HIP FLEXORS RESISTANCE IN YOUTH HOCKEY PLAYERS

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BACKGROUND AND OBJECTIVE

In todays youth hockey leagues, the participation of an individual is based on the chronologic age without regard to the children's variations in development and maturity (Desharnais, 1975; Trudel. 1987). This study demonstrates that a high percentage of children in the pre-adolescence period demonstrates a relative hip flexors decrease endurance. It is currently accepted that the muscular growth of children increases linearly throughout childhood until puberty (Clarke, 1971). At that point. there is an increase in the rate of development in the strength and endurance.) The grip strength in boys increases from 7 to 17 years of age, but it was from 12 to 17 year old that takes place the largest increases in strength and endurance. Most previous studies on musculoskelettal development in children have used arm flexors. grip strength, or knee extensors in order to measure strength and endurance (Methany. 1940). As far as we know, the development of the hip flexors has never been evaluated in a controlled study as to its implication in the functional capacities. Many studies confirm this observation (Berg. 1980; Trudel. 1987). Even though the integrity of these muscle groups are essential in the mobilization of the boot and lower limbs (Basmajian, 1985). few studies have investigated the endurance of hip flexors in children (Bowie and Curnming. 1962; Jones. 1978). The aim of this project was to evaluate the hip flexors resistance in a large sample of active children.

METHODOLOGY

In this study, 900 male hockey players, aging from 6 to 16 years of age inclusively were randomly selected from a pool of 2500 children in the Québec city area.

The experimental procedure is divided in four parts. First, anthropometric measurements such as height and leg lengths are taken. Second, the Milgram test is performed, which is a modified bilateral isometric leg raise. Third, a clinical examination is performed on subjects that scored positive Milgram test. Fourth. analysis is performed.

1) ANTHROPOMETRY

The height of the subjects was measured in the standing position with a metric scale fixed on a wall. The lower limb was also measure standing.. The technician used the superior greater trochanter to lateral malleolus measuring technique.

2) MILGRAM TEST

This simple. test determines the relative hip flexors and lower abdominal endurance, and may also indicate the possible presence of thecal (spinal chord) pathology. As seen in figure 1, the test is performed with the subject lying supine on the examination table. The technician instructs the subject to raise his legs in order to achieve a 40o to 450 hip flexion, and to hold this position for 30 seconds. This maneuver brings the iliopsoas and lower anterior abdominal muscles into activity to steady the pelvis and flex the hips. This results also in increase in intrathecal pressure. If the subject can hold this position for thirdly seconds without pain in the low back region, or the posterior aspect of his leg. the test is negative. However, the test is positive is the subject: 1) cannot keep his legs up for thirty seconds, or 2) cannot lift his legs of the table, or 3) experiences pain in the lumbar area of his spine during any part of the

procedure. The subject was instructed to lower his legs immediately if any pain in the lumbo-pelvic area or inferior limbs were present. Additional verbal questioning was performed by the technician at a 10 seconds interval.

Figure 1

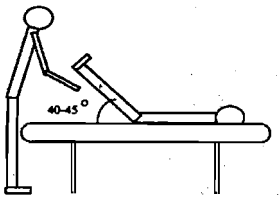

Figure 1 Procedure of the Milgram test, The subject is lying supine on the examination table and holds his legs at a 40o to 450 hip flexion for a 30 seconds count. The technician guards from a sudden leg lowering by placing the hands below the legs during the maneuver.

CLINICAL EXAMINATION

The second part of the study was to perform a clinical examination on the subjects presenting a positive Milgram test. Subjects with abnormal clinical findings were directed to their treating physician with a brief summary of physical findings.

RESULTS AND DISCUSSION

The results of the Milgram test, as shown in table 2, show that in our sample, the youngest and oldest players have the lowest percentage of positive findings; 6 year old:5%, 16 year old, 7%. The 10, 11 and 12 years old groups had an average of 48% positive Milgram test, and 91% of these children (positive milgram test) presented increased lower limb length when compared to children in other age groups. From the 900 subjects, 257 of them had positive Milgram test, but only 2 demonstrated abnormal physical findings that necessitated a referral. The Chi-square test is significant at 117,08, df =10, p < .001. The sitting height/stature ration demonstrates a constant decrease in the ration until 13 and 14 years of age,

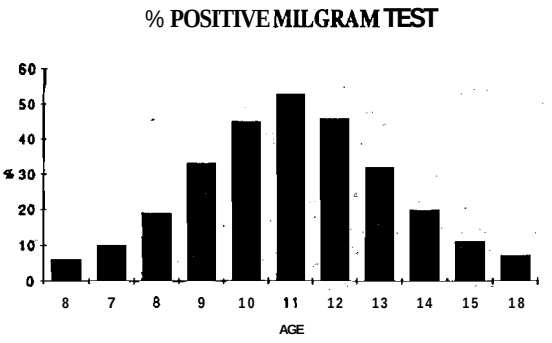

Figure 2. Distribution of subjects unable to maintain a bilateral leg raise for 30 seconds.

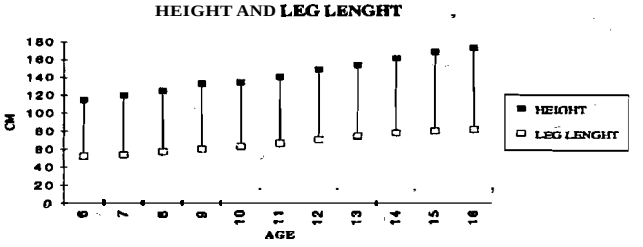

Figure 3. Height and leg length according to age. Peak height velocity is almost constant, in comparison to the decreased velocity in lower limb length growth.

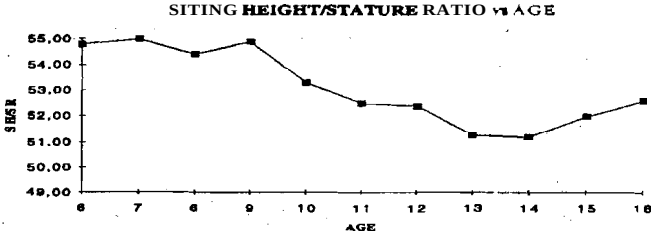

Figure 4. Sitting height/stature ratio from 6 to 16 years of age. The ratio decreases in early adolescence.

The methodology used in this project differs principally form previous studies by four major points. First, a large number of subjects was used (n=900) Secondly, there was a large number of age cells (n=11; 6 to 16 year old). Thirdly, the hip flexors were evaluated in comparison to the usual muscle groups (elbow flexors, grip muscles, knee extensors, etc). Fourthly, the lower limb segments and height were measured in order to determine their relationship with hip flexors resistance.

We know from previous studies that from birth. there is a regular; decrease in the rate of growth up until adolescence where the peak height velocity is found. Figure 5 demonstrates the typical individual velocity curves for length or stature in boys. In this figure, we note a trough in the curve at the 10, 11 and 12 year old category. Furthermore, the sitting height/stature ratio from figure 4, indicates that at the end of this period, the lower limb is proportionally longer than at any other age. We may then assume that the longer legs in these age categories are responsible for increase pelvic bending moments secondary to relative lenghtening of the lever arm. The adolescence growth spurt in males has been found to be accompanied by a marked increase in muscular strength and power. Therefore, in the 10,11 and 12 year old group, these pre-adolescent children have not yet developed the proportional increase in hip flexor strength and endurance in order to compensate for the loss of sitting height/stature ratio. Our results demonstrate that as the children increase in age, the sitting height/stature ratio is modified as we also anticipate an increase in muscular endurance, resulting in a decrease finding of positive Milgram test.

In regard to the previous results, we may then wonder is the hockey players in the 10,11 and 12 year old categories are capable of performing adequately equivalent training drills. The Milgram test is an easily performed procedure and could be included in the classification process of young hockey players.

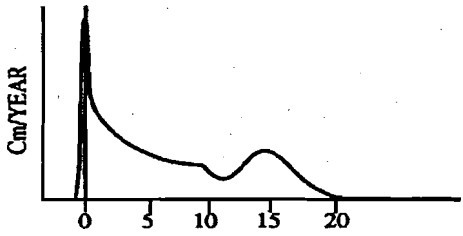

Figure 5. Typical individual velocity curves for length or stature in boys. Note the trough in the curve at the 11 year old category, corresponding to the maximum percentage of positive Milgram test. Curve adapted from Growth maturation and Physical Activity (1991) Malina, R.M.. Human Kinetics Books, Champain, Illinois.

CONCLUSION

This project evaluated the hip flexors resistance by the use of a modified bilateral leg raise test (Milgram test) in a sample of 900 randomly selected hockey players, aging from 6 to 16 years of age. Results show that an average of 48% of 10, 11 and 12 year old cannot perform this test. Furthermore, we find that the sitting height/stature ratio declines throughout childhood into adolescence. The longer lower limb segments and not yet developed proportionally muscular development in these age categories may explain such high percentage of positive Milgram tests. It is suggested that the Milgram test may be used in conjunction with other parameters in the classification of youngsters in sports.

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