

IMPACT OF NUTRITIONAL STATUS ON SKIN AUTOFLUORESCENCE IN HAEMODIALYSIS PATIENTS

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Introduction

Skin autofluorescence (SAF), a measurement of skin accumulation of advanced glycation end-products (AGEs), has been reported to be an independent predictor of survival in haemodialysis (HD) patients but the mechanism of this association is not completely understood. AGEs are uremic toxins rapidly formed during oxidative stress which is associated with systemic inflammation. AGEs are also formed in food and ~10% of the ingested AGEs are absorbed. Oxidative stress and inflammation have been implicated in the development of malnutrition which has also been strongly associated with cardiovascular mortality in dialysis patients.

Methods

AIM: to investigate the impact of several nutritional factors as potential determinants of SAF.

ASSESSMENTS:

- SAF measured using a validated Autofluorescence Reader (AGE Reader, DiagnOptics).



- Dietary AGE intake assessed with a validated food frequency questionnaire.
- Energy, fat and protein intake were also assessed, as well as handgrip strength (HGS), mid-arm muscle circumference (MAMC) and routine biochemical variables.
- 7-point scale Subjective Global Assessment (SGA) was performed to evaluate nutritional status.

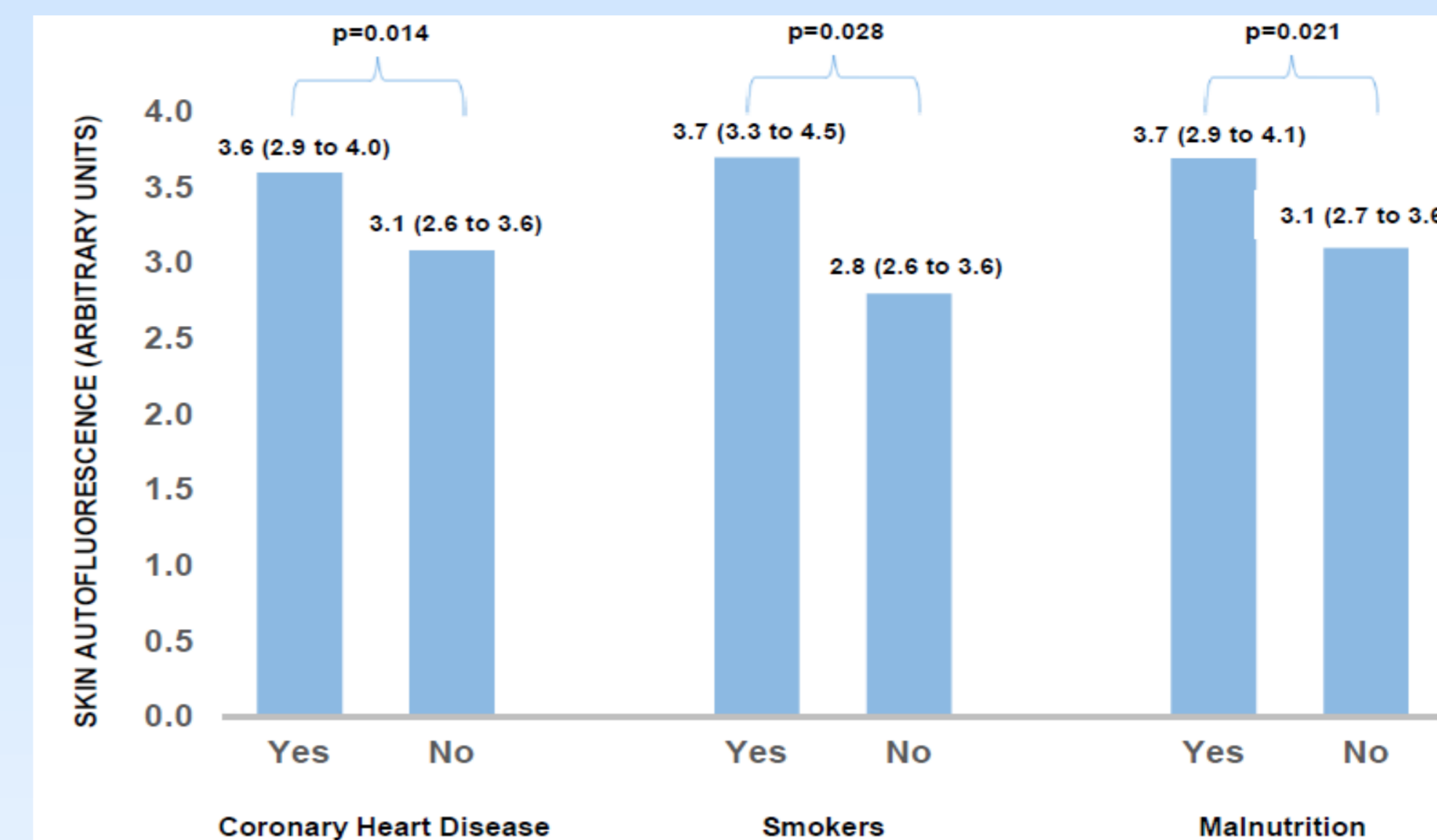
Results

Table 1. Demographic characteristics including biochemical and clinical data.

VARIABLE	ALL (n=76)	VARIABLE	ALL (n=76)
Age (years)	68.0 (IQR 56.0 to 75.7)	Dietary AGE intake (kilounits/day)	12920.3 (9140.3 to 16984.0)
Diabetes [n (%)]	29 (38.2)	Energy intake (kcal/kg/day)	20.1 (16.0 to 24.0)
Coronary heart disease [n (%)]	36 (47.47)	Protein intake (g/kg/day)	0.8 (0.6 to 1.0)
Obesity [n (%)]	29 (38.2)	Handgrip strength (kg)	20.6 (12.7 to 29.3)
Current smoking [n (%)]	9 (11.8)	Albumin (g/L)	33.0 (31.0 to 35.7)
Malnutrition [n (%)]	30 (39.5)	C reactive protein (mg/L)	11.0 (5.0 to 30.0)
Dialysis vintage (months)	38.0 (18.2 to 71.7)	Serum corrected calcium (mmol/L)	2.4 (2.3 to 2.5)
SAF (Arbitrary units)	3.3 (2.7 to 3.8)	Total cholesterol (mmol/L)	3.6 (3.1 to 4.5)

Results

Figure 1. Factors associated with increased skin autofluorescence levels.



SAF was significantly higher in patients with prior coronary heart disease (CHD), in current smokers and in malnourished patients (Figure 1).

Table 2. Univariable correlations between skin autofluorescence and clinical, nutritional and biochemical parameters.

	Dialysis vintage	Serum albumin	Serum cholesterol	C reactive protein	Handgrip strength	Energy intake	Protein intake	Fat intake	Dietary AGE intake
SAF									
r	0.287	-0.353	-0.250	0.255	-0.304	-0.304	-0.317	-0.264	-0.270
p value	0.012	0.002	0.013	0.034	0.010	0.008	0.005	0.021	0.018

Malnutrition was more evident in patients with CHD. Energy and fat intake, MAMC and HGS were significantly lower in patients with malnutrition compared to well-nourished patients (Table 3).

Table 3. Factors associated with malnutrition

FACTOR	MALNUTRITION		p Value
	YES	NO	
Coronary Heart Disease (n)			
Yes	21	15	0.002
No	9	31	
Energy intake (kcal/kg/day)	19.3 (14.5 to 21.7)	20.7 (17.9 to 26.1)	0.046
Fat intake (g/day)	49.6 (35.5 to 61.7)	60.8 (44.6 to 85.1)	0.031
Handgrip strength (kg)	17.0 (10.3 to 27.6)	22.8 (15.5 to 30.8)	0.049
Mid-arm muscle circumference (cm ²)	23.2 (20.8 to 26.0)	26.5 (24.8 to 29.7)	0.001

Multiple linear regression analysis showed that dialysis vintage, current and previous history of smoking, lower HGS and lower protein intake were independent predictors of increased SAF levels, but energy intake and AGE intake were not (Table 4).

Table 4. Determinants of skin autofluorescence in multiple linear regression analysis

VARIABLE	Dependent	Independent	β	p Value
	Ever smoked	0.293	0.006	
	Handgrip strength	-0.236	0.038	
	Protein intake	-0.237	0.024	

Conclusion

Malnutrition is a frequent complication in HD patients and was associated with elevated SAF levels, presence of CHD, low energy and fat intake and decreased HGS. The unexpected finding of an inverse relationship between SAF and dietary AGE intake is probably explained by the association of higher SAF with several markers of malnutrition. Ongoing follow-up of participants will investigate changes in SAF levels over time, one-year survival and the impact of a dietetic intervention to reduce SAF levels.

References

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