Mortality among Japanese Zen priests

MICHIHARU OGATA, MASATO IKEDA, AND MASANORI KURATSUNE

From the Department of Public Health, Faculty of Medicine, Kyushu University, Fukuoka, Japan

SUMMARY A cohort study was done on 1396 deaths seen among 4352 Japanese male Zen priests during a follow up period from 1 January 1955 to 31 December 1978. Standardised mortality ratios were computed for major causes of death by comparing with the counterparts of the general Japanese male population. The SMR for all causes of death was 0.82 ($p < 0.001$) and the SMR values for cerebrovascular diseases, pneumonia and bronchitis, peptic ulcer, liver cirrhosis, cancer of the respiratory organs, and cancer of the lung were all significantly smaller than unity. Taking regional mortality differences into account, a similar computation was made dividing the cohort into two subcohorts—that is, the priests living in eastern Japan and those in western Japan. Both subcohorts showed a highly significantly smaller SMR than unity for all causes of death. With the exception of only a few causes of death for which the observed number of deaths was small, they also showed such reduced SMRs for nearly all of the causes of death tested. A questionnaire survey on the current life style of active priests showed that they smoke less, eat less meat and fish as they follow the more traditional Japanese dietary habits, and live in less polluted areas, but their drinking habits do not differ much from that of the average Japanese adult man. Possible reasons for their reduced mortality are discussed.

Recent epidemiological studies have shown a lower mortality from various diseases among certain religious groups. The members of the Church of Jesus Christ of Latter Day Saints known as Mormons¹⁻⁹ and Seventh Day Adventists¹⁰⁻¹⁴ are particularly notable in this regard, and their peculiar life styles, especially abstinence from smoking and drinking, are esteemed as the main reason for such reduced mortality. A similar lower mortality was also observed among clergymen of the United Presbyterian Church in the United States, the Lutheran Church-Missouri Synod, and some other denominations that do not prohibit smoking.¹⁵⁻¹⁷

Zen is known for its strict discipline and harsh ascetic exercise. Zen monks used to be strict vegetarians and they abstained from drinking, smoking, and sexual life because of their religious precepts. Nowadays, however, they are allowed to marry and do not strictly abstain from animal foods, drinking, or smoking. Nevertheless, the traditional precepts are still esteemed to be essential for their religious discipline, as indicated by the fact that monks are required to complete at least several months of a very ascetic training in certain Zen Buddhist monasteries in order to qualify for priesthood. During such courses they are provided with only very plain meals prepared with vegetable

foods and are never allowed to smoke or drink. Even after the training course they try to live a plain life, valuing manual labour and sitting in meditation, since simplicity and meditation are the keynotes of this group.

This paper will present the results of a cohort study on mortality among Zen priests of a certain sect living in Japan and those of a questionnaire survey made on their current life style.

Materials and methods

We were given permission to see the membership file of the Myoshinji Branch of the Rinzai Sect of "Zen" Buddhism which listed name, sex, date and place of birth, current address, and "Honseki" (registered domicile) of each priest. The 4352 male priests consisted of retired, active, and associate priests who had been appointed to priesthood on 1 January 1955 or became priests thereafter and who were followed up to 31 December 1978. Their vital status was confirmed by asking offices of municipalities where they lived or still live. For those who died during the observation period, copies of their death certificates were obtained from the district legal affairs bureau at their Honseki, since such documents are legally kept there for 27 years

after death. The underlying cause of death for each of the deceased was assigned according to the 8th revision of the International Classification of Diseases, Injuries, and Causes of Death. A total of 153 deaths, 11% of the reviewed death certificates, were referred to the nosologists at the health and welfare statistics and information department, the Ministry of Health and Welfare, because there was discrepancy among our judgments.

The observed number of deaths was compared with those expected that were computed by multiplying age (5 year groups), sex (male), calendar year (5 year intervals) specific person-years at risk, by the corresponding cause, calendar year, and age group (5 years) specific death rates of Japanese men.¹⁸ Differences between the observed number of deaths and those expected were tested on the assumption of a Poisson distribution.

The above analysis was made not only on a cohort consisting of all the member priests throughout the nation but also on the two divided subcohorts—that is, the priests residing in western Japan which includes all the prefectures located in the west of Kyoto, Mie, and Wakayama prefecture and those residing in the remaining eastern prefectures.

Since the above study showed a considerably lower mortality among the Zen priests, as described below, a questionnaire survey was made to clarify their life style. A questionnaire containing 24 question items—that is, frequency of intake of foods and beverages such as bread, miso soup, milk, fresh vegetables, green vegetables, vegetables soaked in rice bran paste, pickled radish, salty foods, meat, boiled fish, broiled fish, green tea, and coffee, habits of smoking and drinking, residential environment, and a few others—was mailed to all the 2558 active male and female priests in April 1981. After repeated requests for cooperation 2032 questionnaires were completed (79.4%)—1887 by male priests, 136 by female priests, and nine for which the sex of respondents could not be identified. Only the 1887 replies from the men have been used in the present analysis.

Results

MORTALITY STUDY

The total number of priests who entered the study was 4352. Of these, 2802 were alive at the end of the follow up period, 1396 had died, and 154 could not be traced, giving a follow up rate of 96.5%. The underlying causes of death could not be clarified for 53 deaths (3.8%) due to lack of their death certificates.

Table 1 shows person-years by age group of the subjects, indicating that their age distribution centres around 50 to 69.

Table 1 Person-years of the cohort by age group

Age	Person-years	Percentage
<20	0	0.0
20-29	339.1	0.5
30-39	7517.8	10.9
40-49	12970.9	18.9
50-59	16023.3	23.3
60-69	15391.7	22.4
70-79	11035.8	16.1
≥80	5407.4	7.9
Total	68686.0	100.0

Table 2 shows that the observed number of deaths from all causes among all the Zen priests was 82% of the expected number of deaths ($p < 0.001$).

Similarly, a substantially and yet statistically significantly lowered mortality was seen for tuberculosis, cerebrovascular diseases, hypertensive diseases, pneumonia and bronchitis, peptic ulcer, liver cirrhosis, cancer of the respiratory organs, and cancer of the lung. SMR values were also low but not significantly so for diabetes mellitus, heart diseases, nephritis and nephrotic syndrome, all external causes, cancer at all sites, and cancer of the oesophagus, stomach, and intestine excluding rectum. For cancer of the rectum, liver, and pancreas the observed number of deaths was slightly higher than the expected but not significantly so.

Table 3 presents the results of a similar computation applied to the two subcohorts that were prepared by dividing all the subjects according to their place of residence. Except for a few causes of death for which the observed number of deaths was small, two subcohorts showed quite similar SMRs for most of the causes of death tested. Furthermore, SMR values were significantly smaller than unity for all causes of death, cerebrovascular diseases, and hypertensive diseases in both subcohorts. SMRs were also under 1 in both subcohorts for tuberculosis, diabetes mellitus, peptic ulcer, liver cirrhosis, external causes, cancer at all sites, and cancer of the stomach, respiratory organs, and lung, but without statistical significance. SMR values for pneumonia and bronchitis and cancer of the oesophagus were significantly small but only among the priests living in eastern Japan.

LIFE STYLE STUDY

Table 4 shows the age composition of the subjects who responded to the questionnaire survey. It was fairly close to the age composition of the cohort used for the mortality analysis. Table 5 shows frequency of intake of nine specific food items. Interestingly, nearly half the priests stated that they never or hardly ever eat bread whereas about 20% of them have

Table 2 Standardised mortality ratio (SMR) for male Zen priests by selected cause of death

Cause of death	ICD No (8th revision)	No of observed deaths	No of expected deaths	SMR
All causes	000-796.9 E800-E999	1396	1702.93	0.82***
Tuberculosis	000-019	41	58.52	0.70*
Diabetes mellitus	250	8	13.47	0.59
Cerebrovascular diseases	430-438	364	468.32	0.78***
Heart diseases	410-414, 420-429	199	214.29	0.93
Hypertensive diseases	400-404	23	45.86	0.50***
Pneumonia and bronchitis	480-486, 490-491	65	91.15	0.71**
Peptic ulcer	531-533	19	31.26	0.61*
Liver cirrhosis	571	20	32.38	0.62*
Nephritis and nephrotic syndrome	580-584	20	23.93	0.84
External causes	E800-E999	54	60.90	0.89
All malignant neoplasms	140-209	255	283.17	0.90
Cancer				
Oesophagus	150	8	15.63	0.51
Stomach	151	117	134.31	0.87
Intestine excluding rectum	152, 153	7	7.69	0.91
Rectum	154	16	10.50	1.52
Liver	155, 197.7, 197.8	30	26.38	1.14
Pancreas	157	14	9.00	1.56
Respiratory organs	160-163	25	37.48	0.67*
Lung	162	19	30.51	0.62*
Leukaemia	204-207	3	3.49	0.86
(Not verified)		(53)		

* p<0.05.

** p<0.01.

*** p<0.001.

Table 3 SMR for male Zen priests, by selected cause of death and by place of residence

	Eastern Japan			Western Japan		
	Obs No of deaths	Exp No of deaths	SMR	Obs No of deaths	Exp No of deaths	SMR
All causes	797	947.37	0.84***	599	755.53	0.79***
Tuberculosis	23	32.58	0.71	18	25.94	0.69
Diabetes mellitus	5	7.46	0.67	3	6.01	0.50
Cerebrovascular diseases	227	259.73	0.87*	137	208.60	0.66***
Heart diseases	109	119.01	0.92	90	95.28	0.94
Hypertensive diseases	13	25.42	0.51*	10	20.45	0.49*
Pneumonia and bronchitis	28	50.62	0.55***	37	40.53	0.91
Peptic ulcer	10	17.41	0.57	9	13.85	0.65
Liver cirrhosis	12	18.10	0.66	8	14.28	0.56
Nephritis and nephrotic syndrome	14	13.43	1.04	6	10.50	0.57
External causes	30	34.18	0.88	24	26.72	0.90
All malignant neoplasms	150	157.48	0.95	105	125.70	0.84
Cancer						
Oesophagus	2	8.68	0.23*	6	6.95	0.86
Stomach	67	74.67	0.90	50	59.64	0.84
Intestine excluding rectum	5	4.28	1.17	2	3.41	0.59
Rectum	10	5.84	1.71	6	4.66	1.29
Liver	18	14.71	1.22	12	11.67	1.03
Pancreas	8	5.01	1.60	6	3.99	1.50
Respiratory organs	15	20.80	0.72	10	16.68	0.60
Lung	10	16.93	0.59	9	13.58	0.66
Leukaemia	1	1.97	0.51	2	1.53	1.31

* p<0.05.

** p<0.01.

*** p<0.001.

"miso" (fermented soybean) soup at almost every meal. Table 6 also shows that about 75% of them never or hardly ever drink coffee. These findings indicate that they still adhere to the traditional Japanese dietary habits, being less westernised in diets than are the average Japanese.

They also seem to eat meat and fish less frequently than the average Japanese man because less than 10% of the priests stated that they eat these foods almost daily, whereas about 50% of the latter are known to eat meat, fish, or egg almost every day (table 5).¹⁹ It is also notable that slightly less than

Mortality among Japanese Zen priests

Table 6 Percentage of Zen priests by frequency of consumption of coffee, tobacco, and alcohol

Frequency of current use	Percentage
Coffee:	
Never	74.6
1-2 cups/day	22.2
3-4 cups/day	1.0
5-9 cups/day	0.0
>10 times/day	0.0
Unidentified	2.2
Total	100.0
Tobacco:	
Daily	50.9
Occasional	2.0
Ex-smoker	26.5
Never (life time)	18.7
Unidentified	1.9
Total	100.0
Alcohol:	
Daily	44.2
1-3 times/week	17.5
1-3 times/month	11.1
Ex-Drinker	7.8
Never (life time)	18.0
Unidentified	1.4
Total	100.0

This is unlikely, as we attained a high follow up rate and a high verification rate of causes of death.

Geographical differences in mortality could also be related to the present findings, because about one third of the priests were residents of the three prefectures of Gifu, Aichi, and Shizuoka, where the life expectancy for adults is known to be longer than the national average.²¹ This fact leads us to suspect that the observed lower mortality might be largely attributable to this particular geographical distribution of the subjects. This also seems unlikely, however, because as mentioned even the priests living in Western Japan, which does not include these three prefectures, showed a reduced mortality from all causes of death and most of the causes of death tested. Thus the observed reduced mortality among the Zen priests seems to be real.

There could be a selection bias, however. As already referred to, one must go through a strict training process in order to become a Zen priest. Anyone who is not healthy physically or mentally would not be able to bear such training. Our cohort, therefore, seems to be a somewhat selected population, slightly healthier than the general population. They may also be even more health conscious compared with average people because most are college graduates.

The fact that smoking is less common among the Zen priests would also explain their lowered mortality not only from lung cancer but also from other causes of death.²² The fact that most active priests live in less polluted areas should also be counted in this connection.

Finally, their reputable moderate attitude in all the aspects of daily life and their mental stableness, both of which could be cultivated by practising self control under the daily discipline of Zen, should also be taken into account because such mental state is believed to exert an over all beneficial effect on their health. We consider that it is no specific single factor but all the factors described above that are unitedly responsible for the observed low mortality among the Zen priests.

This study was supported by research grants from the Ministry of Education, Science, and Culture and from the Princess Takamatsu Cancer Research Fund. We are grateful to Messrs Jyun-ichi Goto and Kodo Noguchi, former and current secretary general of the Myoshinji Branch, Rinza Sect, for their kind advice and encouragement.

References

- Enstrom JE. Cancer mortality among Mormons. *Cancer* 1975; **36**: 825-41.
- Lyon JL, Klauber MR, Gardner JW, Smart CR. Cancer incidence in Mormons and non-Mormons in Utah, 1966-1970. *N Engl J Med* 1976; **294**: 129-33.
- Lyon JL, Wetzler HP, Gardner JW, Klauber MR, Williams RR. Cardiovascular mortality in Mormons and non-Mormons in Utah, 1969-1971. *Am J Epidemiol* 1978; **108**: 357-66.
- Enstrom JE. Cancer and total mortality among active Mormons. *Cancer* 1978; **42**: 1943-51.
- Enstrom JE. Cancer mortality among low-risk populations. *CA-A Cancer Journal for Clinicians* 1979; **29**: 352-61.
- Lyon JL, Gardner JW, West DW. Cancer incidence in Mormons and non-Mormons in Utah during 1967-75. *J Natl Cancer Inst* 1980; **65**: 1055-61.
- Lyon JL, Gardner JW, West PW. Cancer in Utah: risk by religion and place of residence. *J Natl Cancer Inst* 1980; **65**: 1063-71.
- Enstrom JE. Cancer mortality among Mormons in California during 1968-75. *J Natl Cancer Inst* 1980; **65**: 1073-82.
- West DW, Lyon JL, Gardner JW. Cancer risk factors: an analysis of Utah Mormons and non-Mormons. *J Natl Cancer Inst* 1980; **65**: 1083-95.
- Wynder EL, Lemon FR, Bross IJ. Cancer and coronary artery disease among Seventh Day Adventists. *Cancer* 1959; **12**: 1016-28.
- Lemon FR, Walden RT, Woods RW. Cancer of the lung and mouth in Seventh-Day Adventists. Preliminary report on a population study. *Cancer* 1964; **17**: 486-97.
- Lemon FR, Walden RT. Death from respiratory system disease among Seventh-Day Adventist men. *JAMA* 1966; **198**: 137-46.
- Phyllips RL. Role of life-style and dietary habits in risk of cancer among Seventh-Day Adventists. *Cancer Res* 1975; **35**: 3513-22.
- Phyllips RL, Garfinkel L, Kuzma JW, Beeson WL, Lotz T, Brin B. Mortality among California Seventh-Day Adventists for selected sites. *J Natl Cancer Inst* 1980; **65**: 1097-1107.
- King H. Clerical mortality patterns of the Anglican communion. *Soc Biol* 1971; **18**: 164-77.

- ¹⁶ King H, Zafros G, Hass R. Further inquiry into protestant clerical mortality patterns. *J Biosoc Sci* 1975; **7**: 243–54.
- ¹⁷ King H, Locke FB. American white clergy as a low-risk population for mortality research. *J Natl Cancer Inst* 1980; **65**: 1115–24.
- ¹⁸ Ministry of Health and Welfare. Health and Welfare Statistics and Information Department. *Vital statistics 1975 Japan*. Tokyo: Health and Welfare Statistics Association, 1976.
- ¹⁹ Ministry of Health and Welfare. *The present state of national nutrition. The reports of national nutrition survey, 1972–73*. Tokyo: Daiichi Shuppan, Inc, 1976.
- ²⁰ Japan Monopoly Corporation. *Monthly report, August, 1978*. Tokyo: Japan Monopoly Corporation, 1978.
- ²¹ Ministry of Health and Welfare. *Age-adjusted death rates for major causes of death. A special report of vital statistics in Japan, 1975*. Tokyo: Health and Welfare Statistics Association, 1978.
- ²² US Department of Health, Education, and Welfare. Public Health Service. *Smoking and health*. Washington DC: Superintendent of Documents, US Government Printing Office, 1979. (DHEW publication No (PHS) 79–50066.)