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Original Article

Filaria surveys in the Armed Forces: Need for a revisit

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ABSTRACT

Background: Routine annual filarial surveys are conducted amongst various categories of military personnel and their families as per policies in vogue in the Armed Forces. The neglect and inattention faced by this disease needs to be addressed in terms of policy, provisioning and processes while dealing with filariasis in the Armed Forces.

Methods: Routine annual filarial survey was conducted in a garrison during the months of Nov and Dec in 2013 and 2014. Blood slides from 6305 and 10,162 persons were collected in 2013 and 2014 respectively. 546 (60.66%) civilian migratory labourers were also subjected to the filarial survey.

Results: Of the blood slides collected amongst service personnel, 41 were positive for mf in 2013 and 29 in 2014 (i.e. a slide positivity rate (SPR) of 0.65% and 0.28% respectively). Out of 546 blood slides of the migratory population, 10 were found mf positive (SPR 1.83%) and three males had lymphedema.

Conclusion: It is recommended that routine annual filarial survey conducted in military garrisons should include all personnel belonging to known endemic states. Newer modalities of detection of infection may be considered to replace night blood surveys. An organization-specific surveillance programme on prevention and control of Lymphatic filariasis in the Armed Forces thus may need to be launched so that we can achieve elimination.

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Introduction

Lymphatic filariasis (LF) is a neglected tropical disease prevalent in 83 countries affecting 120 million people with serious economic and social consequences.¹ Filariasis has severely disfigured and disabled over 40 million people.² The

Global Programme to Eliminate Lymphatic Filariasis (GPELF) was launched in 2000 with the goal to eliminate LF as a public health problem by 2020 by using mass drug (administration) MDA.³

In India, LF is endemic in 250 districts in 20 states and Union Territories. The population of about 600 million in these districts is at risk of LF.⁴ Government of India launched an

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Fig. 1 – Secular trend (1983–2014) of slide positivity rate during filaria survey from a station in non-endemic state.

annual mass drug administration (MDA) campaign in 2004 and scaled up in 2007 covering all 250 endemic districts, enhancing the coverage of population from 72.4% in 2004 to 87.5% in 2012 to achieve elimination of LF. Microfilaria (mf) surveys in endemic districts before the beginning of MDA have shown reduction in mf rate after MDA from 1.24% in 2004 to 0.45% in 2012 (Fig. 1).⁵

Migration in developing countries of humans from endemic to non-endemic areas is relevant to LF elimination efforts. Military garrisons usually have a heterogeneous population drawn from different places across the country. Military personnel and their dependents belonging to LF endemic regions and residing away from such areas are usually not covered by the MDA instituted by governmental health services under the national vector borne disease control programme (NVBDCP) and continue to harbour the parasitic microfilaria in their blood if infected by lymphatic filariasis. In addition, civilian contractual workers (migratory populations) working at various construction sites are also staying within the military bases for months and probably would continue to stay till the completion of their projects. The majority of these workers are from states which are endemic for LF (Bihar, Jharkhand, West Bengal and UP) and may not have been covered by NVBDCP sponsored MDA. These individuals, if infected by the filarial worm, may become a reservoir of infection for local transmission.

Routine annual filarial surveys are conducted amongst various categories of military personnel and their families as per policies in vogue in the Armed Forces.^{6,7} However, there is presently no policy on MDA.

Material and methods

The study is based in a garrison town located in a non-endemic state (for LF) of north-western India. Routine annual filarial survey was conducted in the township during the months of November and December in 2013 and 2014. During the survey, thick blood slides were obtained aseptically by collecting approximately 20 mm³ blood by finger prick technique

between 2130 h and 2230 h. During the survey, individuals were also examined clinically for presence of lymphedema, hydrocele and other clinical signs of LF and they were queried about medication for LF from civil health agencies earlier. All slides collected were stained with methylene blue and microscopically examined for presence of microfilaria (mf). During the study period, the township had a population of 40,958, which included 27,613 (67.42%) males and 13,345 (32.58%) females. In the month of Oct 2014, about 905 civilian casual labourers (migratory population) with their families moved in to work on various construction projects. Blood slides from 6305 persons (males 4650, females 1655) and 10,162 persons (males 7192, females 2970) were collected in 2013 and 2014 respectively. 546 (60.66%) civilian migratory labourers were also subjected to the filarial survey.

Similar data was obtained from various other townships where public health service delivery units (Station Health Organizations) were located and this data was collated to formulate an overview of filarial surveys across the organization.

Results

Amongst the military population, of blood slides collected of 6305 (2013) and 10,162 (2014), 41 were found to be positive for mf in 2013 and 29 in 2014 with a slide positivity rate (SPR) of 0.65% and 0.28% respectively. Three individuals were found to have clinical signs of LF in 2013 and none in 2014. Two females had lymphedema of the lower limbs and the male had a hydrocele. Out of 546 blood slides of the migratory population, 10 were found mf-positive (SPR 1.83%) and three males had lymphedema. The difference in mf endemicity rate in the two groups was found to be statistically significant as depicted in Table 1.

Amongst those who were mf-positive, the ages of the affected individuals ranged from 6 years to 50 years with an average age of 27.89 years, while in the migratory population, the age ranged from 18 years to 50 years with an average age of 26.40 years. The age-wise distribution of mf-positive individuals is shown in Table 2. The state-wise distribution of mf-positive

Year of filarial survey	Military population			Migratory population		
	Number of slides examined	Number of slides positive for mf	Slide positivity rate % (95% CI)	Number of slides examined	Number of slides positive for mf	Slide positivity rate % (95% CI)
2013	6305	41	0.65 (0.50–0.92)		Survey not done	
2014	10,162	29	0.29 (0.20–0.41)	546	10	1.83 (1.00–3.34)

Z = −5.842; p value < 0.0001.

Age Group	Military population		Migratory population
	2013	2014	2014
Up to 10 years	00	01 (03.45)	00
11-20	00	00	03
21-30	24 (58.54)	21 (72.41)	05
31-40	14 (34.14)	04 (13.79)	01
41-50	03 (07.32)	03 (10.35)	01
Total	41 (100.00)	29 (100.00)	10

The number of mf per slide varied from 1 mf to 21 mf per slide and 1 mf to 17 mf per slide with the average infestation rate in the total population being 3.92 and 3.90 for 2013 and 2014 respectively. Amongst the migratory population, the

Similar data for the period from 2011 to 2014 from different areas where the military is deployed was obtained through liaison. A total of 60 public health detachments were contacted, and only 17 responded by sending the required data. Three detachments had reported nil positivity in all three years and one had not conducted the survey due to logistics issues. The compiled results are given in [Table 5](#). It was seen that slide positivity rates in townships located in endemic and non-endemic states were 0.16 and 0.54 respectively and this difference was statistically significant.

In another town located in a non-endemic region, a data set of filarial surveys from 1983 to 2014 was available, and thus can serve as a surrogate for the secular trend over nearly three decades (Fig. 1). Overall filarial SPR was 0.67% (534 slides positive out of 79,797 slides examined with average annual slides collected being 2494). There is a declining trend in SPR during filarial surveys over the last three decades in parallel to the national pattern post introduction of MDA since 2004 (Fig. 2).

States	Military personnel		Migratory population
	2013 (%)	2014 (%)	2014 (%)
Andhra Pradesh	02 (04.88)	00 (00.00)	00
Bihar	14 (34.15)	14 (24.14)	08 (80.00%)
Chhattisgarh	00 (00.00)	00 (00.00)	01 (10.00%)
Gujarat	00 (00.00)	04 (13.79)	00
Jharkhand	01 (02.44)	00 (00.00)	00
Madhya Pradesh	00 (00.00)	01(03.45)	00
Uttar Pradesh	22 (53.66)	09 (31.00)	01 (10.00%)
West Bengal	00 (00.00)	01 (03.45)	00
Punjab	01 (02.44)	00 (00.00)	00
Odisha	01 (02.44)	00 (00.00)	00
Total	41 (100.00)	29 (100.00)	10 (100.00)

Class of states of personnel examined	2013			2014			Combined		
	Exam	Positive	%	Exam	Posi	%	Exam	Posi	%
Endemic	4914	40	0.81	7565	29	0.383	12,479	69	0.55%
Non-endemic	1391	1	0.07	2597	0	0	3988	01	0.02%
Total	6305	41	0.65	10,162	29	0.285	16,467	70	0.43%
Chi square = 18.55; df = 1; p < .0001.									

Table 5 – Data obtained from 16 different regions (endemic vs non-endemic locations) for period 2011–2014.

	Total slides collected in years 2011–2014	Total number of positive slides	Average annual slides collected	Slide positivity rate (SPR)
Stations in endemic states				
A (Gujarat)	6369	1	1592	0.02
B (Jharkhand)	9540	15	2385	0.16
C (Karnataka)	21,535	28	5384	0.13
D (M.P.)	4287	2	1072	0.05
E (Maharashtra)	4918	0	1230	0.00
F (U.P.)	3649	0	912	0.00
G (Andhra Pradesh)	16,659	33	4165	0.20
H (West Bengal)	7789	59	1947	0.76
J (U.P.)	17,392	10	4348	0.06
Total	92,138	148	2559	0.16
Stations in non-endemic states				
K (J&K)	9578	8	2368	0.83
L (Punjab)	8493	6	2123	0.07
M (J&K)	32,752	196	8188	0.60
N (Punjab)	5464	15	1366	0.27
O (Rajasthan)	4632	17	1158	0.37
P (Rajasthan)	2648	3	662	0.11
Q (Rajasthan)	14,494	28	3264	0.19
Total	78,061	273	2787	0.35

Chi square = 60.17; df = 1; $p < .0001$.

Discussion

The main strategy of the GPELF is to interrupt transmission of LF by an annual single dose of diethylcarbamzine (DEC)/Ivermectin plus Albendazole covering the entire eligible population living in an area where the disease is endemic (where microfilaraemia or antigenaemia is $\geq 1\%$). WHO recommends MDA for five years or more to reduce number of mf in the blood to the level that prevents mosquito vectors from transmitting infection (mf prevalence $< 1\%$).⁸ In India, MDA was started in year 2004 and then extended to all endemic states in year 2006 with single annual dose of DEC

plus Albendazole. Out of 250 filarial endemic districts, 186 districts were having a mf rate $< 1\%$. Coverage of MDA in India (2011) was reported to be 74.93%, and at the national level, the mf rate was brought down to 0.41% (2010) from 1.24% (2004).⁹ The State of Bihar has highest rate of endemicity ($> 17\%$) followed by Kerala (15.7%) and Uttar Pradesh (14.60%); Andhra Pradesh and Tamil Nadu have about 10% endemicity while Goa has the lowest endemicity at $< 1\%$.¹⁰ Our soldiers are recruited from across these states, and usually miss the MDA campaigns in their native areas, due to deployment away from home. Hence, there is a pressing need for a targeted MDA policy within the Armed Forces too.

Fig. 2 – Effect of MDA coverage on microfilaraemia in India (5).

Our study was undertaken amongst military personnel and their families from all regions of India living in a large garrison located in a non-LF endemic state. The survey also included migratory population staying at construction sites in this garrison. The decline in mf rate from 0.65% in 2013 to 0.29% in 2014 could be attributed to treatment given to all mf positive persons detected during the filarial survey of 2013. Our mf rate was lower than the minimum threshold of mf rate (>1%) needed to maintain transmission of infection in the community but was higher than the national average mf rate of 0.45% in endemic states.

In the Indian Armed Forces, the total SPR was 0.04 (2009) and 0.02 (2009).¹¹ In the recent decades there has been limited research on filariasis in the Armed Forces in India, deployment in endemic areas notwithstanding.^{12–14} A study on 8859 recruits and 13,131 soldiers over a five year period in a military township located in an endemic state revealed a significantly higher prevalence of microfilaraemia amongst recruits (1.7%) compared to 0.6% amongst soldiers.¹⁵ In a study done in the Brazilian army, in which 23,773 men were screened, 585 (2.5%) had microfilaria (mf).¹⁶

The mf rate in the migratory population in our study was 1.83%, a level capable of sustaining transmission of infection in the area provided other conditions were conducive for transmission.³ Most of the mf positive military personnel belonged to endemic states, such as Uttar Pradesh (53.66% and 31%) followed by Bihar (34.15% and 24.14%) for the year 2013 and 2014 respectively. Amongst the migratory workers, the distribution was concentrated in the known endemic states of Bihar (80%), Uttar Pradesh (10%) and Chhattisgarh (10%). The average mf density of 3.9 and 6 in the two populations in the same locality may be likely to sustain development of infective larvae in vector after feeding on these low density carriers in the population.¹⁷

Slide positivity was found to be linked not to the geographic location of the garrison, but to the place of origin of the infected individual. It is anticipated that findings will be similar, if surveys are carried out in other similar settings like paramilitary forces camps, public sector establishments, camps for construction workers, etc. If the mf rate among these migratory populations is found to be more than >1%, then these people should be administered the two drug combination annually under the NVBDCP till they stay in non-endemic states.

Therefore, unless specific groups of people at risk like soldiers and migratory workers from endemic states living in non-endemic regions are addressed, the national and global target of achieving elimination of LF appears to be utopian.

Recommendations

The conduct of filarial surveys in the Armed Forces evokes varied responses amongst public health professionals, with viewpoints ranging from frank derision to futility of the exercise, to implementation and logistics issues. These opinions are mostly based on personal perceptions rather than on facts and it is now appreciated that public health decision making ought to be evidence driven rather than anecdotal.

Based on our interpretation of the findings of this study, it is recommended that routine annual filarial survey conducted in military garrisons should include all personnel belonging to known endemic states and 10% of the population from other non-endemic states should be selected by stratified random sampling.

In view of a large number of recruits coming from endemic states during enrolment drives, it is recommended that a multi-centric study should be conducted on fresh recruits to determine the prevalence of mf amongst them. If evidence is generated, then routine screening of recruits from endemic states could be conducted before enrolment. Once enrolled, the annual medical exam for soldiers belonging to endemic states could include a test for microfilaria.

Feasibility of introducing newer modalities of detection of infection by identifying circulating filarial antigen using ELISA or Immunochromatography card test may be considered to replace night blood surveys.

The neglect and inattention faced by this disease needs to be addressed in terms of policy, provisioning and processes while dealing with filariasis in the Armed Forces. An organization-specific surveillance programme on prevention and control of lymphatic filariasis in the Armed Forces thus may need to be launched so that we can achieve elimination.

Conflicts of interest

The authors have none to declare.

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