

Original Research Article

Utilisation of water disinfecting kit by armed forces personnel: a cross sectional study

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ABSTRACT

Background: Prevention of water-borne diseases is important for health and training of Armed Forces (AF) personnel. Although, supply of safe water is being ensured to them in military stations, but their training and frequent travels expose them to situations where water may be contaminated. To ensure prevention of water borne diseases, AF personnel are issued 'Out-Fit Water Sterilising kit' - a kit containing halogen and chlorine-removing tablets. The present study aims to identify the knowledge-use gap in utilization of this kit by AF personnel.

Methods: A cross sectional study among 649 randomly selected AF personnel was carried out in a large military station to identify the knowledge and practices of AF personnel regarding 'OFWS kit'. The data was collected on structured questionnaire through face-to-face interview, and analyse using SPSS ver 20.

Results: The study revealed progressive downward graph from knowledge regarding 'OFWS kit' (75.3%) to its availability (54.8%) and its ever-use (47.9%). Relevant service factors associated with use are presented.

Conclusions: The study highlights the need to ensure regular training of AF personnel in use of 'OFWS kit', its availability at the grass-root level and supervision of its use to ensure positive health of Indian soldier always- a prerequisite for his optimal training.

Keywords: Armed forces personnel, Free residual chlorine, Outfit water sterilising kit, Water borne infection

INTRODUCTION

Water-borne infections are important public health challenge in low-and middle income countries including India. The infections are endemic throughout India, and often are responsible for outbreaks especially in summer months and during monsoon.¹⁻⁴ These infections cause considerable morbidity, and have potential to cause mortality, especially among infants and young children.⁵⁻⁷ In India about 10.7 million cases with 1,535 deaths were reported during 2013.⁸ The incidence of these infections is, relatively less among armed forces (AF) personnel

who are ensured a high standard of hygiene and sanitation in their military stations.⁹ Supply of safe and wholesome water, continuous monitoring of its quality, proper disposal of wastes, integrated vector control, and health education of troops and spouses by armed forces medical services ensure that incidences of communicable diseases among troops and their family members remain 'within acceptable limits' (Mean±2 SD). Maintenance of the highest level of physical environment is vital for training of a soldier for his primary tasks. Paradoxically, the training of a soldier necessitates exposure to 'war-like' environments, where maintenance of the highest degree of hygiene and sanitation may not be feasible. In

addition, AF personnel, because of their deployments at ‘far flung’ areas travel frequently from their ‘places of duties’ to their homes. These ‘service requirements’ expose these personnel to situations where safe and potable water may not be always available. To overcome such situations AF personnel are issued and trained to use ‘water disinfecting kit, called ‘Outfit Water-Sterilizing (OFWS) kit’ (Figure 1) that consists of two small bottles in a box- the first bottle containing white-coloured 200 mg tablets containing 7.5% halogen (para-sulphon-dichloramino-benzoic acid), each being tailor-made for 1.41 litre of water (capacity of water bottle issued to the soldier) to achieve free chlorine levels of 3-4 ppm depending upon contamination levels of the water. The level of free chlorine which neutralise all microorganism including viruses.¹⁰⁻¹² The second bottle contains 15% anhydrous sodium thiosulphate tablets; addition of one blue tablet to the water bottle (not earlier than 30 minutes) renders the water potable by removing excess chlorine.

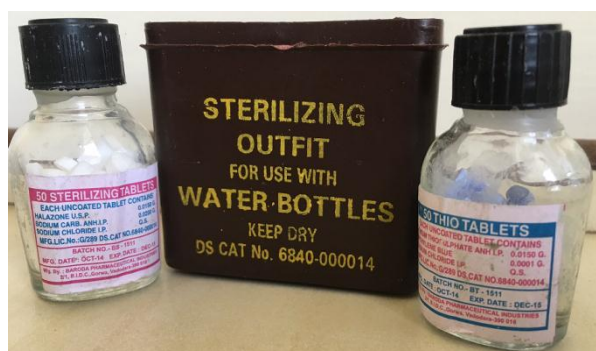


Figure 1: Outfit water sterilisation kit.

Thus, regular and proper use of ‘OFWS kit’ during ‘military operations’, ‘war-like’ training, and movements out of military stations is vital to prevent water borne disease including viral hepatitis which is fifth common cause of hospital admission due to communicable diseases in the armed forces and ensuring optimal health of AF personnel. This study attempts to identify the knowledge, attitude and practices of Indian AF personnel’s regarding ‘OFWS’ kits.

METHODS

This cross-sectional analytical study was carried out among randomly selected AF personnel posted in a large military station located in Western India from January to October 2016. A minimum sample size of 646 was calculated based on prevalent use of 50% obtained from a pilot study, a level of significance of 99% and a precision at 10% of the prevalence. Twenty-five percent was added to the calculated size to account for ‘inability to join the study due to leaves, temporarily away on duty or unwilling to participate in the study. Stratified sampling was used to ensure that all ranks (less commissioned officers) and all ‘arms and services’ were represented. The data was collected on a pre-tested structured

questionnaire by trained health workers. The data was tabulated in Windows Excel spreadsheet and analysed using SPSS ver 20. Summary statistics has been calculated as percentages and is presented graphically and in tables. Chi-square test has been used for establishing associations. Ethical considerations i.e. approval of the Institutional Ethics Committee and informed consent of the participants were ensured. To meet the requirements of service security, specific details regarding stratification and service-particulars of participants are not being presented.

RESULTS

The study was carried out among 649 AF personnel. The demographic profile of study population is depicted in Table 1. As seen, the age of study population varied from 20 to 51 years with mean of 32.5 years. Majority (95.5%) of the participants were under the age of 40 years. All the participants were males. The length of service ranged from 2 to 32 years with mean of 16.3 years. None of the participant was illiterate, and 88.9% were educated 10+2 or above.

Table 1: Demographic profile of study population.

Characteristics	Grouping	Number of individuals (n=649)	%
Age (years)	< 20	49	7.6
	21-30	295	45.4
	31-40	276	42.5
	41-50	27	4.2
	>50	02	0.3
Length of service (years)	< 5	07	1.1
	5-10	78	12.0
	11-20	425	65.5
	21-30	132	20.3
	>30	07	1.1
Education	Primary	15	2.3
	Middle	57	8.8
	Secondary	456	70.3
	Graduate	121	18.6

The knowledge regarding water-borne diseases, OFWS kit and its use is shown in Table 2.

The study revealed that 96.3% of the study participants were aware that contaminated water spreads diseases, and 88.4% had the knowledge that these diseases are preventable. 82.74% of soldiers knew that contaminated water can be rendered ‘safe’ in small quantity by treatment at individual level. The knowledge regarding availability of OFWS kit was 75.3% out of which 61.2% of participants had seen the kit during their service. Although 54.8% of the soldiers had ever been issued the kit, only 47.9% had used the OFWS kit for purification of water in situations where its use is recommended to

render the suspicious water safe i.e. during temporary duties, proceeding to ‘homes’ or training exercises.

square test revealed that age and length of service were significantly associated ($p < 0.05$) with the use, while level of education was not associated ($p > 0.05$).

Association between demographic variables and use of the kit is displayed in Table 3. The analysis using Chi-

Table 2: Knowledge and practices among study personnel regarding water-borne diseases and OFWS kit (n=649).

Attribute	Yes number (%)	No / do not know
Does contaminated water spread diseases?	625 (96.3)	24
Can spread of diseases be prevented?	574 (88.4)	75
Can water be purified in small quantity by an individual?	537 (82.7)	102
Have you heard about outfit water sterilising (OFWS) kit available in service?	489 (75.3)	160
Have you seen OFWS kit?	401 (61.8)	248
Have you ever been issued OFWS kit for use while proceeding on TD/leave/patrol/operation?	356 (54.8)	293
Have you ever used OFWS kit during above activities?	311 (47.9)	338

Table 3: Association of use of OFWS kit with demographic variables.

Characteristics	Grouping	Number of individuals Who had used OFWS kit (n=311) (%)	Number of individuals WS Kit (n=338)	P value (Chi-square test)
Age	<20	16	33	<0.01*
	21-30	131	164	
	31-40	143	133	
	41-50	19	8	
	>50**	02	-	
Length of service (years)	<5	07	05	<0.05*
	5-10	30	48	
	11-20	198	227	
	21-30	75	57	
	>30**	06	1	
Education	Primary	06	09	>0.05
	Middle	25	32	
	Secondary	224	232	
	Graduate	56	65	

Note: * statistically significant; ** data clubbed with previous row for Chi-square test.

DISCUSSION

Physical environment is one of the determinants of health of individuals and populations. Availability of safe and wholesome water is undoubtedly one of the most important factors for of same. The significance of safe water is even higher for AF personnel because health is a prerequisite for adequate training for task that expose them to high degree of physical and mental stress. Cameron in his article has also highlighted that purification of water by chlorination or other means is a major public health challenge in military operation of United States Army.¹³ Operational tasks of AF personnel has the potential to expose them to conditions where organizational efforts to maintain the highest degree of hygiene and sanitation may not be feasible. Hence,

comprehensive military training encompasses empowering them to maintain their water supply safe through individual actions. The equipment available with AF personnel of Indian Army is OFWS kit releasing chlorine. Kosi et al have brought out that chlorine tablets are 3 times more effective than other halogens in destroying *E. coli*.¹⁴ However, the availability of the kit by itself is not the end, as the ‘man behind a machine’ is more important than the machine itself. Hence training of the AF personnel regarding use of OFWS kit during situations where they may be exposed to unsafe drinking water deserves the highest priority.

The present study reveals that although large proportion of AF personnel are aware of risks of consumption of contaminated water, there occurs a continuous southward

shift when we move from knowledge through availability and actual practice (Figure 2).

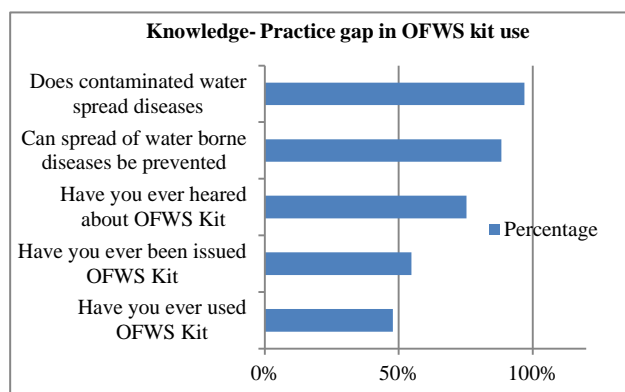


Figure 2: Knowledge-practice gap in OFWS kit use.

Recommendations

It is recommended that the training on use of OFWS kit is included in basic and periodic training manuals of a combatant. It is also recommended that both tablets should be made 'water dispersible' as the present ones require vigorous shaking for few minutes for complete dissolution- a time that may not be available to a soldier in close combat. Similar type of kits in user friendly packaging should also be made available for general public and specifically to frequent traveller, mountaineers, trackers and tourists to whom safe water may not be accessible at all time.

CONCLUSION

The study reveals that more than half of AF personnel have never used an OFWS kit- a equipment and skill that are important for their readiness for his combat role in all terrains and environments. It also shows that age and length of service are associated with the use, while level of education is not. The study provides important recommendations to the IA leadership to plan training of a soldier in essentials of health. Winning Wars need many inputs, but health remains one of them and should always be given the importance it deserves.

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