

# Metabolic age and obesity types and their influence on renal graft function and comorbidities in patients after kidney transplantation



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## Introduction and aims:

Overweight and obesity are civilization diseases recognised as chronic diseases. Two types of obesity are distinguished: android (central, abdominal) and gynoid (gluteo-femoral, peripheral). Metabolic age is a reflection of physical health in the form of a calculation based on the base metabolic rate (BMR). If someone's metabolic age is lower than his or her actual age, it suggests that the body is in good health, while a metabolic age which is higher than the actual age indicates that someone may be experiencing health problems. It is a new term used in the health and fitness industry to describe overall fitness and metabolic activity.

An attempt was made to evaluate obesity and metabolic age influence on a function of a transplanted kidney, and on presence of other diseases in the studied group.

## Methods:

The study covered 108 patients (50 females, 58 males, aged 52.15±14.25 years) with a functioning kidney graft, more than 3 months after the transplantation procedure. Body composition was assessed using the bioimpedance method (BIA) and anthropometric measurements. Their basic metabolic rate (BMR), muscular tissue weight, total body water and fat content were estimated, all being factors contributing to the metabolic age. Information on physical activity was collected during the interview. The nutritional status and the obesity type were determined with the Waist to Height Ratio (WHtR) and the Waist to Hip Ratio (WHR). A function of the transplanted kidney was evaluated by calculating the estimated glomerular filtration rate (eGFR) using the MDRD formula.

## Results:

From the study group 18.44% of patients were found to be underweight, 21.37% of participants had a correct body weight, and 11.11% of them were overweight, while the remaining had obesity (49.08%). Patients with the android shape have lower eGFR as compare with those with the gynoid type (p=0.004). Patients with higher metabolic age, had the lower eGFR (p<0.001). Metabolic age of patients with overweight and obesity is an average 13 years higher in comparison with metabolic age of people with correct body weight. Hypertension and atherosclerosis are more often found in patients of the android shape, while diseases of the osteoarticular system prevail in those with the gynoid body type (p<0.05). Significant correlation was found between a high metabolic age and incorrect dietary habits in patients eating highly processed food, containing low vegetables (p<0.005).

eGFR [ml/min]	Android shape		Gynoid shape		p
	n	%	n	%	
<30	8	15,09%	0	0,00%	p=0,004
31-60	45	84,91%	9	75,00%	
>60	0	0,00%	3	25,00%	

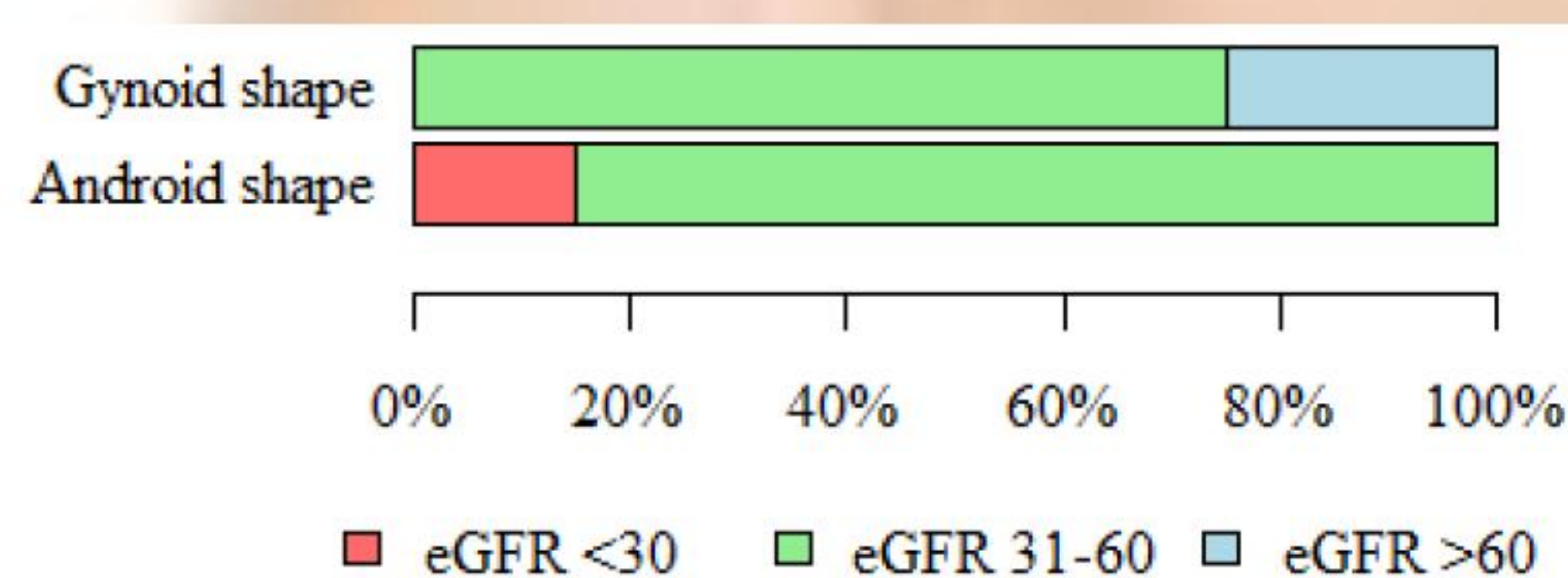


Table 1. Obesity type (WHR) and eGFR

Prevalent diseases	Android shape		Gynoid shape		p
	n	% *	n	% *	
Hypertension	50	94,34%	6	50,00%	p=0,001
Diabetes	21	39,62%	3	25,00%	p=0,511
Atherosclerosis	39	73,58%	1	8,33%	p<0,001
Cardiovascular diseases	25	47,17%	2	16,67%	p=0,102
Varices	15	28,30%	7	58,33%	p=0,087
Osteoarticular diseases	8	15,09%	9	75,00%	p<0,001
Hypothyroidism	18	33,96%	1	8,33%	p=0,093

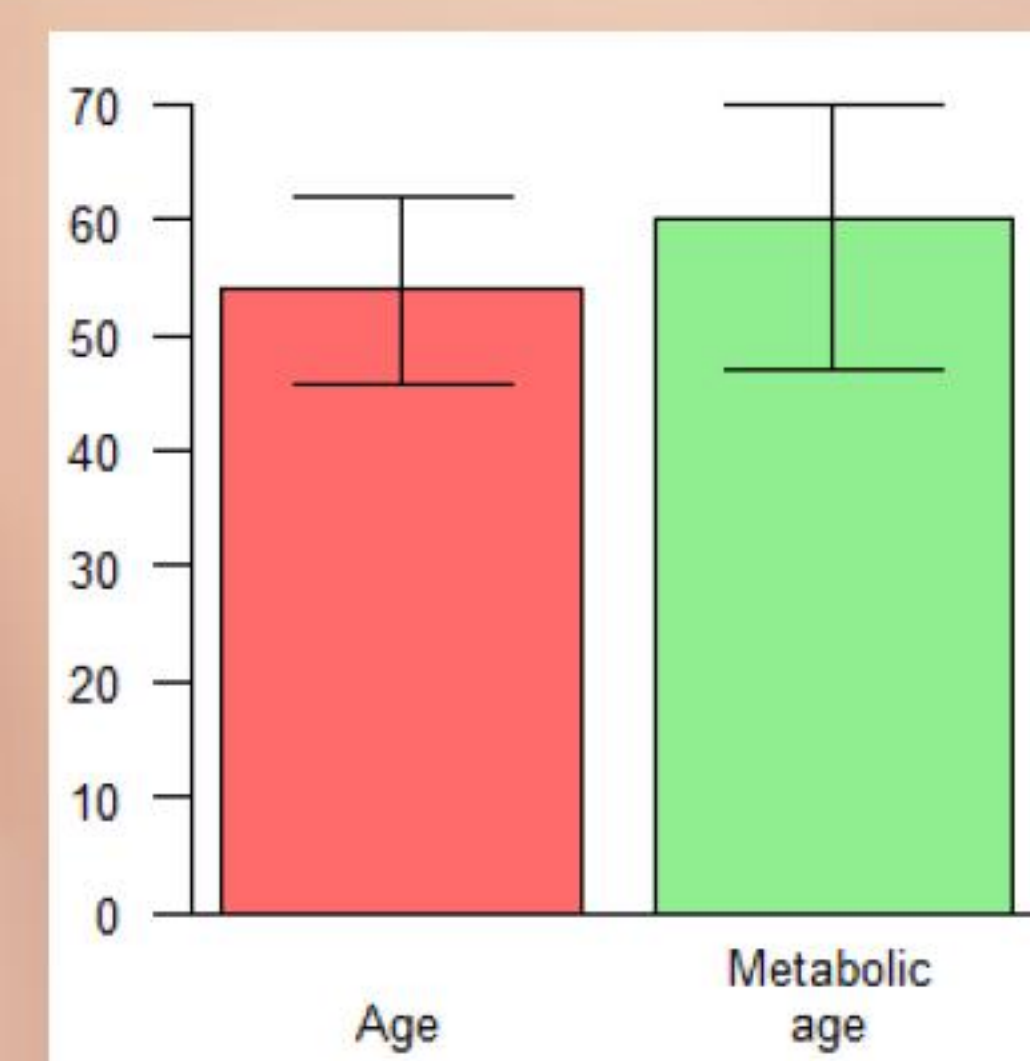
Table 2. Obesity type and diseases

eGFR [ml/min]	Metabolic age							p	post-hoc
	Average	SD	Median	Min	Max	Q1	Q3		
<30	72,25	12,76	77	42	80	72,25	79,25	p<0,001	a
31-60	60,84	15,37	62	18	92	55	70		b
>60	44,52	16,33	44	16	80	33	55		c

Table 3. Metabolic age and eGFR

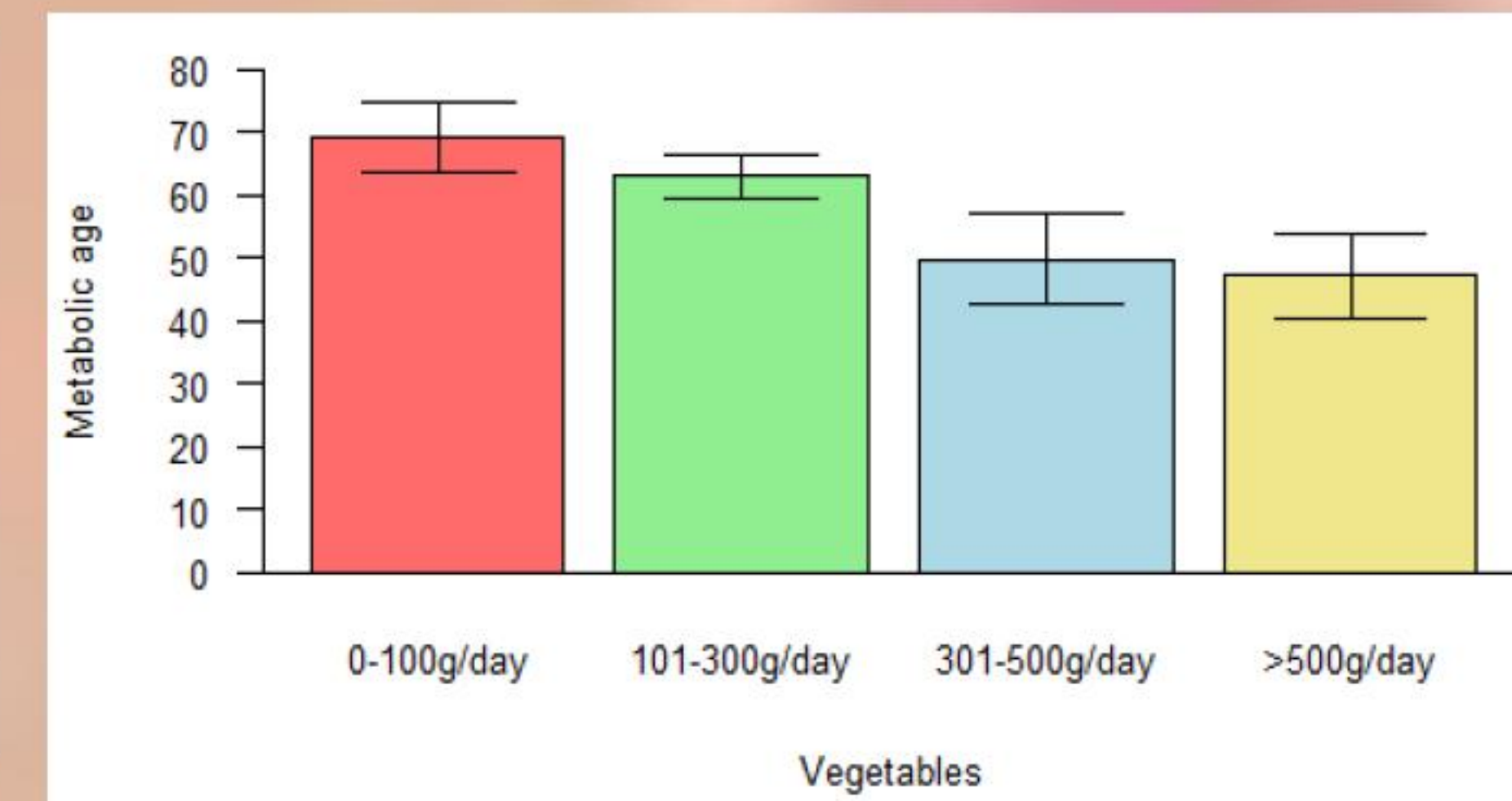
Age [years]	Average	SD	Median	Min	Max	Q1	Q3	p
Chronological	52,15	14,25	54	18	87	45,75	62	p<0,001
Metabolic	57,6	17,35	60	16	92	47	70	

Table 4. Metabolic age and chronological age



Vegetables [g]	Metabolic age							p	post-hoc *
	Average	SD	Median	Min	Max	Q1	Q3		
0-100g/day	69,04	14,14	72	37	92	60	80	p<0,001	a
101-300g/day	62,88	10,95	63	40	82	60	70		a
301-500g/day	49,74	18,75	52	16	80	38,5	65		b
>500g/day	47,09	16,78	47	18	80	35,5	58		b

Table 5. Vegetables intake and metabolic age



## Conclusions:

Reduced glomerular filtration in patients with obesity, overweight and high metabolic age can indicate on negative influence of overnutrition on kidney function. Android obesity is a predictive factors for atherosclerosis, hypertension and related cardiovascular diseases; therefore, appropriate dietary and pharmacological treatment together with physical exercises adjusted to current physical status of the patient are necessary. A high metabolic age and obesity increase a risk of impaired renal function.

