

主題：殘疾人士體能活動 (Spring 03/19)

Elite Training Program for Athletes with Intellectual Impairment

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Athletes with intellectual impairment (II) were first introduced since Sydney 2000 Paralympic Games. However, the events for athletes with II were removed from the Athens 2004, Beijing 2008. After 12-year absence, the National Paralympic Committee finally confirmed the participation of II events in London 2012 Paralympics Games. The events and classes are Athletics (Class T20/F20)*, Swimming (Class S14)* and Table Tennis (Class 11)* [1]. The results of Hong Kong team (II) in London 2012 Paralympics Games were Gold and Silver Medal in Women's Singles Class 11, Bronze Medal in Men's 100 m Backstroke and Women's 100 m Breaststroke [1].

The participation of Paralympic Games have raised out the issue about how to prepare the training program for elite athletes with II. Literature finding indicated that there was significant differences of cognitive components [2], motor skills [3, 4], fitness level [5], lung function [6], multi-task performance [7] and reaction time [8] between people with II and without II. However, the comparisons of the fitness level between age-matched students and athletes with II were found not much differences such as running speed and flexibility [9]. The World Record of the events for II can also echo with the literature finding, e.g. Men's 400m T20 47.22s (Non-II world record is 43.03s), Men's 1500m T20 3'45'50 (Non-II world record is 3'26.00s), Men's Shot Put F20 17.29m (Non-II world record is 23.12m), and Men's Long Jump T20 7.64m (Non-II world record is 8.95m) [1]. The data indicated that proper training methods for the development of athletes' fitness components to elite level become essential in the preparation of Paralympic Games.

In the past (before 2012), limited number of study focused on the training of people with II. The introduction of events for II in London 2012 Paralympics Games has drawn the attention of the researchers and number of research output could be used for planning of training for athletes with II. Sprint interval training could provide beneficial effects on the body composition, systolic blood pressure, lipid profile, fasting insulin, peak VO₂ and muscle fatigue resistance when compared with no training in young adults with II [10]. Motor skills and balance are the essential components for sports participation and so trampoline exercise intervention could significantly improve them [11]. Principle of specificity could also be applied for people with II. Specific training could benefit for muscle strengthening, postural improvement, and improvement of walking movement such as 10m walk time, and 10m obstacle course walk [12]. Lung function could be improved from intervention aerobic exercise program and first second of forced expiration volume (FEV₁) and forced vital capacity (FVC) could improve significantly [6]. Even simple running [13] or aerobic exercise [14, 15] could provide significantly improvement on cardiovascular efficiency.

**Remarks: Class T20 - "T" stands for track and jumps. 20 is the class for athlete with an intellectual impairment. Class F20 - "F" stands for throws. 20 is the class for athlete with an intellectual impairment.*

Class S14 - "S" stands for swimming with freestyle, butterfly and backstroke. 14 is the class for swimmers with an intellectual impairment. Class 11 - Table tennis players with an intellectual impairment.

Training for Athletics

The events for Athletics in Paralympic Games are 400m, 1500m, long jump and shot put [1]. Several of factors need to be considered in training program design for Athletics. The explosive leg power significant contributed to the long jump performance. Upper-body strength and muscular endurance were found significant contributed to shot put performance [16]. In running event, energy system become one of key elements to be developed according to different distance of race. The control of pacing become a major factor in the selection of energy system in running events. Pacing ability was found relatively lower in II runners as they found difficult to control the submaximal running speed [17]. Besides pacing ability, the gross motor skills could impact a lot in long jump and shot put performance. As athlete with II found relatively worse gross motor skills [3, 4, 11], specific training could be considered in the development of gross motor skills such as single leg jumping, landing, hooping skills in long jump.



Training for Table Tennis

The events for Table Tennis in Paralympics Games are Men's Singles Class 11 and Women's Singles Class 11 [1]. The impact of Table Tennis training on children with II could be found in visual perception, and executive functions [18]. For the development of training program for elite table tennis players with II, the consideration of technical skills [19], tactical proficiency [20], dual task management [7], and the unexpected situational movement reaction time [8] were needed. Moreover, another essential training component is gross motor skills as the cognitive profiles of the players with II were found relatively lower, which impact a lot on the gross motor skills and tactical development in table tennis [2, 21]. In this regard, the design of training program need to be specific and individualized according to the weakness of the individual at different training component. Training exercise with several of training items integrated together could also be considered so that a more realistic environment could be simulated. Such training arrangement could provide more positive training effect on athletes when compared with separated training exercise [22].



Training for Swimming

The events for Swimming in Paralympics Games are Men's and Women's 100m, 200m, 400m, 800m, 1500m Freestyle, 100m, 200m Backstroke, 100m, 200m Breaststroke, 100m, 200m Butterfly, 200m, 400m Individual Medley, 4x100m Freestyle, 4x100m Medley [1]. Literature finding indicated that athletes with II have relatively poor cardiorespiratory endurance capacity when compared with sportive peers without II [9]. Some training exercise mode such as running [13], interval sprinting [10], jogging [23], rigorous aerobic-type exercises [14] or general aerobic exercise [15] could be considered which offered positive impact on the cardiorespiratory fitness component of the athletes with II. Besides cardiorespiratory capacity, reaction time and movement time should also be considered in the training program. Previous studies found that athlete with II found significant longer of reaction time and movement time under unexpected changes of the environment which may impact on the swimming performance directly [8]. Therefore, besides regularly water training, specific training on cardiorespiratory capacity, reaction time and movement time were recommended.



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