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Original Article

The Clinical Management of Deconditioned Patient

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Abstract

The current study was designed to investigate the clinical management of deconditioned patients**.** In the current study, we investigate the clinical manifestations of deconditioned patients. A subacute functional deficiency was determined when getting up from a supine position and developing tachycardia with an increase in heart rate by 30 or more per minute for 10 minutes. This study included 172 elderly patients aged 65 to 74 years. The average age of the patients was 69.2+2.2 years. There were 102 men and 70 women in the study. These patients were registered at the dispensary with the therapists of outpatient clinics after an infectious disease. Within 6 months after the treatment, a comprehensive geriatric assessment of patients was performed. All patients were divided into four groups depending on the indicators of motor activity, which in the framework of this study was the criterion of the adaptive function of the body and viability. Patients with normal motor activity indicators did not have the decondition and were designated as a control group. Patients with the decondition did not have normal indicators of motor activity. The obtained results were processed statistically. According to the results of our study, it was noted that the assessment of the six months after the treatment showed heterogeneity of patients from a functional point of view with a homogeneous somatic structure. Six months after the treatment, out of 172 people, 45 people (26.2%) had normal motor activity indicators (39-40 points); according to the questionnaire "Assessment of motor activity in the elderly", the average score was 39.6+0.2; 42 people (24.4%) had mild motor activity disorders (34-38 points), the average score was 36.1+0.4; moderate disorders (21-33 points) were registered in 47 people (27.3%), the average score was 27.9+2.1; significant motor activity disorders (0-20 points) occurred in 38 people (22.1%), the average score was 13.2+1.4. The fall syndrome was characteristic of those patients with the decondition who demonstrated moderate and significant motor activity disorders 6 months after the treatment. In particular, in people with significant motor activity disorders, there was a decrease in muscle strength in the lower extremities by 48.3+3.2% and in the upper extremities – by 27.1+3.1% (P<0.05). As a result of the presence of the decondition, an unfavorable cascade of geriatric syndromes is formed in the form of an increase in the level of situational anxiety from 21.9-24.8 to 58.4-75.3 points on the Spielberger-Hanin scale, a deterioration in morale with an increase in the severity of depression from 5.8-6.0 to 11.0-14.9 points, a decrease in the quality of sleep on the ten-point visual analog scale from 8.3-8.4 to 5.2-5.7 points on the Beck scale, an increase in the proportion of patients at risk of developing malnutrition syndrome from 4.8-6.7% to 46.8-68.4%, the development of the fall syndrome, which, in turn,, it is a predictor of the development of dinapenia in the form of a decrease in the strength of the upper extremities by 22.7-27.1%, a decrease in the strength of the lower extremities by 29.6-49.6%, with a faster rate of decrease in the strength of the lower extremities compared to the upper extremities by 1.8 times, which, accordingly, reduces the rehabilitation potential. Clinical manifestations of the decondition in elderly patients were such geriatric syndromes as anxiety, depression, cognitive decline, sleep disorders, hypomobility, dinapenia, risk of developing malnutrition syndrome and falls syndrome.

Keywords: Older age, Geriatric patient, Physical activity

1. Introduction

The subacute functional deficit is characterized by developing cardiac complications in postural hypotension after an infectious disease (1-4). There is evidence that patients with subacute functional deficits develop chronic fatigue syndrome, anxiety-depressive disorders, apathy and other conditions that worsen the quality of life (5-8). Note that a small amount of data on the subacute functional deficit has been accumulated, but there are even fewer studies regarding this condition among older patients (9-11). However, no data were found in the literature on the identification of geriatric status violations, the development of various geriatric syndromes among older patients with the subacute functional deficit and the effect of this syndrome on the progression of the somatic status deterioration among patients (12, 13). The aspects of psycho-social disorders play a unique role among older patients with acute functional deficits (14, 15).

All these data confirm the relevance of the study.

The current study was designed to identify the clinical manifestations of subacute functional deficits.

2. Materials and Methods

In our study, we studied the clinical manifestations of subacute functional deficit. The subacute functional deficit was determined when standing up from a prone position and the development of tachycardia with the heartbeat rate increased by 30 or more beats per minute for 10 minutes.

This study included 172 elderly patients whose age was 65-74 years. The average age of the patients was 69.2+2.2 years. There were 102 men and 70 women in the study. These patients were registered with the therapists of outpatient clinics after an infectious disease.

Within 6 months after the treatment, a comprehensive geriatric assessment of the patients was carried out. This period was conditioned by the maximum recovery of the geriatric status after the treatment.

All patients were divided into four groups depending on the indices of physical activity, which was a criterion of the body's adaptive function and viability in the framework of this study. The patients with normal motor activity parameters did not have a subacute functional deficit and were designated as a control group. The patients with subacute functional deficits did not have typical physical activity indicators.

The first group (control) consisted of 45 people aged 65-74 years with typical physical activity indicators (men-22, women-23), the average age of patients was 68.9+2.4 years.

The second group consisted of 42 people aged 65-74 years with mild impairments of motor activity (men-18, women-24), the average age of the patients was 68.8+2.3 years.

The third group included 47 people aged 65-74 years with moderate impairment of motor activity (37 men, 10 women), the average age of the patients was 70.6+3.1 years.

The fourth group included 38 people aged 65-74 years with significant impairment of motor activity (men-25, women-13), the average age of patients was 68.9+2.3 years.

All patients were comparable in terms of somatic pathology.

Criteria for inclusion in the studies: age -65-74 years, previous infectious disease, absence of pronounced somatic pathology, absence of pronounced cognitive disorders that complicate contact with a patient, absence of oncological diseases, and the absence of senile asthenia.

Exclusion criteria: age -64 years or less and 75 years or more, severe somatic pathology, cognitive disorders of the dementia level, oncological diseases, senile asthenia.

The following questionnaires and scales were used during the comprehensive geriatric assessment.

Physical activity was assessed according to the following parameters. To assess the parameters of stability and gait, the Tinnetti questionnaire "Assessment of motor activity among the elderly" was used to select the patients with normal parameters of motor activity, mild, moderate and significant

impairments. The volumes of physical activity were determined by the anamnestic method in minutes/week. Muscle functions of the upper extremities were assessed using hand dynamometry. The study of the muscle strength of the lower extremities was carried out using dynamometric stands.

Information on the syndrome of falls was collected from the anamnesis data.

The following questionnaires and scales were used to assess the indicators of the cognitive and psychological aspects: the Philadelphia Geriatric Scale of Moral Status, the assessment of situational and constitutional anxiety level according to the Spielberger-Khanin method, the Beck Depression Scale, the Brief Mental Status Assessment Scale (BMSAS), a ten-point visual scale for sleep quality evaluation.

The 'Summary Nutritional Assessment' (SNA) questionnaire assessed nutritional status.

The results were mathematically and statistically processed using modern parametric and non-parametric statistics methods, adopted in clinical, biomedical and medico-social research using the Statistica v12.0 software package.

3. Results and Discussion

Evaluation of the six months after the treatment showed the heterogeneity of the patients from the functional point of view, with the homogeneity of the nosological structure.

Six months after the treatment, 45 people (26.2%) out of 172 had normal physical activity indicators (39-40 points). According to the questionnaire "The assessment of physical activity among the elderly" (26.2%), the average score was 39.6+0.2; 42 people (24.4%) had mild disorders of motor activity (34-38 points), and the average score was 36.1+0.4; moderate disorders (21-33 points) were registered among 47 people (27.3%), the average score was 27.9+2.1; significant violations of motor activity (0-20 points) occurred among 38 people (22.1%), the average score was 13.2+1.4. These findings are in agreements with previously published work (5, 7, 10)

It turned out that the violations of motor activity are formed both due to gait and stability disturbances and disturbances (Figure 1).

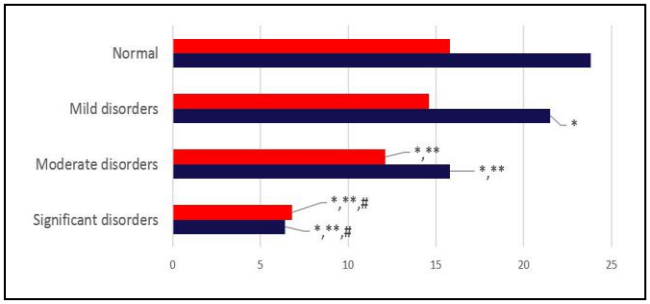

Figure 1. Assessment of stability and gait indicators among elderly patients with a subacute functional deficit (in points) 6 months after treatment
red colour - gait indicators blue colour - stability indicators
**P*<0.05 as compared with the patients who have regular motor activity,
** *P*<0.05 as compared with the patients who have a mild motor impairment,
\# *P*<0.05 as compared with the patients who have significant motor impairment

Thus, among the patients with normal indices of motor activity, the indices of stability were 23.8+0.2 points and gait -15.8+0.1 points. Among the patients with mild impairments of motor activity, the indices of stability were 21.5+0.3 points and gait -14.6+0.2 points. Among the patients with moderate impairment of motor activity, the indices of stability were 15.8+1.1 points and gait -12.1+1.4 points. Among the patients with significant impairment of motor activity, the indices of stability were 6.4+0.4 points and gait -8+0.3 points. The increase of motor activity impairments, in general, was indeed (*P*<0.05) associated with both impaired stability and gait impairments, and the impairments to stability began to be more important indeed earlier (*P*<0.05) than gait impairments. These findings are in agreements with previously published work (10-13)

The revealed violations of motor activity naturally led to a physical activity decrease among the patients (Table 1).

Table 1. Volumes of physical activity among elderly patients with subacute functional deficit 6 months after treatment

Volumes of physical activity, min/week	Patient groups (in terms of physical activity)			
	Normal indicators of physical activity	Mild movement disorders	Moderate impairment of motor activity	Significant violations of motor activity
Aerobic	172.2±4.5	132.2±4.1*	87.2±3.8*,**	67.2±3.9*,**,#
Anaerobic	62.3±2.8	31.1±3.3*	15.2±2.0*,**	13.0±2.8*,**
To train balance functions	24.2±1.5	12.2±3.2*	6.4±1.1*,**	5.8±0.7*,**

* $P<0.05$ as compared with the patients who have regular motor activity,
** $P<0.05$ as compared with the patients who have a mild motor impairment,
# $P<0.05$ as compared with the patients who have significant motor impairment

Thus, the volume of aerobic loads significantly ($P<0.05$) decreased from 172.2+4.5 min/week among the patients with normal physical activity to 132.2+4.1 min/week for mild disorders, 87.2+3.8 min/week for moderate disorders, and 67.2+3.9 min/week with significant impairment of motor activity. The volume of anaerobic loads ($P<0.05$) decreased significantly from 62.3+2.8 min/week among the patients with normal motor activity to 31.3+3.3 min/week for mild disorders, 15.2+2.0 min/week for moderate disorders, and 13.0+2.8 min/week with significant impairment of motor activity. The volume of loads for training the balance function decreased significantly ($P<0.05$) from 24.2+1.5 min/week among the patients with normal physical activity to 12.2+3.2 min/week among the patients with mild impairments, 6.4+1.1 min/week among the patients with moderate impairments, and 5.8+0.7 min/week among the patients with significant impairment of motor activity. These findings are in contrast with previously published work (13-15)

The falling syndrome was typical for those patients with subacute functional deficits who showed moderate and significant impairment of motor activity 6 months after treatment. Within 6 months after the treatment, the prevalence of falls among people with normal physical activity and with mild physical impairment remained statistically insignificant. Among the people with moderate and significant motor activity impairment, the syndrome's prevalence remained unfavourable within 6 months after the treatment. Thus, among the people with moderate motor activity disorders, a six-month prevalence of falls syndrome was noted among 59.6 per 100 people and with significant ones -92.1 per 100 people. Thus, reduced volumes of physical activity among people with fall syndrome and fear of the first and repeated falls led to a progressive loss of muscle strength.

The indices of the absolute and relative moments of muscle strength in the lower extremities were analyzed among elderly patients with subacute functional deficits 6 months after the treatment. Thus, with mild impairments of motor activity, the difference in the indices of the absolute and relative maximum moments of muscle strength in the lower extremities was statistically insignificant as compared to the people with regular motor activity and amounted to (-3.4) +0.3% and (-3.0)+0.3%, respectively. However, with the motor activity disorder increased, these indicators worsened progressively ($P<0.05$). Thus, among the elderly patients with moderate motor impairments, these deviations were (-28.6+2.4%) and (-29.6+3.1%), respectively ($P<0.05$) as compared to the people with mild motor impairments. Among the elderly patients with significant motor impairments, these deviations were (-48.3+3.2%) and (-49.6+4.4%), respectively ($P<0.05$) as compared with the people who have mild and moderate motor impairments.

Physical activity decrease also led to the deterioration of muscular strength indicators in the upper extremities.

Comparison of muscle strength loss rate in the upper and lower extremities ($P<0.05$) showed a considerably more negative trend concerning the loss of muscle strength in the lower extremities (Figure 2).

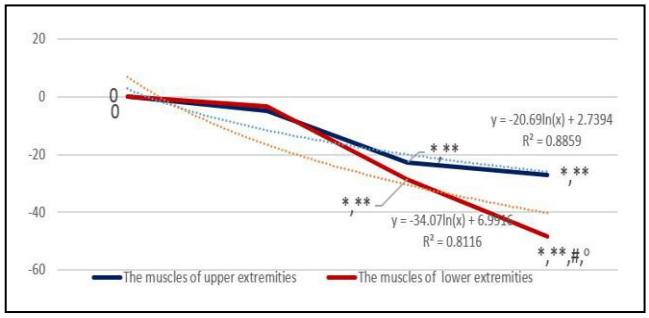

Figure 2. Rates of muscle strength loss among elderly patients with subacute functional deficit 6 months after treatment (in %)
* *P*<0.05 as compared with the patients who have regular motor activity;
** *P*<0.05 as compared with the patients who have mild motor impairment;
# *P*<0.05 as compared with the patients who have significant motor impairment;
op<0.05 compared to the rate of muscle strength loss in the upper limbs.

In particular, among the people with significant disorders of motor activity, the indicator showed muscle strength loss in the lower extremities by 48.3+3.2% and in the upper extremities by 27.1+3.1% (*P*<0.05).

Thus, fall syndrome among elderly people with the subacute functional deficit was the predictor of rehabilitation potential (muscle strength) and rehabilitation prognosis (normalization of movement function) decrease according to the following pathological circular mechanism: fall → fear of falling again → physical activity reduction → muscle strength reduction in lower extremities → formation of motor activity disorders in the form of stability and gait disorders → increased risk of repeated falls (12). Geriatric status among elderly patients with subacute functional deficit differed depending on the presence/absence of motor activity disorders and the most subacute functional deficit (13).

In relation to morale, the following data were obtained. Among the people with normal motor activity indicators (without a subacute functional deficit), the indicator of morale was 30.4+2.8 points according to the Philadelphia Geriatric Moral Status Scale; this indicator did not differ significantly (*P*>0.05) and was 32.3+3.4 points at mild motor impairments. But this indicator was significantly worse at moderate and significant violations of motor activity (6). Among the patients with moderately impaired motor activity, it was 56.8+4.9 points (*P*<0.05 as compared to the patients with normal motor activity and with mild impairments), among the patients with significant impairments, it made 60.2+4.8 points (*P*<0.05 as compared to the patients with normal motor activity and with mild impairments) (Figure 3).

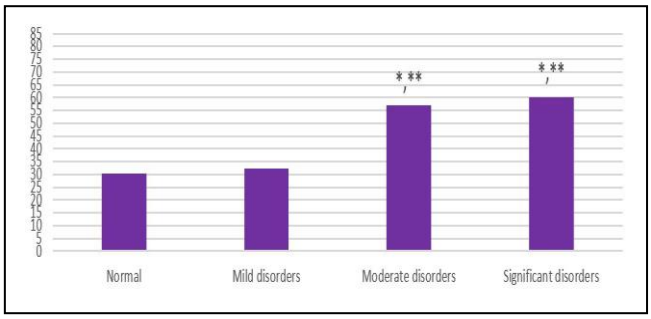

Figure 3. Assessment of morale among elderly patients with subacute functional deficits according to the Philadelphia geriatric scale of moral status (in points), depending on the degree of motor activity impairment
* *P*<0.05 as compared to the patients with normal motor activity,
** *P*<0.05 as compared to the patients with mild motor impairment

On average, the patients with normal indicators of physical activity and with mild impairments were in a good morale zone, and the patients with moderate and significant impairments were in a satisfactory moral zone. Similar patterns were observed for sleep disorders. Among the people with normal motor activity indices, the sleep quality indicator was 8.4+0.4 points according to the inverse VAS scale; at mild motor activity disorders, this indicator did not differ significantly (*P*>0.05) and was 8.3+0.6 points. However, this indicator was significantly worse with moderate and significant motor activity violations. Among the patients with moderately impaired motor activity, it was 5.7+0.3 points (*P*<0.05) as compared to the patients with normal motor activity and with mild impairments), among the patients with significant impairments -5.2+1.0 points (*P*<0.05) as compared to

the patients with normal motor activity and with mild impairments. Even though the patients with dementia levels of cognitive disorders were excluded from the study, there were significant differences in the level of cognitive abilities depending on the degree of motor activity impairment. Thus, among the people with normal indicators of physical activity, the indicator of cognitive ability level made 28.1+0.8 points on the MMSE scale, with mild impairments of physical activity, this indicator did not differ significantly (P>0.05) and amounted to 28.2+0.7 points. With moderate impairment of motor activity, they observed an insignificant (P>0.05) tendency towards cognitive ability reduction to 26.9+0.6 points. But among the patients with significant impairments, the level of cognitive abilities was 25.6+1.0 points (P<0.05) compared to those with regular motor activity and mild impairments.

The following data were obtained concerning depression levels. Among the people with normal indices of motor activity, the indicator of morale made 5.8+1.4 points according to the Beck scale, with mild impairments of motor activity, this indicator did not differ significantly (P>0.05) and amounted to 6.0+1.8 points. However, this indicator was significantly worse with moderate and significant motor activity violations. Among the patients with moderately impaired motor activity, it was 11.0+1.9 points (P<0.05 as compared to the patients with normal motor activity and with mild impairments), among the patients with significant impairments -14.9+1.2 points (P<0.05) as compared to the patients with normal motor activity, with mild and moderate impairments. On average, the patients with normal indices of physical activity and those with mild impairments were in the no depression zone, the patients with moderate impairments were in the subdepression zone, and the patients with significant impairments were at the boundaries of subdepression and moderate depression.

On average, the patients with normal indices of physical activity and mild impairments were in a low level of constitutional and situational anxiety. The patients with moderate impairments were in the zone of an average level of constitutional anxiety and a high level of situational anxiety. The level of situational anxiety was truly higher (P<0.05) among the patients with significant impairment of motor activity than in moderate ones. It can be stated that fall syndrome was a trigger for people with an increased level of constitutional anxiety, the formation of a high level of situational anxiety, which led to an even greater fear of falls, which ultimately resulted in physical activity reduction (3-6).

As for the study of nutritional status, it should be noted that there were no cases of malnutrition syndrome in our study (4). However, it should be noted that moderate and significant impairments in motor activity were associated with the risk of malnutrition syndrome development. Thus, out of 45 people with normal indicators of physical activity, 42 people had a normal nutritional status (93.3%), the risk of malnutrition syndrome development was observed among 3 people (6.7%); out of 42 people with mild motor activity disorders, 40 people had a normal nutritional status (95.2%), the risk of developing malnutrition syndrome -2 people (4.8%); out of 47 people with moderate motor activity disorders, 25 people had a normal nutritional status (53.2%), the risk of developing malnutrition syndrome -22 people (46.8%); out of 38 people with significant motor activity disorders, 12 people had a normal nutritional status (31.6%), the risk of developing malnutrition syndrome -26 people (68.4%).

Thus, the clinical manifestations of subacute functional deficit among elderly patients were such geriatric syndromes as anxiety, depression, cognitive decline, sleep disturbances, hypomobility, dynapenia, the risk of malnutrition syndrome, and falls syndrome development (1, 4).

The presence of a subacute functional deficit develops an unfavourable cascade of geriatric syndromes in the form of situational anxiety level increase from 21.9-24.8 to 58.4-75.3 points according to the Spielberger-Khanin scale, the deterioration in morale with

depression severity increase from 5.8-6.0 to 11.0-14.9 points, quality of sleep decrease on a ten-point visual analogue scale from 8.3-8.4 to 5.2-5.7 points according to the Beck scale, the proportion of patients increases with a risk of malnutrition syndrome development from 4.8-6.7% to 46.8-68.4%, the development of falls syndrome, which, in its turn, is a predictor of dynapenia development in the form of the substantial decrease in the upper extremities by 22.7-27.1%, the decrease of strength in the lower extremities by 29.6-49.6% with an outstripping rate of the substantial decrease in the lower extremities by 1.8 times as compared with the upper extremities, which, accordingly, reduces the rehabilitation potential.

Authors' Contribution

Study concept and design: K. I. P. and L. V. T.
Acquisition of data: T. V. E. and E. I. K.
Analysis and interpretation of data: A. N. I.
Drafting of the manuscript: L. I. P.
Critical revision of the manuscript for important intellectual content: K. I. P.
Statistical analysis: E. I. K.
Administrative, technical, and material support: T. V. E.

Ethics

The study design was approved by the ethics committee of Belgorod State University, 85, Pobedy St., Belgorod, 308015, Russia. Each subject signed an informed consent before participating to the study

Conflict of Interest

The authors declare that they have no conflict of interest.

References

1. Geremew TT, Gezie LD, Abejie AN. Geographical variation and associated factors of childhood measles vaccination in Ethiopia: a spatial and multilevel analysis. BMC Public Health. 2019;19(1):1-15.
2. Sanchis J, Ruiz V, Bonanad C, Valero E, Ruescas-Nicolau MA, Ezzatvar Y, et al., editors. Prognostic value of geriatric conditions beyond age after acute coronary syndrome. Mayo Clin Proc. 2017.
3. Tandon P, Berzigotti A, editors. Management of lifestyle factors in individuals with cirrhosis: A pragmatic review. Seminars in liver disease; 2020: Thieme Medical Publishers.
4. Xu N, Wang D, Liu J. Variance of zein protein and starch granule morphology between corn and steam flaked products determined starch ruminal degradability through altering starch hydrolyzing bacteria attachment. Animals. 2019;9(9):626.
5. Cornelissen G, Otsuka K. Chronobiology of aging: a mini-review. Gerontology. 2017;63(2):118-28.
6. Dukas L, Schacht E, Runge M. Independent from muscle power and balance performance, a creatinine clearance below 65 ml/min is a significant and independent risk factor for falls and fall-related fractures in elderly men and women diagnosed with osteoporosis. Osteoporos Int. 2010;21(7):1237-45.
7. American Geriatrics Society Beers Criteria® Update Expert Panel, Fick DM, Semla TP, Steinman M, Beizer J, Brandt N, et al. American Geriatrics Society 2019 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. J Am Geriatr Soc. 2019;67(4):674-94.
8. Walston J, Hadley EC, Ferrucci L, Guralnik JM, Newman AB, Studenski SA, et al. Research agenda for frailty in older adults: toward a better understanding of physiology and etiology: summary from the American Geriatrics Society/National Institute on Aging Research Conference on Frailty in Older Adults. J Am Geriatr Soc. 2006;54(6):991-1001.
9. Cabral HWS, Andolphi BFG, Ferreira BVC, Alves DCF, Morelato RL, Chambo Filho A, et al. The use of biomarkers in clinical osteoporosis. Rev Assoc Med Bras. 2016;62:368-76.
10. Lin H-H, Huang C-Y, Hwang L-C. Association between metabolic syndrome and osteoporosis in Taiwanese middle-aged and elderly participants. Arch Osteoporos. 2018;13(1):1-7.
11. Hodge JM, Collier FM, Pavlos NJ, Kirkland MA, Nicholson GC. M-CSF potently augments RANKL-induced resorption activation in mature human osteoclasts. PloS One. 2011;6(6):21462.
12. Russell MK. Functional assessment of nutrition status. Nutr Clin Pract. 2015;30(2):211-8.

13. Szucs TD, Stoffel AW. Nutrition and health--Why payors should get involved. Nutrition. 2016;32(5):615.
14. Inoue T, Misu S, Tanaka T, Kakehi T, Ono R. Acute phase nutritional screening tool associated with functional outcomes of hip fracture patients: A longitudinal study to compare MNA-SF, MUST, NRS-2002 and GNRI. Clin Nutr. 2019;38(1):220-6.
15. Ng TP, Nyunt MSZ, Gao Q, Wee SL, Yap P, Yap KB. Elderly Nutritional Indicators for Geriatric Malnutrition Assessment (ENIGMA): Development and validation of a nutritional prognostic index. Clin Nutr ESPEN. 2017;22:54-63.