



## Full Length Research Article

### PREVALENCE OF LIFESTYLE-RELATED DISEASES IN JAPANESE WORKERS

**\*Masaaki Minami**

Department of Bio Signaling and Regulation in Medical Sciences, Graduate School of Medical Sciences,  
Nagoya City University, Nagoya, Japan

#### ARTICLE INFO

##### Article History:

Received 17<sup>th</sup> August, 2016  
Received in revised form  
21<sup>st</sup> September, 2016  
Accepted 18<sup>th</sup> October, 2016  
Published online 30<sup>th</sup> November, 2016

##### Key Words:

Japanese worker,  
Lifestyle-related diseases,  
Hypertension,  
Hyperlipidemia,  
Diabetes mellitus.

#### ABSTRACT

This study was conducted to clarify differences in health status according to groups of various Japanese companies and was assessed the prevalence of Lifestyle-related diseases (hypertension, hyperlipidemia, and diabetes mellitus) in Japanese workers who underwent a through health screening were evaluated. The answers from six companies employing workers (2,513 persons), comparing results of the health checkups, and number of occupational health personnel according to company kinds were obtained. This study revealed that there was significant differences of prevalence of both hypertension and hyperlipidemia between disease and non-disease in comparison with total kinds of companies. But it also revealed that there was not significant differences of prevalence of three diseases between controlled and uncontrolled status in comparison with total kinds of companies. It is suggested that endeavors to maintain a certain level of hygiene and health management play an important role in maintaining worker health in several kinds of Japanese companies.

*Copyright©2016, Masaaki Minami. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.*

#### INTRODUCTION

Lifestyle-related diseases such as hypertension, hyperlipidemia, and diabetes mellitus are the major risk factors for cardiovascular and cerebrovascular disease on a global basis (Imai, 2011). The status of hypertension, hyperlipidemia, and diabetes mellitus is monitored by measuring blood pressure (BP), low density lipoprotein cholesterol (LDL-C), and hemoglobinA1c (HbA1c) levels, respectively (Imai, 2011). The target values are provided by Japanese Society of Hypertension, the Japan Atherosclerosis Society and the Japan Diabetes mellitus Society (JDS) for Japanese populations in Japan. The prevalence of disease-related abnormal finding by healthcare checkup is more than 50% in Japan (Ministry of Health, Labour and Welfare Labor, 2010). Although the health status of workers in Japanese companies has been noted to be relatively poor, no actual comparisons of groups of variously Japanese companies within the same region based on the same methodology have ever been conducted. The present study was conducted to find out the recent prevalence of hypertension, hyperlipidemia, and diabetes mellitus in Japanese workers.

**\*Corresponding author: Masaaki Minami**

Department of Bio signalling and Regulation in Medical Sciences,  
Graduate School of Medical Sciences, Nagoya City University,  
Nagoya, Japan

This result would be useful in contribute to larger more extensive surveillance study about health status of Japanese workers.

#### Details Experimental

##### Subjects

The subjects of this study were employees of the three manufacturing industry companies and three transportation industry companies, which provide services such as health check-up support, and clinical testing. A total of 2,513 workers, 20 years of age or older underwent an annual health check-up at their companies and were included in this study. All participants received oral and written information before giving their written informed consent. This study was approved by adequate ethics committee.

##### Clinical Data Collection

The main aim of the study was to examine BP, LDL-C and HbA1c values from health checkup data from a cross-sectional viewpoint, where a single time point for each individual was selected analysis. In Japan, the Industrial Safety and Health Law requires all employers to provide annual health check-ups for their employees (National Ministry of Health, Labour and

Welfare, 2015). The annual health check-up consists of an interview regarding lifestyle; measurement of weight, height, and BP; physical examination; electrocardiogram examinations; chest x-ray; urinalysis; and blood tests. In this check points, the value of BP, LDL-C, glucose (BG), and HbA1c were used. The BP was measured in each participant in a sitting position after resting for at least 5 minutes using an automatic electronic BP monitor, which was calibrated every week. A minimum of two measurements were taken on out stretched arms at 1-2 minute intervals. If the reading were high (systolic BP  $\geq$  140 mm Hg or diastolic BP  $\geq$  90 mm Hg), then additional reading were obtained. The lowest readings were recorded. Blood samples from the study subjects were obtained from 08:00 to 12:00 after overnight fasting. Standard enzymatic methods were used to determine the serum concentrations of LDL-C, BG, and HbA1c.

### Data analysis

The numbers of workers with disease were determined as follows; workers with disease were considered to be those who on the questionnaire answered that they had a disease for which they were currently receiving medical treatment. The participants were considered to have disease if they presented elevated LDL-C ( $\geq$ 150 mg/dL), elevated BP (systolic BP  $\geq$ 140 mmHg and/or diastolic BP  $\geq$ 90 mmHg), elevated BG ( $\geq$ 106 mg/dL), and elevated HbA1c ( $\geq$ 6.1) (Okumura *et al*, 2003; Ogiwara *et al*, 2009; The Japan Atherosclerosis Society, 2012). In terms of HbA1c values of the JDS were used Japan in 2011 for health checkups. HbA1c (JDS)  $\geq$  6.1%, comparable with HbA1c [National glycohemoglobin standardization program (NGSP)]  $\geq$ 6.5% was the diagnostic criterion for diabetes mellitus on the JDS guideline (The Japan Diabetes mellitus Society). Statistical analysis was performed by chi-square test. P values  $<$  0.05 was considered to be significant.

## RESULTS AND DISCUSSION

The present analysis of health checkup results of Japanese employees showed the prevalence of hypertension, hyperlipidemia, and diabetes mellitus. Table 1 presented the characteristics of the employee in the manufacturing industry companies by hypertension levels. There were no significant differences of each company between disease and non-disease. However, there were significant differences of each company between controlled and uncontrolled disease ( $p <$  0.01).

**Table 1. Prevalence of hypertension in manufacturing industry companies**

	Control	Uncontrol	Total	Disease	Non-disease	Total
The manufacturing industry A	48	22	70	551		621
The manufacturing industry B	23	30	53	298		351
The manufacturing industry C	32	40	72	512		584
Total manufacturing industry	103	92	195	1361		1556

Table 2 presented the characteristics of the employee in the transportation industry company by hypertension levels. There were significant differences of each company between disease and non-disease ( $p <$  0.01). However, there were no significant differences of each company between controlled and uncontrolled disease. Furthermore, there were no significant

differences of prevalence of hypertension between manufacturing industry companies and transportation industry companies.

**Table 2. Prevalence of hypertension in transportation industry companies**

	Control	Disease Uncontrol	Total	Non-disease	Total
The transportation industry A	15	21	36	245	281
The transportation industry B	25	29	54	309	363
The transportation industry C	32	36	68	245	313
Total transportation industry	72	86	158	799	957

However, there were significant differences of control of hypertension between manufacturing industry companies and transportation industry companies ( $p <$  0.01). Table 3 presented the characteristics of the employee in the manufacturing industry companies by hyperlipidemia levels. There were significant differences of each company between disease and non-disease ( $p <$  0.01). However, there were no significant differences of each company between controlled and uncontrolled disease. Table 4 presented the characteristics of the employee in the transportation industry companies by hypertension levels.

**Table 3. Prevalence of hyperlipidemia in manufacturing industry companies**

	Control	Disease Uncontrol	Total	Non-disease	Total
The manufacturing industry A	30	111	141	480	621
The manufacturing industry B	4	30	34	317	351
The manufacturing industry C	30	84	114	470	584
Total manufacturing industry	64	225	289	1267	1556

**Table 4: Prevalence of hyperlipidemia in transportation industry companies**

	Control	Disease Uncontrol	Total	Non-disease	Total
The transportation industry A	2	28	30	251	281
The transportation industry B	9	52	61	302	363
The transportation industry C	18	14	32	281	313
Total transportation industry	29	94	123	834	957

There were significant differences of each company between disease and non-disease ( $p = 0.016$ ). There were also significant differences of each company between controlled and uncontrolled-disease ( $p <$  0.01). Furthermore, there were significant differences of prevalence of hyperlipidemia between manufacturing industry companies and transportation industry companies ( $p <$  0.01). However, there were no significant differences of control of hyperlipidemia between manufacturing industry companies and transportation industry companies. Table 5 presented the characteristics of the

employee in the manufacturing industry companies by diabetes mellitus levels. There were significant differences of each company between disease and non-disease ( $p < 0.01$ ). However, there were significant differences of each company between controlled and uncontrolled disease ( $p < 0.01$ ). Table 6 presented the characteristics of the employee in the transportation industry companies by diabetes mellitus levels. There were significant differences of each company between disease and non-disease ( $p = 0.034$ ).

**Table 5. Prevalence of diabetes mellitus in manufacturing industry companies**

	Disease			Non-disease	Total
	Control	Uncontrol	Total		
The manufacturing industry A	21	47	68	553	621
The manufacturing industry B	3	28	31	320	351
The manufacturing industry C	2	33	35	549	584
Total manufacturing industry	26	108	134	1422	1556

**Table 6. Prevalence of diabetes mellitus in transportation industry companies**

	Disease			Non-disease	Total
	Control	Uncontrol	Total		
The transportation industry A	6	22	28	253	281
The transportation industry B	2	24	26	337	363
The transportation industry C	5	9	14	299	313
Total transportation industry	13	55	68	889	957

However, there were no significant differences of each company between controlled and uncontrolled disease. Furthermore, there were no significant differences of prevalence of diabetes mellitus between manufacturing industry company and transportation industry companies. However, there were no significant differences of control of diabetes mellitus between manufacturing industry companies and transportation industry companies ( $p < 0.01$ ). Several investigations about prevalence of hypertension, hyperlipidemia, and diabetes mellitus in Japanese workers were reported. One study by health service association in Japan demonstrated that the prevalence of hypertension, hyperlipidemia, and diabetes mellitus were 15.1 %, 22.8%, and 4.3%, respectively. This report also demonstrated that the prevalence of hyperlipidemia was increasing (Suka *et al*, 2013). Another report showed that the prevalence of hypertension, hyperlipidemia, and diabetes mellitus were 11.8 %, 2.9%, and 5.1%, respectively. This report also showed that blood pressure differed significantly among company size groups (Yamataki *et al*, 2006). Other researchers also revealed that the prevalence of hypertension in smaller companies tended to be higher than that in larger companies regardless of the type of occupation. This study was also using the results of health checkups as related to company size (Hirai *et al*, 1996). Compared with those studies, our results about total prevalence of hypertension, hyperlipidemia, and diabetes mellitus were almost same and this result may show that it is not significantly worse health status of Japanese workers in terms of hypertension, hyperlipidemia, and diabetes mellitus. But previous reports did not compare among industry types. They also did not compare the disease-control. This study

clarified these points. In terms of disease control, this results revealed that Japanese workers suffered from hyperlipidemia and diabetes mellitus did not control their disease. They also showed about half of workers suffered from hypertension did not control their disease. These results imply that healthcare check has not been reflected in the treatment of disease. Further use of the result of healthcare checkup are needed to maintain a certain level of hygiene and health management in several kinds of Japanese companies.

## Conclusion

This study is described recent prevalence of hypertension, hyperlipidemia, and diabetes mellitus in Japanese workers. It is suggested that endeavors to maintain a certain level of hygiene and health management play an important role in maintaining worker health in several kinds of Japanese companies.

## Acknowledgments

We thank Mr. Masashi Ishihara and Ms. Miwako Fujimura for special encouragement. This study was supported by a grant-in-aid for research from the Nagoya City University, Japan.

## REFERENCES

- Hirai T, Kusaka Y, Iki M, Deguchi Y, sato K, Umino K, and Kawahara K. 1996. Relationship of hypertension prevalence in companies to business type and scale--from an analysis of health examination results in Fukui prefecture. *Nippon KoshuEiseiZasshi*, 43:806-814.
- Imai H, Shiwaku K. 2011. Perspective for molecular epidemiologic cohort study of lifestyle-related disease. *Nihon EiseigakuZasshi*. 66:39-41.
- Ministry of Health, Labour and Welfare. 2010. Labour Standards Bureau Safety and Health section Occupational Health Division Regular health check results report.2010. [<http://www.mhlw.go.jp/toukei/list/127-1.html>]
- National Ministry of Health, Labour and Welfare. (2015)National Ministry of Health, Labour and Welfare Database. [<http://www.e-stat.go.jp/SG1/estat/NewList.do?tid=000001031167>]
- Ogihara T, Kikuchi K, Matsuoka H, Fujita T, Higaki J, Horiuchi M, Imai Y, Imaizumi T, Ito S, Iwao H, Kario K, Kawano Y, Kim-Mitsuyama S, Kimura G, Matsubara H, Matsuura H, Naruse M, Saito I, Shimada K, Shimamoto K, Suzuki H, Takishita S, Tanahashi N, Tsuchihashi T, Uchiyama M, Ueda S, Ueshima H, Umemura S, Ishimitsu T, Rakugi H; Japanese Society of Hypertension Committee. 2009. The Japanese Society of hypertension guidelines for the management of hypertension (JSH2009). *Hypertension Research*, 3:3-107.
- Okamura T, Kadowaki T, Hayakawa T, Kita Y, Okayama A, Ueshima H, Nippon Data 80 Research Group. 2003. What cause of mortality can we predict by cholesterol screening in the Japanese general population? *Journal of Internal Medicine*, 253:169-180.
- Suka M, Miwa Y, Ono, Y, Yanagisawa H. 2013. Changes in the 10 years of organic findings rate of cardiovascular risk factors in periodic health examination. *Sangyou Eiseigaku Zasshi*, 55:1-10.
- The Japan Atherosclerosis Society: Japan Atherosclerosis Society (JAS). 2012. Guidelines of prevention of atherosclerotic Cardiovascular Disease. Tokyo.

The Japan Diabetes mellitus Society (JDS). 2013. Evidence-based practice Guideline for the treatment of diabetes mellitus in Japan. [[http://www.jds.or.jp/modules/en/index.php?content\\_id=44](http://www.jds.or.jp/modules/en/index.php?content_id=44)]

Yamataki H, Suwazono Y, Okubo Y, Miyamoto T, Uetani M, Kobayashi E, and Nogawa K. 2006. Occupational safety and health: workers and industrial safety monitoring for sustainable work environment development. *Journal of Occupational Health*, 48:166-174.

\*\*\*\*\*