Higher body mass index is a predictor of death among professional sumo wrestlers

Higher body mass index is a predictor of death among professional sumo wrestlers

Dear Editor-in-Chief,

Sumo wrestling, Japan's national sport, have a long history over 300 years in Japan. Sumo is becoming well-known all over the world as one of Japanese culture (Nagayama, 2008). As you know, professional Sumo wrestlers are expected to lead specific lifestyles that promote increases in body weight after go professional. This notion makes Sumo wrestlers a unique group of professional athletes unlike any other sport in that they are all obese. In a previous studie on the life expectancies of professional Sumo wrestlers, the result suggested higher body weight led to shorter life expectancies compared to general population (Hoshi and Inaba, 1995). The aim of present study is to clarify that higher body mass index is a predictor of death among professional Sumo wrestlers or not.

Data for all Sumo wrestlers who were promoted to the top division, generally called Nyuumaku, between the years of 1926 and 1989 were compiled using The Professional Sumo Wrestler Directory (Mizuno and Kyosu, 2006). Of the 430 wrestlers listed on the Directory as having made their Nyuumaku between the years from 1926 to 1989, 73 were deceased. Therefore, this study was a case-control study consisting of 73 deceased wrestlers born between the years 1908 to 1955 as cases, and 73 surviving wrestlers with matching birth years as controls. To compare means and frequencies of the variables between cases and controls, t-tests were used for continuous variables, while chi-square tests were used for categorical variables. A multiple logistic regression analysis was used to assess the contribution of each independent variable to death. To further describe predictive properties of a death factor, areas under receiver operating characteristic (ROC) curve for death among Sumo wrestlers were calculated. ROC curves were calculated across all possible death factors. The Statistical Package for the Social Sciences (SPSS Japan Inc. version 13.0J, Tokyo, Japan) was used to conduct the analyses.

After analysed by t-tests or chi-square tests, deceased wrestlers had higher body mass indexes with statistical significance as well as higher winning percentages, won more performance prizes (performance prizes in sumo are given out for outstanding performance, fighting-spirit, or technique) in their careers, and more were ranked higher. Table 1 shows the odds ratios and 95% confidential intervals of each independent factor related to death among Sumo wrestlers using a multiple logistic regression analysis. BMI was a statistically significant death determinant among Sumo wrestlers. As shown in Figure 1, an analysis of the ROC curve for BMI in the prediction of death events suggested reasonable accuracy in the area under the curve of 0.685 (95% confidence interval, 0.597-0.772). A tradeoff between sensitivity and specificity did not suggest an optimal BMI for a cutoff for prediction of death (Akobeng, 2007).

Table 1. Odds ratio and 95% confidence intervals to death by logistic regression analysis among Sumo wrestlers between the years of 1926 and 1989.

	Odds ratio	95% confidencial intervals
Body mass index (kg·m^2)	1.08	1.01 - 1.15
Winning percentage (+10%)	1.29	.86 - 1.93
Special Prizes Won		
Not applicable wrestlers	1.00	
Prize-laden wrestlers	1.75	.50 - 6.10
Top rank in each wrestler's career (number, %)		
Below Makuuchi	1.00	
Above Komusubi	.98	.27 - 3.59

The present study suggests a higher BMI has strong affects on death and has statistical significance among Sumo wrestlers by case-control study, though we could not find an optimal BMI cutoff point for the prediction of death. It is noteworthy that this study was able to identify that a certain weight of a Sumo wrestler at a point in his career can show affects on his death, in spite of weight being a fluctuating variable.
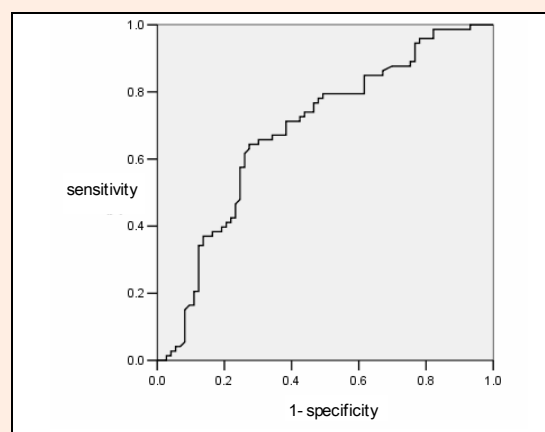

Figure 1. ROC curve of BMI as a predictor of death. For reference, the corresponding data table is included. Area under the curve, 0.685 (95%CI, 0.597 to 0.772).

There are some limitations in the present study. First, we could not assess the details of body composition, cause of death and the effects of other common risk factors of death such as smoking and alcohol consumption, largely because the data used was secondary data from The Professional Sumo Wrestler Directory. Second, this was a case-control study, so our results may include some bias. Finally, there were only 73 deceased Sumo wrestlers examined in this study, implying a need to carry on fur-

ther research regarding this topic in the future.

This study suggests that an higher BMI can be a predictive factor of death even amongst Sumo wrestlers, and that proper guidelines for taking care of their health are necessary.

Hideyuki Kanda, Takehito Hayakawa, Satoshi Tsuboi, Yayoi Mori, Teruna Takahashi and Tetsuhito Fukushima
Department of Hygiene and Preventive Medicine, Fukushima Medical University, Fukushima, Japan

References

Akobeng, A.K. (2007) Understanding diagnostic tests 3: Receiver operating characteristic curves. *Acta Paediatrics* **96(5),** 644-6477.

Hoshi, A. and Inaba, Y.(1995) Risk factors for mortality and mortality rate of sumo wrestlers. *Nippon Eiseigaku Zasshi* **50(3),** 730-736. (In Japanese: English abstract)

Mizuno, N. and Kyosu, T. (2006) *The professional sumo wrestler directory.* Tokyo, Kyodo News Company, Inc.

Nagayama, S. (2008) Sumo, borderless. *Ohzumo* **54(10),** 74-77. (In Japanese).

Niki, Y.(1969) Glucose metabolism in sumo Wrestlers. *Journal of the Japanese Diabetes Society* **12,** 307-310. (In Japanese).

✉ **Dr. Hideyuki Kanda**
Department of Hygiene and Preventive Medicine, Fukushima Medical University, Fukushima, Japan
E-mail: hkanda@fmu.ac.jp