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SHORT REPORT

Prevalence of *Plasmodium vivax* Infection in Selected Townships

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Malaria is caused by *Plasmodium* family parasites transmitted by females Anopheles mosquitoes. Human malaria species are *Plasmodium falciparum* (*P. falciparum)*, *Plasmodium vivax (P. vivax)*, *Plasmodium malariae (P. malariae)* and *Plasmodium ovale (P. ovale)*, of which *P. falciparum* and *P. vivax* are the most prevalent. *Plasmodium knowlesi (P. knowlesi)* is a zoonotic *Plasmodium* which is known to infect humans. According to WHO reporting, about 3.2 billion people were at risk of the malaria in 97 countries and areas in 2013 and an estimated 198 million cases occurred.[1] WHO has developed global technical strategy for malaria between 2016 and 2030 with the vision - a world free of malaria. Then, malaria elimination strategy in Greater Mekong Subregion (GMS) was developed based on WHO global technical strategy for malaria 2016-2030. The ultimate goal of the regional strategy is to eliminate malaria by 2030 and to eliminate *P. falciparum* by 2025. Therefore, this paper aimed to study prevalence of *P. vivax* infection in selected townships. The community-based, cross-sectional descriptive study was done in Banbwe health centre area (Naung Cho Township) and Holeik health center area (Pyin Oo Lwin Township). These areas are also designated as malaria high risk area by the Regional VBDC. The study was conducted in wet season i.e. from June to November 2014 and in dry season i.e. December 2014 to February 2015. Blood samples of total 0.5 ml were taken from the participants for examination of malaria. Blood examination for malaria species identification was conducted using both microscopic and Rapid Diagnostic Testing (RDT-Bio-credit, made in Korea). Criteria for malaria confirmation were made by either microscopic or RDT positive results. The confirmed malaria infections were treated with anti-malarial drug in line with National Anti-malarial Treatment Guideline.

A total of 434 suspected malaria participants residing in forested endemic areas were studied. Mean age of participants was 29±16.3 in year. The youngest was 1 and eldest was 75 years old. Among them, males were 292(67.3%) and females were 142(32.7%). *P. vivax* infections were examined in 72(16.6%) participants and *P. falciparum* infections were investigated in 36(8.3%) participants. Mixed infections with both *P. vivax* and *P. falciparum* were examined in 10(2.3%) people during study period. During the rainy season i.e. from June to November, 292(67.3%) participants were tested and the rests (142) were examined in dry season i.e. from December to February. In rainy season, *P. vivax* infections were examined in 15.8% (46/292) of tested population. Meanwhile, *P. falciparum* infections were tested in 8.2% (24/292) of the tested population.

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Similar distributions were also found in dry season with 18.3% (26/142) for *P. vivax* and 8.5% (12/142) for *P. falciparum* infections.

In the present study, 16.6% (72) and 8.3% (36) were examined with *P. vivax* and *P. falciparum* infections. Mixed infections were detected in 2.3% (10) of total tested population. However, a study conducted in 2012 and 2013 in endemic areas of Pyin Oo Lwin and Naung Cho townships showed that *P. falciparum* and *P. vivax* infections were detected with 13% (30/226) and 12% (28/226) by RDT, respectively, with malaria RDT and microscopic examination.[2] Therefore, *P. vivax* infection prevalence became increased and *P. falciparum* infection was decreased in study areas. This may be due to effectiveness of Artemisinin Combinational Therapy (ACT) on *P. falciparum* infection or due to relapsing nature of *P. vivax* infection.

This study showed the decreasing prevalence of *P. falciparum* infection among the endemic areas. On the other hand, prevalence of *P. vivax* infection became relatively higher than *P. falciparum* infection. This finding is not concordant with World Malaria Report (2012) and report of Health in Myanmar (2013). Those reports revealed that prevalence of *P. falciparum* infections was two times higher than that of *P. vivax* infections.[3, 4] This reverse finding may be due to increasing activities of malaria control measures including control of resistant malaria are targeting to combat the falciparum malaria. Therefore, successful malaria control programs have a greater impact on reducing falciparum malaria, resulting in *P. vivax* becoming the predominant species of infection.[5]

Actually, malaria control activity in Myanmar has been structured to affect both infections simultaneously in everywhere. In such condition, *P. vivax* infections remain as less controlled than *P. falciparum* infections. This may be due to different biology and epidemiology of these two species. Control of *P. vivax* infection is relatively difficult compared to that of *P. falciparum* infection because of complex biology with hepatic stage of *P. vivax* parasites.[5] This paper found that prevalence of *P. vivax* infection was increasing compared to *P. falciparum* infection. Because of relapsing nature, it can cause recurrent attack to the patients and resulting increasing prevalence.

As a conclusion, prevention and control activities for *P. vivax* should be reinforced for its increasing prevalence. Moreover, *P. falciparum* elimination could be initiated as its prevalence became reducing. Another recommendation is that health care providers should prescribe chloroquine together with primaquine to achieve radical cure. Moreover, further research studies such as epidemiological and therapeutic efficacy studies on *P. vivax* infection are necessary to explore why it is increasing and how to combat it to fulfill malaria elimination phase.

Competing interests

The authors declare that they have no competing interests.

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