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Clinical features of chikungunya infection in Sri Lanka

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PEER REVIEW

Peer reviewer

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Comments

This is a good study in which the author evaluated the clinical features of the outbreak systematically with statistical evidence. The results are new and interesting.
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ABSTRACT

Objective: To investigate the clinical features of chikungunya fever (CHIKF) outbreak in Sri Lanka in 2006 and to estimate the relative risk for CHIKF for various demographic factors.
Methods: A total of 885 individuals belonging to 200 families were studied individually for surveillance of this disease, symptoms, contraction order within the family and means of treatments. Relative risks for CHIKF for demographic characters such as gender, age and educational levels were estimated. The associations of symptoms with age and gender were also studied.
Results: The estimated surveillance of CHIKF in the studied population was 89.2%. The duration of suffering due to this disease was 50.9 d (95% *CI*, 47.3, 53.9 d) with fever for 3.9 d (95% *CI*, 3.7, 4.1 d). 93% of the CHIKF patients felt at least one type of joint pain and 8% felt joint swellings. Rash was observed in 15.1% of the patients. Buccal bleeding and mouth ulcer were observed in 1.5% and 9.3% respectively. About 22.7% of the CHIKF patients had vomiting. Female had 1.48 folder higher relative risk for CHIKF infection. The duration suffered due to CHIKF, duration of fever and contraction order within family were highly associated with age ($P<0.000$). Female patients had more than one folder higher relative risks for the symptoms such as rash, vomiting, buccal bleeding and mouth ulcer ($P<0.000$).
Conclusions: The surveillance of CHIKF in Sri Lanka was a severe outbreak which infected much on female and caused more suffering on aged population. The symptoms such as rash, bleeding from mucosa, mouth ulcer and vomiting were highly associated with gender. The reasons for these observations need to be further explored.

KEYWORDS

Contraction order, Chikungunya, Relative risk, Surveillance

1. Introduction

Chikungunya fever (CHIKF) is a dengue like disease in human caused by RNA virus that belongs to the *Alphavirus* genus of the Togaviridae family. This virus is transmitted by *Aedes*, *Culux* and *Mansonia* mosquitoes. The name chikungunya derives from a root verb in the Kimakonde language meaning "that which bends up" or "doubled-up". The clinical manifestations of patients CHIKF infection include fever, skin rash and severe arthralgia. This infection is usually not fatal but causes severe polyarthralgia may persist for several weeks or months. Few clinical complications like neurological syndromes were also recorded[1]. Still no anti-viral drug is available for this infectious CHIKF[2-5].

A fever like CHIKF was recorded as early as 1824 in India[6]. However, the first conformed case of CHIKF was reported in Tanzania in 1952 after the isolation of chikungunya virus from both man and mosquitoes during an epidemic of fever that was considered clinically indistinguishable from

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dengue[7]. More outbreaks have subsequently occurred in Thailand in 1958, India in 1964, Sri Lanka in 1969, Vietnam in 1975 and Myanmar in 1975[8,9]. No major CHIKF outbreak was observed between 1975 and 2005. The recent outbreak started to appear in the Indian Ocean Islands, namely the Comoros, Madagaskar, Mayotte, Mauritius, La Réunion and Seychelles in February 2005. Attack rates peaked in these islands in 2006 and in the La Réunion. It affected roughly one third of the population. Large outbreaks emerged in India in 2006 infecting more than 1.39 million people within a year. Chikungunya has established endemicity in several parts of South-East Asia Region in 2006[10-12]. In Sri Lanka, the outbreak of CHIKF started in October 2006 in parallel with Maldives and Andaman and Nicobar Islands. More than 100 000 chikungunya cases were diagnosed in Sri Lanka in 2006 and 2007. The clinical features of this CHIKF outbreak in Sri Lanka are presented in this paper.

2. Materials and methods

As a purposive sample, a health division called Sainthamaruthu in Sri Lanka which was heavily exaggerated by CHIKF was selected for this study. This health division had 17 sub divisions consisting 25 528 individuals belongs to 6 494 families. Samples of 200 families were selected randomly from these 17 sub divisions using the family list available with district secretariat where the number of families from each sub division was proportional to the number of families in the sub divisions. These 200 families comprised of 885 individuals and all these individuals were interviewed for collecting CHIKF related information through a structured questionnaire. The recorded data in the questionnaires were coded and transferred to Minitab data sheet and required statistical analyses were performed using Minitab-16 software. Models were used to derive estimates and their 95% prediction intervals. The relative risks were estimated using linear logistic models after logit transformations of the proportions and for interpretation the estimations were back-transformed to the original scale.

3. Results

The surveillance of CHIKF in the studied population was 89.2% (95% *CI*, 89.2%±2.1%) that 789 individuals were CHIKF patents out of 885 individuals studied. In 71.5% of the families, all the family members were CHIKF patients and in 1.5% of the families, none of the family members were CHIKF patient. A marginal association was found between CHIKF and gender (χ^2=3.155, P=0.076) where 91.1% of the female and 87.4% of the male were CHIKF patients. The relative risk for getting CHIKF for female was 1.48 folder higher compare to male (95% *CI*, 0.959, 2.575). Figure 1 shows the CHIKF patient percentage among different age groups where≥1 years old age group had 5.54 folder higher relative risk for the CHIKF (95% *CI*, 2.53, 12.3) compare to infants<1 year old. Among the other age groups, no significant difference in relative risks for CHIKF was observed (P>0.47).

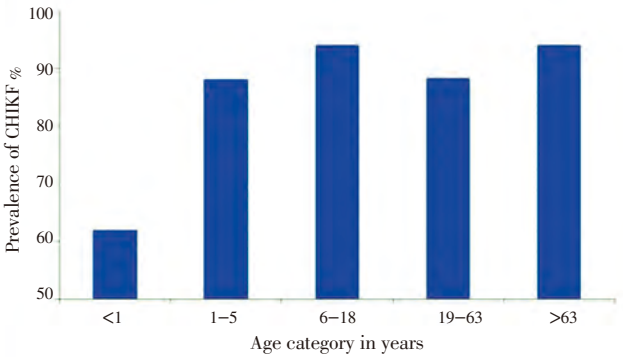

Figure 1. Prevalence of CHIKF among different age groups.

For the age group of more than 18 years old, no association was found between CHIKF and education level (χ^2=0.305, P=0.858). Even though the daily paid workers were much affected (92.8%) by this disease, this percentage is not enough to say that there is an association between occupation and CHIKF (χ^2=2.783, P=0.43). Figure 2 shows the distribution of duration suffered by patients in weeks. About 67.8% of the affected patients suffered for more than 2 weeks. In average, a patient suffered for 50.9 d (95% *CI*, 47.3, 53.9 d) and 67.8% of the patients suffered for more than 2 weeks.

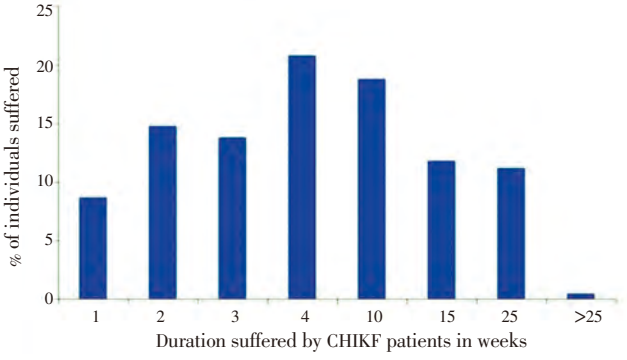

Figure 2. Distribution of duration suffered by CHIKF patients.

Figure 3 shows the average numbers of days suffered by CHIKF for different age groups and it differs significantly among the age groups (P<0.000). In general, number of days suffered was increasing with age. Male and female were suffered for 44.2 and 52.5 d respectively and this difference was not statistically significant (P=0.34).

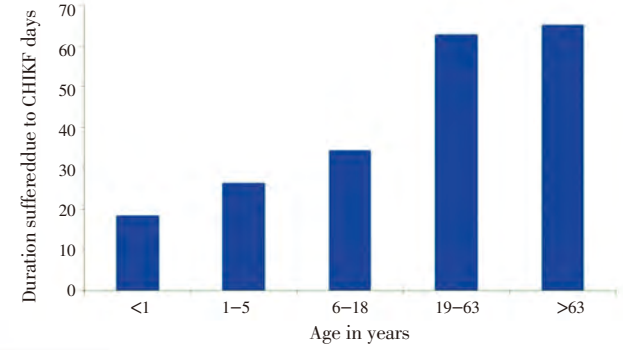

Figure 3. Average numbers of days suffered by different age groups.

The study of contracted order within the families showed that there was a significant difference in contract order in relation to age (P<0.000). Average age of the first contracted person was 31.2 years where as it was 11.3 years for the 9th contracted person. Figure 4 shows the contracted order and the average age. No significant association was found between contracted order and gender. (χ^2=8.151, P=0.42).

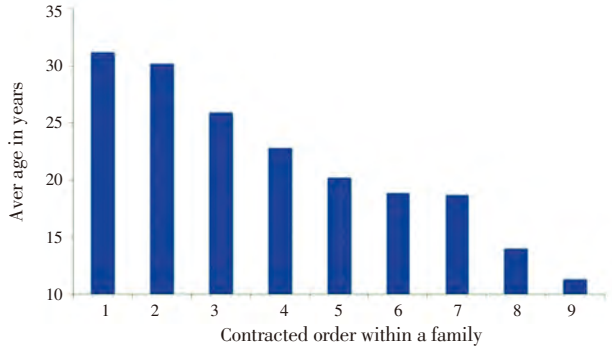

Figure 4. Contracted order and average age.

A small percentage of patients (9.6%) were admitted for treatment in the government hospital and no significant association was found between hospital admission and gender (χ^2= 0.008, P=0.93). The average age of the admitted patients was 31.7 years. No patient from<1 year age group was admitted in the hospital for treatment and risk to be admitted in hospital for 65 or more age group had 1.38 folder higher relative risk compare to the age group 1-63 years. In average, a hospitalized patient had to stay at the hospital for 5.5 d with minimum 1 and maximum of 30 d (95% *CI*, 4.4, 6.6 d). During the outbreak, 64.5% of the CHIKF patients were treated by private clinics, 20.8% by the government clinics, 12.8% treated by both government and private clinics and 1.9% of the patients not attended to any clinics. All the patients had fever and in average one had fever for 3.9 d (95% *CI*, 3.7, 4.1 d). No significant difference in duration of fever was observed for male and female (P=0.62), but it varied significantly with age group (P<0.000). More than 19 years age group had the highest fever duration of 4.2 d and the lowest of 2.7 d was observed for the<1 year age group. During this outbreak, 11.5% of the patients were given injection for pain or severe vomiting. Table 1 gives the percentage of joint pains and joint swellings observed among the patients. No association was found between any of these joint pain and gender (χ^2=2.435, P=0.10), but these joint pains had significant association with age (P<0.000) where the prevalence of joint pain increased with age.

Table 1
Prevalence of joint pains and swellings.

Joints	Prevalence of joint pain (%)	Prevalence of joint swelling (%)
Ankle Joint	54.8	4.4
Wrist Joint	55.0	4.9
Knee Joint	86.8	6.1
Small Joints of Hands / Feet	85.9	5.1

A total of 15.1% of the CHIKF patients had rash on their body and a significant association was found between gender and rash (χ^2=36.785, P<0.000). Rash was found in 22.9% of the female patients, but this percentage is only 7.5 for males. A significant association was also found between age and rash (χ^2=30.780, P<0.000). Very small infants and aged patients had more rash compare to other age groups. 1.5 % of the CHIKF patients had buccal bleeding with gender association (χ^2=5.688, P=0.02). About 2.6 % of female patients had buccal bleeding and it only 0.5% for male. And 9.3% of the CHIKF patients had mouth ulcer with gender association (χ^2=17.664, P<0.000). About 13.7% of female patients had mouth ulcer and it is only 5.0% for male. No significant association was found between age and buccal bleeding (χ^2=2.435, P=0.51). A total of 22.7% of the CHIKF patients had vomiting with gender association (χ^2=41.693, P<0.000). And 32.5 % of female patients had vomiting and it was only 13.2 % for male. No significant association was found between age and vomiting (χ^2=5.716, P=0.22). One male and one female CHIKF patients were reported death in the sample but there was no evidence that the reason for these deaths was CHIKF.

4. Discussion

The surveillance of CHIKF in the studied population was 89.2% which can be said a heavy outbreak. The relative risk for getting CHIKF for female is 1.48 folder higher and the reason for this is yet be known. Infection of this fever had association with age and it was infected much on older people. Duration of fever, prevalence of joint pains and swellings were increasing with age. A detail study will be helpful in future to understand this relationship. Rash on body, buccal bleeding, mouth ulcer and vomiting were highly associated with gender and the occurrences of these were high for female. This also needs to have furtherer exploration. This emergence of the disease in Sri Lanka made to realize for the first time that there is no expertise or a standard guideline for the proper clinical case management, control and prevention of CHIKF. There is a need to understand the epidemiology of the disease in every region so as to develop and implement a rational policy on its prevention and control.

Conflict of interest statement

We declare that we have no conflict of interest.

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Comments

Background

Even though there was an outbreak in 1964, this is the first time in Sri Lankan history the outbreak of CHIKF has been studied scientifically. This is the only research I find about the recent CHIKF outbreak in Sri Lanka. This paper gives an historical overview of the outbreaks and provides the clinical features of the infection with statistical evidence. It estimates the relative risks for CHIKF for various demographic factors such as gender, age and educational levels. The associations of symptoms with age and gender were also studied. This paper has recorded the outbreak for future comparative studies. As CHIKF outbreak occurs rarely, this type of studies should be published to have enough literature for future studies.

Research frontiers

This paper specifically studied the Sri Lankan out break and reports the clinical features with strong statistical evidence. This study has estimated the clinical features quantitatively such as relative risks and associations. These all information are new and valuable for the chikungunya literature.

Related reports

Considerably higher numbers (789) of infected patents were followed in this study compare to the studies in other countries. This study reports more number of symptoms compare to the study of Chhabra *et al*. (2008) and with duration of the symptoms exits and its statistical evidence. Chhabra *et al*. (2008) reported that CHIFK is an acute infection of abrupt onset, heralded by fever and severe arthralgia, followed by other constitutional symptoms and rash lasting for a period of 1-7 d, but this study reported more detail like: all the patients had fever and in average one had fever for 3.9 d (95% *CI*, 3.7, 4.1 d). No significant difference in duration of fever was observed for male and female (P=0.62), but it varied significantly with age group (P<0.000). More than 19 years age group had the highest fever duration of 4.2 d and the lowest of 2.7 d was observed for the<1 year age group. Contraction order against age was not studied in any other literature previously. Overall this study presents the clinical feature more quantitatively with strong statistical evidence.

Innovations & breakthroughs

This study showed new information that the relative risk for getting CHIKF for female is 1.48 folder higher and infection had association with age. It also has reported risk is high for older people. Duration of fever, prevalence of joint pains and swellings were increasing with age. Rash on body, buccal bleeding, mouth ulcer and vomiting were highly associated with female. Further all the statements related to prevalence, risks and associations were presented with evidence. Finding the average ages of contraction order is specific in this study.

Applications

It is significant to know the vulnerable group for CHIKF infection and its symptoms with duration. The seriousness of this outbreak can be compared with other future outbreaks because this study has recorded all these information.

Peer review

This is a good study in which the author evaluated the clinical features of the outbreak systematically with statistical evidence. The results are new and interesting.

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