Research Article

Prevalence of *Plasmodium* species in human population of taluka Pano-aqil, Sindh, Pakistan

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**Abstract**
The study was conducted to check the prevalence of *Plasmodium* species in population of Taluka Pano-aqil, Sindh, Pakistan during January to December, 2014. The data was collected age, sex and month wise. A total of 2257 samples were collected and out of them only 15% were positive with malaria. Among positive cases, 80% were *P. vivax* and 20% were *P. falciparum*. The month-wise data shows the maximum burden of *P. vivax* (100%) was recorded in July and minimum burden was recorded in March (58%), whereas, the maximum burden of *P. falciparum* (41.66%) was recorded in March and minimum load was recorded in September (15.21%). The age-wise prevalence shows the maximum burden of *P. vivax* (85.14%) in over 21 year age group and minimum burden (77.27%) in 1-10 and 11-20 year age group, whereas, the maximum burden of *P. falciparum* (22.77%) in 1-10 and 11-20 year age group and minimum burden (14.85%) in over 21 year age group.

**Keywords:** *P. falciparum; P. vivax; Pano-aqil; Sindh; Pakistan*

**Introduction**
Malarial parasites comprising more than 200 species of *Plasmodium* are known to infect various animal species such reptiles, birds, and mammals. [1] Four *Plasmodium* species (*P. vivax, P. falciparum, P. malariae, P. ovale*) are known to cause damage to Human nature. Another species, *P. knowlesi* found to infect macaque is considered to be zoonotic in human [2]. Mosquito, the vector of *Plasmodium* in human play very important role in the epidemiology of malaria, west Nile virus and dengue fever etc [3]. WHO reports around 140 million people in Pakistan are at risk of malaria and among them about 18% live at high risk [4]. Report indicates the work has been done on the prevalence of *Plasmodium* species in human population in Pakistan [5-8], but none of the report is available from the study area. It was therefore, proposed to carry out the survey on the prevalence of *Plasmodium* species in human population of taluka Pano-aqil, Sindh, Pakistan.

**Materials and methods**
From January to December, 2014, the present study was conducted in human population of taluka Pano-aqil, Sindh, Pakistan. The data was collected from government hospital Pano-aqil and malaria centers in Taluka Pano-aqil. The data collection method was followed of Yasinzai...
and Kakarsulemankhel [9, 10]. The data was analyzed month-wise, age-wise and sex-wise. Three age groups 1-10 years, 11-20 years and 21 and/or above years were prepared. Data was statistically analyzed to know the complete prevalence of *P. vivax* and *P. falciparum* within the study area.

Moreover, as results show that *P. vivax* was noted greater in 21-above age group, whereas, lesser in 1-10 and 10-20 year age group. The prevalence of *P. vivax* was observed higher in 1-10 and 11-20 year age group and lesser in 21-above years age group (Table 2 & Figure 2). So far the gender-wise prevalence is concerned, maximum load of *Plasmodium vivax* was observed in males and females but the ratio of *P. falciparum* was noted lowest in males and females in present locality (Table 3 & Figure 3).

### Table 1. Month-wise prevalence of *Plasmodium* species in taluka Pano-aqil

<table>
<thead>
<tr>
<th>Month</th>
<th>Suspected cases</th>
<th>Positive cases %</th>
<th><em>P. falciparum %</em></th>
<th><em>P. vivax %</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>315</td>
<td>23.80</td>
<td>17.33</td>
<td>82.66</td>
</tr>
<tr>
<td>February</td>
<td>155</td>
<td>9.67</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>March</td>
<td>187</td>
<td>6.41</td>
<td>41.66</td>
<td>58.33</td>
</tr>
<tr>
<td>April</td>
<td>177</td>
<td>5.08</td>
<td>22.22</td>
<td>77.77</td>
</tr>
<tr>
<td>May</td>
<td>163</td>
<td>15.95</td>
<td>30.76</td>
<td>69.23</td>
</tr>
<tr>
<td>June</td>
<td>161</td>
<td>9.93</td>
<td>31.25</td>
<td>68.75</td>
</tr>
<tr>
<td>July</td>
<td>90</td>
<td>3.33</td>
<td>00</td>
<td>100</td>
</tr>
<tr>
<td>August</td>
<td>134</td>
<td>27.61</td>
<td>21.62</td>
<td>78.37</td>
</tr>
<tr>
<td>September</td>
<td>236</td>
<td>19.49</td>
<td>15.21</td>
<td>84.78</td>
</tr>
<tr>
<td>October</td>
<td>153</td>
<td>14.37</td>
<td>27.27</td>
<td>72.72</td>
</tr>
<tr>
<td>November</td>
<td>252</td>
<td>13.88</td>
<td>22.85</td>
<td>77.14</td>
</tr>
<tr>
<td>December</td>
<td>234</td>
<td>20.08</td>
<td>10.63</td>
<td>89.36</td>
</tr>
<tr>
<td>Total</td>
<td>2257</td>
<td>15%</td>
<td>20%</td>
<td>80%</td>
</tr>
</tbody>
</table>

**Figure 1.** Month-wise prevalence of *Plasmodium* species in taluka Pano-aqil
Table 2. Age-wise prevalence of *Plasmodium* species in taluka Pano-aqil

<table>
<thead>
<tr>
<th>Age</th>
<th><em>P. vivax</em> %</th>
<th><em>P. falciparum</em> %</th>
<th>Total Positive cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 years</td>
<td>77.27</td>
<td>22.72</td>
<td>110</td>
</tr>
<tr>
<td>11-20 years</td>
<td>77.27</td>
<td>22.72</td>
<td>132</td>
</tr>
<tr>
<td>21 and above</td>
<td>85.14</td>
<td>14.85</td>
<td>101</td>
</tr>
<tr>
<td>Total</td>
<td>79.59%</td>
<td>20.40%</td>
<td>343</td>
</tr>
</tbody>
</table>

Figure 2. Age-wise prevalence of *Plasmodium* species in taluka Pano-aqil

Table 3. Sex-wise prevalence of *Plasmodium* species in taluka Pano-aqil

<table>
<thead>
<tr>
<th>Taluka</th>
<th>Positive Cases (Male)</th>
<th>Percentage of <em>P. vivax</em> (Male)</th>
<th>Percentage of <em>P. falciparum</em> (Male)</th>
<th>Positive Cases (Female)</th>
<th>Percentage of <em>P. vivax</em> (Female)</th>
<th>Percentage of <em>P. falciparum</em> (Female)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pano-aqil</td>
<td>233</td>
<td>77.25%</td>
<td>22.74%</td>
<td>110</td>
<td>84.54%</td>
<td>15.45%</td>
</tr>
</tbody>
</table>

Figure 3. Sex-wise prevalence of *Plasmodium* species in taluka Pano-aqil
Discussion
According to the report, more than three million human beings live under malarial threat in 24 affected countries [11]. Malaria disease transmits to people when an infective female Anopheles mosquitoes — Malaria vector — bites. They often bite during dusk and dawn [12]. In present study the total 2257 suspected cases were studied and out of these only 15% found to be positive cases. The P. vivax was recorded with the highest prevalence 80% and P. falciparum was recorded with 20%. The other previous reports of [13-20] conducted in Pakistan also support the highest prevalence of P. vivax than P. falciparum. In present study, the P. vivax was 100% in the month of July, whereas, 58% in the month of March. P. falciparum was observed 42% in the month of March, whereas, not seen in the month of July. In previous reports [9, 10, 21, 22], the month-wise prevalence of P. vivax and P. falciparum varies due to geographical variation, habitat differences and climatic conditions. In present study, the P. vivax was 85.14% in 21 and above year age group and 77.27% in 1-10 and 11-20 year age group, while P. falciparum was 22.72% in 1-10 and 11-20 year age group and 14.85% in 21 and above year age group.

In previous reports [9, 10, 21, 22] the age-wise prevalence varies due to geographical variation, habitat differences and climatic conditions. In present study, the P. vivax was recorded highest in both male (77.25%) and female (84.54%), while P. falciparum was recorded lowest in both male (22.74%) and female (15.45%).

Conclusion
The present study concludes that the burden of P. vivax is higher than P. falciparum in taluka Pano-aqil. The burden of P. vivax is higher in the month of July, whereas, the burden of P. falciparum is higher in the month of March. No differential results were found sex-wise. The burden of P. vivax is higher in 21 and above year age group, whereas, the burden of P. falciparum is higher in 1-10 and 11-20 year age group.

Authors’ contributions
Conceived and designed the experiments: MA Mahar, Performed the experiments: MA Mahar, Analyzed the data: NA Birmani, SA Ujjan & BA Samejo, Contributed reagents/ materials/ analysis tools: MA Mahar & AM Sheikh, Wrote the paper: Mahar MA & SA Ujjan

Acknowledgement
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Reference


