COMMUNITY KNOWLEDGE, PRACTICES AND SOCIO-ECONOMIC FACTORS CONTRIBUTING TO THE RE-EMERGENCE OF BRUGIAN FILARIASIS IN PUTTALAM DISTRICT: A STUDY IN PARALLEL WITH AN ASSESSMENT OF VECTOR BIONOMICS

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After nearly four decades human brugian filariasis (BF) has re-emerged in Sri Lanka. Anti Filariasis Campaign showed that there were 109 BF case records in Sri Lanka from 2005-2021, the highest number reported from Puttalam District. A questionnaire survey was carried out to assess community knowledge and the practices on the disease and socio-economic factors that contribute to the re-emergence of Brugian Filariasis in the Puttalam District. Study sites for the community survey were selected based on the most recent BF patient records and the incidence of *Mansonia* spp. positive to *B. malayi*. Accordingly, three locations, Puruduwella (P), Nelumpokuna (N) and Thummodara (T) were selected as study sites. Karavitagara (K) was selected as a control site, since it had no patients, but vector *Mansonia* species were present. A self-administered questionnaire was used to collect relevant information on knowledge on BF infections, practices to reduce transmission, socio-economic data and on the prevalence of reservoir hosts from 80 residents per site within 1 km radius from where a patient was recorded, for 4 months from December 2021 to March 2022. Based on analysis of community feedback a median value was considered when categorizing "Good" knowledge and practices where 11-16 was considered as 'Good' knowledge and 3-8 was 'Good' practices. Filariasis knowledge among four different sites P, N, T & K were significantly different from each other ($p<0.001$). Good knowledge of filariasis infection and its vector control was significantly associated with mature adult age category, lower educational levels, and with two income levels, namely daily wage earners and <20, 000 LKR. Good practices of filariasis infection and its vector control were significantly associated with adolescents and lower educational levels. The self-experience, good knowledge and good practices were significantly associated with test sites where previous patient records were present ($p<0.05$). The dog population in Puruduwella was significantly higher than that of the Karavitagara ($\chi^2=4.962$; $p<0.026$). All three test sites had cattle while no cattle were found in Karavitagara. Study reveals the importance of health education in enhancing knowledge and practices on the control BF infections and its mosquito vectors among all levels of the community where BF is prevalent without adhering to situation specific ad hoc practices.

Keywords: Knowledge, Practices, Brugian Filariasis, Socio-economic factors

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INTRODUCTION

Both *W. bancrofti* and *B. malayi* infections were prevalent in Sri Lanka in the past, and successful vector control activities targeted at *Mansonia* mosquitoes resulted in complete clearance of Brugian Filariasis (BF) by 1967 (Schweinfurth, 1983). In 2016, Sri Lanka was awarded by World Health Organization (WHO), the certificate of eliminated LF as a public health problem. However, AFC-SL statistics showed that there were 109 BF cases records in Sri Lanka from 2005 up to 2021 and the highest number of BF patients i.e. 51cases were reported in Puttalam District (AFC, 2021). They were reported from 9 out of the 13 MOH (MOH area is the basic geographic subdivision in the preventive health care system of Ministry of Health, Sri Lanka) areas in Puttalam district. BF positive cases were reported in Madampe (17 cases), Dankotuwa (10 cases), Mahawewa (9 cases), Nattandiya (7 cases), Arachchikattuwa, Mundel, and Puttlam with 2 cases each and Chilaw and Kalpitiya with 1 case each (AFC, 2021). Further, in a smaller geographical scale, for example within Grama Niladhari (GN) divisions, BF cases were reported while in the same MOH area some GN divisions were not positive for BF cases. There were reports to suggest that in GN divisions which were negative for BF cases, the mosquitoes were found to be positive for *B. malayi*. e.g: In Jayarathnagama, Siththampalamwatta, Issanmadilla, and Galahitiyawa GN divisions of Madampe MOH area (AFC, 2021). Such observations suggested that occurrence of BF cases in the community may not be always related to the prevalence and abundance of mosquito vectors, and that there may be yet other factors causing the transmission of BF in Puttlam district.

Studies around the world have identified various contributing factors unique to each environment and the population associated with it; knowledge of the disease, practices pertaining to vector breeding, exposure to the vector and even some socio-economic characters increasing the risk of exposure to the vector. Observations on zoonotic filarial infections suggests dogs and cats as potential reservoirs for human dirofilariasis and brugian filariasis in Sri Lanka (Mallawarachchi *et al.*, 2018). Thus, to analyze the occurrence BF in Puttalam district it was thought appropriate to include investigations related to community knowledge; human BF infections, mosquito vectors and community practices influencing BF transmission: mosquito control methods, rearing of reservoir hosts, were thought may be possible risk factors of BF in Sri Lanka.

METHODOLOGY

The methodology of the study involved collecting information from the community residing in study sites. Hence ethical approval was obtained from the Ethics Review Committee of the Institute of Biology, Sri Lanka (Registration No: ERC IOBSI. 254 11 2021). Since the study was on investigating factors involved in BF case distribution, it was conducted over a four-month period from December 2021 to March 2022 in areas where BF cases were reported, and the findings were compared with an area where BF cases had not been reported in the Puttalam district. Accordingly, 3 GN divisions in Puttalam district, namely Puruduwella (70 28’ N 790 52’ E), Nelumpokuna (70 48’N 790 84’ E) and Thummodara (70 23’ N 790 51’E), where recent BF patients were reported (AFC, 2020) were selected and were considered as test sites. A control site in Karavitagara (Weerakelewatta) GN (70 55’ N 790 E) division where no BF cases were reported (2005-2020) was selected for the study. Eighty individuals from each study site were interviewed at their residencies from the selected GN divisions. Residencies were selected within a 1 km radius from the place of filaria patient recorded

previously and for the control site 1 km radius was considered from the possible breeding site of vector mosquitoes, Karavitagara wewa. A single individual selected randomly representing the families were questioned using a pre-tested self-administered questionnaire made in their preferred language to assess the associated socio-economic factors, knowledge on the disease and vector and practices on filariasis control. Prior to the information collection, informed written consent was obtained. Data was analysed using SPSS statistical software package 22.0. The level of knowledge and practices were considered as dependent variables while the independent variables. Scores obtained for individual questions on knowledge and practices were summed to obtain a total score for each category. Valid responses for the knowledge section were defined as "correct" (scored as "1") or "incorrect" (scored as "0") based on the current scientific knowledge according to the existing literature. Accordingly, the total knowledge score ranged from 0 to 16 Median splits were considered in division of the knowledge score into "Good" and "Poor" categories. The "Poor" (0 to 10 marks) and "Good" (11 to 16 marks) were given. Practices were also assessed in a similar manner to knowledge through a score ranged from 0 to 8 with a maximum score of 8. Then the practice score was categorized as "Poor" (0 to 2 marks) and "Good" (3 to 8 marks) based on the median value. Descriptive statistical measures were used to describe the level of knowledge and practices. Multiple Logistic Regression was used to predict potential variables having an association with knowledge and practices. The association of self-experience with knowledge and practice related to filaria infection and prevention was assessed using the Pearson correlation. Pearson correlation was used to assess the correlation of knowledge and practice. Potential age categories that associated with good knowledge were found using Chi-Square Goodness-of-Fit Test. A p value ≤ 0.05 was considered as significant.

RESULTS AND DISCUSSION

Knowledge and Practice on Filariasis Infection and Control

Median (11) splits were used to categorize Good and Poor knowledge. Scores between 0-10 were categorized as poor while scores from 11-16 were categorized as Good. Out of 320 total respondents 40.31% (n=129) had good knowledge while 59.37% (n=190) had poor knowledge. The mean knowledge of all test sites together was higher than that of the control site.

Median (3) splits were used to categorize Good and Poor practice. Scores between 0-2 were categorized as poor while scores from 3-8 were categorized as Good. Out of 320 total respondents 40% (n=128) had good practices while 60% (n=192) had poor practices. The mean practice score of all test sites together was higher than that of the control site. Knowledge and the practices of the test sites were significantly higher than that of the control site Karavitagara ($p<0.001$).

Socio-economic factors associated with Knowledge and Practice

Good knowledge on filariasis was significantly associated only with the Education level ($\chi^2=14.76$; $p=0.011$) and the income level ($\chi^2=17.54$; $p=0.002$). Surprisingly respondents that possessed a higher educational qualification, like a degree, did not have a very good knowledge compared to those who had passed the G.C.E. O/L & were Vocational trained (47.6%). The respondents who had no formal education were having a significantly higher level of knowledge when compared to respondents with only primary education (Grade 1-5) (OR=1.3831).

When considering the income levels, the highest proportion with good knowledge was among the residents who earn 40,000 LKR per month or more (47.9%). However, the respondents who had a daily income and respondents earning <20,000 LKR per month were having a significant higher level of knowledge (OR=2.2895). The respondents who were earning less were having good practices when compared with the higher levels of income. This may be because these residents are the ones who are generally at the household as they are unemployed thus, they get a higher chance to participate in health education programs than that of the higher income level people who are mostly employed and out of residents. Similar findings are supported by other Knowledge, Attitude and Practice research where lower income levels/unemployed individuals having higher knowledge however, no significance in attitude or practice (Zibran *et al*., 2019).

Good knowledge on filariasis were significantly associated with the age (p=0.032) where, Mature adults were having a significantly higher knowledge than Adolescents (p=0.016) and midlife adults (p=0.031).

Good practice on vector mosquito control was significantly associated with the Education level (p=0.029). The highest proportion with good practice was found in respondents who had no formal education (85.7%) and respondents who passed G. C. E. O/L or with Vocational training. Similar to good knowledge, good practices were found among respondents who were not formally educated or those who were GCE O/L qualified or vocationally trained. These findings where knowledge and good practices on filariasis was higher among the people who had less formal education than those with higher formal education levels differ from studies done in Nigeria where poor knowledge contributed to poor attitudes and practice of vector control (Jaiyeola *et al*., 2022). This may indicate that assessment of knowledge and practices are situation specific and cannot be generalized across countries.

Good practice on vector mosquito control were significantly associated with the age (p<0.001) where, Adolescents having a significantly higher good practice than Midlife adults (p<0.001) and mature adults (p=0.004). Early adults having a significantly higher good practice than Midlife adults (p<0.001) and Mature adults (p<0.048). Good knowledge on filariasis were significantly associated with the age (χ^2=8.816; p=0.032) where higher age categories were having more knowledge and good practices. These results may have due to the longer lifetime experience of mature adults that living in the filariasis endemic region. As people mature they earn more experiences from the society and environment. Thus, mature adults had more infection control knowledge than the other age groups. A study in Northwest Ethiopia among the healthcare workers whose age 31 and above were about three times more knowledgeable about infection prevention than when compared to those aged 21–25 (Desta *et al*., 2018). Good practice on vector mosquito control were significantly associated with the age (χ^2=23.349; p<0.001) where, younger age groups were having better practices. In the South Asian communities there is a tendency towards following elders' commands and requests which is obvious in our country too. Thus, the engagement in activities is higher in lower age categories even though the knowledge is higher in the elderly age groups. Contradictory and similar results are reported in other research where it differs in different communities and it differs according to the subject being tested in certain research elders were having good knowledge as well as better practices (Zibran *et al*., 2019).

The knowledge and the practices were significantly associated (r=0.348; p<0.001), where higher the knowledge better the practice. Moreover, residents who had filariasis patient in their household were having a higher knowledge (r=0.138; p<0.013). However, practice was not significantly correlated with presence of filariasis (r=0.041; p<0.470). Good knowledge on filariasis did not depend on number of family members (χ^2=0.09; p =0.771), gender (χ^2=0.06; p = 0.803), nationality (χ^2=0.78; p=0.379), religion (χ^2=1.68; p=0.431), and the state of employment (χ^2=0.96; p=0.327), of the respondents which was consistent with previous studies done in other countries for dengue and filaria infection (Udayanaga *et al*., 2020).

Community behaviour and practices among study sites

Significantly higher knowledge on filariasis, filariasis infection control and mosquito vector control practices were observed in Puruduwella and Nelumpokuna compared to Thummodara and Karavitagara (P <0.001). This may be a result of village community associating closely with Health sector officials during health education programs, entomological surveillance and night blood filming conducted in these study sites due to the presence of BF patients in these villages in the recent past. In study sites positive for BF cases, residents were more aware about filariasis. It was proved by the results of Karavitagara, without patients only 30% (n=24) had good knowledge and 70% (n=56) had poor knowledge. This is supported by literature where a study done on Knowledge, Attitude and

Practices (KAP) on Dengue infection reveals the endemic study populations having a higher knowledge than that of the others (Selvarajoo *et al*., 2020).

Among the possible reservoir hosts, dog population in Puruduwella was significantly higher than that of the Karavitagara ($p = 0.026$). Similarly, cattle were found in all three tests sites but was absent from the control site Karawitagara. Studies indicate the possibility of dogs being reservoir vectors of BF harbouring the microfilaria in the country, thus the dog population may pose a severe threat the human population associated (Mallawarachchi *et al.,* 2018). Observation revealed the presence of dog biting *Armigeres subalbatus* in all study sites and increased monthly percentage abundances of mosquitos in Puruduwella and Karavitagara compared to other two sites. In such situations, it will be important to confirm the presence of *B. malayi* from *A. subalbatus* samples of Puruduwella using molecular methods.

Conclusion

Good knowledge and practices on filariasis, filariasis infection and control is significantly associated with lower educational qualifications and low-income levels, indicating the current knowledge dissemination or the control programmes might have targeted residents by convenience. Health education programs on filariasis infection control and vector control should be promoted in the areas that associated with vector breeding sites targeting all levels of the communities not just by convenience.

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