A Cross-Sectional Study of Heat-Related Knowledge, Attitude, and Practice among Naval Personnel in China

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Abstract

Background: Heat-related illnesses have significant impacts on health, and military personnel were widely exposed to risk factors of heat-related illness. Knowledge, attitudes and practices (KAP) are the three of the most important factors to prevent the heat-related illness. A cross-sectional study was designed to explore heat-related KAP of military personnel in China.

Methods: This survey was conducted in June 2019. A total of 646 military personnel were recruited from 2 navy troops in tropical zone and one in temperate zone. Data regarding demographic characteristics and KAP scores were collected using questionnaires. Univariate analysis and Scheffe's method were used for data analysis.

Results: The mean K-score was relatively high (10.37, SD=1.63), but the subscore of awareness of exertional heatstroke and the risk of alcohol and soda drinks were inadequate. There are noticeable differences in the mean K-score according to age, military ranks and education levels (P<0.05). The mean A-score was 7.76 (SD=2.65). The participants from tropical zone or had relevant experience had higher A-score (P<0.05). The mean P-score was 3.80 (SD=1.12), and participants from temperate zone had higher P-score (P<0.001).

Conclusions: Military personnel's awareness of the prevention and first-aid measures of heat related illnesses need to be strengthened, and it is very important to develop educational programs and enrich systematic educational resources of heat-related illness.

Background

The Intergovernmental Panel on Climate Change (IPCC) projects that the frequency, duration and intensity of extreme weather may increase in the coming decades[1]. The extreme weather of exceed 3-consecutive-day with maximum temperature over 35 °C
could be described as heat wave[2]. The frequency of heat waves has increased in most parts of Asia[3], Europe and Australia. Furthermore, episodes of heat waves can have significant impacts on health and present a challenge for occupational health protection. Heat-related illness includes heat stroke, heat exhaustion, rhabdomyolysis, heat spasm, heat syncope and heat rash. The inverse effects of heat-related illnesses on mortality have been widely reported. Mortality from heatstroke among the elderly exceeds 50%[4]. Another study, conducted in 66 cities in China, showed that 5.0% of excess deaths may be associated with heat waves[5]. The global estimate for the number of heat-related deaths will increase by about 90,000 annually in 2030 and more than 255,000 in 2050[6]. Therefore, more attention should be paid to the insidious health effects of heat-related illness.

Risk factors associated with heat-related illness may be environmental or individual. As exogenous factors, environmental risk factors may include high temperature, humidity, direct sun exposure, etc. The individual risk factors, also known as endogenous factors, may include insufficient fluid intake, physical exertion, physical condition, medications, pregnancy, etc[7]. Military personnel, especially those in low latitude area where soldiers routinely pay high levels of physical exertion in high ambient temperature and humidity environment, are widely exposed to both exogenous and endogenous risk factors of heat-related illness. Military endeavors in heat waves can alter the judgment and physical performance of military personnel, and end with significant impairment of individual’s ability to work, or even lead to death[8,9]. Therefore, reducing heat-related illness is one of the key factors to ensure the combat effectiveness of the army in heat waves condition. The Knowledge, Attitudes and Practice (KAP) study among specific populations is to collect data on people’s knowledge, perception and behaviors about a certain topic. literatures showed that knowledge of heat waves, attitudes to risk factors and adaptation practices
are the three of the most important factors to prevent the heat-related illness[10]. KAP studies on heat waves has been mostly performed in different occupations. For instance, a KAP study about health professionals in Victoria found that an opportunistic, reactive approach in conjunction with gaps in knowledge leave the aged at risk of preventable harm from extreme hot weather[11]. For military personnel, only a few studies have focused on the knowledge of heat related illnesses among Chinese soldiers, but there is a lack of investigation and correlation analysis on the three aspects of knowledge, attitude and practice. Therefore, in this study, three troops with different risk factors in low latitudes were selected to explore heat-related KAP of military personnel in Chinese Navy for the first time, which aimed to provide data for future policy formulation and implementation in response to heat waves and associated adverse impacts.

Methods

2.1 Climate Zone of Study Area

A total of 3 navy troops took part in the study. Two of the sampled troops are located in the tropical zone (geographic coordinates, approximately 9° north latitudes), under high temperature and humidity stress the whole year. The annual mean temperature is 28-30°C, while the highest surface temperature is up to 60°C in summer. The precipitation and summer sunshine hours are 1200-3300mm and 6.03h. The other sampled troop is situated in a warm temperate continental monsoon climate zone (geographic coordinates, approximately 30° north latitudes), characterized by solar-rich sunshine (6.4h in average), with an annual mean temperature of 8.8°C and the precipitation of 428.8mm. There are about 18 days per year called “heat day”, in which the maximum temperature exceeds 35°C[2].

2.2 Study Participants

The convenience sampling method was utilized to selected military personal from 3 navy
troops. The target population of this study was active-duty Navy members without health care work experience. A platoon is a military unit containing 30-50 Navy members. A total of 15 platoons of troops in the tropical zone were included in the study, with 560 navy members participated in the study. In the temperate zone, three platoons were included in the study with totally 86 navy members.

2.3 Design and Data Collection

A questionnaire was developed based on a literature review on heat waves and heat-related illness. The questionnaire consisted of four sections: (1) socio-demographic information, including age, year of military service, education level, marital status, military ranks and heat-related illness experience; (2) Knowledge section: 18 questions on knowledge about heat-related illnesses (13 true-false items and 5 multiple-choice items), including symptoms and treatment about heat-related illnes and risk factors of heat waves. (3) Attitude section: 4 attitude-related questions, i.e., whether measures were taken by navy members to prevent heat-related illnesses in heat waves. (4) Practice section: 6 questions on practices for preventing heat-related illnesses.

Data were collected in June 2019. Participant were interviewed by well-trained researchers using the structured questionnaires. Various actions were taken to ensure the quality of the questionnaire. Firstly, a panel of experts were consulted at the questionnaire development stage, and then a small scare of pilot study was performed to do semantic analysis. Before the survey, all the researchers were trained systematically to be familiar with the unified guide language and filling methods. All questionnaires were filled in and collected on the spot to increase the return rate. Two independent researchers performed data collation and entry to minimize errors in the data processing.

2.4 Statistical Analysis

There were eighteen, four, and six items in knowledge (K), attitude (A), and practice (P)
section respectively. For K section, the true-false items and multiple-choice questions were assessed by assigning 1 point to correct answer, or otherwise 0. In the multiple-choice questions, however, if a wrong option was ticked, it counted as 0. In A section, a 4-point scale that was used as the marking scheme (the options were arranged from 1–4 with no higher or lower score). For P section, scores were assessed by assigning 1 point to each response of “Yes” and 0 point to response of “No.” The score ranges for the K, A, and P sections were 0–18, 1–16, and 0–6, respectively.

The SPSS for Mac version 25.0 program was used for data analysis. Mean and standard deviation (SD) values were calculated for continuous variables. Categorical variables were computed as a percentage of subjects with the perspective attribute. Univariate analysis of variance was used to test the association of each demographic characteristic with the K, A, and P-scores and the overall score. Scheffe’s method was used in further paired comparisons if necessary. Pearson correlation analysis was performed to clarify the correlations among the K, A, and P scores. p < 0.05 was considered statistically significant.

3 Ethical Statement

The study was approved by the ethics committee of the institutional review board of the Naval Medical University. Written informed consent was obtained from all participants before the survey. All the data obtained was anonymous.

Results

4.1 Participant Demographic

In the baseline survey, a total of 646 subjects were approached and invited to join this study, but 6 participants did not complete the questionnaires, leaving 640 (99.1%) in the final analysis. The social-demographic characteristics of the participants is presented in Table 1. All of the participants were males, with the mean age of 25.1 years (range 18–43
years, SD = 4.09). Most participants (43.9%) were in the length of military service for 1–5 years. With respect to the climate zone for the residence of troops, 86.8% of the participants came from the tropical zone. The education level and military ranks of participants varied, and 29.1% of the participants had heat-related illness experience.

4.2 Response to Questions on Knowledge

Table 2 provide the details of the responses to the questions on knowledge about heat-related illnesses. For the true-false items, more than a half of the questions received correct answers from over 80% of the respondents. Most of participants (95.9%) knew the heat exhaustion management including transferring victims to a cool environment, drink fluids, apply cool water, ice packs and fanning. However, over one-third of participants (34.7%) did not know that sweating could reduce body temperature, and 37.5% of the participants considered that only physically weak persons are susceptible to the heat-related illnesses during field training exercises. Moreover, 81.2% of participants had the wrong answer in heatstroke characteristics. For the multiple-choice items, the correct rate is far lower than the true-false items. 77.4% of the participants considered alcohol as the factor to decrease the risk of heat waves, which actually is one of the risk factors. 85.0% of the participants preferred to have soda drink during field training exercises, instead of water or Oral Rehydration Salts (ORS), which is recommended by the World Health Organization (WHO).

4.3 Responses to Questions on Attitude and Practice

In the Attitude section, the ratio of the participants who selected very concern about the risk of heat-related illnesses was only 26.2%. 40.4% of the participants considered they were somewhat sensitive for heat-related illnesses, while less than 12.8% answered “Not at all”. In respect of the Practice section, most of the participants (79.7%) reported that their leaders generally arranged outdoor activities at relative cooler time and the medics
took intervention measures (74.4%) when a high temperature warning is released.
Additionally, 71.9% of the participants were aware of that it is necessary to implement
good heat-related illnesses preventive measures. However, only 64.8% of participants
received health education before field training, and nearly three-fourth of the participants
(74.4%) stated that they drank water only when thirsty (Table 3).

4.4 Mean Score of Knowledge, Attitude and Practice
The detailed mean KAP score and mean overall score according to the demographic
characteristics were showed in Figure 1. The mean K-score was 10.37 (range 3–13, SD =
1.63). There are noticeable differences in the mean K-score according to age, military
ranks and education levels (P<0.05). The paired comparisons using Scheffe’s method
indicated that mean K-score was lower in the participants younger than 20 years old
compared with the other age groups (P<0.05), and was higher among junior
officers (P<0.05) and those had bachelor or above degree (P<0.05).
The mean A-score was 7.76 (range 0–16, SD = 2.65). The participants from tropical zone
had higher A-score than those from temperate zone (8.2, SD = 3.08 vs. 6.9, SD = 2.34)
(P<0.05). In terms of heat-related illness experience, participants who had relevant
experience reported higher A-score than those who did not have (7.8, SD = 2.65 vs. 6.9,
SD = 2.58) (P<0.05).
The mean P-score was 3.80 (range 1–6, SD = 1.12). The participants from temperate zone
had higher P-score (4.3, SD = 0.90 vs. 3.6, SD = 1.22) (P<0.001) than those from
temperate zone.

4.5 Correlation among Knowledge, Attitude and Practice
Correlation analyses suggested a significant positive correlation between A and P scores (r
= 0.170, P<0.001), however, the correlations were weak. A positive correlation was found
neither between K and A score nor K and P score (Table 4).
Discussion

Several studies have reported that heat waves have adverse effects on human health[12]. People's awareness to risk, protective practices and knowledge about of heat-related illness are crucial elements for reducing harmful effects of heat waves[2]. However, to our knowledge, this is the first study to survey the military personnel’s KAP with regard to heat-related illnesses in Chinese Navy. Study on this field may be great significant as military personnel were widely exposed to risk factors of heat-related illness. Therefore, the finding of this study may provide essential references for military training and health education to military personnel. 

In this survey, the majority of the participants had high score on most K-questions and had well awareness and protective practice towards heat-related diseases. However, some subgroups showed lower K, A, P scores, which were related to demographic factors, environmental difference and personal experience.

Knowledge plays an important role to mitigate the adverse effects of heat waves[13]. By analyzing participants’ answers to K-questions in this study, we find that military personnel had high score on most common-sense questions about heat-related illness, such as 95% of the participants knew that cool environment, drink fluids, apply cool water, ice packs and fanning were interventional measures for heat-related illness.

However, the rates of correct answers for exertional heatstroke were extremely low. Only 37.5% of the participants recognized the severity of exertional heatstroke and 25.2% of the participants identified no sweating as danger signal. Exertional heatstroke is a medical emergency, which is directly related to intense physical activity. Military personnel under conditions of exercise intensity and environmental exposure is vulnerable to exertional heatstroke[14]. An epidemiological survey on military personnel showed steady increase in morbidity and mortality of exertional heatstroke in the past
decade[15], but effective recognition and promptly treatment can greatly reduce its mortality rate[16]. Therefore, it is necessary to strengthen military personnel’s awareness of the prevention and first-aid measures of exertional heatstroke.

It is stunning to note that 85% of the participants chosen soda drink for the heat victim, and 93.4% of them believed that alcohol beverages were beneficial for preventing one from heat-related illnesses during field training. The misinformation that alcoholic beverages and soda drinks contributing to the prevention and treatment of heat-related diseases may be related to the media channel. Military personnel may access information through television, internet and smart phone[17]. However, the information from these media usually has commercial purposes, which may be misleading to the audience. For example, advertisements often link ice beer to the hot summer, and show the image of a sportsman in high ambient temperature drinks ice soda drink delightedly. The erroneous information may be fatal at the critical moments of rescuing severe exertional heatstroke.

According to a literature report from New England Journal of Medicine, alcohol heightens the metabolic response to physical activity and is the risk factor for exertional heatstroke[4]. Therefore, administrators of the army should pay efforts to develop educational programs to improve the military personnel’s knowledge with regard to heat-related illness, moreover, governments and relative institutions should call on the dissemination of relevant knowledge on mass media.

Through the analysis of demographic characteristics, we find that participants younger than 20 had lower K-score(p<0.05). This result was in contrast to the findings of Jing Li et al[2]. The reason may be that the age span of objects in Jing Li’s study was large, ranging from 15–91, whereas the military personnel involved in our study were all young with the mean age of 25.1 years old. Additionally, K-score was higher among junior officers(p<0.05) with higher educational levels, which was similar to those of previous
studies[18]. This results suggest that we should carry out health education on heat-related illness especially for young soldiers. Simultaneously, the advantage of military officers with high education level and good mastery of relevant knowledge should be taken, and they could be further developed to be instructors in health education projects. The majority of the participants had well awareness towards heat-related diseases. 87.5% of the participants intended to take preventive measures in high ambient temperature, and 75.1% of the participants considered themselves sensitive for heat waves. Moreover, participants from a humid tropical zone had a higher mean A-score than those from temperate zone. However, with regarded to the risks of heat-related illnesses, participants expressed opposite attitudes. Most of them (44.5%) reported only little concern about the risks, which is probably due to insufficient knowledge of the risks of heat-related illness[19]. Hence, it is very important to enrich systematic educational resources to promoting such information.

The Pearson correlation analysis indicated that there is weak correlations between A and P score, consistent with the results of previous studies[20], in which the authors reported that risks awareness and adaptation practices were positively correlated. The explanation as to this correlation could be provided by the Health Belief Model. This model asserts that health-related practices are determined by whether people recognized the seriousness of the problem and perceived themselves to be susceptible to heat-related illness[21]. Therefore, a positive attitude or well awareness towards heat-related diseases will promote preventive practices, which would reduce the adverse effects of heat waves. But a subgroup in this study showed an interesting result that military personnel worked in tropical zone had positive awareness, but low P-score. These finding may be partially explained by three factors. Firstly, people in low latitudes are better adapt to heat through behavioral and structural adjustment than people in high latitudes, which called
thermal acclimatization[22]. Therefore, although positive attitude toward heat-related illness, military personnel in tropical zone had limited protective behaviors. Second, the majority of military personnel were young man who may be more willing to take risk and believe that they can handle heat. In addition, motivation and pressure from peers and instructors are likely to drive the young to perform beyond their physiological capability, which is also one of the major risk factors for exertional heatstroke[23]. It shows that many factors might influence people's behavior, so further studies are needed to explore the production of protective behaviors.

6. Limitation
There are several limitations in our research. Firstly, our present study only investigated KAP of heat related illnesses in Chinese naval officers and soldiers, thus, caution should be applied when the results were generalized to other military services. Secondly, most of the participants came from the tropics and only a small sample were from the temperate zone, which devalued the representativeness of the study results. Thirdly, the questions in the questionnaires relating to KAP of heat related illnesses are limited and not comprehensive and detailed enough, which may not explore the knowledge mastery, behaviors and attitudes in depth.

Conclusion
Our research revealed that participants had high score on most common-sense questions and had well awareness and protective practice towards heat-related illness. However, the risk of exertional heatstroke and alcohol and soda drinks were inadequate. In addition, some subgroups showed lower K, A, P scores, which were related to demographic factors, environmental difference and personal experience. Thus, military personnel’s awareness of the prevention and first-aid measures of heat related illnesses need to be strengthened. In order to address these issues, it is very important to develop educational programs and
enrich systematic educational resources of heat-related illness.

Abbreviations

The Intergovernmental Panel on Climate Change (IPCC); The Knowledge, Attitudes and Practice (KAP); Standard Deviation (SD).

Declarations

Ethics approval and consent to participate:

The study was approved by the ethics committee of the institutional review board of the Naval Medical University. Written informed consent was obtained from all participants before the survey. All the data obtained was anonymous.

Consent for publication

This manuscript does not contain any individual person’s data. All participants were informed of the publication of research findings through information sheets. Permission to publish the results from this study was granted by the ethics committee of the institutional review board of the Naval Medical University.

Availability of data and materials: Data is not available for online access, only members of the research team have access to the data.

Competing Interests: The authors declare that they have no competing interests.

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Author Contributions: LG and SX conceived and designed the study, and administrative support; XW undertook data analysis, results interpretation and manuscript preparation; DX organized the field works and collected the data; YW was responsible for critical revision of the manuscript.

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**Tables**

**Table 1.** Demographic Characteristics (n=640)

| Characteristic                      | Category       | n   | Proportion(%) |
|-------------------------------------|----------------|-----|---------------|
| Age(year)                           | £20            | 59  | 9.2           |
|                                     | 21-25          | 347 | 54.2          |
|                                     | 26-30          | 154 | 24.1          |
|                                     | £30            | 78  | 12.2          |
|                                     | Unanswered     | 2   | 0.3           |
| Year of Military service            | £1             | 48  | 7.5           |
|                                     | 1-5            | 281 | 43.9          |
|                                     | 6-10           | 159 | 24.8          |
|                                     | 11-15          | 107 | 16.7          |
|                                     | £16            | 44  | 6.9           |
|                                     | Unanswered     | 1   | 0.2           |
| Education Level                     | Bachelor level or above | 139 | 21.7          |
|                                     | Junior middle school | 214 | 33.4          |
|                                     | Senior middle school | 253 | 39.5          |
|                                     | Elementary school | 31  | 4.8           |
|                                     | Unanswered     | 3   | 0.5           |
| Marital Status                      | Unmarried      | 479 | 74.8          |
|                                     | Married        | 157 | 24.5          |
|                                     | Divorced       | 2   | 0.3           |
|                                     | Unanswered     | 2   | 0.3           |
| Rank                                | PFC            | 90  | 14.1          |
|                                     | Corporal       | 206 | 32.2          |
|                                     | Sergeant or above | 248 | 38.8          |
|                                     | Junior officer | 76  | 11.9          |
|                                     | Field officer  | 17  | 2.7           |
|                                     | Unanswered     | 3   | 0.5           |
| Climate Zone                        | Tropical zone | 556 | 86.8          |
|                                     | Temperate zone | 84  | 13.2          |
| Heat-Related Illness                | Yes            | 186 | 29.1          |
| Experience                          | No             | 453 | 70.8          |
|                                     | Unanswered     | 1   | 0.2           |

**Table 2.** Responses to knowledge items (n=640).
| Question                                                                 | Category       | n (%)  |
|------------------------------------------------------------------------|----------------|--------|
| 1. Could fainting and collapse be due to heat-related illnesses        | Yes            | 84.1   |
| during field training exercises?                                       | No             | 15.9   |
| 2. Is heat exhaustion managed by transfer of the victim to a cool      | Yes            | 95.9   |
| environment, drink fluids, apply cool water, ice packs and fanning?   | No             | 4.1    |
| 3. Are fever, fatigue, and chest tightness common symptoms of heat    | Yes            | 80.1   |
| stroke?                                                                | No             | 19.9   |
| 4. When heat stroke is suspected, should you first transfer the       | Yes            | 93.2   |
| victim to a cool environment then ask for ambulance?                  | No             | 6.8    |
| 5. Can wearing of thick clothes prevent heat stroke?                   | Yes            | 5.5    |
|                                                                      | No             | 94.5   |
| 6. Could muscle cramps in victim be due to heat-related illnesses      | Yes            | 81.8   |
| during field training exercises?                                       | No             | 18.2   |
| 7. Can cooling body down prevent heat stroke?                          | Yes            | 86.5   |
|                                                                      | No             | 13.5   |
| 8. Can staying at cold spots prevent heat stroke?                      | Yes            | 93.3   |
|                                                                      | No             | 6.7    |
| 9. Is dehydration one of the symptoms of heat stroke?                  | Yes            | 92.2   |
|                                                                      | No             | 7.8    |
| 10. Can sweating reduce body temperature?                              | Yes            | 65.3   |
|                                                                      | No             | 34.7   |
| 11. Only those physically weak persons are susceptible to the heat-    | Yes            | 37.5   |
| related illnesses during field training exercises?                    | No             | 62.5   |
| 12. Can heat-related illnesses cause a rapid loss of victim life       | Yes            | 84.0   |
| during field training exercises?                                       | No             | 16.0   |
| 13. Is heat exhaustion characterized by temperature higher than 40    | Yes            | 81.2   |
| degrees?                                                               | No             | 18.8   |

| Question                                                                 | Category       | n (%)  |
|------------------------------------------------------------------------|----------------|--------|
| 1. Which type of heat-related illnesses sign or symptom is more        | No sweating    | 25.2   |
| serious during field training exercises?                               | Sweating       | 78.2   |
|                                                                       | Faint          | 38.8   |
|                                                                       | Fatigue        | 20.5   |
| 2. Which type of drinks would you prefer heat victim drink during      | Ginger drink   | 40.3   |
| field training exercises?                                              | Soda drink     | 85.0   |
|                                                                       | Water or ORS   | 36.8   |
|                                                                       | Coffee         | 22.7   |
|                                                                       | Aging          | 21.6   |
|                                                                       | Overweight     | 29.2   |
|                                                                       | Alcohol        | 77.4   |
|                                                                       | Enough fluid   | 9.7    |
|                                                                       | Alcohol        | 93.4   |
|                                                                       | Beverages      | 14.4   |
| 4. How to prevent oneself from heat-related illnesses during field     | Wear thick and | 40.5   |
| training exercises?                                                   | dark clothes   |        |
|                                                                       | Use sunscreen  | 38.9   |
|                                                                       | Heat cramp     | 60.3   |
|                                                                       | Heat exhaustion| 70.5   |
|                                                                       | Heat stroke    | 37.5   |
|                                                                       | Heat syncope   | 73.4   |

*a* The correct answer.
Table 3. Responses to attitude and practice items (n=640).

| Question                                                                                   | Category     | n (%)  |
|-------------------------------------------------------------------------------------------|--------------|--------|
| 1. Do you intend to take preventive measures of heat cramp, heat exhaustion and heat stroke before and during field training exercises if a high temperature warning is released? | Very much    | 45.1   |
|                                                                                            | Much         | 42.4   |
|                                                                                            | Sometime     | 8.6    |
|                                                                                            | Not at all   | 4.0    |
| 2. What is your level of concern relating to the risk of heat-related illnesses during field training exercises? | Very concern | 26.2   |
|                                                                                            | Little concern | 44.5  |
|                                                                                            | Not at all   | 21.8   |
|                                                                                            | I don’t know | 7.5    |
| 3. Do you consider yourself sensitive for extreme heat?                                    | Very well    | 34.7   |
|                                                                                            | Somewhat     | 40.4   |
|                                                                                            | Not at all   | 12.8   |
|                                                                                            | I don’t know | 12.1   |
| 4. Do you think the medics raise enough awareness for extreme heat?                         | Too much     | 30.3   |
|                                                                                            | Just enough  | 40.4   |
|                                                                                            | Too little   | 20.1   |
|                                                                                            | I don’t know | 9.1    |

| Question                                                                                   | Category     | n (%)  |
|-------------------------------------------------------------------------------------------|--------------|--------|
| 1. Do your leaders generally arrange outdoor activities at relative cooler time when a high temperature warning is released? | Yes          | 79.7   |
|                                                                                            | No           | 20.2   |
| 2. Before you go out in the field for training exercises, do your medics educate you about how to prevent and cope with heat-related illnesses?  | Yes          | 64.8   |
|                                                                                            | No           | 35.2   |
| 3. When you go out in the field for training exercises, do you implement good heat-related illnesses preventive measures? | Yes          | 71.9   |
|                                                                                            | No           | 27.9   |
| 4. During field training exercises, do you pay more attention to the signs and symptoms of heat cramp, heat exhaustion and heat stroke? | Yes          | 63.1   |
|                                                                                            | No           | 36.9   |
| 5. Do you drink water only when thirsty during field training exercises?                    | Yes          | 74.4   |
|                                                                                            | No           | 25.4   |
| 6. When your troops go out in the field for training exercises, does Medics prepare good heat-related illnesses intervention measures, such as medications, fluids and temperature decreasing devices? | Yes          | 74.4   |
|                                                                                            | No           | 25.4   |

Table 4. correlation among knowledge, attitude and practice scores

| Variable      | Knowledge score | Attitude score | Practice score |
|---------------|-----------------|----------------|----------------|
| Knowledge score | 1               | 0.004          | 0.020          |
| Attitude score  | 0.004           | 1              | 0.170**        |
| Practice score  | 0.020           | 0.170**        | 1              |

**P<0.001**

Figures
Figure 1

Detailed mean KAP score and mean overall score according to the demographic characteristics