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An Essay Comparing and Contrasting Different Medical Issue on Opposite Ends of the Spectrum of Health Care

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Introduction

In healthcare, there are a plethora of issues that vary in diagnosis and treatment and are present in many different cultures and age groups. We reviewed the topics of sleep paralysis and childhood cataracts, and found that there is a correlation between impoverished cultures who struggle with a lack of resources and adequate medical care that affects both of these topics. In countries where there is less development, the technology is not available to educate or treat patients.

Culture shapes the lifestyles of different group of individuals worldwide. From belief systems to available resources, culture often increases the effects of a disorder, making it more debilitating than necessary. In sleep paralysis, the religious beliefs with which one is raised affects the severity of the episodes. These beliefs can contribute to a lack of medical care, which then leads to the culmination of debilitating effects of the disorder. This commonly leads to more severe outcomes than in countries where more medical care and education is available. Patients from more developed countries and who have access to education often experience more mild episodes, as they can be treated and diagnosed, thereby gaining some understanding of the disorder. In underdeveloped areas, however, patients are more likely to have heart conditions and greater stress levels because of the tension of these belief systems, causing them to attach to their experiences due to ignorance of the issue. Culture is also a determining factor for children developing cataracts. Those in developing nations often lack certain vitamins, such as vitamin A, C, and E, B12, biotin, iron, and zinc that are typically found in an average person's daily diet. Since these underdeveloped countries do not have these vitamins, many eye related issues will arise, leading to a higher number of patients, often children, with the onset of cataract formation. The absence of nutrients is critical for these populations. This absence affects a child's ability to get an education, work, and so much more.

Another similarity between sleep paralysis and childhood cataracts is the use of technology, both in availability and testing. For example, both conditions involve the use of measurement equipment in order to find treatment. When first diagnosing a cataract, an eye care provider would perform a slit-lamp examination to observe the imparities of the eye. An ultrasound of the eye is done on a cataract patients to discover what type of artificial lens (IOL) would best be suited for that individual. After the invasive cataract surgery is complete, most children with access to the necessary healthcare can live a normal life. Those unfortunate individuals who are not able to get the proper resources, or even get the cataract removed, may continue to have eye issues the rest of their lives. Sleep paralysis requires highly invasive testing through expensive and complex technology as well. This testing usually involves the use of EEG or EKG techniques to measure and record brain activity. These measurements are later analysed and used to determine why the brain is not functioning correctly. Once the root of the problem is found through these techniques, the mental health issues or disorders causing sleep paralysis can be treated much more efficiently in a way that is tailored to the specific patient. In developing countries where access to this technology is nonexistent, these opportunities for better treatment are not available to patients.

Childhood cataracts is a profound issue in developing nations where resources for prevention are scarce. The general public should gain an awareness on the impacts of many factors contributing to childhood cataracts in order to limit the number of children with visual losses. More research, which may open the door to more access to treatment in the developing world, could in turn decrease the number of eye surgeries and blindness worldwide. Along with childhood cataracts, sleep paralysis shares this problem. If cultures where this disorder causes fatalities had more education, the fear and harm it causes would be significantly decreased. Patients with more information on both of these issues find them much more treatable, with less harmful impact on their everyday lives.

Childhood Cataracts Bibliographic Entries

Andrew Whatham et al. “Vitamin and mineral deficiencies in the developed world and their effect on the eye and vision.” *Ophthalm. Physiol. Opt*, vol. 28, 2008, pp. 1-12. *Wiley Online Library*, doi: 10.1111/j.1475-1313.2007.00531.x.

In this article, researchers examine different vitamins and minerals that many developing nations lack, and thus relate these deficiencies by linking them to certain diseases and health problems. More specifically, the researchers determine the effects of lacked micronutrients in children and the ocular downfalls that come from absence of particular vitamins. The vitamins and minerals reviewed include vitamin A, C, and E, B12, biotin, iron, and zinc. Each of the minerals they reviewed are known to have ocular and visual effects if deficient in the patient. Lack of Vitamin A can lead to disruption in the cornea (the clear part in the front of the eye) by softening of the cornea (keratomalacia) and can also increase dry eye syndrome. B12 deficiencies result in reduced color vision and also centrocecal scotoma, a depression causing issues with central vision. The lack of biotin can cause optic atrophy, resulting in damage to the optic nerve (main nerve running from the eye to the brain) by the death of important cells in the nerve, leaving a patient permanently blind. Lack of Vitamin C typically on leads to subconjunctival hemorrhages, the popping of blood vessels in the eye. Vitamin E deficiency can cause rod and cone receptors to be lost, which in turn affects our ability to see color and low light levels. The mineral iron in low amounts can cause issues with the visual cortex, which receives sensory inputs from the thalamus. Lack of the mineral zinc can cause corneal oedema is deficient (swelling of the cornea). These deficiencies can be fixed if found in time via particular supplementation. Deficiencies in such described vitamins and minerals are mainly found in developing countries, but can also be a concern in developed nations.

Fahnehjelm, Kristina Teär et al. “Visual outcome and cataract development after allogeneic stem-cell transplantation in children.” *Acta Ophthalmologica Scandinavica*, vol 85, 2007, pp 724-733.

This journal article is a study of young adults and children who have undergone hematopoietic stem-cell transplantation (SCT) and see if these individuals have frequency of cataracts or other visual imparities from such treatment/exposure. SCT has been used to help treat patients with certain cancers and also help treat particular autoimmune diseases. Background research reveals that 50% of children have been reported for having ocular issues after SCT, with cataracts being the most prevailing. In this study, the authors observed 79 children whom had been exposed to SCT and the time span or irradiation, chemotherapy, and other techniques. Out of the 79 patients, 46 (58%) had developed a cataract. Only 17 of these patients underwent cataract surgery. The researchers noted the exposure to TBI in each of these patients to see if this made a difference in cataract extraction. TBI is total body irradiation which is a form of radiotherapy used as a technique in stem cell transplantation. All 58% of patients whom developed cataracts had been exposed to TBI as treatment. After running tests, researchers found that by enduring single-dose total body irradiation TBI (s-TBI) and fractionated TBI (f-TBI), children were at a higher risk in developing cataracts than those who endured other treatments such as chemotherapy and busulfan. This information is important for the parents of children who have to go through SCT because they can be aware of the potential outcomes from particular therapy and treatment. It is also important for researchers to look into why this is happening and what can be done about this. Are there ways to improve treatments for SCT in which cataract formation would decrease, such as changing the type of medication used? What other effects are being caused to children undergoing these procedures? Will there be more harmful effects to the eye in their later lives? This article suggested that there needs to be more studies done on this topic, due to little research on the topic.

Kumar, Deepa, et al. "A Link between Maternal Malnutrition and Depletion of Glutathione in the Developing Lens: a Possible Explanation for Idiopathic Childhood Cataract?" *Clinical and Experimental Optometry*, vol. 96, no. 6, 2013, pp. 523–528., doi:10.1111/cxo.12076.

This article provides evidence to link maternal malnutrition and low birth weight to the development of cataracts in children, especially in the developing nations. A majority of the children who are blind in the world live predominantly in Africa and Asia. Both of these countries are known as developing countries partially due to the lack of resources available. Many inhabitants in these countries have no access to health care to live healthy lives. Most of the cataracts detected in these children have been classified as idiopathic cataracts, cataracts that happen spontaneously without a specific cause. Idiopathic childhood cataracts are more predominant in children who have low birth weight, resulting from maternal malnutrition. The eye forms early in development, which lead to the researchers questioning if oxidative stress, due to maternal malnutrition, causes cataract development or overall lens changes. They also question if the main antioxidant in the lens, known as glutathione, can affect the eye. If glutathione synthesis is stopped (reduced levels of antioxidants), it can lead to cataracts. Antioxidants are found in many of the foods in a healthy individual's daily diet. Therefore, in developing nations, where there is a lack of food sources, we begin to see the issue of maternal malnutrition and cataract development in children. This information suggests that developing nations need better healthcare and nutrients to help lower the number of children with idiopathic cataracts.

Magli, Adriano et al. "Congenital and Developmental Cataracts: Focus on Strabismus Outcomes at Long-Term Follow-Up." *Seminars in Ophthalmology*, vol. 32, no. 3, 2017, pp 358-362.

The researchers focus on patients (children) with strabismus, a condition where both eyes do not look in the same direction at the same time (cross-eyed), and congenital and developmental cataracts. A cataract is when the natural lens in the eye becomes cloudy, preventing light from entering the eye, which will then cause blurry vision. Patients can have congenital cataracts, which are formed before birth, or they can have developmental cataracts which patients develop cataracts sometime after birth. In this study, they took a sample of patients either with congenital or developmental cataracts and did a follow-up study five years after the cataract was extracted/removed. In the follow-up they determined whether the strabismus would be improved in patients. For this experiment, they had a criterion for both congenital and developmental cataracts. All patients were operated by the same surgeon and underwent either primary implantation of the IOL (intraocular lens) or secondary postponed implantation of the IOL. The IOL is the artificial lens that is put in place of the natural lens once removed from cataract surgery. During primary implantation of the IOL, the patient has the cataract extracted and the artificial lens put into place. During secondary postponed implantation of the IOL, the cataract is extracted and contact lenses are worn by the patient to correct vision until the doctor is ready to put in an artificial lens. Overall, there was no significant difference that the strabismus improved after removal of the cataract. The researchers noted that strabismus surgery was necessary during the follow up for the patients with congenital cataracts. This research allows researchers and doctors to understand the effects of cataract extraction on patients with strabismus and allow them to further seek knowledge on how to effectively help these patients see in better quality.

Šimunović, Marko et al 2018. "Cataract as Early Ocular Complication in Children and Adolescents with Type 1 Diabetes Mellitus." *International Journal of Endocrinology*, 2018, pp. 1-6. Hindaw. <https://doi.org/10.1155/2018/6763586>

This review article centers on pediatric population affected by Type 1 Diabetes (T1DM) and who also suffer from visual imparities, such as cataracts. Most studies focus on older patients with diabetes, since this disease (T1DM) can cause more harmful eye diseases in the eye like diabetic retinopathy, where the sugar is uncontrolled, leading the damage in the back of the eye. In many cases, once this damage is done, the vision cannot be restored. The researchers summarized the results about how important it is for early screening to

find complications, such as the first ocular imparities of recently diagnosed T1DM children. They also focused on trying to discover new experimental therapeutic choices for early cataract prevention and treatment in children affected with T1DM. Researchers determined that increasing the intensive insulin therapy (treatment to monitor blood sugar levels) quicker would lower the number of children suffering from cataracts. Overall, they found that there is still a need for studies of the population of children who have been diagnosed with cataracts from having T1DM.

Sleep Paralysis Bibliographic Entries

Parker, Jennifer D, and Susan J Blackmore. “Comparing the Content of Sleep Paralysis and Dream Reports.” *Dreaming*, vol. 12, no. 1, 2002, pp. 45–59, doi:10.1023/A:1013894522583.

This journal article outlines the data gathered by surveying and interviewing individuals about their experiences with dreams and sleep paralysis. The data is organized by gender and highlights common accounts found. The frequency, symptoms, and emotional and psychological effects of dreams versus sleep paralysis are recorded and compared between the two groups. Men less frequently encountered violence and aggressive situations than women in these nightmares, as women experienced more feelings that they described as assault. While women’s experience with sleep paralysis more often featured sexual content and intense terror, men were more often embarrassed and felt sensations of touch on the extremities, not the abdomen. Both genders recorded sensory perception during this time, mostly auditory and tactile, and varying feelings of fear. This article concluded that sleep paralysis is a separate state from dreaming, but that they are clearly intertwined, and this connection could be studied in more thorough ways. This basic information on sleep paralysis and how it differs according to gender lays the groundwork for further research to build upon.

Flavie Waters et al, “What Is the Link Between Hallucinations, Dreams, and Hypnagogic–Hypnopompic Experiences?,” *Schizophrenia Bulletin*, vol 42, no. 5, 2016, pp. 1098–1109.

This article argues that hallucinations and sleep related experiences are more similar than scientists have previously thought. The method of study proposed is to measure the brain activity of patients experiencing these different symptoms and compare and contrast them. The neuropsychologists involved in the study observed that hallucinatory experiences and sleep experiences created varying levels of brain waves, some strikingly similar. The brain activity during hallucinations allowed them to conclude that the entire brain is active during these episodes and appears to be reacting to outside stimulus. Meanwhile, brain scans during sleep related episodes suggests that the activity is focused inward with less of the areas of the brain involved. The thalamus is heavily active during both occurrences however different they may be. These mysterious discoveries about how the mind works allows scientists to create links between these phenomena and hopefully help those suffering from them. These observations may show the differences between when a common nightmare is occurring as opposed to something much more complicated and traumatizing, aiding doctors as they find the best method of treatment. Factors like mental health or any sleep disorders present are detected through this analysis and are huge variables in treatment of the issue.

Girard, Todd A, and J. Allan Cheyne. “Timing of Spontaneous Sleep-Paralysis Episodes.” *Journal of Sleep Research*, vol. 15, no. 2, 2006, pp. 222–229.

This article outlines Todd’s repetition of Cheyne’s previous sleep study concerning the frequency and timing of sleep paralysis episodes. Todd outlines Cheyne’s results, and points out reasons that the previous experiment may have been flawed; One of the flaws being the clarity of methodology. Cheyne asked patients to group their experiments into two periods, hypnagogic or ‘while falling asleep’, and hypnopompic meaning ‘when waking up’. This was unclear because many sufferers of sleep paralysis have hypnagogic episodes, or experiences that interrupt the sleep cycle. Todd modified the experiment to allow participants to distinguish between the three. Todd’s amended experiment brings forth data suggesting that instead of sleep paralysis being a sleep onset

phenomenon, as Cheyne concluded, it may actually be a sleep offset occurrence strongly relating to REM sleep and irregularities in the circadian rhythms or sleep cycles of participants. The scientific method is a crucial part of experimentation as well as experiment repeatability, which allows for the fine tuning of tests and results. With Todd's clarifications, this experiment is repeatable and may gather more data leading to other conclusions if it is tested again, adding scientific legitimacy to claims that this condition is more than a common nightmare and even dangerous at times.

Sharpless, Brian A, et al. "Isolated Sleep Paralysis and Fearful Isolated Sleep Paralysis in Outpatients with Panic Attacks." *Journal of Clinical Psychology*, vol. 66, no. 12, 2010, pp. 1292–1306., doi:10.1002/jclp.20724.

This article outlines the observation of sleep paralysis found in patients with panic disorders such as anxiety or PTSD. Sharpless et.al. predicts that the occurrence of sleep paralysis is intertwined with preexisting conditions related to psychopathology. They also hypothesize due to previous observations that many of the patients will be of African descent, female, and be overweight according to their BMI, as these have been linked as common traits in other sleep disorders. The authors distinguish between two kinds of sleep paralysis: FISP which involves intense fearful or distressing emotions, and ISP or isolated sleep paralysis. They observe that FISP has many associated features, including hallucinatory experiences, and divides these into three categories: Intruder, Incubus, and Vestibular-motor. These first two categories are associated with threat activated vigilance systems, a person's natural instinct to protect themselves; The second involves brainstem activation during sleep cycles. The results of this study found that most people who have multiple sleep paralysis experiences report extreme distress or fear during the episode, and a majority of these people also met the criteria for Panic Disorder (95.5%). A tenth of this fraction did not experience hallucinatory episodes during these experiences. There was an observed frequency of similarities found between BMI, Ethnicity, and IQ, but they encourage further study in this field to explore if these are truly related. Understanding the processes of sleep paralysis more deeply allows researchers to focus on certain areas and processes active in the brain during these episodes, shedding light on sleep disorders and the workings of our own minds.

Dahlitz, M., and J. D. Parkes. "Sleep Paralysis." *The Lancet*, vol. 341, no. 8842, 1993, pp. 406-7.

This article argues that sleep paralysis should not be considered a symptom of the sleep disorder narcolepsy but labeled as its own disorder. The research to support this argument was conducted upon 22 individuals from different ethnic backgrounds. Some of these individuals were from the same families, enabling research on whether the phenomenon may be hereditary. These patients experienced frequent sleep paralysis, which brought with it feelings of terror, respiratory difficulty, and visual hallucinations. In the article, instances of sleep paralysis are argued to be similar to Cataplexy and the REM stage of sleep. It was observed to be frequent in family groups, leading researchers to believe that there may be some kind of genetic makeup involved, making the disorder hereditary. The authors argue that this disorder is separate from narcolepsy in that it may be present in patients who display no other symptoms of the disorder. Establishing sleep paralysis as an individual and legitimate sleep disorder is beneficial to those who suffer from it worldwide, many of which experience symptoms that affect quality of life and may even be fatal in some circumstances.