原 著

Epidemiological study for the healthy disparities utilized basics medical checkup at the small region

Ryuko TAMON, Yukie YOSHIDA, Yukiko OGAWA and Masahide IMAKI

Graduate School of Comprehensive Rehabilitation, Osaka Prefecture University

Abstract

The purpose of this study was to clarify healthy disparities in small region using a biochemistry index and the health action such as metabolism or the inflammatory marker by basics medical checkup.

Subjects in small area were H city, Osaka (population was 120, 395). The model area was developed as new residential area and the model area lived people who were higher rate of white collar, economy level and taking rate of a health examination. The old areas were compared with the model area. The model area showed lower level in obese rate, the tobacco use, and drinking rate than the model area by sex and age groups. BMI, blood pressure and the blood chemistry test values of the model area were higher than the old area. Especially, the woman showed that tendency.

Thus present study showed that the socioeconomic factor affected to health behaviors and the test values such as metabolism or the inflammatory marker in small area.

Key words: healthy disparities (健康格差), basics medical checkup (住民基本健康診査), bio-psycho-social model (生物・心理・社会モデル), healthy behaviors (健康行動), small region (小地域)

I. Introduction

Recently, the preventive the life-style related diseases in Japan is the mainstream by health education based on "bio-medical model", which is explaining human being from a biological side such as genes or a habit.

However, the interim report of healthy Japan 21 showed that the outcome of the promotion does not progress.

The "bio-psycho-social model" is proposed to explain the interaction of the social environment including society economic conditions in human being.

The society epidemiologic studies based on "bio-psycho-social model" are becoming popular to clarify the relationships between a social structure, individuals, health and the disorder [1-3].

Previous studies in Europe and America reported that there were the relationships of socioeconomic factors such as an education career and income, with diet, obesity, physical activity and health behavior [4].

Morbidity of the disorder and the mortality also related with the socioeconomic factor [5,6].

The British Whitehall study showed that metabolism and the inflammatory marker has negative relationship with hier-archy of occupation. The study reported that the differences of the socioeconomic factors may affect to biological mechanism related with the risk of the cardiovascular disease [7,8].

The large-scale research study (AGES study) for a local elderly person showed that socioeconomic status was associated with a health index and a health risk factor, and those status affected mortality and morbidity of the disease [9].

These previous studies suggested that socioeconomic factor have influenced on health directly or indirectly. As the socioeconomic factor depends on the inequity of the social structure, the region intended to be a wide area. Previous socio-epidemiologic studies showed that equal society shows a healthy thing in the wide region such as country, district and state.

However, the study about a small region didn't show the relationship [10]. Thus the relationship between socioeconomic factor and health in small region was not clear yet.

In Japan, Fukuda et al reported about relationship between social economic conditions and mortality in cityg [11] and prefecture [12], but it was not clear the health disparities in small region.

This study conducted to clarify health disparities in small region using a biochemistry index and the health action such

as metabolism or the inflammatory marker by basics medical checkup.

II. Methods

This study compared basics medical checkup results to clarify healthy disparities between a former resident of the region and the new residential area as the model area in H city, Osaka.

1. Subjects:

Population in the small area was 120,395. Participants in the basics medical checkup were 12,004 people (3,759 men and 8,245 women). Average age was 65.2 ± 10.6 years old (men 55.5 ± 7.0 years old, women 56.3 years old ± 6.9 years old).

2. The basics medical checkup:

The designated medical doctors in the H-city conducted drawing blood and a standard medical examination. The previous medical history, a drinking situation, the smoking status were asked by oneself-style medical interview sheet

3. Measurement parameter:

1) BMI

BMI was calculated by height and weight.

BMI = weight (kg)/ height (m)^2.

2) The measurement of the blood test value

The blood sampling was taken by hungry state. 5ml was collected from an elbow vein and 2ml was anticoagulation with K$_2$EDTA. Then it was used for the measurement of the blood count.

The total items were 25 items such as a total white-cell count, blood platelet, total protein, alkaline phosphates, serum CRP value in addition to the inspection items were 11 items which were measured in the health-care service for elderly.

The measurement conducted in an examination organization and offered to finish for less than 6 hours after drawing blood. The serum CRP value was measured by high sensitive CRP by latex immuno-nephelometry.

The measurement results were accumulated and compiled into a database by H City government through medical institution.

4. The comparison areas for statistical analyze:

The comparison areas were seven political divisions. The one area (the model area) was developed land in 1970's as new residential area and the designated the model area for the administrative section of H City. The six other areas (the old area) were compared with the model area.

This study conducted to compare the healthy action between these two areas.

The analysis conducted three age groups: 40-64 years

Table 1 Conditions of the land use district

	Model area	%	Old area	%
Total	211.1	100.0	2432.8	100.0
Controlled urbanization area	57.1	27.0	1213.9	49.9
Area designated for urbanization	154.0	73.0	1219.1	50.1
Residential use area-base	151.9	98.6	1091.8	89.6
Low rise-rise exclusive residential (category 1)	119.1	77.3	208.9	17.1
Low-rise exclusive residential (category 2)	7.2	4.7	0.0	0.0
Medium-to-high-rise exclusive residential (category 1)	0.0	0.0	390.2	32.0
Medium-to-high-rise exclusive residential (category 2)	1.4	0.9	57.4	4.7
Residential (category 1)	8.2	5.3	406.9	33.4
Residential (category 2)	15.9	10.3	7.3	0.6
Quasi-residential districts	0.0	0.0	21.1	1.7
Commercial zoning area based	2.0	1.3	32.3	2.6
Commercial districts	–	–	–	–
Neighborhood commercial districts	2.0	1.3	32.3	2.6
The industrial zoning area	0.0	0.0	94.9	7.8
Quasi-industrial districts	0.0	0.0	80.4	6.6
Industrial districts	–	–	–	–
Exclusive industrial districts	0.0	0.0	14.5	1.2

old, 65-74 years old, and 75 years or older by sex. Panic values and extreme values [13,14] were excluded from test values.

The statistical analysis conducted student t-test, Mann Whitny U test and chi square test by using Macintosh Statview Ver. 5.0 Computer Program (SAS Institute Inc., Berkeley, USA). In addition, the significance level was p<0.05.

Ⅲ. Results

1. The conditions of the land use district by the model area and the old area

Table 1 showed the conditions of the land use district.

The model area was showed that 82.0% of the regional area was low-rise exclusive residential and the regional area was bigger than the old area.

2. Characteristics of participants in the basic medical checkup

Table 2 showed nine characteristics of the participants in the basics medical checkup in H-city such as age, BMI, blood pressure and the high density lipoprotein cholesterol.

3. The healthy behaviors: Obesity, Tobacco use etc

Table 3 showed comparison the rate of obesity, the tobacco use and a drinking rate by the model area and the old area. The model area showed lower level in obese rate, the tobacco use, and drinking rate than the old area by sex and age groups. There were significant differences at the tobacco use of men, the obese rate and tobacco use of women. The healthy behavior in the model area was better than those in the old area by each age group and sex.

4. BMI, Blood pressure and blood test results

BMI, blood pressure and the blood chemistry test values

Table 2 Characteristics of participants in the basic medical checkup

	n=12004	Mean ± S.D.
Men (%) /Women (%)		3759 (31.3) /8245 (68.7)
Age	year	65.2 ± 10.6
40-64	n(%)	5533(46.1)
65-74	n(%)	4259(35.5)
75-	n(%)	2212(18.4)
Height	cm	155.9 ± 8.5
Weight	kg	56.3 ± 10.4
BMI		23.1 ± 3.5
Systolic blood pressure	mmHg	130.8 ± 18.5
Diastolic blood pressure	mmHg	75.6 ± 11.0
HDL	mg/dl	62.3 ± 16.3
TG	mg/dl	127.1 ± 80.3
LDL	mg/dl	126.1 ± 33.0
WBC	$\times 10^3/mm^3$	5.7 ± 1.6
Alb	g/dl	4.4 ± 0.3
ALP	Iu/l	235.1 ± 72.9
γ-GTP	Iu/l	36.0 ± 51.7
CRP	mg/dl	0.2 ± 0.7
HbA1c	%	5.3 ± 0.8

of the model area were lower than the old area. Especially, the woman showed that tendency. The following items were showed significant differences statistically (Fig.1-1, Fig.1-2).

For the items of diastolic blood pressure aged 65-74 years old, the diastolic blood pressure aged 75 years or older, γ-GTP the 40-64 years old, the alkaline phosphatase aged 75 years or older of men in the model area showed significantly lower than the old area.

On the other hand, serum high density lipoprotein cholesterol of aged 75 years and older was significantly higher in the model area.

Table 3 Rate of obesity, tobakcco use, drinnking

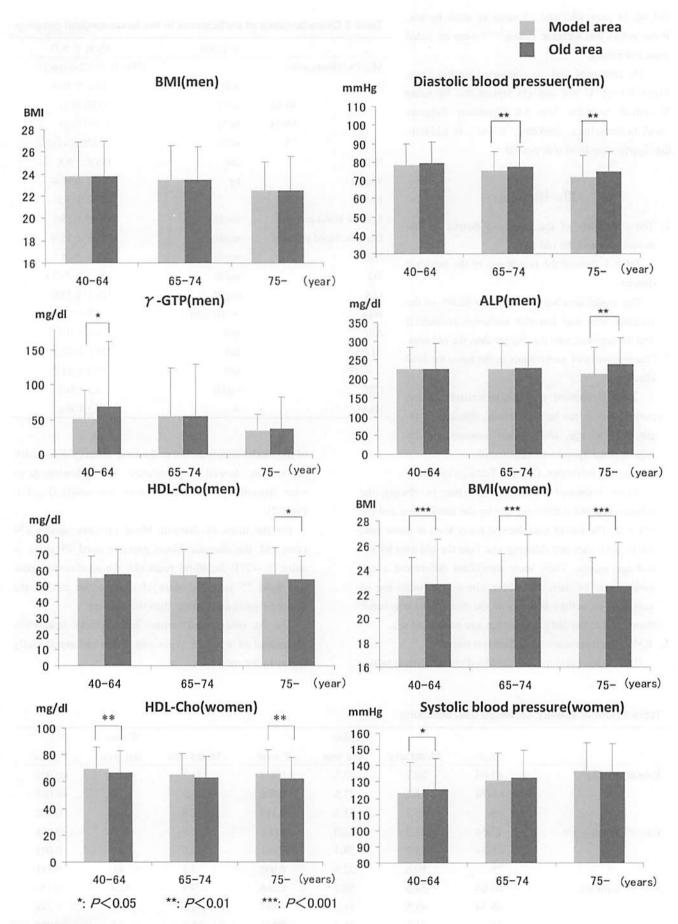|	Age	Men			Women		
		Model area	Old area	P value	Model area	Old area	P value
Rate of obesity	40-64	28.1	33.5	0.434	14.3	23.7	<0.001
	65-74	27.1	27.5	0.706	15.3	27.7	<0.001
	75-	16.7	21.3	0.117	13.8	24.6	0.004
Rate of tobacco use	40-64	33.3	42.0	0.065	5.8	12.2	<0.001
	65-74	15.7	28.4	<0.001	2.5	6.9	0.003
	75-	10.6	22.5	0.002	3.2	4.6	0.381
Rate of drinking	40-64	54.5	59.7	0.266	9.7	12.4	0.130
	65-74	48.5	51.5	0.467	9.2	8.1	0.518
	75-	41.2	36.7	0.332	2.2	4.1	0.206

Fig.1-1 BMI, Blood pressure and blood test results

*: P＜0.05   **: P＜0.01   ***: P＜0.001

Model area
Old area

WBC(women)

×10³/mm³

***

8
7
6
5
4
3
2

40-64   65-74   75- (years)

HbA1c(woman)

%

*   *

6.5
6
5.5
5
4.5
4
3.5
3

40-64   65-74   75- (years)

CRP(women)

mg/dl

*

0.25
0.2
0.15
0.1
0.05
0

40-64   65-74   75- (years)

Diastolic blood pressure(women)

mmHg

*

110
100
90
80
70
60
50
40
30

40-64   65-74   75- (years)

ALP(women)

mg/dl

*   *

350
300
250
200
150
100
50
0

40-64   65-74   75- (years)

*: $P < 0.05$ **: $P < 0.01$ ***: $P < 0.001$

Alb(women)

mg/dl

*

5
4.5
4
3.5
3

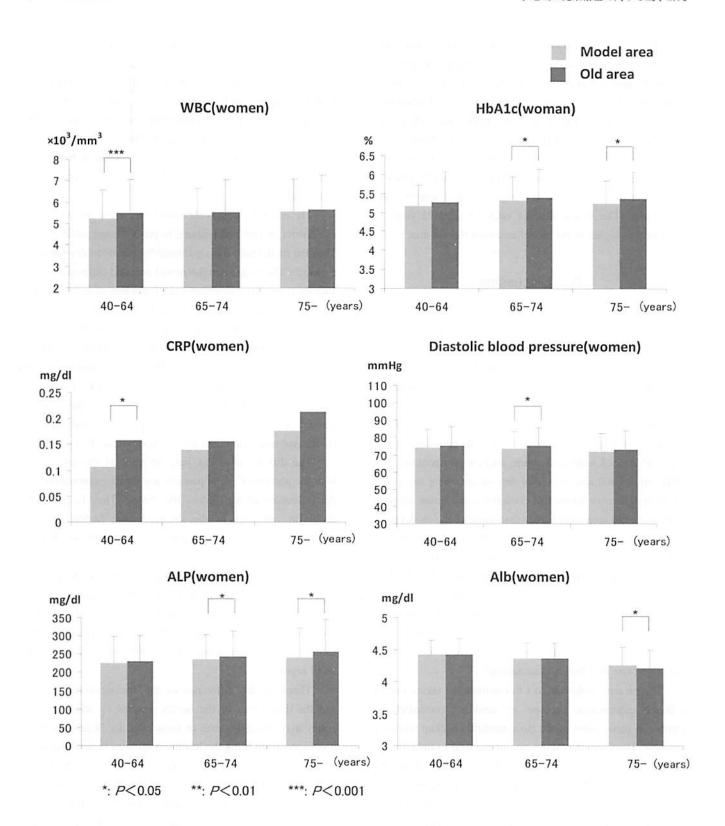40-64   65-74   75- (years)

Fig.1-2 BMI, Blood pressure and blood test results

For the women, BMI in the old area was significantly higher than the model area of all aged groups. Serum high density lipoprotein cholesterol in the model area was lower than the old area by all age groups except 65-74 years old.

Also, systolic blood pressure, total white-cell count, HbA1c, and serum CRP value of aged 40-64 years, diastolic blood pressure, alkaline phosphatase of aged 65-74 years, alkaline phosphatase HbA1c of aged 75 years or older of the model area were significantly lower than the old area. The serum albumin value of aged 75 years or older was higher in the model area than the old area.

IV. Discussion

The purpose of this study was to clarify healthy disparities comparing between the model area and the old area by using basics medical checkup results.

As a result from a smoker rate, an obese subject rate and the drinking rate, the model area showed that health behavior was higher than the old area.

Moreover, the old area showed that the values of BMI, systolic blood pressure, diastolic blood pressure, serum triglyceride, total white-cell count, alkaline phosphatase, γ-GTP, serum CRP, and HbA1c of the old area were lower, but serum high density lipoprotein cholesterol and serum albumin level of the old area were higher than those of the model area.

Comparison with the indexes medical checkup such as BMI, blood pressure, lipids abnormality, liver function, the diabetes mellitus suggested that there were the healthy disparities between the model area and the old area.

The previous study compared with seven political divisions in the H city reported that the model area lived people who were higher rate of white collar, economy level and taking rate of a health examination[15].

The present study couldn't to calculate the taking rate of a health examination because we couldn't command the number of participants of the basic medical checkup precisely this time. However, the taking rate of medical examination at the model area was supposed to higher than the old area by the previous study. Also the composition of population and a component proportion ratio of the participants in the medical examination were almost same ratio with the previous study.

The taking of the medical examination is one of the important health behaviors. The medical examination is important role which have the right recognition about the state of health oneself[16]. The percentage of a person having the healthy behavior as well as taking of the medical examination at the model area was higher than the old area. Thus the higher health behavior such as lower rate of obesity, tobacco

use and higher rate of exercise habit may affect test values at the model area.

Also, living environments may be possible effect on health behaviors and the test values. WHO reported the importance of the urban development, and that coziness of the community promotes psychosocial and physical well-being[17].

The model area and the old area showed the major difference. In the model area, the large portion is occupied by residence areas.

The residence area is the most restricted zones in the land use district and limited building to protect home environment. Thus the model area was developed by the urban development project[18]. The designated the model area and difference of the socioeconomic factors affected the behaviors of residents, and then these caused to metabolism and an inflammatory marker. U.S study of NHANES which was analyzed the difference of the socioeconomic factor and the association of the risk factor of the cardiovascular disease. This study showed longer education career related to higher of married rate, living city residence and health behavior. Moreover there were significant difference with blood pressure, BMI, serum cholesterol and serum high density lipoprotein cholesterol[19].

The difference of sex may be affected the differences with the percent of participants in the health examination and the influences of test values by obesity. Thus future study about the influence of the socioeconomic factors may be cleared by adjusting subject number and a marker of physical index.

Although previous study about analyzing of small region suggested that the health disparities by the socioeconomic factor was reduced, the present study showed that the socioeconomic factor affected to health behaviors and the test values such as metabolism or the inflammatory marker in small region.

Therefore the difference of the socioeconomic factors and the differences of the health services by administrative policy may affect the level of knowledge for health, and then it is supposed to bring the healthy disparities in small region.

This study was cross sectional study using the basics medical checkup of the single financial year. The future study will be necessary the continuance and long-term analysis using the past basics medical checkup data accumulated in the cities and towns.

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