

## **The Effect of Table Tennis Practice on Mental Ability Evaluated by Kana-Pick-out Test**

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### **Abstract**

The possibility of table tennis practice to prevent or delay mental deterioration was studied on table tennis players over age fifty in various regions of Japan, using the Kaneko method or Kana-pick-out test.

The results were compared with the standard counts in each age group tested on controls. It was confirmed that the scores of table tennis players were higher than the control in every age group. It is evident from this study that table tennis players preserve far better mental ability even in the older age compared with non-players. These findings suggest that table tennis practice can prevent or delay senile dementia as other sport activities could.

Key words: table tennis, mental ability, Kaneko test

### **Introduction**

As the life expectancy is lengthened in developed nations due to improved medical, social and financial benefits, senile dementia becomes a big problem in these nations. It is understood that physical and mental activities prevent or delay senile dementia (1,5,7,8). As lovers of table tennis, we are interested in the effect of table tennis practice to preserve, not only physical but also mental ability. The purpose of this study is to find out the influence of table tennis practice upon the mental ability of players in advanced ages.

### **Methods and Subjects**

There have been various testing methods developed to evaluate mental ability in older individuals. In Japan MMS (mini-mental state) and Hasegawa test have been popular, but they are not adequate to detect senile dementia in its early stages. Those tests were designed to check mostly the function of the posterior half of the cerebrum, i.e. the ability of language, memory, orientation, visuospatial function and so on, as in the test of WAIS (Wechsler Adult Intelligence Scale). There are, however, the function of the lower level in the cerebrum and they are preserved almost in the same level until the age of 70 or 80.

Prefrontal function is, instead, the ability of the highest level in human beings

Table 1

Average Score of Our 59 Non-players and Kaneko's Study

Age	#	Our control (A)	#	Kaneko's report (B)
40-49	17	36.3	40	36.6 ± 10.0
50-59	23	30.5	25	31.9 ± 10.9
60-69	9	28.7	77	23.9 ± 8.4
70-79	7	24.9	90	22.4 ± 9.3
Over 80	3	13.0	8	19.2 ± 7.4

Table 2

Kana-Pick-Out Test Score of 217 Table Tennis Players

Age	# Sex	Range	Average	SD	Comparison with (A) and (B)	
50-59	46 men	13-60	44.5	± 12.1	+14.0	+12.6
	87 women	24-54	43.9	± 10.5	+13.4	+12.0
60-69	36 men	17-51	37.7	± 10.9	+9.0	+13.8
	31 women	11-59	24.9	± 11.4	-3.8	+1.0
70-79	8 men	7-59	29.2	± 13.1	+4.3	+6.8
	7 women	6-44	24.8	± 16.2	-0.1	+2.4
80<	1 man		33.		+20.0	+13.8
	1 woman		17.		+4.0	-2.2

Table 3

Length of Table Tennis Practice and Kana-Pick-Out Test Scores

Age	#	Years of Table Tennis Practice					
		1-9	10-19	20-29	30-39	40-49	50<
Over 70	8		31.5	44		16	27
60-69	186	34	37.4	37	40	33.6	35
56-59	134	43.1	43.8	44	44	47	

Figure 1

Kana-Pick-Out Test Paper

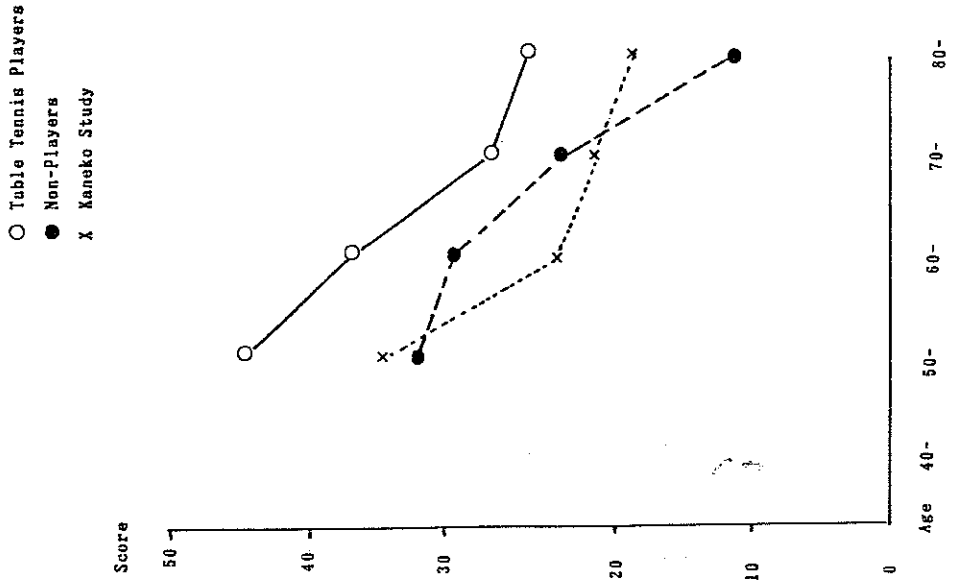
文の中から、「あ・い・う・え・お」をひろいあげて、○をつけてください。  
 (練習問題) ももたろうは、きじといぬとさるをけらいにしして、おにがしまへ、おにたいじにいきました。

むかし あるところに、ひとりぐらしのおばあさんが  
 いてどしを とって、びんぼうでしたが、いつも ほか  
 らかに くらしていました。ちいさなこやに すんでいて、  
 きんじよの ひどの つかいはしりを やっては、こちら  
 で ひどくち、あちらで ひどのみ、おれいに たべさせ  
 てもらって、やっど そのひぐらしを たてていましたが、  
 それでも いつも げんきで ようきで、なにひとつ  
 ふそくはないと いうふうでした。  
 ところが あるばん、おばあさんが いつものように  
 にここにこしながら、いそいそと うちへ かえるとちゅう、  
 みちばたの みぞのなかに、くろい おおきなつぼを  
 みつけました。「おや、つぼだね。いれるものさえあれば  
 べんりなものさ。わたしにや なにもないが。だが、  
 このみぞへ おとしてつたのかねえ」と、おばあさんは  
 もちぬしが いないかと あたりを みまわしましたが、  
 だれも いません。「おおかた あなが あいたんで、  
 すてたんだらう。そんなら ここに、はなでも かけて、  
 まどに おこう。ちよつくら もつていこうかね」 こう  
 いうて おばあさんは つぼのふたを とって、なかを  
 のぞきました。  
 (イギリス民話「いたずらおばけ」 湖田貞二 再録  
 「こどものとも」 1977年2月号、福音館書店刊より)

施行日 年 月 日 正( ) 限( )

●「老人性眼疾の正しい知識」(東江堂発行)より抜粋●

Figure 2  
 Average Scores of Age Groups



which includes the ability of concentration, symbolization, attention distribution, humor, imagination and so on. These are in maximum level at the age of 20 and then decreases rectilinearly as age advances in normal individuals.

Our co-author, Matsuo Kaneko, neurosurgeon, designed several test batteries for prefrontal functions. One of them is called Kana-pick-out test or Kaneko test which was employed in this study.

The intention of this test is to check the ability of attention-distribution for several works simultaneously with concentration. This test has also been applied to detect minor deterioration of the higher brain function such as early senile dementia. He has diagnosed more than 1500 cases of early senile dementia on this method and has been applying early treatment for them.

This Kaneko method is to have examinees pick out and encircle as many of the five Japanese vowels "a,i,u,e,o" in sentences written in Japanese alphabets. This must be done as possible within two minutes(see Fig. 1).

Subjects of the study were 217 Japanese aged over fifty and who play table tennis regularly more than four hours every week. Mimura tested 85 players in Tamana, Kuriyama tested 27 players in Osaka, Ohta tested 17 players in Hiroshima, Ueda tested 12 players in Tochigi, Kadooka tested 10 players including two players of age forties in Toyokawa, and Mrs. Noguchi tested five players in Kobe. The other 71 players were tested in Nagasaki by Kawano. The oldest player was an 85-year-old male. All scores of players were studied and compared with those of non-players.

As a control, the Kana-pick-out test was conducted on a group of non-players in Kokura, Kita-kyushu. Nearly all of them were women. The result of the test is shown in Table 1. The average score in each age group is similar to the score reported by Kaneko in his early study on 1,200 old residents in Hamamatsu area(2).

## Results

As shown in Table 2, the average test score of table tennis players in their fifties was 44.5 (standard deviation  $\pm 12.1$ ) among 46 men, and 43.9( $\pm 10.5$ ) among 87 women. Of those tested in their sixties, it was 37.7 ( $\pm 10.9$ ) among 36 men, and 24.9 ( $\pm 11.4$ ) among 31 women. For those in their seventies it was 29.0 ( $\pm 13.1$ ) among 8 men, and 24.8 ( $\pm 16.2$ ) among 7 women. There was one man and one woman in their eighties, an 85-year-old male and an 81-year-old female. Their scores were 33 and 17, respectively.

When these scores were compared with the scores of our control(A) and Kaneko's study(B), a big difference was noted in the 50-59 age group. Table tennis players of both sexes show much higher counts of plus 12 or more as compared with non-players. The score of male players in the age of 60-69 is also high, 9.0 or 13.8 higher than control-A and -B, although women in the same age group show a slightly lower count. Another exception is the score of women in their seventies. Their score is almost the same as control-A but higher than control-B. The only woman player older than eighty years showed a slightly higher score of plus 4.4 than control-A but it is 2.2 points lower than control-B. The result in the eighties is not statistically significant because only one player of each sex was tested. Figure 2 illustrates the average scores in the age groups of table tennis players and non-players. The difference is significant. Table tennis players demonstrated much higher scores than non-players.

We tried to find the relationship between the years of table tennis practice and Kana-pick-out test scores. The Table 3 shows the result.

No correlation was found between the length of practice and score of the test in players older than seventy. The number of subjects was too small for evaluation, only eight players in total. However, in the 50-59 age group of 133 players, the score steadily improved as the length of practice became longer.

## **Discussion**

Physical exercise of any kind improves blood circulation, and thus contributes to a good supply of blood containing oxygen, nutrients, vitamins and other necessary chemicals to the brain. Jogging, running or walking helps to improve the brain function along with the function of the heart and muscles, as reported by many authors(1,5,7,8). Activities of the brain are stimulated and reinforced by sport activities of all kinds.

Mizutani et al(6) have investigated factors which affect mental ability of older residents in Shizuoka Prefecture, age over 65. Kana-pick-out test was carried out on 1,245 subjects. They investigated 124 individuals of excellent scores as well as higher than normal and 133 suspects of pre-dementia with scores below the lower limit of the normal. The former group, 92.5 percent, were fond of reading books and newspapers in contrast to 55.3 per cent of the latter group. They also found that 49.2 per cent of the excellent group participated in regular sports exercises, whereas only 25.8 per cent of the pre-dementia group engaged in sports activities.

Table tennis is one of the popular sports with moderate energy consumption and easier access, economically far more feasible than expensive golf or cruising. Yet, it uses all extremities and many muscles as well as the brains. It is an ideal sport for any age and sex. It does not require large outdoor space or expensive tools and equipment. It is a good sport in Japan where land is limited and rain falls often. You can enjoy the game inside a room even in a short break from work. It should be recommended more, if it helps to improve one's brain function and intelligence which we believe it does. As we have found, the Kana-pick-out test proved the better and quicker mental action of table tennis players in comparison with non-players in every age level with rare exception. If the number of tested subjects increases, more accurate reliable data may be obtained to prove the neuron-activating effects of table tennis practice, in addition to its blissful effect to counter and overcome stresses.

We admit that our study is only a beginning. Many more studies are needed to confirm the effectiveness of table tennis practice to improve mental ability and to prevent dementia in this stressful world of conflict and competition.

## **Conclusion**

1. Two hundred and seventeen table tennis players aged over fifty were tested using the Kana-pick-out test, and the scores were studied in each age group and then compared with the scores obtained on non-players using the same test.

2. It was found that table tennis players in general succeeded in obtaining higher scores in this test than non-players as shown by comparison between the scores in our control and the scores of earlier Kaneko's study.

3. The longer one practices table tennis, the better is the score on this test. This tendency was confirmed in younger age groups.

4. There were a few exceptions in some age groups, but future studies of different kinds on many more players will provide more reliable data concerning the role of table tennis in prevention of dementia.

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