Impact of Chikungunya infection on patients' quality of life: A 3 Months Follow up

A project submitted

by

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This work is dedicated to my parents and siblings for their unconditional love and support.

Certification Statement

This is to certify that the project titled “Impact of Chikungunya Infection on Quality of Life of Patients Belonging to the Healthcare and Non-Healthcare Background Living in Dhaka City: A 3 Months Follow-up” submitted for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy from the Department of Pharmacy, BRAC University constitutes my own work under the supervision of **Mohammad Kawsar Sharif Siam**, Senior Lecturer, Department of Pharmacy, BRAC University that appropriate credit is given where I have used the language, ideas or writings of another.

Signed,

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Countersigned by the Supervisor

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Abstract

During 2017, an outbreak of chikungunya affected a large group of population in Bangladesh that caused a nationwide epidemic. In this study, 140 chikungunya patients have participated among whom 90 patients were from non-healthcare background and 50 patients were from healthcare background. Moreover, these patients were taken from different areas of Dhaka city, capital of Bangladesh. Additionally, this research aims to measure the impact on the quality of life for 3 months after recovering from chikungunya. Also, modern statistical tools have been used to analyze the data collected from the patients. Patients have suffered from various post chikungunya symptoms like fever, joint pain, muscle pain, skin rash, sleep disturbance, loss of appetite, headache and fatigue due to chikungunya. The most significant symptom that patients have faced is joint pain ($P = 0.006$) which is acquired during chikungunya. The level of satisfaction with their health condition is fair to good (Mean = +0.36). Thus, this research describes the impact of chikungunya in quality of life of the patients who lived in Dhaka city. The frequency of disease highlights the importance of developing prevention and treatment interventions.

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List of Acronyms

CHIKV = Chikungunya Virus

WHO = World Health Organization

USA = United States of America

RT-PCR = Reverse Transcriptase Polymerase Chain Reaction

CIR = Cumulative Incidence Rate

CNS = Central Nervous System

CHIKV+ = Chikungunya Virus Positive

CHIKV- = Chikungunya Virus Negative

CDC = Center for Disease Control and Prevention

IEDCR = Institute of Epidemiology, Disease control and Research

ICCDR,B = International Centre for Diarrheal Disease Research, Bangladesh

1 Introduction

Chikungunya, a tropical disease, caused by an arbovirus that belongs to the genus Alphavirus and they belong to the togaviridae family carried by *Aedes* Mosquitoes. The disease contains acute illness such as fever, skin rash and incapacitating arthralgia which are alike as dengue as both disease contains same vector (Pialoux, Gaüzère, Jauréguiberry, & Strobel, 2007). Chikungunya virus was first discovered in 1952 and the first outbreak was reported during 1952-1953 in Makonde Plateau, the border between Mozambique and the region was known as Tanganyika earlier. After this outbreak, the virus spread in sub-Saharan Africa, India and other countries of Southeast Asia which lead to various epidemics in subsequent years (Sudeep & Parashar, 2008). Afterwards, the virus was isolated from few countries of Southern Africa and Central Africa which included Kenya, South Africa, Sudan, Central African Republic, Uganda, Congo and Malawi from 1960s to 1990s (Powers & Logue, 2007). During 1999s, a massive outbreak occurred in Democratic Republic of Congo. Although human infections were at lower level for a number of years but in 2007, another outbreak occurred in Gabon (Simon, Javelle, Oliver, Leparc-Goffart, & Marimoutou, 2011). In February of 2005, a major chikungunya outbreak occurred in some islands located in Indian Ocean. Until the massive outbreak occurred during 2006-2007, this outbreak of Indian Ocean caused huge number of imported case transmissions. In 2006, the outbreak was at its top level. Some other countries like India, Thailand, Indonesia and Myanmar have reported over 1.9 million cases since 2005 (Simon et al., 2011). In Europe, the first outbreak occurred in 2007 and it was in the northeastern region of Italy. (Jain, Rai, & Chakravarti, 2008). During this outbreak, 197 cases had reported and it was confirmed that the mosquito responsible for the outbreak in Europe was the *Aedes albopictus*. Two of the laboratories confirmed autochthonous case which was reported in France, specifically the French region of Carribean Island of St. Martin. After this case was reported, local transmission of the infection had been confirmed in few countries and territories the areas of Americas. This was described as the first official chikungunya epidemic having autochthonous transmission (Leparc-Goffart, Nougairede, Cassadou, Prat, & De Lamballerie, 2014). Documentation of more than 1.3 million cases that are suspected to be chikungunya was done in April 2005 in the Caribbean Island, Latin America and USA. There were 191 cases of death that were ascribed to this disease and on October 2014, four cases which were locally developed chikungunya infection was confirmed

in France. Additionally, 11 local transmission of the disease were confirmed in late 2014 and over 10,000 people of Puerto Rico had been affected by chikungunya virus infection (Ganesan, Duan, & Reid, 2017). Symptoms like fever, extreme joint pain, myalgia, weakness, headache, sore joints, skin rash, nausea and vomiting are triggered by this disease which are similar to the symptoms of dengue. The reason behind similar symptoms is that both viruses are carried by same vector.(Edelman et al., 2000). Basically, *Aedes aegypti* which is an urban mosquito, are anthropophilic in nature. *Aedes albopictus* also stated as a primary vector of chikungunya virus infection. Also, they maintain close associations with human and they are the major vector of Chikungunya and CHIKV that are isolated from the mosquito of Tanganyika, Thailand and Calcutta (Sudeep & Parashar, 2008). The recent chikungunya virus strains that have been isolated in India are similar to strains found in Reunion (99.61% homology) and Maharashtra of India in 2000 (98.95% homology). Until now, ten complete nucleotide sequence of chikungunya virus have been determined and two human isolates (Ross and S27) were recovered during 1952-1953 outbreak. Chikungunya can be detected based on three benchmarks, which are clinical, epidemiological, and laboratory. Clinical benchmark suggests that fever with joint pain; muscle pain can give an indication about chikungunya. Moreover, it can be called epidemiological benchmark if an affected individual has fever for more than twelve days. Additionally, if reduced lymphocyte count with consistent viremia presents in an individual, it can be called the laboratory benchmark. There are several methods by which Chikungunya can be diagnosed such as virus isolation, serological test, RT-PCR etc. (Cirimotich et al., 2017). Chikungunya word is used for both the disease and virus which means ‘to walk bent over’. In the African language of the people of Makonde that refers to the effect of the weakening arthralgia (Pialoux et al., 2007). For several months or years Rheumatic Manifestations may persist after acute infection that have been reported previously by CHIKV. Shorter duration of symptoms can be seen in the patients who are male and in younger age groups. A report states that between March 2005 and September 2006, 38.2% of 7,85,000 inhabitants of Reunion Island were infected and in mainland France lots of returning travelers suffered from chikungunya and 70% of them did not get fully cured 4 months after onset of chikungunya virus infection.(Couturier et al., 2012). The study will include the 3 months follow up study on the group of people who participated in the study during CHIKV infection period of January 2017 to October 2017. Population

from both healthcare and non-healthcare professions participated in this study follow-up on their quality of life is either affecting due to chikungunya virus or not. In addition, this study aims to observe impact of chikungunya in quality of life of the patients and changes in lifestyle that are brought by chikungunya.

1.1 What is follow up study?

Follow up study is the alternative term for cohort study. This study includes checking on the condition of a group of people time to time to study the causes of disease and establishing bridge between their risk factors and outcomes. Follow up studies prospectively progress from acquaintance to consequence and investigators find groups of people who were exposed or unexposed from time to time to determine the results. Because of conducting such study, outcome from subjects can be measured and relationship with particular characteristics can be determined. The rate of the outcome is lower for exposed group but it is higher for unexposed group. Follow up studies have important advantage as in this study regulation of the outcome is achievable. Nevertheless, it limits the effect of confounding variables as subjects in this study can be similar. In case of rare diseases, it is very expensive and less yield result (Aronow, 2015).

1.1.2 How to design a follow up study

Well-designed follow up studies can bring powerful results because a specific study population which can be identified by the exposure, followed over time to gain the desired result. The primary disadvantage of the study design is the investigators have partial control over the collection of data and the data which are existing may not have been complete, accurate or consistently measured between subjects. As there are instant availability of data, this study design is less expensive. It also takes a lesser amount of time (Song & Chung, 2011)

1.1.3 Issues regarding methodology

Mark of a follow-up study is selecting a group according to the subject and exposure status at the start of the study. Selection of subjects in follow-up study is very important and source population is selected by some practical concerns like sampling. Subjects can be from the hospital or a member from a community or from individual practice of doctor. Subset of these groups may be eligible for conducting the study. Generally, follow-up studies require extended follow-up time, it is necessary to decrease loss to follow-up. Forfeiting to follow-up means investigator loses connection with the subjects which can result in data loss. If there are high number of loss of follow up, the validity of the study may reduce. General rule of the practice suggest that rate of losing to follow-up should not be more than twenty percent. If any kind of systematic difference, which is related to the result between the people who dropped out and the people who stayed, occurs, there should be examination of the study if possible, a comparison of individual remaining in study and dropped out can be done. The methods of minimizing the loss to follow up is described in table 1.1.1 (Song & Chung, 2011)

Table 1.1.1: Methods which are used for minimizing loss in the follow-up (Song & Chung, 2011)

During the time of Enrollment
1. Exclude subjects who are probably miss in future - Planning to move - Non-committal 2. Obtaining necessary contact information for future - Collection of subject's mailing addresses, contact number and email addresses - Collection of numbers used in different healthcare facility
During the follow-up
1. Maintain time to time contact - Using telephone: may require to call when subject is available - Using mail: sending emails regularly or by sending stamped and self-addressed return envelopes - Other: token of appreciations or newsletter

1.1.4 Advantages and disadvantages of follow-up study

There are many advantages of a follow-up study. To begin with, gathering of data concerning the series of actions, which can measure causality. Secondly, examining multiple consequences for a given coverage. In addition, it is also good for considering unusual exposure. Lastly, easy to calculate rates of disease in the population regularly. On the other hand, there are some disadvantages too. First of all, large number of population are essential to study rare exposures. Also, susceptibility to selection bias. Again, may be expensive to conduct in the case of rare exposure, may require long term duration for follow-up, maintaining this follow-up may become difficult, there is likelihood of losing follow-up or withdrawals and less control over variables (Song & Chung, 2011)

1.2 Rationale for choosing follow-up of chikungunya

This follow up is designed to evaluate- 1) The 3 months after effect of chikungunya among the population who were affected by chikungunya during January 2017 to October 2017; 2) The natural history of the sign and symptoms seen during this period; 3) Medication to suppress the sign and symptoms during this period.(Rica et al., 2016)

1.3 Follow-ups that were done before

Several works have been done before this 3 months' follow-up. To begin with, Estimation of frequency of long-lasting pain after CHIKV infection in America. In that study, a cross-sectional follow-up was done on 500 Chikungunya patients. They are from Atlántico Department of Colombia who were diagnosed with chikungunya during 2014-2015. The Colombian epidemic study contains 20 months of follow-up on symptoms were evaluated in clinically confirmed cases. From that study it has been found that the patients had severe joint pain in their wrists, ankles and fingers and initial joint pain lasted 4 days in an average. Some of them could not even work properly and after this 20 months, one-fourth population experienced tireless joint pain. Also, many college students were unable to attend class or work due to headache or knee pain and missed normal activities (Chang et al., 2018). In

addition, another work was done in France to quantify the frequency of risk factors for rheumatic symptoms after CHIKV infection that tends to measure the impact on quality of life. Around 391 patients participated in the study among them 176 patients recovered, shorter duration of some symptoms were observed in young population. It has been found that 39% of population recovered within one year's time. Those who did not recover were older than the rest of the population and had more comorbidities with a longer acute stage of joint swelling. Thus, it was summarized that follow-up with special attention to pre-existing medical condition that provides information on possible chronic symptoms. This will help in giving support to the population for depression and anxiety (Couturier et al., 2012). Again, a study was done at La Réunion Island to assess the CIR of CHIKV-associated CNS disease and patient outcome after 3 years. In between 2005 and 2006, around fifty-seven patients were diagnosed with chikungunya virus associated with CNS diseases. This includes 24 patients with CHIKV associated encephalitis, the latter corresponding to a CIR of 8.6 per 100,000 people. Among those 100,000 people 187 patients were below the age of 1 year and 37 patients aging over 65 years, having encephalitis at both the extremes of age category. It concludes by stating that in case of a large outbreak, CHIKV can be a significant cause of CNS disease (Bintner, Tournebize, Renouil, & Michault, 2015). Furthermore, another research shows that persistent symptoms, which are mainly joint pain, muscle pain and depression, are seen for several months in patients suffered from CHIKV infection. Their quality of life was different from the unexposed population. From this study investigator wanted to observe the quality of life and health care cost for more than 1 year. Almost 200 patients with CHIKV were compared with same number of unexposed population matching age, gender and area. Among these population 56% of the population fully recovered but others had complained of having symptoms like arthralgia, myalgia, fatigue, depression and hair loss. In addition, no difference was found between two groups regarding mental component. They came to a conclusion that CHIKV positives reported more discomforts than CHIKV negatives and impact on quality of life is reasonably hard (Soumahoro et al., 2009).

1.4 Signs and symptoms occur after Chikungunya

Numerous characteristic symptoms indicated that chikungunya's symptoms are generally similar to the dengue and zika virus. Chikungunya virus is severely significant and it generates

indication in a larger ration of infected individuals when equated to other alphaviruses. It has also been seen that almost 10% to 70% of individuals live in an exposed location, whereas 50% to 97% CHIKV infected a clinical manifestation (Ganesan et al., 2017; Yactayo, Staples, Millot, Cibrelus, & Ramon-Pardo, 2016). Thus, the symptoms of CHIKV infection can be numerous initially starting with a fever which lasts for weeks at a time and it is followed by other symptoms such as extreme muscle pain, joint pain, arthritis, encephalitis and eye complications (for rare cases) and skin rashes (Heath et al., 2018; Leparc-Goffart et al., 2014). Even after recovering from Chikungunya, several cases were reported that symptoms like Fever, joint pain, muscle pain, encephalitis, depression, hair loss etc. could occur in those CHIKV positive patients. (Chang et al., 2018; Soumahoro et al., 2009).

1.4.1 Fever

Chikungunya fever is a high in viremia load and associated anomalies, which can be pronounced lymphopenia and restrained thrombocytopenia. Chikungunya fever can appear in two phases of illness in which one is acute phase and another is chronic phase. In acute phase, 2 stages are identified in which one is the viral stage lasting for 5 to 7 days and during this stage viremia occurs and the stage is the recuperating stage lasting for 10 days. During this phase it is very hard to identify the chikungunya virus in the blood. The range of temperature of the body elevates from 39-40^{o}C (Thiberville et al., 2013). After the acute phase, even after recovering from fever, it can still require for several times during the first 6 to 9 months. A study showed that a population of 171 people suffered from fever again within first 3 months (Couturier et al., 2012). Similarly, clinical study on 509 CHIKV patients has been done to observe after effect of chikungunya and it has been found that 13.6% of children, 59.5% adults and 26.9% elderly patients suffered from fever. (Chopra, Anuradha, Ghorpade, & Saluja, 2012). Additionally, another study reported that from the population of 485, around 376 people or 79% of the population suffered from fever (Chang et al., 2018).

1.4.2 Joint pain and muscle pain

During Chikungunya excessive joint pain, generally occur beside fever, which remains even after several days or months after being infected. For some rare cases, it can remain in the body for even a year (Capeding et al., 2013). An antiviral research shows that 87% to 98% of

cases reported joint pain including immovable joints but joint swelling was a rare case (Thiberville et al., 2013). In more cases, both arm and leg joints are found to be most pretentious which follows a symmetrical pattern although patients. The most affected joints are those of the limbs but muscles are also prone to be affected by chikungunya virus infection (Burt, Rolph, Rulli, Mahalingam, & Heise, 2012). A follow-up study was done on approximately a population of 500 people to get an idea of the quality of life they were living. Among those 500, 15 cases were excluded as no serological information was found and there were missing data about having joint pain or have not reported the joint pain status. It was reported that 98% of the remaining 485 had suffered from joint pain from which 119 people had persistent joint pain and 352 people had no persistent joint pain as shown in Table 1.4.1 (Chang et al., 2018). Another follow-up study, which was carried out 2 years, suggested that both recovered and non-recovered patient had suffered from bodily pain as well as arthritis. The presence of comorbidity was around 60% and among them 34% of them suffered from Arthritis (Couturier et al., 2012). Moreover, another study reported that a follow up study was done on almost 400 patients where the mean age of the population was 42 years ranging 2-91. From the acute phase of the disease following month between 5-28 months 112 population were fully recovered where fast recovery rate under the age of 30. 53% of CHIKV positive patients suffered from Arthralgia where 38%, 42%, 43% were upper limbs, lower limbs and spine respectively. Also, 42% and 36% of the CHIKV+ patient suffered from Myalgia (muscle pain) and fatigue respectively. Again, among CHIKV negative patient 28% suffered from arthralgia, 23% suffered from Myalgia and 16% suffered from fatigue (Soumahoro et al., 2009).

1.4.3 Depression

Depression is a mood disorder, which causes distressing symptoms affecting feelings, thinking, managing daily activities like sleeping, eating or working. Symptoms may last for nearly 2 weeks (National Institute of Mental Health (NIH), 2016). A report suggests that 3% population of total 485 CHIKV infected patients in a follow up have gone through depression and among them 72% are female and 28% are male indicating female patients are more prone to depression during chikungunya (Chang et al., 2018). Again, another report suggested that

from a population of 434 CHIKV+ patient 13% had faced depression whereas in CHIV- patients the percentage of depressed people are lower than CHIKV+ patients (Soumahoro et al., 2009). Similarly, in 391 CHIKV patients, around 23% of patients had experienced depression during a two year follow up study. (Couturier et al., 2012).

1.4.4 Hair Loss

Many chikungunya patients have suffered hair loss after being affected by chikungunya. Hair loss increases for the patients after being affected by chikungunya. In a report, 199 pairs were made consisting of CHIKV+ and CHIKV- patients. It had been observed that 10% of the CHIKV+ patients suffered from hair loss but on the other hand, only 5% CHIKV- patients suffered from hair loss. This statistics shows that hair loss increased after CHIKV infection (Soumahoro et al., 2009).

1.4.5 Skin Rashes

In 40 to 50% cases, chikungunya virus positive patients have gone through the experience of rashes, specially maculopapular rash (Thiberville et al., 2013). It has been reported that the patients who have experienced skin rashes, had developed it in the initial phases of their illness. Around 73% of the CHIKV+ patients experienced skin rash along with fever, arthralgia and myalgia during the severe phase of skin problems. In 32 % of cases, patients developed skin rashes after fever was reduced or they were either fully or partially recovered. This can persist from one month to several months although 8% patients experienced skin problems after fully recovered from CHIKV infection. Additionally, there are some patients who have experienced erythema nod sum, edema of the hands and feet, erythema multiform as well as urticaria. Skin problems such as psoriasis, lichen planus exists in the CHIKV+ patients were also observed (Inamadar, Palit, Sampagavi, Raghunath, & Deshmukh, 2008; Prashant, Kumar, Mohammed Basheeruddin, Chowdhary, & Madhu, 2009). In addition to that, a study on 509 patients states that 25 children, 102 adults, 44% elderly patients suffered from skin rash during a 2 years follow up study (Chopra et al., 2012). Similarly, another follow up study reported that among 485 observed patients 409 patients suffered from rash during this period among them the ratio of female patients suffering from skin rashes are more than male patients (Chang et al., 2018).

1.4.6 Encephalitis

Encephalitis is the presence of inflammation in the brain. This encephalitis is associated with clinical confirmation of dysfunction of neurons. For health practitioners, it is one of the most challenging syndrome as is difficult to diagnose and manage. The particular cause of this disease is, the identification of a specific pathogen is less than 50% for the patients. Additionally, both infectious and noninfectious etiology can be responsible for encephalitis. (Bloch & Tunkel, n.d.). Although chikungunya is a nonfatal disease with spontaneous resolution and does not cause any life threatening lifelong disabilities, rare case of CNS disease had been reported. The study was conducted in a hospital consisting of almost 300,000 patients. The study found that the case fatality rate of encephalitis associated with CHIKV was 16.6% and the proportion is estimated between 30 to 45% for that of children who are discharged with persistent disabilities. In infants, clinical symptoms and consequences were less than adults (Soumahoro et al., 2009).

1.5 Prevention and Control

Controlling the vector is an important way to prevent the spreading of chikungunya virus. An area where outbreak has occurred is dangerous for travelers and it has been suggested that they wear fully covered clothes, use mosquito nets or repellants and stay in an air conditioned room. Avoiding mosquito exposure is very important especially for those who are susceptible to the chikungunya fever. Stagnant water, tall grass and weeds which are the most probable areas for mosquito breeding need to be eradicated and cleared properly along with spraying of insecticides. Additionally, public health education and training to educate local people need to be prioritized, as it is one of the most important step to control vector breeding and impede the transmission of chikungunya virus. Recently, it has been reported that people who are vulnerable to this CHIKV infection must maintain proper distance from the outbreak areas and use of fully covered defensive clothes to reduce the exposure of bare parts of the skin to the vectors of chikungunya. Additionally, topical repellants can be applied to the bare parts of the skin to prevent the mosquito bite in an area of outbreaks. In this case, proper labeled instruction must be followed and these repellants need to contain DEET, IR3535 or icaridin (Rodriguez et al., 2015). People who tend to sleep during day, are advised to use mosquito

nets as a protection from mosquito bites. Additionally, mosquito coils or insecticide vaporizers can lower the mosquito biting in indoor complexes. Furthermore, people who tend to travel frequently to affected areas must ensure the proper use of repellants along with well-equipped room having proper screens and covering their full body wearing full sleeve clothes (David M. Morens, M.D., and Anthony S. Fauci, 2007; Weaver & Lecuit, 2015).

1.6 Transmission of Chikungunya

Throughout Asia, Africa, America and Europe more than 60 countries have been affected by chikungunya. (Singal, 2017). Generally, the chikungunya virus transmits from human to human after being affected by female *Aedes* mosquitoes' biting. *Aedes aegypti* and *Aedes albopictus* are two of the most dangerous species as that are involved in spreading mosquito borne diseases, they traverse small distances to ingest blood as their meal, and they usually bite during daytime. Also, they may peak their activity in the late afternoon or early morning (Liebman et al., 2014). Although it has been found that *Aedes aegypti* and *Aedes albopictus* bite outdoors. However, *Aedes aegypti* found to bite indoors. If these CHIKV infected vector mosquitos, effects will start within 4 to 8 days. However, experience of symptoms of sickness bites any person can start from day 2 or can be as late as 12 days depending on person. In addition, it has been reported that vertical transmission may allow transmission of CHIKV to child from mother at birth or during pregnancy in rare case of transmission. Vertical transmission rate can be from 27.7% to 48.29% in cases where maternal viremia may be present during delivery time having neonatal symptoms evolving 3-9 days after the child is born. (Marinho, Cunha, Amim Junior, & Prata-Barbosa, 2017; Torres et al., 2016). Generally, the possibility of transmission of the virus by coming into contact having viral samples of complete blood having used in exchange transfusion, plasma derivatives or blood components or through organ that is transplanted is conceivable but no case has been reported of these transmission. Local transmission and imported cases are the two types of transmission by which virus can enter into an area (Burt et al., 2012).

1.6.1 Local Transmission

In 2014, CDC mentioning a virus in Virgin Island, Florida of USA and Costa Rica had reported the very first local transmission case. Local Transmission occurs when mosquitoes bite the infected patient in a region and the transmission of the virus occurs to others who had never been exposed to the chikungunya virus (Sharma & Kearney, 2017). Moreover, Italy is the first European country where the local transmission of the disease occurs. (Watson, 2007).

1.6.2 Imported Cases

This kind of transmission occurs when a traveler goes to the area where there is an epidemic of chikungunya has occurred, becomes affected by it and returns to their home containing the virus of the disease. From 2006 to 2013 in United States, Centers for Disease Control reported that every year 28 people became affected by chikungunya through this mean of transmission. However, it increased rapidly in 2014 and from May 2014 to January 2015, more than around 2300 travelers came back to the United States while carrying the virus. Although local transmission is more dangerous than this type of transmission as it has been reported that CHIKV containing mosquitos of an area can cause outbreak of chikungunya in a local region. Also, imported cases may be too hazardous as the patient containing CHIKV can be bitten by female *Aedes* mosquitos at home which enables the mosquitoes to spread the virus infection locally. People in a local area where patient resides may not show any measure for protection against virus and the risk of an outbreak in that area increases. Furthermore, it is very difficult for the doctors or healthcare practitioners to identify the virus, as the virus is transmitted in new countries or territories through travelers. Patient coming from a foreign country carrying the virus or subsequent patients infected through local transmission can affect local population who do not have experience of dealing with the infection previously. Due to lack of knowledge and awareness, they cannot provide treatment or help to prevent or control the disease. This virus does not spread through human saliva, kissing, breastfeeding or any other human contact and all this cases include mosquito bites that can originate by virus. (Sharma & Kearney, 2017).

1.7 Chikungunya Scenario in Bangladesh

Since 1908, more than 120 types of mosquitos have been documented in Bangladesh although only 25 of the species have been found upon which surveys were done and these mosquitos are from the Aedes species. Aedes mosquitos are type of mosquitos that are responsible for different diseases like yellow fever, dengue and west nile fever as well as chikungunya fever. For a time being Dhaka, (capital of Bangladesh) became one of the epidemic of chikungunya disease due to mosquito biting. Local population of Dhaka were reported to be affected by chikungunya disease limitlessly. IEDCR reported that from April to July of 2017, more than

750 cases of chikungunya had been found and the number of suspected cases during May to July of 2017 were more than 3000. Additionally, IEDCR also marked some areas (around 23 areas) of Dhaka city that are at high risk of chikungunya. Although this was a major outbreak of chikungunya but in December 2008, the first epidemic occured in Rajshahi and Chapainawabganj districts of Bangladesh which was investigated by a team of IEDCR and ICDDR,B (ICDDRB, 2009) and it was the third outbreak in Bangladesh. In this outbreak 32 patient were diagnosed with chikungunya (Pervin, 2016). After this case had been reported, the disease started to spread through transmission process. In October 2011 local health practitioners from Dohar, Dhaka had reported of a kind fever which accompany arthralgia. Local health center collected samples from the patients to run antibody test for dengue and smearing blood for diagnosing malaria but they reported that neither dengue nor malaria was present in the sample. For this reason, another team was formed during November 2011 consisting of medical epidemiologists, FRA (Field research assistant), few entomologists and some laboratory technician from IEDCR, Ministry of Health and family welfare and ICDDR, B to find out the actual cause or epidemiology of the disease. (Khatun et al., 2015). The former director of IEDCR states that around 10% of Dhaka city's population are prone to be affected by chikungunya infection in 2017. Due to extended monsoon weather in September, the breeding of mosquitos might go beyond control and may occur an indefatigable outbreak. The local government with the help of the government announced a strategy to release guppy fish in the drain and sewage system to ingest mosquito larvae to minimize the outbreak and took different initiatives like applying insecticide within the zone susceptible to illness caused by chikungunya virus. In addition to that, researchers think that the chikungunya might have spread to the entire country by the end of the monsoon during September to October. Also, a clinic for arthritis had been established in the department of Rheumatology, Bangabandhu Sheikh Mujib Medical University (BSMMU) for chikungunya patient suffering from arthralgia (joint pain) and myalgia (muscle pain). But due to lack of trained doctors and nurses the hospital became overcrowded with people who were very unsatisfied however these of scenarios are quite common in Bangladesh. As a result of inadequate services, characteristics of the infection and extensiveness of this mosquito borne disease, most of the chikungunya patients remain undiagnosed or misdiagnosed (Hassan, Rahman, Rahim, Barua, & Biswas, 2014). During 2017's outbreak 17 out of 64 districts were affected by chikungunya. It is very

important to understand the spatiotemporal dynamics of this outbreak, increase trained human resource capacity, enforcement of entomological surveillance with proper vector control and reaching mass people is very important to prevent and control this kind of outbreaks (Kabir, Dhimal, Müller, Banik, & Haque, 2017).

2 Methodology

2.1 Research Objectives and Goals

The primary objective of this research was to gather information about the signs and symptoms that an individual face after chikungunya and what kind of changes does chikungunya make an individual's life from healthcare and non-healthcare background and what kind of difficulties an individual face due to chikungunya in first 3 months after recovering from chikungunya.

2.2 Research design and methods

This study began with constructing a questionnaire which is one of the requirements of conducting a survey. Before generating questionnaire for the survey, papers of different follow up study on chikungunya were accumulated from different sources and studied collecting necessary information which was important for the implementation of the survey. Afterwards, the findings were utilized to develop necessary questionnaire for the survey.

A 26-item questionnaire had been prepared to achieve the intent of the study. 148 people from two different group (healthcare and non-healthcare background) who were affected by chikungunya during January 2017 to October 2017 had been taken for the main study. Among those 148 population 140 people has been reached out successfully for the follow up study. This number has been validated using Daniel's equation (Daniel, 1999) through RAOsoft (Raosoft, 2004) where it has been done in confidence level of 95%, error acceptance of 5% and response distribution of 50% the minimum sample size required is 108 although 140 (n=140) people can be reached. The questionnaire that consists of questions asking the signs and symptoms that people have experienced after they recovered from chikungunya. Moreover, people were asked about the problems they have faced throughout that period and what the doctor suggested them. Additionally, they were also asked whether they suffered from other diseases like hypertension, diabetes etc. which affect or alleviate the symptoms of chikungunya. Lastly, they were asked about their opinions whether or not they are happy with their life and if their family's financial condition was getting affected or if they want an anti-allergic drug during chikungunya or want a specific test for identifying chikungunya.

The population of 50 from healthcare background and 90 from non-healthcare background had been asked to fill out the questionnaire with the assurance of keeping information confidential and information about if they have participated in this study or had withdrawn themselves from the study. They were contacted through email, phone and in person to collect data from the patients. Most of the participants were university students and their family members. Also, the study is carried out only in Dhaka excluding the population from outside of Dhaka city. The Study is carried out from January 2018 to April 2018.

For data analysis, statistical tools like Microsoft Excel 2013 and SPSS (version 17.0) have been used. Analysis like frequency test, bar graphs, pi-charts, chi-square test and t-test have been carried away using the mentioned software and result has been observed. Additionally, for the opinion based questions, scoring has been done (Table 2.1) from which mean and standard deviation was calculated by SPSS.

Table 2.1: Scoring of the Likert scale

Scale	Score
1	2
2	1
3	0
4	-1
5	-2

2.3 Research Questions

1. What is your gender and age?

2. Have you faced any of the disease condition/discomfort like fever, joint pain, muscle pain, skin problem, fatigue, headache, sleep disturbance and loss of appetite within this 3 months?

3. Have you experienced any Chikungunya-associated ache in your joints or your muscles within the last 3 months after being affected by it?

4. Assuming you experienced Chikungunya-associated ache in your joints, which of the joint(s) like fingers, wrists, elbows, hips, knees, ankles, soles, shoulders, chest and other joint(s) did you experience pain in during the last 3 months?

5. In the last 3 months, did you experience pain with stiffness in your joints immediately after waking up in the morning?

6. In the last 3 months, did you experience pain with stiffness in your joints anytime except in the morning? (If yes, please specify the time)

7. In the last 3 months, how many times did you experience fever?

8. In the last 3 months, did you experience frequent headaches?

9. In the last 3 months, did you experience any kind of skin problems?

10. What kind of skin problems did you experience during the last 3 months?

11. In the last 3 months, which part of your body was mostly affected by skin problems?

12. In the last 3 months, did you experience any disruption during your sleep?

13. In the last 3 months, did you experience any changes in your dietary pattern?

14. What type of changes did you experience in your dietary pattern during the last 3 months?

15. Did a physician, doctor or acquaintance recommend any specific medication to you to manage the symptoms of Chikungunya? If yes, please list their names below.

16. What was the most useful medication you believe for alleviating your symptoms of Chikungunya?

17. If you were suffering from any pre-existing medical conditions such as rheumatoid arthritis, diabetes, kidney disease, heart disease, hypertension, COPD, etc., were the symptoms of your medical condition worsened after being affected Chikungunya?

18. Did you have to refrain from participating in any sort of physical work or activities due to Chikungunya-associated pain in the last 3 months?

19. Did you find yourself with adequate strength and stamina to perform daily, regular work in the last 3 months?

20. How satisfied are you with the condition of your health in the last 3 months?

21. How satisfied are you with the quality of sleep you received in the last thirty days?

22. How often have you experienced feelings of depression, anxiety, pessimism, frustration and other such neurotic emotions in the last thirty days?

23. How much would you say the symptoms of Chikungunya affected the financial condition of your family?

24. How much would you agree to the point that Chikungunya patients should be prescribed other painkillers rather than only paracetamol?

25. How much would you agree to the point that Chikungunya patients should be prescribed anti-allergic drugs for rashes?

26. How much would you agree to the point that there should be proper identification tests for Chikungunya?

*Question 20 to 26 are public opinion based questions

3 Results

Q1. What is your gender and age?

Following tables (3.1 & 3.2) are the representation of the population participated in the study.

Table 3.1: Gender of the participants from healthcare and non-healthcare profession

	Healthcare	**Non Healthcare**	**Total**	**Percentage (%)**
Male	17	50	67	47.86
Female	33	40	73	52.14
Total	50	90	140	100

Table 3.2: Age group of the participants from healthcare and non-healthcare profession

Age group	**Non-healthcare**	**Healthcare**	**Total**	**Percentage (%)**
18-29 years old	51	45	96	68.57
30-49 years old	18	3	21	15
50-64 years old	21	2	23	16.43

Q2. Have you faced any of the disease condition/discomfort like fever, joint pain, muscle pain, skin problem, fatigue, headache, sleep disturbance and loss of appetite within this 3 months?

The table 3.3 shows that people suffered more from joint pain and muscle pain than any other disease condition or discomfort within this 3 month. Moreover, independent chi-square test had been done to all of the disease condition to see the significance at the level of 5%. From the p-value, it has been seen that joint pain is the most significant disease condition than any other disease due to chikungunya. Furthermore, t-test had been done for all the disease condition to observe the significance of these disease conditions.

Table 3.3: Frequency of disease or discomfort that healthcare and non-healthcare people faced

	Health Care		**Percentage (Yes)**	**Non-healthcare**		**Percentage (Yes)**	**Total**		**Percentage**	
Symptoms	**Yes**	**No**	**%**	**Yes**	**No**	**%**	**Yes**	**No**	**Yes**	**No**
Fever	19	31	38	28	62	31.11	47	93	33.57	66.43
Joint pain	32	18	64	76	14	84.44	108	32	77.14	22.86
Muscle Pain	33	17	66	62	28	68.89	95	45	67.86	32.14
Skin Problems	14	36	28	26	64	28.89	40	100	28.57	71.43
Fatigue	11	39	22	20	70	22.22	31	109	22.14	77.86
Headache	20	30	40	21	69	23.33	41	99	29.29	70.71
Sleep Disturbance	15	35	30	22	68	24.44	37	103	26.43	73.57
Loss of Appetite	12	38	24	17	73	18.89	29	111	20.71	79.29

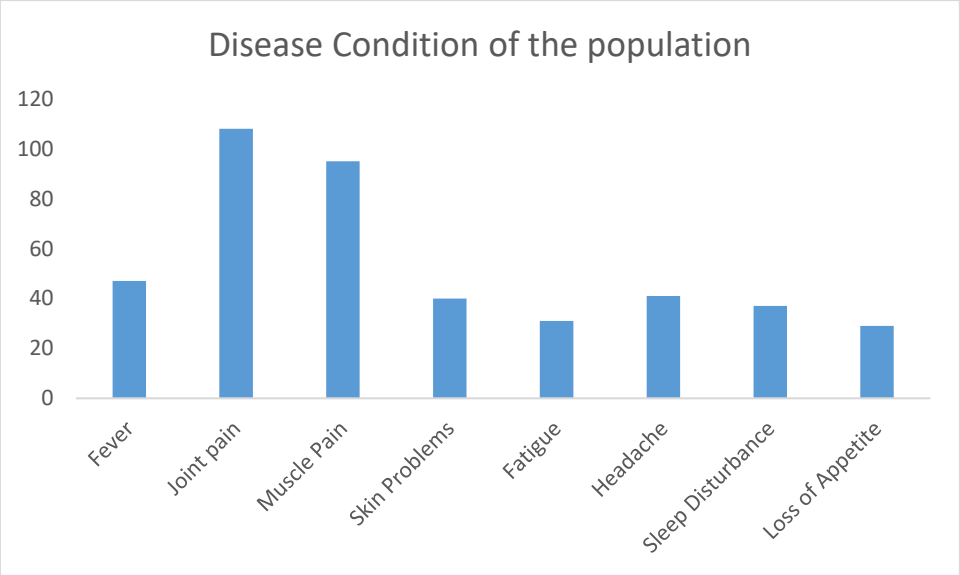

Figure 3.1: Post chikungunya disease condition or discomfort that people have faced

Table 3.4: Chikungunya patients suffering from disease or discomfort in their follow up period of 3 months

Symptoms	Healthcare	Non-healthcare	Total	p-value
Fever	19	28	47	0.408
Joint Pain	32	76	108	0.006
Muscle Pain	33	62	95	0.726
Skin Problem	14	26	40	0.911
Fatigue	11	20	31	0.976
Headache	20	21	41	0.038
Sleep Disturbance	15	22	37	0.475
Loss of Appetite	12	17	29	0.475

Chi square test and T-test of the symptoms

1. Fever

Chi-square Test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Fever	140	100.0%	0	.0%	140	100.0%

Field of Study * Fever Crosstabulation

			Fever		
			No	Yes	Total
Field of Study	Healthcare	Count	31	19	50
		Expected Count	33.2	16.8	50.0
		% within Field of Study	62.0%	38.0%	100.0%
		% within Fever	33.3%	40.4%	35.7%
		% of Total	22.1%	13.6%	35.7%
	Non-healthcare	Count	62	28	90
		Expected Count	59.8	30.2	90.0
		% within Field of Study	68.9%	31.1%	100.0%
		% within Fever	66.7%	59.6%	64.3%
		% of Total	44.3%	20.0%	64.3%
Total		Count	93	47	140
		Expected Count	93.0	47.0	140.0
		% within Field of Study	66.4%	33.6%	100.0%
		% within Fever	100.0%	100.0%	100.0%
		% of Total	66.4%	33.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.684[a]	1	.408		
Continuity Correction[b]	.410	1	.522		
Likelihood Ratio	.678	1	.410		
Fisher's Exact Test				.457	.260
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.79.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.070	.408
	Cramer's V	.070	.408
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Fever	Healthcare	50	.38	.490	.069
	Non-healthcare	90	.31	.466	.049

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Fever	Equal variances assumed	2.341	.128	.823	138	.412	.069	.084	-.097	.234
	Equal variances not assumed			.811	96.980	.419	.069	.085	-.100	.237

2. Joint Pain

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Joint Pain	140	100.0%	0	.0%	140	100.0%

Field of Study * Joint Pain Crosstabulation

			Joint Pain		
			No	Yes	Total
Field of Study	Healthcare	Count	18	32	50
		Expected Count	11.4	38.6	50.0
		% within Field of Study	36.0%	64.0%	100.0%
		% within Joint Pain	56.3%	29.6%	35.7%
		% of Total	12.9%	22.9%	35.7%
	Non-healthcare	Count	14	76	90
		Expected Count	20.6	69.4	90.0
		% within Field of Study	15.6%	84.4%	100.0%
		% within Joint Pain	43.8%	70.4%	64.3%
		% of Total	10.0%	54.3%	64.3%
Total		Count	32	108	140
		Expected Count	32.0	108.0	140.0
		% within Field of Study	22.9%	77.1%	100.0%
		% within Joint Pain	100.0%	100.0%	100.0%
		% of Total	22.9%	77.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.619[a]	1	.006		
Continuity Correction[b]	6.504	1	.011		
Likelihood Ratio	7.370	1	.007		
Fisher's Exact Test				.011	.006
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.43.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.233	.006
	Cramer's V	.233	.006
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Joint Pain	Healthcare	50	.64	.485	.069
	Non-healthcare	90	.84	.364	.038

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Joint Pain	Equal variances assumed	26.720	.000	-2.818	138	.006	-.204	.073	-.348	-.061
	Equal variances not assumed			-2.601	80.237	.011	-.204	.079	-.361	-.048

3. Muscle Pain

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Muscle Pain	140	100.0%	0	.0%	140	100.0%

Field of Study * Muscle Pain Crosstabulation

			Muscle Pain		
			No	Yes	Total
Field of Study	Healthcare	Count	17	33	50
		Expected Count	16.1	33.9	50.0
		% within Field of Study	34.0%	66.0%	100.0%
		% within Muscle Pain	37.8%	34.7%	35.7%
		% of Total	12.1%	23.6%	35.7%
	Non-healthcare	Count	28	62	90
		Expected Count	28.9	61.1	90.0
		% within Field of Study	31.1%	68.9%	100.0%
		% within Muscle Pain	62.2%	65.3%	64.3%
		% of Total	20.0%	44.3%	64.3%
Total		Count	45	95	140
		Expected Count	45.0	95.0	140.0
		% within Field of Study	32.1%	67.9%	100.0%
		% within Muscle Pain	100.0%	100.0%	100.0%
		% of Total	32.1%	67.9%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.123[a]	1	.726		
Continuity Correction[b]	.026	1	.871		
Likelihood Ratio	.122	1	.726		
Fisher's Exact Test				.850	.433
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.07.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.030	.726
	Cramer's V	.030	.726
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Muscle Pain	Healthcare	50	.66	.479	.068
	Non-healthcare	90	.69	.466	.049

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Muscle Pain	Equal variances assumed	.462	.498	-.348	138	.728	-.029	.083	-.193	.135
	Equal variances not assumed			-.346	99.008	.730	-.029	.084	-.195	.137

4. Skin Problem

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Skin Problem	140	100.0%	0	.0%	140	100.0%

Field of Study * Skin Problem Crosstabulation

			Skin Problem		
			No	Yes	Total
Field of Study	Healthcare	Count	36	14	50
		Expected Count	35.7	14.3	50.0
		% within Field of Study	72.0%	28.0%	100.0%
		% within Skin Problem	36.0%	35.0%	35.7%
		% of Total	25.7%	10.0%	35.7%
	Non-healthcare	Count	64	26	90
		Expected Count	64.3	25.7	90.0
		% within Field of Study	71.1%	28.9%	100.0%
		% within Skin Problem	64.0%	65.0%	64.3%
		% of Total	45.7%	18.6%	64.3%
Total		Count	100	40	140
		Expected Count	100.0	40.0	140.0
		% within Field of Study	71.4%	28.6%	100.0%
		% within Skin Problem	100.0%	100.0%	100.0%
		% of Total	71.4%	28.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.012[a]	1	.911		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.012	1	.911		
Fisher's Exact Test				1.000	.536
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.29.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.009	.911
	Cramer's V	.009	.911
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Skin Problem	Healthcare	50	.28	.454	.064
	Non-healthcare	90	.29	.456	.048

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Skin Problem	Equal variances assumed	.050	.824	-.111	138	.912	-.009	.080	-.168	.150
	Equal variances not assumed			-.111	101.768	.912	-.009	.080	-.168	.150

5. Fatigue

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Fatigue	140	100.0%	0	.0%	140	100.0%

Field of Study * Fatigue Crosstabulation

			Fatigue		
			No	Yes	Total
Field of Study	Healthcare	Count	39	11	50
		Expected Count	38.9	11.1	50.0
		% within Field of Study	78.0%	22.0%	100.0%
		% within Fatigue	35.8%	35.5%	35.7%
		% of Total	27.9%	7.9%	35.7%
	Non-healthcare	Count	70	20	90
		Expected Count	70.1	19.9	90.0
		% within Field of Study	77.8%	22.2%	100.0%
		% within Fatigue	64.2%	64.5%	64.3%
		% of Total	50.0%	14.3%	64.3%
Total		Count	109	31	140
		Expected Count	109.0	31.0	140.0
		% within Field of Study	77.9%	22.1%	100.0%
		% within Fatigue	100.0%	100.0%	100.0%
		% of Total	77.9%	22.1%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.001[a]	1	.976		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.001	1	.976		
Fisher's Exact Test				1.000	.576
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 11.07.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	.003	.976
	Cramer's V	.003	.976
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Fatigue	Healthcare	50	.22	.418	.059
	Non-healthcare	90	.22	.418	.044

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Fatigue	Equal variances assumed	.004	.952	-.030	138	.976	-.002	.074	-.148	.144
	Equal variances not assumed			-.030	101.268	.976	-.002	.074	-.149	.144

6. Headache

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Headache	140	100.0%	0	.0%	140	100.0%

Field of Study * Headache Crosstabulation

			Headache		
			No	Yes	Total
Field of Study	Healthcare	Count	30	20	50
		Expected Count	35.4	14.6	50.0
		% within Field of Study	60.0%	40.0%	100.0%
		% within Headache	30.3%	48.8%	35.7%
		% of Total	21.4%	14.3%	35.7%
	Non-healthcare	Count	69	21	90
		Expected Count	63.6	26.4	90.0
		% within Field of Study	76.7%	23.3%	100.0%
		% within Headache	69.7%	51.2%	64.3%
		% of Total	49.3%	15.0%	64.3%
Total		Count	99	41	140
		Expected Count	99.0	41.0	140.0
		% within Field of Study	70.7%	29.3%	100.0%
		% within Headache	100.0%	100.0%	100.0%
		% of Total	70.7%	29.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.311[a]	1	.038		
Continuity Correction[b]	3.544	1	.060		
Likelihood Ratio	4.223	1	.040		
Fisher's Exact Test				.052	.031
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 14.64.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.175	.038
	Cramer's V	.175	.038
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Headache	Healthcare	50	.40	.495	.070
	Non-healthcare	90	.23	.425	.045

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Headache	Equal variances assumed	13.096	.000	2.094	138	.038	.167	.080	.009	.324
	Equal variances not assumed			2.005	89.198	.048	.167	.083	.002	.332

7. Sleep Disturbance

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Sleep Disturbance	140	100.0%	0	.0%	140	100.0%

Field of Study * Sleep Disturbance Crosstabulation

			Sleep Disturbance		
			No	Yes	Total
Field of Study	Healthcare	Count	35	15	50
		Expected Count	36.8	13.2	50.0
		% within Field of Study	70.0%	30.0%	100.0%
		% within Sleep Disturbance	34.0%	40.5%	35.7%
		% of Total	25.0%	10.7%	35.7%
	Non-healthcare	Count	68	22	90
		Expected Count	66.2	23.8	90.0
		% within Field of Study	75.6%	24.4%	100.0%
		% within Sleep Disturbance	66.0%	59.5%	64.3%
		% of Total	48.6%	15.7%	64.3%
Total		Count	103	37	140
		Expected Count	103.0	37.0	140.0
		% within Field of Study	73.6%	26.4%	100.0%
		% within Sleep Disturbance	100.0%	100.0%	100.0%
		% of Total	73.6%	26.4%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.510[a]	1	.475		
Continuity Correction[b]	.264	1	.607		
Likelihood Ratio	.505	1	.478		
Fisher's Exact Test				.550	.301
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.21.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.060	.475
	Cramer's V	.060	.475
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Sleep Disturbance	Healthcare	50	.30	.463	.065
	Non-healthcare	90	.24	.432	.046

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Sleep Disturbance	Equal variances assumed	1.887	.172	.710	138	.479	.056	.078	-.099	.210
	Equal variances not assumed			.697	95.601	.488	.056	.080	-.103	.214

8. Loss of Appetite

Chi-square test:

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Field of Study * Loss of Appetite	140	100.0%	0	.0%	140	100.0%

Field of Study * Loss of Appetite Crosstabulation

			Loss of Appetite		
			No	Yes	Total
Field of Study	Healthcare	Count	38	12	50
		Expected Count	39.6	10.4	50.0
		% within Field of Study	76.0%	24.0%	100.0%
		% within Loss of Appetite	34.2%	41.4%	35.7%
		% of Total	27.1%	8.6%	35.7%
	Non-healthcare	Count	73	17	90
		Expected Count	71.4	18.6	90.0
		% within Field of Study	81.1%	18.9%	100.0%
		% within Loss of Appetite	65.8%	58.6%	64.3%
		% of Total	52.1%	12.1%	64.3%
Total		Count	111	29	140
		Expected Count	111.0	29.0	140.0
		% within Field of Study	79.3%	20.7%	100.0%
		% within Loss of Appetite	100.0%	100.0%	100.0%
		% of Total	79.3%	20.7%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.511[a]	1	.475		
Continuity Correction[b]	.247	1	.619		
Likelihood Ratio	.504	1	.478		
Fisher's Exact Test				.517	.306
N of Valid Cases	140				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.36.

b. Computed only for a 2x2 table

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	-.060	.475
	Cramer's V	.060	.475
N of Valid Cases		140	

T-test:

Group Statistics

	Field of Study	N	Mean	Std. Deviation	Std. Error Mean
Loss of Appetite	Healthcare	50	.24	.431	.061
	Non-healthcare	90	.19	.394	.041

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Loss of Appetite	Equal variances assumed	1.937	.166	.711	138	.478	.051	.072	-.091	.193
	Equal variances not assumed			.693	93.760	.490	.051	.074	-.095	.198

Q3. Have you experienced any chikungunya-associated ache in your joints or your muscles within the last 3 months after being affected by it?

From 140 participants, it has been observed that 65% of people have experienced chikungunya-associated ache in their joints or muscles within the 3 months after being affected by chikungunya. 34.29% of the participant did not face chikungunya associated ache in their joints or muscle and 0.71% of participant did not response to the question.

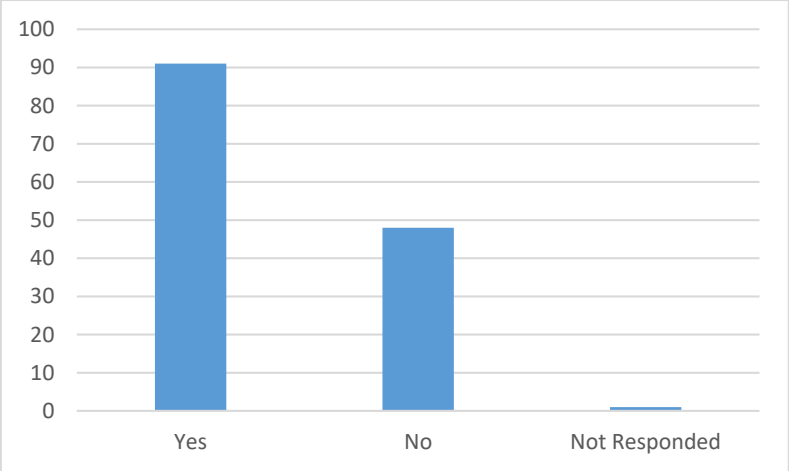

Figure 3.2: People response of the question whether they faced chikungunya associated pain in their joints or muscles or not.

Q4. Assuming you experienced chikungunya-associated ache in your joints, which of the following joint(s) did you experience pain during the last 3 months?

Table 3.5: Frequency of part of the body affected by chikungunya associated ache

Part of the body affected	Healthcare	Non Healthcare	Total	Percentage (%)
Fingers	23	38	61	43.57
Wrists	10	19	29	20.71
Elbows	11	8	19	13.57
Hips	0	0	0	0
Knees	23	28	51	36.43
Ankles	10	21	31	22.14
Soles	2	13	15	10.71
Shoulders	7	15	22	15.71
Chest	0	0	0	0
Waist Joints	1	1	2	1.43
Neck	0	3	3	2.14
Lumber Ciatic Pain	0	1	1	0.71
Tringing Sensation in Legs	0	1	1	0.71

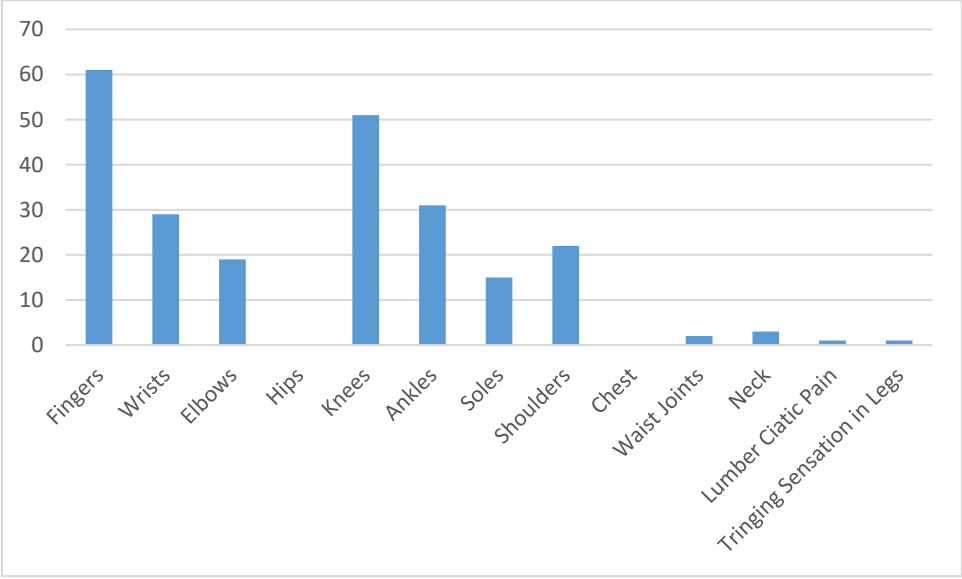

Figure 3.3: Participant's responses to the question of part of the body being affected by chikungunya associated ache.

Q5. In last 3 months, did you experience pain with stiffness in your joints immediately after waking up in the morning?

From the 140 participant, it has been observed that 53.57% of the people have experienced pain with stiffness in their joints immediately after waking up in the morning and rest 46.43% of the people have not experienced any pain with stiffness in their joints immediately after waking up in the morning.

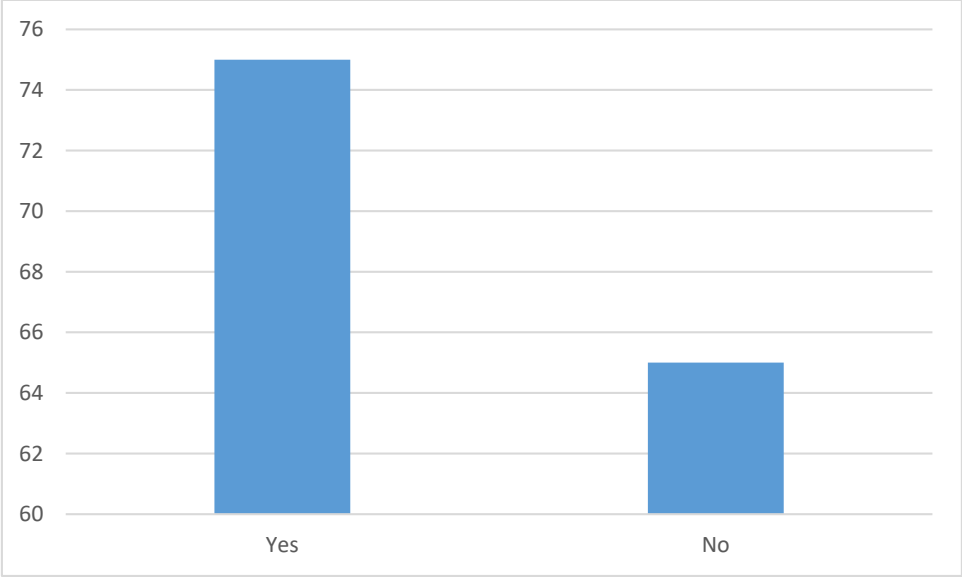

Figure 3.4: Participant's responses to the question whether they experienced pain with stiffness in their joints after waking up in the morning or not

Q6. In last 3 months, did you experience pain with stiffness in your joints anytime except in the morning? If yes, then please specify the time:

From the 140 participant, it has been observed that 32.14% of the people have experienced pain with stiffness in their joints immediately after waking up at any time of the day except morning and rest 67.86% of the people have not experienced any pain with stiffness in their joints immediately after waking at any time of the day except morning.

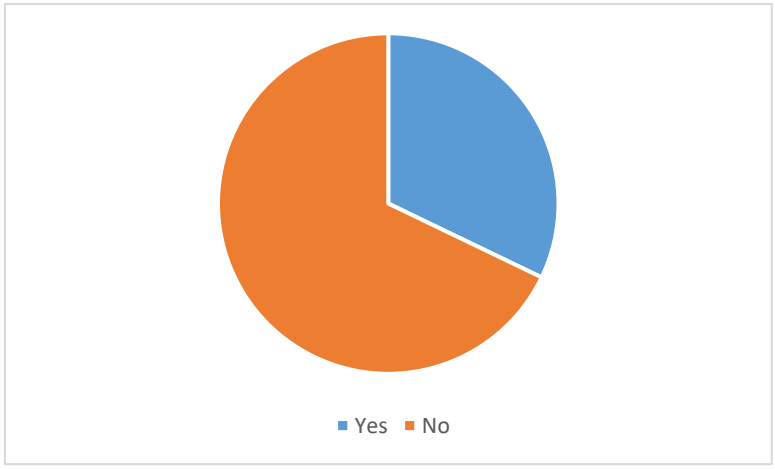

Figure 3.5: Participant's responses to the question whether they experienced pain with stiffness in their joints after waking at any time of the day except morning or not.

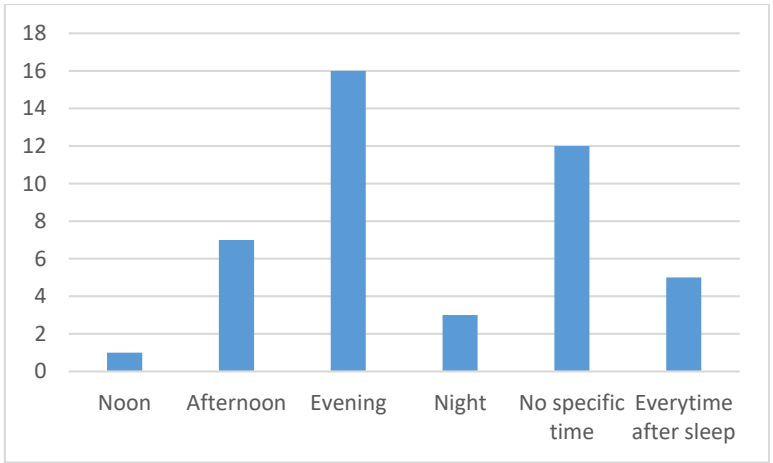

Figure 3.6: Participants mentioned the time they have experienced pain with stiffness in their joints after waking at any time of the day except morning.

Q7. In the last 3 months, how many times did you experience fever?

From the 140 participants, it has been observed that in the interval of 3 months of post chikungunya 48.57% of the people have experienced fever not even once, 17.86% of them have experienced fever once, 22.14% of them have experienced fever twice, 5% of them have experienced fever thrice and 6.43% of them have experienced fever more than 3 times.

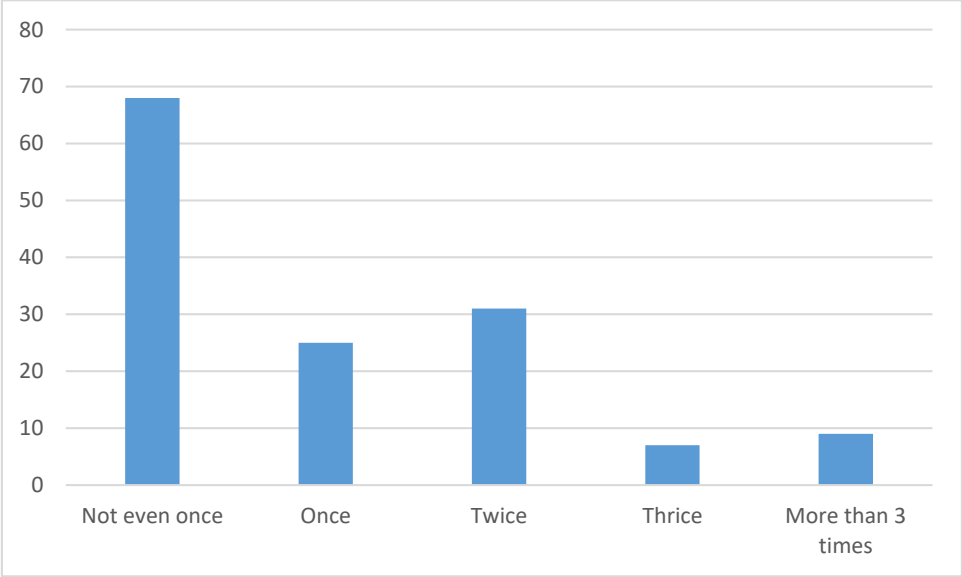

Figure 3.7: Participant's responses to the question how many times they have experienced fever during those 3 months

Q8. In last 3 months, did you experience frequent headaches?

32.86% of the participant have experienced frequent headaches during 3 months of post chikungunya and rest 67.14% of the participant have not experienced frequent headaches.

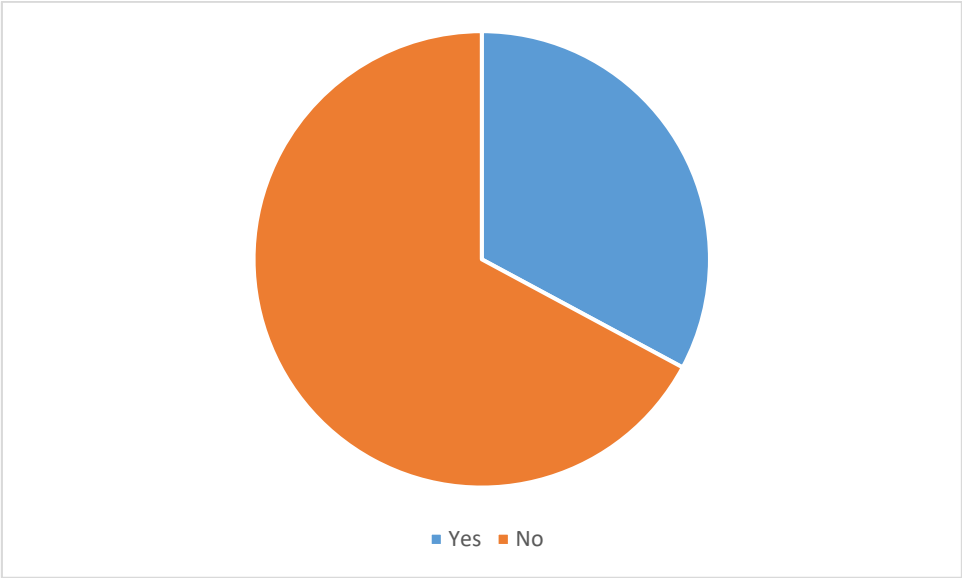

Figure 3.8: Participant's responses whether they have experienced frequent headaches or not during those 3 months

Q9. In last 3 months, did you experience any kind of skin problems?

54.29% from 140 participants have experienced skin problems of any kind and rest 45.71% of them have not experienced any kind of skin problems.

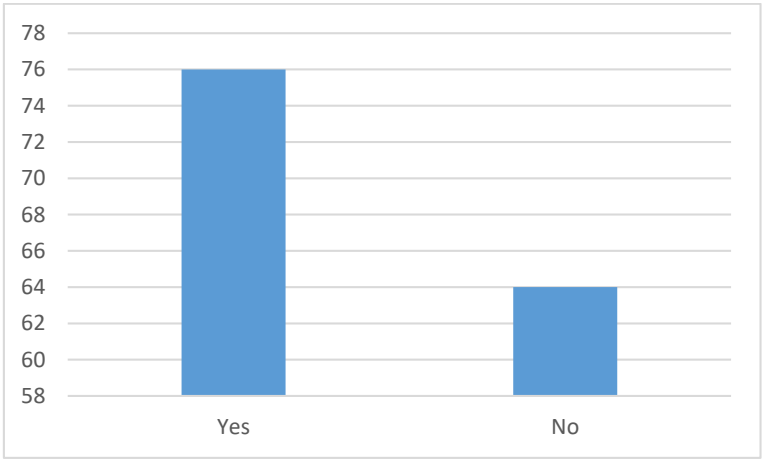

Figure 3.9: Participant's response to the question whether they have experienced any kind of skin problems or not.

Q10. What kind of skin problems did you experience during the last 3 months?

Table 3.6: Participant's response to the question what kind of skin problems they have experienced during those 3 months.

Types of skin problem	Healthcare	Non-healthcare	Total	Percentage (%)
Rashes	21	39	60	78.95
Lumps	0	3	3	3.95
Acne	6	2	8	10.53
Skin Peeling	7	13	20	26.32
Hair Fall	12	18	30	39.47
Mouth Ulcer	0	0	0	0

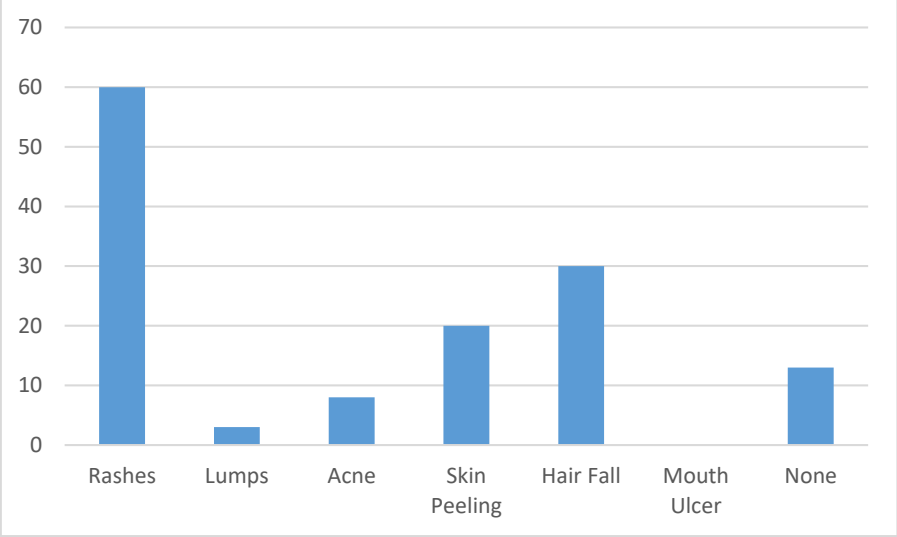

Figure 3.10: Participant's response to the question what kind of skin problems they have experienced during those 3 months.

Q11. In last 3 months, which part of your body was mostly affected by skin problems?

Table 3.7: Participant's response to the question which part of the body were affected by skin problems during those 3 months.

Part of the body affected	Healthcare	Non-healthcare	Total
Face	13	24	37
Neck	2	7	9
Upper Limbs	8	15	23
Trunk/Body	11	13	24
Lower Limbs	2	5	7
Soles	1	6	7
Scalp	6	9	15
Elbow Skin	1	0	1

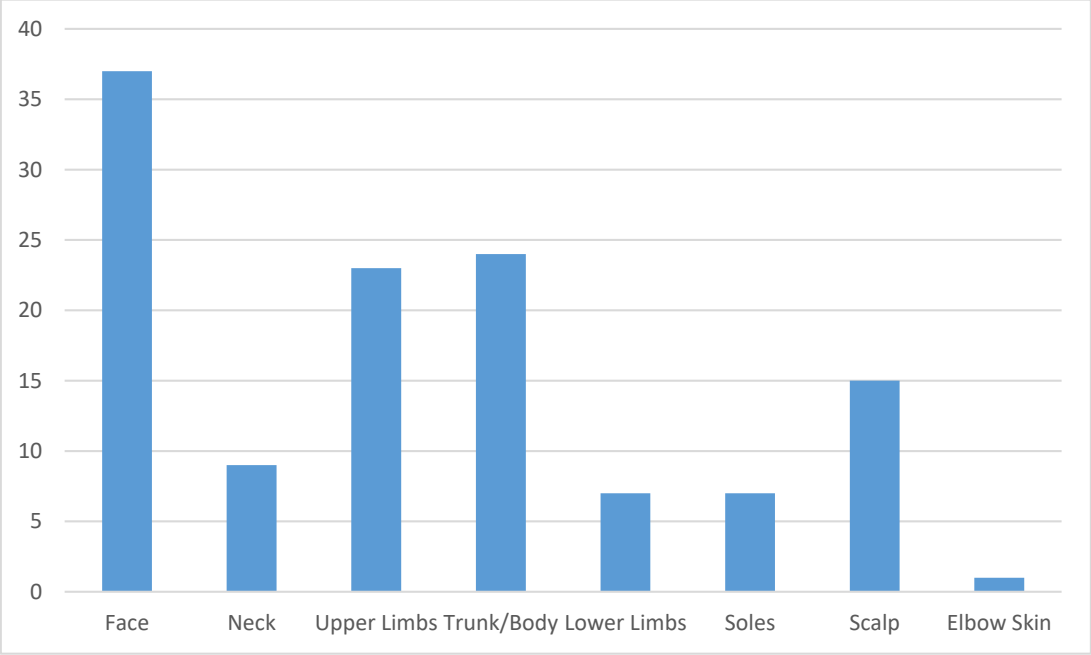

Figure 3.11: Participant's response to the question which part of the body were affected by skin problems during those 3 months.

Q12. In last 3 months, did you experience any disruption during sleep? If Yes, then what is the type of disruption you have faced?

From the 140 participants, it has been observed that 59.29% of them experienced disruption during sleep in those 3 months and rest 40.71% of them did not experience any disruption during sleep.

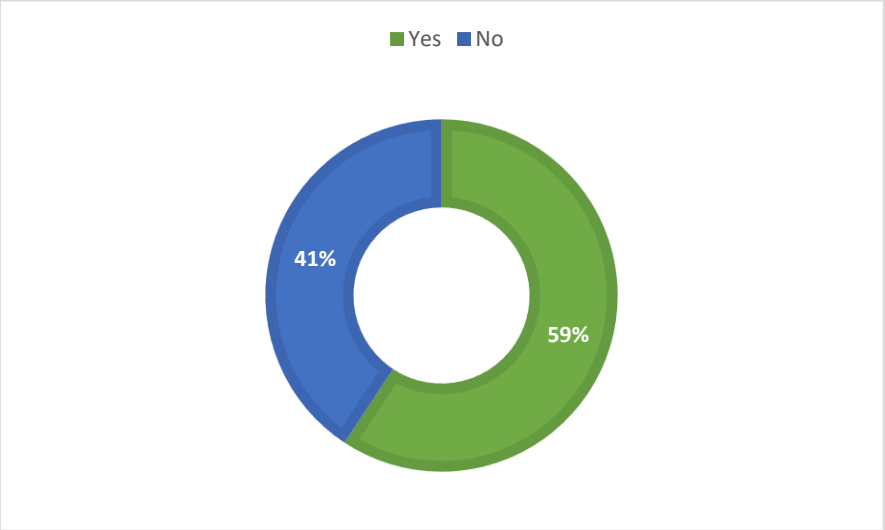

Figure 3.12: Participant's response to the question if they experienced disruption during sleep.

Furthermore, they were asked whether their sleep disruption was severe or moderate and it has been found that from 140 participants 13.57% of them have experienced severe sleep disruption while 45.71% of them have experienced moderate sleep disruption.

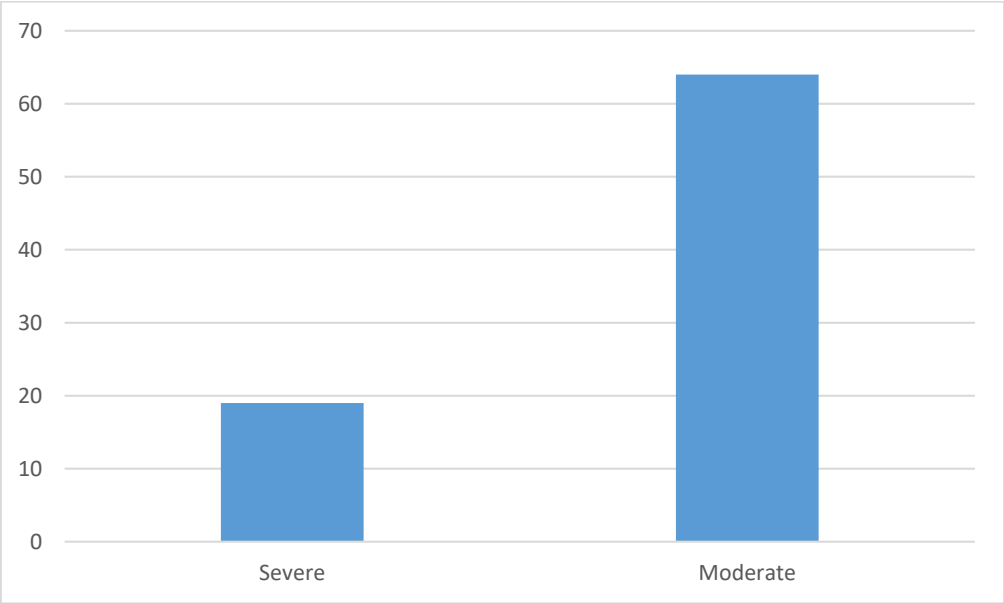

Figure 3.13: Participant's response to the question what type of disruption they experienced during those 3 months.

Q13. In the last 3 months, did you experience any changes in your dietary pattern?

From 140 participants, it has been observed that 43.57% of them have experienced change in their dietary pattern and 56.43% of them did not experienced change in dietary pattern.

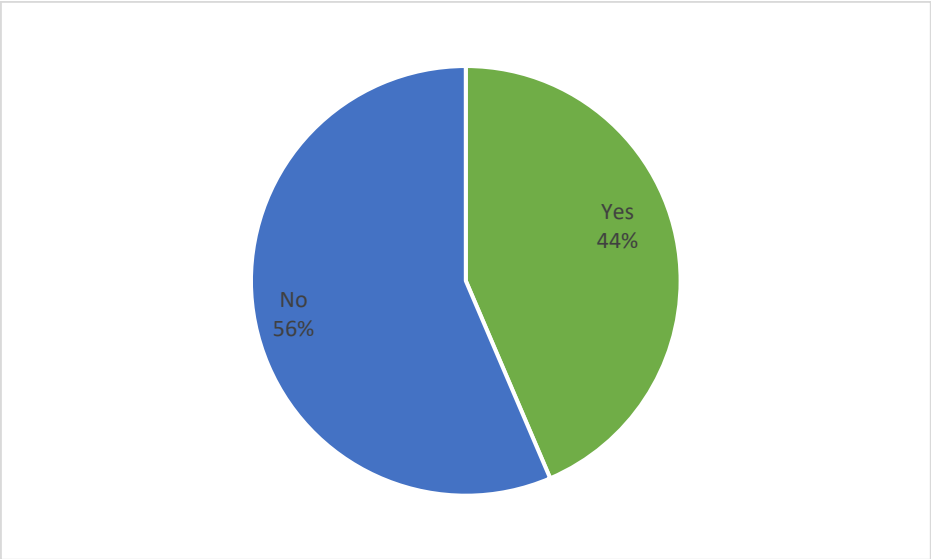

Figure 3.14: Participant's response to the question whether they experienced changes in their dietary pattern during those 3 months or not.

Q14. What type of changes did you experience in your dietary pattern during the last 3 months?

From 140 participants, it has been observed that 26.43% of them experienced loss of appetite, 7.86% of them experienced allergies to some foods, 15.71% of them experienced abdominal discomfort and 1.43% of them experienced other changes in their dietary pattern.

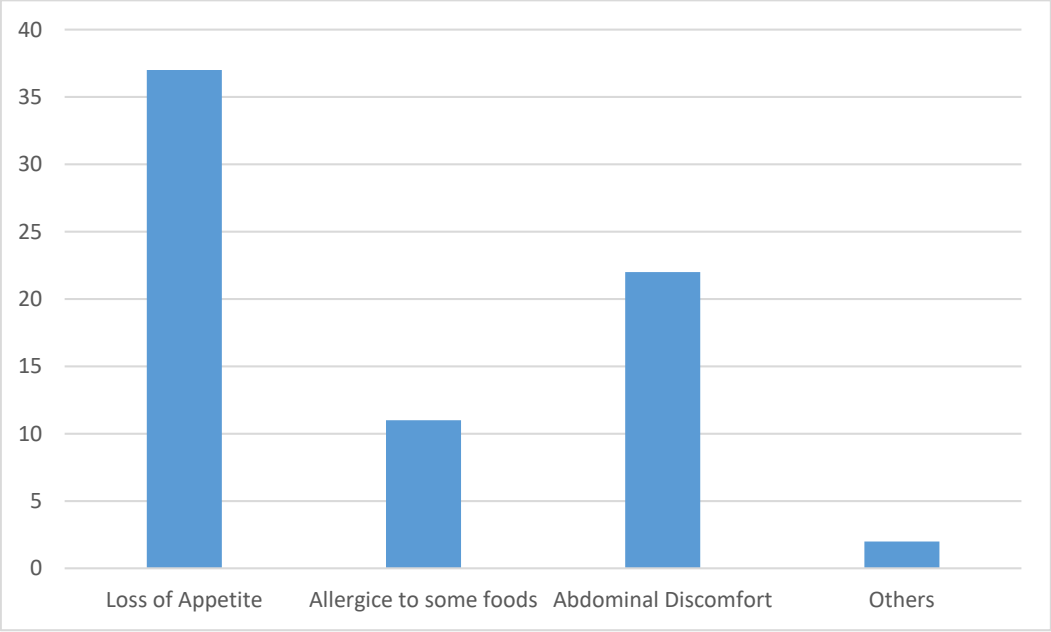

Figure 3.15: Participant's response to the question what type of changes they experienced in their dietary pattern during those 3 months.

Q15. Did a physician, doctor or acquaintance recommend any specific medication to you to manage the symptoms of chikungunya? If yes, then please list their names below:

In response to the question about specific medication recommended by the physician or doctor to manage the symptoms of chikungunya 114 out of 140 participant answered negatively and 24 of them answered affirmatively and 2 of them did not response to the question and those 24 participants has list out some of the medications that they were recommended. Most of them has mentioned about paracetamol with brand names like Napa (BEXIMCO pharmaceuticals Ltd., Bangladesh). Furthermore, they mentioned about some steroidal drugs, pain killer, pain relieve ointments, topical agent although did not mention brand or generic names. Additionally, they enlisted medication like Naproxen in brand name of Naproxen (Amico Laboratories Ltd., Bangladesh), Naprosyn (Roche Bangladesh Pharmaceuticals Ltd.), Naprosyn plus (Radiant Pharmaceuticals Ltd., Bangladesh), Ibuprofen in brand name of Flamex (ACI Ltd., Bangladesh) which are NSAIDS (Non-steroidal anti-inflammatory drugs), Esomeprazole in brand name of Pronex (Drug International Ltd., Bangladesh), Zil forte for hair fall. Also, they were suggested to have morning walk and drinking lots of fluid or liquid.

Table 3.8: Participant response whether or not physician or doctor recommended any specific medication to manage the symptoms.

Response	Healthcare	Non healthcare	Total
Yes	8	16	24
No	42	72	114
Not answered	0	2	2

Table 3.9: List of the medication participants were recommended by their physician or doctor

Remarks	Name of Medication	Healthcare	Non-healthcare	Total
	Paracetamol	6	11	17
	Naproxen	1	1	2
	Naprosyn plus	1	2	3
	Steroidal Drugs	1	1	2
	Morning Walk(slowly)	1	1	2
Not Remembered	Pain killer	1	1	2
	Pain relieve ointments	1	0	1
	Topical agent for rashes	1	0	1
	Flamex(Ibuprofen)	0	1	1
	Pronex(Esomeprazole)	0	1	1
	Zil forte	0	1	1
	Drinking liquid	0	1	1

Q16. What was the most useful medication you believe for alleviating your symptoms of chikungunya?

140 participants were asked what the most useful medication they believe for alleviating their symptoms of chikungunya was and in response they have mentioned some of the medication that they believe were useful for alleviating their symptoms of chikungunya. They mentioned about paracetamol with brand names like Napa (BEXIMCO pharmaceuticals Ltd., Bangladesh) and also mentioned about painkiller, analgesic, topical agents and many more. Also, they believe that morning walk, drinking water, few exercise may have helped them. Few believe these symptoms cannot be alleviated by anything and some mentioned medication like Naproxen with brand name of Naproxen (Amico Laboratories Ltd., Bangladesh), Naprosyn (Roche Bangladesh Pharmaceuticals Ltd.), Naprosyn plus (Radiant Pharmaceuticals Ltd., Bangladesh) and zil forte for hair fall.

Table 3.10: List of medication they believe useful for alleviating symptoms of chikungunya

Name of medication	Healthcare	Non-healthcare	Total
Paracetamol	13	19	32
Painkiller	1	0	1
Analgesic	1	0	1
Topical agent	1	0	1
Nothing helped	1	0	1
Morning walk	1	1	2
Drinking Water	1	0	1
Exercise	1	0	1
Zilforte(for hairfall)	1	1	2
Naprosyn/naproxen	0	1	1
Naprosyn plus	0	1	1

Q17. If you were suffering from any pre-existing medical conditions such as rheumatoid arthritis, diabetes, kidney disease, heart disease, hypertension, COPD, etc., were the symptoms of your medical condition worsened after being affected Chikungunya?

From 140 participants, it has been observed that 18.57% of people believe that their pre-existing medical condition like rheumatoid arthritis, diabetes, kidney disease, heart disease, COPD (Chronic obstructive pulmonary disease) were worsened due to chikungunya and 78.57% of them respond negatively and 2.86% did not respond to the question.

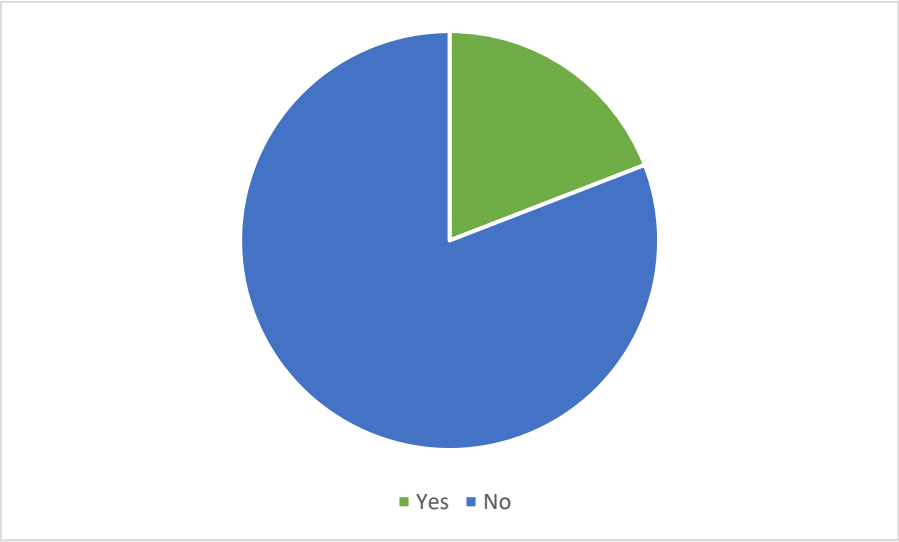

Figure 3.16: Pre-existing medical condition worsened

Q18. Did you have to refrain from participating in any sort of physical work or activities due to Chikungunya-associated pain in the last 3 months?

From 140 participants, it has been observed that 49.29% of people believed that their physical work or activities were held back by the chikungunya associated pain and 49.29% of them did not believed that their physical work or activities were refrained by the chikungunya associated pain and 1.43% did not respond to the question.

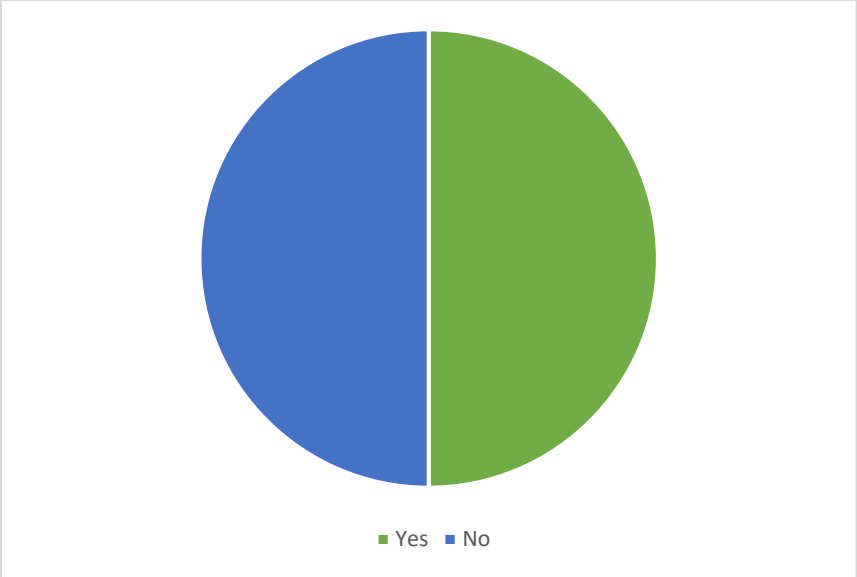

Figure 3.17: Participant's response regarding their physical work or activities were refrained by the chikungunya associated pain

Q19. Did you find yourself with adequate strength and stamina to perform daily, regular work in the last 3 months?

From 140 participants, it has been observed that 47.14% of people believed that their strength and stamina to perform daily, regular work in those 3 months were adequate and 51.43% of them believed that their strength and stamina to perform daily, regular work in those 3 months were not adequate and 1.43% did not respond to the question.

Figure 3.18: Participant's responses whether their strength and stamina to perform daily, regular work in those 3 months were adequate or not

Q20. How satisfied are you with the condition of your health in the last 3 months?

Among 140 participants, 139 have expressed their opinion on their satisfaction on their health condition in those 3 months. It has been observed that 19.29% had very good health condition, 11.43% had good health condition, 55.71% had fair health condition, 11.43% had poor health condition and 1.43% had very poor health condition.

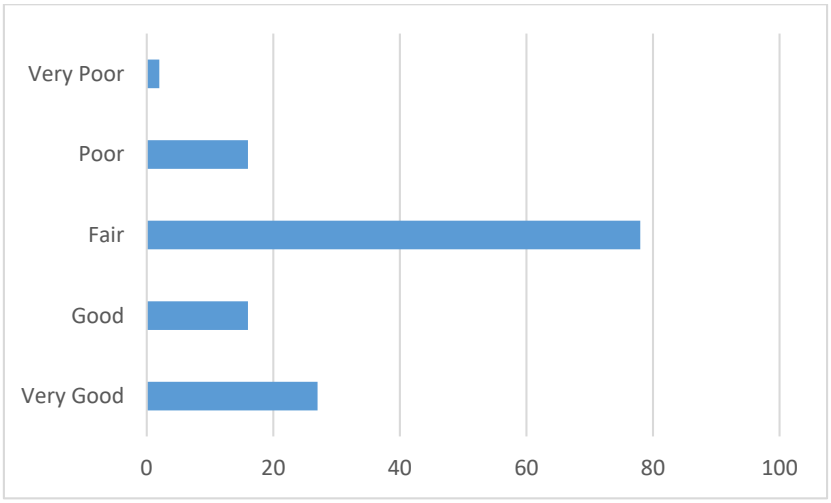

Figure 3.19: Satisfaction on their health condition in those 3 months.

Q21. How satisfied are you with the quality of sleep you received in the last thirty days?

Among 140 participants, 139 have expressed their opinion on their satisfaction on the quality of sleep they were receiving in those 3 months. It has been observed that 17.14% had very good quality of sleep, 22.86% had good quality of sleep, 43.57% had fair quality of sleep, 12.86% had poor quality of sleep and 2.86% had very poor quality of sleep.

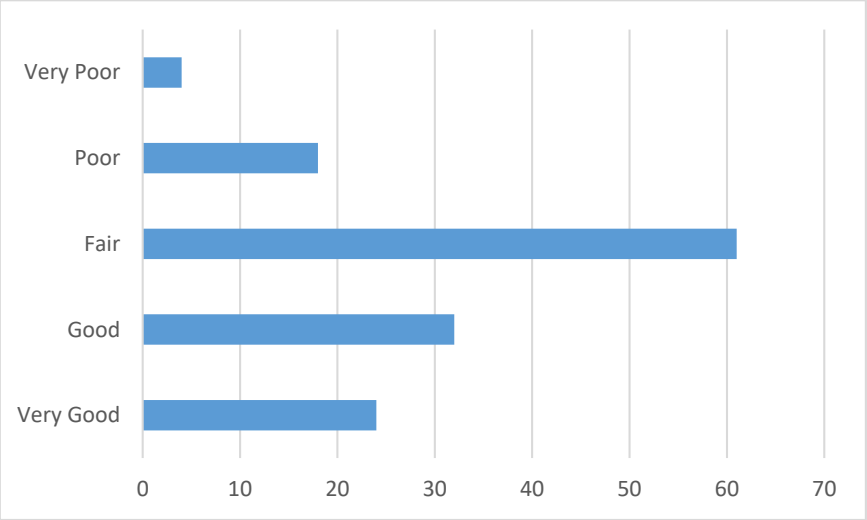

Figure 3.20: Satisfaction on the quality of sleep they received

Q22. How often have you experienced feelings of depression, anxiety, pessimism, frustration and other such neurotic emotions in the last thirty days?

Among 140 participants, 139 have expressed their opinion on their experience of feeling depressed, anxious, frustrated and other emotions in those 3 months. It has been observed that 20.71% had never felt these kind of emotions, 23.57% had rarely felt these kind of emotions, 33.57% had felt these kind of emotions every once in a while, 15.71% had sometimes felt these kind of emotions and 5.71% had felt these kind of emotions almost always.

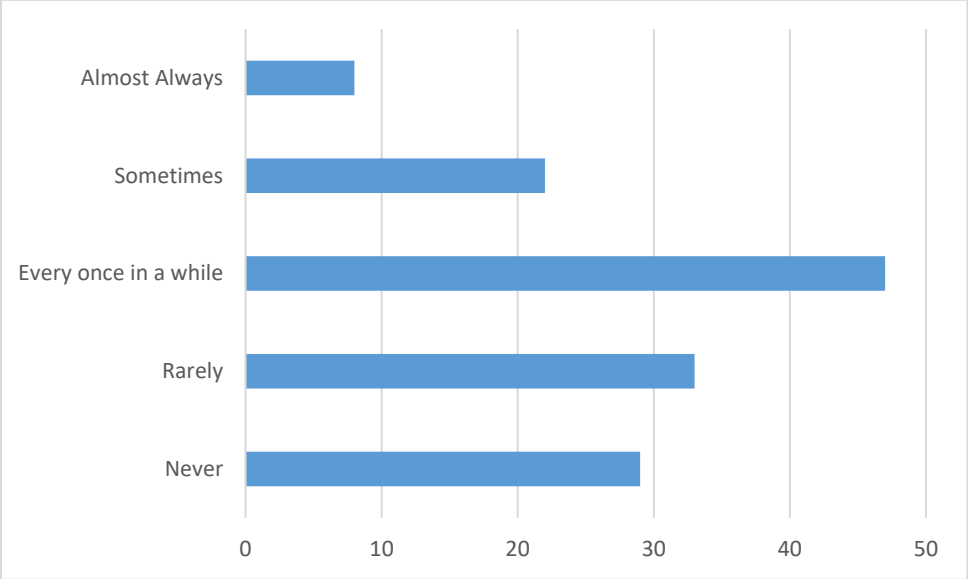

Figure 3.21: Experience of feeling depressed, anxious, frustrated and other emotions

Q23. How much would you say the symptoms of Chikungunya affected the financial condition of your family?

Among 140 participants, 136 have expressed their opinion on their financial condition being affected by chikungunya. It has been observed that financial condition did not affect at all to 40.71% population, not much effect on 33.57% population, neutral effect on 15.71% population, somewhat effect on 2.14% and very much effect on 5% population.

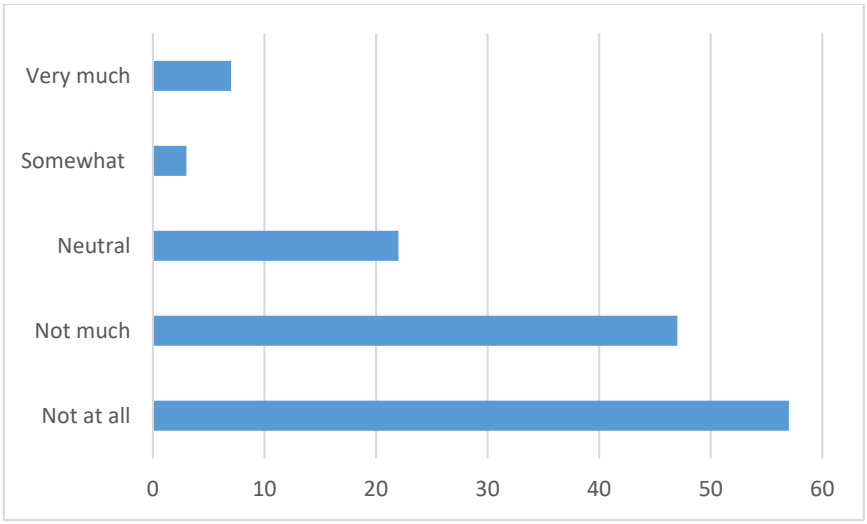

Figure 3.22: Financial condition of their family is being affected by chikungunya

Q24. How much would you agree to the point that Chikungunya patients should be prescribed other painkillers rather than only paracetamol?

Among 140 participants, 139 have expressed their opinion on the point that chikungunya patients should be prescribed other painkillers rather than only paracetamol. It has been observed that 23.57% had strongly agreed to this point, 25.71% agreed to this point, 30.71% neutral on this point, 11.43% disagreed to the point and 7.86% strongly disagreed to this point.

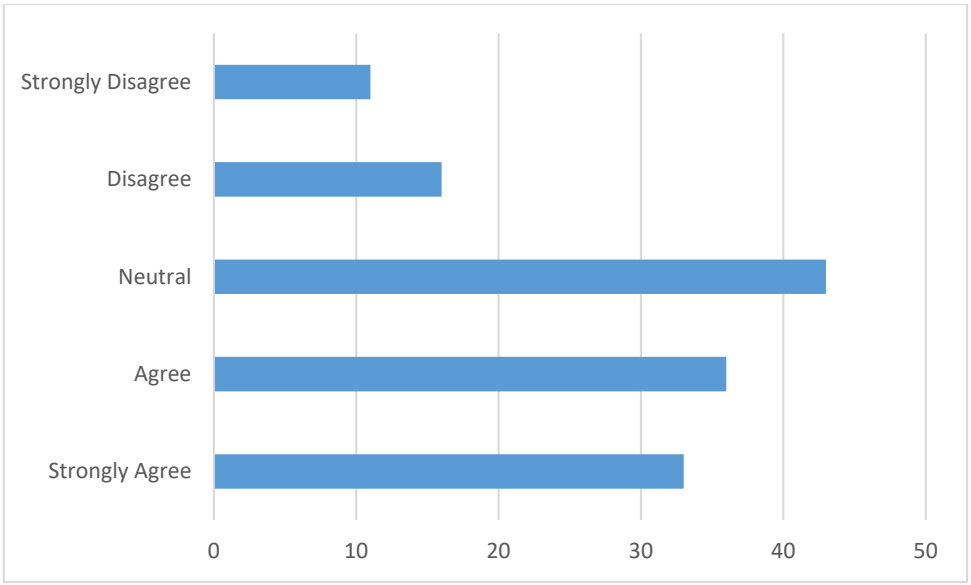

Figure 3.23: Opinion on the point that chikungunya patients should be prescribed other painkillers rather than only paracetamol

Q25. How much would you agree to the point that Chikungunya patients should be prescribed anti-allergic drugs for rashes?

Among 140 participants, 138 have expressed their opinion on the point that chikungunya patients should be prescribed anti-allergic drugs for rashes. It has been observed that 20% had strongly agreed to this point, 17.86% agreed to this point, 28.57% neutral on this point, 15% disagreed to the point and 17.14% strongly disagreed to this point.

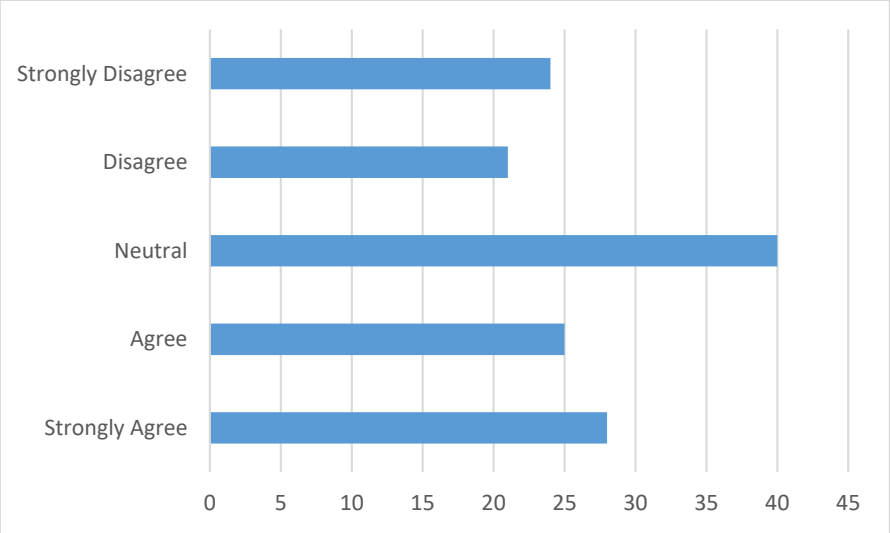

Figure 3.24: Opinion on the point that chikungunya patients should be prescribed anti-allergic drugs for rashes

Q26. How much would you agree to the point that there should be proper identification tests for Chikungunya?

Among 140 participants, 139 have expressed their opinion on the point that there should be proper identification tests for Chikungunya. It has been observed that 35.71% had strongly agreed to this point, 8.57% agreed to this point, 29.29% neutral on this point, 13.57% disagreed to the point and 12.14% strongly disagreed to this point.

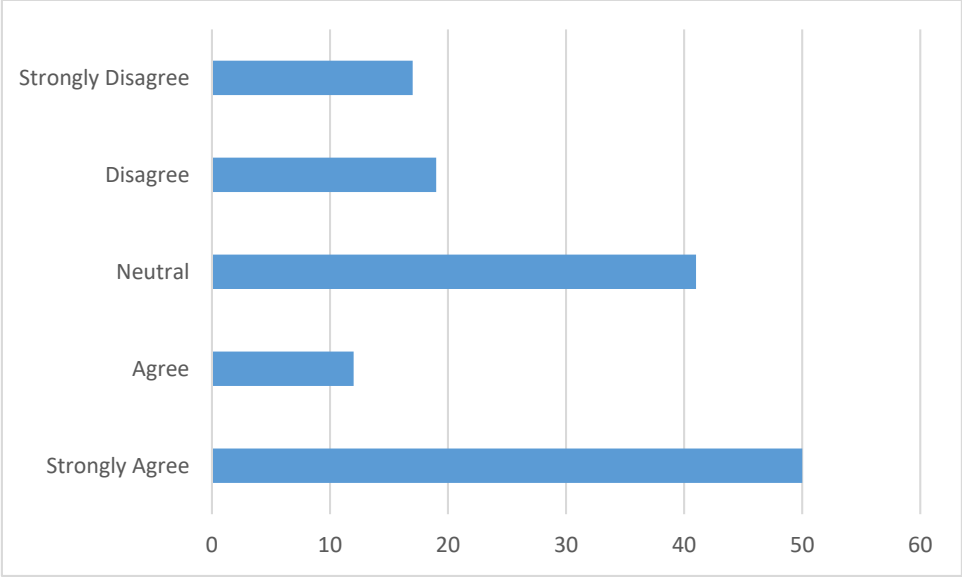

Figure 3.25: Opinion on the point that that there should be proper identification tests for Chikungunya

Furthermore, mean and standard deviation has been calculated for the opinion based questions. It is found that for the question of being satisfied with their health condition the mean value is +0.36 which means participants are more likely to go for scale of ‘3’ or above. Additionally, for the question of being satisfied with their quality of sleep the mean value is +0.39 which means participants are more likely to go for scale of ‘3’ or above. In addition to that, for the question of experiencing neurotic emotions the mean value is +0.38 which means participants are more likely to go for scale of ‘3’ or above. Moreover, for the question where they were asked about their financial condition of being affected the mean value is +1.06 which means participants are more likely to go for scale of ‘2’ or above. Again, on the question where they were asked of prescribing painkillers other than only paracetamol the mean value is +0.46 which means participants are more likely to go for scale of ‘3’ or above. For the question of prescribing anti-allergic drug for rashes the mean value is +0.09 which means participants are more likely to go for scale of 2 to 4. Lastly, for the question where they were asked of requiring proper identification test for chikungunya the mean value is +0.42 which means participants are more likely to go for scale of ‘3’ or above.

4 Discussion

The findings from the study suggest that there may be some impacts of chikungunya in quality of life of the patients and changes in lifestyle that are brought by chikungunya.

There was evidence of effects of chikungunya on patients as statistics shows that chikungunya patients have suffered from disease conditions like joint pain (statistically significant, $p<0.05$), muscle pain, skin problems and headache significantly. Moreover, we observed that joints or muscles of fingers, knees, ankles and wrists have most effects of chikungunya. In addition, patients suffered from pain with stiffness during woke up time mostly in the morning. Additionally, skin problems like rashes, skin peeling and hair fall have statistically significant effect on chikungunya patients. However, there is no significant evidence of worsening the pre-existed medical conditions like rheumatoid arthritis, diabetes, kidney disease, heart disease etc. Additionally, they hardly suffered from fever during the follow up period. In addition, they hardly experienced depression, anxiety, and frustration in the period of one month after recovering from chikungunya.

However, there was less evidence of changes in patients' lifestyle during the follow up period. Most patients experienced disruption during sleep, which may be moderate to severe. Patients hardly experience change in their dietary pattern. However, those who faced changes in dietary pattern, loss of appetite is the most common type of change. Half of the population face difficulty in physical work or activities due to CHIKV infection but most of them believed that they did not find adequate strength and stamina to perform daily or regular work in the 3 months. In addition, most of them are satisfied with their quality of health, sleep and chikungunya hardly affected their financial condition.

On the other hand, one-study shows that 53% patients suffered from joint pain, 42% suffered from muscle pain and 10% had skin disorder during follow-ups. From which joint pain and muscle pain were very significant (p-value<0.001) (Soumahoro et al., 2009). Although, our study shows that joint pain and headache is the most significant among the patients (p-value < 0.05). Due to difference in environment and follow up period, this dissimilarity may occur. Four studies after 2008 shows that patients with pre-existing medical condition like

rheumatoid manifestation are being affected by chikungunya infection. In the 15, 17, 18 and 24 months follow-up rheumatoid symptom are affected for 57%, 44%, 64% and 59% patients respectively (Borgherini et al., 2008; Larrieu et al., 2010; Sissoko et al., 2009; Soumahoro et al., 2009). However, less than 20% of our patients had effect on their pre-existing medical condition like rheumatoid arthritis. It differed due to less population and less follow up period than those studies.

This study has some limitations. Firstly, it was very hard to reach all of the patient within short time, as few of them did not shared their real contact information. Many of them are contacted through social media or by person to bring out the information. Secondly, most of the population are from non-healthcare profession and they could hardly verify the symptoms that are caused by chikungunya. They are also not able to differ the comorbidities and after effect of chikungunya. Thirdly, the duration of the follow up was 3 months and many of the patients found difficulty to recall all the symptoms they faced during that period.

There are some unexpected results that are found during the study. For instance, patients are treated with some analgesic (e.g. ibuprofen) other than paracetamol which is unlikely. Additionally, less number of patients found effect in their quality of life (e.g. quality of health, quality of sleep and financial condition). It may happen because of the level of satisfaction differ with the perception of the patient or they are not sure about it. In addition to that, they want specific drug for the symptoms of chikungunya like joint pain, skin rashes etc. as they are less satisfied with the existing drugs.

5 Conclusion

Within last 10 years' chikungunya virus has become one of the major arboviral public health threat around the world (Zeller et al., 2016). Different medical conditions or discomforts have been observed in the patients over the follow up period of three months. Most of the people who participated in the study suffered from post chikungunya joint pain and muscle pain. Participants believed that most of them suffering from these discomforts are the result of chikungunya infection. Also, they have chikungunya associated ache in their joints or muscles like fingers, knees and ankles. They have suffered from pain with stiffness after waking up from sleep in the morning or sometimes during the day mostly after afternoon. Although it is believed that chikungunya fever is not prone to reoccur and most of the participants did not have fever within this follow up period but few participants suffered from post chikungunya fever from one to more than three times. Also, they have suffered from different kinds of skin problems within this follow up period and most of them had rashes, hair fall and skin peeling. Affected body parts were mostly face, upper limbs or body. Moreover, for the participants with in this follow up period, chikungunya has been a cause for sleep disruption. They were also asked some opinion-based questions that gave an idea about their quality of life and choice of drugs.

There are some recommendations that can be formulated in the light of these findings. To ensure better quality of life, seeking medical help of chikungunya patients is very important until they recovered fully from CHIKV infection. They should pay more attention to the pre-existing medical condition, quality of sleep, diet and neurotic emotion to have better quality of life. More information can be passed to the patient about the chikungunya and its after effect. Volunteer organization can come forward to help the chikungunya patient not only during chikungunya but also during follow-up or unless they fully recover from the CHIKV infection.

Therefore, this study gives us an overall idea on quality of life of the patients over the follow up period. Furthermore, this study can be extended to a large number of participants where they may be asked about knowledge and perception from both healthcare and non-healthcare background who were affected with chikungunya. In addition to that, they may be asked to

participate in the follow up study that can be extend to 6 months to 1 year or even more. We are planning to perform the follow up study having a period of 1 year or more that will allow us to know the impact of chikungunya in an individual's lifestyle more precisely and allow us to perform more statistical analysis and comparative study of the samples.

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