TESTS FOR PREDICTION OF ENDURANCE IN ARMY OFFICERS

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INTRODUCTION

Many military professions are physically demanding. Therefore, tests are carried out before entering military schools, at these schools, and at military units, in order to explore if the level of endurance is sufficient. The results of such tests affect whether or not a person can start a military career and may, on the other hand, be the cause of attrition. Since tests seldom are perfect, individuals with sufficient endurance may fail in the test and people with inferior physical work capacity might pass the test. In the first case, the employer loses a competent person, sometimes after spending a lot of money on training, and moreover, the individual will suffer considerable inconvenience. In the second case, the system will accept a person that might prove inadequate which is a waste of time and money, Therefore, it is important that the tests are both reliable and valid so that the number of misjudgements are minimized. This investigations was carried out to explore commonly used tests and potential alternatives focusing on what information they may give regarding physical performance during field maneuvers.

METHODS

Twenty-eight army officers performed (i) two different running tests, 2 km and 10 km, respectively, (ii) treadmill walking at 5 km/h, 12" uphill slope, 6 min dressed in combat uniform and boots followed by 3 min of rest during which 20 kg of military equipment was added. Then the subjects started to walk again, instructed try to complete another 6 min, (iii) submaximal cycle ergometry at a fixed work rate and at one related to body mass. rased to 2/3 power. Heart rate and metabolic rate were measured every minute. Samples for determination of blood lactate concentration were obtained 30 s after termination of each work bout. To estimate the subjects endurance during field conditions, the endurance performance during a 5 day field maneuver was rated both by the subjects and their commanding officer using an eight point scale ranging from "very good" to very poor". Moreover, endurance performance during field maneuvers was estimated in 395 students at different military schools by the commanding officers. These ratings were compared with running performance at 2 km and 10 km. The relationship between these different tests of endurance, and between tests and endurance during the maneuver were evaluated by means of Spearman rank correlation coefficients (Rho) or Pearson correlation coefficient (r).

RESULTS AND DISCUSSION

There were several significant correlation between different tests and test variables but none of them was high, except for the two running tests (r=0.85). Thus, different variables did no rank the subjects the same. Among the 28 officers neither the physiological variables nor running performance correlated significantly with the estimated endurance during the field maneuver. In contrast, performance (= walking time) during the treadmill test with equipment correlated significantly with estimated field endurance (Rho=0.46). For the students at military schools, there were significant correlations between running performance (both at 2 km and 10 km) and field endurance (Rho 0.39 and 0.35, respectively). In spite of these significant correlations between performance tests and estimated field endurance, the predictive values of these tests is not very high. This may of course be the result of a poor accuracy in the estimation of field endurance and/or the methods applied to test endurance.

Table I. Rank correlation (Spearman) between performance tests and field endurance for 28 army officers.

	Running 2 km	Running 10 km	Treadmill walking†
Field endurance	-0.26	-0.21	0.46*

† with equipment

Table 2. Rank correlation (Spearman) between physiological variables obtained in three different submaximal tests and (i) field endurance, (ii) the results in three different performance tests for 28 army officers.

	Treadmill walking††		Cycle ergometry‡		Cycle ergometry‡‡	
	LA-conc	HR	LA-conc	HR	LA-conc	HR
Running 2 km	0.67*	0.60*	0.43*	0.56*	0.32	0.35
Running 10 km	0.74*	0.70*	0.40*	0.47*	0.18	0.13
Treadmill walking†	-0.28	-0.65*	-0.13	-0.32	-0.07	-0.13
Field endurance	-0.11	-0.35	-0.21	-0.27	-0.12	-0.21

† with equipment

†† without equipment

‡ Work rate proportional to (body mass)$^{2/3}$

‡‡ Work rate = 200W

* significant correlation

It may also be a question of insufficient validity. If the problem is the estimation of field endurance, it will be difficult to find tests displaying considerably higher predictive power than the present ones. The tests used in this study have a rather high reliability (1), so it is probably a question of insufficient validity. For the 28 army officers, performance during the laden treadmill walking test correlated significantly with estimated field endurance. while running performance did not. One explanation might be that the capacity to carriage equipment is vital both in field endurance and in treadmill walking. However, it may also be the result of so called mass significance and therefore it not clear that this treadmill waking test ought to replace the presently used running tests.

CONCLUSIONS

There were significant correlations between performance tests such as running and walk and field endurance. However, there correlations were not very high, indicating that none of these performance tests has the power to to predict the endurance during field conditions very accurately. Different tests, as well as different variables measured during the same test, may rank individuals considerably different. Hence, the question of who passes an endurance test, and who does not is just partly depending of physical capacity; the choice of test may have considerable influence. This results of this study do not indicate that submaximal tests could replace performance test without reducing the correlation between test the result and the endurance in the field.

REFERENCES

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