Bio - Cultural Analysis of Kuru Diseases in Australian Tribe

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Abstract: From all over the globe Tribal’s are known for their unique culture and customs which makes them distinct from the main stream likewise South Fore of New Guinea exhibits a distinct culture which lead them to obtained hereditary confusion by the practicing cannibalism.

This paper aim to highlight the effect of cultural factors (belief, sorcery, witchcraft etc.) in determining the nature of prion and its implication on human beings and also make an attempt to understand hereditary and cultural variants in disseminating the prion infection.

Keywords: Cannibalism, Cultural factors, Genealogy, Genetic Disorder.

Definition:

The term ‘kuru’ is derived from fore word ‘kuria or guria’ which mean to shake, shiver, or trembling in fear. Kuru can be defined as a rare slow progressive neurological disease disseminated by practices of cannibalism rituals among the Fore people of New Guinea. Sometimes kuru can also be known by different names such as laughing Death or laughing Sickness or biomedical names like Creutzfeldt-Jakob disease (CJD), transmissible spongiform encephalopathy etc.

Introduction:

The identification and study of kuru disease began in 1950 by a medical researcher Michael Alpers and some Anthropologist in collaboration with Australian Government. At first it was reported by patrol officers as psychosomatic and thought to be caused by sorcery and witchcraft. It was not until 1957 scientific investigation was initiated by Gajdusek and his team to understand the cause of kuru and try to find out the solution for curing the disease. However after conducting an experiment in laboratory kuru was confirmed as neurodegenerative disease resulting from an infectious agent in the brain. Sometimes this disease is also as known as Creutzfeldt-Jakob disease, Gerstmann Sträussler Scheinker disease, and fatal familial insomnia in biomedical science due to resemblance of symptoms with kuru. Today the study of kuru has marked significant impact on medical research with an aim to eliminate the epidemic disease and also to prevent the people from getting the disease by spreading awareness and doing clinical test. However the incubation period may extend depending upon the person. This incubation period is also called as preclinical or asymtomatic phase. The average incubation period is between 10–13 years or can be short as 5 years and based on the record it has been estimated to last long for 50 years or more after initial exposure and the youngest individual recorded to have kuru among the South Fore was 12 years old girl.

Methodology of study:

Both primary and secondary data were collected consisting of qualitative and quantitative methods. In addition to that even case study was employed to examine and understand the phenomenon. Mode of study involves Participation observation by social scientist and scientific examination by various biomedical researches.

Cultural Description:

According to the Dr. Cole studies early relatives of modern humans, and he is particularly interested in how ancient hominines’ behaved and the complexities of their lives. Paleolithic cannibalism offers a way to study that complexity, he said. If ancient hominines’ were similar to modern humans, they may have practiced cannibalism for a variety of reasons, including ritual, cultural, social and nutritional. A researcher studying cannibalism in the Paleolithic era estimated that a human body would provide an average of 125,000 to 144,000 calories, if consumed. Below, average calorie counts for some body parts. Dr. Cole found that human thighs come in at a beefy 13,350 calories, while the calves are about 4,490 calories. The upper arms are around 7,450 calories, and the forearms about 1,660 calories. Within the chest
cavity beats a heart that is about 650 calories. There are also the lungs, which come in around 1,600 calories, and below them the liver sits at around 2,570 calories. The kidneys total about 380 calories together.

He concludes that humans are not really worth eating purely for nutritional reasons. The meat on one human’s body could have provided a group of 25 modern adult males with enough calories to survive for only about half a day, he found. In contrast, that same tribe during Paleolithic times could have feasted on a mammoth, which with 3.6 million calories would have provided enough sustenance for 60 days. Even a steppe bison would offer 612,000 calories, enough for 10 days of nourishment. He said that because humans offered such a comparatively low amount of calories, his findings suggested that some examples of Paleolithic cannibalism that had been interpreted as “nutritional” may have occurred for social or cultural reasons.

Silvia Bello an anthropologist from the Natural History Museum in London who has also studied ancient cannibalism, agrees with the paper that Paleolithic cannibalism was probably practiced more as a choice than as a necessity. However, she said finding the motivation behind those choices would be difficult.

Coming to the kuru diseases, it is one of the most distinct features of South Fore culture is the division of labour and pattern of residence where men sleep in the house engaging themselves in legal disputes feuds, raids and ceremonies. While women stay in small hut along with their children, doing agricultural works and nurturing the pigs. One of the unique features of their culture was rituals associated with cannibalism signifying the their affection and loves to their death kin’s thereby consuming their death bodies on which brain was eaten by the women and children and remaining parts by the males. Since the brains was already affected and at the same time were not thoroughly cooked, the virus present in the victim brain does not die permanently leading to distortions of proteins causing malfunctioning and lack of coordination to the human brain due to which brain does not function as it is intended to coordinate for various functions. Kuru showed unusual epidemiological characteristics since women and children have higher rate of getting the disease than men because the women become the carrier and the affected genes are passed to the offspring through the mother from generation after generation. However Kuru is not prevalent among any tribes from adjacent groups, even after having a good deal of contrast nor it has been passed to European countries and thus due to this distinct features kuru appears to be a rare disease in medical science.

**Cultural Factors for Kuru Disease:**

The Study of kuru disease does not only limit to biomedical research but also contributes to cultural barriers in understanding the disease and this way contribution of social scientists like anthropologists came into existence. Anthropologists like Robert and Shirley Glasse had done ethnographic field worked on South Fore groups highlighting the impact of local tradition in determining the nature of kuru disease. They also worked on establishing the genealogy of the Fore tribe and try to understand the rituals associated with cannibalism and how cannibalism has form as an important part of their culture. Based on the research it has been found that the practice of cannibalism has emerged from 1910 as per as the local record and how this tradition has been a continuous process among the South Fore. The finding of the research also give a clear indication about the existence of acculturation process with the neighboring tribal group in disseminating the practice of cannibalism. Thus, due to the practice of this custom, a rare kind of disease known as kuru has developed which results to death among them. Initially this ritual was carried out for showing their love and affection to the deceased which involves eating of brain by the women and children and remaining parts by the males. Since the brains was already affected and at the same time were not thoroughly cooked, the virus present in the victim brain does not die permanently leading to distortions of proteins causing malfunctioning and lack of coordination to the human brain due to which brain does not function as it is intended to coordinate for various activities. Even after 50 yrs. of research still now scientists does not a proper explanation on how exactly prion has developed in the human brain and what was the initial stage of inheriting the prion and how exactly it has emerged. Based on the record the last kuru to be reported in medical history was 2005 but still it does not give us a confirmation that the disease has been entirely wiped out since the incubation period is long which can be emerged in the future generation.


**Biological Factors of Kuru disease:**

Over a decade scientific study of kuru disease has been a limelight in the field of research and many experiment and research has been carried out by various biological and social scientists based on laboratory and observation. This studies of kuru disease draw attention when virologist and anthropologist Carleton Gajdusek make a first visit to South Fore in 1957 for a period of 10 months. After identifying the disease he then devote his entire life in finding the solution to cure as well as in quest of its origin due to which he was awarded Noble prize for physiology of Medicine in 1976 for his immense contribution. While carrying out the research, various hypotheses has been put forward by scientists in order to explain nature of disease in innumerable ways like genetic, infectious, sociological, behavioral, toxic, endocrine, nutritional, and immunological, with immune plausible explanation of understanding the symptoms within limited group of South Fore, New Guinea. (Alpers 1970:134)

However one of the major limitation while studying the nature of disease was mutation, composed of either dominant or partly dominant mutation, emerge from an single individual as original carrier from centuries and thus proliferate to existing descendent of Fore ethnic group in a recent years. And another hypothesis was the lethal gene responsible for the growth and development of genes causing death of an organism or an individual depending upon the types of alleles.

Since human DNA is composed of genes which codes messages for protein production, consisting of complex molecules known as amino acids which are responsible for proper functioning and maintaining the body cells through hormones and there by acts a building blocks in our body. When protein chain are misfolded, the genes attack the cerebellum present in the brain which play an important role in coordination and controlling the cellular body for various activities and at the same time the pathogen attack the genes producing a little cavities which look like a sponge. Due to this, prior proteins don't contain nucleic acid thereby making our immune system weak and highly resistance towards the foreign antigens. As a results many research has been carried out enormously with an attempt to understand the disease better and also making an effort to invent a medicine for curing the disease. Based on etiological classification, human prion diseases can be divided into acquired, sporadic and inherited forms.

**Acquired prion:**

Kuru is the most well-known example of acquired prion disease that results from exposure to human prion by the practice of cannibalism. Susceptibility to this disease is associated with homozygosis for methionine at PRNP codon 129. As stated above, heterozygosis on this codon is protective. A novel PRNP variant G127V polymorphism is recognized as an acquired prion disease for kuru epidemic. There is no evidence for vertical transmission of kuru.

Other examples of acquired prion disease include iatrogenic CJD and VCJD. Iatrogenic CJD has been caused by implantation of Dura mater grafts, treatments using growth hormone derived from pituitary glands of human cadavers, corneal transplantation, contaminated electroencephalographic (EEG) electrodes, and surgical operations using some instrument. VCJD was recognized in the United Kingdom in 1995 and is caused by same prion strain that causes BSE in cattle and other iatrogenic routes not involving consumption of central nervous system tissue from infected cattle.

**Sporadic prion disease:**

Approximately 85% of cases of human prion disease occur sporadically as sporadic CJD at a rate of 1-2 cases per million populations per year worldwide. It does not have a sexual predilection. The cause of sporadic CJD is unknown, although hypotheses include somatic PRNP mutation or spontaneous conversion of PrPC into PrPSC as a rare stochastic event.

**Inherited prion disease:**

Approximately 15% of human prion diseases are associated with autosomal dominant pathogenic mutations in PRNP. The three main diseases that fall in this category include GSS, familial CJD, and FFI. Over 30 autosomal dominant pathogenic PRNP mutations have been described and PRNP analysis can be used for pre-symptomatic genetic testing in affected families.

**Stages of Kuru disease in biological view:**

The clinical stage begins at the first onset of symptoms which lasts for an average of 12 months. The clinical progression of kuru is divided into three specific stages, the ambulant, sedentary and terminal stages. Stages of kuru may be varies depending upon the individuals based on sex or age. Before reaching the clinical symptoms,
individual may experience prominent symptoms including headache and joint pain in the legs.

**Stages of Disease:**

In the first (ambulant) stage, the infected individual may exhibit unsteady stance and gait muscle control, tremors, difficulty in speech (dysarthria) and intubation. This stage is named because the individual is still able to walk around despite symptoms.

In the second (sedentary) stage, the infected individual is unable to walk without support and suffers ataxia and severe tremors. Furthermore, the individual shows signs of emotional instability and depression, yet exhibits uncontrolled and sporadic laughter. Despite the other neurological symptoms, tendon reflexes are still intact at this stage.

In the third and final (terminal) stage, the infected individual develops symptoms like ataxia, dysphagia, or difficulty in swallowing leading to malnutrition and finally death. An infected person usually dies within three months to two years after the first terminal stage symptoms either because of pneumonia or infection. Within three months to two years after the first terminal stage symptoms either because of pneumonia or infection.

![Figure 1: Stages of Kuru Disease. (Source: own creation)](image-url)
What are the Biological symptoms of kuru?

Some commonly known Symptoms of neurological disorders may exhibits similar to kuru like Parkinson’s or stroke and symptoms may include such as:

- Difficulty in walking
- Lack of proper coordination
- Difficulty in swallowing
- Slurred speech
- Mood swings and behavioral changes
- Dementia
- Muscle twitching and tremors
- In ability to grasp objects
- Random compulsive of laughing or crying

Theoretical explanation of kuru:

Traditionally the origin of kuru is analogous with sorcery or witchcraft which is understood to be a psychosomatic or a mental factor without having a proper explanation. Another theory for causing kuru was cassowary disease known as Negi Negi. However this disease was believed to be caused by ghosts due to shaking and strange behavior. With an attempt to cure kuru, patients were given pork and casuarinas bark as part of their meal. Practice of cannibalism came into recognition prior to the late 1950s, patrol officers thought that kuru was psychosomatic and was caused by the trauma of western colonization and perpetuated by beliefs in sorcery and witchcraft. It was not until 1957 that cannibalism was investigated with data, by Gajdusek, to be the cause of kuru. However, it was not considered a priority because it was thought to be too strange or evidence that theorized cannibalism as a cause lacked proper evidence. Cannibalism, however, was a reasonable enough explanation for kuru that the Australian administration banned the practice of feasting on the dead, until it was nearly obsolete by 1960. As the number of cases of kuru decreased, those in medical research were able to properly investigate kuru, which then led to the modern proposition of prion being the cause of kuru.

Kuru was first described in official reports by Australian officers patrolling the Eastern Highlands of Papua New Guinea in the early 1950s. Some unofficial account took place as early as 1910. In 1951, it was Arthur Carey who first used the term ‘kuru’ in his report to describe a new disease affecting the Fore tribes of Papua New Guinea. In his report, Carey noted that kuru mostly affect Fore women, eventually killing them. In 1953, kuru was observed by patrol officer John McArthur who provided a description of the disease in his report. McArthur believed that kuru was merely a psychosological episode resulting from the confirmed sorcery practices of the tribal people in the region.

It was not by the time that the Kuru disease had spread into an epidemic when Daniel Carleton Gajdusek, a virologist, and Vincent Zhtagas, a medical doctor, first started doing scientific
research on the disease in 1957. However, ethnography was by anthropologists Ronald Berndt and Catherine Berndt. After that the disease was festered into a bigger epidemic in the western world.

In effort to understand the pathology of Kuru disease, Gajdusek established the first experimental tests on chimpanzees for Kuru at the National Institutes of Health (NIH). The methods of the experiment would be to introduce the kuru brain material to the closest human relative, the chimpanzee, and to document the behaviors of until death or a negative outcome would occur. Michael Alpers, an Australian doctor, collaborated with Gajdusek by providing the samples of brain tissues he had taken from an 11-year-old Fore girl who had died of Kuru. In his work he also highlights Kuru disease in his first bibliography. Gajdusek was joined by a man named Joe Gibbs to monitor and record the behavior of the apes and conduct autopsies. Within two years, one of the chimps, Daisy, had developed kuru, demonstrating that the unknown disease was transmitted through infected biomaterial and that it was capable of crossing the species barrier to other primates. After confirmation from Elisabeth Beck, this experiment brought about the first conducted transmission of Kuru and was deemed an very important finding in the advancement of human medicine leading to the award of a Nobel Prize to D. Carleton Gajdusek in 1976.

Subsequently, E. J. Field spent large parts of the late 1960s and early 1970s in New Guinea investigating the disease, connecting it to scrapie and multiple sclerosis. He noted similarities in the diseases interactions with glial cells, including the critical observation that the infectious process may depend on structural rearrangement of the host's molecules. This was an early observation of what was to later become the prion hypothesis.

What are the Biological causes of kuru?

Kuru belongs to a class of diseases called transmissible spongiform encephalopathy (TSEs) known as prion. It primarily affects the cerebellum of the brain responsible for coordination and maintaining the cellular mechanism of the brain. Unlike the infectious agents, kuru is not caused by a bacteria, virus, or fungus. It is caused due to abnormality of proteins known as prion which are in distorted shapes. Normally Prion is not present among living organisms and hence they do not reproduce. Diseases like Creutzfeldt-Jakob, Gerstmann-Sträussler-Scheinker disease, and fatal familial insomnia are some other degenerative diseases caused by prion. However this disease can be inherited by consuming an infected brain or with open wounds or sores of infected person.

How is kuru diagnosed?

Kuru can be diagnosed by doing constant clinical checkup and by stopping cannibalism within the group.

Neurological examination

Neurological examination includes investigation on medical history, neurological function, blood tests, such as thyroid, folic acid level, liver and kidney function tests. Tests such as electroencephalogram (EMG) are used to examine the electrical activity in your brain. Brain scans such as an MRI may be performed, but they may not be helpful in making a definitive diagnosis.

Mortality/Morbidity:

There is no effective treatment for kuru. It occurs within 4-24 months after being infected and the incubation period may be as short as 5 years or as long as 50 years.

Race:

Kuru is only affected to the Fore linguistic group of the Eastern Highlands of Papua New Guinea and their neighbors with whom they intermarried. The practice of cannibalism was an important part of rituals to the Fore people signifying respect to their dead relatives. But latter on when it was discovered that this rituals developed a rare disease causing death to 200 people every year then the Australian government took an initiative steps by the establishing a Okapa patrol post in 1954 as one of the first administrative work for controlling the disease. By 1956, endo cannibalism was effectively eliminated. Surrpetitious eating of dead relatives was reported in remote communities for some years afterward, but by the end of the 1950s, the practice had effectively ended. Epidemiological surveillance for kuru began in 1957 and has continued ever since today.

Sex:

Kuru are found more dominant on women and children and the proportion of an affected males is relatively low of 2% of overall cases from 1957-1958.

Age:

The latest year of birth recorded for any patient with kuru was 1959; only 9 individuals with kuru are recorded as having been born since 1956. During the peak of the epidemic, it was estimated
that most of the affected individuals were young women but only a small number of children and post-menopausal women were also found to be infected.

**What are the treatments for kuru?**

Even after conducting intensive research by various scientists for almost 65 years still there is no cure for kuru and one of the reason for this due to the incubation period which is longer than the other disease. As a result in course of time prion get mature and affect the whole body parts which ultimately leads them to death.

**What is the outlook for kuru?**

People suffering from kuru require assistance to stand, move and ability to swallow and eat. As there is no cure for affected people sometimes it may also lapse into a coma for six to 12 months after experiencing initial symptoms. The disease is fatal and it's best to prevent it by avoiding exposure.

**How can I prevent kuru?**

Kuru is exceptionally rare contracted by ingesting infected brain tissue. Governments and societies work together in collaboration to prevent the disease in the mid-20th century by discouraging the practice of cannibalism and with that the disease has almost vanished to some extent.

Today, kuru is rarely diagnosed. Symptoms similar to those of kuru more likely indicate another serious neurological disorder or spongiform disease. Due to kuru long incubation period the disease has lingered. However, the epidemic has declined from 200 deaths per year in 1957 to 1 or no deaths annually in 2005 Signs and symptoms.

**Organizations and their activities:**

Papua New Guinea Institute of Medical Research is a statutory body established in 1968. Its headquarters with offices and laboratories are located at Goroka, Eastern Highlands Province and another major branch is located at Yengaun, near the coastal town of Madang. The Institute also has other branches and offices in Maprik and Wewak (East Sepik Province) and in its capital Port Mores. Initially this institute was formulated by the Government of Australia by the act of parliament, focusing on the health issue of people particularly the South Fore through various activities and research thereby bringing improvement and solution of a desired disease. The main aim of the institute is to understand the disease process and constraints changes by examining the host factors and the agents causing the disease Earlier the institute focused on respiratory diseases, pigbel (clostridia necrotizing enteritis) and kuru. Since then many initiatives program has been launched in various fields around the globe. Further the institute has also four units which are given below.

**Vector Borne Disease Unit**

The unit focuses on research into malaria and lymphatic filariasis. Most activities are concentrated Madang and Maprik branches. The unit has molecular and immunological laboratories, large research microscopy section and an entomology laboratory which conducts clinical trials with anti-malarial drugs.

**Infection and Immunity Unit**

This unit conducts research into enteric diseases like cholera and respiratory problem, pneumonia and tuberculosis. Besides they also conduct continuous surveillance of suspected cases of kuru

**Sexual and Reproductive Health Unit**

This is the second unit emerged from previous Operational Research Unit conducting clinical, laboratory and social research into sexually transmitted infections including HIV/AIDS, and other sexual and reproductive health issues.

**Environmental and Emerging Diseases Unit**

This is most recent established unit that deals with environmental pathogens and infectious diseases such as cholera and influenza. This unit is interdisciplinary and translational compromising of various dimensions from different fields like epidemiology, microbiology, immunology, entomology, medical anthropology, molecular genetics, biostatistics, public health, and demography

Its headquarters is in Goroka which is also a house of editorial office of Papua New Guinea Medical Journal- a peer-reviewed scientific periodical publication by the Medical Society of PNG. Besides Electronic versions of Journal's publications can be obtained through institute website.

**Funding:**

The institute receives funds in collaboration from Government of Papua New Guinea and AusAID focusing mainly on future research for advanced studies. Other than that they also receive funds from overseas agencies like Bill & Melinda Gates Foundation, the Australian National Health and
Medical Research Council, the U.S. National Institutes of Health (NIH), the Global Fund to Fight AIDS, Tuberculosis and Malaria, the World Health Organization, the Swiss National Science Foundation and several others in a contractual basis. In the last two years, the PNG Liquefied Natural Gas (PNG LNG) project has also lend their support by providing infrastructural schemes and carried out the research in analyzing the health issues and its impact for assessment on a large scale.

**National Institute of Neurological Disorders and Strokes (NINDS) Mission**

The mission of NINDS is to seek fundamental knowledge about the brain and nervous system and make effective use of knowledge to reduce the burden of neurological disease.

**Support and its assistance:**

Supports and assistance includes timely scientific research on translational, clinical neuroscience, meetings, training and career development programs for increasing more awareness about the disease and also educates the expertise as well as the local so as to ensure vibrant, talented and diverse work force and also minimize the barriers responsible for causing the agents.

For more information about the mission and activities of NINDS, see the NINDS OVERIEW.

**NINDS Overview:**

The National Institute of Neurological Disorders and Stroke (NINDS) conducts and supports research on brain and nervous system disorders. launch by the U.S. Congress in 1950, NINDS is one of the biggest research institutes having centers like National Institutes of Health (NIH) and etc. The NIH is also located in Bethesda, Maryland, an agency of Public Health Service within the U.S. Department of Health and Human Services. For more than 50 years NINDS has occupied a central position in the world of neuroscience and more than 600 disorders due to the nervous system has been identified and reported. Common disorders such as stroke, epilepsy, Parkinson’s disease, and autism are well-known and other neurological disorders are rare and known to few individuals and family. Therefore NINDS conduct research for clues to understand the function and mechanism of the brain and also at the same time and focus on the solution for finding solution for specific diseases. Neurological disorder estimates about 50 millions of Americans citizen each year exacting an incalculable personal toll and spending billions of dollars in medical expenses and productivity.

To accomplish goal NINDS supports and conducts basic translational and clinical research for both normal and affected person and then look for a treatment which can enhance further development of a patients. On the other hand they also provides training for investigators in basic and clinical neurosciences and seeks better understanding about the disease, diagnosis, treatment, and prevention of neurological disorders.

Basic research pursues an understanding of the normal and abnormal structure and activities of the human nervous system. The knowledge gained from this research creates the foundation for diagnosing and treating brain disease. Some important areas of NINDS basic research include: biology of the cells of the nervous system, brain and nervous system development, genetics of the brain, cognition and behavior, neuro-degeneration, brain plasticity, repair, neural signaling, learning, memory, motor control and integration, sensory function, neural channels, synapses, and circuits. The great challenge of modern neuroscience is to translate the remarkable findings of basic science into useful therapies for those who suffer the devastating effects of neurological disorders. To facilitate this translation, NINDS supports many specific research projects and research resources that accelerate preclinical therapy development.

Clinical research applies directly to mechanisms of the diseases of the nervous system which can be translated into disease detection, prevention, and treatment, such as studies of brain imaging techniques, trials to test new drugs, and development of novel therapies such as stem cell implants and gene transfer. Some key areas of NINDS clinical research include: neurological consequences of AIDS, Alzheimer’s disease, brain tumors, developmental disorders, epilepsy, motor neuron diseases, muscular dystrophies, multiple sclerosis, neuro-genetic disorders, pain, Parkinson’s diseases, other neurodegenerative disorders, sleep disorders, spinal cord injury, stroke, and traumatic brain injury.

Most NINDS-funded research is conducted by extramural scientists in public and private institutions, such as universities, medical schools, and hospitals. NINDS intramural scientists, working in the Institute’s laboratories, branches, and clinics, also conduct research in most of the major areas of neuroscience and on many of the most important and challenging neurological disorders.

Besides that they also focus on various dimension citing as an inter-disciplinary research in a broad sense. The Institute collaborates with other NIH components, as well as with other federal agencies
with voluntary, professional and commercial organizations.

NINDS also commit to strengthen the foundation of neuroscience in years ahead and for achieving the goal, more research on training and development is carried out for next generation of neuroscientists. In addition, NINDS serves as a prime source of neurological information for scientists, clinicians, and the public.

For more information please visit our website at www.ninds.nih.gov or contact the Institute’s Brain Resources and Information Network (BRAIN).

**Conclusion:**

Since the discovery of the kuru epidemic in New Guinea, a vast amount of knowledge has been gained concerning prion diseases. The specific dynamics of the kuru disease are important to realize in order to better understand all prion diseases. Scientists admit that there is still a lot of work is needed to covered this area of research. Numerous questions have been answered, yet many puzzles still remain to be solved. A large amount of the work done in an attempt to understand prion diseases and with this many research was been carried out by anthropologists in the field studying the Fore. Their contributions to this research have played a vital role in eliminating the disease in New Guinea and therefore many cases for kuru were not found in the recent years.

**REFERENCES**


KURU DISEASES PHOTO GALLERY

FIGURE 1: Kuru Effected Part in Brain
FIGURE 2: Ancient Group Cannibalism
FIGURE 3: Modern Group Cannibalism