

INTRAOCULAR PRESSURE AND SPIRITUALITY:  
A CORRELATIVE STUDY

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A CORRELATIVE STUDY

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## ABSTRACT

*Background:* Spirituality has been shown to impact health in many positive ways, including decreasing high blood pressure and increased mental health. This study explores the correlation between intraocular pressure (IOP) and spirituality. While many aspects of health and spirituality have been studied, the link between IOP and spirituality has yet gone unexplored. *Methods:* A one page survey was distributed to primary care patients at the Michigan College of Optometry (MCO) clinic. Non-glaucoma patients between the ages of 18 and 75 years old were randomly selected for voluntary participation in this survey. Surveys were collected until 55 completed surveys had been returned. *Results:* A T-test revealed  $t = 1.40$  with a standard deviation of 2.67. The probability of achieving this result, assuming a null hypothesis is 0.167. While, this is not a statistically significant result, this study does demonstrate a potential inverse relationship between spirituality and IOP. *Conclusion:* Spirituality may have a beneficial effect on IOP, reducing IOP thereby contributing to increased ocular health. While this is suggested by the results of this study, further investigation must be done before a definitive statement to this effect is made. Patients should be educated on the positive effects of prayer and spirituality; it is also beneficial for physicians (including optometrists and ophthalmologists) to pray with their patients.

Faith is the realization of  
what is hoped for and  
evidence of things unseen.  
- Hebrew 11:1

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## **INTRODUCTION**

### *INTRAOCULAR PRESSURE*

Intraocular pressure (IOP) is a factor tested at virtually every eye exam. Aqueous humor, a blood product, is secreted from the ciliary epithelium into the posterior chamber. It then flows around the crystalline lens into the anterior chamber where it establishes a convection current before draining from the eye and returning to the bloodstream. Aqueous drains at a pressure dependent rate through the trabecular meshwork into Schlemm's canal and, to a lesser extent, at a pressure independent rate when the uveoscleral blood vessels reabsorb the aqueous. Pressure raises when there is an increase in the production of aqueous or a decrease in drainage. Average IOP is 15.5 mmHg<sup>1</sup>.

The measurement of IOP is called tonometry. The two types of tonometry are applanation and indentation tonometry. The most commonly used forms of measuring IOP are Goldmann applanation and non-contact (applanation) tonometry. The goal of applanation tonometry is to measure the pressure required to flatten a pre-determined area of the cornea. This is analogous to determining the inflation of a basketball by pushing on the surface with a thumb. Goldmann uses a split prism probe on a spring to accomplish this; non-contact tonometry uses a brief puff of air. The most common type of indentation tonometry is Schiottz tonometry, in which the clinician rests a concave plate on the cornea while a plunger of known weight indents the cornea; the depth of the indentation reflects the IOP<sup>1</sup>.

Glaucoma is a condition in which IOP pushes against the internal walls of the eye, causing damage to the nerve fibers in the retina. This cell damage, if untreated, over



time, can lead to blindness. Glaucoma, affecting 3 million Americans, is the leading cause of blindness in African Americans. In glaucoma, elevated IOP is strongly associated with vision loss. According to the National Eye Institute, “data demonstrate(s) that chronic elevation of intraocular pressure has a neurodegenerative effect on neurons critical for the integration and transmission of visual information<sup>2</sup>.” As such, the goal of most glaucoma treatment is to preserve vision by lowering IOP, this treatment usually requires the daily use of eye drops.

### *SPIRITUALITY*

Issues of faith tend to be a very private matter. Each person defines the walk with the Unknown in slightly a different way. Spirituality refers to one’s personal relationship with a divine entity. This journey, among many other facets, often includes prayer or meditation, giving to charitable works, helping others, reading from religious books, and attending meetings or services with others of like faith. Spirituality transcends all barriers – age, sex, race, economic and social status. 79% of Americans describe themselves as spiritual<sup>3</sup>.

Spirituality and prayer have been well documented to improve health, longevity, and overall quality of life. Amongst other benefits, faith has been shown to lower blood pressure, improve surgical outcomes, and decrease stress<sup>4</sup>. A recent double-blind study, with a population of 393 patients, asked religious people to pray for coronary patients in a specific hospital unit; after prayer, there was a decrease in the severity of illness, ventilation assistance, and medication usage when compared to the coronary patients who had received no prayer<sup>5</sup>.

## **METHODS**

A one-page survey was created, listing seven characteristics commonly found in spiritual people (Appendix A). This survey was administered to primary care patients at the Michigan College of Optometry clinic. Non-glaucoma patients between the ages of 18 and 75 years old were randomly selected for voluntary participation in this survey. Surveys were distributed from April 2005 to July 2005 until fifty-five were returned completed; the total number of surveys distributed was 138.

The survey was formatted as such that a patient scored zero points if the trait was never exhibited; one point was added for infrequently exhibited; sometimes earned two points; fairly often accumulated three points; if a point is very frequently exhibited, the patient scored 4 points. The points on each survey were tallied; a maximum of 24 points were possible. Those whose total score fell between 0 and 11 (inclusive) were deemed “non-spiritual” or “secular”; those whose total score fell between 13 and 24 (inclusive) were deemed “spiritual”. Those whose score fell at 12 were disregarded in order to give a clear delineation between the two categories.

Clinicians used Goldmann applanation tonometry to measure IOP via during the typical course of primary care exams. The IOP, as well as the time taken, sex and age of the patient were recorded; then the patient was asked (in person or via mail) to fill out the survey. Surveys were returned to the Michigan College of Optometry, accumulated, and then tallied.

## RESULTS

Survey results were tallied. A T-test revealed  $t = 1.40$  with a standard deviation of  $2.67^{\dagger}$ . The probability of achieving this result, assuming a null hypothesis is 0.167. This is not a statistically significant result. Before any definitive statement is made relating spirituality and IOP, further studies should be done on this topic. The results, though not significant, do potentially indicate an inverse relationship between spirituality and IOP; spirituality correlates with lower IOP (Tables 2 and 3).

A total of 52 completed surveys were used for this study; 3 completed surveys were discarded. The ranges of IOP were 10 to 23 in the total population, 11 to 23 in the “spiritual” population, and 10 to 22 in the “secular” population. The ranges of ages were 18 to 73 in the total population, 18 to 73 in the “spiritual” population, and 21 to 71 in the “secular” population. The ranges of survey scores were 3 to 23 in the total population, 13 to 23 in the “spiritual” population, and 3 to 11 in the “secular” population. (Appendix B)

The mean IOP was 15.0 in the total population, 14.5 in the “spiritual” population, and 15.5 in the “secular” population. The mean age was 42.4 in the total population, 43.2 in the “spiritual” population, and 42.4 in the “secular” population. The mean survey score was 12.2 in the total population, 17.6 in the “spiritual” population, and 6.9 in the “secular” population.

The total population was 36.5% male / 63.5% female, 23% male / 77% female in the “spiritual” population, and 50% male / 50% female in the “secular” population.

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<sup>†</sup> Statistics obtained via software from the College of St. Benedict and St. John University. Available at: [www.physics.csbsju.edu/stats/t-test.html](http://www.physics.csbsju.edu/stats/t-test.html).





## COMMENTS

While it may not eliminate the need for therapeutic glaucoma medications, encouraging patients to become more spiritually active may be a helpful adjunct to medications in the fight against glaucoma. The patient should be educated that spirituality is not a “cure-all;” drop usage should not be altered without prior physician instruction. Regardless of patient education, some patients will be non-compliant with drop usage. The standard of care states that these patients should be referred for surgery; however, presenting these patients with the advantages of spirituality may encourage them to increase that aspect of their lives, thereby decreasing IOP by surgery and perhaps even a bit further by prayer.

93% of Americans believe prayer heals<sup>4</sup>. In a recent randomized-controlled study in the Southern United States, physicians in primary care offices offered to pray with their patients; over 90% of patients accepted the prayer. It must be done delicately, but offering to pray with patients may be beneficial to the patient’s ocular, systemic, and psychiatric health. Another study stated that “more than 70% of Americans say their approach to life is based on their religion, 75% of patients think their physician should address religious issues, and 50% of patients want their physician to pray with them.”<sup>6</sup>

## **CONCLUSION**

Spirituality has been shown to have many positive health effects, including lowering blood pressure, decreasing stress and depression, and increasing longevity. It may have a beneficial effect on IOP, reducing IOP thus contributing to increased ocular health. While this is suggested by the results of this study, further investigation must be done before a definitive statement to this effect is made. At this point in time, prayer should be used only as an adjunct to medical therapy, instead of a replacement. Patients should be educated on the positive effects of prayer and spirituality; the Krause study suggests that it may be beneficial for physicians, including optometrists and ophthalmologists, to pray with and for their patients.

## REFERENCES

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APPENDIX A:

SURVEY



Number \_\_\_\_\_

Age \_\_\_\_\_

Gender M F

1. Do you attend religious services?

Never Infrequently Sometimes Fairly Often Very frequently

2. Do you read religious material?

Never Infrequently Sometimes Fairly Often Very frequently

3. Outside of religious services are you involved with your place of worship  
(ex. Bible study, fellowship, etc.)?

Never Infrequently Sometimes Fairly Often Very frequently

4. Do you pray and/or meditate?

Never Infrequently Sometimes Fairly Often Very frequently

5. Do you give financially to your place of worship or other charitable  
organizations?

Never Infrequently Sometimes Fairly Often Very frequently

6. Do you do volunteer work?

Never Infrequently Sometimes Fairly Often Very frequently

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Clinician: Please administer this survey to all non-glaucoma patients between the  
ages of 18 and 75. Please provide pressures taken via Goldmann tonometry.  
Please turn this form and the patient's survey into Sue or Kerrie at checkout.  
Thank you.

IOP \_\_\_\_\_ OD \_\_\_\_\_ OS

Time \_\_\_\_\_ am / pm

APPENDIX B:  
Ranges and Means

POPULATION:	TOTAL	SPIRITUAL	SECULAR
Ranges:			
Range of IOPS:	10 to 23	11 to 23	10 to 22
Range of ages:	18 to 73	18 to 73	21 to 71
Range of scores:	3 to 23	13 to 23	3 to 11
Means:			
Mean IOP:	15.01	14.5	15.5
Mean age:	42.35	43.2	42.42
Mean survey score:	12.22	17.58	6.88
Total:			
Males:	36.5%	23%	50%
Females:	63.5%	77%	50%