MIKLÓS ZRÍNYI
NATIONAL DEFENCE UNIVERSITY
Doctoral Council

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Lieutenant Colonel

The Experience of Physical Capacity Test of the Hungarian Soldiers in Foreign Military Service

Summary of Ph.D. Thesis

Budapest
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1. FORMULATION OF THE SCIENTIFIC PROBLEM

By serving at foreign duties the proper health and physical condition is particularly important. Missionary duties and the training for them means a serious strain to our forces, thus I felt it relevant and necessary to observe the physical stamina of the soldiers up to different foreign affectations to armed forces or other services. In the last couple of years a huge emphasis was put on the examinations and surveys concerning corpulence in the Hungarian Defence Forces. Extra weight and corpulence have a negative effect on the soldier's health conditions and obviously on their physical capacity. The degree of corpulence is defined by considering the increase of body mass redundancy, body mass index (BMI) and the percentage of body fat. By analysing the capacity and anthropometrical factors of the missionary troops and taking connections into consideration, it can be proved that in what extent do the decay of body build index (body weight, percentage of body fat, BMI) decrease physical activity and affect health condition. This paper is part of the scientific activity that has been being carried out for more than ten years. The results of the observations give a further sample on the condition of the civil sphere connected to national defence, the general ranks of Hungarian Defence Forces, and especially of those who apply for foreign services.

2. SCIENTIFIC AIMS, ASSUMPTIONS

- Analysis and examination of the physical aptitude test system for foreign military service in the 2007- 2010 period.
- Inspection of body build index (body weight, percentage of body fat, BMI) among ranks up to foreign military service.
- Observation on the connections between body build index (body weight, percentage of body fat, BMI) and choice of exercise.
- Observation on the connections between body build index (body weight, percentage of body fat, BMI) and physical capacity index.
- Comparison between body build index (body weight, percentage of body fat, BMI) and the capacity index of different missionary service ranks.
- Observation on the connection between age and physical capacity.
- Observation on the role of age concerning the change in the body build index.
- Summary of the observation results, revealing possible expansions, phrasing suggestions.

I assume that the body build index (body weight, percentage of body fat, BMI) has an effect on the soldiers' choice of exercise and their physical capacity:

1. *I assume that ranks with previously revealed health mutation have more adverse body build index (body weight, percentage of body fat, BMI) than their healthy associates.*
2. *I assume that the capacity of those who choose alternative exercises (bicycle ergometrics) due to health reasons is the lowest concerning both the power and capacity types of exercises.*
3. *I assume that the body build index (body weight, percentage of body fat, BMI) of those who choose pull-up- sit-up- run kind of exercises is the lowest and their physical capacity is also the highest compared to other groups.*
4. *I assume that the difference between the capacities of groups with distinct forms of exercises can be related to the dissimilar body fat percentage.*

I assume that different missionary ranking categories affect not only the capacity index of the troops but also their body build index.

5. *I assume that the body build index of those who apply for the "advanced" (T3) level of missionary service is higher, more adverse than of those who have the proper physical capacity for the "increased" (T4) level.*
6. *I assume that ranks in T+ level status perform weaker in power and capacity exercises than T4 level ranks concerning each type of exercise group.*

According to secondary literature data, physical capacity decreases by age, it is also a proven fact that body consistence changes by age and as to my former assumption, body build index (body weight, percentage of body fat, BMI) has an effect on physical capacity.

7. *I assume that the average rate of body mass index and body fat percentage are higher among those soldiers who received inadequate classification disregarding age groups, compared to those who passed the classification.*

3. RESEARCH METHODS

- I rated the sources and after I started to collect data.
- While collecting information I set out the familiar sources and processed the parts relevant to my topic.
- I applied the methods in accordance with the current law passages concerning the simple and combined capacity-physiology (3200 meters run, bicycle ergometrics, push-up, pull-up and modified sit-up) under laboratory circumstances.
- I measured height and body weight with the help of MICRA METRIPOND and I used OMRON BF 305 device to classify body fat percentage. I calculated BMI with the height and weight data by the following equation: BMI= body weight (kg)/ height^2 (m)
- For comparing groups I used the Student's two pattern test.
- Between body fat percentage (dependent factor) and power numbers (independent factor) I completed a polinomic secondary regression analysis.
- Between body fat percentage (dependent factor) and capacity index (independent factor) I used a linear regression analysis.
- I used Microsoft Office Excel 2003 for statistics analysis and defined the significance level at $p<0.05$.

4. BRIEF SUMMARY OF THE COMPLETED OBSERVATION

From the 15679 people who were called in 12713 (81.1 %) people showed up, 2019 people (12.9 %) asked for a new appointment, 921 (5.9%) people didn't appear or stood off. The average age of the ranks who, appeared was only 30.8 +/- 5.5 years, their body weight was 82.4 +/- 12.3 kg, which contributed with normal body fat percentage (17.2 +/- 5.5%). The BMI rate was 26.1 +/- 3.4 kg/m^2 that is more than the normal 25.0 kg/m^2.

Between 2007 and 2010 from those who appeared 83.3 % completed the adequacy test with the exercise types stated in the referring law passage. In the case of 16.7 % of the candidates a health problem arose, so 10.3 % was tested with bicycle ergometry under laboratory circumstances, the further 6.4 % was not available.

The role of build factors concerning the choice of exercise and capacity

On the basis of body weight the HFF group had the lowest rate (77.0 +/- 10.7 kg), the average body weight of the FFF group (81.7 +/- 11.6 kg) was significantly higher ($p<0.001$) compared

to HFF. The rate of the FFK group (86.1 +/- 13.5 kg) was significantly higher ($p<0.001$) in comparison of the weight of the FFF group. The NT group proved to have the biggest body weight (91.1 +/- 15.1 kg). This number is significantly higher ($p<0.001$) than of any other group's rate.

Comparing the body fat percentage group by group showed similar tendency as the differences in body weight. The HFF had much lower ($p<0.001$) fat percentage than the FFF group, but the average body fat percentage of both groups were within the normal range. The body fat percentage rates of the FFK and the NT groups were close, or even crossed the normal limit (20 %), so we can state that overweight affects the FFK and the NT ranks only.

Concerning the BMI rates the similar tendency can be noticed. Only the HFF group had the average rates within the normal limit (24.5 +/- 2.8 kg/m^2). In case of the other three groups the average rates of BMI were higher than the normal limit. The average BMI rate of the FFF group was 25.9 +/- 3.2 kg/m^2, the FFK group's rate was 27.0 +/- 3.8 kg/m^2 and the highest BMI belonged to the NT group with 28.9 kg/m2. The average BMI of the groups compared to each other showed a significant ($p<0.001$) difference.

49.9 % of the HFF group, 36.8 % of the FFF and 28.4 % of the NT had a normal BMI. 38.3 % of the NT, 19.6 % of the FFK, 10 % of the FFF and 2 % of the HFF proved to be overweight (BMI>=30 kg/m^2). The overweight category (BMI 25.0-29.9 kg/m^2) in case of each group was around 40-50 %.

The relation between the body mass index (BMI), body fat percentage and physical capacity

According to the data of the chargeable groups (HFF, FFF, FFK) I concluded that in both power numbers the HFF group has reached a much higher repetition number and score compared to the FFK group. The HFF group reached a significantly ($p<0.001$) higher score compared to the FFF group. The difference between the score of the HFF group with pull-ups and the FFF's push-up exercises was significantly higher in comparison with the results of the sit-up scores.

The body fat percentage showed a positive correlation with the running time, namely the higher body fat percentage someone had the slower was he able to finish the 3200 m distance. The relation between the body fat percentage and the running speed was negative.

In case of the FFK group I also revealed a negative connection between the body fat percentage and the maximum capacity.

After comparing the scores of certain exercise types, I came to the conclusion that on bicycle ergometer (FFK) the scores associated with the capacity were significantly higher than the scores of the running activities. There is not any relation between the two evaluation system, on bicycle ergometer with lower capacity level and worse antropometrical rates a higher score could have been reached.

Comparison between the physical capacity test result of T3 and T4 categories

Between 2007 and 2010 1690 male soldier from the T3 and 11023 from the T4 category was examined. The average age of the T3 category was 33.9 +/- 6.0 years, till the T4 was 30.3 +/- 5.3 years. According to the categories defined by the WHO, 30.8 % of the T3 physical capacity ranks has a normal body weight and 15.5 % has overweight. From the T4 category 39.8 % is of normal weight, while 48.5 % was considered to be overweight and 11.7 % obese.

The average body weight of the HFF ranks belonging to the T3 category was 80.5 +/- 8.2 kg, FFF's was 84.0 +/- 12.0 kg, FFK's was 88.0 +/- 13.3 and NT's was 93.6 +/- 15.4 kg. On the contrary the average body weight of the HFF ranks in the T4 category was 76.7 +/- 10.8 kg, FFF's was 81.4 +/- 11.5 kg, FFK's was 85.4 +/- 13.5 and NT's was 91.4 +/- 15.1 kg.

The average BMI rate of the HFF ranks belonging to the T3 category was 5.4 +/- 2.0 kg/m^2, FFF's was 26.3 +/- 3.2 kg/m^2, FFK's was 27.4 +/- 3.7 kg/m^2 and NT's was 29.4 +/- 4.5 kg/m^2. The average BMI rate of the HFF ranks belonging to the T4 category was 24.4 +/- 2.9 kg/m^2, FFF's was 25.8 +/- 3.2 kg/m^2, FFK's 26.9 +/- 3.8 kg/m^2 and NT's was 28.8 +/- 4.3 kg/m^2.

The average body fat percentage of the HFF ranks belonging to the T3 category was 15.5 +/- 3.6 % (HFF), 18.4 +/- 5.2 % (FFF), 20.9 +/- 5.7 % (FFK), 22.6 +/- 54.1 %. The average body fat percentage of the HFF ranks belonging to the T4 category was 13.3 +/- 4.4 % (HFF), 17.0 +/- 5.4 % (FFF), 19.2 +/- 5.9 % (FFK), 19.7 +/- 4.6 %.

The average number of pull-ups within 55 members group of the T3's from the709 HFF was 15 (ps) repetition number, which corresponded with 85 points, sit-ups had 56 (ps) repetition number with 75 points. The average number of pull-ups within the 654 membered

T4 group was 15 repetition number, which corresponded with 85 points, sit-ups had 59 (ps) repetition number with 75 points.

In the case of the 1165 members group of the T3's from 9874 FFF the push-ups reached 44, the sit-ups were 49 repetition numbers, which meant 65 and 68 points. In the case of the 8709 membered T4's the following data turned out: push-ups 48,, sit-ups 53 repetition numbers which meant 69 and 70 points.

In the case of the 362 members group of the T3's from 1314 FFK the following result came out: 39 repetition number of push-ups, 43 repetition number of sit-ups that corresponded with 64-64 points. The 952 membered T4's reached 42 repetition numbers in push-ups, 48 in sit-ups, that resulted in 63-64 points.

Observation on the relation between age and physical capacity

From the period between 2007 January 1 and 2010 December 31 I highlighted the results of the soldiers from T4 level's FFF group that requires the highest level of training capacity, considering that most of them (8709) belonged to this category.

From the 6275 "Physically Adequate" soldiers (divided by age groups) reached the following repetition numbers with push-ups: under 25: 55 +/- 11, between the age of 26 and 30: 53 +/- 11, between the age of 31 and 35: 50 +/- 11, between the age of 36 and 40: 47 +/- 10, and up to 41: 42 +/- 10. From the 2434 "Physically Inadequate" soldiers reached the following repetition numbers with push-ups: under 25: 40 +/- 9; 26-30 years: 39 +/- 9; 31-35 years: 37 +/- 9; 36-40 years: 35 +/- 8, and up to 41: 29 +/- 7.

The average sit-up score from T4's 6275 members in the FFF group who had been classified as "Physically Adequate" (divided by age groups) reached the following results: under 25: 61 +/- 10; 26-30 years: 58 +/- 9; 31-35 years: 54 +/- 9; 36-40 years: 51 +/- 10, and up to 41 years: 49 +/- 11. The average sit-up score from 2434 members in the FFF group who had been classified as "Physically Inadequate" (divided by age groups) reached the following results: under 25: 49 +/- 10; 26-30 years: 46 +/- 10; 31-35 years: 42 +/- 10; 36-40 years: 38 +/- 11, up to 41 years: 34 +/- 9.

The average running time from 6275 members in the FFF group who had been classified as "Physically Adequate" (divided by age groups) reached the following results: under 25: 895 +/- 69 s., 26-30 years: 918 +/- 72 s., 31-35 years: 949 +/- 76 s., 36-40 years: 983 +/- 87 s., up to 41: 1011 +/- 90 s.. The average running time from 2434 members in the

FFF group who had been classified as “Physically Inadequate” (divided by age groups) reached the following results: under 25: 1030 +/- 92 s., 26-30 years: 1061 +/- 97 s., 31-35 years: 1100 +/- 97 s., 36-40 years: 1136 +/- 96 s., up to 41: 1179 +/- 124 s.

The average body weight of T4’s FFF category members who had been classified as “Physically Adequate” (divided by age groups) reached the following results: under 25: 77.0 +/- 10.2 kg, 26-30 years: 80.0 +/- 10.8 kg, 31-35 years: 81.1 +/- 11 kg, 36-40 years: 82.7 +/- 11; up to 41: 82.3 +/- 10.3 kg. The average body weight of the “Inadequate” ranks (divided by age groups) reached the following results: under 25: 82.1 +/- 11.9 kg, 26-30 years: 85.2 +/- 12.1 kg, 31-35 years: 86.0 +/- 12.6 kg, 36-40 years: 85.7 +/- 12.8 kg, up to 41: 89.7 +/- 10.5 kg.

The average body fat percentage of the “Adequate” ranks (divided by age groups) reached the following results: under 25: 13.3 +/- 4.9 %, 26-30 years: 15.9 +/- 4.8 %, 31-35 years: 17.3 +/- 4.9 %, 36-40 years: 19.0 +/- 4.7 %, up to 41: 20.7 +/- 4.4 %. The average body fat percentage of the “Inadequate” ranks (divided by age groups) reached the following results: under 25: 16.7 +/- 5.6 %, 26-30 years: 19.0 +/- 5.2 %, 31-35 years: 19.9 +/- 4.9 %, 36-40 years: 20.7 +/- 4.7 %, up to 41: 23.9 +/- 3.5 %.

The average BMI rates of the “Adequate” ranks (divided by age groups) reached the following results: under 25: 24.4 +/- 2.8; 26-30 years: 25.3 +/- 3.0; 31-35 years: 25.8 +/- 2.9; 36-40 years: 26.5 +/- 2.9; up to 41 years: 26.5 +/- 2.9 . The average BMI rates of the “Inadequate” ranks (divided by age groups) reached the following results: under 25: 25.9 +/- 3.6; 26-30 years: 27.0 +/- 3.4; 31-35 years: 27.4 +/- 3.3; 36-40 years: 27.4 +/- 3.4; up to 41 years: 28.3 +/- 2.6.

Based on the data collected in four years by different measurements I concluded without any doubt that the BMI increases significantly ($p<0.001$) by aging, furthermore it has a close relation with the decrease of the missionary ranks’ physical capacity. As a conclusion there is a negative correlation between age and the rates of push-ups, sit-ups and running exercises.

5. CONCLUSION

The observation focused on the body build index (body weight, percentage of body fat, BMI) and the choice of exercise together with the effect on the capacity of the rolled-up ranks (12713 persons) between 2007- 2010. The body build index of the four groups showed significant differences. The evolving or already extant health impairment of the FFK and NT group members can be related to overweight or obesity. The difference between the capacities of certain exercise groups in given BMI categories is in close relation with the dissimilar body fat percentage. The increase of BMI correlates with the body fat percentage. The body consistence differences between certain exercise groups could have been traced even within the same BMI categories. In all exercise group there is a connection between body fat percentage and capacity index.

A squaring correlation could have been noticed between the scores of body fat percentage reached by push-ups and pull-ups. It is also true to between the achieved capacity with sit-ups and the body fat percentage. In case of very low body fat percentage the ranks achieved weaker scores in power and capacity tests.

According to the data collected in four years I could obviously conclude that body mass index is significantly ($p<0.001$) increasing by age, what is more the decrease of the physical capacity of the missionary ranks can also be easily connected to this tendency.

The connection between BMI and body fat percentage divided by type of exercise, furthermore the relation between the reached capacity levels and scores in each exercise type let me conclude that BMI categorization makes the dissimilarities in the body build index more apparent. In the same time, my analysis proved that the current bicycle score system needs to be modified.

6. NEW SCIENTIFIC ACHIEVEMENTS

1. I have proven that the body build index of soldiers have an effect on their choice of exercise. The body build index of the ranks who have certain health impairments is much higher than of their healthy associates. Due to the measurements I have proven that the increase of body weight, percentage of body fat and BMI shows a negative correlation to the soldiers' physical capacities.

2. I have proven that the capacity of those who went under alternative strain (bicycle ergometrics) due to health reasons was only significantly lower in the power type of exercises compared to the other groups' rates. The score of the alternative group's capacity index was surprisingly much higher than expected compared to the rates of the pull-up- sit-up- running group. I have proven that the current bicycle score system does not correspond with the runner's score system.

3. I have proven that those who choose the pull-up type of exercises have significantly the lowest body build index, however their physical capacity is clearly the highest among the groups.

4. I have proven by statistic calculations that the difference between the physical capacity of certain exercise groups derives from the dissimilar body fat percentage.

5. Based on measurements and other observations I have proven that those who apply for the T3 missionary services with the required physical capacity have much higher body build index than of the T4 level ranks'.

6. I have proven by statistic calculations that the capacity of the T3 level ranks was significantly lower in each group of exercises, compared to the T4 level ranks. Concerning the power type of exercises in the case of the pull-up group there was not any difference between the two categories.

7. I have proven that the body build index of the soldiers with inadequate classification was significantly higher in any age group than of the average rates of adequately classified soldiers'.

7. PARTICULAR USAGE OF RESEARCH ACHIEVEMENTS, SUGGESTIONS

For the sake of the most efficient work of our troops either in abroad or at home the proper physical condition and capacity is essential, moreover it is rather a requirement with huge significance.

By looking at the observation results it is clear that the physical capacity of the age group under 30 failed the most in accordance with the minimum level of the American system (APFT). I consider it especially important for the 116/2009. HVKF arrangement (for which my former research achievements proved to be helpful) to come into effect, as it contains all the minimum claims on the incoming ranks. It makes it guaranteed that the concerned ranks will be able to fulfil the physical efficiency requirements of the "advanced" (T3) or the "increased" (T4) levels.

I find particularly relevant to monitor and examine the physical capacity and it's sustenance on a regular basis in the "advanced" (T3) or the "increased" (T4) levels, especially before getting involved in foreign services (condition tests, adequacy tests).

I suggest that besides considering the appointed tasks and aims, the commissars, physical education officers, health experts and aldermen should pay more attention to those soldiers who have higher body build index and lower capacity index than the average. Namely it can not only been harmful to their health by aging but it also has a negative effect on the Hungarian Defence Forces' physical capacity, which can cause problems in the respect of ability to military duties besides it can endanger the quality of battle as well.

I suggest that aldermen should always consider that the different missionary services, as well as the "advanced" and "increased" level training capacity have to be kept under control, as it can be affected by the body build index (body weight, percentage of body fat, BMI) increase in a negative way. If it is possible the training level should be increased, as foreign conditions that differ from the ones here, put a serious strain on our soldiers. Obviously a more trained body has a much bigger chance to avoid injuries and health impairments deriving from the increased strain levels.

In the light of my previously stated assumptions which later had been confirmed by numerical dates, I suggest that the partial body build index (body weight, percentage of body fat, BMI) test should take place during the recruitment period. This way those candidates who don't have the adequate rates can be immediately sent down. This process would increase

the number of “Physically Adequate” candidates compared to the “Physically Inadequate” ones, that would also decrease the expenditures of the recruitment system.

Ranks already in service, if they stay on the same capacity level as in the beginning of their service, will be able to get ready for foreign conditions under appropriate professional control within shorter period of time. Changes due to expected negative stimuli will probably be smaller or do not show up at all.

I suggest that through military training step by step the commissars should try for reaching a higher level of capacity be the end of the training among the missionary ranks than would be enough in the particular area. Soldiers should be more trained than they are supposed to be in abroad, in order that the stimuli affecting them would not cause any trauma or health impairment. This way by the end of the adaptation processes due to the capacity training (motoric skill developing, training) their condition would reach the “advanced” (T3, 240 points) or the “increased” (T4, 260 points) levels. The possibility for their success in accomplishing bigger physical challenges will also increase. Their working capacity would only decrease for a minimal extent or probably not at all.

If the commissars develop the motoric skills, essential to the missionary services during the training period- under the afore mentioned radical weather conditions, than the chances for the capacity of soldiers who go to abroad could increase in the particular operational areas, or the decrease will only be very minimal.

The need of conditional skills is always based on both the combination of the type of activity and the environment factors, and if their rate is high enough for the particular situation. Depending on the possibilities, the type of the given missionary work and the climatic factors should be taken into consideration, and one should choose the appropriate skill improving methods, exercises, tools and location.

The optimal would be if the last phase of preparation (training, preparation) took place already in a NATO headquarter near the current warlike area, which is the closest to the missionary circumstances.

This way the ranks could adapt to the stimuli that affects them there step by step. Furthermore, their training level either physically, and mentally could reach a higher standard and would be stronger as well.

I consider it significant that during the several prevention programs the control of body weight, and the claims should be increased, moreover the attention of the commandant ranks should be raised to the time spent on group or individual preparation and it's control.

8. A TÉMÁVAL KAPCSOLATOS PUBLIKÁCIÓS JEGYZÉK

Lektorált folyóiratcikkek (Magyarországon megjelenő idegen nyelvű)

1. **Kende György, Juhász Zsolt**: Examination of the connections between motion forms and constitutional factors in the circle of the Hungarian Army's staff applying for foreign service (01.01.2007-31.12.2010.) (Hadmérnök, on-line tudományos lap, VI. évfolyam, 2. szám – 2011. június)http://www.hadmernok.hu/2011_2_kende_juhasz.php
   Letöltési idő: 2011. 08.10.

2. **Juhász Zsolt**: Comparison of qualifications and constitutional indexes of categories T3 and T4 in the circle of the Hungarian Army's staff applying for foreign service (01.01.2007-31.12.2010.) (Hadmérnök, on-line tudományos lap, VI. évfolyam, 2. szám – 2011. június) http://www.hadmernok.hu/2011_2_juhasz.php
   Letöltési idő: 2011. 08.10.

Lektorált folyóiratcikkek (Magyarországon megjelenő magyar nyelvű)

3. **Juhász Zsolt**: A 2008. év fizikai alkalmasság-vizsgálatainak és állapotfelméréseinek tapasztalatai (Repüléstudományi közlemények, on-line tudományos lap, XXI. évfolyam, 2009., 3. szám) http://www.szrfk.hu/rtk/folyoirat/2009_3/testnev_konf/Juhasz_Zsolt.pdf
   Letöltési idő: 2011.08.10.

4. **Juhász Zsolt**: A katonák fizikai alkalmasság-vizsgálatával foglalkozó forrásmunkákról, Hadtudomány, XIX. évfolyam, 2009/1-2. sz., Budapest, 2009. április, ISSN 1215-4121, 113-118 pp.
   Letöltési idő: 2011.08.10.

5. **Juhász Zsolt**: Fizikai alkalmasság-vizsgálat az újjászervezett, önkéntes haderő logisztikai rendszerében (Hadmérnök, on-line tudományos lap, III. évfolyam, 2. szám – 2008. június) http://www.zmne.hu/hadmernok/2008_2_juhasz.pdf
   Letöltési idő: 2011. 08.10.

6. **Juhász Zsolt**: A katonák fizikai alkalmasság-vizsgálatának tapasztalatai (Kard és toll, 2006/1, HM ZMNE, Budapest, 2006, ISSN 1587-558X, 58-61.)

Elektronikus publikációk

7. **Juhász Zsolt**: A Magyar Honvédség jelenlegi fizikai állapotfelmérésének gyakorlata http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt01.pdf Letöltési idő: 2011.08.10.

8. **Juhász Zsolt**: Fizikai Alkalmasság-vizsgálat a külszolgálatra jelentkező katonák körében http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt03.pdf Letöltési idő: 2011.08.10.

9. **Juhász Zsolt**: A magyar katonák külszolgálati tevékenysége (Történeti áttekintés a Magyar Honvédség külszolgálati tevékenységéről) http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt02.pdf Letöltési idő: 2011.08.10.

10. **Juhász Zsolt**: A Magyar Honvédség külszolgálatra jelentkező állományának vizsgálata a választott mozgásformák, mozgásforma csoportok és az elért teljesítménymutatók szempontjából (2007. január 1. - 2010. december 31.) http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt04.pdf Letöltési idő: 2011.08.10.

11. **Juhász Zsolt**: A jelenlegi fizikai követelményrendszer elemzése http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt05.pdf Letöltési idő: 2011.08.10.

12. **Juhász Zsolt**: A toborzó irodákon keresztül jelentkező leendő szerződéses állomány vizsgálati tapasztalatai (2007. szept. - 2008. dec.) http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt06.pdf Letöltési idő: 2011.08.10.

13. **Juhász Zsolt**: A fizikai erőnléti állapot, mint a hadrafoghatóság egyik alappillére (a 2008. év fizikai alkalmasság alkalmasság-vizsgálatainak és állapotfelméréseinek tapasztalatai) http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt07.pdf Letöltési idő: 2011.08.10.

14. **Juhász Zsolt**: A fizikai aktivitás hatása a misszióra jelentkezők kondícionális állapotára
http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt08.pdf
Letöltési idő: 2011.08.10.

15. **Juhász Zsolt**: A fizikai alkalmasság-vizsgálati és állapotfelmérési rendszer aktuális változásai és tapasztalatai
http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt09.pdf
Letöltési idő: 2011.08.10.

16. **Juhász Zsolt**: A szakszerű edzés, az edzéstervezés alapjai
http://193.224.76.4/download/konyvtar/digitgy/publikacio/juhasz_zsolt10.pdf
Letöltési idő: 2011.08.10.