


Prevalence of Hemodynamically Significant Internal Carotid Artery Disease Based on the Signs of the Zodiac

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Abstract

Vascular sonography requires a basic understanding of statistical concepts used to evaluate exam efficacy. Statistical analysis, however, is often viewed as intimidating and dull. To make this subject less threatening and more interesting, our vascular ultrasound class investigated the prevalence of hemodynamically significant internal carotid artery (ICA) disease based on signs of the zodiac. Randomly selected carotid ultrasound patients were obtained from an accredited vascular laboratory database based on month and day of birth. Each sign of the zodiac was assigned 60 patients. Exam results were defined as (1) normal: bilateral < 50% ICA stenoses, or (2) abnormal: unilateral or bilateral \geq 50% ICA stenosis. The Fisher exact test was used to compare normal and abnormal patient groups within each sign of the zodiac. The *P* value of < .05 was used to define statistical significance. A total of 720 patients were included in this analysis. Patients born under the sign of Gemini had significantly fewer numbers of abnormal stenoses than 6 astrological groups: Capricorn (*P* = .004), Virgo (*P* = .014), Libra (*P* = .007), Pisces (*P* = .026), Aries (*P* = .000), and Sagittarius (*P* = .007). Patients born under the sign of Aries had significantly greater numbers of abnormal results than 7 zodiacal groups: Taurus (*P* = .001), Aquarius (*P* = .002), Gemini (*P* = .000), Pisces (*P* = .040), Cancer (*P* = .015), Scorpio (*P* = .002), and Leo (*P* = .022). Hemodynamically significant (\geq 50%) ICA stenoses were statistically more prevalent for carotid duplex patients born under the zodiac sign of Aries and significantly less prevalent under the sign of Gemini. While these results may be medically unimportant, this vascular ultrasound assignment helps students understand the value of statistical reporting and, in general, made statistical analysis more relatable and enjoyable.

Keywords

statistics, education, carotid, stenosis, zodiac

Purpose

The education and understanding of vascular ultrasound is increasingly reliant on referencing scientific research papers and journals rather than traditional textbook education. Inherent to the vascular ultrasound profession is a basic understanding of statistical concepts used to evaluate exam efficacy. Statistical analysis, however, is often viewed as intimidating and dull. A statement from a classmate exemplifies what I think many sonography students may feel: “Please God, no more statistics.” To make this subject less threatening and more interesting, our vascular ultrasound class investigated the prevalence of hemodynamically significant internal carotid artery (ICA) disease by classifying patients based on their astrologic sign.

Methods

Randomly selected carotid ultrasound patients were obtained from an accredited vascular laboratory database. Patients were selected based on the month and day of their birth corresponding to the astrological calendar, and 60 patients were assigned

to each sign of the zodiac. Each patient’s carotid duplex exam results were defined as (1) normal—bilateral < 50% ICA stenosis; maximum ICA peak systolic velocity (PSV) < 150 cm/s, or (2) abnormal—unilateral or bilateral \geq 50% ICA stenosis; maximum ICA PSV \geq 150 cm/s. The Fisher exact test using QuickCalcs GraphPad software was used to compare normal and abnormal patient groups within each sign of the zodiac. Statistical significance was defined as a *P* value of < .05.

Results

A total of 720 patients with bilateral carotid duplex exams were analyzed, with 60 patients included in each of the 12 signs of the zodiac. Total number of normal (<50%) and abnormal

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Zodiac Sign	Normal <50%	Abnormal >50%	Capricorn	Taurus	Virgo	Aquarius	Gemini	Libra
Capricorn	45	15	X	YES-Less>50 0.053	NO 0.829	NO 0.097	YES-Less>50 0.004	NO 1.000
Taurus	54	6	YES-More>50 0.053	X	NO 0.132	NO 1.000	NO 0.491	NO 0.085
Virgo	47	13	NO 0.829	NO 0.132	X	NO 0.220	YES-Less>50 0.014	NO 1.000
Aquarius	53	7	NO 0.097	NO 1.000	NO 0.220	X	NO 0.209	NO 0.101
Gemini	57	3	YES-More>50 0.004	NO 0.491	YES-More>50 0.014	NO 0.209	X	YES-More>50 0.007
Libra	46	14	NO 1.000	NO 0.085	NO 1.000	NO 0.101	YES-Less>50 0.007	X
Pisces	49	11	NO 0.507	NO 0.295	NO 0.820	NO 0.322	YES-Less>50 0.026	NO 0.654
Cancer	50	10	NO 0.369	NO 0.421	NO 0.644	NO 0.602	NO 0.075	NO 0.494
Scorpio	53	7	NO 0.097	NO 1.000	NO 0.220	NO 1.000	NO 0.322	NO 0.148
Aries	38	22	NO 0.235	YES-Less>50 0.001	NO 0.076	YES-Less>50 0.002	YES-Less>50 0.000	NO 0.118
Leo	50	10	NO 0.369	NO 0.421	NO 0.644	NO 0.602	NO 0.075	NO 0.494
Sagittarius	46	14	NO 1.000	NO 0.085	NO 1.000	NO 0.101	YES-Less>50 0.007	NO 1.000

Zodiac Sign	Normal <50%	Abnormal >50%	Pisces	Cancer	Scorpio	Aries	Leo	Sagittarius
Capricorn	45	15	NO 0.507	NO 0.369	NO 0.097	NO 0.235	NO 0.369	NO 1.000
Taurus	54	6	NO 0.295	NO 0.421	NO 1.000	YES-More>50 0.001	NO 0.421	NO 0.085
Virgo	47	13	NO 0.220	NO 0.644	NO 0.220	NO 0.0756	NO 0.644	NO 1.000
Aquarius	53	7	NO 0.322	NO 0.602	NO 1.000	YES-More>50 0.002	NO 0.602	NO 0.101
Gemini	57	3	YES-More>50 0.026	NO 0.075	NO 1.000	YES-More>50 0.000	NO 0.075	YES-More>50 0.007
Libra	46	14	NO 0.654	NO 0.494	NO 0.148	NO 0.118	NO 0.494	NO 1.000
Pisces	49	11	X	NO 1.000	NO 0.444	YES-More>50 0.040	NO 1.000	NO 0.654
Cancer	50	10	NO 1.000	X	NO 0.602	YES-More>50 0.015	NO 1.000	NO 0.374
Scorpio	53	7	NO 0.444	NO 0.602	X	YES-More>50 0.002	NO 0.602	NO 0.101
Aries	38	22	YES-Less>50 0.040	YES-Less>50 0.015	YES-Less>50 0.002	X	YES-Less>50 0.022	NO 0.163
Leo	50	10	NO 1.000	NO 1.000	NO 0.602	YES-More>50 0.022	X	NO 0.374
Sagittarius	46	14	NO 0.654	NO 0.374	NO 0.101	NO 0.163	NO 0.374	X

YES-More>50: Significantly greater numbers of Abnormal >50% ICA stenosis
YES-Less>50: Significantly fewer numbers of Abnormal >50% ICA stenosis

Figure 1. <50> internal carotid artery stenosis for signs of the zodiac.

(≥50%) ICA stenosis with comparison analysis and designated P values for each of the 12 astrological signs are displayed in Figure 1.

Patients born under the sign of Aries had significantly greater numbers of abnormal ICA stenoses than 7 zodiacal groups: Taurus (P = .001), Aquarius (P = .002), Gemini (P = .000), Pisces (P = .040), Cancer (P = .015), Scorpio (P = .002), and Leo (P = .022).

Patients born under the sign of Gemini had significantly fewer numbers of ≥50% stenoses than 6 astrological groups: Capricorn (P = .004), Virgo (P = .014), Libra (P = .007), Pisces (P = .026), Aries (P = .000), and Sagittarius (P = .007).

Discussion

Whether you love or hate statistics, whether it puts you to sleep or makes you scream, an understanding of statistics remains a necessity for vascular sonographers in the 21st century. We must have at least a basic understanding of this subject so that we can critically evaluate scientific research inherent to the sonography profession. This assignment made me realize that a better understanding of statistical analysis helps clarify methodology and enhances the explanation and justification of the conclusions.

A greater appreciation of the statistical process assists in exposing sources of potential error and the reliability of the presented assumptions and principles. For example, our article

discusses the prevalence of hemodynamically significant ICA disease based on patients' astrological signs, yet we made no adjustments for sample size or bias, including age, race, or gender. Moreover, more traditional risk factors known to increase the risk for developing carotid artery disease such as hypertension, hyperlipidemia, diabetes, obesity, smoking, peripheral artery disease, coronary artery disease, and family history were not examined as part of this study.

Sample size calculations vary. One blanket formula cannot be used for all study designs.¹⁻³ To prevent sample bias, an understanding of the study population from which the sample was drawn is required.³⁻⁵ Native American and Caucasian individuals have the highest prevalence of carotid artery disease while African American males and Asian females have the lowest prevalence.⁶ Carotid disease is more prevalent among men than women, and there is increased occurrence with age.⁷ Uncontrolled variances and unbalanced study groups can result in skewed and implausible conclusions.

While our methodology in determining the prevalence of significant ICA stenoses based on the signs of the zodiac may be scientifically questionable and improbable, the actual hands-on study protocol of extracting relevant patient files from a large database, sorting them into specific categories, and evaluating results with the assistance of professional research sonographers brought to life the possibilities of using statistics in a real-world setting. Outside of the dry and often, unfortunately, dull academic rote learning environment, the gathering and

interpretation of statistics became less threatening and far more interesting. For many students, this assignment was a turning point in their studies.

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References

1. Patra P. Sample size in clinical research, the number we need. *Int J Med Sci Public Health*. 2012;1:5-9.
2. Anvari A, Halpern E, Samir A. Statistics 101 for radiologists. *RadioGraphics*. 2015;35:1789-1801.
3. Amitav Banerjee A, Chaudhury S. Statistics without tears: populations and samples. *Ind Psychiatry J*. 2010;19(1):60-65.
4. Jacobowitz GR, Rockman CB, Gagne PJ, et al. A model for predicting occult carotid artery stenosis: screening is justified in a selected population. *J Vasc Surg*. 2003;38(4):705-709.
5. Mineva PP, Manchev IC, Hadjev DI. Prevalence and outcome of asymptomatic carotid stenosis: a population-based ultrasonographic study. *Eur J Neurol*. 2002;9(4):383-388.
6. Rockman CB, Hoang H, Guo Y, et al. The prevalence of carotid artery stenosis varies significantly by race. *J Vasc Surg*. 2012;57(2):327-337.
7. De Weerd M, Greving J, de Jong A, Buskens E, Bots ML. Prevalence of asymptomatic carotid artery stenosis according to age and sex: systematic review and metaregression analysis. *Stroke*. 2009;40:1105-1113.