



ANNUAL DIVING FATALITY RATES AMONG INSURED DAN MEMBERS

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Introduction

The annual count of injury deaths in USA and Canada has been surveyed since the sixties. Peaking at 150 in mid-seventies, the death count has been fairly stable for more than one decade at 84 ± 5 (range 77 – 91).

Without knowing the number of exposed persons, it is impossible to evaluate how the safety and riskiness of scuba diving change over time or to identify divers with greater than average risk.

Cardiovascular disease has also become increasingly recognized as a factor in the death in older divers but the association has not been tested due to lack of data.¹

This study computed fatality rates among insured members of the Divers Alert Network (DAN), and tested effects of age and gender on overall rates and on cause specific rates.

Methods

Age, gender, and death while diving were extracted in de-identified form from about 150,000 insured DAN members for each year from 2000-2006.

Annual fatality rates were computed per 100,000 members.

Association with age and gender was tested with logistic regression ($p < 0.05$).

The relative risks for divers < 50 and ≥ 50 years of age for drowning, arterial gas embolism (AGE), and cardiac incidents were computed.

Results

Age of Insured DAN Members

There was a total of 1,141,367 insured member-years. Males made 64% and their mean age was three years greater than mean age of females. In seven year since 2000, mean age increased for three years for both genders.

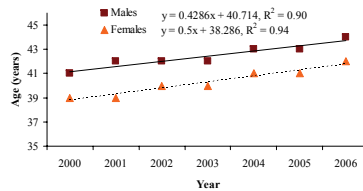


Figure 1: Mean age of insured DAN members.

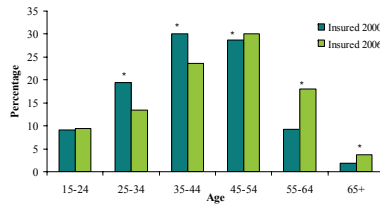


Figure 2: Age distribution of insured DAN members.

Annual fatality rates

Overall fatality rate was 16.4 (95% CI:14.2-18.9). Annual fatality rates varied from 12-23 per 100,000 with no trends during the observed period.

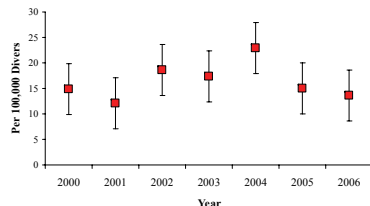


Figure 3: Annual fatality rates for DAN insured members

Age- and gender-specific fatality rates

The overall rate was greater for males (21.2) than for females (7.6) (2.8 OR, 1.9–4.5 95% CL). Rates increased with age both for males and females. The difference in rates diminished with age, becoming similar after age 60.

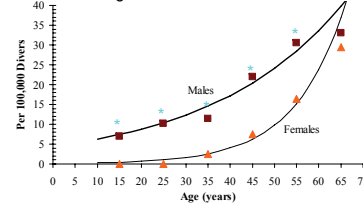


Figure 4: Fatality rates by age and gender

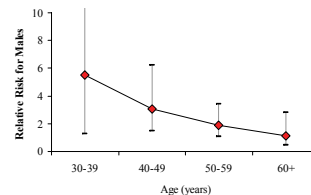


Figure 5: Relative risk for males in comparison to females

Cause-specific relative risks for older divers

In divers ≥ 50 years, cardiac disease is leading (37%) suspected cause of death while diving. In the same age group, the relative risk of cardiac related scuba death is 12.9 times greater than in group under 50.

Table 1. Cause specific RR

Cause of Death	<50 years n=788,489	≥50 years n=352,878	RR	Lower Limit	Upper Limit
Cardiac	5	29	12.9	5.0	33.5
AGE	8	14	3.9	1.6	9.3
Drowning	15	17	2.5	1.3	5.1
Unknown	15	16	1.9	0.9	4.1
Other	7	3	1.0	0.2	3.7
Total	50	79			

Discussion

DAN insured divers may not be representative of all recreational divers but their aging seem to reflect similar trends in population.

Annual number of fatalities are small and thus random variations may affect year-to-year changes of fatality rates.

Relative increase of risk with age may be associated with prevalence of heart disease in population that increases with age, too.

Conclusions

In addition to specific risks in diving - AGE and drowning - older divers are exposed to additional, health-related risks.

Healthy life style and regular exercise may help reduce risk in diving.

Divers with risk factors for heart diseases should seek medical evaluation prior to diving.

References

Caruso JL, Bove AA, Uguccioni DM, Ellis JE, Dovenbarger JA, Bennett PB. Recreational diving deaths associated with cardiovascular disease: epidemiology and recommendations for pre-participation screening. *Undersea and Hyperbaric Medicine*. 2001;28 (suppl):75.