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Correlation between Dental Status and Nutritional-Blood-Markers in the Elderly

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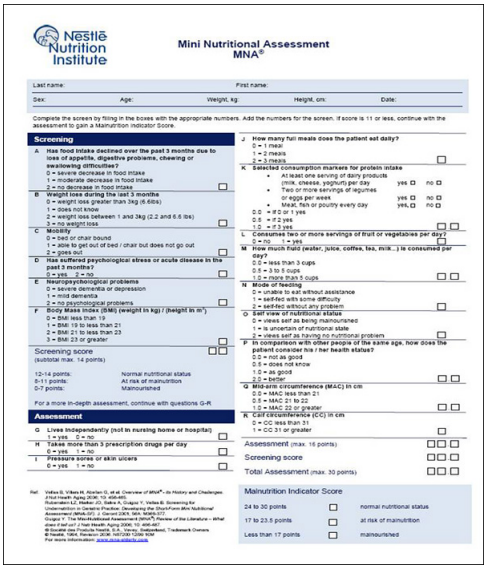
Introduction

It is long known that the selection of nutritional items is affected by the dental status. However there is little information whether this is also reflected in nutritional-blood-markers due to a change in nutritional habits.

Objectives

Thus it was the aim of this clinical study to evaluate a potential correlation between the dental status and selected nutritional-blood-markers in elderly patients. The following null hypothesis was tested: The dental status does not affect the blood-markers a) folate, b) albumin, c) lymphocytes and d) cobalamin.



Mini Nutritional Assessment
MNA®

Last name: First name:
Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers. Add the numbers for the screen. If score is 11 or less, continue with the assessment to gain a Malnutrition Indicator Score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3kg (6.6lbs)
1 = does not know
2 = weight loss between 1 and 3kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F Body Mass Index (BMI) (weight in kg) / (height in m²)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

Screening score
(subtotal max. 14 points)

12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished

For a more in-depth assessment, continue with questions G-R

Assessment

G Lives independently (not in nursing home or hospital)
1 = yes 0 = no

H Takes more than 3 prescription drugs per day
0 = yes 1 = no

I Pressure sores or skin ulcers
0 = yes 1 = no

J How many full meals does the patient eat daily?
0 = 1 meal
1 = 2 meals
2 = 3 meals

K Selected consumption markers for protein intake
- At least one serving of dairy products (milk, cheese, yoghurt) per day: yes no
- Two or more servings of legumes or eggs per week: yes no
- Meat, fish or poultry every day: yes, no

0.0 = if 0 or 1 yes
0.5 = if 2 yes
1.0 = if 3 yes

L Consumes two or more servings of fruit or vegetables per day?
0 = no 1 = yes

M How much fluid (water, juice, coffee, tea, milk...) is consumed per day?
0.0 = less than 3 cups
0.5 = 3 to 5 cups
1.0 = more than 5 cups

N Mode of feeding
0 = unable to eat without assistance
1 = self-fed with some difficulty
2 = self-fed without any problem

O Self view of nutritional status
0 = views self as being malnourished
1 = is uncertain of nutritional state
2 = views self as having no nutritional problem

P In comparison with other people of the same age, how does the patient consider his / her health status?
0.0 = not as good
0.5 = does not know
1.0 = as good
2.0 = better

Q Mid-arm circumference (MAC) in cm
0.0 = MAC less than 21
0.5 = MAC 21 to 22
1.0 = MAC 22 or greater

R Calf circumference (CC) in cm
0 = CC less than 31
1 = CC 31 or greater

Assessment (max. 16 points)
Screening score
Total Assessment (max. 30 points)

Malnutrition Indicator Score
24 to 30 points: normal nutritional status
17 to 23.5 points: at risk of malnutrition
Less than 17 points: malnourished

Fig. 1: Mini Nutritional Assessment

Material and Methods

Eighty elderly inpatients of the Department of Geriatrics (Bonifatius Hospital Lingen/Ems, Germany) (minimum age 60 years) were included in the study (approval by the Ethics Committee JLU Giessen, AZ 191/09). The assessment comprised the dental status (score 1: no treatment necessary to 4: treatment obligatory), the Mini Nutritional Assessment (MNA, score 0: normal nutritional status, 1: at risk of malnutrition, 2: malnourished, Fig. 1) and the blood-markers folate, albumin, lymphocytes and cobalamin. Additionally a masticatory function test (comminution of a slice of carrot, diameter 2cm and height 1cm, chewing time 45s, score 1: excellent comminution to 6: comminution impossible, Fig. 2 and Tab. 1) was carried out. For statistical analysis (SPSS 17.0) of normally distributed data Oneway Anova was used; otherwise a Kruskal-Wallis H-test was applied. Additionally a Spearman regression for the dental status and the masticatory function test was calculated.

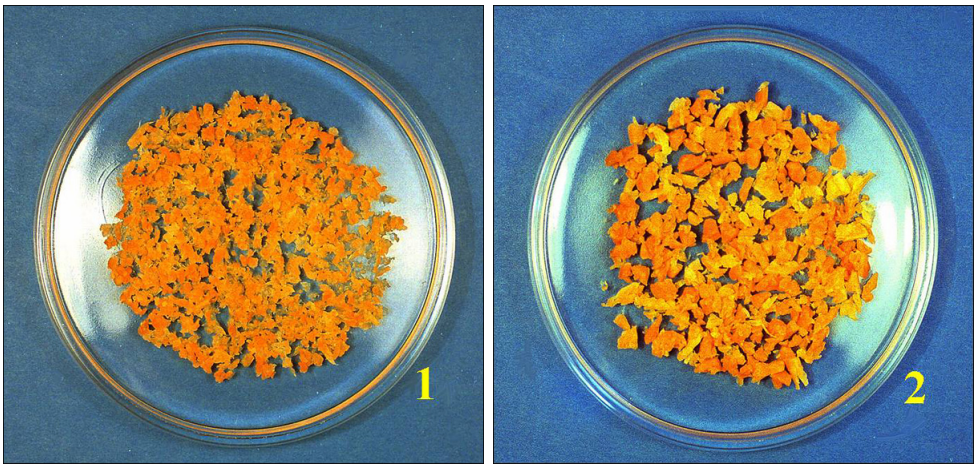


Fig. 2a-b: Masticatory function test (comminution)

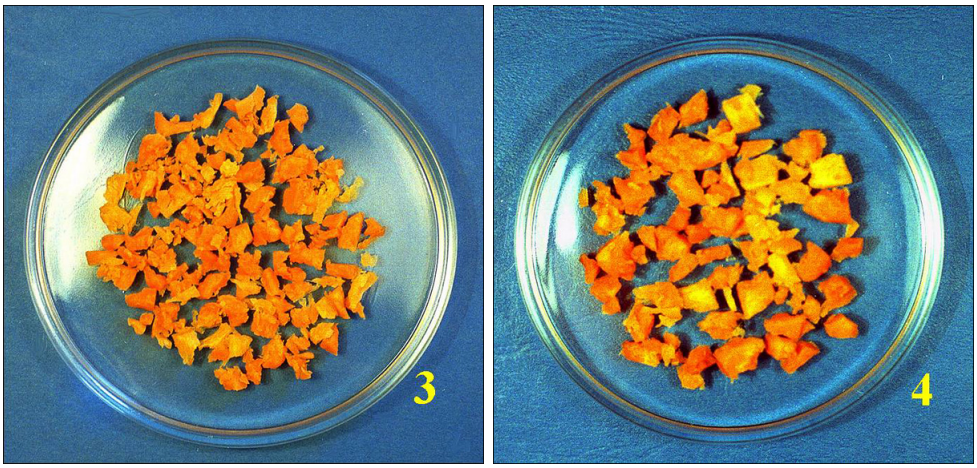


Fig. 2c-d: Masticatory function test (comminution)

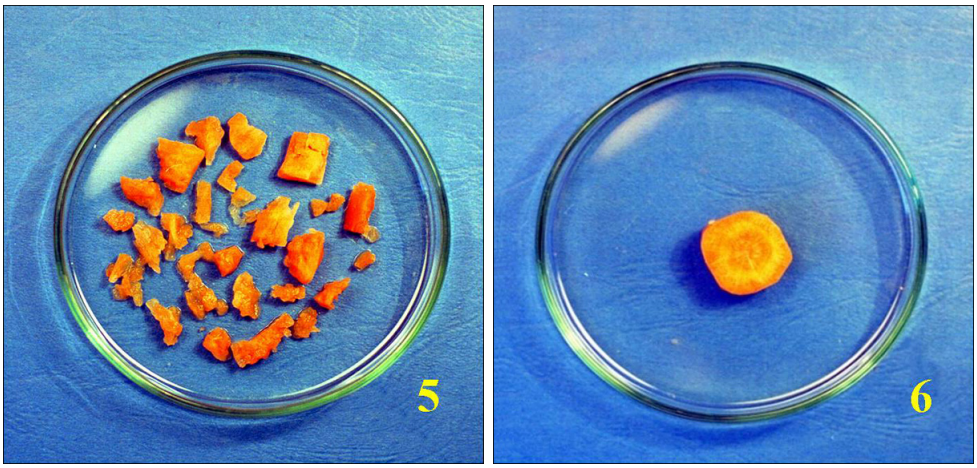


Fig. 2e-f: Masticatory function test (comminution)

score	**comminution**
1	excellent
2	good
3	medium
4	moderate
5	poor
6	impossible

Tab. 1: Masticatory function test (scores)

Results

The mean score (Mean ± StD) for the dental status was 3.0 ± 0.8 and 0.8 ± 0.6 for the MNA (Tab. 2). There was a significant correlation (Spearman, $p < 0.05$) between dental status and the masticatory function test (3.8 ± 1.6) (Fig. 3) as well as albumin. However, no correlation between dental status and the MNA, folate (7.0 ± 3.7 ng/ml), lymphocytes (2.6 ± 0.7 giga/l) or cobalamin (394.9 ± 270.9 pg/ml) could be observed. Thus only the part b of the null hypothesis could be rejected.

dental status	masticatory function test	MNA	folate [ng/ml]	albumin [g/dl]	lymphocytes [giga/l]	cobalamin [pg/ml]
standard values			4.6-18.7	5.5-6.9	1.0-4.8	197-866
1	1.5±0.7	0±0	5.2±1.1	2.5±1.0	19.0±0	354.6±9.3
2	2.5±1.2	0.7±0.5	7.2±4.2	3.5±0.4	23.7±8.1	412.1±342.7
3	3.6±1.2	0.8±0.6	7.4±3.7	3.3±0.5	26.6±7.6	421.8±279.4
4	5.5±0.7	1.0±0.5	6.5±3.6	3.2±0.4	27.4±7.6	340.0±186.2
overall	3.8±1.6	0.8±0.6	7.0±3.7	3.3±0.5	25.8±7.7	394.9±270.9

Tab. 2: Dental status, masticatory function test, MNA and blood-markers (Mean ± StD)

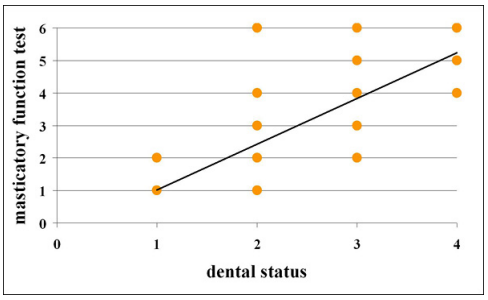


Fig. 3: Dental status and masticatory function test. The line represents the Spearman regression.

Conclusions

Since all folate, lymphocytes and cobalamin mean values are within the normal range and all albumin mean values were below the normal range regardless of the dental status it complicates the statement of a correlation between dental status and blood-markers. As multimorbidity and thus multimedication is typical for elderly people our data may be influenced otherwise. Though patients with known problems in their reported history were excluded from the study, probably some were not aware of their status and did not fully report.

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1. Sahyoun NR, Lin CL, Krall E. Nutritional status of the older adult is associated with dentition status. J Am Diet Assoc 2003; 103:61-66.
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Poster Faksimile:

Correlation between Dental Status and Nutritional-Blood-Markers in the Elderly

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1 Objectives

It is long known that the selection of nutritional items is affected by the dental status[1,2,3,4]. However there is little information whether this is also reflected in nutritional-blood-markers due to a change in nutritional habits. Thus it was the aim of this clinical study to evaluate a potential correlation between the dental status and selected nutritional-blood-markers in elderly patients. The following null hypothesis was tested: The dental status does not affect the blood-markers a) folate, b) albumin, c) lymphocytes and d) cobalamin.

2 Materials & Method

Eighty elderly inpatients of the Department of Geriatrics (Bonifatius Hospital Lingen/Ems, Germany) (minimum age 60 years) were included in the study (approval by the Ethics Committee JLU Giessen, AZ 191/09). The assessment comprised the dental status (score 1: no treatment necessary to 4: treatment obligatory), the Mini Nutritional Assessment (MNA[5,6,7], score 0: normal nutritional status, 1: at risk of malnutrition, 2: malnourished, Fig.1) and the blood-markers folate, albumin, lymphocytes, and cobalamin. Additionally a masticatory function test (comminution of a slice of carrot, diameter 2cm and height 1cm, chewing time 45s, score 1: excellent comminution to 6: comminution impossible, Fig.2 and Fig.3) was carried out. For statistical analysis (SPSS 17.0) of normally distributed data Oneway Anova was used, otherwise a Kruskal-Wallis H-test was applied. Additionally a Spearman regression for the dental status and the masticatory function test was calculated.

Fig. 1: Mini Nutritional Assessment

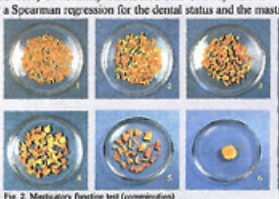

Fig. 2: Masticatory function test (comminution)

score	comminution
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Fig. 3: Masticatory function test (scores)

3 Results

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However, no correlation between dental status and the MNA, folate (7.0 ± 3.7 ng/ml), lymphocytes (2.6 ± 0.7 giga/l) or cobalamin (394.9 ± 270.9 pg/ml) could be observed. Thus only the part b of the null hypothesis could be rejected.

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Fig. 4: Dental status, masticatory function test, MNA and blood-markers (Mean ± StD).

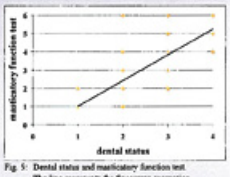

Fig. 5: Dental status and masticatory function test. The line represents the Spearman regression.

4 Discussion & Conclusion

Since all folate, lymphocytes and cobalamin mean values are within the normal range and all albumin mean values were below the normal range regardless of the dental status it complicates the statement of a correlation between dental status and blood-markers.

As multimorbidity and thus multimedication is typical for elderly people our data may be influenced otherwise. Though patients with known problems in their reported history were excluded from the study, probably some were not aware of their status and did not fully report.

However, within the limitations of the study it can be concluded that the dental status in elderly patients reflects itself in some of the tested nutritional-blood-markers. But the question whether the sole independent variable for the nutritional status is the dental status or which role other variables play (e.g. the socioeconomic status[8]) remains open.

5 References

1. Sahyoun NR, Lin CL, Krall J. Nutritional status of the older adult is associated with dentition status. J Am Diet Assoc. 2003; 103:61-66.
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