was guided by the first author's clinical experience and the common belief that acupuncture's perceived benefit is greater in the culture in which it originated.

METHODS

Study Design

The NHIS is a nationally representative cross-sectional household interview survey of the US civilian noninstitutionalized population aged 18 years or older. The NHIS uses a multistage, clustered sample design that allows for the determination of national estimates for health indicators.

The NHIS in-home computer-assisted personal interview is performed annually via the Centers for Disease Control and Prevention's National Center for Health Statistics (NCHS) and carried out by Census Bureau interviewers. Its basic module is composed of 3 parts: Family Core, Sample Adult Core, and Sample Child Core. In 2002, the NHIS included the Alternative Health/Complementary and Alternative Medicine Supplement with the Sample Adult Core, both of which are self-reported except in rare instances in which the adult is physically or mentally incapable of answering. Our study examined responses from the Sample Alternative Medicine Supplement related to acupuncture and responses from the Sample Adult Core related to age, sex, obesity, Chinese ethnicity, and Asian race. The NHIS data[13] were downloaded from the NCHS Web site (http://www.cdc.gov/nchs/hnis.htm). Our study is a descriptive secondary data analysis.

Measurement Strategy

Measurement of Perceived Benefit

One survey question assessed the degree of help related to acupuncture treatment for the most bothersome treated condition. This question contained 4 possible degrees of help: "great help," "some help," "helped a little," and "none." A dichotomous variable was created called "any help" that was positive if "great help" or "some help" or "helped a little" was answered. A second dichotomous variable of perceived benefit was created named "great help." This variable was positive if respondents answered "great help" on the question assessing degree of help. The 5 missing values in the "any help" variable and the 5 missing responses in the "great help" variable were counted conservatively as negative responses.

Another survey question assessed the degree of help related to acupuncture treatment for a specific condition. The created variables "any help" and "great help" were used again.

Measurement of Biological and Ethnic/Racial Covariates

Answers to questions in the NHIS pertaining to age, sex, BMI, and race/ethnicity were examined to determine the

possible association of these characteristics with the perception of benefit from acupuncture in those who used acupuncture to treat a specific condition. Variables were formed for the age groups 18–30, 31–40, 41–50, 51–60, and ≥61 years or over (older group). Variables formed for BMI were: obesity- (BMI equal to or greater than 30); overweight- BMI less than 30 and greater than or equal to 25.5; healthy weight- BMI less than 25.5 and greater than or equal to 18.5; and underweight- BMI less than 18.5. Finally, variables were formed for racial/ethnic categories white, African-American, Hispanic, Chinese, and Asian. Chinese ethnicity also was included within the Asian category. There was some overlapping in the white, Hispanic, and African-American categories.

Statistical Analysis

The analysis was carried out with STATA 9.2SE (STATA Corp, College Station, TX) using the svy commands to account for the complex survey sample design and NHIS weighting system. Relative standard errors (RSE) (standard error [SE]/point estimate $\times$ 100%) were calculated as an indicator of the reliability of estimates.[3] Respondents who answered yes to the initial questions (having ever seen an acupuncturist and having seen an acupuncturist in the last 12 months prior to the interview) were then asked if they had used acupuncture to treat a specific health problem or condition. The number of responses to each of the first 2 questions was recorded.

Perceived Benefit Across All Conditions Treated

The proportion of respondents who used acupuncture to treat a specific condition was determined for those reporting "any help" and for those reporting "great help." The corresponding SEs, confidence intervals, and population estimates of each proportion were determined.

Perceived Benefit for Specific Conditions Treated

The proportion of respondents using acupuncture to treat each specific condition was determined for those reporting "any help" and for those reporting "great help." Again, the corresponding SEs, confidence intervals, and population estimates of each proportion were determined.

Association of Biological and Ethnic/Racial Covariates With Perceived Benefit

The dichotomous variables for age, sex, obesity, Chinese ethnicity, and Asian race were assessed for association with perceived benefit (dichotomous variable "any help") with χ^2 tests. In instances in which statistical significance was reached, risk differences (attributable risks) were determined.

We set $P < .05$ to denote statistical significance, recognizing that tests of statistical significance are approximations that serve as aids to interpretation and inference.

RESULTS

Respondent Characteristics

The in-home computer-assisted interviews included 31,044 participants, resulting in a 74.3% response rate. The number of respondents who indicated having ever seen a provider or practitioner of acupuncture was 1,274. Of those, 329 had used acupuncture in the last 12 months; 276 of these participants used acupuncture to treat a specific condition. Table 1 displays the demographic characteristics of respondents who used acupuncture to treat a specific condition.

Perceived Benefit

Perceived Benefit Across All Conditions Treated

Eighty-six percent (SE, 2%) of participants reported being helped by acupuncture, while 45% (SE, 4%) reported being greatly helped (Table 2).

Perceived Benefit for Specific Conditions Treated

The specific conditions treated by acupuncture, according to the wording on the NHIS questionnaire, are shown in

TABLE 1. RESPONDENT CHARACTERISTICS ($N = 276$)

	No.	
	Survey subpopulation	*National population estimate*
	276	1,824,805
Age, y		
18–30	45	352,304
31–40	63	398,991
41–50	64	459,896
51–60	55	348,306
61 and over (older group)	53	298,826
Sex		
Male	114	828,050
Female	162	996,755
Body weight*		
Obese	64	359,230
Overweight	102	716,095
Healthy weight	104	716,810
Underweight	6	32,670
Race/ethnicity		
White	222	1,517,483
African American	21	119,198
Hispanic†	46	211,202
Asian‡	15	106,400
Chinese	5	32,072

*Obese was defined as a body mass index (BMI, calculated as weight in kilograms divided by height in meters squared) equal to or greater than 30; overweight- BMI equal to or greater than 25 and less than 30; healthy weight- BMI equal to or greater than 18.5 and less than 25; and underweight- BMI less than 18.5.

†Individuals of Hispanic ethnicity overlap with White and African-American.

‡Includes Chinese.

TABLE 2. PERCEIVED EFFECTIVENESS OF ACUPUNCTURE ACROSS CONDITIONS TREATED AND PER CONDITION TREATED

Condition treated	No.	Population	Any help, % (SE) [95% CI]	RSE, %	Great help, % (SE) [95% CI]	RSE, %
Across all conditions treated	276	1,824,805	86 (2) [82–90]	2	45 (3) [39–52]	7
Back pain or problem	89	610,000	87 (4) [80–94]	5	36 (6) [25–47]	17
Neck pain or problem	33	240,000	77 (7) [64–91]	4	12 (5) [2–23]	42*
Joint pain or stiffness	32	260,000	97 (3) [92–102]	3	21 (5) [11–31]	24
Severe headache or migraine	25	180,000	92 (5) [82–102]	5	14 (4) [7–22]	29
Recurring pain	22	150,000	67 (10) [47–87]	15	7 (2) [2–12]	29
Arthritis, gout, lupus, or fibromyalgia	18	97,000	78 (12) [54–102]	15	6 (2) [2–11]	33*
Anxiety/depression	10	53,000	97 (3) [92–103]	3	2 (1) [−1 to 4]	50*
Fracture, bone/joint injury	8	51,000	84 (14) [56–113]	17	5 (2) [0–9]]	40*
Hay fever	7	47,000	100 (0)		4 (2) [0–8]	50*
Head or chest cold	7	44,000	100 (0)		4 (2) [0–7]	50*
Allergic reaction to food	6	69,000	98 (3) [92–103]	3	98 (3) [92–103]	3
Sinusitis	6	32,000	100 (0)		45 (22) [2–88]	48*
Asthma	5	50,000	100 (0)		42 (23) [−3 to 88]	55*
Insomnia or trouble sleeping	5	24,000	100 (0)		40 (18) [5–75]	45*
Skin problems	5	36,000	69 (22) [25–113]	32*	45 (24) [2–92]	53*
Menstrual problems	4	18,000	100 (0)		53 (27) [1–105]	51*
Sprain or strain	4	38,000	80 (19) [42–117]	24	37 (24) [−10 to 85]	65*
Stomach or intestinal illness	4	40,000	100 (0)		87 (13) [62–113]	15
Menopause	3	22,000	100 (0)		62 (30) [3–120]	48*
Neuropathy	3	23,000	68 (27) [16–120]	40*	32 (27) [−20 to 84]	84*
Bowel problems or constipation	2	14,000	100 (0)		83 (20) [44–122]	24
Cholesterol	2	10,000	100 (0)		51 (35) [−19 to 120]	69*
Diabetes	2	22,000	100 (0)		75 (27) [22–127]	36*
Gynecologic problems	2	14,000	100 (0)		100 (0)	
Knee problem (not arthritis or joint injury)	2	6,300	100 (0)		60 (34) [−7 to 127]	57*
Other nerve damage including CTS	2	16,000	100 (0)		0 (0)	
Thyroid problem	2	14,000	100 (0)		56 (35) [−13 to 214]	63*
Allergic reaction to medication	1	4,141	100 (0)		100 (0)	
Excessive sleepiness during the day	1	34,000	100 (0)		100 (0)	
Hearing problem	1	4,194	100 (0)		0 (0)	
Heart condition or disease	1	6,881	100 (0)		0 (0)	
Hypertension	1	3,420	0 (0)		0 (0)	
Missing limbs (fingers, toes, or digits)	1	3,700	100 (0)		100 (0)	
Poor circulation in legs	1	6,098	100 (0)		0 (0)	
Dental pain	1	9,476	100 (0)		0 (0)	
Ulcer	1	8,607	100 (0)		0 (0)	
Weight problem	1	5,693	100 (0)		100 (0)	
Other injury	1	8,135	100 (0)		0 (0)	
Other, specify	71	480,000	88 (4) [81–96]	5	49 (7) [36–63]	14

Abbreviations: CI, confidence interval; CTS, carpal tunnel syndrome; RSE, relative standard error; SE, standard error.
*RSE greater than 30% is considered unreliable.

Table 2. In the any help category, 11 conditions have a relative standard error (RSE) less than or equal to 30%. These 11 conditions include: Back Pain or Problem; Neck Pain or Problem; Joint Pain or Stiffness; Severe Headache or Migraine; Recurring Pain; Arthritis, Gout, Lupus, or Fibromyalgia; Anxiety/Depression; Fracture, Bone/Joint Injury; Allergic Reaction to Food; and Sprain or Strain. In survey data, estimates with RSEs greater than 30% are not considered reliable. The RSE is calculated by dividing the SE by the estimate and multiplying by 100%.[3] Two conditions, skin problems and neuropathy, have RSEs greater than 30%. The RSE for the remaining listed conditions could not be calculated because the estimates were either 100% (26 instances) or 0% (1 instance).

For those specific conditions in which the RSEs were calculable and less than or equal to 30%, the range for any help was 98% to 67%. In the great help category, 8 conditions have an RSE less than or equal to 30% (Table 2). These 8 conditions include: Back Pain or Problem; Joint Pain or Stiffness; Severe Headache or Migraine; Recurring Pain; Allergic Reaction to Food; Stomach or Intestinal Illness; and Bowel Problems or Constipation. Eighteen conditions have RSEs greater than 30%. The RSE for the remaining listed conditions could not be calculated because the estimates were either 100% (5 instances) or 0% (8 instances). For those specific conditions in which the RSEs were calculable and less than or equal to 30%, the range for great help was 98% to 7%.

TABLE 3. ASSOCIATIONS OF BIOLOGICAL AND ETHNIC/RACIAL CHARACTERISTICS WITH PERCEIVED BENEFIT

	χ^2 value	P value
Age, y		
18–30	0.31	.58
31–40	1.36	.24
41–50	0.92	.34
51–60	2.75	.10
61 and over (older group)	8.00	<.001
Sex	0.89	.35
Body weight*		
Obese	7.55	.01
Overweight	2.62	.11
Healthy weight	0.81	.37
Underweight	0.01	.94
Race/ethnicity		
White	0.00	.96
African American	3.02	.08
Hispanic†	0.55	.46
Asian‡	4.11	.04§
Chinese	5.18	.02§

*Obese was defined as a body mass index (BMI, calculated as weight in kilograms divided by height in meters squared) equal to or greater than 30; overweight- BMI equal to or greater than 25 and less than 30; healthy weight-BMI equal to or greater than 18.5 and less than 25; and underweight-BMI less than 18.5.

†Individuals of Hispanic ethnicity overlap with White and African-American.

‡Includes Chinese.

§Statistically significant by 2×2 table χ^2 analysis but not statistically significant when risk difference calculated.

Association of Biological and Ethnic/Racial Covariates With Perceived Benefit

Analysis (Table 3) indicated statistically significant associations between any help and the variables age, obesity, Asian race, and Chinese ethnicity. The risk differences (attributable risks) for these variables were then calculated: (1) for age greater than or equal to 61 years, the risk difference was minus 0.004 ($P = .002$); (2) for obesity, the risk difference was minus 0.003 ($P = .004$); (3) for Asian race, the risk difference was 0.01 ($P = .13$); and (4) for Chinese ethnicity, the risk difference was 0.01 ($P = .17$). Thus, the variables older age and obesity have statistically significant risk differences but they are without clinical significance. The risk differences for Asian race and Chinese ethnicity were not statistically or clinically significant.

DISCUSSION

Our analysis of the perceived effectiveness of acupuncture in the nationally representative 2002 NHIS indicated that the proportion of participants who perceived effectiveness from acupuncture for the treatment of specific conditions was high across all conditions and generally high per specific condition treated. Older and obese individuals were, however, associated with less perceived effectiveness, but at a level that is not clinically significant (risk differences less than 1%).

Our study does have some limitations. Nonresponse can bias the results of surveys. The response rate for the 2002 NHIS is at an acceptable level (74.3%). In addition, self-reports can be unreliable. This survey used trained Census Bureau interviewers assisted by computers to enhance the reliability of the self-report data. Credibility of self-reported perceived effectiveness in the 2002 NHIS is also supported by comparing the proportions of participants reporting any help (86%) and great help (45%). It is unlikely that this difference would have occurred if the participants had answered in an enthusiastic and unreflective manner. By design, the NHIS survey did not collect data from respondents who had used acupuncture more than 12 months before the survey interview nor from those who did not use acupuncture to treat a specific condition. More rigorously designed studies are needed to test the hypotheses generated by this NHIS study. The subpopulations analyzed are small; however, the population estimates are based on weighted counts of these subpopulations. The population estimates are enabled by the survey design using a large nationally representative random sample. Additionally, RSEs were calculated for point estimates, which result in more conservative assessments of the reliability and precision of the data. Finally, our study examines the perception of effectiveness and is not an effectiveness or efficacy study that has produced hypotheses relevant to medical practice and public health.

Our detailed analysis of the perceived effectiveness of acupuncture indicated that 86% of an extrapolated 1.8 million US residents perceived effectiveness of acupuncture across more than 40 specific conditions while perception of effectiveness per specific condition treated ranged from 98% to 67%. The covariates of older age and obesity showed statistically significant negative associations with perceived outcome. However, older age and obesity did not appear to exert clinically significant effects based on calculations of risk differences (attributable risks) of minus 0.4% for older age and minus 0.3% for obesity. The covariates of Asian race and Chinese ethnicity based on risk difference (attributable risk) calculations were neither statistically nor clinically significant. Further study with a larger sample size is recommended. No other 2002 NHIS CAM studies examined perception of effectiveness of acupuncture in detail. Burke et al[2] made a detailed report of acupuncture based on sociodemographic variables, insurance coverage, disclosure of acupuncture use to conventional medical professionals, number of acupuncture treatments, other variables, and reported effectiveness across conditions treated.

Based on our study, physicians can better predict which patients are using or have used acupuncture and the likelihood of perceived effectiveness. Policy makers might estimate that demand for acupuncture services has been at least

stable and probably increased since the 2002 NHIS was conducted. An examination of the perceived effectiveness of the list of acupuncture-treated conditions can provide perspective to physicians regarding the use of acupuncture by their patients. Our descriptive hypothesis-generating study provides preliminary data on which to base small phase 2 studies for those conditions not yet rigorously studied, e.g., allergic reactions to food.

The NHIS questionnaire could be expanded to include possible adverse effects and possible side benefits (clinical experience indicates side benefit occurrence). To increase sample size, exclusive acupuncture surveys could be carried out in geographic regions of high use[2] or the NHIS could oversample areas of high use. Also, exclusive acupuncture surveys could be carried out by sampling participants from acupuncture practices and clinics. Thus, a very large sample size could be generated providing very reliable information on perceived effectiveness and preliminary clinical trial data.

CONCLUSIONS

In our study, acupuncture was perceived to be effective by most individuals who used it to treat a specific condition. Older age and obesity were negatively associated with perceived effectiveness, but not at a clinically significant level. A larger sample size of Asian and Chinese subgroups is needed to determine if there is an association of these subgroups with perceived benefit. Our study generates a number of interesting hypotheses and preliminary data regarding the effectiveness of acupuncture treatment.

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