

Thesis Title The Analysis of Correlation Among  
Physical Characteristics, Sport Ability,  
and Balance..

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### Abstract

The balance ability of male athletes, age between 18 to 32 years old, was analyzed in various sports : Gymnastics, Weightlifting, Table tennis, Boxing and Basketball at different levels of sport abilities :the National and the University teams, and compared with male sedentary subjects in the same age range. There were about 10 persons in each group. The

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balance ability was assessed in eyes opened(EO), eyes closed(EC) and after 3 minutes supine lying(SU) conditions by using a stabilometer. The balance ability were tested 5 times in each condition; EO, EC, and SU, controlling the lateral dynamic balance within 10 degree limiting angle for 30 seconds. Each time the platform declined beyond the limiting angle, this was recorded as the "number of error"(NE). The total time that the platform was kept within the limiting angle was recorded as the "time in balance"(TIB). The two balance parameters were recorded every 10 seconds, the data of 20-30 second were used for comparisons.

The result showed that there was no significant difference in TIB between those subjects from the National and the University teams in each sport. But NE was significantly different only in table tennis( $P < 0.05$ ), NE of the National team was less than the University team. This may be due to the faster reaction time(RT) in T1 than T2. The RT was positively correlated with the NE.

The TIB of the gymnastic group was the longest and significantly greater than the table tennis group ( $P < 0.05$ ) and boxing group( $P < 0.01$ ), but the difference of NE in the last 10 second period was not

statistically significantly different in all groups. The TIB of all subjects was negatively correlated with height(HT), weight(WT), leg length(LGR), sum of skinfold(SFR), and the percentage of body fat(%BF), and was positively correlated with flexibility(FLX). The results demonstrate that the physical characteristics that are most appropriate to good balance ability are present in the gymnastic group. In addition, the balance ability may not only be dependent on the physical characteristics, but also on other effects of training on the balance mechanisms(for example joint receptors, vestibular system, and adaptation of the neuromuscular system).

In the eyes closed condition, the balance abilities were significantly reduced ( $P < 0.001$ ) in all subjects, comparing with condition of eyes opened. This indicates that the vision plays an important role in the feedback control of balance ability. The TIB of gymnastic group was reduced greatest after eliminating of visual capacity. The visual cues may mostly be used to maintain balance ability of this sport.

In the study of the balance ability with eyes opened and after 3 minute supine lying condition(SU), the result showed that TIB with the condition of SU was

greater than the first condition in all groups. In this experiment, the improvement of balance may be partially the effect of learning and vestibulospinal reflex adjustment for maintenance of balance.

Physical characteristics and physical fitness also affect the balance ability. These factors may be useful for planning of training and selecting of athletes to improve sport ability.