

# The Fourth Japan–Nepal Health Scientific Expedition : Comparative Epidemiological Studies on the Genesis of Hypertension : Helambu Study

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研究資料

# The Fourth Japan-Nepal Health Scientific Expedition

## Comparative Epidemiological Studies on the Genesis of Hypertension

—Helambu Study—

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|---|---|
| 1. Name of the Expedition<br>Japan-Nepal Health Scientific Expedition<br>—Comparative Epidemiological Studies<br>on the Genesis of Hypertension—  | Associate Professor, Institute of<br>Health Science, Kyushu Univer-<br>sity. (Exercise Physiology)<br>Kazue ITOH (Dr. Med. Sci.) :<br>Associate Professor, Division of<br>Food and Nutrition, Nakamura<br>Gakuen College. (Nutrition)<br>Yutaka YOSHIMIZU (B. Phys. Ed.) :<br>Professor, Department of Health<br>and Physical Education,<br>Kurume University. (Exercise<br>Physiology) |
| 2. Country of the Expedition :<br>Japan   | (Nepalese Side)<br>Gopal P. ACHARYA :<br>Professor & Head, Institute of<br>Medicine, Tribhuvan Univer-<br>sity. (Internal Medicine)<br>Pashupati REGMI :<br>Medical Doctor, Institute of<br>Medicine, Tribhuvan Univer-<br>sity. (Internal Medicine)<br>Pradeep K. GHIMIRE<br>Deputy Instructor, Institute of<br>Medicine, Tribhuvan Univer-  |
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#### 6. Objects of the Expedition

During the summer of 1987, an International Joint Research titled "Tribhuvan University-Kyushu University Hypertension Project(TUKUHP)" was carried out by the "Japan-Nepal Health Scientific Expedition(JANESE '87)" group, composed of the Dean and professors of the Institute of Medicine, Tribhuvan University, and Japanese specialists of hypertensiology, exercise physiology, nutrition, and cultural geography including the applicants. The ultimate goal of this project was to clarify the factors which affect the pathogenesis of hypertension from an epidemiological point of view. To know the important conditions which generate the hypertension, the health status, dietary practice, and physical activities of the Nepalese people, whose blood pressure are low in general, were compared with those of the Japanese.

The blood pressure, body fat mass, urinalysis, complete blood counts, blood chemistries and nutritional intakes of the inhabitants were measured at the two sites in Nepal; one of which was a hilly village, named Kotyang in Kabhre District, the other a suburban village, named Bhadrakali in Kathmandu District. The prevalence rates of the hypertensives in both sites(0.7 % in Kotyang, 6.9 % in Bhadrakali) were by far lower than those in Japan(25-30% in general) in spite of the fact that the levels of average salt intake of the two countries were almost identical(about 12 g/day). Taking the other results into consideration, we assumed that the blood pressure might be influenced by physical activity, fat free mass and nutrient intake rather than by the amount of daily salt intake, although a weak positive link of salt consumption to blood pressure was detected statistically.

On the basis of these results which were

accepted with great interest at several international meetings of medical and nutritional science, we carried out the second and the third TUKUHP researches with the cooperation and assistance of the Institute of Medicine, Tribhuvan University, and confirmed the previous results, which have already been reported.

The purpose of the fourth TUKUHP investigation is to find out the difference of body composition, blood pressure, blood chemistries, nutrient intakes and physical activities between the people living in the mountain area and those who had been investigated in the first and the third TUKUHP study. The people living in the mountain area are said to have taken salt tea still in their life and their salt consumption is said to be more than 15g per day.

The similar methods to the previous TUKUHP research were applied to the fourth one so that the data can be compared.

#### Annexed Objects :

- 1) Diagnosis and treatment of the people concerned.
- 2) A contribution to the accumulation of the information on the amelioration of nutritional status in Nepal.
- 3) A contribution to the development of the scientific fields included in this project in Nepal.
- 4) The promotion of the scientific relationship between Japan and Nepal.

#### 7. Schedule of Survey

The field research was carried out at Tarkeghyang and Sermathang in Helambu District at or above 2,500 meters above sea level. We left Kathmandu for Tarkeghyang on March 2nd in 1992 and arrived there on March 4th. The research started on March 5th and lasted for 4 days. Because of the lack of the participants, the survey area was changed to Sermathang, and the research there was continued for 4 days from March 10th till 13th. The same methods as the previous study were applied to the pres-

Table 1. Number of subjects studied, by sex, age group and area

Age Group	20-29	30-39	40-49	50-59	60-69	70-	Total
Tarkeghyang							
Men	10	20	8	18	13	5	74
Women	14	9	12	21	12	8	76
Sermathang							
Men	18	20	19	12	23	7	99
Women	14	19	13	15	22	19	102
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Total							
Men	28	40	27	30	36	12	173
Women	28	28	25	36	34	27	178

ent one except for taking electrocardiography.

#### 8. Temporary View

##### 1) The subjects investigated

The subjects investigated in the two areas are shown by sex and age group in Table 1. The elderly subjects were participated in Sermathang. No sex difference was observed between the two areas. Since the people living in the two areas are ethnologically identical, the numbers of the subjects are presented by the sum of the two areas investigated.

##### 2) Nutritional Survey

###### A) Methods

The survey for the nutrient intakes was carried out by 24-hour recall method to obtain the individual food consumption using the food models. The measurement method was also applied to about 10% of total subjects.

###### B) Results and Comments

- (1) Diet mainly consisted of Bhat, Dal and Tarkari, and occasionally of Achar in both areas. Sattu and salt tea were usually taken for breakfast.
- (2) All were habitually drinking salt tea in both areas, the approximate amount ranging from 1,000 to 3,000 ml per person.

The concentration of salt in salt tea was considered to be 0.3 - 0.4%.

- (3) High carbohydrate diet was dominant and protein intake was extremely low in both areas, while fat intake was slightly lower than that of Japan.
- (4) Protein energy ratio was 7 %, being lower than the Japanese.
- (5) Animal protein ratio was almost zero in most all of the subjects, whereas animal fat ratio was more than 60%, a half of which was taken from Tibetan tea.
- (6) The intakes of energy per kg of body weight were considered to be 35-45kcal, which were higher than those of the Japanese.

##### 3) Morphological and Physiological Survey

###### A) Methods

- (1) Measurement of body height, weight, skinfold thickness (Triceps, Subscapular, Suprailiac, Umbilical and Calf) for estimating %fat of the body.
- (2) Measurement of maximal aerobic power (Margaria's indirect method) and estimation of daily consumption of energy by 24-hr ECG.

All subjects shown in Table 1 par-

Table 2. Mean and standard deviation of morphological parameters and maximal aerobic power for subjects by sex and age group

Age (yrs)	Men				Women			
	Ht (cm)	Wt (kg)	%Fat (%)	MAP (ml/kg/min)	Ht (cm)	Wt (kg)	%Fat (%)	MAP (ml/kg/min)
20-29	163.2 ±6.0	53.3 ±5.2	12.2 ±3.1	52.9 ±10.1	152.6 ±4.4	48.9 ±6.3	21.9 ±6.0	39.4 ±5.3
30-39	162.4 ±5.3	55.3 ±7.2	13.1 ±4.7	46.3 ±8.7	151.3 ±5.0	50.7 ±6.9	22.6 ±5.5	35.8 ±6.5
40-49	163.2 ±4.6	54.7 ±5.2	12.8 ±3.6	44.4 ±7.5	151.4 ±4.8	50.3 ±5.6	21.3 ±6.0	35.9 ±5.4
50-59	163.3 ±5.6	54.3 ±7.6	12.0 ±2.5	37.2 ±6.1	151.7 ±4.9	48.7 ±6.2	21.0 ±5.7	31.9 ±5.7
60-69	161.8 ±5.2	53.3 ±7.1	12.8 ±3.8	33.1 ±5.8	151.3 ±5.9	47.7 ±5.8	18.1 ±3.7	28.3 ±2.2
70-	163.2 ±4.6	57.8 ±9.2	14.0 ±5.0	33.3	146.7 ±7.5	43.7 ±9.3	16.5 ±4.5	—

Ht: body height, Wt: body weight, %Fat: percent of the body fat,  
MAP: maximal aerobic power

ticipated in the morphological survey. However, maximal aerobic power was only measured in 138 men and 85 women, respectively.

#### B) Results and Comments

The mean body height(Ht), weight (Wt), %body fat(%Fat) and maximal aerobic power (MAP) are shown in Table 2.

- (1) Ht and Wt of the subjects in Helambu were slightly higher than those in Kotyang and Bhadrakali.
- (2) Percent of the body fat(%Fat) was also higher than in both villagers.
- (3) Mean maximal aerobic power(MAP) of the present subjects was higher than those in Bhadrakali villagers, but not significantly different from those in Kotyang in all age group.

#### 4) Medical Survey

#### A) Methods

The same medical chart as the previous one was prepared in advance, and the individual medical check was carried out according to this chart.

- (1) Family history, life history, present status and physical examination were checked by the Nepalese doctors.
- (2) The subjects usually voided in the morning after arising. The next voided urine was collected as "a second morning voiding urine" into a paper cup and 8 variables(pH, protein, sugar, occult blood, urobilinogen, bacteria and keton body) were determined semiquantitatively using the strip (BMTEST 8-11) by one examiner.
- (3) Blood pressure(BP) and pulse rate(PR) were measured 3 times consecutively in the sitting position using the semiautomated BP measuring device(OMRON HEM 401

Table 3. Classification of blood pressure according to WHO criteria by age group

Age Group	20-29	30-39	40-49	50-59	60-69	70-	Total
HT	53	41	29	28	25	11	187(53.3%)
BHT	2	13	8	7	13	7	50(14.2%)
HT	1	14	15	31	32	21	114(32.5%)

NT: normotension(SBP<140 and DBP<90 mmHg)

BHT: borderline hypertension(SBP=140-159 and DBP=90-94 mmHg)

HT: hypertension(SBP $\geq$ 160 and/or DBP $\geq$ 95 mmHg)

C) prior to the blood sampling. The room temperature at the time of the BP measurement was between 10 and 16°C in both areas. The average of 3 consecutive measurements for systolic and diastolic BP and PR were computed and were used for the analyses. The subjects were classified into 3 groups according to WHO criteria.

- (4) Approximately 7 ml of blood was drawn through the median vein from the subjects who agreed to blood sampling. The blood specimen was centrifuged and each separated serum was frozen using the liquid nitrogen gas. Complete blood counts were not determined.

#### B) Results and Comments

The results of blood pressure measurements are briefly shown in Table 3. The prevalence rates of borderline hypertension and hypertension in the two areas were 14.2% and 32.5%, respectively. There was no sex difference in the classification of blood pressure. The prevalence

rate of hypertension was higher in Sermathang than in Tarkeghyang probably due to the higher percentage of the elderly subjects in the former. The prevalence rates in these areas were remarkably higher than those of any of the previous studies. Although the high altitude and the coldness may be one of the reasons for the high incidence of hypertension, further discussion concerning this matter will be necessary.

The incidences of proteinuria and hematuria were 1.2% and 4.0% in men and 1.1% and 11.9% in women, respectively. Only one female subject of positive glucosuria was detected in the present study.

All data including blood chemistries will be analysed in Japan and will be sent to the counterpart in Nepal.

This progress report was sent to the Office of the Research Division on March 23, 1992, just before the Japanese team left Kathmandu for Fukuoka.