Blind spot enlargement

Blind Spot Enlargement in Non-Athletes

Abstract

Everyone has a blind spot in the visual field caused by an absence of nerves on the retinal wall where the nerve ganglia enter. Our brains “ correct” this blind spot by filling-in the missing information so that we do not notice the blind spot in normal, daily activity. There have been a few studies conducted to determine how the brain compensates for the phenomenon.

Recent studies indicate that in certain people seeking chiropractic treatment, unequal blind spots result from muscoloskeletal misalignments. This research has been controversial; however, it brings up several interesting questions. There are conditions that can damage the retina, causing blind spots in the visual field. It is generally assumed that athletes maintain a better level of general health, via exercise and a healthier diet, than those who do not engage in athletic pursuits.

This study used blind spot mapping techniques of the chiropractic industry to map the blind spots of 10 athletes and 10 non-athletes. The blind spots of athletes and non-athletes showed a statistically significant difference.

Introduction

Every eye has a blind spot . The blind spot is the hole in the retinal wall where the nerve ganglia pass though. This area of the retina contains no photoreceptors and therefore creates a black spot in every person’s vision. The gap created by the blind spot is approximately 6 degrees of the total visual field, which is a large area, relatively speaking. We do not see this area in our normal functioning because our brain has a mechanism for “

filling in” the missing information. The information that would normally be received by the blind spot is projected onto the other eye and the brain essentially “ averages” the image (Lou and Chen, 2003).

The blind spot in physical structure and given the normal variances in human physiology, it would be expected that there would be little variation in the blind spot from person to person. However, there are certain conditions that could cause damage to the retinal wall, thus causing nerve damage to he photoreceptors, thus causing a blind spot. This damage may cause an additional blind spot in the visual field; of if damage occurs to the retina surrounding the natural blind spot, the natural blind spot could essentially be enlarged. (Windsor and Windsor, 2003; Hall, 2003; and Seddon and Kuijk, 1998).

There are several factors that can effect eye health, such as nutrition and general health. It is generally assumed that athletes have an overall healthier lifestyle that n the general public. They are assumed to engage in habits that promote good health such as eating more nutritiously, exercising and maintaining a generally higher level of health than the general public. It is therefore the premise of this study that athletes would be expected to have fewer eye-related health problems and that these problems would result in fewer visual blind spots or smaller naturally occurring blind spots than in non-athletes.

This study will use methods for mapping blind spots in the chiropractic field to measure the blind spots of a group of athletes and a group of nonathletes.

This research will support the hypothesis that the group of nonathletes will be found to have larger blind spots due to decreased general health.

Literature Review

The existence of a blind spot in each eye is a naturally occurring anatomical trait and therefore has received very little academic attention in itself. There has been limited attention to the study of how our brain “ compensates” for this phenomenon, however, once explained, it received very little attention. The blind spot can be located if a person trains their attention to it. There is a simple visual test; contained in APPENDIX I that can help a person “ see” the blind spot in their right eye.

There have been a group of chiropractors that claim that in persons with certain musculoskeletal misalignments, the blind spot in each eye is unequal. They also claim that adjusting the spine can alleviate this condition. This research will not attempt to confirm or deny these claims, but will rely on techniques derived from the practice of “ blind spot mapping” or develop a method for testing the blind spots of a group of athletes and a group of nonathletes. No similar studies could be found, save for one study conducted by an ophthalmologist, using opthamological equipment to assess general retinal scarring in certain persons diagnosed with opthamological disease (Cai and Cavanagh, 2002).

Chiropractors have developed a technique, primarily to be used as a diagnostic technique to detect what they claim is an “ unequal blind spot” in the eyes. The claim that an enlarged blind spot can diagnose a malfunction in the brain. These studies have come under heavy criticism as there are

several illogical arguments posed by them (Hall, 2003). Hall finds several areas of contention in the design of these experiments. In addition, several chiropractors claim to “ cure clumsiness” by increasing the peripheral vision of patients. These claims are completely unfounded, as the blind spot is located in the primary visual field, not the peripheral vision. These doctors are causing confusion with the blind spot when driving that is caused by mirrors, not the eyes (Hall, 2003). These studies have very little academic credibility, however, do provide a useful tool for mapping the blind spot of the groups being studied in this research.

It has been a long held concept that eating certain vegetables can improve eyesight. Recently, physicians have been prescribing leafy green vegetables to prevent a condition called macular degeneration. Other food have also been recently cited as having health benefits for the eyes such as egg yolks, orange juice, and corn (Seddon, and Kuijk, 1998). Macular degeneration causes blindness by the development of “ macular hole,” which consists of patches of dead nerves on the retinal well, thus creating blind spots.

It is generally held that athletes tend to follow a more nutritious diet than the non-athletic population. The typical athletic diet is high in carbohydrates, proteins and a balance of the necessary vegetables to maintain overall health. This improved diet has been shown to have a number of health benefits. Athletes are expected to have an improved diet and improved general health as compared to the average population. Therefore, it could be expected that there would be fewer eye problems than in the general population. One effect of this improved eye health would be the occurrence of smaller natural blind spots, due to less scarring from disease, and the

occurrence of fewer extra blind spots on the retinal wall. This will be the focus of this research, to detect an improvement in eye health by measuring the size and occurrence of blind spots in a population of athletes and a population of non-athletes.

Methodology

The measurement instrument used in this experiment was a modified version of the blind spot mapping technique used in chiropractic practice. Extra controls from above those described in the literature were instituted to insure greater precision of measurement. The blind spot mapping technique was described in Hall, 2003. It may be noted that opthamologists have a more precise technique for blind spot mapping, but that technique requires a completed degree in opthamology and requires very expensive equipment. This technology was not available for purposes of this study. The technique used was simplistic in design, yet accurate enough to obtain meaningful results.

Test subjects for this study were recruited from senior members of the varsity football team and persons in the general campus population. Senior members of the varsity football team were used due to the assumption that they would be the most likely to adhere to the rules of good nutrition, exercise and general health that were required for dependent variable of this study. The control group consisted of ten general population students, who were screened by asking them if they were involved in regular exercise activity. Test subjects for the control groups were chosen who did not participate in exercise programs.

An apparatus of measurement was devised. The blind spot can be visualized in the following manner. The set of spots in Appendix I can be used to find the blind spot for the right and left eye. The test was set up as in APPENDIX II with the subject sitting at a table. A box was used to rest the chin, so as to maintain a steady height. The subject was instructed to place his chin on the box and look at the screen. They were instructed to keep their head a still as possible once the test has begun.

One set of dots was cut out and mounted in a piece of poster board. An identical set of dots was made for each eye. This was mounted to a board that could be moved closer and farther from the subject until the proper distance for that blind spot could be located for each subject. This was necessary, as everyone’s blind spot would be in a different place.

The subject was told to sit on the chair and place their chin on the box and to stay as still as possible. They were told to cover the right eye and fixate on the cross, appropriate for that eye. They were not to move their head, just fixate using their eyes. An assistant would slowly move the screen farther away or closer to the subject until the subject indicated that the large dot had disappeared and the ground appeared solid white. This is where the blind spot is located.

As assistant moved a sharpened pencil horizontally in front of the paper until the tip of the pen disappeared from the subject (was in the blind spot). The assistant then moved the pen horizontally across until the tip reappeared. The subject would indicate that the tip had reappeared and the assistant would mark a dot at the point of reappearance. This process was repeated in

a pattern of compass points, starting from the blind spot each time. This process was repeated for the other eye using the appropriate image. This created a picture of the blind spot and the area of the blind spot could be calculated in centimeters. An example of the test results can be found in APPENDIX III.

Results

When the tests were completed, the average radius of the blind spots was estimated using a compass. The radius of the circle was taken as an average of the points from the center. The following raw results were found for the two groups. Results expressed in r-values of the circles.

The difference between the means is 0. 15. A p value of a one-tailed z-test was set at 0. 5 (95% confidence) with a critical value of 1. 65. The z value for these two groups was 1. This would indicate a statistically significant test result and did indicate that the blind spot radius of athletes if significantly smaller than that of non-athletes.

Discussion

The results for this research indicate a significant difference in the radius of the blind spot between athletes and nonathletes. This would tend to support the hypothesis that athletes have smaller blind spots than non-athletes do. It can then be theorized that these differences are due to better eye health. However, before we draw this conclusion it must be noted that the sample size in this research was extremely small for this type of study. Different results may be obtained from a larger sample size. In addition, subjects were not screened for diet, exercise, and general health. Caution must be taken in drawing broad conclusions from this research due to these factors. However,

the results will be helpful in further research design. Further research should be done on the subject. A screening survey of the subjects would be helpful in isolating the dependent and independent variables. This survey would include questions on diet exercise and general health.

There are several factors that may explain the results obtained. Cai and Cavanagh (2002) found that a condition called acute idiopathic blind spot enlargement syndrome (AIBSE) would cause a similar result in these patients. A swelling in the optic disc from infection can also cause an enlarged blind spot (Fletcher, 1988). A fungus called Histoplasma capsulatum causes scarring to the retina and can cause an enlarged blind spot. However, this is an unlikely cause as one must be exposed to large amounts of bird droppings to contract it (Windsor and Windsor, 2003). In order for future tests to be more conclusive, these conditions must be ruled out as a cause.

In conclusion, the results of this research support the hypothesis that athletes have a smaller blind spot than non-athletes do. Although this may lead us to the conclusion that this is due to better diet and general health. This conclusion must be taken with caution. Due to the small sample size and failure to eliminate certain confounding variables, this conclusion must be made in a guarded fashion. This research will prove useful in the conduct of future research design. It was helpful in designing a simple and effective instrument of the measurement of this phenomenon. Future research should expand on these results and attempt to account for variables that were beyond the scope of this project.

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