Effect of Cernitin™ and Hydrolysed Protein on Adaptation to Physical Effort in Subtropical Conditions

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INTRODUCTION

The work on the effect of Cernitin™ and hydrolyzed protein in subtropical conditions was carried out in order to assist Polish servicemen serving in Polish Military Special units which are part of the United Nations Peacekeeping Force in the Near East. The men selected for the service in the Polish Military Special Unit were chosen on the basis of usefulness of their professional skills, high degree of discipline and awareness of their role in the Near East. It appeared that in practice not all the men selected for the Special Unit performed well under radically changed climatic conditions. This was mainly due to the fact that factors like physiological and fitness adaptation were not sufficiently considered in the selection of men for duties in subtropical conditions. The servicemen of the Polish Military Special Unit were transported to Egypt by air and consequently the process of acclimatization began abruptly on reaching the destination. The servicemen were allocated various tasks connected with their duties immediately on arrival. Under these conditions it seems important to find out whether the process of acclimatization could be speeded up by the use of some additional substances. Cernitin™, which is known as a substance increasing the nonspecific resistance of the organism as well as increasing physical fitness and capability, was chosen for this purpose (8). It is also known that the effect of Cernitin™ is enhanced by administration in conjunction with hydrolyzed protein which acts as a source of erogenic amino acids (11).

The purpose of the investigations was as follows:

- Evaluation of changes in selected parameters of physical fitness and capability as well as in some psychological functions during the 20 weeks period of duty in subtropical conditions.
- Establishing which factors of physical fitness undergo the greatest changes in the first phase of stay in subtropical conditions.
- Observations of effect of Cernitin™ and hydrolyzed protein on parameters of physical fitness and capability as well as on psychological functions and subjective sense of well being.
- Establishing whether the use of Cernitin™ in conjunction with hydrolyzed protein facilitates return of physical fitness and capacity in subtropical conditions to their initial level.

METHODS AND ORGANIZATION OF THE INVESTIGATIONS

The investigations were carried out on three groups of soldiers all of whom were drivers of army vehicles aged 20-23 years old, average weight 66.28 kg and average height 170.9 cm. The soldiers belonged to three platoons engaged in the same tasks. Each platoon consisted of 30 men. Physiological examinations were carried out on 25 men from each platoon. All the men in the examined groups lived under similar conditions in regard to work, nutrition, and rest. Each group received different biologically active agents as follows:

- Group 1 did not receive any biologically active agents.
- Group 2 received Cernitin™ twice daily in the form of two tablets “Pollisport™”.
- Group 3 received twice daily: two tablets of “Pollisport™” and 1 g of hydrolyzed protein in the form of “Pollen Stark™ Protein” tablets.

These biologically active agents were given to Groups 2 and 3 after breakfast and dinner.

For the assessment of physical fitness the following test were used:

1. Pull-ups on the bar – measured strength.
2. Zigzag running – measured agility.
3. 100-m sprint – measured speed.
4. 1000 m runs – measuring endurance.
5. Long jump – measuring strength, speed, and agility.

Physiological testing on a bicycleergometer used a load of 2 watt/kg of body weight maintained for 6 minutes at a speed of 60 revs/ min. The following parameters were measured before, during and at the end of the tests:

1. Heat rate – measured electrocardiogram.
2. Blood pressure – systolic and diastolic – measured by sphygmomanometer.
3. Cardiac stroke volume and minute volume – calculated from the Starr formula.
4. Oxygen uptake – calculated from Astrand tomogram.
5. Oxygen pulse.
6. Blood levels of: lactic acid, pyruvic acid, creatine phosphokinase (CPK), asparagine aminotransferase, and lactic acid dehydrogenase. All estimations were made using “Eskalab” reagents (Smith, Kline Instr. Inc.).

The values obtained for lactic acid and pyruvic acid were used for the calculation of lactate excess.

The following psychological tests were carried out in conditions of rest:

1. Speed and accuracy of observation – using Toulouse-Pieron Test.
2. Tempo of motor activity – using stroke test.
3. Speed and accuracy of mental activity – using Bourdon test.
4. Capacity of concentration – using Wiersma test.
5. Sense of well being – using 7 point self-assessment scale.

Preliminary investigations were carried out in Poland 2 weeks prior to the departure to the Near East and during the term of duty in weeks 1, 2, 3, 4, 6, 8, 12, 16, and 20. All the results were statistically analyzed using appropriate tests.

RESULTS AND THEIR EVALUATION

Analyzing the general characteristics of the subjects it was evident that during a 20-week term of duty in the Near East the body weight was decreased but the change was not statistically significant. The height of subjects remained unchanged.

Tests showed that the stay in subtropical conditions impaired the subjects’ physical fitness. The greatest changes were observed in the 1000-m run, long jump and 100 m sprint. The results of “pull-ups” on the bar and zigzag run also showed a decline but the differences were slight and not statistically significant.

In the groups given both Pollisport™, and hydrolyzed protein the level of strength remained almost the same and even slightly increased during the later period of the stay in the Near East. The results of the 100-m sprint in Group 3 (receiving both substances) showed at first a decline (similar to that in the other groups) followed by a return to initial values in the fourth week of the stay. In Group 2 receiving Pollisport™ only, this return to initial values took place in the 12th week of the stay, while in the control group not receiving any substances values did not return to baseline levels during the stay in Egypt.

In the 1000 m run the group receiving both substances showed a slight increase in time, noticeable during the first phase of the stay in Egypt. In the other two groups this increase was statistically significant and returned to initial values after 8-20 weeks (Fig. 1).

In the long jump the group receiving Pollisport™ and “Pollen Stark™ Protein” showed a decline of results as late as the fourth week of their stay, while in the other two groups this decline was still observed after 6-12 weeks (Fig. 2).

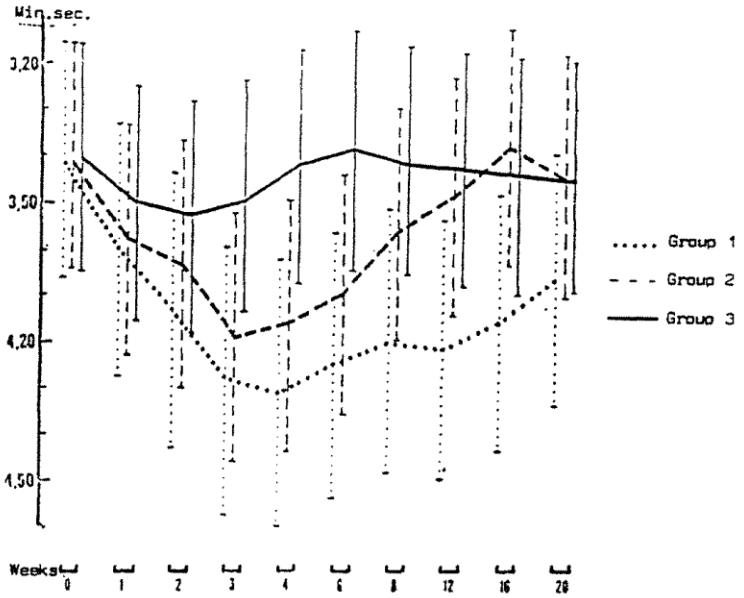

Fig. 1 Changes in results of 1000 m race before and during the stay in the Near East.

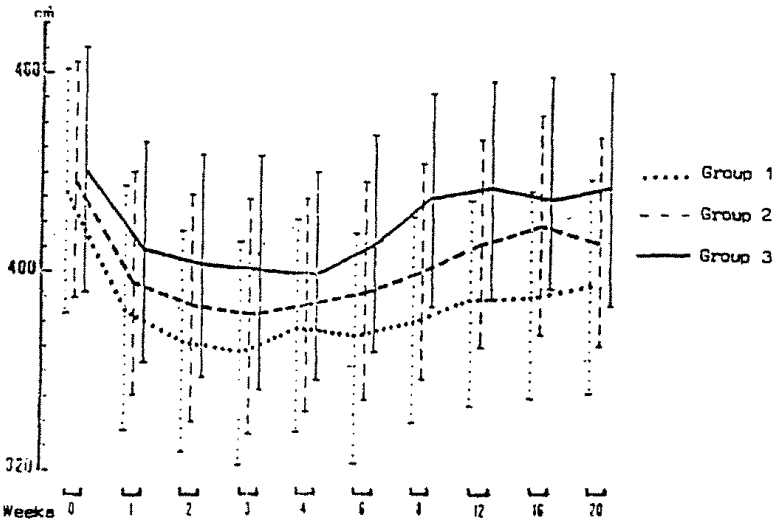

Fig. 2 Changes in running long jump results before and during the stay in the Near East.

The results of physiological test showed that changes in the chosen parameters at rest are slight and statistically insignificant. Nevertheless, the results suggest an increase in the activity of the parasympathetic nervous system; the heart rate, systolic blood pressure, cardiac minute volume, and enzyme levels (CPK and LDH) were lowered. The stay in the Near East had a particularly marked effect on measurements of physiological parameters during standard loading in the bicycle ergometer test. The changes in the physiological cost of effort were particularly noticeable in the first 3-4 weeks of stay in the Near East, returned later to the initial values obtained before the posting to the Near East.

The effect of Cernitin™ and hydrolyzed protein was observed in the rate at which the physiological cost of effort returned to the normal value. In Group 3 receiving both substances the phase of physiological acclimatization was shortened by about 2 weeks (from 6 to 4 weeks). This is shown by changes in minute volume (Fig. 3), lactate levels (Fig. 4) and aspartate aminotransferase levels (Fig. 5).

The results of psychological investigations indicate that in the Near East changed all the psychological parameters investigated, including the subjective sense of well being of the individuals tested. Only the tempo of motor activity did not show statistically significant changes. The greatest changes were found in concentration and observation ability. The remaining psychological functions were affected to a lesser degree.

The subjective sense of well being of the individuals investigated was impaired; this effect lasted a long time (up to 8-12 weeks in groups not receiving any substances) during the stay in the Near East (Fig. 6). Administration or Pollisport™ and hydrolyzed protein in the first phase slightly speeded up the correction of psychological disturbances. These substances were shown to be beneficial by improving the sense of well-being lessening disturbances and accelerating return to normal. Ability to concentrate was least adversely affected in the third group, given both Cernitin™ and hydrolyzed protein, and showed the fastest return to normal (Fig. 7).

All the physical fitness investigations were carried out using a set of tests routinely applied in the Polish Army (14). The tests were used according to general instructions for evaluating particular motor characteristics (3, 5, 18).

The physiological methods were based on the correlation between effort, capacity and post-exercise in the parameters analyzed. It is particularly relevant in the case 0£ the haemcdynamic parameters and maximum oxygen uptake – which form the basis of the evaluation of effort capacity (15).

In the psychological investigations use was made of methods tried previously in the Near East and developed by Galubinska et al (7).

Analyzing the results one observes that the work on the bicycle ergometer resulted in a rise of the heart rate to 170/ min. These figures are in excess of the norm allowed for the work in high temperatures as given by Brouh and Wenzel (2, 22). Other authors also report a decrease in capacity to work in a high temperature environment. The authors linked this fact with the inability of the thermo regulating mechanism to cope with excessive external temperature in addition to the heat generated during work (19, 23 and others).

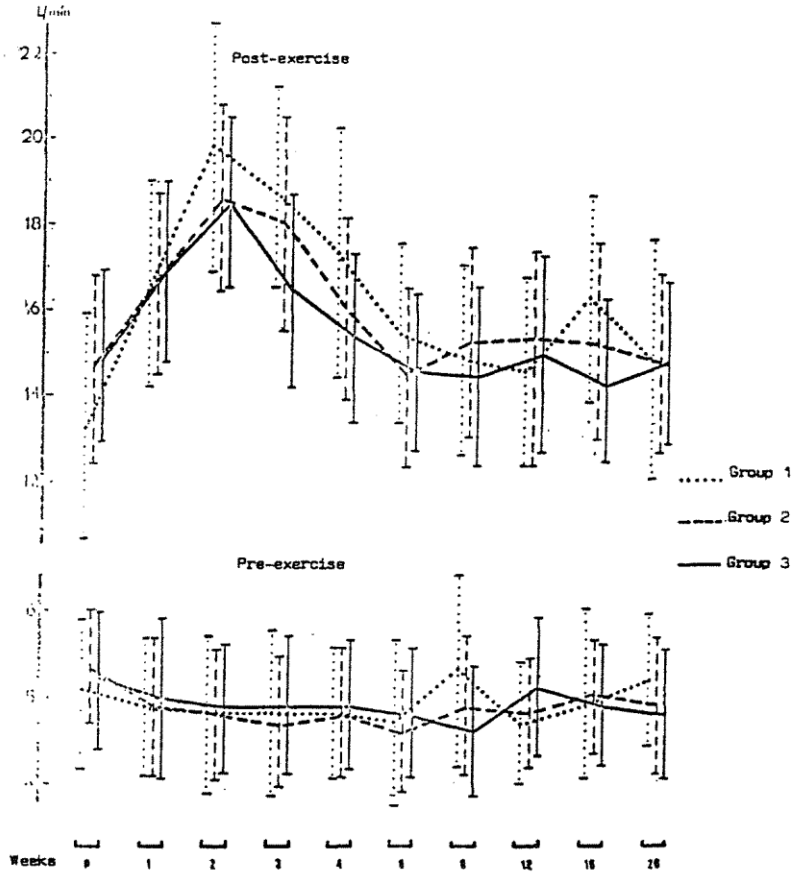

Fig. 3 Changes in cardiac minute volume at rest and post-exercise before and during the stay in the Near East.

The decline in physiological effort capacity, particularly in the early stages of the stay in Egypt is supported by the findings of many authors; e.g. Brouha et al (1) found that the length of the distance travelled per one heart contraction is decreased by a quarter in conditions where the temperature is 41°C and relative humidity 43%.

Our investigations showed that the most significant and long-lasting changes occurred in the biochemical parameters. Haemodynamic parameters were affected to a much lesser degree and differed slightly from the initial values obtained before the transfer to the Near East and returned to initial values more rapidly.

The beneficial effect of administration of Cernitin™ combined with minerals, vitamins and hydrolyzed protein on effort capacity was observed by many authors. The administration of these substances to sportsmen of various disciplines during training accelerated the achievement of peak form (4, 6, 11, 12, 13). Cernitin™ also increases tolerance to changes in climatic condition, and general nonspecific resistance of the body (17, 8, 9, 16, 20). It has been suggested that this effect is due to the presence of plant growth hormones in Cernitin, while vitamins and mineral salts are present in optimal proportions. Experiments carried out on animal receiving Pollisport™ tablets showed among other effects an increase of enzymatic protein in the muscles and an increase in intestinal aminoacid absorption (21). These findings might explain that fact, confirmed by our own investigations, that Pollisport™ given in conjunction with hydrolyzed protein was more effective than given on its own. This problem requires more extensive investigation.

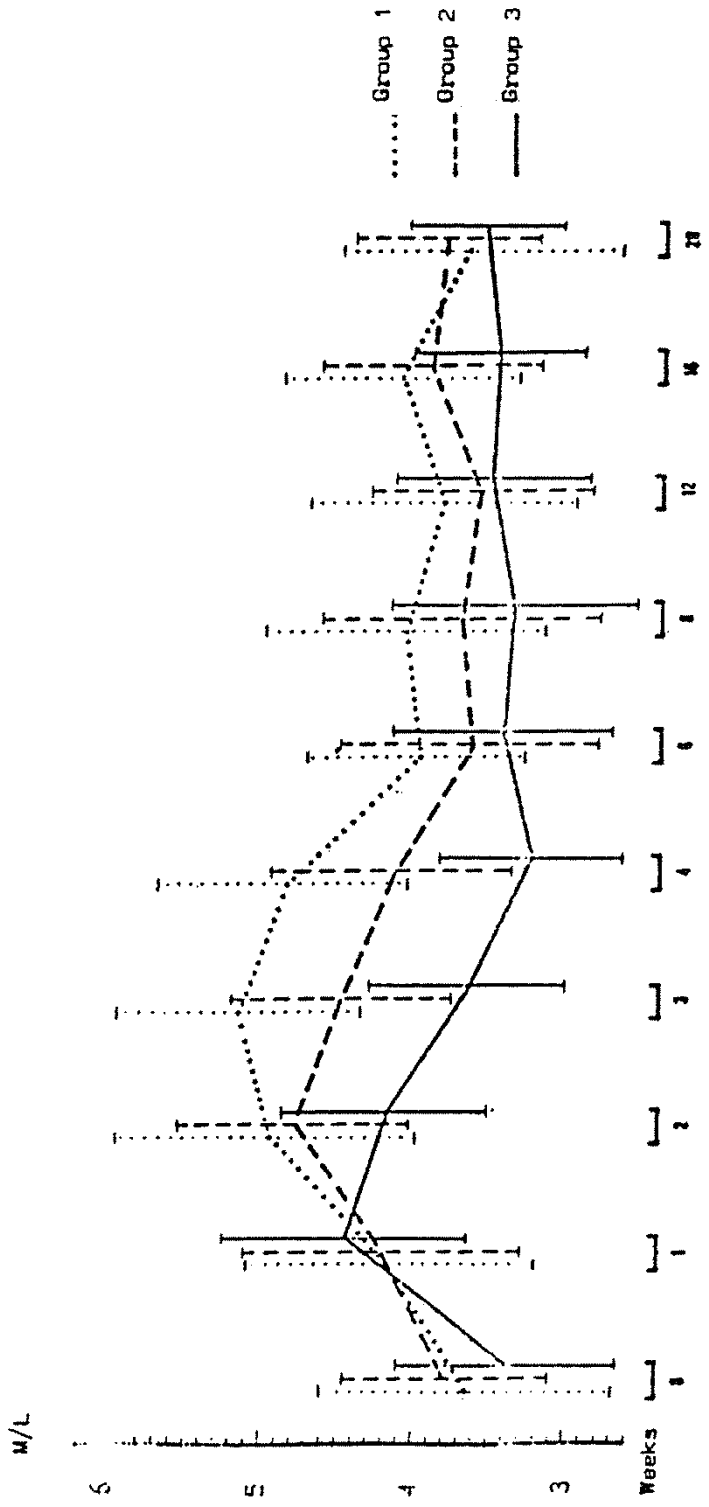

Fig. 4 Changes in lactate level before and during the stay in the Near East.

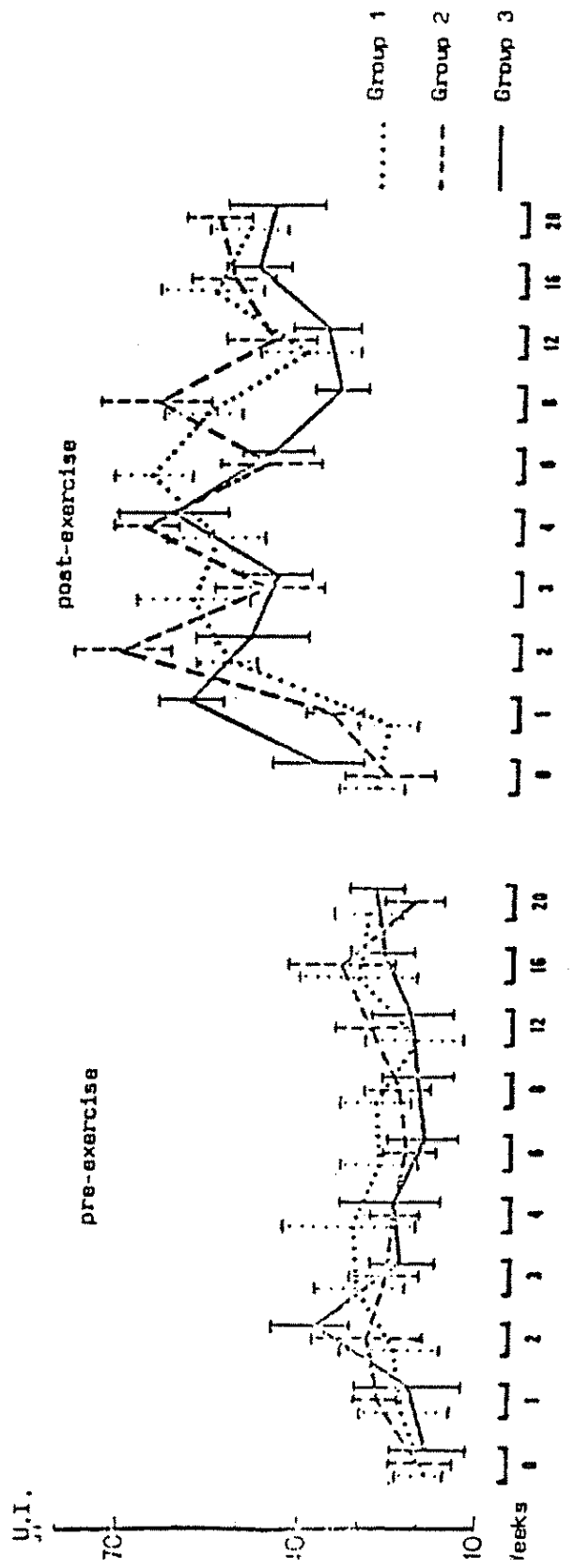

Fig. 5 Pre- and post-exercise changes in aspartate aminotransferase activity before and during the stay in the Near East.

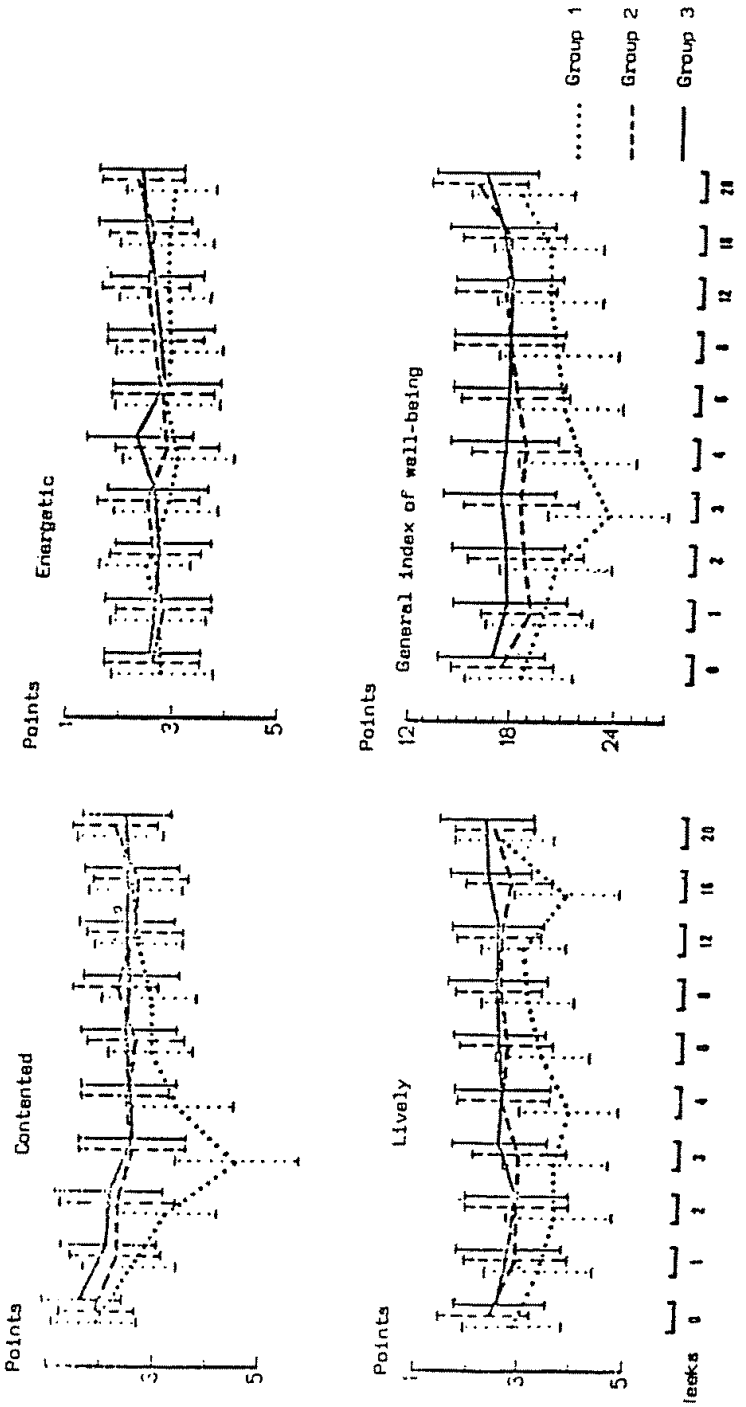

Fig. 6 Changes in selected parameters of subjective sense of well-being before and during the stay in the Near East.

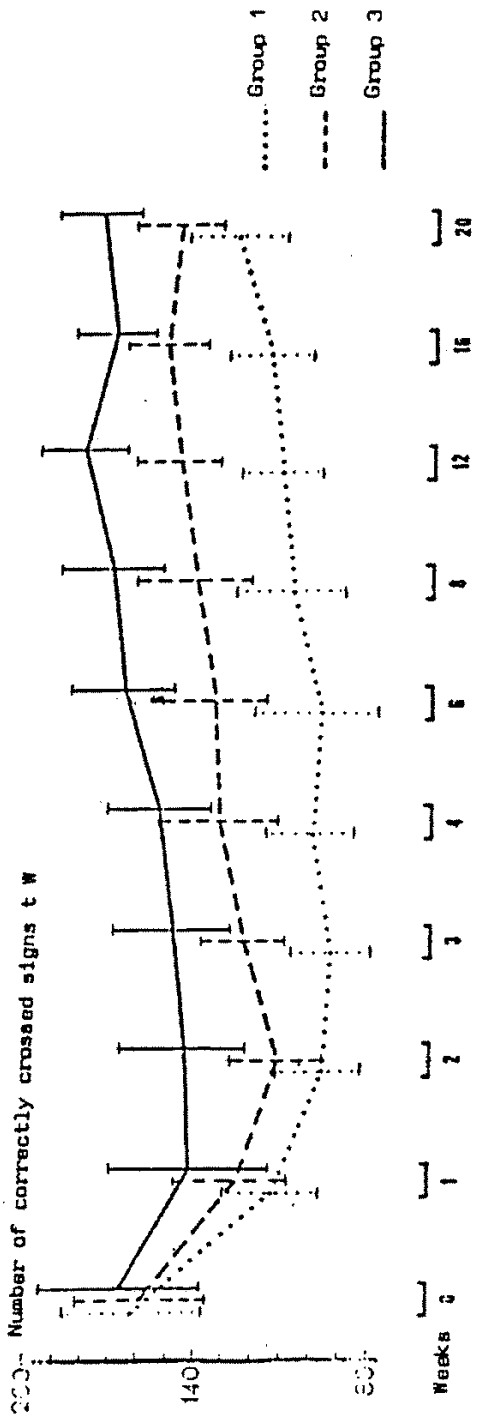

Fig. 7 Changes in ability to concentrate before and during the stay in the Near East.

CONCLUSIONS

1. Rapid transport (by air) of Polish Military Special Unit drivers into sub-tropical conditions resulted in reduced physical fitness, physical capacity, ability of observation, and adversely affected their subjective sense of well-being. The last two factors are essential in the work of professional drivers and their impairment can lead to the occurrence of road accidents.
2. The period of acclimatization to subtropical conditions was much longer in the servicemen studied than had been assumed on the basis of preliminary tests. The average length of this period was 4-6 weeks, depending on the experimental group.
3. The most significant and longest-lasting changes were found in the group, which received neither Cernitin™ nor hydrolyzed protein.
4. Administration of Cernitin™ and hydrolyzed protein significantly shortened the period of acclimatization as measured by the rate of normalization of physical fitness factor; it also had a beneficial effect on psychological function and on the subjective sense of well-being. It was particularly noticeable in the group receiving both of these substances.
5. The beneficial effect of Cernitin™ and hydrolyzed protein in physical fitness and capacity is probably related to the effect of these substances on oxygen debt tolerance and to an increase in anaerobic capacity.

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