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AN OBSERVATIONAL STUDY EVALUATING THE IMPACT OF CHIKUNGUNYA VIRUS INFECTION ON ORAL CAVITY AND TEMPOROMANDIBULAR JOINT

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ABSTRACT

Over a past few years, a very limited number of studies researched whether the chikungunya virus affects the oral cavity in addition to pronounced symptoms in extremities but on literature review different studies were found to have different conclusions. Thus an Observational Study was conducted evaluating the impact of Chikungunya Virus Infection on Oral Cavity and Temporomandibular Joint. This was a cross sectional study having a self-designed questionnaire, descriptive and associative tests were run for Data analysis using SPSS. Out of 527 tested, 204 patients were found seropositive and 135 were selected for data analysis on their consent (N 135). Pain and burning sensation of mouth (71.1%), discomfort in mouth opening (65.9%), Bleeding gums (53.3%), and taste aversion (50.3%) were the most common complaints followed by Inability to chew food (48.1%), Discomfort in swallowing (35.5%), Halitosis (34.8%) and tenderness over TMJ (30.4%). The study significantly recorded pain, discomfort and bleeding gums intraorally. Pain, tenderness and decreased efficiency of temporomandibular joint were also noted.

Contribution/Originality: This study contributes in the existing literature of Chikungunya virus infection. Interval estimation statistical method is used. It is one of very few studies which have investigated impact of Chikungunya Virus Infection on Oral Cavity and Temporomandibular Joint and concluded it to be quite painful and uncomfortable to bear causing burning gums, limiting speech, decreased chewing ability, altering taste perception, TM-joint and muscles tenderness and difficulty in food swallowing.

1. INTRODUCTION

Chikungunya virus infection often results in severe fever, rash and debilitating poly-arthralgia lasting weeks to months [1, 2]. While arthralgia, pain in joints is the most consistent and debilitating symptom of CHIKV-induced disease, most commonly effecting distal extremities as well as ankles and metatarsophalangeal joints [2]. Researchers have also investigated the involvement of temporomandibular joint in oral cavity; not much literature is available in this regard. Oral cavity may show features, as indicative in this research, which may uphill towards more specific diagnosis for CHIKV-induced disease.

CHIKV is considered a neglected tropical disease, because it circulates within the subtropical and tropical regions, but it has the potential to affect more than 1 billion people [3]. Since 2005, major breakouts of chikungunya virus have occurred in India, Indonesia, Maldives, Myanmar and Thailand have reported over 1.9

million cases. In Pakistan, it was first reported at Lahore in 2011 during dengue outbreak [4] chikungunya shares some common clinical symptoms with dengue and zika virus therefore requires greater expertise in diagnosis and treatment. Dated recently, the disease took a flare up in November, 2016 affecting 30 000 people in the metropolis of Karachi [5].

Joints being the commonest victim of Chikungunya Virus infection presents as poly-arthralgia, extent of pain vary from weeks, months to years [1, 6]. Experiment and Research performed in 2015 by David W. Hawman hypothesized that increase in viral persistence, induction of autoimmune disease and exacerbation of pre-existing joint disease contributes to CHIKV-induced arthritis [7]. Like other body tissues, oral cavity appears to show some features such as bleeding gums, halitosis, difficulty in swallowing and mastication. A study evaluating the impact of CHIKV infection on oral health status conducted in India in year 2011 deduced that severe pain, bleeding gums and gingivitis along with discomfort in oral function was found in majority of cases affected by CHIKV [8]. The foremost concern is the involvement of musculoskeletal component of oral cavity; the temporomandibular joint is yet to be further experimented and researched. This study, based on observational survey, underscores the engrossment of TMJ and other oral features significant of CHIKV-induced infection.

2. MATERIAL AND METHOD

This study was aimed to evaluate the impact of CHIKV infection on oral cavity and temporomandibular joint via a survey conducted at different Hospitals and Health care centers, data was than collected from patients with due consent.

It was a cross sectional study, accompanied with a self-designed questionnaire run through a pilot study which encompassed clinical findings in oral cavity of patients with CHIKV and also its effect on temporomandibular joint. Patient's demographics were collected, past hospital records of infection treated or active were also squared.

In Karachi, Baldia town and Malir town has been reported as endemic areas, where during course of this study 527 patients were found to be admitted with suspected infection. On lab investigations 204 patients were diagnosed with CHIKV infection, among which 135 were selected as participants for this study with their consensus. Study was undertaken at Civil hospital, Sindh Government Hospital Malir, RHC Baldia town and few private health care centers from January 2017 to October 2017.

Patients screened for active disease showing confirmatory lab diagnosis of CHIKV infection with no concomitant systemic disease or illness were included in this study. All those patients not detected with active CHIKV infection were not included in this study.

After Data Collection, Descriptive and Association tests were used for Statistical analysis using SPSS-16.0.

Clinically, the Gold standard Test for diagnosis of CHIKV infected person is viral culture [9] other includes Enzyme-linked immunosorbent assay (ELISA) and real-time PCR (RT-PCR) [10, 11]. For the reason that endemic circumstances, small time window, lack of resources and funding's for clinical diagnosis in adjunct with the hospital's reports based on RT-PCR were also trusted and patients were considered positive based on reports confirmation.

3. RESULT

The study accompanied 135 patients diagnosed with CHIKV out of which 78 were male and 57 female. The age range from 13 to 61 years, patients of 15 to 30 years were mostly infected by virus as demonstrated in the pie graph (Figure, 1)

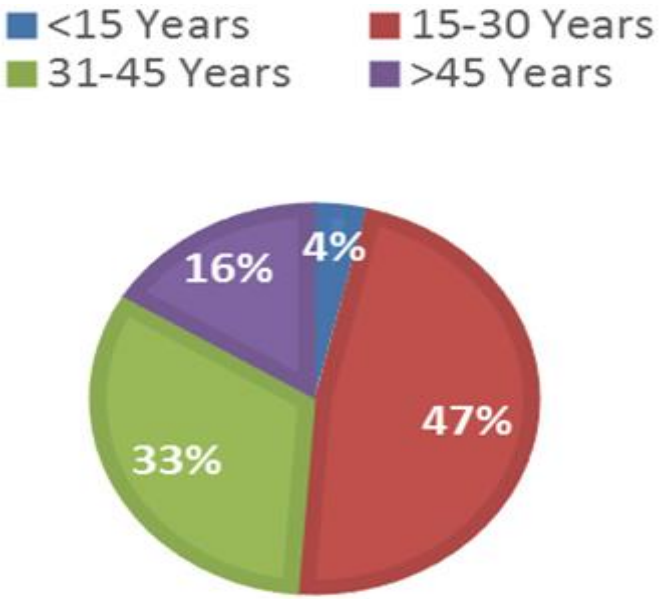

Figure-1. Patient's age groups.
Source: Self designed table generated by interpreting Data via SPSS 16.0

On analysis, more than 50% of patients' complaint of pain and burning sensation in oral cavity along with discomfort in mouth opening and bleeding gums. Some also reported taste aversion and inability to chew food. Less than 50% of affected candidates listed discomfort in swallowing and bad breath. The major finding was tenderness over temporomandibular joint reported by 30.4% of CHIKV infected patients. Very few (<10%) indicated mouth sores, excessive salivation, discharge from gums, grating sound from TMJ and loosening of teeth as an associated symptom (Table 1 and 2).

Table-1. Impact of Chikungunya on Oral Cavity

S.no	Clinical finding and Questioning	Number of positive patients out of 135.	Percentage
1.	Mouth sore	12	8.8%
2.	Bleeding in gums	72	53.3%
3.	Pain or Burning Sensation in mouth	96	71.1%
4.	Halitosis	47	34.8%
5.	Ulceration of Gums	21	15.5%
6.	Excess salivation	8	5.9%
7.	Distaste	68	50.3%
8.	Whitish Discharge from gums	3	2.2%
9.	Loosening of teeth	9	6.6%
10.	Discomfort in swallowing	48	35.5%

Source: Self designed table generated by interpreting Data via SPSS 16.0

Table-2. Impact of Chikungunya on Temporomandibular Joint

S.no	Clinical finding and Questioning	Number of positive patients out of 135.	Percentage
1	Do you feel any Pain or tenderness over TMJ area in or around your ear?	41	30.4%
2	Do you feel any Pain or discomfort while opening your mouth?	89	65.9%
3	Do you feel any Pain or inability while chewing?	65	48.1%
4	Do you feel any Pain or discomfort while speaking?	17	12.5%
5	Do you feel any Clicking or grating sound while opening or closing your mouth?	8	6.0%
6	Do you feel any swelling on sides of your face or ear area?	38	28.1%
7	Do you feel your teeth not properly fit together?	23	17.0%

Source: Self designed table generated by interpreting Data via SPSS 16.0

Data collected was interpreted and evaluated on the basis of age and gender to signify the findings in oral cavity during CHIKV infection. On the basis of age group, statistically it was established that pain and burning sensation was mainly reported by younger patients (78%) while symptoms like discomfort in mouth opening (72%), bleeding gums (59%), inability to chew (72%) and halitosis (45%) were found to increase proportionally with escalation in age.

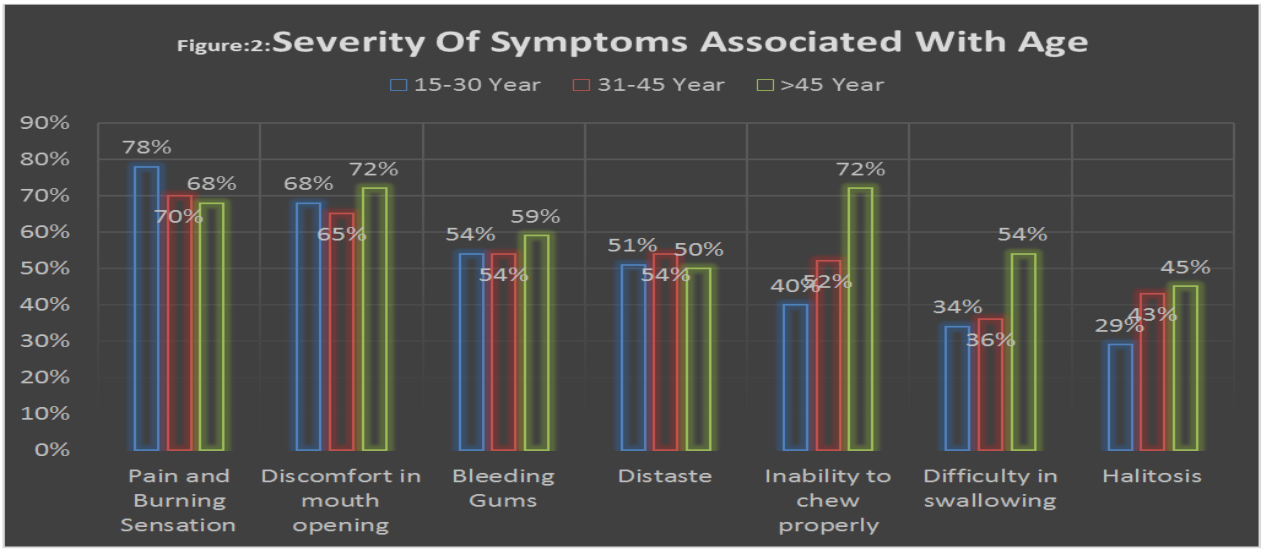

Figure-2. Severity of symptoms associated with age.

Source: Self designed chart generated by interpreting Data via SPSS 16.0

In the survey, 65.9% of Patients affected by chikungunya virus infection stated the significant symptoms associated with the Temporomandibular Joint, irrespective of age and gender, in chikungunya virus infected patients are pain and discomfort in oral cavity during chewing, tenderness over temporomandibular joint (30.4%) and swelling over TMJ area (28.1%) (Table 2).

On gender basis, 79% female patients complaint of pain and burning sensation in oral cavity and 72% reported discomfort in mouth opening compared to 65% of male pupil. No other significant gender predilection was found for other symptoms under investigation (Table: 3.) (Figure, 3)

Table-3. Symptoms association with Gender

	SYMPTOMS	Total Positive Patients out of 135	Males (n=78)	Females (n=57)
1	Pain and Burning Sensation	96	51 (65%)	45 (79%)
2	Discomfort in mouth opening	89	48 (61%)	41 (72%)
3	Bleeding Gums	72	42 (53%)	30 (52%)
4	Distaste	68	41 (52%)	27 (47%)
5	Inability to chew properly	65	39 (50%)	26 (45%)
6	Difficulty in swallowing	48	25 (32%)	23 (40%)
7	Halitosis	47	30 (38%)	17 (29%)

Source: Self designed table generated by interpreting Data via SPSS 16.0

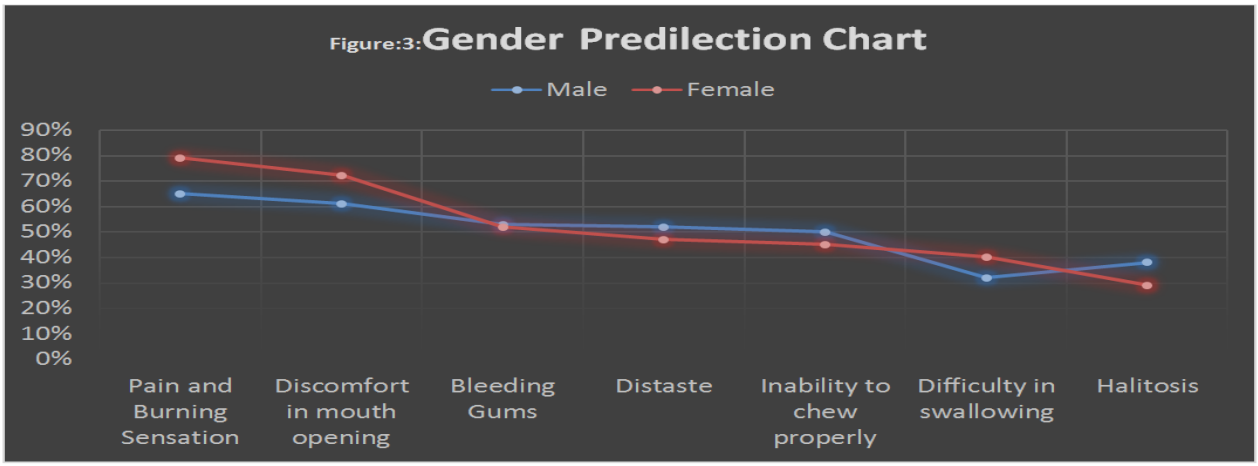

Figure-3. Genders predilection chart

Source: Self designed chart generated by interpreting Data via SPSS 16.0

4. DISCUSSION

Research and studies [1, 12-15] done in this regard mainly focused on joint infection and extremities involved in chikungunya virus infection, based on systemic, arthrological and classical signs and symptoms of chikungunya virus infection. Very few literatures were exclusively focused on impacts of CHIKV infection on oral health and temporomandibular joint [8].

This study aimed to correlate the oral findings and effects on temporomandibular joint with chikungunya virus infection so as to help understanding the nature of CHIKV Infection and for better diagnosis of disease even in Dental outpatient department. Actively diseased patients were identified and approached in Health care centers of major endemic areas and randomly chosen for data collection.

During the study, it was found that CHIKV infection affects a vast group of population from teens to adults ranging 13 to 61 years. However, around 47% of the patients fall in age range 15 to 30 years thus a leading population in mid-teens and young adults is infected. Other research articles [16, 17] also highlighted that pupil of 20 to 40 years or > 45 years [18] were also found to be infected.

On statistical analysis, a male female ratio was 1.3:1. In similar studies, the ratio was 2.3:1 [11] and 2.4:1 [18] showing male dominance. Contrary to this, other studies show female domination with ratio 0.9:1 [2, 8]. This difference in gender predominance can be due to socio-cultural diversity and difference in exposure indexes.

In this study, most prevailing intra oral symptom found in 71.1% of affected patients was pain and burning sensation along with less established ulceration of gums reported by 15.5% of patients indicating gingivitis. The laboratory findings show that patients with CHIKV viral fever have Lymphopenia (lymphocyte count, <1000 cells/mm^3), a very common finding, which can account for hemorrhagic findings [1, 18, 19].

Prevalence of bleeding gums was recorded to be 53.3% in this study, similar results were found in other studies [8, 18]. Mild thrombocytopenia during chikungunya virus infection can be a decent justification for bleeding gums [1, 18, 19].

Another noteworthy finding recorded during this study was taste aversion in 50.3% patients indicates strong association with chikungunya virus infection.

Discomfort in mouth opening in 59.9% patients, inability to chew food 48.1% and pain or tenderness over TMJ area were the major complaints involving oral cavity in the chikungunya virus infection related with TMJ arthralgia and myalgia. These symptoms signifies the arthralgic nature of CHKV affecting TMJ along with other joints of the body [20].

Halitosis was also an underlined complaint recorded in 34.8% of CHIKV affected group. This may be attributed to inability of patients to maintain oral hygiene when combatting infectious disease which then leads to debilitated gingival status thus bad breath [8].

Overall prevalence of inquired symptoms among diseased males and females was 50.1% Average-positivity rate in Males and 52% Average-positivity rate in females. While excruciating symptoms like intra-oral pain and burning sensations, pain or discomfort in mouth opening and food swallowing were found to be greater in females (79%, 72%, 40%) as compared to males (65%, 61%, 32%).

The Gold standard Test for diagnosis of CHIKV infected person is viral culture [9] but for this study because of endemic circumstances, small time window and lack of resources and funding's clinical diagnosis in adjunct with the hospital's reports based on RT-PCR were also trusted and patients were considered positive based on such reports confirmation.

5. CONCLUSION

Chikungunya virus infection has affected almost every continent of the world and is still dynamically involving and infecting millions of lives. The impact of chikungunya virus on patient's health is acutely painful and tremendously debilitating. Agony is that chikungunya virus infection is still medically unpreventable although the disease itself is self-limiting. Together with fever and joints pain in extremities it significantly involves Oral cavity and temporomandibular joint. Its impact on Oral health and TMJ is found to be quite painful and uncomfortable to bear causing burning gums, limiting speech, decreased chewing ability, altering taste perception, TM-joint and muscles tenderness and difficulty in food swallowing. Unfortunately very few exclusive studies have been done on chikungunya virus impact on oral health and Temporomandibular joint hence literature needs extensive studies and researches to help in understanding the pathological processes, pacifying the distresses and enhancing the treatment options.

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