Project Report

A Survey on

Knowledge and awareness of Monkeypox among the College students Bangladesh perspectives

Submitted To

The Department of Pharmacy,

Faculty of Allied Health Sciences,

Daffodil International University

In the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy

Submitted By

Student ID: 183-29-139

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Department of Pharmacy

Faculty of Allied Health Sciences

Daffodil International University

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APPROVAL

This project A survey on Knowledge and awareness of Monkeypox among the college students Bangladesh perspectives, submitted to the Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy and approved as to its style and contents.

BOARD OF EXAMINERS

……

Dr. Muniruddin Ahmed

Professor and Head

Department of Pharmacy

Faculty of Allied Health Sciences

Daffodil International University

…… Internal Examiner 1

…… Internal Examiner 2

…… External Examiner

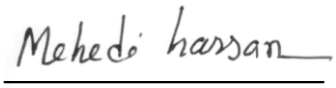
DECLARATION

I, at this moment, announce that I am carrying out this project study under the supervision of "Dr. Sharifa Sultana," Associate Professor, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, Impartial Compliance with the Bachelor of Pharmacy Degree Requirement (B. Pharm). This project, I declare, is my original work. I also state that neither this project nor any part thereof has been submitted for the Bachelor's award or any degree elsewhere.

Supervised by:

Dr. Sharifa Sultana
Associate Professor
Department of Pharmacy
Faculty of Allied Health Sciences
Daffodil International University

Submitted by:



Md. Mehedi Hassan
ID: 183-29-139
Department of Pharmacy
Faculty of Allied Health Sciences
Daffodil International University

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Author

Md. Mehedi Hassan

DEDICATION

I dedicate this work to my parents, my teachers and my friends.

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Abstract

Monkeypox is a rare disease similar to smallpox caused by the monkeypox virus. Typically, people of Central and West Africa are affected by monkeypox through traveling contact with other persons who are already affected by monkeypox pox. The study aimed to find out the knowledge prevalence rate, and management treatment of monkeypox among College students. Of the 195 participants, the students were 45 % male and 55% female, 89%unmarried, 11% married. 90% of students have heard the name monkeypox 10% of students don't know about monkeypox. 62% of students learned about monkeypox for the first time via social media, 20% through news articles, 16% from teachers,55% of participants think that monkeypox is transmitted by Air and another 45% of participants don't think it is transmitted by air. 56% of students responded that symptoms of monkeypox typically appear within 2 weeks, 16% said that they typically appear within 3 weeks, and 28% said that they typically appear within 4 weeks. We know about monkeypox but do not have sufficient knowledge about treatment and management. Monkeypox is a viral disease, it can be converted serious disease so we need a large-scale study about it.

Key words: Monkeypox, Drug, Diseases, Antibiotic.

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Chapter One: Introduction

1.1.Virus

Viruses are very small infectious organisms that can only multiply inside the cells of a living host. Viruses can only infect living cells. [1] Viruses are a danger to every living creature on Earth, from macroorganisms like animals and plants to microorganisms like bacteria and archaea. They may cause disease in all of these different types of organisms.[2] Since Dmitri Ivanovsky's 1892 article describing a non-bacterial pathogen infecting tobacco plants and Martinus Beijerinck's 1898 discovery of the tobacco mosaic virus,[3] more than 9,000 virus species have been described in detail,[4] with the Zika virus being the most recent to be described in 2006.There are millions of different types of viruses in the environment, but since Martinus Beijerinck's 1898 discovery of the tobacco mosaic virus and D [5-6] Viruses are the most common kind of living entity and may be discovered in practically every setting on Earth. They are responsible for almost all disease. [7] [8] The study of viruses is the primary focus of the subdiscipline of microbiology known as virology. When a cell gets infected with a virus, it is sometimes required to produce thousands of copies of the original virus in an extremely short amount of time. Independent particles, also known as virions, may be seen most of the time when a virus is not present inside an infected cell or when it is not in the process of infecting a cell. I the genetic material, which is made up of long molecules of DNA or RNA that encode the structure of the proteins by which the virus acts; ii the capsid, which is a protein coat that surrounds and protects the genetic material; and iii, in some cases, an outer envelope made of lipids. These particles make up the virus. I the genetic material, which is made up of long molecules of DNA or RNA that encode the structure of the proteins by which the virus acts. These viral particles have the potential to assume a broad variety of forms, ranging from the simplest helical and icosahedral structures to more sophisticated geometrical arrangements. It is not feasible to view the virions of most virus species with an optical microscope since the virions of most virus species are one tenth the size of most bacteria.Plasmids are mobile fragments of DNA, and it's possible that certain viruses arose from them. Other viruses, on the other hand, could have come from bacteria. In the same way that the horizontal transmission of genes by viruses is essential to the evolutionary processes that take place, genetic diversity may be increased via sexual reproduction. [9-10] Some scientists believe that viruses are living forms despite the fact that they lack fundamental characteristics, such as cell structure, that are generally

considered to be crucial requirements for defining life. These characteristics include the ability to reproduce, pass on genetic information to offspring, and evolve as a result of natural selection.

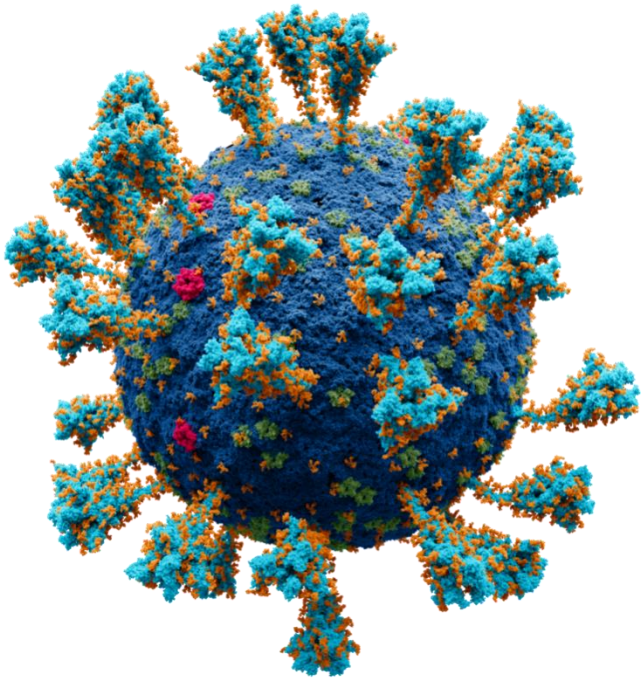

Fig 01 : Viruses

Replicators and "organisms on the edge of life" are two names that have been given to viruses due to the fact that they share some of these features but not others. [11] There are many different kinds of carriers that viruses may employ to spread. Vectors are organisms that carry diseases and have the potential to transmit them to other hosts. For instance, aphids and other insects that feed on plant sap have the potential to transmit viruses from one plant to another, and blood-sucking insects have the potential to transmit viruses from one mammal to another. The common cold, SARS-CoV-2, chickenpox, smallpox, and measles are only few of the viruses that may be spread via the air by coughing and sneezing. Other viruses that can be spread include the common cold and smallpox. Noroviruses and rotaviruses are the two viruses that are responsible for the vast majority of cases of viral gastroenteritis. Viral gastroenteritis may be caused by a variety of other viruses. It takes far less than one hundred norovirus particles to get a person sick with the sickness. [12] HIV is only one of several viruses that may be spread via sexual contact or blood contact. The "host range" of a virus refers to the many kinds of cells that it is capable of infecting. If a virus can only infect a limited number of species, then its host range is considered to be confined. On the

other hand, if it can infect a vast variety of organisms, then its host range is considered to be broad. When a virus infects an animal, the body generates an immune response in an effort to clear itself of the foreign invader and prevent further infection. Vaccines, which offer an immunity against a particular viral infection that is intentionally acquired, may also be used to induce immune responses in the recipient. Viruses such as HIV/AIDS, human papillomavirus (HPV), and hepatitis viruses, on the other hand, are able to circumvent these defenses and live within the body for lengthy periods of time. In order to battle viruses, researchers have developed a variety of distinct classes of antiviral medications.[13]

1.1.1..Origins

Viruses are ubiquitous in the biosphere and have likely been there from the earliest days of cellular existence. [14] Since viruses cannot leave fossils, scientists have to resort to molecular methods to learn about their early history. [15] Furthermore, viruses are often able to integrate their genetic material into the germline of their host species, allowing them to be passed on to subsequent generations of the host's progeny. This offers paleovirologists with a goldmine of data for reconstructing the history of viruses that have been around for millions of years. There are three primary theories that attempt to clarify where viruses came from: [16-17]

A. Regressive hypothesis

Perhaps viruses evolved from smaller cells that parasitized bigger ones. As time went on, parasitism-unrelated genes were eliminated. Both rickettsia and chlamydia are examples of bacteria, and like viruses, they can only multiply while within a host cell. They provide credence to the theory, since they presumably lost genes that allowed them to thrive outside of a cell due to their need on parasitism. Sometimes referred to as the "degeneracy hypothesis"[18-19] or the "reduction hypothesis," this idea goes by a few different names. [20]

B. Cellular origin hypothesis

The genetic material of one creature may have "escaped" and given rise to the genes of a virus. Potential sources of the escaping DNA include plasmids and transposons. Plasmids are mobile bits of bare DNA that may jump from cell to cell (molecules of DNA that replicate and move around to different positions within the genes of the cell). [21] Transposons, which were once referred to as "jumping genes," are an example of mobile genetic components and may represent the virus's

original source. Barbara McClintock first noticed them in maize in the year 1950.The term "vagrancy hypothesis" has been used to describe this phenomenon[22]. This is known as "escape hypothesis" for short. [23]

C. Co-evolution hypothesis

One alternative name for this idea is the "virus-first hypothesis."suggests that viruses depended on cellular life for billions of years since they emerged from complex molecules of protein and nucleic acid at the same time cells first arose on Earth. Viroids are non-viral RNA molecules. This is because they do not have a protein coat, which is a characteristic shared by viruses. They are sometimes referred to as subviral agents since they share properties with many viruses. Plants are susceptible to a wide variety of viral diseases. [24] They connect with the host cell and replicate with the help of the host cell's machinery but lack their own coding for proteins. [25] The human hepatitis delta virus shares an RNA genome with viroids but uses a protein coat borrowed from the hepatitis B virus rather than producing its own. A flawed virus is what this is. Even though the hepatitis delta virus DNA may reproduce on its own once within a host cell, the virus cannot infect new cells without the protein coat provided by the hepatitis B virus. [26] Mimivirus, which infects the protozoan Acanthamoeba castellanii, is also required for the survival of the sputnik virophage. [27] These viruses, known as "satellites," are reliant on the existence of other viral species in the host cell and may represent evolutionary intermediates between viroids and viruses. [28-29]All of these theories had issues in the past, for example, the regressive theory failed to explain why even the tiniest cellular parasites are not similar to viruses. The intricate capsids and other viral particle structures could not be explained by the escape concept. By definition, viruses can only replicate inside of living host cells, hence the virus-first idea ran counter to this fact.It is now understood that viruses predate the separation of life into the three domains and have existed for a very long time.This new information has caused virologists to reevaluate and rethink three long-held theories. [30] Computer analysis of viral and host DNA sequences and evidence for an ancient universe of RNA cells are shedding light on the evolutionary connections between various viruses and might lead to the identification of their forebears. Such studies have not settled the debate over which of these theories is more accurate. [31] It's very improbable that all known viruses descended from a single source, and it's possible that viruses have repeatedly emerged in the past via several ways. [32]

1.1.2.Classifications of viruses

a) Class I: Double stranded DNA (dsDNA) viruses.
b) Class II: Single stranded DNA (ssDNA) viruses.
c) Class III: Double stranded RNA (dsRNA) viruses.
d) Class IV: Single stranded RNA (ssRNA) viruses.
e) Class V: Single stranded RNA (ssRNA) viruses.

1.2.Monkeypox

The illness known as monkeypox is caused by a virus that is contagious and may affect both people and other animals.Some of the symptoms include a high temperature, enlarged lymph nodes, and a rash that starts out as blisters before becoming crusty.The time it takes for symptoms to appear after exposure might vary anywhere from five to twenty-one days. [33] The average length of time that symptoms last is between two and four weeks.There may be just a few, moderate signs, or it may take place with no symptoms at all being recognized. [34] It has been discovered that the characteristic presentation of shingles, which consists of fever and muscular aches, followed by swollen glands, and lesions all occurring at the same stage, is not present in every outbreak.some cases, particularly those affecting youngsters, pregnant women, or those with compromised immune systems, may be quite serious.This illness is brought on by the monkeypox virus, which belongs to the genus Orthopoxvirus and is a zoonotic virus. [35] This genus also contains the variola virus, which is responsible for causing the disease known as smallpox.Of the two forms that may affect humans, clade II (previously known as the West African clade) is associated with an illness that is less severe than the one that originates in Central Africa (the Congo basin). Transmission from infected animals may occur via the handling of contaminated meat, as well as through bites and scratches.Transmission from one individual to another may take place when a person is exposed to infected bodily fluids or contaminated items, when there is a little droplet-to-droplet contact, or even by the airborne route.The virus may be passed from person to person from the time symptoms first appear until all of the lesions have crusted over and fallen off; however, there is evidence of dissemination for more than a week after lesions have crusted over.The diagnosis may be verified by doing a DNA test on a lesion to look for the virus. Nobody has found a treatment that works. A research that was conducted in 1988 indicated that the smallpox

vaccination had a protective efficacy of around 85% when it came to avoiding infection in people who were in close contact with one another and reducing the severity of the illness. [36] A more recent vaccine for smallpox and monkeypox that is based on modified vaccinia Ankara has been given the green light for use, but there is only a limited supply of it.In addition, it is important to wash your hands often and stay away from ill people and animals.During an epidemic, antiviral medications like as cidofovir and tecovirimat, as well as vaccinia immune globulin and the smallpox vaccination, may be administered.

Fig 02 : Monkeypox

The majority of people who are infected will recover within a few weeks even if they don't get treatment since the sickness is often minor. Estimates of the risk of mortality range from 1% to 10%, however very few fatalities have been documented as a result of monkeypox since 2017.It is hypothesized that a number of different mammalian species serve as natural reservoirs for the virus.[37-39] Although it was originally considered to be rare in humans, the number of outbreaks as well as their intensity has considerably risen since the 1980s. [40] It is possible that this is due to diminishing immunity as a consequence of the cessation of regular smallpox immunization. In 1970, the Democratic Republic of the Congo was the location where researchers discovered the first instances of the disease in people (DRC).There have been isolated incidents of this disease

throughout Central and West Africa, but it is prevalent in the Democratic Republic of the Congo.[41] The outbreak of monkeypox in 2022 is the first time that widespread community transmission has occurred outside of Africa. It was first discovered in the United Kingdom in May of that year, and subsequent cases have been confirmed in at least 74 countries across all continents with the exception of Antarctica.The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC) on July 23, 2022 . At the time of the declaration, more than 53,000 cases had been reported in 75 countries and territories.[42]

1.2.1.Signs and symptoms

Despite its terrible potential, monkeypox is often a brief, self-limiting viral illness that causes a rash. Most patients get well within a couple of weeks without medical help. It is possible for individuals to get critically ill and even die under certain situations. Symptoms of monkeypox often appear between 5 and 21 days after infection. There may be a progression of symptoms over the course of 2 weeks to 4 weeks.

Painful rashes may appear anywhere on the body, including:

- mouth
- genitals
- perianal
- face
- the body's limbs
- feet
- hands

The rash goes through many phases during the course of its typical 14–28-day duration. At last, scabs develop and eventually fall off. Accompanying the rash may be universal signs such as:

- fever
- chills
- enlarged lymph glands
- headache
- Tense muscles

- aching joints
- hurting back
- exhaustion

From the time the initial symptoms appear until the scabs come off on their own and the skin heals, you will be infectious.[43-44]

1.2.2. Causes

The monkeypox virus is a member of the Poxviridae family and the genus Orthopoxvirus. It has two strands of DNA and is a double-stranded virus. It has the potential to infect both humans and animals. This virus, which was detected for the first time in monkeys that were held in zoos, is most often found in the tropical rainforests of Central and West Africa. There are two different viral subtypes, and they are clade I and clade II (formerly Congo Basin and West African clades, matching the geographical areas).Dormice (Graphiurus spp.), African squirrels, and Gambian pouched rats (Cricetomys gambianus) have all tested positive for the virus thus far in addition to monkeys (Heliosciurus, and Funisciurus). Consumption of diseased animals raises significant worries about the possibility of infection in humans. [45]

Fig 03 : Heliosciurus

1.2.3. Diagnosis

- It is important to rule out other rash-causing diseases when making a clinical diagnosis, such as chickenpox, measles, bacterial skin infections, scabies, syphilis, and medication-related allergies. Monkeypox may be distinguished from chickenpox and smallpox by the presence of lymphadenopathy during the prodromal stage of disease. It is possible to confirm a diagnosis by doing a test for the virus.

- It is recommended that samples taken from skin lesions be analyzed by polymerase chain reaction (PCR) testing in the lab. Due to the little period the virus spends in the blood, PCR blood tests are sometimes inconclusive. Date of fever beginning, date of rash commencement, date of specimen collection, stage of rash at time of collection, and patient age are all necessary for interpreting test findings.[46]

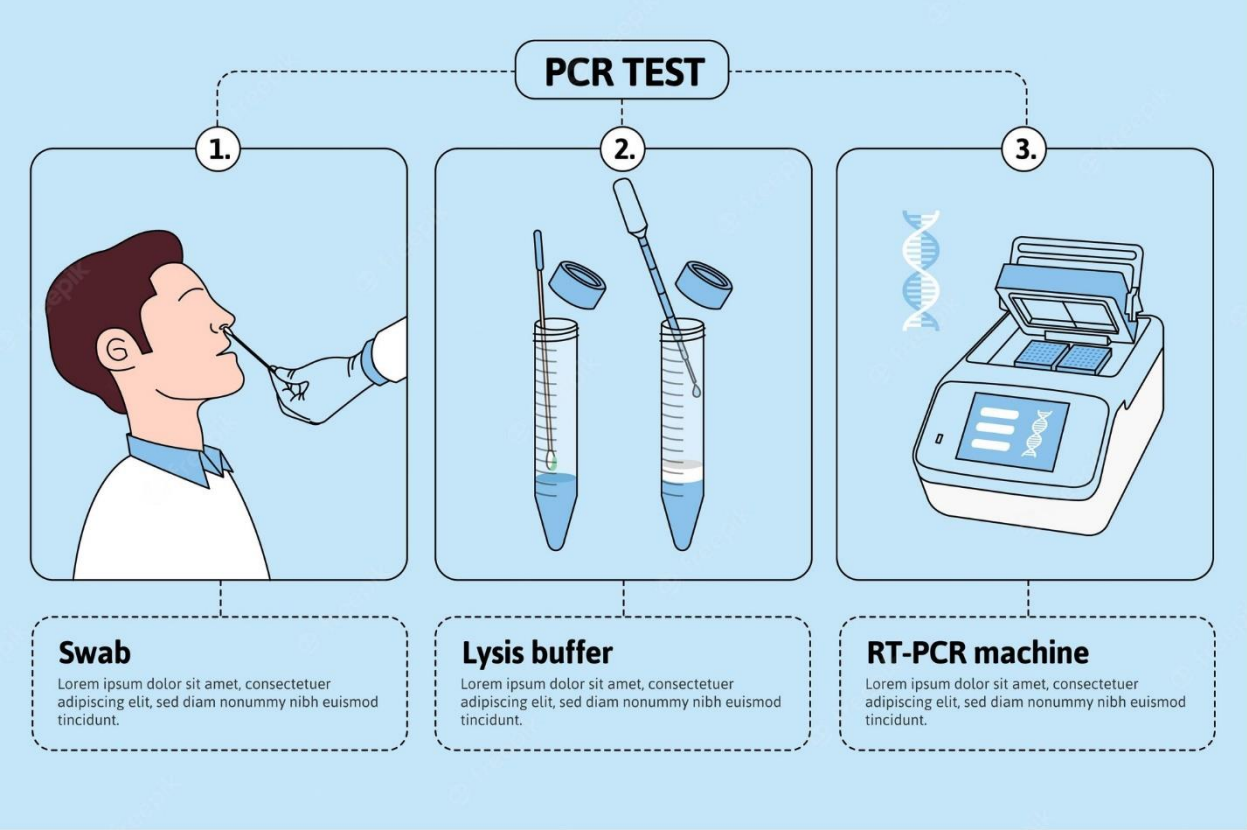

Fig 04 : PCR Test

1.2.4. Risk Factors

It's possible that some groups of individuals have a higher chance of getting monkeypox than others.

Those who are more likely to develop a severe case of monkeypox include:

International travelers: Anyone who goes to an endemic country (areas where the virus has continued circulation) or places with outbreaks is at a higher risk for monkeypox. This includes both domestic and international travelers. [47] If you engage in activities that put you in touch with infected people or animals, the likelihood of contracting the disease increases significantly.

People who participate in anonymous sexual activity: Although monkeypox is not considered a sexually transmitted infection (STI) since it may be spread in other ways, it is nevertheless contagious and can be passed on by bodily fluids, close touch, and skin-to-skin contact. The worldwide epidemic that occurred in 2022 was mostly transmitted from person to person via sexual contact.

People who have contact with animals with the virus: When a person comes into touch with an infected animal (such as a monkey, rat, or squirrel), there is a risk that they may get monkeypox from that animal and pass it on to themselves. This may happen if you are bitten or scratched by an animal infected with monkeypox. It is also possible to get monkeypox from coming into contact with the lesions or saliva of an infected animal.[48]

Healthcare workers: After providing medical attention to a patient who is afflicted with monkeypox, you run the risk of catching the illness yourself. In a medical facility, the virus may be spread by direct contact with a patient's body fluids, lesions, or respiratory droplets. Another mode of transmission is through the spread of respiratory droplets. It is also possible to get it by coming into touch with the clothes or bedding that a person infected with the virus wore.[49]

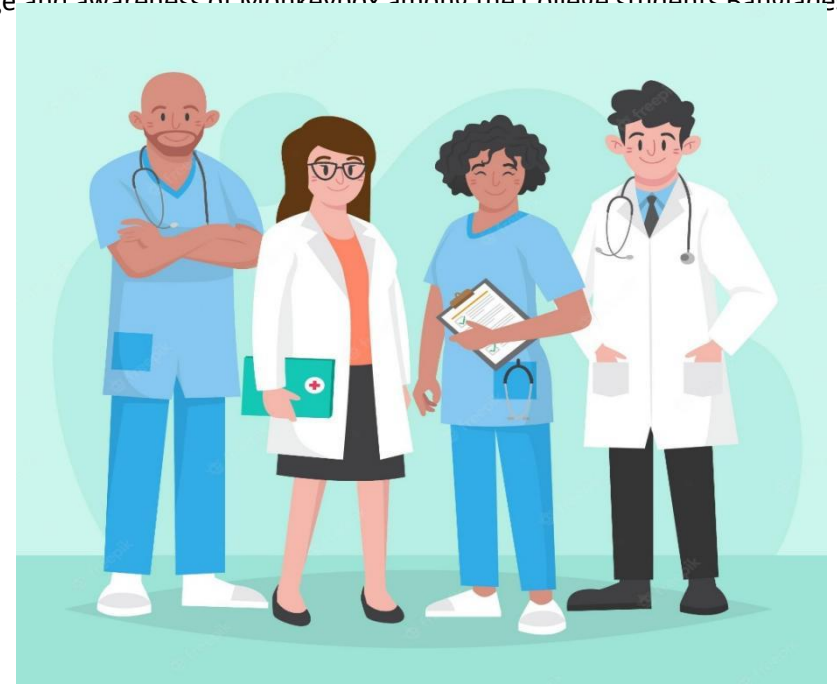

Fig 05: Healthcare workers

1.2.5. Prevention

Because smallpox and monkeypox are closely related viruses, and the vaccine protects animals against experimental deadly monkeypox challenges, it is a commonly held belief that vaccination against smallpox also protects against infection with monkeypox in humans. This is due to the fact that the vaccine protects animals against experimental deadly monkeypox challenges. [50] This has not been demonstrated to be the case in humans since extensive vaccination against smallpox was discontinued when it was reported that the illness had been eliminated. People in Africa who have had the smallpox immunization may have a lower risk of contracting monkeypox compared to those who have not received the vaccination. One explanation for the widespread occurrence of monkeypox is that populations are gradually losing their resistance to poxviruses as a result of recurrent exposure to these viruses. Cross-protective immunity among people who were inoculated before to 1980, when mass smallpox vaccinations were ceased, has diminished, and the continuously growing proportion of unvaccinated persons is being blamed for this.The Centers for Disease Control and Prevention (CDC) strongly recommends that anybody who will be doing research on monkeypox outbreaks or giving medical treatment to humans or animals who have been infected with monkeypox be vaccinated against smallpox. Anyone who has had direct or intimate contact with a monkeypox carrier, whether the carrier is a human or an animal, should be

vaccinated against the disease. Unless they are going to be doing field investigations, the Centers for Disease Control and Prevention (CDC) does not recommend vaccination before to exposure for unknown veterinarians, veterinary personnel, or animal control authorities who may come into contact with the disease. As of the time this article was written, neither the immunization for smallpox nor the vaccination for monkeypox is considered to be safe for use during pregnancy. [51] Before treating an infected patient, medical personnel should dress in full personal protective equipment (PPE), as directed by the Centers for Disease Control and Prevention (CDC). It includes a gown, a mask, goggles, and a respirator respirator that has a filter that can be thrown away after each use (such as an N95).

Fig 06: Respirator

In a perfect world, a person who is infected would be isolated in a chamber with negative air pressure; nevertheless, a private examination room might do in a pinch. [52] Vaccination alone is not sufficient to prevent monkeypox; other measures are necessary. The availability of treatment, the dependability of information, and the quality of health care are all becoming more pressing concerns.Effective communication is perhaps the aspect of public health that presents the biggest challenge. Due to the inherent complex interconnection of the illness as well as the negotiated social meanings, accurate communication about public health has to be a collaborative effort between medical professionals and people.This is the reason why, as Scalvini argues in the BMJ,

we need a "new ethic of shared responsibility" to warn the public of possible hazards and equip disadvantaged populations with the tools they lack to make informed choices.[53]

1.2.6. Treatment

In both the European Union and the United States, studies have demonstrated that the antiviral medication tecovirimat is effective against a variety of poxviruses, including monkeypox. [54] In addition to supportive care, the antiviral medicine tecovirimat or brincidofovir, which is used to treat smallpox, is recommended as a first-line alternative by BMJ Best Practice in the event that antiviral therapy is required (including antipyretic, fluid balance and oxygenation). An empirical therapy with antibiotics or aciclovir may be offered if it is thought that the patient may develop a future infection with bacteria or varicella zoster. [55]

Fig 07: Tecovirimat

1.3. Monkeypox virus

The monkeypox virus is a DNA virus that has the potential to infect people as well as other animals. It is also known as the monkeypox X virus and the human monkeypox X virus. Approximately 190 kilobytes make up the whole of the genome. [56] The monkeypox virus is a member of the family Orthopoxviridae, which also contains the variola (VARV), cowpox (CPX), and vaccinia (VACV) viruses. These are all viruses that are only remotely related to the monkeypox virus. This virus does not derive directly from the variola virus that causes smallpox, nor does it have a common ancestor with the virus that causes smallpox (variola virus). Although clinically similar to smallpox, monkeypox is characterized by a milder form of the disease's

hallmark rash and has a reduced risk of death. [57-59] It is not necessary for an animal and a person to come into touch with one another for the virus to be transmitted from animal to human. [60] Even though monkeys were the first animals to be infected with the virus that would later be recognized as monkeypox, rodents are currently considered to be the most frequent reservoir hosts. It has been shown that the virus exhibits some degree of virulence variation, as it has been found that isolates from Central Africa have a greater virulence than isolates from Western Africa. The virus has now divided into two clades, one of which is unique to each location. These clades were once known as the clade that originated in the Congo Basin (Central Africa) and the clade that originated in West Africa, respectively. [61]

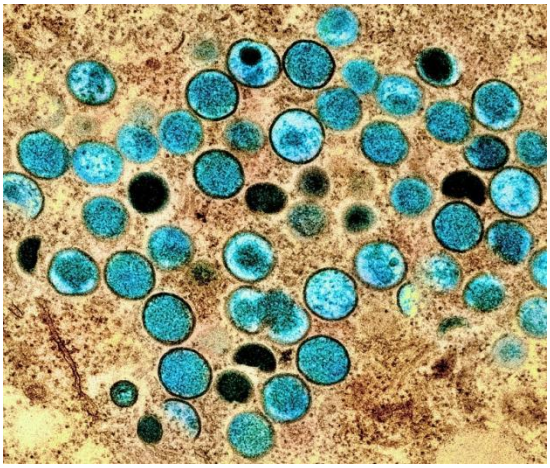

Fig 08: Monkeypox virus

1.3.1. Virology

Classification

The World Health Organization (WHO) has placed MPV on its list of illnesses that have the potential to become epidemic or pandemic. MPV is classified as a member of the genus Orthopoxvirus, which is part of the Poxviridae family. [62]

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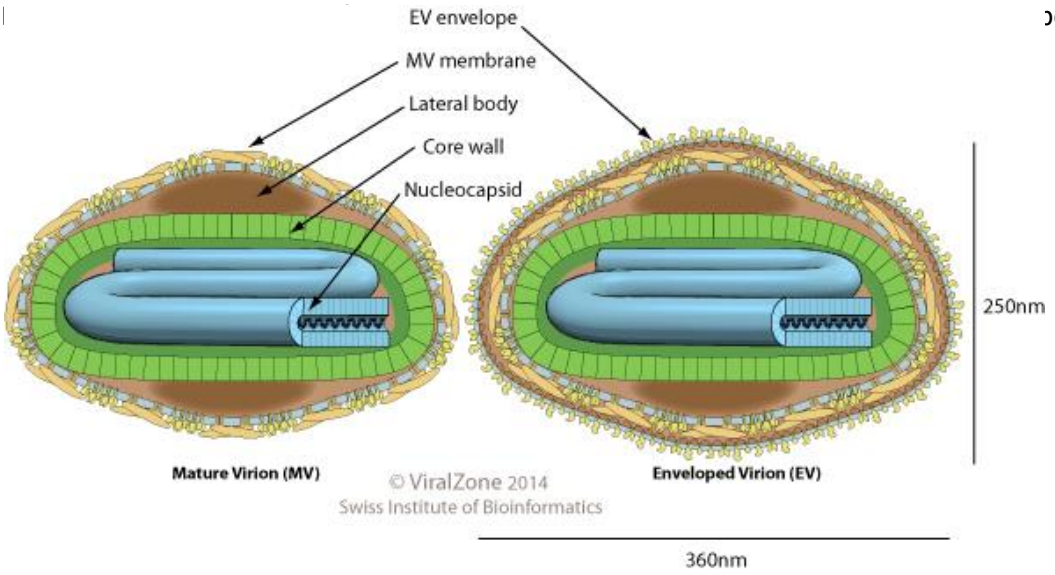


Fig 09 : Orthopoxvirus

The structure as well as the genome

The monkeypox virus, like other poxviruses, has an oval shape and an exterior membrane that is composed of a lipoprotein. Enzymes, DNA, and transcription factors of the virus are shielded from the outside environment by the virus's outer membrane. [63]The genome of the monkeypox virus is around 200 kilobytes in size and encodes for about 200 different proteins. It possesses double-stranded DNA that is presented in the form of a linear structure with covalently closed hairpin ends; the 3' and 5' ends are not free. [64] The irons of monkey pox have huge oval-shaped envelopes, much like the irons of other poxviruses.The 3' and 5' ends are not free. A core can be found inside of every virion, and this core contains the genome in addition to the enzymes that aid in the process of replicating and removing the protein coat.[65]

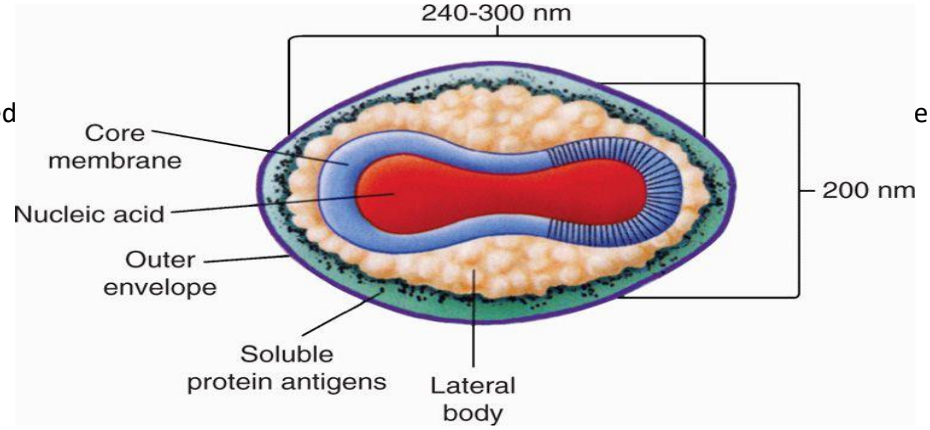


Fig 10 : Poxviruses

Replication and life cycle

Gene expression begins when MPV releases viral proteins and enzymatic factors that disable the cell.Protein synthesis allows for the ER membrane of the factory to disassemble. As an orthopoxvirus, MPV replication takes place entirely in the cell cytoplasm within 'factories' created from the host rough endoplasmic reticulum (ER), where viral mRNA transcription and translation also take place. [66]

1.3.2.Distribution

The virus that causes monkeypox is carried by a variety of species, including primates. [67] In the year 1958, it was discovered by Preben von Magnus in Copenhagen, Denmark, in crab-eating macaque monkeys (Macaca fascicularis) that were being used as research animals. [68] The source of the outbreak in the United States in 2003 was determined to be prairie dogs that had been infected by a Gambian pouched rat that had been imported from Ghana. [69]The monkeypox virus is responsible for illness in non-primate animals as well as primates. The tropical rainforest areas of Central and West Africa are the most common habitat for the virus. [70] The tropical woodlands of West and Central Africa are the most common habitat for the virus to be found in. In 1958, it was found that monkeys carried the disease, and in 1970, it was shown that people did. Over 400 occurrences of the disease in people were recorded between the years 1970 and 1986. In the equatorial regions of Central and West Africa, routinely occurring small viral outbreaks with secondary human-to-human infection can be found.It is believed that the most common way to get the disease is via direct contact with sick animals or their body fluids. [71] The first outbreak of the disease to be documented outside of Africa took place in 2003 in the midwestern United States, specifically in Illinois, Indiana, and Wisconsin, with a single incident recorded in New Jersey. 2017 was the year when Nigeria had a large epidemic. [72]

1.4. Vaccination

Vaccines against smallpox that include the vaccinia virus and are used to prevent monkeypox, such as Imvanex (Jynneos) and ACAM2000, have an efficacy of around 85 percent. This degree of protection is derived from research conducted in Africa in the late 1980s utilizing smallpox vaccinations that were put through their paces in the tests. [73-75] The vaccination with Jynneos/Imvanex is "administered as two subcutaneous injections four weeks apart," as stated by the Centers for Disease Control and Prevention (CDC), whereas the vaccination with ACAM2000 is "administered as one percutaneous dose via multiple puncture technique with a bifurcated needle." Imvanex (Jynneos) is recommended for potentially immunocompromised persons due to it containing an attenuated, non-replicating orthopoxvirus, Modified Vaccinia Ankara-Bavarian Nordic. On the other hand, ACAM2000 is not recommended for potentially immunocompromised persons due to the high replication competency of vaccinia (MVA-BN). [76] The United Kingdom Health and Safety Executive (UKHSA) has started giving close contacts of known patients Imvanex as a post-exposure prophylactic measure.On May 25th, disease specialists working for the NICD in South Africa said that they did not feel there was a need for widespread immunization since they do not expect the number of cases would skyrocket like they did during the COVID-19 pandemic.[77] Several nations have said that, in response to the current epidemic of monkeypox, they would either purchase vaccinations specifically for use in the outbreak or release vaccines from their national stockpiles so that they may be used in the outbreak. In May of 2022, the United States of America, Spain, Germany, the United Kingdom, and the United Kingdom all stated that they would be purchasing smallpox vaccine.Jennifer McQuiston, Deputy Director of the Centers for Disease Control and Prevention (CDC), said on May 24 that the United States would be releasing part of its Jynneos vaccine supplies from their Strategic National Stockpile for those who are considered to be at "high risk."[78]On June 23rd, the New York City Department of Health made an announcement that a clinic located within the Chelsea Sexual Health Clinic would offer the two-dose Jynneos vaccine to "...all gay, bisexual, and other men who have sex with men (cisgender or transgender) ages 18 and older who have had multiple or anonymous sex partners in the last 14 days."[79] By the 27th of July, the federal government had already issued 300,000 pills to state and municipal health authorities, with distribution taking place in clinics around the country. Additionally, the government planned to release 786,000 more doses during that same week. Bavarian Nordic is the only company in the world that produces Jynneos, and in the spring

of 2022, the company decided to shut its production plant so that it may be remodeled to produce vaccines for other illnesses with the MVA-BN technology. The business anticipates that production of Jynneos will resume in 2023, with the exception of 15 million doses that just need "fill and finish" repackaging at the conclusion of the process. [80]

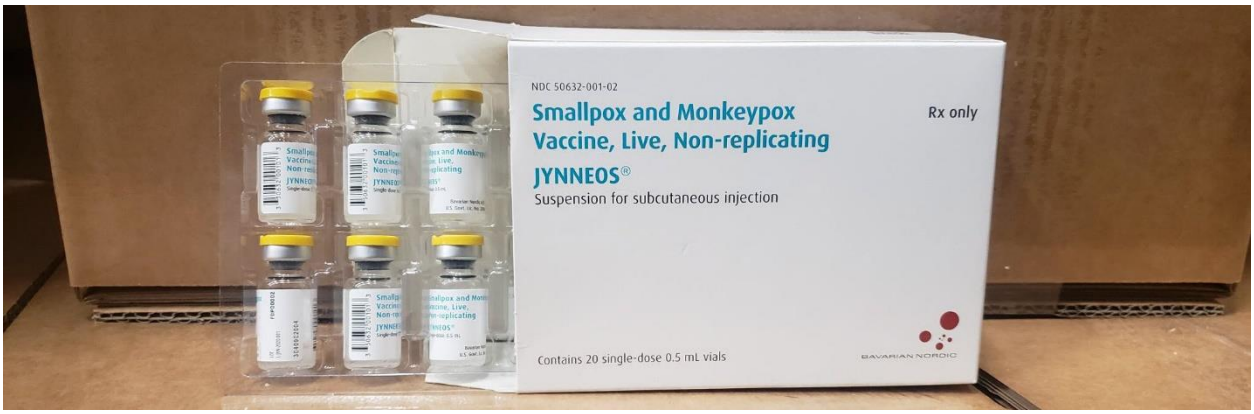


Fig 11 : Jynneos vaccine

Because the United States contributed to the funding of the development of Jynneos, there are now fears that existing contracts would lead to vaccine nationalism and hoarding. These fears have prompted requests for GAVI to allocate doses to countries with lesser incomes. The Food and Drug Administration (FDA) issued an emergency use license on August 9 for vaccinating against monkeypox intradermally (rather than subcutaneously) with a lower dosage of Jynneos. This would boost the number of doses that are accessible by up to five times. The immunization would still be administered in two doses, with a gap of 28 days between each one. A protocol of a one-fifth dosage administered intradermally was evaluated in a trial that took place in 2015.Another monkeypox vaccine, the current LC16m8 vaccine was created in Japan as a national asset, and the maker declared it could not help other nations.[81]

Fig 12 : LC16m8 vaccine

Chapter Two: Literature Review

2.1. Andrea M. McCollum, Inger K. Damon "Human Monkeypox" Clinical Infectious Diseases, Volume 58, Issue 2, 15 January 2014

A zoonotic orthopoxvirus called human monkeypox has a smallpox-like appearance. It is difficult to distinguish the illness from varicella and smallpox clinically. Laboratory diagnostics are crucial for illness monitoring and detection, and novel tests are required for a quicker and more accurate diagnosis. The bulk of human infections occur in Central Africa, where monitoring in underdeveloped rural regions may be challenging but is possible with the use of technologies that are evidence-based and materials that teach public health professionals about key concepts. Now that smallpox immunization is not a common practice, epidemiological studies are required. For the treatment and prevention of monkeypox, new medications and vaccinations provide promise; nevertheless, further study is required before they can be used in endemic areas. To better understand and stop human infections, there is a need for additional study on the biology, ecology, and epidemiology of the virus in endemic locations.

2.2. J. G. Breman, Kalisa-Ruti, M. V. Steniowski, E. Zanotto, A. I. Gromyko, and I. Arita "Human monkeypox, 1970-79 "Bull World Health Organ. 1980; 58(2): 165–182.

Since the successful elimination of smallpox worldwide, concern to human monkeypox has grown. Monkeypox, which was originally identified in 1970 in Central Africa, has clinical characteristics with smallpox but is epidemiologically distinct from it. Since 1970, there have been 47 instances of human monkeypox recorded from 5 different Central and West African nations, with 38 of those cases coming from Zaire. Monkeypox has a case-fatality rate of around 17%, and smallpox has the same pathogenesis and aftereffects. Eighty three percent of the cases involve children under the age of 10. All occurrences have happened in tropical rainforest regions, and it has been shown that cases tend to cluster in certain places both within and across families and nations. Four instances may have included person-to-person transmission.

2.3. Antoine Gessain, M.D., Emmanuel Nakoune, Ph.D., and Yazdan Yazdanpanah, M.D. "Monkeypox" N Engl J Med 2022; 387:1783-1793

During two outbreaks of a smallpox-like illness in a colony of cynomolgus monkeys, the monkeypox virus was initially discovered in late 1958 in Copenhagen. Before the disease's eruptive phase, which is marked by a maculopapular rash, no clinical symptoms had been seen. Given how much it resembled other recognized poxviruses, the virus was given the moniker monkeypox virus. In colonies of captive monkeys in the United States and the Netherlands, there were a number of further outbreaks of monkeypox between 1960 and 1968. 2 Despite the deaths of many infected animals during these outbreaks, there were no instances of monkeypox found in people, suggesting that humans were immune to the disease. As part of the regional monitoring and eradication operation for smallpox that was then underway in Africa, the first incidence of monkeypox in a person was recorded in 19703. A fever and a centrifugal rash appeared in this instance on 9-month-old kid two days apart.

2.4. Robert A. Weinstein, Aysegul Nalca, Anne W. Rimoin, Sina Bavari, Chris A. Whitehouse "Reemergence of Monkeypox: Prevalence, Diagnostics, and Countermeasures" Clinical Infectious Diseases, Volume 41, Issue 12, 15 December 2005.

A viral zoonotic illness called human monkeypox predominantly affects the rain forests of central and western Africa. However, imported wild rats from Africa brought the illness to the United States lately. The clinical signs of monkeypox are remarkably similar to those of common types of smallpox, including flu-like symptoms, fever, malaise, back pain, headache, and the recognizable rash. A differential diagnosis to exclude out smallpox is crucial given this clinical range. There are no approved treatments for human monkeypox, however the smallpox vaccination may provide protection. The overall lack of immunization in the 1980s has increased the human population's vulnerability to monkeypox virus infection. As a result, there are worries that the monkeypox virus may be employed in bioterrorism. Minimizing contact with sick people or animals and limiting respiratory exposure to infected people are essential components of effective prevention.

Chapter Three: Purpose of the study

Purpose of the study are:

1. To Find out the knowledge about monkeypox among college students.

2. To determine the prevalence rate of monkeypox.

3. To find out the sign and symptoms of monkeypox.

4. To find out the treatment and management of monkeypox.

Chapter Four: Methodology

4.1. Period and target population

The target population for this study was comprised of College students in Bangladesh

4.2 Study Design

Location of survey area: Pirgacha, Rangpur.

Name of Collage: Pirgacha College and Deuti College.

Survey type: Offline.

Survey time: 15 September to 30 Octobe.

Number of Participants: 195 students.

Class: College 1st year and 2nd year students.

4.3 Questionnaire development, pretesting, and validation

A prototype questionnaire was created after a thorough literature and book study focusing on people's awareness of monkeypox, which was previously published in different publications and is available in Daffodil International University's library. To test the quality of the questions, this was checked with the questions of the various literature which were previously published from India, Japan, USA, Saudi, and many European countries. This question was evaluated by the department of pharmacy, at Daffodil International University before being assigned as the final question. The final question was divided into four sections: participant demographic profile, knowledge, attitude, and practice. A trial survey was conducted on 15 students before the final survey to ensure that the questionnaire was intelligible, effective, and contained reliable data.

Survey Question:

Title : Knowledge and awareness of Monkeypox among the collage students

Name :

1.You are the student of

a. Inter 1st year

b.Inter 2nd year

2. Gender

a. Male

b.Female

3. Your age (in years).

a.14-16years

b.17-19 years

c. 19-21 years

d.Above 21 years

4.Marital status

a.Married

b. Unmarried

c.Divorced

5. Religion

a. Muslim

b.Sanatana Dharma

c. Buddhists

d. Other

6.Do you know about the monkeypox

a.

b.No

7.Where did you first hear the monkeypox

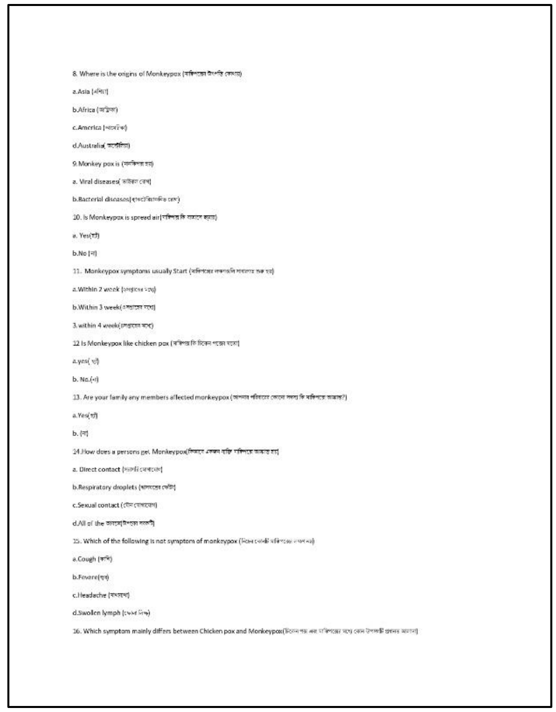
a.Newspaper

b.Book

c.Social media

d.Health worker

e. Teacher



8. Where is the origins of Monkeypox

a.Asia

b.Africa

c.America

d.Australia

9.Monkey pox is

a. Viral diseases

b.Bacterial diseases

10. Is Monkeypox is spread air

a. Yes

b.No

11. Monkeypox symptoms usually Start

a.Within 2 week

b.Within 3 week

3.within 4 week

12 Is Monkeypox like chicken pox

a.yes

b. No.

13. Are your family any members affected monkeypox

a.Yes

b.

14.How does a persons get Monkeypox

a. Direct contact

b.Respiratory droplets

c.Sexual contact

d.All of the

15. Which of the following is not symptom of monkeypox

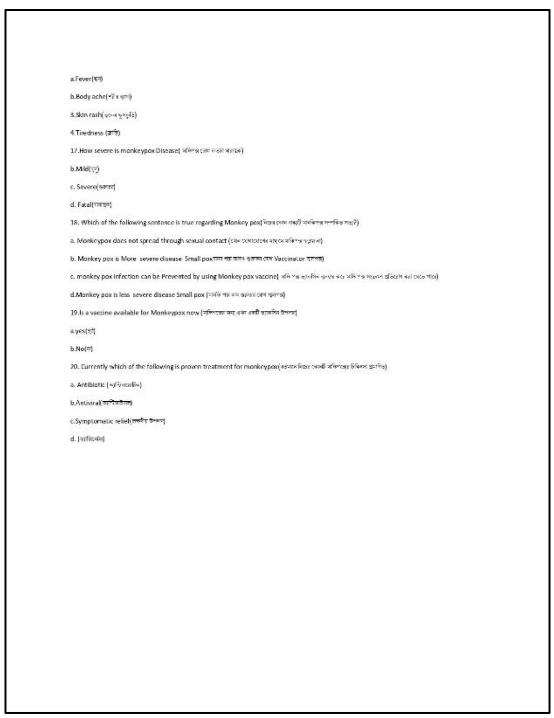
a.Cough

b.Fevare

c.Headache

d.Swollen lymph

16. Which symptom mainly differs between Chicken pox and Monkeypox



a.Fever

b.Body ache

3.Skin rash

4.Tiredness

17.How severe is monkeypox Disease

b.Mild

c. Severe

d. Fatal

18. Which of the following sentence is true regarding Monkey pox

a. Monkeypox does not spread through sexual contact

b. Monkey pox is More severe disease Small pox Vaccinator

c. monkey pox infection can be Prevented by using Monkey pox vaccine

d.Monkey pox is less severe disease Small pox

19.Is a vaccine available for Monkeypox now

a.yes

b.No

20. Currently which of the following is proven treatment for monkeypox

a. Antibiotic

b.Antiviral

c.Symptomatic relief

d.

Chapter Five: Result and Discussion

5.1. Age of survey participant: This survey study mainly knowledge about college students. Students Age mainly 14-20.

Serial No.	Age of participants	Rate of response in Percentage
1.	14 years to 16 years	43%
2.	17 years to 19 years	57%
3.	19-21 years	0%
4.	Above 21 years	0%

Table 1: Age of survey participant

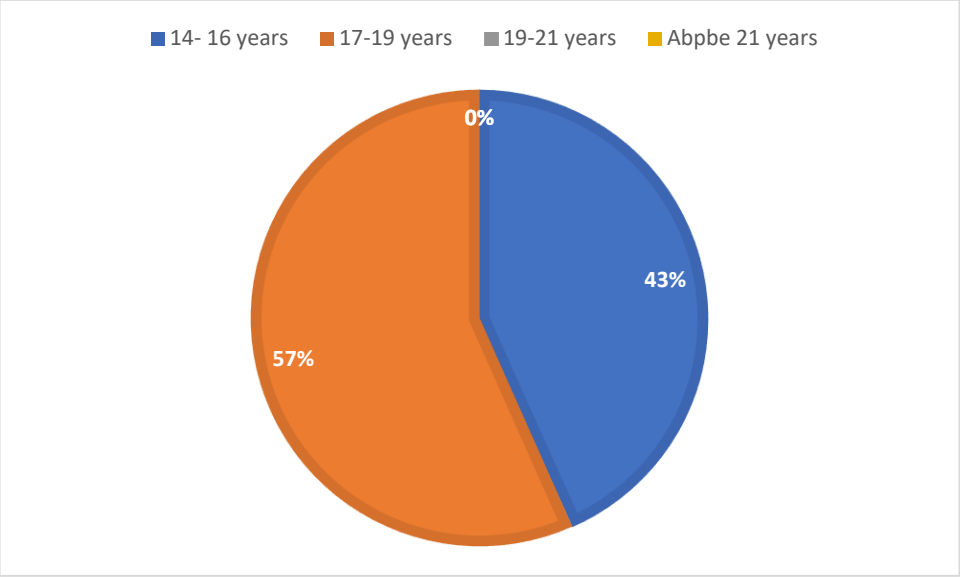


Fig 13: Age of survey participant

According to the study, 43% respondents are in between 14-16 years old and 57% respondents are belonging to in between age 17-19 years old.

5.2. Marital status of participants: According to the study 11% participants reported being married, and 89% reported being unmarried which is a significant number.

Serial Number	*Marital status of participants*	*Rate of response in percentage*
1.	Married	11%
2.	Unmarried	89%
3.	Divorce	0%

Table 2: Marital status of participants

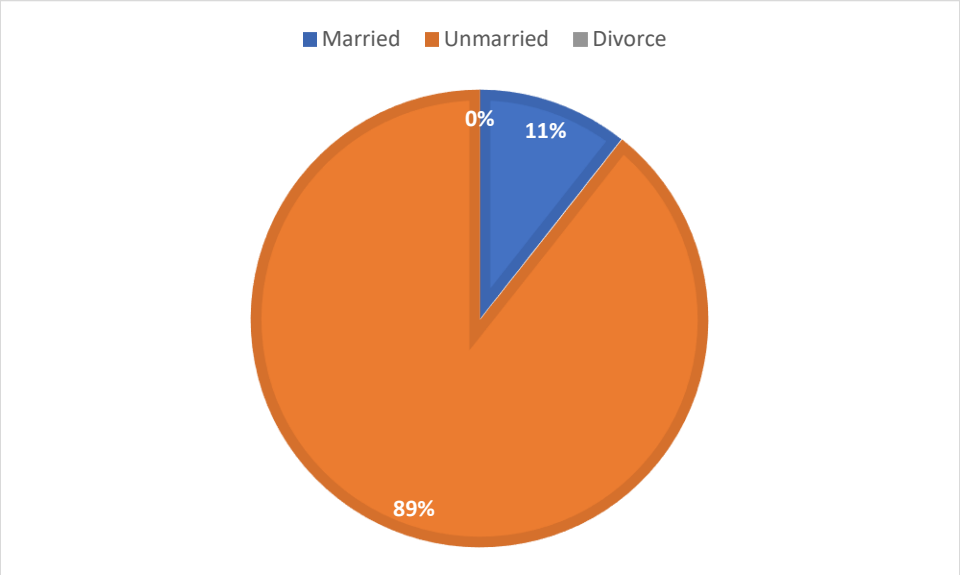


Fig 14: Marital status of participants

5.3. Knowledge about monkeypox: According to this survey about 93% of participants know monkeypox and 7% of participants have no idea about monkeypox.

Serial Number	knowledge about the monkeypox	Response in Percentage
1.	Yes	93%
2	No	7%

Table 03: knowledge about monkeypox

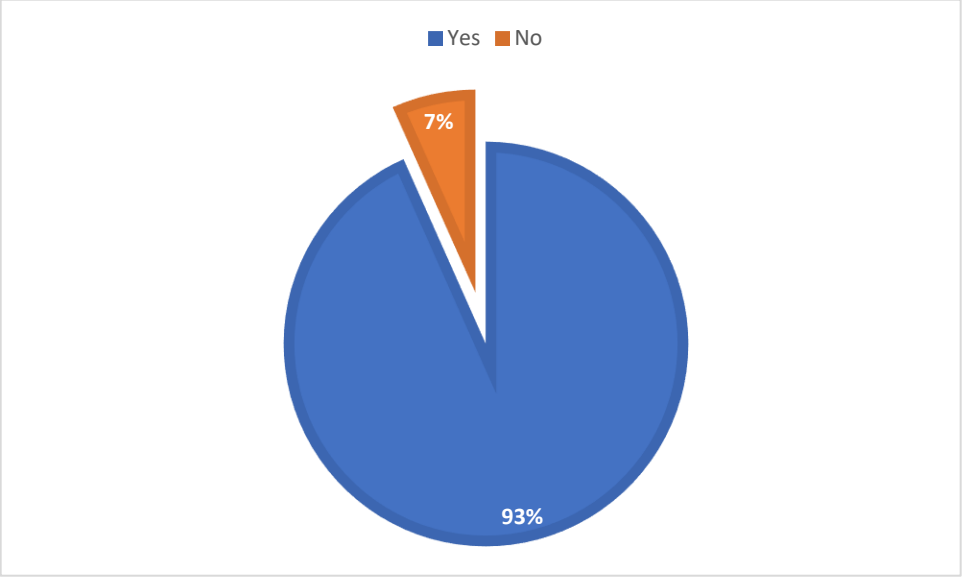


Fig15: knowledge about the monkeypox

5.4. The people know about monkeypox:

Monkeypox was discovered in research monkeys more than half a century ago. Certainsquirrels and rats found in Africa are among other animals that harbor this virus. Currently, an outbreak is spreading fast outside of Africa.According to this survey, 62% of individuals learned about monkeypox for the first time via social media, 20% through news articles, 16% from teachers, and 2% through health. They know monkeypox is a viral disease but do not sufficient knowledge about the management and treatment of monkeypox.

Serial Number	***You know about monkeypox***	***Response in Percentage***
1.	News Paper	20%
2.	Book	0%
3.	Social Media	62%
4.	Teacher	16%
5.	Health Worker	20%

Table 4: The people know about monkeypox

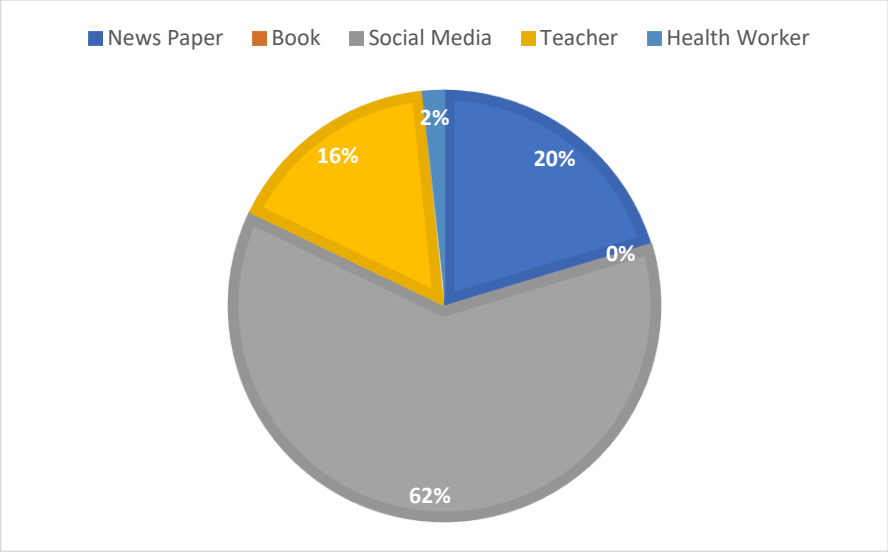


Fig 16: The people know about monkeypox

According to this survey, 62% of individuals learned about monkeypox for the first time via social media, 20% through news articles, 16% from teachers, 2% through health workers, and 0% through books.

5.5. Origins of Monkeypox :

Monkeypox primarily occurs in central and west Africa, often in proximity to tropical rainforests, and has been increasingly appearing in urban areas. Animal hosts include a range of rodents and non-human primates

Serial Number	*Name of the country*	*Response in Percentage*
1.	Asia	20%
2.	Africa	27%
3.	America	43%
4.	Australia	10%

Table 5: Origins of Monkeypox

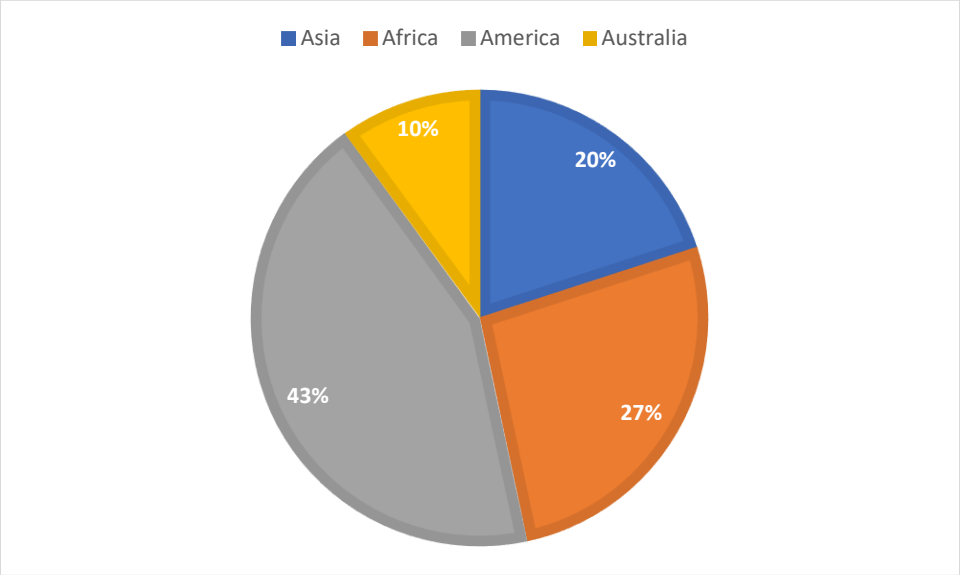


Fig 17: Origins of Monkeypox

According to this survey, 27% of participants believe that monkeypox originated in Africa, 10% of participants believe that monkeypox originated in Australia, 43%% of participants believe that monkeypox originated in America, and 20% of participants believed that monkeypox originated in Asia.

5.6. Monkeypox transmitted by the air: Monkeypox can spread to anyone through close, personal, often skin-to-skin contact. This survey asked about the airborne transmission of monkeypox.

Serial Number	*Transmission of Monkeypox by Air*	*Response in Percentage*
1.	Yes	55%
2.	No	45%

Table 6: Transmission of Monkeypox by Air

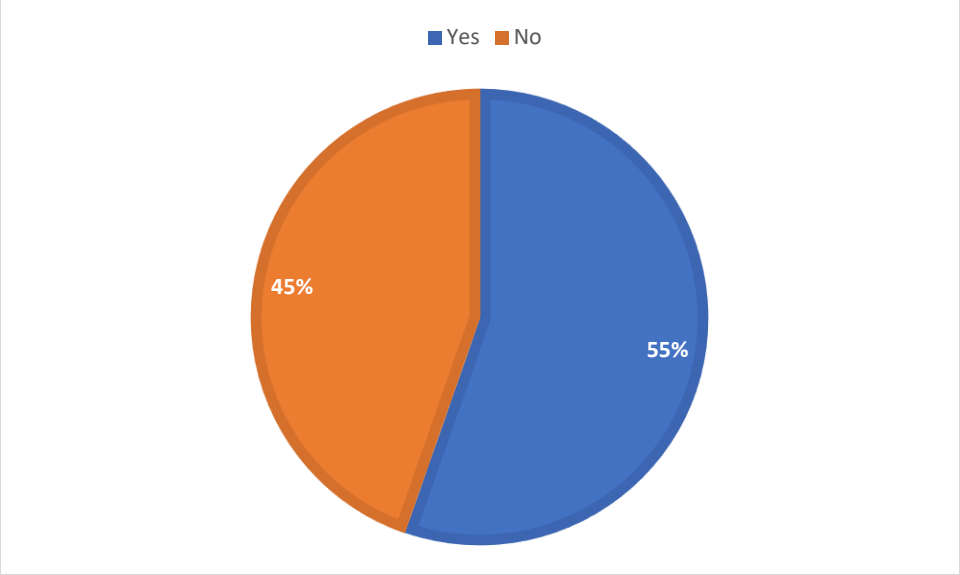


Fig 18: monkeypox transmitted

According to this survey around 55% participants think that monkeypox transmitted by Air and another 45% participants don't think it transmitted by air.

5.7. Monkeypox symptoms usually:

According to the survey 56% of respondents said that symptoms of monkeypox typically appear within 2 weeks, 16% said that they typically appear within 3 weeks,

Serial Number	*Monkeypox symptoms usually Start in week*	*Response in Percentage*
1.	Within 2 weeks	56%
2.	Within 3 weeks	16%
3.	Within 4 weeks	28%

Table 7: Monkeypox symptoms usually start

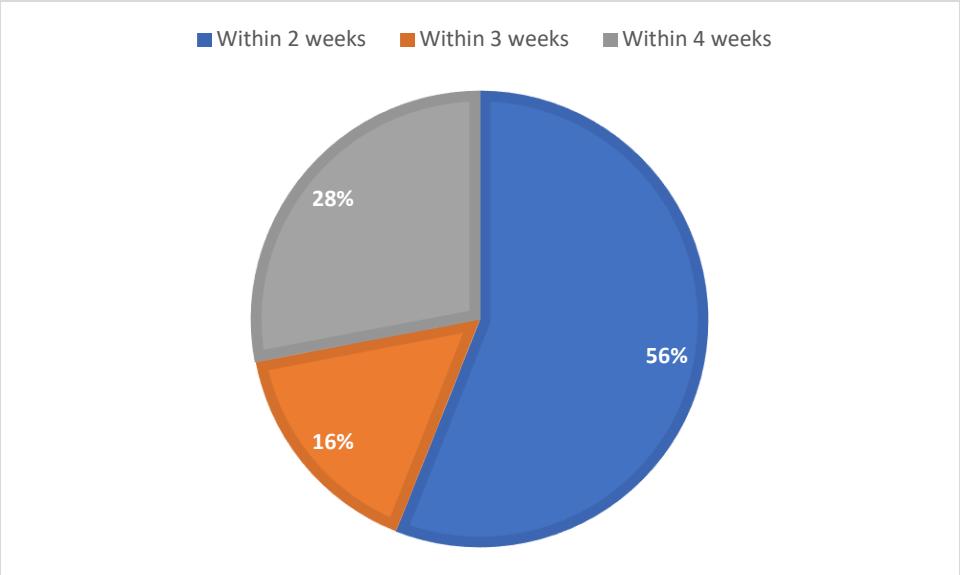


Fig 19: Monkeypox symptoms usually start

56% of respondents said that symptoms of monkeypox typically appear within 2 weeks, 16% said that they typically appear within 3 weeks, and 28% said that they typically appear within 4 weeks.

5.8. Person's get Monkeypox : According to the findings of this survey, approximately 30% of respondents believed that people can get monkeypox through direct contact,

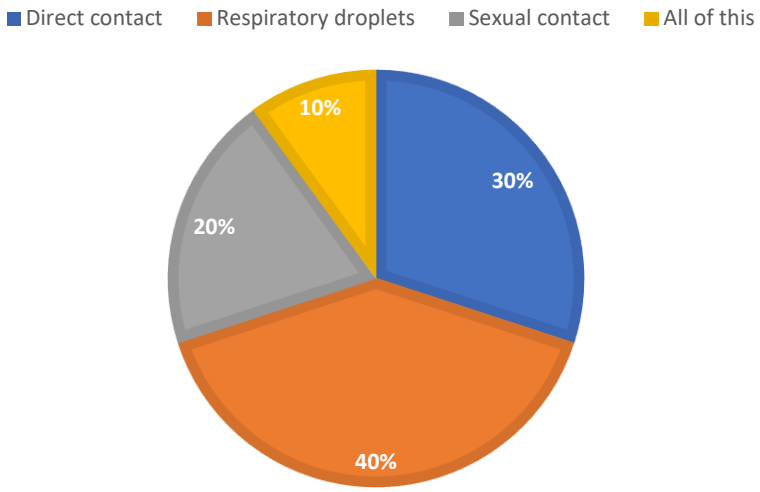


Fig 20: Person's get Monkeypox

40% believed that monkeypox can be transmitted through respiratory droplets, 20% believed that monkeypox can be transmitted through sexual contact, and 10% believed that all of these factors combined can be the cause of transmission of monkeypox.

5.9. Severity of monkeypox Disease: Monkeypox is usually a mild illness. Most people recover in 2 to 4 weeks. However, in some cases, if a person is unwell, they may require hospital treatment in a specialist unit.

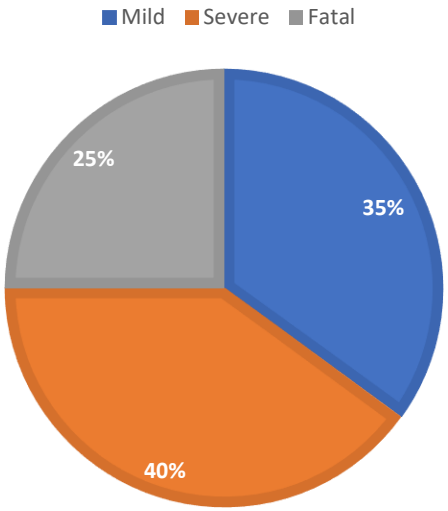


Fig 21: Severity of monkeypox Disease

According to the results of this study, 40%t of respondents believe that monkeypox is a severe disease, 25% of respondents believe that monkeypox is a fatal disease, and 35% of respondents believe that monkeypox is a mild disease.

5.10. Current treatment for monkeypox : There is no treatment specifically for monkeypox. Monkeypox and smallpox are closely related, drug and vaccines developed to treat and protect against smallpox may be effective for monkeypox.

Serial Number	*Class of Drugs*	*Response in Percentage*
1.	Antibiotic	37%
2.	Anti-viral	27%
3.	Symptomatic Relief	18%
4.	Vaccine	18%

Table 8: Current treatment for monkeypox

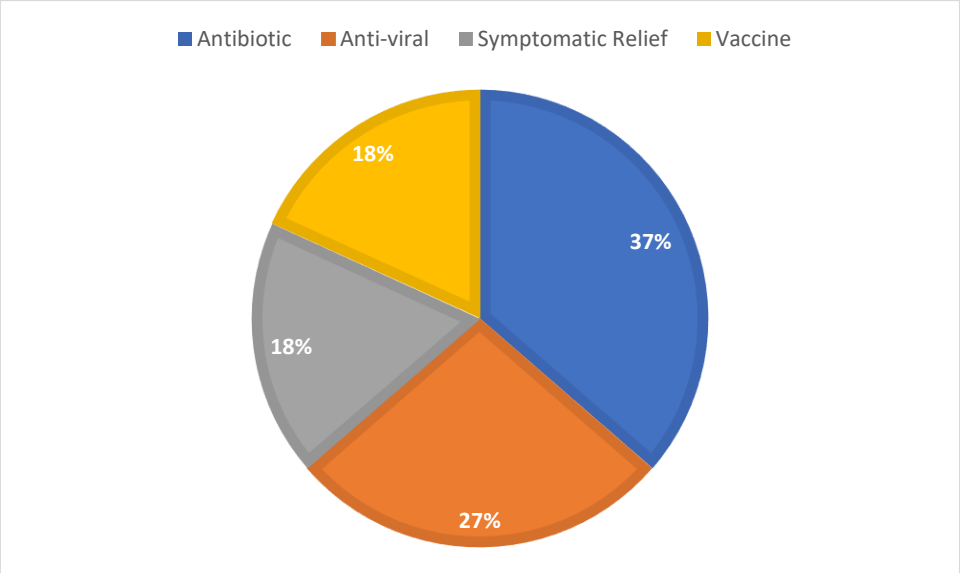


Fig 22: Current treatment for monkeypox

This survey found that 37% of respondents believed that antibiotics had an effect on monkeypox, 18% of respondents believed that symptomatic treatment is effective for treating monkeypox, 27%

believed that antiviral has a good response for current treatment of monkeypox, and 18% believed that there is a vaccine for treating monkeypox. They have knowledge about treatment of monkeypox

Chapter Six: Conclusion

The major objective of this study was to determine of knowledge of monkeypox among the College students. In their evaluations can be concluded that awareness of the college students is most of students know about monkeypox (97%). They have knowledge about transmission method. They know how to management of monkeypox.They have knowledge about treatment of monkeypox . We have knowledge about monkeypox but not sufficient knowledge about treatment and management. Monkeypox is a viral disease, it can be convert serious disease so we need large scale study about it.

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