

## Impact of Joint Pain and Stiffness on Quality of Life among Post Chikungunya Patients in Vadodara District

**Dr. Sarfraznawaz F. Shah**

1. Professor, College of Physiotherapy, Sumandeep Vidyapeeth deemed to be University, Vadodara
2. Former Associate Professor, BITS Institute of Physiotherapy, Vadodara

**Dr Jignaben Chaudhari**

MPT (Musculoskeletal & Sports), BITS Institute Physiotherapy, Vadodara

---

---

### Abstract:

**Background:** It is a vector borne disease, vector borne diseases are transmitted through bite of infected female *Aedes aegypti* or *aedes albopictus* mosquitoes. In 2004 from the Indian ocean the disease spread to India and it infected almost 1.5 million people in India. Chikungunya infection occurs in two phases as acute and chronic phase in respect to symptoms. The acute phase is said to be less than 3 months. If the symptoms like polyarthralgia and musculoskeletal stiffness persist for more than three months, it is termed as chronic phase. If chronic phases persist for longer duration, there is a need to assess quality of life in post chikungunya. **Objective:** The objective of our study is to find the impact of joint pain and stiffness in quality of life among post chikungunya patients. **Methodology:** A cross – sectional study was conducted among 174 post chikungunya patients. Arthralgia was assessed using patient reported arthralgia inventory, Musculoskeletal Stiffness was assessed using musculoskeletal stiffness questionnaire and the quality of life was assessed using Short Form – 36 questionnaires. **Result:** Out of 174 participants 76 were male and 98 were female participants. Results of the study suggested that all the participants were having arthralgia following chikungunya. 74 % were having multiple joint involvement. 55.7 % of participants had experienced stiffness in many of their joints. Quality of life score was found to be 54.7. % in post chikungunya patients. **Conclusion:** It was concluded from the results that joint pain and stiffness has a significant impact on quality of life among post chikungunya patients.

**Key words:** Musculoskeletal stiffness questionnaire, SF- 36, Patient Reported Arthralgia Inventory, Quality of life.

---

---

### Introduction:

Chikungunya is an infection caused by chikungunya virus (CHIKV).<sup>1</sup> It is a vector borne disease which is named chikungunya in accordance with the stooped posture caused due to severe joint pain. Chikungunya means 'which bends up'.<sup>1,2</sup> Major epidemic outbreaks of chikungunya occurred in the year 1963, 1964, 1973 and 2000 in India.<sup>3</sup> In Gujarat confirm cases of chikungunya were 1363, 1290, 669 and 895 in the year 2017, 2018, 2019 and 2020 respectively.<sup>4</sup>

Chikungunya infection occurs in two phases as acute and chronic phase in respect to symptoms. Acute phase is subdivided into viraemia and acute post-viraemia, which is characterized by sudden onset of high-grade fever, chills, nausea, vomiting, myalgias, polyarthralgia with swollen

and painful joints, stooped posture of the patient, polyarthralgia, fatigue, tenosynovitis, and bursitis. If the symptoms like polyarthralgia and musculoskeletal stiffness persist for more than three months its termed as chronic phase.<sup>4,5</sup> Chronic phase symptoms follow pattern similar to osteoarthritis, rheumatoid arthritis, fibromyalgia and associated with physical disability and hampering quality of life in affected people.<sup>5,6</sup>

The progression of symptoms to chronic stage is reported as 4.1–78.6%.<sup>8</sup> Stiffness is mainly seen in the morning, which involves both small and large joints, but ankles, knees, hips, wrists, elbows, and metacarpophalangeal joints are mainly involved.<sup>9</sup>

Chikungunya is commonest cause of virus induced arthritis in eastern hemisphere with recorded major outbreaks in Africa, Asia, and Indian islands.<sup>10</sup> During chronic phase arthralgia and arthritis persist with symmetrical bilateral involvement and pain can be of intermittent or constant characteristics that is accompanied by articular oedema and joint stiffness.<sup>11</sup> Musculoskeletal manifestation of disease in chronic phase is very common.<sup>7</sup>

Arthralgia is an aching or painful joint due to any underlying condition that will involve multiple joints.<sup>13,14</sup> Among the total chikungunya patients around 50% of patients have marked joint swelling and arthralgia at 3 years of occurrence of acute chikungunya infection.<sup>15</sup> Viral load reduces faster from the organs but it persists for long duration in the joint and muscles which may leads to arthralgia.<sup>7,8</sup> Synovial biopsy reports had shown infiltration of natural killer cells and CD4 cells and viral RNA in macrophages, which is similar to other inflammatory arthropathies.<sup>13</sup> Age more than 50 years and having Diabetes and hypertension are commonest causes, diabetes leads to more severe presentation of disease. Obesity is also the risk factor for severe manifestations.<sup>15</sup>

Stiffness is a symptom of musculoskeletal system injury. Some causes of stiffness can be arthritis, prolonged immobilization of joints, swelling and inflammation, post-surgery, overuse injuries and soft tissue injuries.<sup>15</sup> Musculoskeletal stiffness in the morning affects the functional ability and contributes to physical impairment.<sup>14</sup> Stiffness in the morning stops a person from doing work that is necessary to do in the early morning. Such loss of work is responsible for physical impairment in quality of life.<sup>16</sup> Severe musculoskeletal stiffness stops a person from doing any work and leads to more frustration and dependence on others. And this long-lasting sequelae of activity limitation of daily living gives a frustration and anxiety in the chronic chikungunya manifestation patients.<sup>11,14</sup> Which will also affect the emotional component of quality of life among them. Reduced functional ability and disability has a great association with quality-of-life affection. Long Duration of acute phase, severe presentation of symptoms, age and associated comorbidities leads to more severe chronic manifestation and so more functional disability, which leads to more affection in the quality of life. With the affection in functional ability, it will also hamper the person's work ability.<sup>12,13</sup>

Quality of life is “a conscious cognitive judgment of satisfaction with one's life” and “an individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”. A subjective definition of quality of life is “an overall general well-being that comprises objective descriptors and subjective evaluations of physical, material, social, and emotional well-being together with the extent of personal development and purposeful activity, all weighted by a personal set of values”.<sup>9</sup>

A health-related quality of life is defined as “how well a person functions in their life and his or her perceived well-being in physical, mental, and social domains of health”.<sup>12</sup> Quality of life is

assessed to identify the number of health-related problems that are affecting the life of a patient. Also helps in identifying the impact of long-term manifestations of some diseases on patients' lives. Long term manifestations of some diseases can be overlooked or ignored without quality-of-life assessment.<sup>2,6,7</sup>

The joint pain, stiffness and discomfort significantly causes impairment of activities which leads to affecting quality of life to a remarkable level post chikungunya. Quality of life is a very subjective thing.<sup>5,6</sup> Person's perception, expectations and coping strategies towards health can largely influence quality of life outcome measure. People with same presentation may adapt to different coping strategies and that can positively or negatively influence quality of life.<sup>6</sup>

Debilitating joint pain and musculoskeletal stiffness following the chikungunya are predominantly thought to be a cause of physical impairment.<sup>13</sup> And severely affects quality of life following chikungunya. It not only affects physical but chronic manifestation distress post chikungunya patients emotionally also. People having chronic sequelae of post chikungunya symptoms suffer with pain and impairing physically and emotionally.<sup>5,16</sup>

Patients with chronic manifestations of arthralgia and stiffness that affect their daily living as well as life of family.<sup>7</sup> In 2006 outbreak of chikungunya in India 25588 cases with an overall burden of 45.26 disability adjusted years per million people. Among that arthralgia counted for 69 % of the total disability adjusted years.<sup>9</sup>

Few studies have described the evolution of joint pain and stiffness among patients with chikungunya and there is minimum literature on impact of joint pain and stiffness on quality of life in post chikungunya patients in Gujarat, India.<sup>3,5,7,9,10</sup> Hence, the purpose of the study was to estimate the impact of joint pain and stiffness on the quality of life among post chikungunya patients.

**Aim:**

To evaluate the impact of joint pain and stiffness on the quality of life among post chikungunya patients

**Literature Review:**

1. **Gianandrea Borgherini et al. (2006)** conducted a study on 88 subjects of chikungunya to identify persistent arthralgia adult patients with laboratory confirmed acute chikungunya were taken in the study. Patients were assessed after the mean of 18 months from acute phase by using questions on a standard form, undergoing a medical examination, and being tested for the presence of IgM antibodies to chikungunya virus. 63.3% patients were reported with persistent arthralgia associated with chikungunya and half of the patients had joint pain with negative impact on activity of daily living. Arthralgia was polyarticular and there was continuous pain in 31 subjects.<sup>8</sup>
2. **Catherine Marimoutou et al. (2012)** conducted a retrospective cohort study to assess quality of life and morbidity rate after 30 months of chikungunya. They collected information about socio demographic background, clinical symptoms, and quality of life was assessed using short form- 36 (MOS-SF36). They observed that the main complaint was, joint pain, stiffness, swelling, fatigue and limitations in activity of daily living. Both the components of quality of life were found to be impaired. They concluded that there is long term impact of chikungunya on physical and emotional component of quality of life on reunion island in patients affected in 2006.<sup>20</sup>

3. A systematic review and meta-analysis were done by **Alaa Badawi et al. (2018)** on prevalence of comorbidities in chikungunya. Meta-analysis of 11 articles was performed to evaluate the prevalence of chikungunya comorbidities and stratify severity of it. They found that among 2773 chikungunya patients' hypertension was the most prevalent comorbidity following diabetes, cardiac diseases, and asthma. All the diseases lead to severe chikungunya manifestations. Diabetes can predispose patient for high risk of severe infection.<sup>26</sup>
4. A prospective epidemiological study was done by **Brieg Couzigou et al. (2019)** on 509 chikungunya diagnosed patients by physicians. They were assessed for acute clinical signs and symptoms. All patients were followed up after 3 or more months by phone call. They were asked for clinical symptoms, ongoing treatment, and quality of life. Out of 509 subjects 200 subjects had chronic stage presentation. Amongst them 98.5% still experience pain, 84.3% has joint pain, 21.2 % woke up with pain, 47.2% were depressed/ anxious, daily activity was affected in 55.8% and work was affected in 36.2% subjects.<sup>28</sup>
5. **Claire J. Heath et al. (2021)** conducted cross-sectional cohort study on 240 post chikungunya patients to identify the risk factor for chronic chikungunya arthralgia in Grenada, West Indies. They administered different questionnaires to assess demographic, behavioural, psychological, social, and environmental factors to identify associations with chronic disease and also physical examination was performed and persistent symptoms were noted. Results showed that female gender and age has association with chronic joint pain and are predictors of chronic joint pain post chikungunya. Long duration of acute phase symptoms also leads to more severe chronic presentation.<sup>34</sup>

**Methodology:**

**Study site:** Vadodara District

**Study Population:** Post chikungunya patients reside in Vadodara District.

**Sample Size:** The sample size was 174.

**Type of Sampling:** Convenient sampling

**Study Duration:** The study was conducted from February 2020 to December 2021.

**Study Design:** A cross-sectional study

**Inclusion Criteria:**

- Age group: 18 - 45 years
- Both males and females
- Post chikungunya patients with a duration between three months to one year

**Exclusion Criteria:**

- A person with any congenital / acquired musculoskeletal deformity, neurological or cardio-pulmonary conditions, other pathological conditions like rheumatoid arthritis, ankylosis spondylitis, tumor, osteomyelitis.
- History of trauma within one year
- Those who are not able to understand command & not willing to participate in the study.

**Outcome Measures:**

- **Musculoskeletal stiffness questionnaire**

The musculoskeletal questionnaire is used to evaluate musculoskeletal stiffness and also its impact on physical and psychological health.

- **Patient-Reported Arthralgia Inventory (PRAI)**

The patient reported arthralgia inventory is the questionnaire to assess the severity of joint pain in the lower and upper extremity joints.

- **Short-form – 36 (SF-36)**

Short form – 36 is a health-related quality of life questionnaire to assess the quality of life.

**Materials used in the study:**

- Pen, Pencil
- Goniometer
- Consent form & Assessment form
- Patient information sheet

**Method:**

Ethical clearance was obtained from the Institutional Ethical Committee of BITSP, Vadodara prior to the study. The whole procedure of the study was explained to all the subjects and a patient information sheet was given to participants. A written informed consent of all the subjects were taken prior to the study. The 174 post chikungunya subjects of the Vadodara district who were fulfilling the inclusion criteria, willing to participate and had signed the inform consent were included in the study. All the post chikungunya patients were assessed regarding demographic details, pain & mobility. Joint stiffness was assessed by filling “Musculoskeletal stiffness questionnaire”, joint pain was assessed by filling “Patient-reported arthralgia inventory” and quality of life was assessed by filling “Short form – 36”. All three questionnaires for all subjects were filled in by the investigator.

**Statistical Analysis:**

Descriptive statistics are presented as Qualitative data as frequency/percentage, quantitative data as mean and standard deviation (SD) with 95% confidence interval (CI) for normative distribution or median and inter quartile range (IQR) for non- normative distribution of data.

**Result:**

**Gender Distribution:**

Gender	Number of Participants
Male	76
Female	98
Total	174

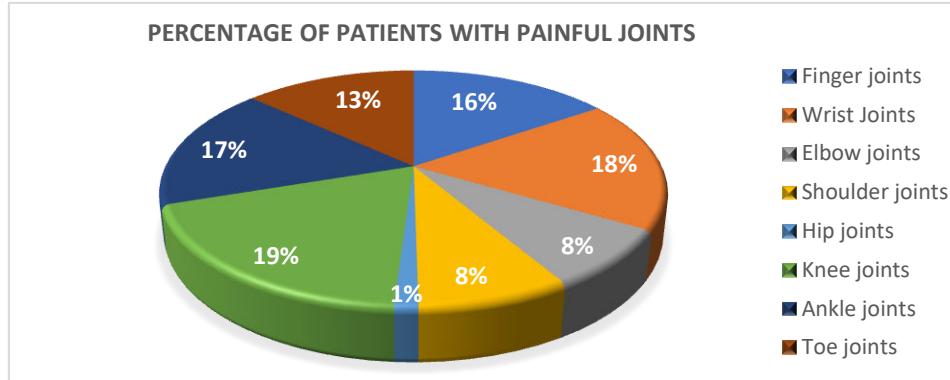
Table 1: Gender distribution among Post chikungunya patients

**Age Distribution:**

<b>Total No. of participants</b>	<b>Mean Age</b>	<b>SD</b>
174	41.71	11.21

**Table 2: Age distribution among Post chikungunya patients**

**PRAI Painful Joints and Pain Intensity:**



**Figure 1: Percentage of painful joints Post chikungunya.**

Joint	Finger joints	Wrist Joints	Elbow joints	Shoulder joints	Hip joints	Knee joints	Ankle joints	Toe joints
<b>Percentage</b>	50.5	57.4	21.2	19.5	3.4	55.1	56.3	42.5

**Table 3: Percentage of bilateral joint involvement in Post chikungunya patients.**

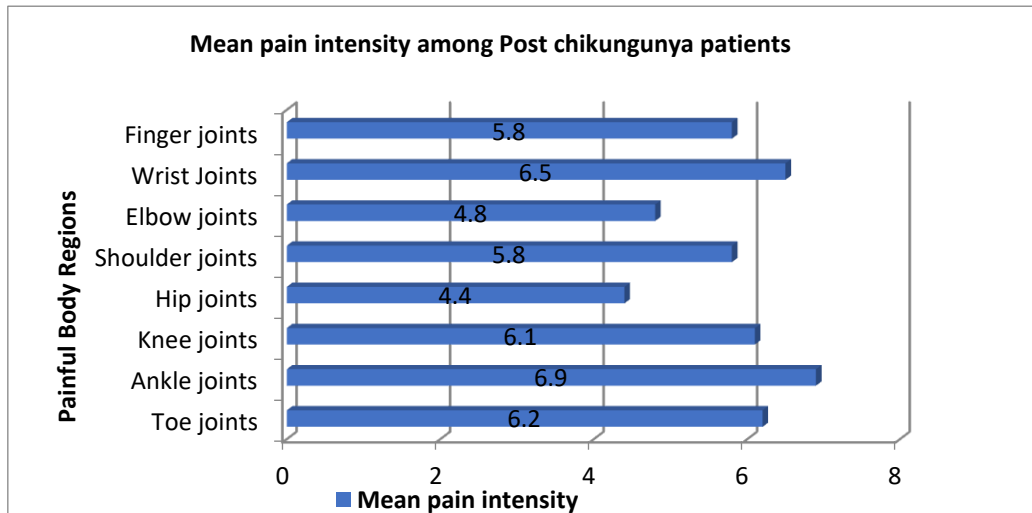
Joint	Percentage of Participants with Joint Pain
Left Fingers	51.7
Right Fingers	51.7
Left Wrist	57.4
Right Wrist	63.2
Left Elbow	25.2
Right Elbow	28.1
Left Shoulder	23.5
Right Shoulder	31.6
Left Hip	3.4
Right Hip	5.1
Left Knee	58.6
Right Knee	67.2
Left Ankle	56.8
Right Ankle	56.3
Left Toes	43.6
Right Toes	44.8

**Table 4: Percentage of joint pain in Post chikungunya patients**

Joint	Mean Pain Intensity
-------	---------------------

Left Fingers	5.8
Right Fingers	5.8
Left Wrist	6.5
Right Wrist	6.5
Left Elbow	4.6
Right Elbow	5.1
Left Shoulder	5.8
Right Shoulder	5.8
Left Hip	4.5
Right Hip	4.3
Left Knee	6
Right Knee	6.2
Left Ankle	7
Right Ankle	6.9
Left Toes	6.3
Right Toes	6.2

**Table 5: Mean pain intensity in different body areas among Post chikungunya patients.**



**Figure 2: Mean pain intensity in different painful area among Post chikungunya patients**

### Musculoskeletal Stiffness Questionnaire

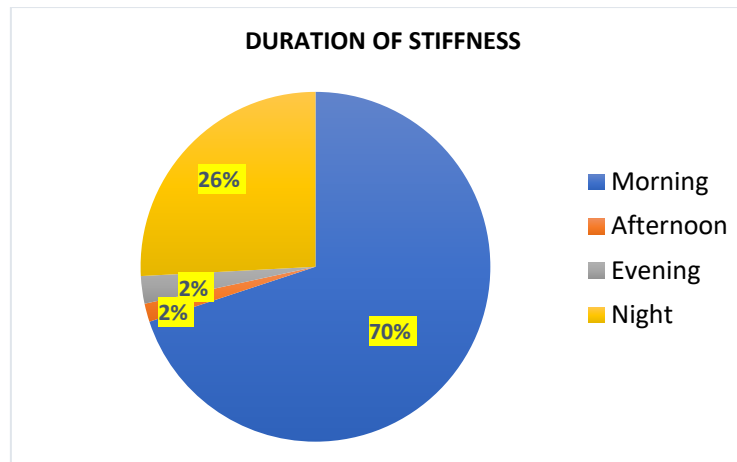


Figure 3: Duration of stiffness in post chikungunya patients.

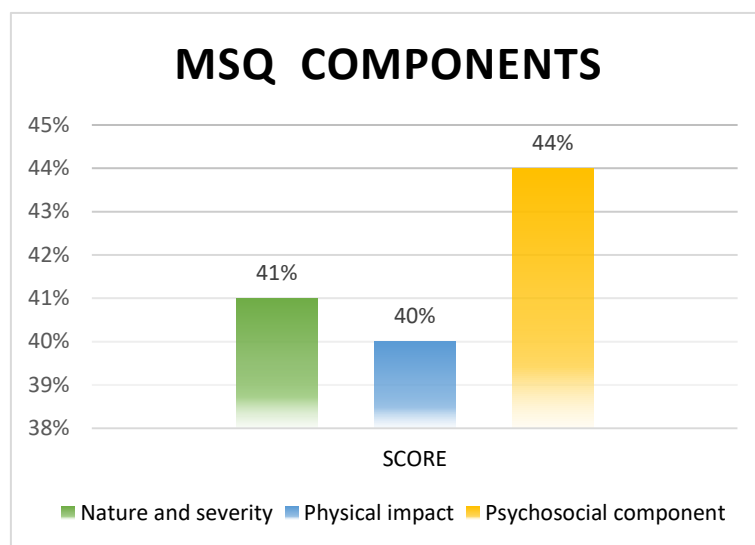
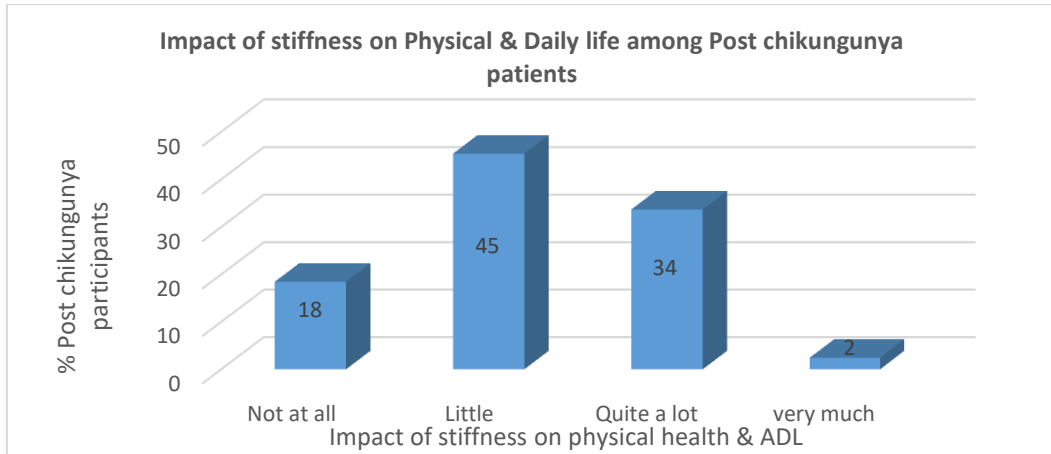


Figure 4: Affection in different components of the musculoskeletal stiffness questionnaire

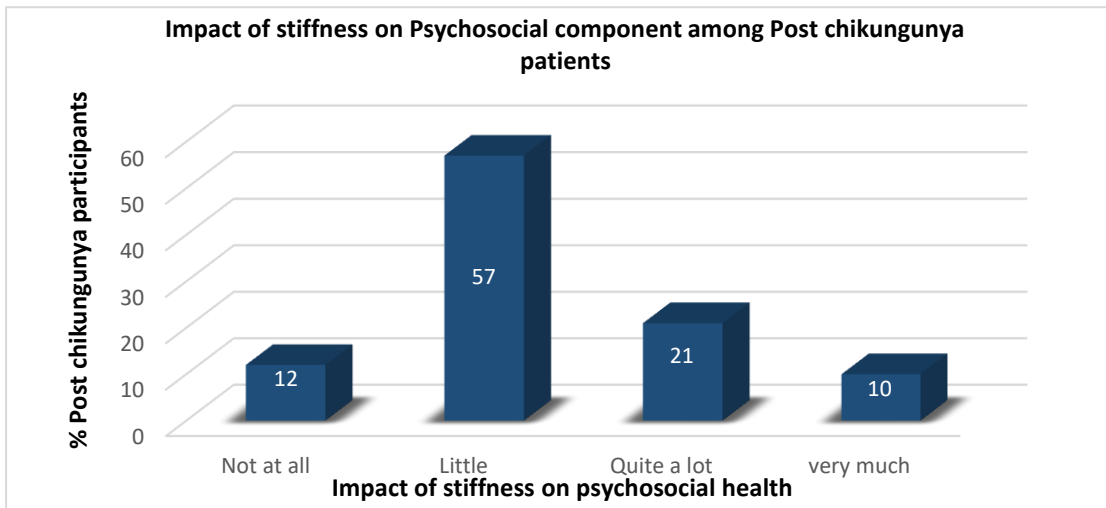
Musculoskeletal stiffness and physical health:





**Figure 5: Impact of musculoskeletal stiffness on physical health & daily life.**

**Musculoskeletal stiffness and Psychosocial component:**



**Figure 6: Impact of musculoskeletal stiffness on psychosocial health**

**Quality Of Life in Post Chikungunya Patients:**

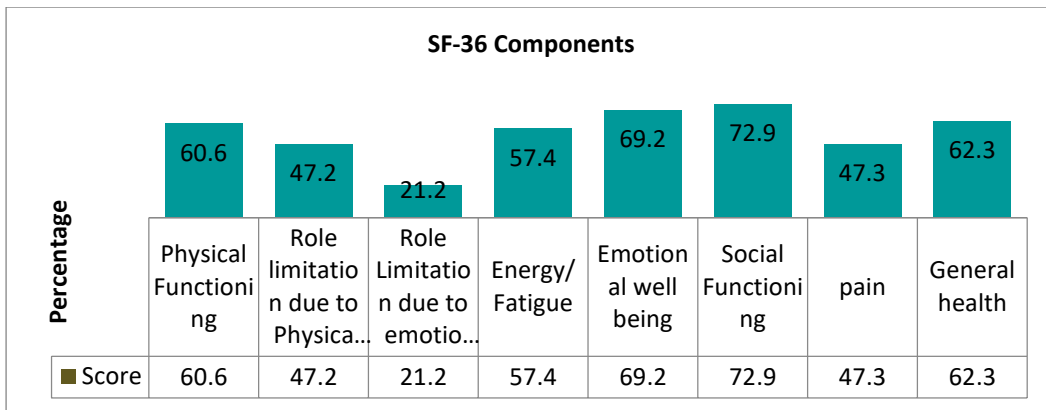


Figure 7: Affection of quality of life in eight domains of SF-36 post chikungunya.

**Discussion:**

The results of the study “Impact of joint pain and stiffness on quality of life among post chikungunya patients in Vadodara District” are discussed here. Among the 174 post chikungunya participants 43.7 % were male participants and 56.3 % were female participants with the mean age of 41.7 years and standard deviation of 11.21.

**Joint pain among post chikungunya patients using Patient Reported Arthralgia Inventory (PRAI):**

Joint pain in post chikungunya patients were assessed using patient reported arthralgia inventory. Sixteen upper and lower body joint pain intensity was assessed using 0 -10 scale. It was found from the results that 6.8 % participants had one joint affection, 13.7 % had two joint affection, 4.5 % had three joint affection and 74.4 % had more than three joint affection. Similarly, after 15 months follow up post chikungunya out of 147 participants 76 % had the persistent arthralgia in more than 4 joints in Reunion Island.<sup>34</sup> A study done by Gianandrea Borgherini et al. on 88 adult post chikungunya patients after 18 months follow up 63.8 % participants experienced persistence of arthralgia.<sup>8</sup>

Many literatures suggest that chronification of chikungunya leads to persistent joint pain.<sup>8,12</sup> Reason for the chronification is not well known. But the persistence of high antibody titers against CHIKV in the synovial fluid of affected joint, genetic predisposition, autoimmune disease induction, tissue damage caused by virus or exacerbation of pre-existing joint disease can be the cause.<sup>17,18</sup> At 6 months after chikungunya 97 % of French chikungunya patients had the joints symptoms affecting quality of life.<sup>36</sup>

Knee was the most painful joint reported by 19% of the participants followed by wrist joint by 18 % of participants, ankle joints by 17 % of participants, finger joints by 16 % of participants, toe joints by 13 % of participants, shoulder joints by 8 % of participants, elbow joints by 8 % of participants and hip joints was the least painful joint reported by 1 % of participants.

Our findings are comparable to observation study done by V. Ramachandran and co-workers in Chennai India, they found that knee was the most affected joint followed by wrist (80%), ankle (77%), fingers (77%), toes (72 %), shoulder (4%), elbow (2 %) \$ hip (3.2 %) and were painful. They also found the multiple joint involvement in post chikungunya patients.<sup>7</sup>

Results revealed that most of the post chikungunya patients had multiple joint involvement, and some had bilateral joint involvement also. Among 174 post chikungunya participants 57.4 % participants reported bilateral Wrist joint affection followed by Ankle joint which was 56.3 %, Knee joints were 55.1 %, Fingers joints were 50.5 %, Toe joints were 42.5 %, Elbow joints were 21.2 %, Shoulder joints were 19.5% and Hip joints were 3.4 % least bilaterally affected. Chronic phase of chikungunya disease manifests with musculoskeletal pain and polyarticular

involvement, commonly affecting bilaterally which will last months to years after acute phase of chikungunya.<sup>37,38</sup>

Individual side right and left joint pain was reported 67.2% in right side knee pain followed by 63.2% right side wrist, 58.6 left side knee, 57.4% left side wrist, 56.8% left side ankle, 56.3% right side ankle, 51.7 % left and right-side fingers, 44.8 % right side toes, 43.6 % left side toes, 28.1 % right side elbow, 25.2 % left side elbow, 5.1 % right side hip and 3.4 % left side hip which was least affected.

The mean pain intensity using PRAI was 7 in Left ankle joint, 6.9 in right ankle joint, 6.5 in left & right wrist joint were reported highest painful joints followed by knee joints, shoulder joints & fingers. Hip joints were reported to be the lowest painful regions.

Joint pain severity varies in duration but pain was persistent.<sup>39</sup> Age at the time of acute infection of CHIKV was also a important predictor of persistent arthralgia.<sup>34</sup> Yee Suan Poo and co-workers work on immune factors responsible for controlling acute and chronic chikungunya virus infection suggest that a persistent viraemia in different B cell deficient mouse strains, also as persistent viral RNA in wild-type mice and other than from antibodies, some immune factors such as CD4 T cells and TNF, are active in viraemia control. Persistent arthralgia can be due to the persistent, replicating and transcriptionally active chikungunya virus RNA.<sup>40</sup>

#### **Musculoskeletal stiffness among post chikungunya patients using Musculoskeletal Stiffness Questionnaire (MSQ):**

Musculoskeletal stiffness amongst post chikungunya patients were assessed using a musculoskeletal stiffness questionnaire. It assesses the nature and severity of stiffness, impact of stiffness on physical domain and impact of stiffness on psychosocial component. Nature and severity component consists of 8 questions asking about stiffness and its severity in the past 7 days. The first question asks about the duration of stiffness. 70 % participants experienced stiffness in the morning, 26 % experienced stiffness in the night, 2 % experienced in the evening and 2 % experienced in the afternoon.

Joint stiffness was experienced by most of the participants. 55.7 % participants experienced stiffness in many of their joints and 44.2 % had experienced stiffness in few of their joints. Over the past 7 days 58.6 % of participants experienced little stiffness after immobility, 24.1 % experienced quite a lot of stiffness and 17.2 % experienced stiffness very much. In 45.4 % participants stiffness was experienced for 30 minutes to an hour, in 45.4 % stiffness was experienced for less than 30 minutes, in 5.7 % stiffness was experienced 1-2 hours and 3.4 % stiffness was experienced more than 4 hours but less than a day. Overall nature and severity of stiffness was found to be 41 %. Along with the stiffness arthralgia tend to be more intense in the morning and during physical activities.<sup>37</sup>

Impact of stiffness on physical health was found to be 40 % according to the physical domain of musculoskeletal health questionnaire. Physical domain has the 8 questions which are about physical tasks like dressing, washing, responsibilities, activity of daily living, fine movement, gripping and balance. In the physical domain about 2 % participants had very much difficulty in physical and daily living, 34 % had quite a lot of difficulty, 45 % had a little difficulty and 18 % had experienced no difficulty.

Impact of stiffness on the psychosocial component was found to be 44 % according to the psychosocial component of musculoskeletal stiffness questionnaire. Psychosocial component consists of 5 questions about worries, frustration, concern and change in behaviour due to stiffness. 12 % had impact of stiffness on psychosocial component, 57 % had little impact of stiffness on psychosocial component, 21 % had quite a lot of impact on psychosocial component and 10 % had very much impact of stiffness on psychosocial component.

A study by Hugh Watson on stiffness and joint pain in chronic chikungunya disease using a musculoskeletal stiffness questionnaire reveals that arthralgia and musculoskeletal stiffness were the prominent symptoms in chronic chikungunya disease. Between 30 – 73 % had the impact of stiffness on each of the physical activities in the physical impact domain of musculoskeletal stiffness questionnaire and 73 % were having at least one psychosocial impact according to the psychosocial component domain of musculoskeletal stiffness questionnaire. While most affected activities were getting out of bed, balancing and walking.<sup>12</sup>

C. Marimoutou et al. evaluated quality of life after 6 years of chikungunya they found that stiffness was a prominent symptom with three times more experienced by chikungunya positive patients than the chikungunya negative patients and was affecting quality of life. Also, fatigue, headache and depressive mood was reported 34 %, 20 % and 7 % respectively.<sup>41</sup>

### **Quality of life in post chikungunya patients using short form – 36:**

Quality of life post chikungunya was assessed using a short form – 36 questionnaires. It has eight domains which are: physical functioning, role limitation due to physical health, role limitations due to emotional problems, energy/fatigue, emotional wellbeing, social functioning, pain, and general health.

In the study result, physical functioning was found to be 60.6 % post chikungunya. The physical functioning domain consists of 10 questions about vigorous physical activities, moderate activities, lifting, stair climbing, bending, kneeling, stooping, walking, bathing, and dressing. Role limitations due to physical health domain consist of 4 questions about the limitations in work or other activities and difficulty in carrying activities or work. It was found to be 47.2 % in post chikungunya. Persistent joint pain and stiffness associated with chronic presentation led to notable physical incapacity and so affecting the quality of life and limiting the person's work efficiency.<sup>42</sup>

Role limitation due to emotional problem domain consist of 3 questions asking details about change in work or activity duration and change in way of doing activities. It was found to be 21.2 % in chikungunya. Emotional well-being domain consists of 5 questions asking about feeling of nervousness, calmness & peacefulness, downheartedness, and tiredness. It was found to be 69.2 % in chikungunya. Suffering due to joint pain and stiffness limits person from achieving desired level of activity and work.<sup>42</sup> Which leads to frustration, mood alteration, sleep disturbances and behavioral changes.<sup>42</sup>

Energy/fatigue domain consists of 4 questions asking about the level of energy and fatigue experienced. It was found to be 57.4 % in chikungunya. In retrospective cohort of 199 subjects Man-Koumba Soumahoro et al. observed fatigue in 71 subjects after 17 months of acute presentation.<sup>43</sup>

Social functioning domain consists of 2 questions asking about interference of physical or emotional health in social activities with friends and family. It was found to be 72.9 % in chikungunya.

Pain domain consists of 2 questions asking about bodily pain experience during work and different activities during the last 4 weeks. Pain was found to be 47.2 % in chikungunya.

General health domain consists of 5 questions asking about general health conditions and its perception. It was found to be 63.3% in chikungunya.

Difficulty in walking, handling objects and gripping difficulties makes patients more dependent and affects one's mental health.<sup>44</sup> Polyarthralgia and a musculoskeletal pain for prolonged duration after chikungunya and its interference with work and activity of daily living affects the patient's quality of life remarkably.<sup>37</sup>

The SF – 36 questionnaires evaluated the physical domain to be significantly affected with common symptoms like arthralgia, sleep disturbance, fatigue and depression.<sup>44</sup> Duration of

recovery also had an accountable impact on the quality-of-life score. More the duration of recovery lesser the quality-of-life score and lesser the duration of recovery higher the quality-of-life score.<sup>45</sup> Clinical recovery is faster but cannot be correlated with the normal quality of life as persistence of symptoms hampers quality of life till longer duration.<sup>21</sup>

Catherine Marimoutou and co-workers' study of quality of life after 30 months of chikungunya infection using SF-36 in reunion island found that there was significant reduction in quality-of-life score of physical as well as emotional domain of SF – 36 in chikungunya positive subjects than the chikungunya negative subjects.<sup>20</sup>

After 36 weeks post chikungunya Schilte et al. found that 62.9 % were having difficulty in lifting themselves from sit to stand, 54.8 % were having difficulty in picking up objects, 54.8 % were having difficulty in walking 53.2 % had difficulty opening containers, 37.1 % were having difficulty in bathing. Also found that it was not limited to pain, patients were also facing mental, mood and sleep disorders. Emotional problems leading to 56.4 % sleep disorders, 50 % depression and 38.7 % concentration disorders.<sup>42</sup>

This study had few limitations. Due to the covid -19 pandemic situation we were not able to take a systemic clinical examination of the patients including a detailed range of motion examination. Study lacks the long term follow up after 12 months of chikungunya. The patients were taken between 3 months to 12 months duration post chikungunya. We were able to take subjects who directly and indirectly encountered us. As there was no database access to all chikungunya patients in Vadodara district.

The study has its limitations, but future studies can be performed covering larger geographical areas to have a more accurate idea about chronic presentation of chikungunya and its impact on one's quality of life and daily living activities. Also, it can be done with larger sample size according to occurrence of disease and long term follow up should be taken to see the progression.

### **Conclusion:**

There was significant persistence of arthralgia among the post chikungunya patients with involvement of multiple joints and bilateral involvement. Along with the polyarthralgia musculoskeletal stiffness was also prominent particularly in the morning which leads to disturbance of sleep, frustration and depression lowering the quality of life. A proper intervention program should be designed to reduce pain and stiffness among post chikungunya patients, thereby improving their quality of life.

### **Clinical Implications:**

From the study's result these symptoms affect one's quality of life along with physical health, activities of daily living and emotional wellbeing were also affected. Hence, rehabilitation programs should be designed to target stiffness & joint pain and to improve functional activity & quality of life. Energy conservation techniques should be taught. Proper psychological counselling should be provided.

### **Bibliography**

1. Madariaga M, Ticonab E, Resurrecion C. Chikungunya: bending over the Americas and the rest of the world. *Braz J Infect Dis*. 2016;20(1):91-98
2. Ramachandran V, Kaur P, Kanagasabai K, Vadivoo S, Murhekar M V. Persistent arthralgia among Chikungunya patients and associated risk factors in Chennai, South India. *J Postgrad Med* 2014;60:3-6
3. Borgherini G, Poubeau P, Jossaume A, Goux A, Cotte L, Michault A, et al. Persistent arthralgia associated with chikungunya virus: A study of 88 adult patients on Reunion Island. *Clin Infect Dis* 2008;47:469-75.
4. Couturier E, Guillemin F, Mura M, Léon L, Virion J, Letort M, et al. Impaired quality of life after chikungunya virus infection. *Rheumatology* 2012;51:1315-1322
5. Soumahoro M, Rardin P, Boëlle P, Perrau J, Fianu A, Pouchot J, et al. Impact of chikungunya virus infection on health status and quality of life: a retrospective cohort study. *PLoS ONE* 2009;11(4): e7800.
6. De-Araujo Ben-Hur James Maciel, Hazime Patricia Bueno Nestarez, Galeno Francisca Joyce Vasconcelos, Candeira Laís Nascimento, Sampaio Mayare Fortes, Hazime Fuad Ahmad. Clinical manifestations in patients with musculoskeletal pain post-chikungunya. *BrJP* 2019; 2 (4): 326-330
7. Watson H, Tritsch SR, Encinales L, Cadena A, Cure C, Ramirez AP, Mendoza AR, Chang AY. Stiffness, pain, and joint counts in chronic chikungunya disease: relevance to disability and quality of life. *Clin Rheumatol*. 2020 May;39(5):1679-1686
8. Couturier E, Guillemin F, Mura M, Léon L, Virion JM, Letort MJ, De Valk H, Simon F, Vaillant V. Impaired quality of life after chikungunya virus infection: a 2-year follow-up study. *Rheumatology (Oxford)*. 2012 Jul;51(7):1315-22.
9. Castel LD, Wallston KA, Saville BR, Alvarez JR, Shields BD, Feurer ID, Cella D. Validity and reliability of the Patient-Reported Arthralgia Inventory: validation of a newly-developed survey instrument to measure arthralgia. *Patient Relat Outcome Meas*. 2015 Jul 28;6:205-14.
10. Brazier JE, Harper R, Jones NM, O'Cathain A, Thomas KJ, Usherwood T, Westlake L. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ*. 1992;305(6846):160-4.
11. Chopra A, Anuradha V, Lagoo-Joshi V, Kunjir V, Salvi S, Saluja M. Chikungunya virus aches and pains: an emerging challenge. *Arthritis Rheum*. 2008;58(9):2921-2.
12. de Andrade, D.C., Jean, S., Clavelou, P. et al. Chronic pain associated with the Chikungunya Fever: long lasting burden of an acute illness. *BMC Infect Dis* 2010;10 (31)
13. Balasubramaniam SM, Krishnakumar J, Stephen T, Gaur R, Appavoo N. Prevalence of chikungunya in urban field practice area of a private medical college, Chennai. *Indian J Community Med*. 2011 Apr;36(2):124-7.
14. Marimoutou C, Vivier E, Oliver M, Boutin JP, Simon F. Morbidity and impaired quality of life 30 months after chikungunya infection: comparative cohort of infected and uninfected French military policemen in Reunion Island. *Medicine (Baltimore)*. 2012 Jul;91(4):212-219.
15. Ramachandran V, Malaisamy M, Ponnaiah M, Kaliaperuam K, Vadivoo S, Gupte MD. Impact of Chikungunya on Health Related Quality of Life Chennai, South India. *PLoS ONE* 2012;7(12): e51519.
16. Huits R, De Kort J, Van Den Berg R, Chong L, Tsoumanis A, Eggermont K, Bartholomeeusen K, Ariën KK, Jacobs J, Van Esbroeck M, Bottieau E, Cnops L. 2 clinical features and predictors of post-chikungunya chronic polyarthralgia. *PLoS One*. 2018;13(4):e0196630.
17. Miner, Jonathan J et al. "Chikungunya viral arthritis in the United States: a mimic of seronegative rheumatoid arthritis." *Arthritis & rheumatology* 2015; 67(5) : 1214-1220.



18. *Elsinga J, Grobusch MP, Tami A, Gerstenbluth I, Bailey A. Health-related impact on quality of life and coping strategies for chikungunya: A qualitative study in Curaçao. PLoSNegl Trop Dis. 2017;11(10):e0005987.*
19. *An W, Ge N, Cao Y, Sun J, Jin X. Recent progress on chikungunya virus research. Virol Sin. 2017;32(6):441-453.*
20. *Badawi A, Ryoo SG, Vasileva D, Yaghoubi S. Prevalence of chronic comorbidities in chikungunya: A systematic review and meta-analysis. Int J Infect Dis. 2018;67:107-113.*
21. *Duvignaud, A., et al. "Rheumatism and Chronic Fatigue, the Two Facets of Post-Chikungunya Disease: the TELECHIK Cohort Study on Reunion Island." Epidemiology and Infection, 2018; 146 (5): 633–641.*
22. *Couzigou B, Criquet-Hayot A, Javelle E, et al. Occurrence of Chronic Stage Chikungunya in the General Population of Martinique during the First 2014 Epidemic: A Prospective Epidemiological Study. The American Journal of Tropical Medicine and Hygiene. 2018;99(1):182-190.*
23. *Mehdi Z, Shahbaz H, Owais A, et al. Frequency, Awareness, and Symptoms of Chikungunya Among Patients in a Tertiary Care Hospital of Karachi: A Cross-Sectional Study. Cureus. 2019;11(2):e4054.*
24. *Levi LI, Vignuzzi M. Arthritogenic Alphaviruses: A Worldwide Emerging Threat? Microorganisms. 2019;7(5):133.*
25. *Watson H, Tritsch S, Encinales L, et al musculoskeletal stiffness in chikungunya disease: distinct from pain and relevant to quality of life Annals of the Rheumatic Diseases 2019;78:1324-1325.*
26. *de Moraes L et al. A clinical scoring system to predict long-term arthralgia in Chikungunya disease: A cohort study. PLoSNegl Trop Dis. 2020;21;14(7):e0008467.*
27. *Watson, H, Lynggård Hansen, A, Calusi, G, Bartels, LE. Musculoskeletal stiffness is common in healthy adults and increases with age. Musculoskeletal Care. 2021; 19: 3– 8.*
28. *Heath CJ, Lowther J, Noël TP, Mark-George I, Boothroyd DB, Mitchell G, MacPherson C, Desiree LaBeaud A. The Identification of Risk Factors for Chronic Chikungunya Arthralgia in Grenada, West Indies: A Cross-Sectional Cohort Study. Open Forum Infect Dis. 2018 Jan 3;5(1):ofx234.*
29. *Sissoko D, Malvy D, Ezzedine K, Renault P, Moscetti F, Ledrans M, Pierre V. Post-epidemic Chikungunya disease on Reunion Island: course of rheumatic manifestations and associated factors over a 15-month period. PLoSNegl Trop Dis. 2009;3(3):e389.*
30. *Queyriaux B, Simon F, Grandadam M, Michel R, Tolou H, Boutin JP. Clinical burden of chikungunya virus infection. Lancet Infect Dis. 2008 Jan;8(1):2-3.*
31. *Sales GMPG, Barbosa ICP, Canejo Neta LMS, Melo PL, Leitão RA, Melo HMA. Treatment of chikungunya chronic arthritis: A systematic review. Rev Assoc Med Bras (1992). 2018 Jan;64(1):63-70.*
32. *Ribeiro, AileciramMonialy Barros Marinho et al. Physiotherapeutic approach on the late phase of chikungunya: a case report. Revista Brasileira de Saúde Materno Infantil [online]. 2016,16 (1), S51-S56.*
33. *Yergolkar PN, Tandale BV, Arankalle VA, et al. Chikungunya Outbreaks Caused by African Genotype, India. Emerging Infectious Diseases. 2006;12(10):1580-1583.*
34. *Poo YS, Rudd PA et al. Multiple immune factors are involved in controlling acute and chronic chikungunya virus infection. PLoSNegl Trop Dis. 2014 Dec 4;8(12):e3354.*
35. *Marimoutou, Catherine & Ferraro, J. & Javelle, Emilie & Deparis, Xavier & Simon, François. (2015). Chikungunya Infection: Self-Reported Rheumatic Morbidity and Impaired Quality of Life Persist 6 Years Later. Clinical Microbiology and Infection. 21. 688-693.*
36. *Brito CAA, Marques CDL, Falcão MB, Cunha RVD, Simon F, Valadares LDA, Luz KG, Melo CFCAE, Albuquerque Filho DO, Brito MCM, Duarte ALBP. Update on the treatment of musculoskeletal manifestations in chikungunya fever: a guideline. Rev Soc Bras Med Trop. 2020;53:e20190517.*

37. Soumahoro MK, Gérardin P, Boëlle PY, Perrau J, Fianu A, Pouchot J, Malvy D, Flahault A, Favier F, Hanslik T. *Impact of Chikungunya virus infection on health status and quality of life: a retrospective cohort study. PLoS One. 2009; 11;4(11):e7800.*
38. Simon, Fabrice et al. "Chikungunya virus infection." *Current infectious disease reports 2011;13,3: 218-28.*
39. Couturier E, Guillemin F, Mura M, Léon L, Virion JM, Letort MJ, De Valk H, Simon F, Vaillant V. *Impaired quality of life after chikungunya virus infection: a 2-year follow-up study. Rheumatology (Oxford). 2012;51(7):1315-22.*