

Associations between Dentition Status, Nutritional Status, and the Eating Experience in Older Adults

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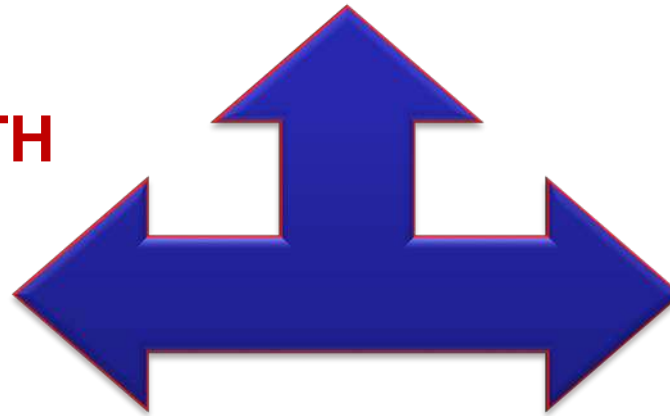
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Overarching Aim: To explore associations between nutritional status and dentition status in older adults AND explore the impact of impaired dentition on dietary intake and the eating experience



DIET AND NUTRITION

**SYSTEMIC HEALTH
& DISEASE**



**ORAL HEALTH
& DISEASE**

- Synergy between diet, nutrition, and integrity of the oral cavity in health and disease¹
- Older adults are at high risk for both impaired oral health and suboptimal nutritional status
 - ~ 30% worldwide and ~ 20% in the US are edentulous^{2,3}
 - ~ 50% malnourished or at risk of malnutrition (varies by setting)^{4,5}

Tooth Loss and Dietary Intake

- Oral cavity is the gateway to nutrient intake
 - Biting– primarily with anterior teeth
 - Chewing – primarily with posterior teeth
- Masticatory ability is influenced by:
 - Number and distribution of teeth
 - Occlusion (how the teeth fit together)
- Affects food choice and diet quality
 - Decreased consumption of fruit and vegetables, fiber, calcium, iron, and other vitamins.⁶⁻¹⁰



Systematic Review: Zelig et al, 2016¹¹

Among community dwelling older adults what are the associations between tooth loss & malnutrition risk (as measured by the MNA)?



5 of 8 studies found significant associations:

Fewer teeth and poorer occlusion were significantly associated with lower MNA score as compared to more teeth / better occlusion

Complete denture wearers had higher MNA scores than those who were edentulous without dentures but lower MNA scores than dentate controls

In partially dentate individuals, MNA scores improved with provision of removable partial dentures

PHASE 1: QUANTITATIVE RESEARCH

Phase 1 Aim: Explore associations between nutritional status (self-MNA), and tooth loss in older adults (≥ 65).

Hypothesis: Malnutrition risk be higher (lower Self-MNA scores) in those with fewer teeth / limited occlusion.¹¹



¹² Zelig R, Byham-Gray L, Singer SR, Hoskin ER, Fleisch Marcus A, Verdino G, Rigassio Radler D, Touger-Decker R. Dentition and Malnutrition Risk in Community-Dwelling Older Adults. *Journal of Aging, Research and Clinical Practice (JARCP)*, 2018;7:107-114.

Methodology

- Cross-sectional
- Conducted at the RSDM in Newark, New Jersey
- Sample: 107 adults aged ≥ 65 years , who came for care between June 1, 2015 - June 30, 2016
- Variables:
 - Dental: Number and location of teeth
 - Nutrition: Self-MNA (validated tool to measure malnutrition risk)
 - Confounders: other clinical and demographic variables

Mini Nutrition Assessment (MNA)

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	<input type="checkbox"/>
B Weight loss during the last 3 months 0 = weight loss greater than 3 kg (6.6 lbs) 1 = does not know 2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs) 3 = no weight loss	<input type="checkbox"/>
C Mobility 0 = bed or chair bound 1 = able to get out of bed / chair but does not go out 2 = goes out	<input type="checkbox"/>
D Has suffered psychological stress or acute disease in the past 3 months? 0 = yes 2 = no	<input type="checkbox"/>
E Neuropsychological problems 0 = severe dementia or depression 1 = mild dementia 2 = no psychological problems	<input type="checkbox"/>
F1 Body Mass Index (BMI) (weight in kg) / (height in m²) <input type="checkbox"/> 0 = BMI less than 19 1 = BMI 19 to less than 21 2 = BMI 21 to less than 23 3 = BMI 23 or greater	<input type="checkbox"/>

**Screening score
(max. 14 points)**

12-14 : **Normal**
 8-11 : **At risk of malnutrition**
 0-7 : **Malnourished**

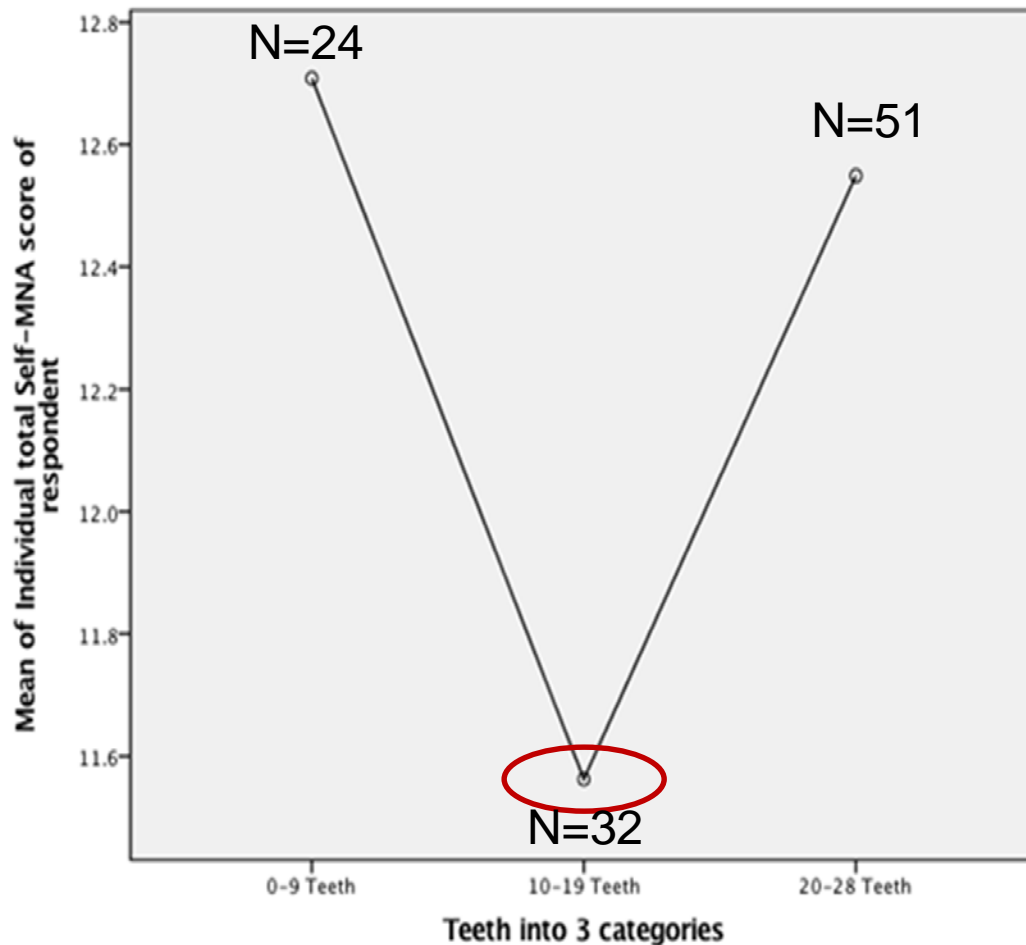
Subject Characteristics

~ 50% Male/Female

~ 37% Black or African American, ~ 32% White and 21% Hispanic

	Mean	SD	Range
Age	72.6	5.6	65.0 – 91.0
MNA Score	12.3	2.0	5.0 – 14.0
BMI	28.8	4.9	19.2 - 39.9
Number of Teeth	16.9	8.5	0.0 – 28.0

Figure 1: Mean Self-MNA Score in Relation to Dentition Categories



- No linear relationship between number of natural teeth and Self-MNA Score. ($r=0.104$, $p=0.285$)
- Those with 10-19 teeth had lower Self-MNA scores (mean=11.6, SD=2.5) than those with 0-9 teeth (mean=12.7, SD=1.3) or 20+ teeth (mean=12.6, SD=1.8), ($p=0.116$)
- Among those with 10-19 teeth the odds of being at risk for malnutrition/malnourished were 2.5 X those with 20+ teeth (OR=2.5, $p=0.076$)

Phase 1 Conclusions:

Majority of this sample of older adults were:

- Partially edentulous
- Overweight / obese
- Normal nutritional status

Those with 10 – 19 teeth were more likely to be at risk for malnutrition:

- Not statistically significant but trend may have clinically meaningful implications

Limitations:

- Small sample size
- Self reported MNA data

Future Research:

- Larger more heterogeneous sample
- Better understand the eating experience

PHASE 2: QUALITATIVE RESEARCH

Phase 2 Aim: Qualitatively assess for themes from interviews about the impact of impaired dentition on dietary intake & the eating experience

Hypothesis: tooth loss leads to adaptive and maladaptive eating behaviors, particularly in consumption of fruits, vegetables & other high fiber foods.¹³⁻¹⁴



Methodology

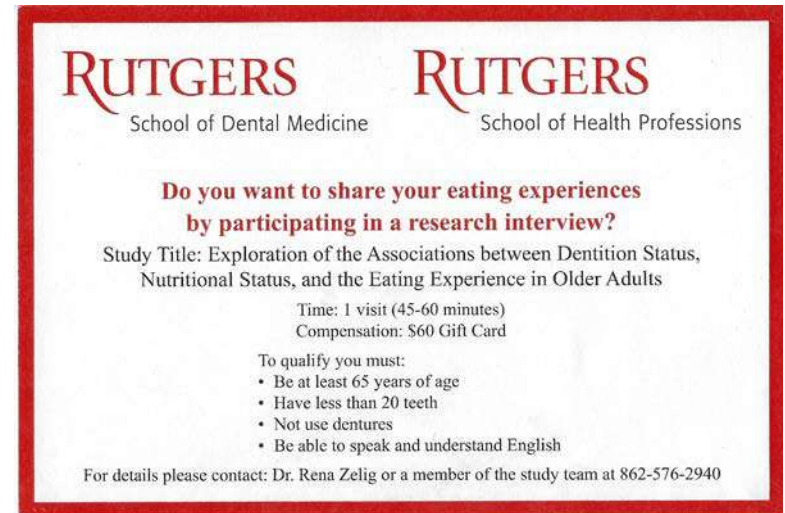
- Convenience sample of RDSM patients

- Inclusion Criteria:

- 65+ years of age
- < 20 teeth
- No dentures
- Speak and understand English

- Recruitment:

- Purposeful random sampling and direct marketing (postcards and calls)
- Flyers hung at RSDM
- Dental student and faculty referrals



Methodology

- In-depth semi-structured interviews conducted at RSDM
 - Interview guide was adapted from prior research^{13,14,15} and focused on:
 - **Eating experience** (impact of missing teeth on food preparation and intake)
 - **Eating related quality of life** ERQOL (social/emotional impacts of missing teeth)
- Consent – verbal and written
- Data collection
 - Demographic characteristics (interview and EHR)
 - Mini Nutrition Assessment-Short Form (MNA-SF) score
 - Anthropometrics (height and weight measured)
 - Number and location of teeth (EHR)
- Compensation: \$60
- Recorded and transcribed
- Thematic Analysis using NVivo 11

Demographic and Clinical Characteristics (N=19)

~ 52.6% Female

~ 63% Black or African American, ~ 32% White and 5% Hispanic

	Mean	SD	Range
Age	71.3	5.2	66.0 – 83.0
Number of Teeth	10.8	6.5	0.0 - 19.0
BMI	28.6	6.3	16.5 – 47.1
MNA-SF Score	12.1	2.4	4.0-14.0

- 15.8% (n=3) completely edentulous
- 31.6 % (n=6) at risk for malnutrition or malnourished

Eating Experience Themes

ADAPTATION (+)

Cooking Method / Texture Modification

- Choose softer foods
- Cook until soft, puree, liquify / blenderize
- Chop, mash, peel, shred, ground
- Add product to moisten

Chewing Strategies

- Time and location

MALADAPTATION (-)

Food Avoidance

- Vegetables (especially raw)
- Fruit (e.g.: apples)
- Nuts and seeds
- Meats (e.g.: steak, pork chops)
- Grains (e.g.: bread)

These foods are rich in fiber, vitamins and minerals

Participants on Eating Out

Limitations in Eating Out with Others

- “Because you know when you don't have teeth sometimes saliva sprays out. So it's probably not fun for other people either ...Cover my mouth and don't go out to eat with people I don't know very well. So yeah. And I don't like going out anymore. To events or parties...So I guess yeah I'm self conscious for not having any teeth.”

Adaptation When Eating Out

- “When I go in there I tell them, “Listen I want something soft” and I explain to them why. If they cant do it, don't take my money.”

Adaptation When Eating Out

- “People want to go out to dinner. I have to drink a smoothie before I go. And usually I'll order fish and eat the fish and that'll be it. Mashed potatoes, but I really don't like mashed potatoes.”

Participants on Feeling Self-Conscious or Embarrassed

Affects Social Interactions

- “Yeah, I put my hand in front of my mouth a lot. I do it all the time. I find myself, even doing it, when I talk to my daughter. It's embarrassing. It's not like I can just go to the dentist and say, “Give me everything I need.” Because the expense is so high.”

Affects Eating

- “Maybe a little self conscious. When you're out there in the public you feel a little odd ripping your sandwich up taking it piece by piece. But that's the way it goes.”

Affects Smiling & Talking


- “Yes! Of course! I can't smile, I can't talk. Especially in public. Somebody, made me laugh. Like if I was going shopping, somebody made me laugh. And then I forget about my teeth and then people be looking! Oh it's so embarrassing. I can't even open my mouth and talk. Sometimes when I'm in a group of people, we'll be talking but I don't want to say anything.”

Thematic Analysis: Other Factors



- Lack of finances limited food choices
- Support of family and friends enhanced ERQOL

Phase 2 Conclusions

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- Adaptive coping strategies: adjusting chewing, food choices and preparation methods as eating become more difficult
 - Maladaptive behaviors (food avoidance, limiting eating out and smiling in public) may lead to increased risk for malnutrition, social isolation and decreased quality of life
 - Tooth loss may be compounded by multiple other psychosocial factors that affect ERQOL

Future Research

What We Know:

- Relationship may not be linear; 10-19 teeth are higher risk
- Tooth loss affects dietary intake and ERQOL
- Older adults use adaptive and maladaptive techniques to compensate when functional dentition is compromised

Future Research:

- Study the relationship between tooth loss, nutritional status (and overall health and wellbeing) using tools that measure diet quality and ERQOL in a larger more heterogeneous sample
- Design and tailor diet and nutritional interventions to meet the unique needs of older adults with tooth loss

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SUPPLEMENTAL SLIDES

Number of Natural or Restored Teeth by Nutrition Status Category (N=107)

Number of Natural or Restored Teeth	n	%
0 Teeth	5	4.7
1 – 9 Teeth	19	17.7
10 – 19 Teeth	32	29.9
20 – 28 Teeth	51	47.7

Nutritional Status Category	Mean number of natural or restored teeth	Standard Deviation	Range
Normal (n=80)	17.4	8.8	0 - 28
At Risk for Malnutrition (n=22)	16.2	8.3	0 - 28
Malnutrition (n=5)	14.4	4.3	10 - 21

Interview Guide: Eating Experience

The impact of missing teeth on food preparation and intake

Have you changed your diet because of the condition of your mouth?

Are there specific food or fluids you avoid? (PROBE into food groups)

Are there any tricks that you use to help you eat? (PROBE into modification)

Has eating become easier or harder over time?

Are there any foods you would like to eat but cannot due to difficulty chewing them?

Do you have any mouth pain? How does this affect your eating experience?

Interview Guide: Eating Experience

Eating Related Quality of Life / Social Emotional Implications

Do you enjoy eating at this point in time?

What affects your enjoyment of eating?

Have your eating habits impacted your family/friends that you eat with?

Do you eat the same foods as your family or is your food modified?

Do you prepare meals at home? Have you adjusted or changed recipes?

Do you eat meals outside of your home? Has this changed?

Are you self-conscious or embarrassed because of your missing teeth?