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Research Article

EYE DISEASE AND VISUAL IMPAIRMENT AMONG HISPANICS IN THE USA

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Abstract

Objective: The purpose of this quantitative study was to examine the relationship between eye disease/visual impairment and ethnicity among Hispanics in the USA and to investigate to what extent ethnicity (Hispanic vs. Caucasian) makes a difference on eye disease/visual impairment for various ocular diseases such as Glaucoma, Cataracts, Ager-related Macular Degeneration and Diabetic retinopathy. **Materials and Methods:** Correlational Design was utilized as the research deign of this quantitative study. The sample size included 300 participants in which half were Hispanic and half Caucasian. The average age of participants was 41 and 63% were female. **Results:** Overall Hispanics had higher rates in most eye diseases. Hispanic participants had higher rates of refractive error than Caucasians. Hispanics had statistically significantly higher rates in four categories including cataracts, blepharitis, pinguecula and glaucoma suspect.

INTRODUCTION

Hispanics are considered the largest ethnic minority group in the United States. By the year 2050, the Hispanic population is estimated to be 30 percent of the U. S. population. Therefore, it is critical to ensure that this population has access to proper medical care, including eye care, and is able to receive adequate health education in order to ensure the well-being of this growing consumer population [1].

Some of the most common correctable visual impairments can be simply be corrected by an appropriate optical correction such as glasses in an attempt to improve vision and the quality of the life of individuals. According to a study by the National Eye Institute (NEI), it has been estimated that about half of all American adults, including the some of the Hispanics, suffer from correctable vision reduction due to various types of refractive errors of the eyes, and do not have 20/20 vision [2].

Also, when it comes to adhering with eye care providers' recommendations, reports indicate that Hispanics are 46 percent less likely to wear recommended eye corrections compared to the Caucasians, Asians, and Blacks living in the U.S. This could be could be due to various factors including a possible lack of access to proper patient education from providers to these patients [3].

When it comes to ocular health, minorities especially the fact growing U.S. Hispanic population, are no exemption for some of the challenges and limitations, and risks. According to a research that was conducted as a part of the Los Angeles Latino Eye Study (LALES), which was supported by the National Eye Institute (NEI), stated that the U.S. Latino population has higher rates when it comes to developing certain eye conditions/diseases including developing visual impairment, blindness, diabetic eye disease, and cataracts in compare to non-Hispanic Whites [4]. The same study reported the Latinos have low rates of early, and late Age related- macular degeneration (ARMD). Compared to some of the other population-based studies, the LALES study indicated that the Latino population in the U.S. were half as likely to develop early ARMD, and one-third as likely to develop late ARMD compared to non-Hispanic Whites [4].Previously the LALES study had indicated that more than 60 percent of the eye disease were undiagnosed, and undetected in the Latino population; including about 98 percent of ARMD, 95 percent of diabetic retinopathy, 82 percent of glaucoma, 57 percent of cataracts, and 19 percent of refractive errors," among the U.S. Hispanic population [5].

Besides certain ocular diseases and conditions which tend to be more common among the Hispanic population, there are also some known systemic conditions that are also prevalent in the Hispanic population, and also have the potential to affect their visual health secondary to these conditions. The most two common ones include diabetes, and hypertension. Diabetes and high blood pressure, both can lead to serious visual complications including diabetic and hypertensive retinopathy respectively. Diabetes also tends to affect Hispanics at an earlier age [6]. Diabetes and hypertension may result in ocular changes and result in damages to the eye, therefore, regular eye exams can be a valuable tool in diagnosing and

preventing potential ocular damages that may occur, plus help the eye care practitioner to work hands in hand with the patient's primary care physician in order to keep the systemic condition under adequate control as best as possible by monitoring for the changes in the eye. [3] Near half of the Hispanic population with high blood pressure has been estimated to be unaware of the diagnosis. Again, re-emphasizing the importance of regular eye exams for ensuring the overall health of the U.S. Hispanic population [1]. Among the ocular conditions and diseases that tend to be more prevalent in the Hispanic population is Glaucoma. Glaucoma is referred to by some as "the silent thief of sight." It is considered the leading cause of blindness among Hispanics. Studies suggest that open-angle glaucoma, a type of glaucoma that is known to be common among the African American population, also has comparable rates among Hispanics, and "at much higher rates compared to non-Hispanic Whites [6]." Also, cataracts which is considered to be the leading cause of preventable blindness in the world, for which the risk factors are considered multifactorial including age, gender, and cumulative UV exposure, it has also been found to be more common among Hispanics [1].

It has been shown that when it comes to the importance of UV protection in order to prevent sun damage to the eye, Hispanics have among the lowest awareness levels, with just 3.7 percent recognizing that sun can damage their eyes. Hispanics also seem to be unaware of the importance of the use of UV eye wear protection to prevent some of the most common UV-related eye diseases that are considered common among Hispanics such as cataracts, and pterygium [1,7].

And even though, Hispanics are known to be at a higher risk for developing certain eye diseases or conditions, but they continue to have the lowest number of yearly exams compared to other of demographic groups living in the U.S. There have been some discussions an reasons behind this including unaffordable exam costs, being too busy, and possibly not experiencing any vision problems, therefore, not recognizing the need for yearly eye checkups [3,8]

This lack of awareness may have some of its roots in the fact that according to the U.S. Census Bureau, about 70% of the U.S. Hispanic population speaks Spanish at home[3], therefore, indicating a great need for bilingual educational pamphlets at doctors' offices, and the need for professional translators when dealing with individuals who may not speak English well or would just simply prefer an exam given in their mother tongue. Using professional translators instead of relatives, neighbors, friends, or young family members, can prevent miscommunications, or misunderstandings, and will cause the patient to feel more comfortable at the exam knowing that his or her exam is confidential, and can lead to better patient education, which will translate into better compliance with any possible recommended treatments, and a higher change that the patient would return for his or her next follow-up appointment.

There are other factors that may also play a role in limiting the access of a certain minority group to a more accessible better health care such as the level of education or income of the individuals belonging to that group. According to Zhang et al. from 1999 to 2008, Hispanic individuals who had less education and a lower income were shown to be less likely to have had an eye exam in the past 12 months compared to non-Hispanic Whites [4]. They were also able to find some significant differences among individuals when looking at their ability to afford eyewear based on their racial/ethnic background. There was some significant racial/ethnic differences in the ability to afford eyeglasses in several years. As a matter of fact, according to Zhang et al., in 2008, Hispanics were more likely to report an inability to afford eye glasses when needed compared to non-Hispanic Whites and non-Hispanic Blacks. And, it was found that individuals who had less than a high school education were more likely to report an inability to afford eyeglasses when needed, compared to those with higher levels of education [4].

Among the factors that need to be considered, which can have an effect on the ocular health and the overall health of Hispanics, are the effects and the importance of the religious and cultural beliefs that are held by this group of individuals. Some of the religious and/or cultural beliefs may interfere or change the way the individual perceives different eye diseases or conditions, and affect their decision making when it comes to receiving the available treatment options, and the actual compliance of the individual. Just like any other ethnicity in the U. S., the Hispanic-American culture, also demonstrates a wide diversity, therefore, it is difficult to generalize its health beliefs and practices, but it is crucial for health care providers including eye doctors to have some kind of familiarity with the topic in order to be able to provide better care, and to ensure better compliance when it comes to patients' health.

For example, many Hispanics believe that God controls everything, including one's health status [9,10,11,12]. Furthermore, different diseases and illnesses may be viewed as a result of bad luck or as a punishment from God for a committed sin by an individual.[9] These cultural and religious beliefs can influence and alter patients' compliance with both preventative and prescribed health treatment regimens [9,11,13,14,15,16]. The Hispanic individuals who perceive that the individual has little control over determining their health outcomes, will be less likely to participate in healthy lifestyle activities such as exercising, an activity that plays a role in the overall systemic health of individuals [13,17].

Plus folk remedies including herbal remedies, or even rituals, as an alternative to medical treatments or as an "adjunct" to the conventional medical treatment is also very common among some the Hispanic- American cultures [11,12,16]. Magico-religious practices are very common including shrines, medals, candles, prayers and healers who focus "on the physical, mental, spiritual and social aspects of the ill person [9,13,16]."

These are just a few notions in order to signify the importance of knowing some basic information regarding the Hispanic cultural and its religious believes. An eye care provider, or any health care provider for that matter, when familiar with these belief systems may be able to better communicate and understand his or her patients' perspectives, and hopefully be able to provide better patient education, make a timely diagnosis, better communicate the available treatment options and consequently better monitor the progression of the disease in the follow up visits. A culturally competent health care provider can create an environment where the patient may feel an accepting and respecting attitude towards his/her cultural or religious beliefs such as an herbal therapies, folk medicine, and folk healers, and therefore, result in an

honest sharing relationship and be able to support better health outcomes [9]. For example, a Hispanic patient who has been diagnosed with glaucoma, and is using herbal medicine instead of the prescribed medications, if the health care provider shows awareness and respect towards the cultural and religious beliefs of the individual, he or she may be able to improve the patient- doctor relationship in a way that he patient may agree to resume the prescribed conventional medical treatment while continuing with some of the herbal remedies that both the doctor and the patient agree to be healthy for the individual and sort of create a con-management opportunity where the patient's visual health and the disease progression can be monitored and managed while the patient also feels emotionally more satisfied and happy with the treatment plan.

In conclusion, being unable to afford the eye care cost or being unable to afford the recommended eyewear treatment, the possible lack of proper patient education due to low number of professional translators used for eye exams and health exams in general, instead of family members or young children, the lack of symptoms in many eye conditions such as in early stages of glaucoma, the lack of awareness, certain cultural differences, and beliefs which in some instances may override the doctor's recommendations or treatment options, all can result in delayed testing, a delayed diagnosis, and therefore, delays in treatment. Plus struggles with ensuring preventative care, and continuation of care and treatment, may create frustrations for both the patient and care providers, which could again be simply due to a lack of understating on both ends, which at the end of the day can put the patients' eye health and overall health at even a higher risk for some of the known ocular and systemic conditions that are already known to be more commonly affect the Hispanic individuals.

MATERIALS AND METHODS:

The purpose of this quantitative study was to examine the relationship between eye disease/visual impairment and ethnicity among Hispanics in the USA and to investigate to what extent ethnicity (Hispanic vs. Caucasian) makes a difference on eye disease/visual impairment for various ocular diseases such as Glaucoma, Cataracts, Ager-related Macular Degeneration and Diabetic retinopathy. This study aimed to answer the following research questions:

1. Is there a statistically significant difference between the overall rates of eye diseases between Hispanic patients and Caucasian patients in the USA?
2. Is there a statistically significant difference between the overall rates of refractive error between Hispanic patients and Caucasian patients in the USA?
3. To what extent does ethnicity (Hispanic vs. Caucasian) make a difference on eye disease/visual impairment for various ocular diseases such as Glaucoma, Cataracts, Ager-related Macular Degeneration and Diabetic Retinopathy?

The research design in this study is correlational research design. Correlational research design "uses the correlation statistical test to describe and measure the degree of association (or relationship) between two or more variables or set of scores [18]." The correlational research was cross-sectional; the data was collected at one point in time. The purpose of the correlational research is to determine the extent in which two variables co-vary; determine the "changes in one variable are reflected in changes in the other [18]."

The form of data collection used in this research study was past patient records compiled by a private eye clinic in Texas. the school district. Identifying information about patients were deleted for confidentiality purposes. The researcher did not incur any costs for the data collection.

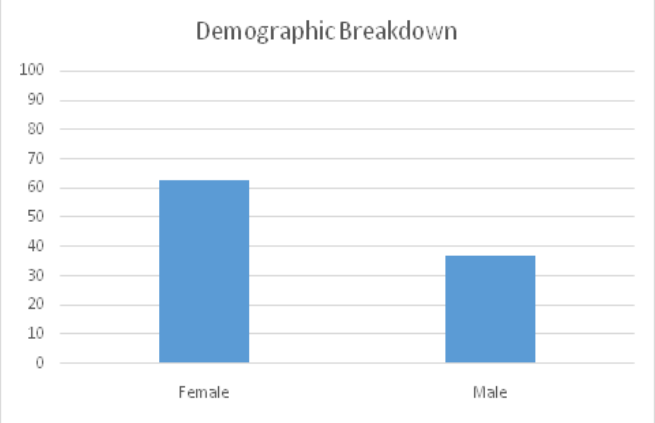
The participants of this study were all adult patients that had visited the specific eye clinic within a specific period of time for diagnosis or treatment of visual impairment or eye disease. The criteria for inclusion in the study was that participants had to be either Hispanic or Caucasian. The total population of 300 patients was used and therefore, no sampling procedure was used. The participants remained anonymous and confidential. No names were provided to the researcher, and all information provided were kept confidential by the researcher. The researcher used an identification number for the information of each participant.

The ten most common eye diseases were used as dependent variables in this study. See table 1 for a list of these diseases. The data collected was analyzed using Statistical Package for the Social Science (SPSS). The data analysis includedboth descriptive and inferential analysis. The dependent variables were checked for normality and then appropriate inferential test were utilized to answer the research questions of this study.

RESULTS

From the 300 participants, around half were Hispanic and the other half were Caucasian. The mean age of participants was 41. The majority of participants were female as illustrated in Figure 1.

Figure 1: Gender proportions of participants



Since the dependent variable owas not normally distributed a non-parametric inferential test was used. A Kruskal-Wallis test was conducted comparing the eye disease rates of Hispanic and Caucasian participants. A significant result was found ($p< .01$) , indicating that the groups differed from each other. Hispanic participants had significantly higher eye disease rates than Caucasians.

A Kruskal-Wallis test was conducted comparing the refractive error rates of Hispanic and Caucasian participants. A significant result was found ($p< .05$) , indicating that the groups differed from each other. Hispanic participants had significantly higher rates of refractive error than Caucasians.

Further post hoc analysis showed that Hispanic participants had statistically significantly higher rates in four categories including cataracts, blepharitis, pinguecula and glaucoma suspect as illustrated in Table 1.

Table 1: Results of differences of ethnicities based on various eye diseases

Disease/Ethnicity	Frequency	*p* value (*p<.05)
Astigmatism		0.82
Caucasian	138	
Hispanic	141	
Presbyopia		0.79
Caucasian	104	
Hispanic	108	
Cataracts		0.03*
Caucasian	55	
Hispanic	90	
Hyperopia		0.34
Caucasian	69	
Hispanic	77	
Myopia		0.70
Caucasian	72	
Hispanic	79	
AMD		0.87
Caucasian	67	
Hispanic	63	
Dry Eye Syndrome		0.68
Caucasian	23	
Hispanic	26	
Blepharitis		0.02*
Caucasian	13	
Hispanic	24	
Pinguecula		0.00*
Caucasian	6	
Hispanic	25	
Glaucoma Suspect		0.00*
Caucasian	3	
Hispanic	28	

DISCUSSION

As the literature indicates, there are certain eye diseases and conditions that tend to affect Hispanics more than non-Hispanics. Here is a quick overview regarding the different diseases that were found in both phases of the study. In the first phase of this study, some eye diseases and conditions were found to be more common among the Hispanics versus the non-Hispanics in the study including *myopia, hypermetropia, presbyopia*, *astigmatism, cataracts, age related macular degeneration (ARMD), and borderline glaucoma (glaucoma suspect).* However, none of the eye diseases found in the first phase of the study was clinically significant.

Myopia is considered a type of refractive error of the eye. There are several different types of myopia, and this condition is considered to multifactorial including genetics, and the type of environment and visual demands patients may have on a daily basis [19]. Patients with this type of refractive error, generally, tend to experience more reduction in their distance vision than their near vision if proper optical corrections such as glasses, contact lenses are not worn or without any type of refractive surgery to correct their vision. The reduction in the distance vision can be significant depending on the severity of the myopia. Patients may struggle with some of the simplest daily activities such as driving, seeing road signs, or seeing the board clearly in class, which can adversely affect the quality of the their lives, interfere with schooling, and even make them a danger on the road due to their inability to see clearly without correction.

Hypermetorpia is another type of refractive error that may occur in the eye. Depending on the patient's age, the visual problems and symptoms that are typically experienced by patients will vary, but generally, patients with *hypermetropia or hyperopia,* will mainly experience visual symptoms that mainly occurs when looking up close at near. Without the proper correction, these patients may experience headaches from their own focusing system trying to compensate for the refractive error to make things clearly up close which will create an extra demand for accommodation when looking at near, and depending on the patient's age, whether they have enough accommodation or focusing ability available to them, then they may start to experience visual symptoms such as cause headaches, blurry vision, asthenopia or even present as strabismus in young children. This can translate into a child who may not be doing well in school, and shows a lack of interest in any type of homework, reading or in any type of near work in general. Unfortunately, if not diagnosed and properly corrected for in time, hypermetropia depending on the severity, may result in a total lack of interest in school, and therefore, lead to the child dropping out of school, and never obtaining even a high school diploma, and turning in to other avenues in order to make money and fulfill financial needs and goals in life. And depending on the individuals' family, financial, and cultural background, in some cases, this may lead into the individual getting involved with crimes, or different gangs down the road.

As it was mentioned earlier, an uncorrected high amount of hyperopia in a child, may lead to an eye turn or strabismus, which if not corrected for, may lead to permanent vision loss. In addition to visual problems, this can also cause various types of emotional stress for the child, and may even lead to the development of different types of psychological disorders and problems such as anxiety, depression or many other emotional disorders simply because the child was made fun of on a daily basis because of her/his eye turn, which could be prevented or helped with a proper timely diagnosis and treatments such as optical corrections like appropriate eye glasses, contact lenses, or in some cases, with proper surgical options.

Now imagine the other end of the spectrum, like an elderly person with uncorrected hyperopic refractive error. Like many older patients, an elderly patient may struggle to see things clearly up close due to *presbyopia* (described later in this paper) due to normal aging changes that occurs to the crystalline lens inside the eye, resulting in a reduction and loss of accommodation or focusing ability at near with age. Therefore, an elderly patient with uncorrected hyperopia in addition to presbyopia, may experience even more visual symptoms due to the inability of the focusing system to at least try to compensate for the uncorrected hypermetorpia. This can translate into daily

struggles such as reading the medication labels and etc. making the patient less independent and eventually dependent on others for many daily activities and creating psychological and confidence issues for something that can be simply helped with an appropriate pair of glasses, and therefore, increase patient's compliance with different medications and avoid possible unintentional overdosing by the patient. This situation can become even more complicated when the patient may also additionally struggle with the small prints indicating the instructions for taking a certain medication, if the patient is not comfortable at reading English like many Hispanic parents or grandparents, who may have to rely on their kids or relatives, therefore, putting their health at a higher risk for potential inadequate treatments, resulting in poor compliance or even more serious health issues such as overdosing, which may be prevented by appropriate visual corrections and providing clear instructions in both English and Spanish. *Presbyopia* is an eye condition, which generally starts occurring in the normal population after the age 40. With presbyopia, the crystalline lens inside a normal eye, responsible for focusing and bringing things into focus, will start to lose its ability to focus, therefore the accommodative ability of eyes will start to decrease and therefore, it will become difficult to see things clearly at near. Most patients attempt to hold materials at a further distance, in an attempt to bring things into focus at up close, but eventually will be limited by the length of their arms resulting in either the patient finally reaching out to an eye care doctor or attempting to self-treatment using over the counter readers which do not typically provide the best correction depending on the type of refractive error or other ocular issues that the patient may also have. This may complicate daily activities, and can lead to something as simple as being unable to read the newspaper prints or putting someone's or others' health in danger if one is in charge of operating certain machinery if an appropriate correction is not worn, and the vision is not appropriately corrected. Also, reading small prints like medication labels will become a daily challenge as well with presbyopia. And without the appropriate visual correction to compensate for the declining focusing ability, putting the patient's health at risk and making them dependable on others.

Astigmatism is a type of refractive error, which depending on its severity, may also lead to a blurry vision or simply cause asthenopia, headaches or other visual complications. There is an inability of the eye to form a clear retinal image due to an irregularly shaped cornea or the crystalline lens having an inappropriate curvature, therefore, resulting in a challenge to see clearly at distance and at near [20]. As an example, a student with high levels of uncorrected astigmatism, my experience headaches, blurry vision, and other visual problems while trying to study for an upcoming test, or the uncorrected astigmatism may result in driving to become a challenge.

Other than the different types of refractive error conditions that were described in the above, which were found in both phases of the study, additionally there were some ocular disease that were also found in both phases including cataracts, AMD, and borderline glaucoma referred to as being a glaucoma suspect. In the second phase, presbyopia, myopia, hyperopia, astigmatism, and AMD were again found, but continued to be not clinically significant. Additionally, dry eye syndrome (DES) was also found to be more common among the Hispanics seen in the study compared to non-Hispanics. However, in the second phase of the study, there were four eye diseases or conditions that were found to be more common among the Hispanic population two of which had also been also found in the first phase but this time were actually clinically significant which included cataracts, and glaucoma suspects. Additionally, Hispanic patients in the second phase were also found to have two other eye diseases or conditions that were found to be more prevalent among the Hispanics in the study and were clinically significant which included pinguecula and blepharitis. Here is an overview of these ocular diseases.

Cataracts may be caused due to different reasons but the most common type of cataracts occur due to normal aging changes to the crystalline lens. There are certain risk factors which can accelerate the formation of different types of cataracts including excessive ultraviolet (UV) 22 exposure over a patient's life time that will eventually result in the crystalline lens turning cloudy and forming a cataract. It is believed that diabetic patients are 60% more likely to develop cataracts compared to normal population. Also, patients with diabetes tend to developed cataracts at an earlier age or have them progress at a faster rate.[23] Cataracts may also be caused secondary to trauma, or from taking certain medications such as corticosteroids, or be simply congenital. Therefore, depending on which stage of life cataracts occur in someone's life, they may affect their vision or daily lives in different ways. Depending on the type and the location of the cataract, distance vision, near vision or both may become affected as result of the changes in the lens. This could make driving a challenge or even something as simple as reading the newspaper in the mornings. Therefore, resulting causing the patient to become less independent, and forced to rely on others for help for even some of the most normal daily activities. For example, a child with congenial cataracts, if not diagnosed in a timely manner, may develop amblyopia and have long life permanent vision loss, versus, in case of a senile cataract, the vision will be affected slowly over time, and patient usually regains adequate vision after cataract surgery, with or without additional optical corrections depending on the case. According to the LALES study, Latinos were shown to be "more likely to develop cataracts in the center of the lens (10.2 percent) than the edge of the lens (7.5 percent). Many of these lens changes were age-related, as 50 percent of Latinos age 70 and older developed cataracts in the center of the lens [5]." Also, if there are certain co-existing ocular conditions such as diabetic retinopathy which tends to more commonly affecting Hispanics than non-Hispanics , or due to complications during and after surgery, patient may experience decreased vision, despite best optical correction [5].

There are also different types of *glaucoma.* According to the Los Angeles Latino Eye Study (LALES), funded by the National Eye Institute, it was reported that the overall prevalence of open angle glaucoma (OAG) among Hispanics is about five percent, which is similar to the prevalence amongst African Americans in whom OAG is known to be at least four times more common than in Caucasians living in the United States of America [21].Glaucoma is an eye condition that will cause painless permanent vision loss. Unfortunately, it affects side vision first, therefore, there are no associated pains or symptoms, therefore, patients who do not have regular eye exams or

those with lack of adequate access to eye care professionals, can have delayed diagnosis, and lose significant vision preeminently, before being able to receiving any type of care. Also, assuming the diagnosis is made on time, or if the patient is found to have borderline glaucoma, therefore, having a higher possible risk compared to the rest of the population for developing this disease, then patient educating becomes very crucial in order to make the person realize that even though there might not be any associated visual symptoms yet, however, they need to obtain yearly checkups, or adhere to a recommended follow up schedule or have repeated testing. In cases where the patient is actually diagnosed with glaucoma, patient education is also important to ensure proper care and prevent further damage by explaining the importance of compliance with the recommended eye care treatment. So, educating the patient about the importance of compliance is always a vital part of patient care when dealing with patient with borderline glaucoma or actual glaucoma. Also, some patients discontinue treatment due to lack of understanding that may arise from on both the patient side, and the provider side if proper communication is not maintained. These are some of the daily challenges that most eye care providers will have to deal with when dealing with patients with glaucoma or when trying to convince the patient regarding the importance of follow-up visits, and further possible required testing especially in cases of glaucoma suspects. Now this process becomes even more complicated when dealing with a patient who may not speak English, or may have certain cultural beliefs such as the belief that different diseases may be a form of punishment from God, which commonly is held by some with a Hispanic background. This can especially become problematic when the patient does not fully understand the language, and if there is a lack of proper professional translators, or culturally incompetent health care professionals. Some of these cultural or religious beliefs, if not understood by the care providers, may adversely affect the patient care, and inevitably, lead to poor compliance, or discontinuation of care and permanent visual or health damages. If providers are culturally competent, by using a respectful and understanding tone, a compromise may be reached where the patient may still be able to seek some of the traditional remedies that she or he believes is going to be helpful to them to for example help them reach inner peace and relaxation, while also taking the medications that the provider has recommended in order to provide adequate care and treatment, versus, a case where if there are no dialogues or mutual understandings, then the patient may decide to stop all treatments, and solely rely on other remedies based on their cultural or religious beliefs which may not be sufficient to provide the adequate proper treatment and therefore, result in a lack of ability to prevent the patient for example from going blind or eventually, possibly, even lead to patient's death.

Age related macular degeneration (AMD) was also found to be common among the Hispanic population. AMD is a condition in which the central vision or the part of vision that is responsible for seeing details, becomes compromised, and the vision becomes blurry. Therefore, it can also make the individual dependent on others for even routine daily work such as driving, cooking, reading and etc. due to the permanent vision loss that affects the central vision. These are individuals who eventually will not even be able to see their grand children's faces since their vision loss will even deprive them of such a simple joy in life.

According to Munoz et al., the prevalence of early AMD in Hispanics was significantly higher compared to Whites. However, the prevalence of late AMD was shown to be lower than that estimated for Caucasians living the United States of America [22].

Previously it was mentioned earlier that in the second phase of this study, there were four major eye conditions and eye diseases that were found to be most prevent among the Hispanics while also showed to actually clinically significant including *cataracts, border line glaucoma* (glaucoma suspect), *blepharitis,* and *pinguecula.* A brief discussion for the latter two conditions is followed.

Blepharitis is an inflammatory condition that affects the eyelids and the eye margins. In chronic cases, it requires long-term follow-ups and continued treatments. Untreated chronic cases may lead to other ocular complications and problems such a conjunctivitis, lid margin changes, marginal keratitis, corneal neovascularization [23]. Blepharitis may also affect the tear layer composition and cause symptoms similarly found in patients with dry eyes such as a sandy gritty sensation, stinging, or burning sensations of the eye, itching, redness of the lids and the margins, and visual fluctuations secondary to the tear layer being affected, or even more serious ocular changes like corneal changes requiring more aggressive treatments in order to prevent permanent vision loss. Blepharitis is a treatment that requires the provider to educate the patient about the importance of active compliance with the recommended regimen. Unfortunately, many elderly patients already suffer from blepharitis and dry eye, and in many cases this is mainly due to a lack of adequate patient education, disrupted continued care, and in some cases secondary to lack of patient's financial ability to afford multiple follow-up visits or some of the treatment remedies that may be more effective but not yet covered by insurance companies. Some of these novel treatment options are generally estimated to cost about $1,500 to $2,000 for treating both eyes [24]. Therefore, cost can obviously be a major obstacle in controlling a chronic disease such as blepharitis or its associated ocular signs and symptoms, therefore, resulting in continued ocular signs and symptoms, and patient's suffering from lack of proper treatment or lack of adequate patient education which may affect many Hispanics, therefore, affecting the quality of their lives.

Pinguecula is a conjunctival change that patients may notice as a small elevated pumps located at three and nine o'clock on the conjunctiva which is the white part of their eyes. Long term, high exposure to UV radiation has been associated with its formation [25]. These growth, even though are considered benign, but they may result in tear layer disruptions and cause the patient to experience dry eye symptoms such as stinging, burning, tearing, redness, visual fluctuations and many more. Pinguecula was one of the four eye conditions that were found to be clinically significance as far as being prevalent among the Hispanic population in the second phase of this study. The reason for which could be due to a possible lack of ability to afford outdoor UV protective sun glasses or the lack of education regarding the possible adverse effects of not wearing UV protection when outdoors which again, the risk of development of pingueculas may be lowered if proper patient education is implemented through the use of

professional translators or bilingual educational tools such as pamphlets describing various common diseases and simple common ways known to prevent them.

CONSLUSION

This study found that Hispanics had higher rates in most eye diseases in the United States of America. Hispanic participants had higher rates of refractive error than Caucasians. Hispanics had statistically significantly higher rates in four categories including cataracts, blepharitis, pinguecula and glaucoma suspect.

Further quantitative studies are recommended to investigate why Hispanics tend to have higher rates in most common eye diseases in the USA compared to Caucasian patient. There are many systemic conditions that are known to affect the Hispanic population which can lead to potentially vision threatening conditions in the eye if not properly treated such as diabetes and hypertension. Therefore, continuous regular eye exams are highly recommended in these individuals since the risk for various ocular morbidities tend to increase the longer the patient has had certain systemic diseases such as diabetes. In addition, regular eye exams can be helpful in ensuring that the patient receives better continued care through maximizing the communication between the primary care physicians and the eye care providers in order to ensure these patients' ocular and overall well-being.

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