

Abstract

Alpine winter sports are very popular in Austria, and Austrians have had much international success in alpine ski racing, snowboarding and ski cross. These sports demand high physical fitness levels in all age groups. Sport-specific tests are crucial to effectively monitor training programs and individual fitness. The following article provides an overview of physical testing with a special emphasis on sport-specific tests used in young and elite athletes, such as bench press and pull tests, loaded power test, snowboard and ski cross start test and gliding test.

Keywords

Ski racing– Snowboarding– Ski cross– Performance testing– Young and elite athletes

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Sportmotorische Leistungsdiagnostik österreichischer Nachwuchs- und Eliteathleten in den Sportarten alpiner Skirennlauf, Snowboard und Ski Cross**Zusammenfassung**

Der alpine Wintersport hat in Österreich durch seine vielen internationalen Erfolge im Skirennlauf, Snowboard und Ski Cross einen hohen gesellschaftlichen Stellenwert. Diese Sportarten erfordern in allen Altersgruppen eine sehr gut ausgebildete körperliche Leistungsfähigkeit. Sportspezifische Tests sind für eine optimale Trainingsplanung und individuelle Leistungsfähigkeit von enormer Bedeutung. Der folgende Artikel bietet einen Überblick sportartspezifischer Leistungsdiagnostiken mit einem besonderen Augenmerk auf sportartspezifische Tests bei Nachwuchs- und Eliteathleten, wie beispielsweise Bankdrücken und Bankziehen, Laststufentest, Snowboard- bzw. Ski Cross-Starttest und Gliding-Test.

Schlüsselwörter

Skirennlauf– Snowboard– Ski Cross– sportmotorische Leistungsdiagnostik– Nachwuchs- und Eliteathleten

REVIEW

Current performance testing trends in junior and elite Austrian alpine ski, snowboard and ski cross racers

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Background**The significance of alpine sports and performance testing in Austria**

Alpine skiing is one of the most popular sports in Austria. The long record of consistent success in all age groups of Austrian alpine ski racers is due to an optimised training and testing environment. Elite ski racing performance has not reached its peak. Improvements may be miniscule, but performance will continually evolve through better equipment, skiing technique and physical preparation. Ski racing advances at the international level will come mainly through improved training quality, not increased training quantity. High quality training can only be ensured when kinematic and dynamic knowledge of current elite racing technique is made available through biomechanical field research [28,29]. The training process should be systematically planned with training methods specifically tailored to the training goal. Sport-specific tests must guide training so that test results can predict current individual performance and evaluate individual performance progress [14]. Consequently, several

tests analysing important variables in alpine skiing are performed regularly in the talent development program of Austrian alpine ski racers, from an early age to national team athletes (see Figure 1).

Evaluation of success predicting factors in alpine skiing

Alpine skiing requires high physical fitness levels in all age groups [27]. Events range from 50 s to 2.5 minutes, depending on the discipline, so physical fitness is critical to performance and should be trained and tested. Several studies have investigated the relationship between success predicting factors in alpine ski racing. Ski and snowboard racers must be very fit in the following areas: aerobic and anaerobic capacity, muscular strength and power, and complex motor abilities such as balance, agility and coordination, among others [12,18,20,22,24,32]. The combination of evolving equipment, changing environmental factors (e.g. artificial snow) and the complexity of skiing technique presents a complex challenge for ski racers. There is no one single variable responsible for alpine skiing performance, it is dependent upon several factors [1,32].

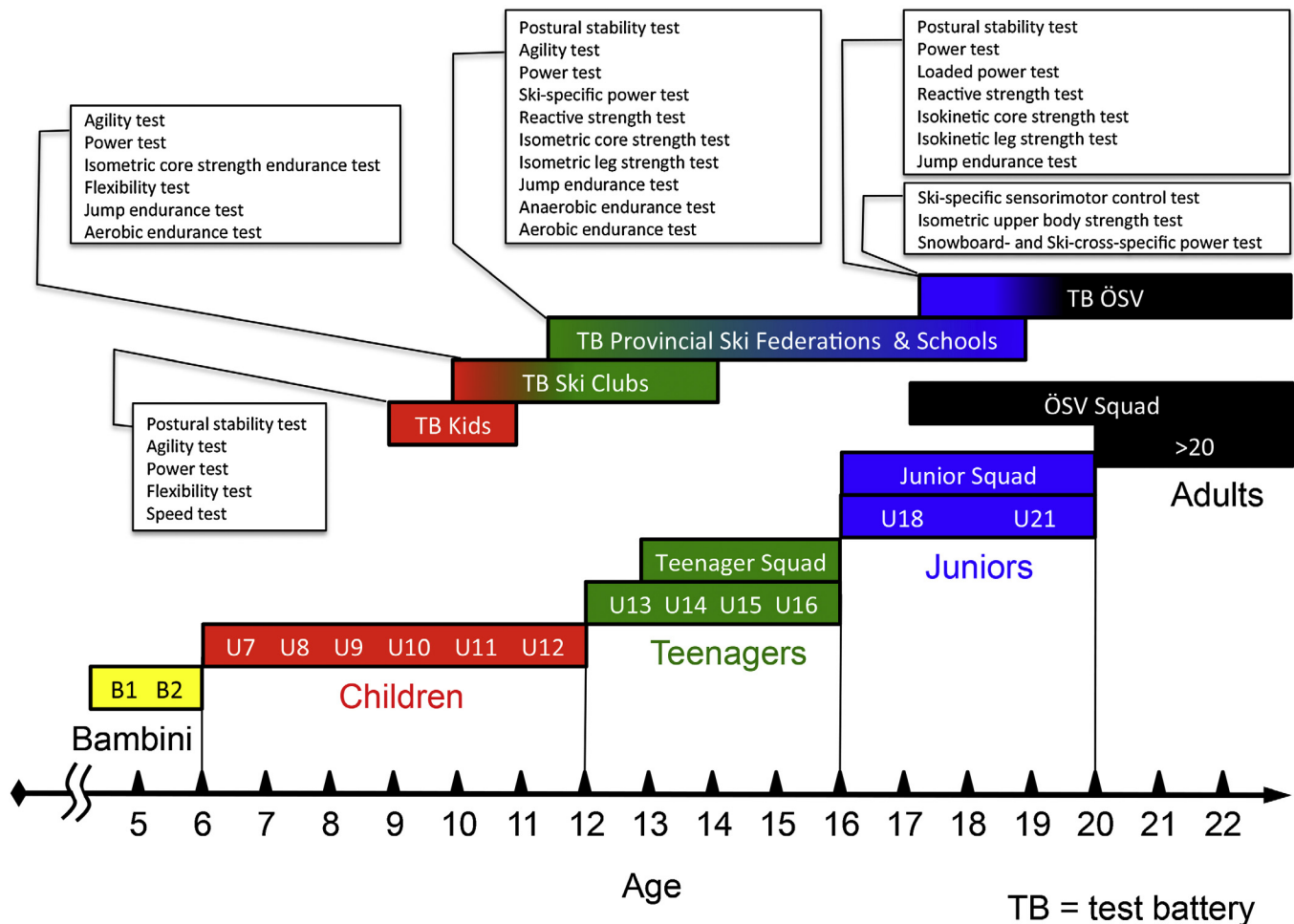


Figure 1 Longitudinal systematic fitness testing of Austrian ski, snowboard and ski cross racers (ÖSV = Austrian Ski Federation).

As previously mentioned, training quality is optimized through systematic planning and goal-oriented training programs, especially in a seasonal sport like alpine ski racing. Testing should examine sport-specific parameters so that current individual status and progress can be determined and evaluated. Age class comparison with other racers can classify the current individual status in the variables relevant to alpine skiing.

Performance testing in early athlete development

It is essential that racers are exposed to physical testing at an early age and at regular intervals. Williams and Reilly stated that a multidisciplinary

approach of anthropometric, physiological and psychological profiling is necessary to create predictive tools in talent development [34]. This is a key element in the talent development of young Austrian athletes, as for example in the Skigymnasium Stams, the most well-known ski boarding school in Austria [27]. Even young ski racers must develop appropriate physical fitness and skills in order to cope with the demands placed upon the musculoskeletal system.

Performance testing in injury prevention

Along with performance assessment and performance prediction,

injury prevention is of primary importance in elite sport-specific testing. Hergenroeder outlined the importance of a regular physical examination to detect conditions that may predispose athletes to injury [7]. There is evidence for a cause-effect relationship between sport-specific risk factors, physical fitness and injuries in alpine skiing [24,30]. Regular testing enables the detection of imbalances and highlights physical fitness deficits.

The following article provides an overview of physical testing of young and elite athletes in alpine skiing, snowboarding and ski cross.

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