

A PRELIMINARY NOTE ON THE EFFECT OF FATIGUE DUE TO LOAD MARCH ON THE AGILITY OF A SOLDIER

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The effect of long load-marches on mental alertness and neuromuscular coordination was tested by appropriate standard tests. The results, which are of a preliminary nature, showed that although cumulative fatigue did not bring about any significant deterioration, a tendency towards deterioration was clearly evident.

It is common knowledge that human efficiency is affected by fatigue. In the case of load carriage, particularly in mountainous terrains, the infantry soldier has not only to lift his body but also carry load against gravity and is subjected to respiratory stress. As the soldier is expected to be ready for operations at the end of the march, it is imperative that his mental alertness, power of concentration and steadiness should be normal. The purpose of the present study was to ascertain, quantitatively, the effect of cumulative fatigue on the concentration power of the soldier.

The concentration power of an individual is reflected in his memory as well as neuromuscular coordination. As such, experimental observations were taken in two phases to assess the effects of fatigue: (a) memory and (b) neuromuscular coordination.

TESTS

Visual memory—Since the jawans are expected to be alert for action after the march, it was decided to subject them to a visual memory test and compare pre-fatigue and post-fatigue performances.

Observations were taken on three young jawans of mean height, 167.3 cm and mean body weight, 57.9 Kg. They were required to carry a load of 22.8 Kg each and march without break, for 2 hours at normal speed. Frames, each containing 16 pictures of familiar objects arranged at random, were prepared and used as objects for visual memory. In each trial, two such frames were flashed before the subjects, one by one, for 25 seconds during which time the subject was to memorise the pictures on the frame. Immediately thereafter, the frame was removed and the subject asked to recall in 1 min. 30 sec. the pictures he had seen on the frame. The efficiency score (Woodworth method)¹ was calculated for each subject on each day, both before and after the march, as follows:—

$$\text{Efficiency score} = \frac{(\text{No. of pictures correctly recalled} - \text{No. of wrong pictures recalled})}{\text{Total No. of pictures in the frame.}} \times 100$$

Neuromuscular coordination—Since in combat the firing accuracy of the soldier counts, the test chosen was dart shooting on a dart board. Seven concentric circles, were drawn 1 cm apart, on a board and hung 275 cm away from the position of the subject with the centre 170 cm above the flow level. The score for each shooting trial was computed. The number of shots was restricted to seven.

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On each day of the trial, all the subjects were required to shoot seven darts in succession in the unfatigued condition and the individual score was computed from the performance. Subsequently, the subjects were asked to carry out a load march covering a total distance of 13 km and a net climb of 700 m in about 4 hours while carrying a load of 22.8 kg. The subjects rested for a total period of 50 minutes during the march. Immediately after the load march, the subjects were asked to shoot seven darts as before and the score was computed.

RESULTS

Visual memory—The average deterioration of the score, due to the fatigue in load march was 4.2%. This was statistically insignificant. However, it was observed that the subjects showed some qualitative symptoms of deterioration as a result of the fatigue. Whereas in the unfatigued condition, they recalled the pictures in a pattern (in particular rows or columns), in the fatigued state they invariably recalled the more striking pictures first and then struggled to recall the less striking ones. This showed that in the unfatigued state the subject was mentally alert and could remember the pictures irrespective of their impression while in the fatigued state, he remembered first the pictures, which were prominent and because of the competitive spirit (as was evident from his eagerness to know the scores of others) struggled hard to remember the other pictures later. This showed that though the quantitative performance of the subject was not significantly affected, the way in which this result was achieved had been influenced by fatigue.

Neuromuscular coordination—The results of the dart test revealed that in 4 out of 8 subjects the performance deteriorated due to fatigue. Two of the subjects showed no change, while in the other two, the score actually increased. However, statistical analysis using the paired 't' test showed that only in 2 out of 8 subjects there was a significant lowering in the score.

Though there is a tendency for the score to deteriorate as a result of the fatigue, yet a definite picture does not emerge from the data. However, it is quite possible that if instead of assigning scores according to the concentric regions around the target in which the shots got embedded, actual deviation of each shot from the target is measured and the mean dispersion of shots worked out, the differences, if any, due to fatigue, may be reflected more sensitively.

CONCLUSION

The results, which are of a preliminary nature, reveal that the concentration power, as manifested through memory and neuromuscular coordination, does not significantly deteriorate due to fatigue in load march, even though a tendency for the same is clearly indicated.

REFERENCE

1. WOODWORTH, R.S. & SCHLOSBERG, H., "Experimental Psychology", Revised Edition (New York Holt) 1960, 700.