TYPE A Behavior Pattern and Sports Injuries

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Abstract

This study was designed to investigate the relationships between the tendencies toward Type A behavior pattern (TABP) and sports injuries. A total of 2164 (1631 males and 533 females) athletes from several colleges in Japan, volunteered for this study. They were divided into two groups: an injury group and a non-injury group. KG's Daily Life Questionnaire was used to investigate the tendency of TABP. Our hypothesis was that Type A individuals showed higher occurrences of sports injury than Type B individuals. Most of the results in this study supported our hypothesis. To put it concretely, the injury group showed higher TABP tendency than the non-injury group. And the higher TABP score group showed higher occurrence of injury experiences than those of low score group. Therefore, there was a possibility that TABP tendency of athletes might be one of the informations to prevent sports injuries.


Key word: Type A behavior pattern, Sports injury, KG's Daily Life Questionnaire

INTRODUCTION

Most of the studies concerning the causes of sports injuries have discussed mainly the physical factors of athletes and/or environmental factors of playing fields. However, the fact that there are many athletes who have been injured very often, independently of physical or environmental factors, suggests that the effect of mental and psychological factors should also be considered. Actually, several studies have showed the significant relations between the occurrence of sports injuries and several life stresses and personality types among athletes. Andersen and Williams proposed a model of relations between life stresses and sports injuries, including sociological and psychological factors such as life stresses, personality and resources for coping with difficulties. This model has contributed to preventing several kinds of sports injuries.

Type A behavior pattern (TABP) is a concept that was developed from Friedman and Rosenman's observations. They found out that this specific behavior pattern was associated with coronary heart disease (CHD). After Friedman and Rosenman's proposal many investigators studied TABP and it was found that TABP was a major independent risk factor for CHD, and the risk was of similar magnitude to those of traditional factors such as high blood pressure, advancing age, elevated serum cholesterol, and cigarette smoking. TABP is defined as a constellation of physiological and behavioral characteristics including such features as enhanced

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aggressiveness, hard driving competitiveness, a chronic sense of time urgency, and hostility.\textsuperscript{10)}

The TABP tendency has been studied for athlete groups. Nigorikawa et al. showed that athletes familiar with sports activity had greater TABP tendencies than subjects who did not lead a physically active life.\textsuperscript{21)} Furthermore, several reports showed that Type A individuals were more likely to exhibit a great deal of responses of the sympathetic nervous system to psychological stimuli or tasks compared with non-Type A individuals.\textsuperscript{23)} In the case of athletes, Type A individuals might show a disturbance of nerve-muscle coordination or absence of sufficient attention to the circumstances under the conditions of training or competition with too much tension or excitement. Thus there is a possibility that Type A athletes suffer from a higher percentage of injury occurrence compared with non-Type A athletes.

However, the relationships between TABP and sports injuries are not clear at present. This study investigated the relations between the tendency toward TABP and sports injuries.

METHODS

I. Subjects

A total of 2164 (1631 males and 533 females) athletes from seven different colleges in Japan, volunteered for this study. They ranged in age from 18 to 24 years old (mean $\pm$ SD: 19.1 $\pm$ 1.8 years). After explanations of purpose and procedures of this study were completed and informed consent obtained, the questionnaire described below was initiated. The numbers of subjects were slightly different among different analyses.

II. Procedures

A) Evaluation of the TABP tendency

The KG's Daily Life Questionnaire (KG questionnaire) made for Japanese was selected to evaluate the tendency of TABP in this study. The KG questionnaire consists of 55 items (44 TABP items and 11 irrelevant items), and subjects were instructed to chose one of three answers (Yes, ?, or No) for each question. According to basic studies, e.g., item analyses, calculation of reliability coefficients, and scattergram drawings, a KG questionnaire consisting of 44 items of TABP and 11 irrelevant items was developed. This questionnaire provides a global TABP score and scores for three sub-factors; hostility, hard driving, and speed items. After testing reliability, construct validity was investigated, using several evaluations. These results showed that this questionnaire had sufficiently high construct validity.\textsuperscript{32)}

B) Analyses of the KG's Daily Life questionnaire (KG questionnaire)

Scores obtained by using the KG questionnaire (TABP score) were standardized by T score. Subjects who showed more than 60 in this score were classified into the TABP higher score group (i.e., indicating stronger TABP tendency), while those who showed less than 40 were classified into the TABP lower score group (i.e., indicating weaker TABP tendency). Three sub-factor scores were classified into higher score group (T $\geq$ 60) and lower score group (T $\leq$ 40) with the similar method.

TABP tendencies were compared between two groups, i.e., a no injury group consisting of people who had not been injured in the past five years and an injury group consisting of people who had suffered from some injuries at least once in the same period.

C) Questionnaire about sports injury and disease

In addition to answering the KG questionnaire, each subject was asked to answer the following items regarding sports injuries:
1) Sort of sports event:
   What sort of sport have you been doing?
2) Experience (frequency) of sports injury:
   How many times have you experienced a sports injury during the past three years?
3) Sorts of sports injury:
   What sort of sports injury have you experienced during the past three years?
4) Process of making a comeback to training:
   Choose your physical condition when you completed your comeback to training after some sports injury or disease.
   A : Completely healed
   B : Moderate
   C : Incompletely healed
5) Process of stopping training because of sports injury or disease
   Choose your attitude toward stopping training when you suffered from injury or disease.
   A : Taking rest without hesitation
   B : Moderate training
   C : Continue training

These additional questions (4 and 5) were applied in order to evaluate the behavior of athletes as to whether they tended to make a comeback to training life even if they were under incomplete physical conditions.

III. Data analyses
The proceeding studies showed no significant difference in TABP mean scores between males and females. Ueda et al. reported the same result recently. In this study, therefore, the data obtained from males and females were analyzed together in all cases.

RESULTS
Mean and SD of TABP scores of all subjects were 40.3 and 11.4 respectively. Subjects who showed more than 60 as the T score, i.e. over 51.7 of TABP score, were defined as being in the higher score group, while those who showed less than 40, i.e. under the T score of 28.9, were defined as being in the lower score group. This resulted in a distribution of 369 higher score subjects and 349 lower score subjects. In regard to the three sub-factors of TABP, the means and SDs were 20.0±6.8 for hostility item, 11.6±5.2 for hard driving item, and 14.1±5.2 for speed item respectively (Table 1).

1. Comparison of TABP scores between injury and non-injury groups

Figure 1 shows the comparison of TABP scores between the injury and non-injury groups. The injury group was composed of 754 subjects (34.8%) and the non-injury group was composed of 1410 subjects (65.2%). The means of TABP scores

| TABLE 1. Means, SDs and other statistics of TABP and three sub-factors. |
|-----------------|-----|-----|-----|-----|
| n   | n=2164 | Mean | SD  | MAX | MIN |
| TABP | 40.3 | 11.4 | 74  | 2   |
| Hostility | 20.0 | 6.8  | 36  | 0   |
| Hard-driving | 11.6 | 5.2  | 28  | 0   |
| Speed | 14.1 | 5.2  | 29  | 0   |

** p < 0.01

![Graph](image)
were 41.8±11.2 for the injury group and 39.4±11.4 for the non-injury group. The injury group showed higher TABP scores than those of the non-injury group. The unpaired t test showed that the difference of these scores was statistically significant (t=4.64, p<0.01).

Similar tendencies were obtained for three sub-factors of TABP (Table 2). On the hostility item the means were 20.7±6.7 for the injury group and 19.6±6.9 for the non-injury group. On the hard-driving item the means were 12.2±5.1 for the injury and 11.2±5.2 for the non-injury groups. On the speed item the means were 14.6±5.2 for the injury and 13.8±5.2 for the non-injury group.

Table 2. Comparisons of TABP and sub-factor scores between injury and non-injury groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>Injury group n=754</th>
<th>No injury group n=1410</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>TABP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hostility</td>
<td>20.7</td>
<td>6.7</td>
<td>19.6</td>
</tr>
<tr>
<td>Hard-driving</td>
<td>12.2</td>
<td>5.1</td>
<td>11.2</td>
</tr>
<tr>
<td>Speed</td>
<td>14.6</td>
<td>5.2</td>
<td>13.8</td>
</tr>
</tbody>
</table>

* * : p<0.01

2. Relationships between TABP tendency and frequency of sports injury or disease

Figure 2 shows a comparison of the number of injury experiences between TABP high and low score groups. Subjects were classified as being in TABP high score group (369 students) or TABP low score group (349 students). The means of injury frequencies were 0.76±1.25 (times) for the high TABP group and 0.45±0.94 for the low TABP group. The high TABP group showed higher injury frequency than that of the low TABP group. This difference was statistically significant (t=3.78 p<0.01).

As regards the three sub-factors of TABP, similar analyses were conducted. Similar to the case of TABP score, the high score group showed higher injury frequencies than the low score group for each sub-factor. All these differences were statistically significant (Table 3).

3. Relationships between TABP scores and an attitude for stopping training because of injury or disease

Figure 3 shows the relationships between TABP scores and an attitude for stopping training because of injury or disease. Athletes who answered that they would continue training even if they were insufficient physical condition tended to show higher TABP scores than athletes who answered that they would stop training without hesitation. This difference was statistically signifi-
Table 3. Comparisons of numbers of injuries between high and low score groups on TABP sub-factors.

<table>
<thead>
<tr>
<th>Experience of injuries (times)</th>
<th>High score group (T ≥ 60)</th>
<th>Low score group (T ≤ 40)</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Hostility</td>
<td>405</td>
<td>0.72</td>
<td>1.17</td>
</tr>
<tr>
<td>Hard-driving</td>
<td>370</td>
<td>0.73</td>
<td>1.10</td>
</tr>
<tr>
<td>Speed</td>
<td>365</td>
<td>0.73</td>
<td>1.17</td>
</tr>
</tbody>
</table>

** : p<0.01

Fig. 3. TABP scores and attitude for stopping training when suffering from some injuries or diseases.

Table 4. Relationships between TABP sub-factor scores and attitude for stopping training of injury or disease.

<table>
<thead>
<tr>
<th></th>
<th>Taking rest without hesitation</th>
<th>Moderate</th>
<th>Continue training</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Hostility</td>
<td>19.7</td>
<td>6.5</td>
<td>20.7</td>
<td>6.9</td>
</tr>
<tr>
<td>Hard-driving</td>
<td>13.5</td>
<td>5.6</td>
<td>14.0</td>
<td>5.2</td>
</tr>
<tr>
<td>Speed</td>
<td>11.3</td>
<td>5.1</td>
<td>12.8</td>
<td>5.5</td>
</tr>
</tbody>
</table>

4. Relationships between TABP scores and attitude toward making a comeback to training after rest periods

Figure 4 shows the relationships between TABP scores and attitude for making a comeback to training after rest periods because of injury. Athletes who answered that they would make a comeback to training even if they were insufficient physical condition showed significantly higher TABP score than that of athletes who answered that they would stop training without hesitation (F=11.78, p<0.01). However, no significant differences were obtained for hostility and hard-driving items.
cient physical conditions showed higher TABP scores than athletes who answered that they would make a comeback to training after complete recovery following their rest periods. This difference was statistically significant ($F=4.64, p<0.01$).

Table 5 shows the results of the same analyses conducted on the three sub-factors of TABP. Almost all the same tendencies were obtained for the three sub-factors, except for the hostility item.

**DISCUSSION**

Type A behavior pattern (TABP) has been regarded as an important risk factor of coronary heart disease (CHD). In a longitudinal study of almost 3200 healthy men, Type A individuals were shown to exhibit twice the risk of CHD as their easy-going Type B counterparts. Therefore, early detection and intervention among healthy Type A individuals are important prevention methods.

Many studies have been conducted to investigate the effects of exercise on the modification of TABP. As the results of those studies, habitual exercise has been shown to reduce individuals’ self-report scores of TABP, diminish overt signs of TABP, and attenuate cardiovascular responses in Type A individuals. However, Nigorikawa et al. reported that athletes in competitive sports showed higher TABP tendencies than those of non-athletes. In any case, it could be considered that TABP may be related to habitual exercise and sports activity. This study was conducted to investigate the relationships between TABP and sports injuries.

Several questionnaires have been established in the United States to evaluate TABP characteristics in individuals. In particular, the Structured Interview (SI) and the Jenkins Activity Survey (JAS) have been used frequently.
However there are some difficulties involved in applying these methods to Japanese, because the cultures and life-styles of these two countries are different. Several original methods to evaluate TABP have been developed in Japan.\textsuperscript{28,32,33} The KG's Daily Life Questionnaire (KG questionnaire) was selected in this study, because it had sufficiently high reliability and construct validity.\textsuperscript{33}

Our hypothesis was that Type A individuals showed higher occurrences of sports injury than Type B individuals. Most of the results in this study supported our hypothesis. To put it concretely, the injury group showed higher TABP tendency than the non-injury group. And the higher TABP score group showed higher occurrence of injury experiences than the low score group. Several reasons could be suggested for those results.

First, Type A individuals are more likely to exhibit a great deal of responses of the sympathetic nervous system to psychological stimuli or tasks.\textsuperscript{23} Therefore, Type A athletes might reveal a shortage of coordination of muscle movements or inattentiveness under situations of too much tension or excitement.

Second, it is easy to conjecture that Type A athletes tend to perform greater amounts of exercise and training in their sports events than non-Type A athletes, because hard-driving or the time urgency is one of the main characteristics of TABP. Nigoriwaka et al.\textsuperscript{21} showed that the higher competition level athletes showed higher TABP tendency than the lower level group. This result might support the presumption that Type A athletes have a tendency to perform greater amounts of exercise and training compared to non-Type A athletes.

Third, Type A individuals have unique tendencies about their feelings of fatigue and/or improper physical condition. Essau and Jamieson\textsuperscript{9} showed that Type A individuals have a tendency to inhibit fatigue feelings and/or physical symptoms of wrongness. They concluded that Type A individuals tended to put themselves under a great deal of stress. Carver et al.\textsuperscript{7} have reported that Type A individuals felt lesser extents of fatigue compared to Type B individuals, although they performed more intense exercises than Type B on a treadmill running. Furthermore, Weidner and Mathews\textsuperscript{31} showed that Type A individuals tended not to complain about their poor physical conditions, compared to Type B individuals when they performed mental tasks. Accordingly, Type A athletes might have fallen into symptoms of over-training that might have brought some sports injury to themselves. In any case, TABP tendencies of athletes should become useful data for athletes themselves and for coaches in helping to prevent the symptoms of over-training.

Since TABP includes feelings of time urgency and strong will toward hard driving, it is easy to predict that Type A athletes may show distinctive features when they stop training because of injuries or when they come back to training. Considering several results of this study, it was shown that Type A athletes tended not to stop training easily even if they had been injured. Furthermore, our results showed that there was a tendency for Type A athletes to come back to training easily, even if their injuries had not fully healed. It is considered that these specific tendencies for Type A athletes are undesirable for the process of their recovery from sports injuries. Therefore, if athletes have been judged to have a strong tendency toward TABP they should pay careful attention to the processes of their stopping training and coming back to training after injury. Moreover, managers or coaches of sports clubs should grasp the TABP tendencies of their team members because they can give some advice their members about stopping training and coming back to training so that their injuries do not get worse.
After considering all the examinations in this study, clear relationships between TABP and sports injuries were observed. Therefore, TABP tendency of athletes is suggested as one of the factors to be considered in helping to prevent sports injuries.

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