



Acta Genet Med Gemellol 36:493-501 (1987)
© 1987 by The Mendel Institute, Rome

Smoking and Drinking Discordance and Health Condition: Japanese Identical Twins Reared Apart and Together

Kazuo Hayakawa

Department of Public Health, Kinki University School of Medicine, Osaka, Japan

Abstract. A total of 543 like-sex pairs of twins (407 MZ, 136 DZ) were sent mailed questionnaires on cigarette smoking, alcohol drinking and health conditions. The observed concordance rate for alcohol drinking was significantly higher than expected in both MZ and DZ pairs. The observed concordance rate for cigarette smoking was significantly higher than expected in the MZ, but not the DZ pairs. The observed rate of intrapair concordance for drinking was significantly higher than expected even in MZ pairs reared apart from infancy or very early childhood. Higher life satisfaction was observed more often in the higher alcohol consumers than in the lower consumers among MZ pairs discordant for alcohol drinking, while earlier onset of presbyopia was observed more often in the lower consumers. Physical symptoms, especially pains in the upper extremities, were reported more often by higher alcohol consumers than by lower consumers in the MZ pairs discordant for drinking.

Key words: *Twins reared apart, Epidemiology, Drinking, Smoking*

INTRODUCTION

For epidemiological research, MZ twins reared apart provide a powerful research method which is comparable to that of inbred line mammals. The potential value of this type of twin study has been emphasized in the field of epidemiology [1], although it has been considered to be very difficult to collect enough MZ twins reared apart for statistical analyses.

Since 1981, the authors have attempted to collect adult MZ and DZ twins in Japan for epidemiological research and have so far collected a relatively large number of MZ twins, including MZ twins reared apart [2,3]. A questionnaire survey was conducted by

mail on their health conditions. The results are now analysed with a focus on alcohol drinking, cigarette smoking and physical symptoms.

MATERIALS AND METHODS

The subjects are 543 like-sexed twin pairs (454 male, 89 female) of the Kinki University Adult Twin Registry consisting of 1,314 adult twin pairs. The subjects are from 47 to 87 years old and mostly in their 50s or 60s. They are from all of Japan, but mostly from Kinki area, the western part of Japan.

The data were collected through mailed questionnaire including 40 items on physical health (see Appendix). The item, "Do you smoke more than 20 cigarettes a day on the average? (Yes, No)", was used to compare cigarettes smoking within the pair. The item, "Do you drink alcohol everyday? (Yes, No)", was used to compare alcohol drinking within the pair.

Zygosity was determined through one of the questionnaire items, "When growing up, were you often said to be as like as two peas in a pod? (Yes, No)". A total of 396 pairs, in which both twins answered "Yes" to this question, were classified as MZ. The remaining 140 pairs were classified as DZ. The accuracy of this zygosity diagnosis is estimated at 97.0% for MZ pairs, based on the results of 87 pairs whose zygositities were established by nine blood genetic markers [4].

RESULTS AND DISCUSSION

Table 1 shows the intrapair concordance rate for alcohol drinking in 407 MZ and 136 DZ pairs. The expected number of pairs was calculated on the basis of the binomial distribution. Out of the 407 MZ pairs, both of the 131 pairs drank everyday, vs an expected number of only 75.5 pairs. The observed number of concordant pairs was significantly greater than expected in both MZ and DZ pairs ($P < 0.001$).

Table 2 shows the concordance rate for cigarette smoking in 393 MZ and 135 DZ pairs. The difference between observed and expected numbers was statistically significant

Table 1 - Intrapair concordance for alcohol drinking

		Both drink	One drinks cotwin doesn't	Neither drinks
MZ pairs***	observed	131	89	187
	expected	75.7	199.6	131.7
DZ pairs***	observed	42	43	51
	expected	29.6	67.7	38.6

*** $p < 0.001$

Table 2 - Intrapair concordance for cigarette smoking

		Both smoking	One smoke cotwin doesn't	Neither smokes
MZ pairs***	observed	76	109	211
	expected	43.0	175.0	178.0
DZ pairs**	observed	18	57	60
	expected	16.0	61.0	58.0

** $p < 0.01$, *** $p < 0.001$

Table 3 - Age at the time of separation in the male MZ twins

Separation age	0-5	6-10	11-15	16-20	21-25	26 and over
Number of pairs	15	0	39	63	45	36

in the MZ ($P < 0.001$) and the DZ ($P < 0.01$) pairs.

The age of separation (ie, the age when the cotwins started to live apart) (see Table 3). There were 15 MZ pairs separated at age 0 to 5 and no pairs separated at age 6 to 10.

Fig. 1 shows the intrapair concordance for alcohol drinking in these 198 male MZ pairs. The observed concordance was higher than expected for all age groups. The difference between observed and expected rates was largest in the separation age group 16-20.

The intrapair concordance on cigarette smoking is shown in Fig. 2. The difference between observed and expected rates was largest in the separation age group 21-25 and was relatively small in two age groups 0-5 and 26 and over.

Fig. 3 shows the observed/expected ratio in smoking and drinking. The ratio was relatively small in the age group 0-5 and then increased to over 2.5 for both smoking and drinking, for reasons that are not clear at this point.

Of the 407 MZ pairs, 89 were discordant for alcohol consumption. Fig. 4 compares higher consumers (drink everyday) and lower consumers (do not drink everyday) within the pair, on body weight, blood pressure, onset of presbyopia and life satisfaction. Higher consumers and lower consumers did not differ greatly in heavier twins within the pair. Of the MZ pairs discordant for high blood pressure, 60% were concordant for alcohol drinking. The higher consumers of alcohol accounted for a higher percentage in higher life satisfaction while the lower consumers accounted for a higher percentage in earlier onset of presbyopia.

Out of 396 MZ pairs, 109 were discordant in cigarette smoking. Fig. 5 compares higher consumers (more than 20 cigarettes/day) and lower consumers within the pair. There was no item on which higher and lower consumers differed significantly.

Fig. 6 compares physical symptoms in higher and lower consumers of alcohol in the 89 MZ pairs discordant for alcohol drinking. The higher consumers reported pains in the

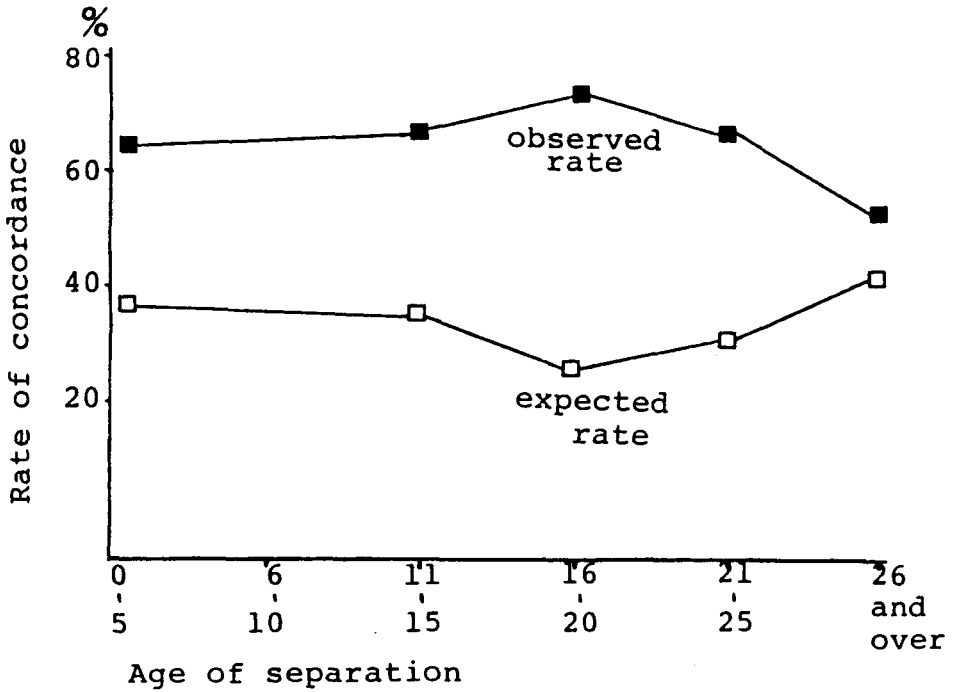


Fig. 1. Age of separation and the rate of concordance on drinking

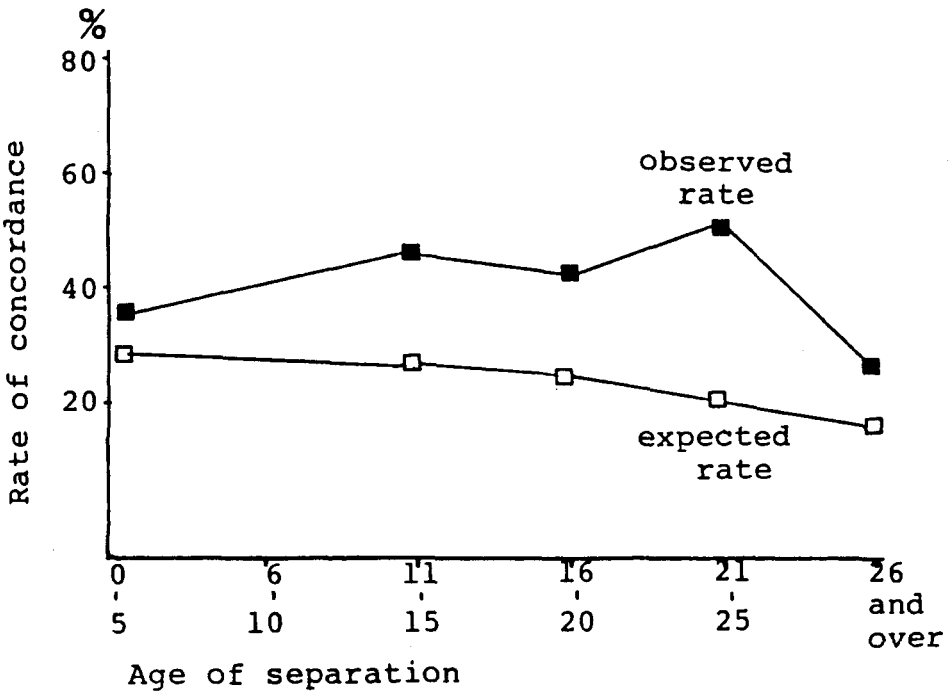


Fig. 2. Age of separation and the rate of concordance on smoking

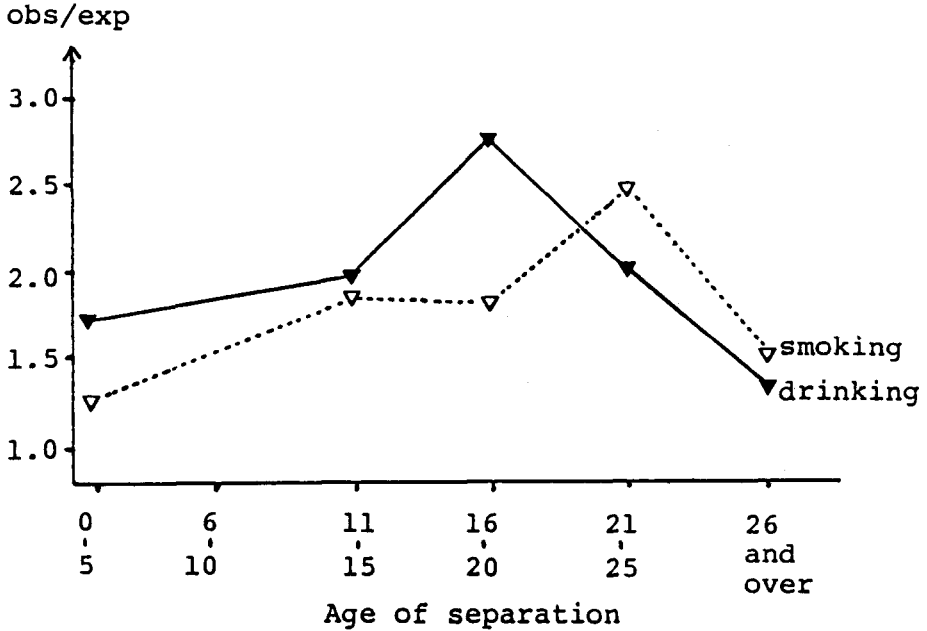


Fig. 3. Observed/expected ratio of concordance on alcohol drinking and cigarette smoking

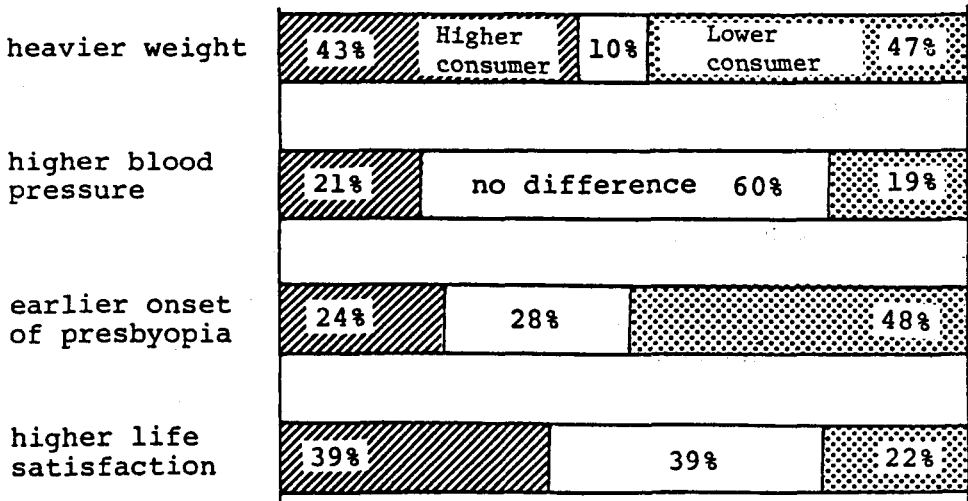


Fig. 4. Intrapair difference of body weight, blood pressure, presbyopia and life satisfaction in 89 MZ pairs discordant in alcohol consumption

upper extremities more often than the lower consumers ($P < 0.05$). Higher and lower consumers also showed a relatively large difference in pains in the back or the waist and in shortness of breath.

Fig. 7 compares the physical symptoms reported by higher and by lower consumers of cigarettes in 109 MZ pairs discordant for smoking. No significant difference was found since this study focused upon the present amount of cigarette consumption, further analysis is needed with respect to past consumption.

REFERENCES

1. MacMahon B (1978): Epidemiological approach to family resemblance. In Morton NE, Chung CS (ed): Genetic Epidemiology. New York: Academic Press, pp 3-11.
2. Hayakawa K, Shimizu T, Ohkuni M, et al (1982): Collecting twin subjects in later adulthood and their health conditions. *Jpn J Pub Health* 30:279-282.
3. Hayakawa K, Shimizu T, Ohknuni M, et al (1983): Gerontological research on aging twins (2nd report): results of the health survey through questionnaires. *Jpn J Pub Health* 30:349-357.
4. Hayakawa K, Shimizu T, Kanamitsu Y (1986): Accuracy of zygosity diagnosis by the mailed questionnaires for adult twins. *Jpn J Publ Health* 33:340-344.

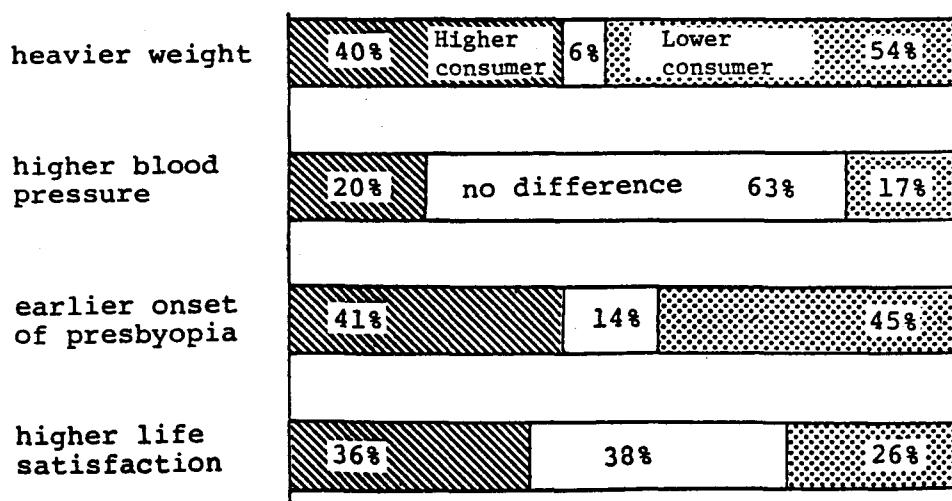


Fig. 5. Intrapair difference of body weight, blood pressure, presbyopia and life satisfaction in 109 MZ pairs discordant in cigarette consumption

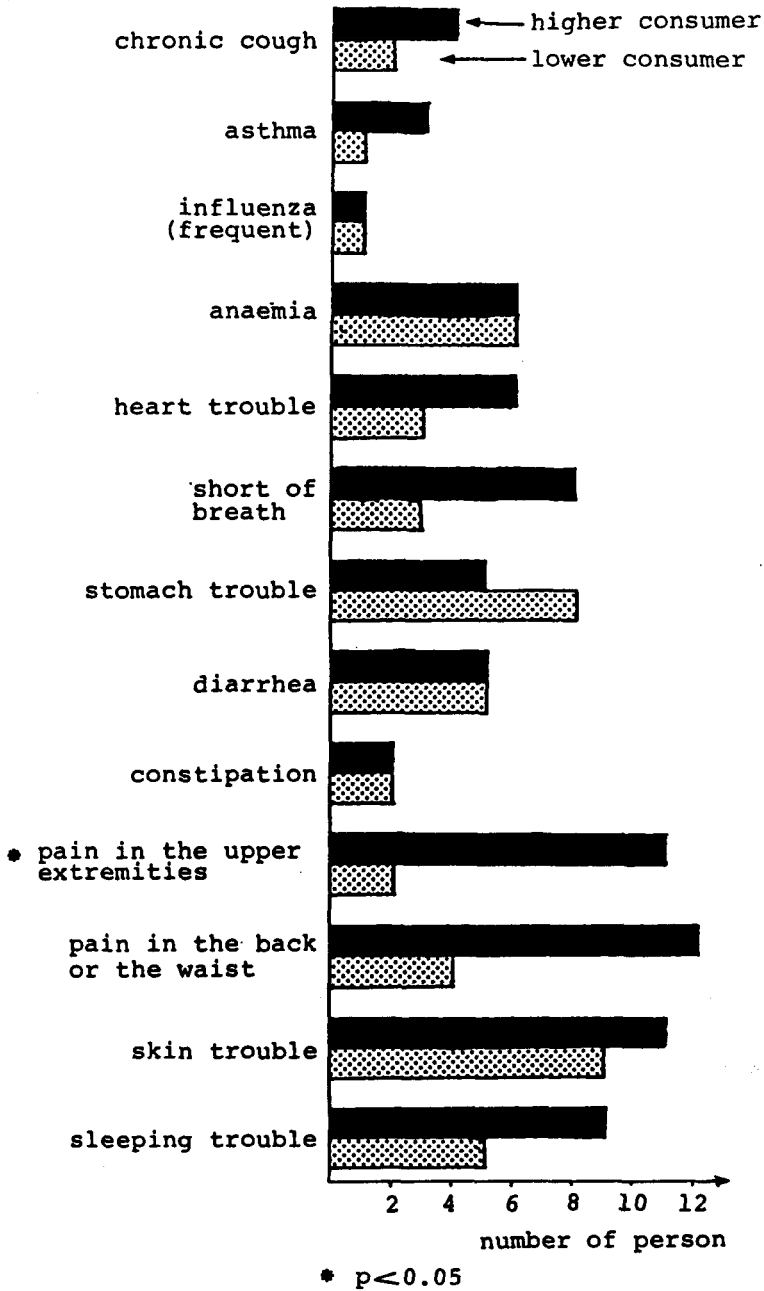


Fig. 6. Complaints of physical symptoms in 89 MZ pairs discordant in alcohol consumption

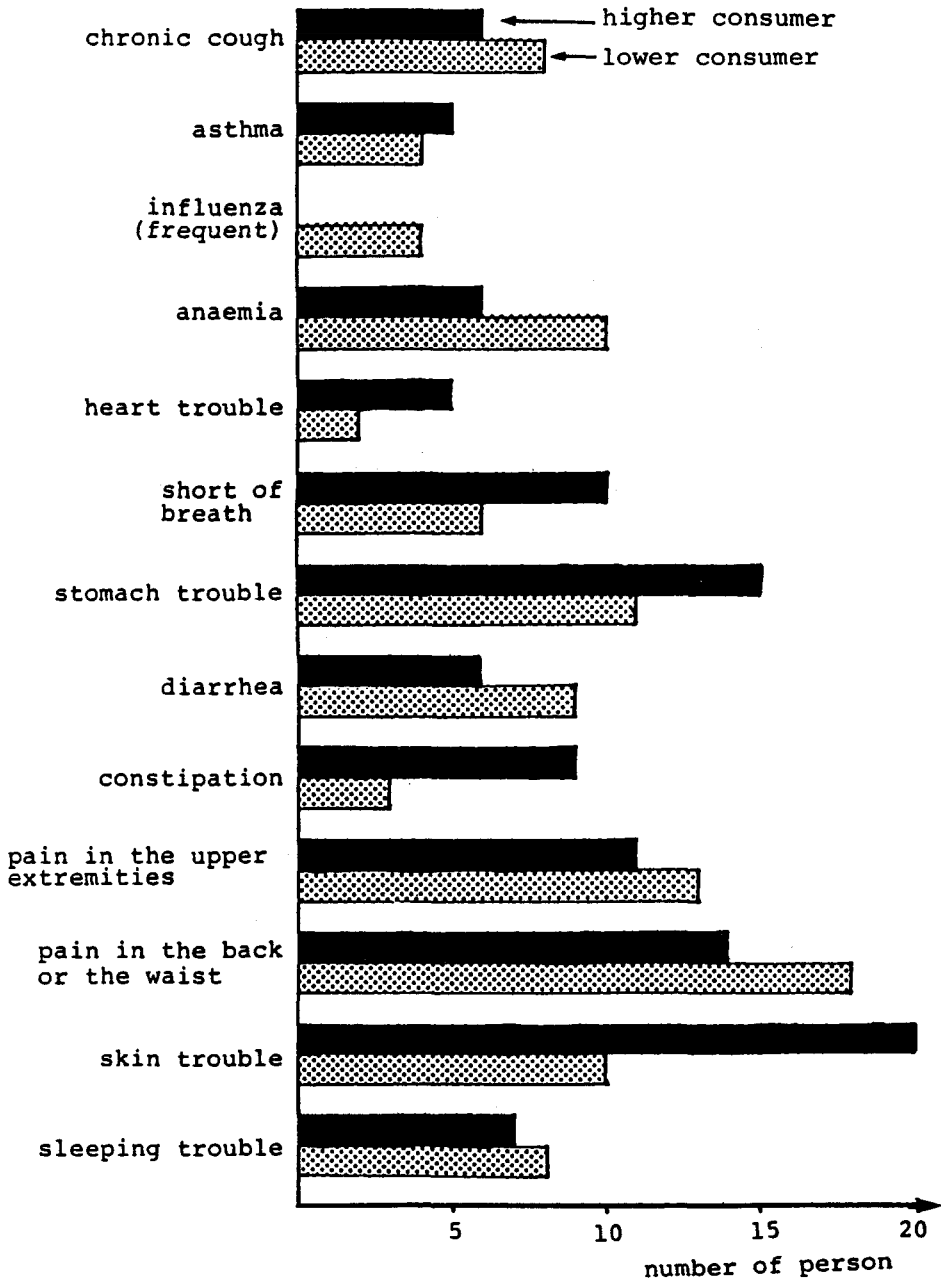


Fig. 7. Complaints of physical symptoms in 109 MZ pairs discordant in cigarette consumption

APPENDIX

The following are some of items used in this questionnaire survey.

1. Do you smoke more than 20 cigarettes a day on the average? (Yes, No)
 2. Do you drink alcohol everyday? (Yes, No)
 3. How old were you when you started to live apart from your twin brother/sister?
 4. Do you have a chronic cough? (Yes, No)
 5. Do you have asthma? (Yes, No)
 6. Do you frequently get influenza? (Yes, No)
 7. Do you have any heart trouble? (Yes, No)
 8. Do you easily get short of breath? (Yes, No)
 9. Do you often have a stomach trouble? (Yes, No)
 10. Do you often have diarrhea? (Yes, No)
 11. Do you have bad constipation? (Yes, No)
 12. Do you often have pains in the arm or in the hand?
 13. Do you often have pains in the waist or in the back?
 14. Do you often have skin troubles? (Yes, No)
 15. How much do you weigh?
 16. Have you been ever told "hypertensive" by a physician?
 17. How old were you when you started to use the eyeglasses for presbyopia (aged eyes)?
-

Correspondence: Dr. K. Hayakawa, Department of Public Health, Kinki University School of Medicine Osaka, Japan.