

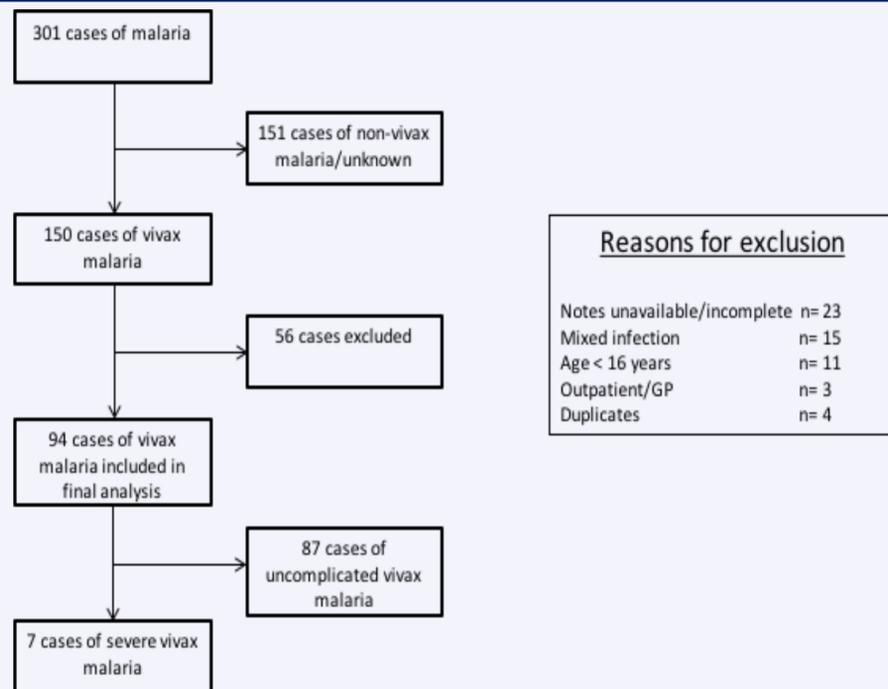
Introduction

Plasmodium vivax (PV) malaria is a major cause of worldwide morbidity and mortality with up to 2.5 billion people living in endemic regions and an estimated 15.8 million symptomatic cases of *P. vivax* malaria globally in 2013.¹ It has been traditionally described as a 'benign' malaria, however recent years have seen increasing reports of severe disease and deaths in many parts of the world including the Indian subcontinent, South America and Papua, Indonesia.²⁻⁶ PV accounts for 10-20% of the cases of imported malaria in the UK and is concentrated in regions with large communities of South Asian heritage.⁷ Leicester is an area of significant ethnic diversity with considerable population exchange with the Indian subcontinent. Despite a recent surge in the literature reporting on severe vivax in endemic regions, there is a scarcity of similar data on imported vivax malaria, its associated complications and resultant mortality.

Methods

We performed a retrospective analysis of all adult cases of vivax malaria presenting to our regional Infectious Diseases Unit at the University Hospitals of Leicester, UK. We included all cases identifiable from the local pathology services database from 2003 to 2013. We reviewed the clinical notes and pathology database to retrieve data on demographics, clinical features, baseline blood investigations including a blood film and G6P-D testing. We used WHO guidelines to define patients suffering with severe malaria. Finally, we looked at the treatments, recurrence rates and overall mortality.

Study Flow Chart



Results

Variable	Number (%)
Age (median, interquartile range)	42 (27.3 - 53.8)
Age categories	
16-34	37 (39.4%)
35-50	26 (27.7%)
51-64	24 (25.5%)
65+	7 (7.4%)
Gender	
Female	30 (31.9%)
Male	64 (68.1%)
Ethnicity¹	
Asian	80 (85.1%)
African	7 (7.4%)
White	6 (6.4%)
Place of birth	
Indian Subcontinent	44 (46.8%)
Africa	11 (11.7%)
Europe	4 (4.3%)
Unknown	35 (37.2%)
Region of acquisition¹	
Indian Subcontinent	80 (85.1%)
Africa	11 (11.7%)
Other	2 (2.1%)
Prophylaxis	
Yes	9 (9.6%)
No	67 (71.3%)
Unknown	18 (19.1%)
G6P-D levels	
Normal	76 (80.9%)
Deficient	2 (2.1%)
Unknown	16 (17.0%)

¹Data available in 93 patients

Table 1. Demographic characteristics of patients with imported vivax malaria (n=94)

Clinical features	Number (%)
Presenting symptoms	
Fever	93 (98.9%)
Headache	61 (64.9%)
Rigors	64 (68.1%)
Examination findings	
Temp > 39°C	22 (23.4%)
HR > 110	26 (27.7%)
Systolic BP < 80mm Hg	1 (1%)
GCS < 15	2 (2.1%)
Jaundice	5 (5.3%)
Hepatomegaly	8 (8.5%)
Splenomegaly	3 (3.2%)

Table 2. Clinical features of patients with imported vivax malaria (n=94)

Laboratory parameter	Median (IQR) or Number (%)	Meets WHO severity criteria
Haemoglobin (g/dL)	12.9 (11.6-13.9)	
Anaemia (<11.5 in females, <13 in males)	37/94 (39.4%)	1/94 (1.1%)
Lymphocyte count (x10 ⁹ /L)	0.95 (0.6-1.45)	
Lymphopaenia (< 1x10 ⁹ /L)	31/77 (40.3%)	
Platelet count (x10 ⁹ /L)	95 (68-129)	
Platelet count < 50x10 ⁹ /L	12/91 (13.2%)	
Sodium < 130 mmol/L	5/93 (5.4%)	
Creatinine > 150 µmol/L	1/93 (1.1%)	1/93 (1.1%)
Raised liver enzymes	22/88 (25%)	
Bilirubin > 50 µmol/L	7/89 (7.9%)	2/89 (2.2%)

Table 3. Laboratory findings in vivax malaria patients

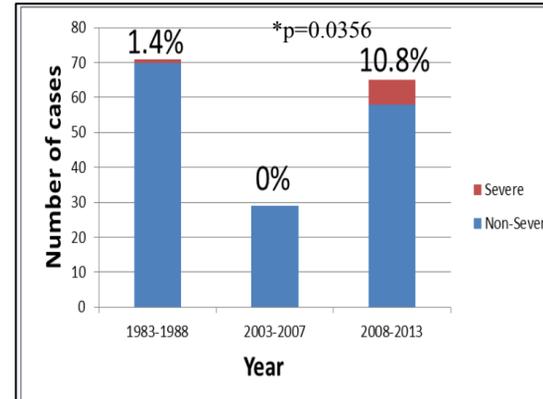


Figure 1. Percentage of cases with severe disease⁸

Outcomes

- Majority treated with chloroquine and primaquine
- Median length of stay – 3 days (IQR 2-4 days)
- Recurrence – 2 (2.1%)
- Overall mortality – 2 (2.1%)

Deaths

- One gentleman was elderly and had multiple co-morbidities
- However, a 58-year-old lady with minimal co-morbidities succumbed to vivax disease associated with ARDS and multi-organ failure despite being treated with ECMO.

Discussion

Limitations

- Retrospective in nature
- Single centre
- Incomplete data set
- No PCR confirmation of vivax mono-infection

Conclusions

- **This study has demonstrated the evolution of imported vivax malaria into a pathogen associated with severe disease and mortality.**
- **All cases of imported vivax malaria should be evaluated thoroughly for complications and managed appropriately.**

References

1. WHO; Control and elimination of plasmodium vivax malaria: a technical brief.
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