



Comparison of standard and modified human landing collection (HLC) techniques for blackflies in the era of onchocerciasis elimination

Research Summary

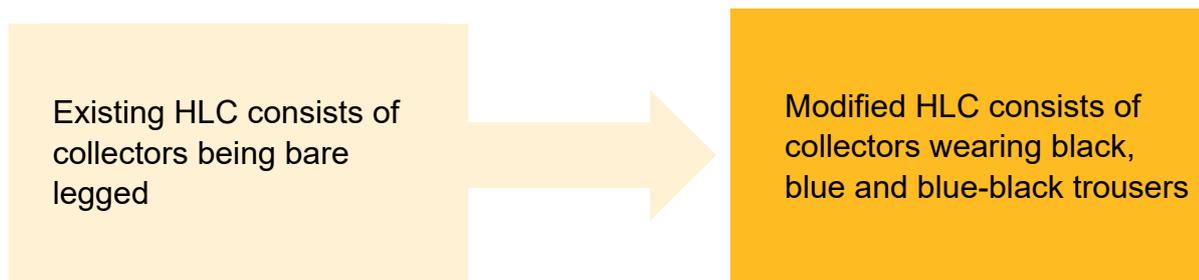
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Introduction

Onchocerciasis is a parasitic disease that affects millions of people around the world. Elimination of this disease has been demonstrated to be feasible following the successful interruption of transmission in some foci in Africa. Thus, many countries are moving towards elimination targets by 2030. The WHO guidelines for verification of elimination uses entomological evaluations, which require the collection of large numbers of anthropophilic blackflies. Human landing collection (HLC) is the standard method for collecting anthropophilic blackflies, as this measures human exposure to fly bites and provides information on transmission indices to determine the interruption of transmission.

There is a need to develop new and safer sampling techniques to replace the standard HLC technique for the collection of blackflies, as this method involves exposing the lower limbs of the collectors - which poses a lot of ethical concerns. This study evaluates the performance of a modified HLC technique: instead of being barelegged, the collectors wear trousers in colours known to be attractive to blackflies.

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Why is this issue important?

The WHO acknowledges the need to develop new collection techniques to replace the standard HLC method, during which collectors may be exposed to bites of infective flies. These techniques should collect appropriate numbers of the same vector populations and the same age structure (parity rates) as those biting humans, and in a condition that enables transmission indices to be determined.

Various techniques have been studied as a replacement for HLC. Unfortunately, other collection techniques demonstrated conflicting success depending on geographical locations and the type of non-human baits used. Furthermore, traps using physical and/or chemical baits sometimes require constant maintenance to ensure effective collection. Thus, to date no suitable method has been found to replace HLC. This study provides an opportunity to use the HLC technique, while at the same time protecting collectors from infective blackflies.

What do the research findings tell us?

Key messages

A total of 5,130 (29.7%) flies were collected using the standard technique during all seasons; 5,148 (29.9%) by the black; 3,717 (21.6%) by blue and 3,251 (18.9%) by blue-black.

There was no significant statistical difference in the number and physiological status of flies caught between the standard and the modified HLC with black trousers in both the dry and rainy seasons ($p=0.13$ and $p=0.14$ respectively).

Black trousers provide a viable alternative for the standard HLC whilst addressing the ethical concerns.

Summary

The study was conducted in Massangam health district in the West Region of Cameroon. Sections of the river Nja at Makouopsap and river Mbam towards the Camp Sic neighbourhood were selected for this study and collections were done from October to November 2018 (the rainy season) and January to February 2019 (the dry season).

Four collector pairs - one 'standard' (barelegged) and three modified (blue trousers, black trousers and blue-black patterned trousers) - were placed 50 metres apart in known blackfly breeding sites of the river Mbam. In the standard HLC, vector collectors sat down and rolled up their trouser legs to knee level, exposing their foot and lower leg, and flies that landed on them were caught using a mouth aspirator. In the modified technique, collectors wore coloured trousers corresponding to the three other HLC methods.

Blackfly collections were performed four days a month between 7am and 5pm. The collectors used a locally-made aspirator labelled with the collection site, technique and hour of collection. Collectors and their positions were interchanged to minimise collection bias. Caught flies were transported hourly in the aspirators to the field laboratory for specimen count, dissection and data storage. The flies were then dissected under a microscope at x40 magnification to determine the parous status and parasitic stages of OV infections (L1, L2 and L3).

The mean proportion of the number of blackflies caught and physiological status (parity) was calculated and compared between the HLCs and seasons, using the Mann-Whitney U test.

Limitations and suggestions for future research

This was a small-scale study, therefore further studies are needed to confirm whether the findings can be generalised across different eco-zones and transmission environments, and among different blackfly species.

Learn more

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Read the full report [here](#).

This research was presented at the ASTMH Annual Meeting in 2021 – [read the abstract](#) (p394).

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