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Karshi-Khanabad Surveillance Program (K2SP)

Preliminary Morbidity and Mortality Findings

BACKGROUND

Karshi-Khanabad (K2), a former Soviet-era airbase in Uzbekistan,[1-2] was occupied by US Forces from OCT 2001 through APR 2005 in support of OEF[2]. Occupational and environmental surveys performed at K2 in 2001, 2002, and 2004 found underground jet-fuel plumes, surface dirt contaminated with trace amounts of asbestos and depleted uranium, and periodic high levels of dust and other particulate matter (PM) in the air due to seasonal dust storms. [1-2]

In 2012 Army Public Health Command (APHC) conducted a retrospective cohort study of cancer outcomes among 7,000 active-duty Service members who had deployed to K2 compared to a similar group of active-duty Service members that deployed to S. Korea.[3] The only increased risk was found for malignant melanoma (aRR = 3.68; 95%CI = 1.35 – 10.04) and leukemias and lymphomas (aRR = 5.64; 95%CI = 1.70 – 18.70).. In contrast, lower rates were observed in most other diseases (circulatory, respiratory, and mental health) among K2 Service members. This study included only about half of all those that deployed to K2, had <10 yrs. follow-up in a relatively young group of active-duty Service members in whom we would not expect to observe appreciable rates of cancers or other chronic diseases. Thus, these results do not provide definitive evidence to support or negate an adverse health effect associated with K2 deployment. However, it is concerning that this study suggests there may be an increased risk of leukemias and lymphomas and indicates the need for ongoing assessment and monitoring of the K2 population.

The K2 Surveillance Program (K2SP) was designed to provide a methodology for ongoing surveillance and assessment of the potential negative health effects associated with deployment to K2. Here we present preliminary findings from the initial morbidity and all-cause disease-specific mortality analyses.

METHODS

- In collaboration with DoD, VHA, and VBA we identified 15,035 Veterans and Service members that deployed to K2 (Table 1). Of these 2,832 remain on active duty and/or were special operations for whom deployment information is unavailable leaving 12,203 available for study.

Table 1. Summary of steps to identify the K2 cohort.

Step	Description	Count
1	Central Command Roster	10,401
2	DMDC/ VADIR[1] – UZB deployment	10,814
3	subtotal (1+2)	21,215
4	duplicates	-6,039
5	Civilian-only	-69
6	bad SSN	-72
7	**K2 Master Roster**	**15,035**
8	Not confirmed[2]	-2,832
9	**K2SP**	**12,203**

1- DMDC = Defense Manpower Data Center; VADIR = VA Data Identification Record.
2- Remain on active duty and/or special operations.

- Two comparison groups were created:
  - OEF deployed during the K2 occupation but never deployed to K2.
  - OEF era that did not deploy to anywhere in SW Asia during the K2 occupation.
  - Comparison groups matched 5:1 to K2 cohort on
    - Age, Sex, Race, Branch, Rank, component

- Morbidity (disease) outcomes were defined by ICD9/10 codes derived from DoD and VHA healthcare encounter data beginning in 2000 through 2021:
  - Morbidity outcomes included: neurologic, respiratory, cancers, as well as HTN, CFS, IBS, and diverticulitis.
  - Prevalence ratios with 95% confidence intervals comparing K2 to each of the comparison groups was used to assess if deployment to K2 was associated with an increased risk of disease.

- Mortality outcomes were derived from the Mortality Data Repository (NDI):
  - All-cause, disease-specific mortality is presented here that excludes KIA, accidents, suicides, and homicides.

- Mortality ratios with 95% confidence intervals were used to compare K2 to each of the comparison groups.
- Standardized Mortality Ratios were computed comparing each of the K2SP groups to the general US population controlling for age, sex, and race.

RESULTS

- Table 2 summarizes the demographic and key military characteristics for the K2 Surveillance Program (K2SP) population by group. While some variability across groups was observed, the differences were all very small and not statistically significant.

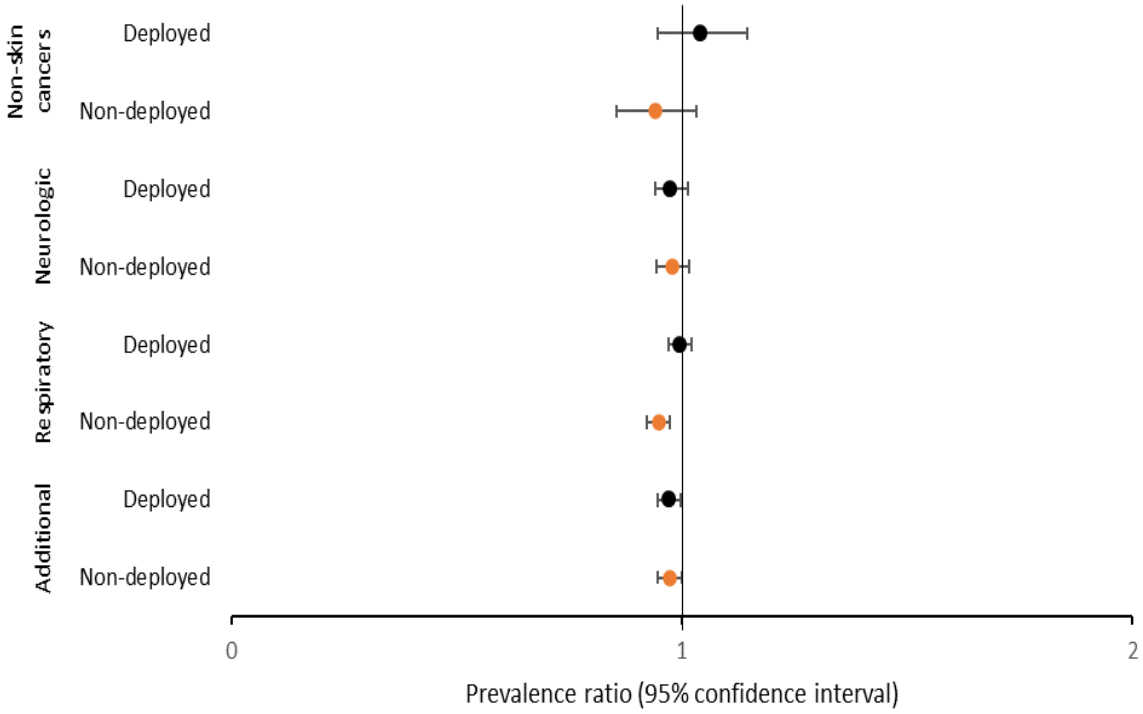
Table 2. Demographic and military characteristics by K2SP by group.

		K2	OEF deployed	OEF era
Sample Size (#)		12,203	61,015	61,015
Age Category (%)	<= 40	8.74	9.3	9.1
	41-45	25.1	25.5	25.5
	46-50	19.1	18.2	19.1
	51-60	33.1	33.4	32.3
	Over 60	14.0	13.7	13.8
Race (%)	Black	13.2	13.2	13.5
	White	73.2	73.3	72.7
	Other	13.6	13.6	13.9
Sex (%)	Male	90.9	90.9	90.9
Rank (%)	Enlisted	87.3	89.8	86.7
	Officer	12.7	10.3	13.3
Deployed Pre 9/11 (%)		21.9	21.7	21.6
Duration of Service (%)	0-3 years	1.0	1.2	0.6
	3-5 years	8.9	9.7	8.1
	5-8 years	10.1	10.3	9.7
	over 8 years	80.0	78.8	81.6
Branch of Service[1] (%)	Army	27.7	28.2	28.5
	Air Force	44.9	46.7	43.3
	Marine Corps	2.9	2.8	3.1
	Army Reserve/NG	10.5	9.8	11.3
	Air Force Reserve/NG	12.5	10.8	10.9
	Other	1.6	1.7	2.9

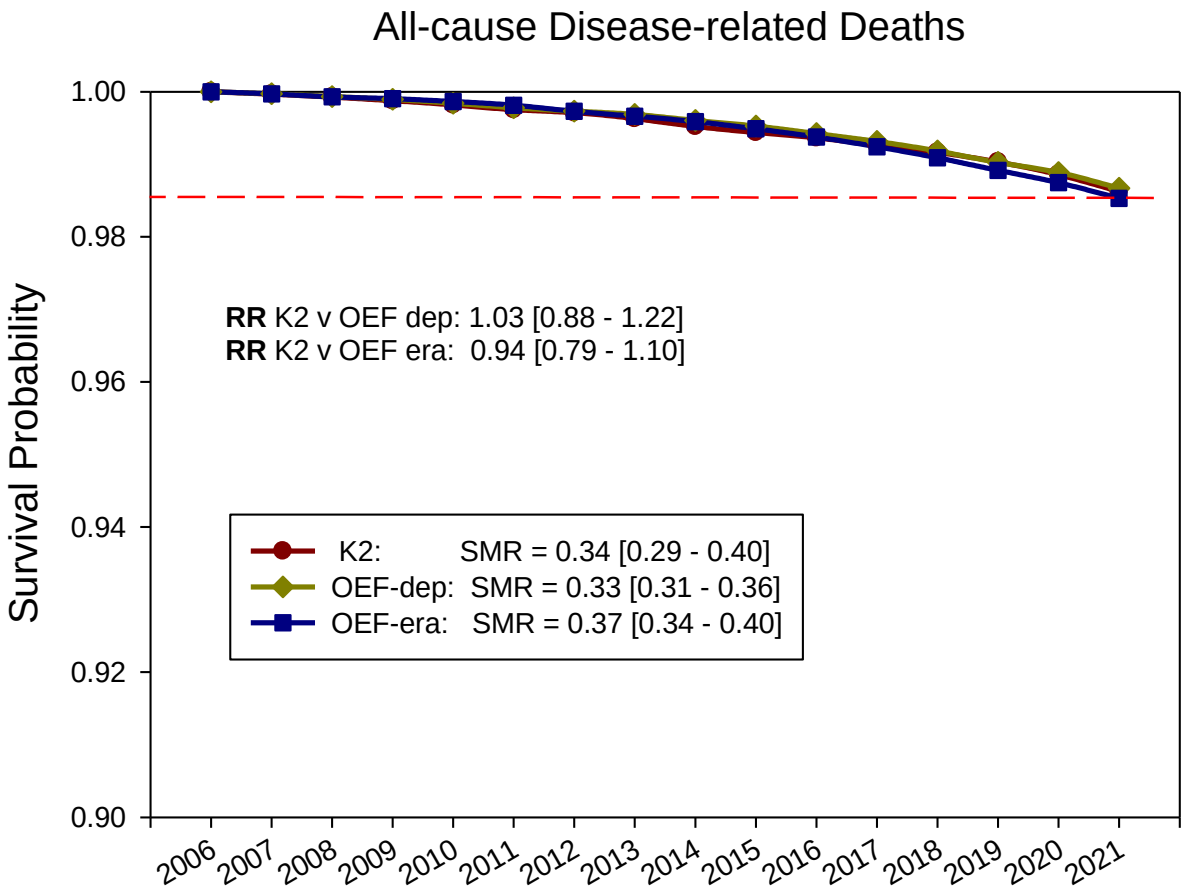
1- Initial Branch of service during the K2 occupation (2001 – 2005).

- Figure 1 graphically displays the comparison of disease prevalence's between the K2 cohort and each of the comparison groups: OEF deployed (black circles) and OEF era (orange circles) by major disease category.
    - There was no increased prevalence in the K2 group compared to either of the comparison groups in any of the major diagnostic groups.
    - There was no specific condition within each of the major diagnostic groups (data not shown) in which the K2 disease prevalence was higher than the prevalence in either the deployed or non-deployed comparison groups.

Figure 1. Prevalence ratios of morbidity



- Figure 2 summarizes findings for the all-cause, disease-specific mortality:
  - Survival probability was greater than 97% in all three groups (red dashed line).
  - There was no difference in the relative mortality risk (RR) between K2 and each of the comparison groups (see RRs in Figure 1).
  - Standardized mortality ratios (SMR) were computed that compare the mortality in each of the K2 Surveillance Program groups to the general US population (see box in Figure 1). Compared to the general population, the mortality risk was substantially lower in all three groups (SMRs all less than 0.40).



DISCUSSION

This is the first of many reports from the K2 Surveillance Program (K2SP) assessing health effects that may be associated with K2 deployment. Based on these initial analyses, there was no increased disease risk (morbidity) in in the K2 cohort. The risk of disease was no different or lower in the K2 group across all diagnostic categories and the individual diseases within each category (see Figure 1). Similarly, there was no increased all-cause, disease-specific mortality risk in the K2 group compared to the comparison groups, and each of the K2SP groups had a substantially lower mortality risk compared to the general population (see Figure 2). At this time, there is no evidence to suggest that having deployed to K2 is associated with adverse health outcomes.

However, most of the outcomes (chronic diseases, cancers, and deaths) typically have a long latency that do not manifest clinically until later in life. The follow-up duration for these initial analyses averaged about 15 years. Additionally, the K2SP population was relatively young (mean age of 52 years) and healthy. Thus, these initial findings should not be construed as definitive evidence of no increased disease or mortality risk associated with deployment to K2. Rather, this intermediate level of follow-up and the young age of the population suggests that these initial findings are preliminary and that longer follow-up in an older cohort is needed to allow for sub-clinical disease to fully manifest. The latter is one of the primary reasons that a surveillance approach was chosen to address health concerns related to K2.

In summary, at present there is no evidence to suggest that K2 deployment is associated with an increased risk of disease or mortality. These analyses will be repeated every two years through at least 2030. The current findings can serve as a baseline for future analyses assessing trends in the morbidity and mortality outcomes.

FUTURE DIRECTIONS

The K2 Surveillance Program (K2SP) will update the morbidity and mortality outcome data on an annual basis and the analyses presented here repeated every two years at least through 2030. Maintaining the K2SP data in this manner will enable prompt assessment of any emerging health issues that may arise during the life the of the K2SP as well as to better identify increasing trends in disease outcomes.

REFERENCES

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3. Sharkey JM, Abraham JH. Evaluation of postdeployment cancers among active-duty military personnel. AMEDD Journal 2015; July – September: 68 – 75.