Practice of the team approached medicine : From medical viewpoint ~ Challenging to diabetes with multi-disciplinary cooperation ~

COI disclosure
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Lecture fee :
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Annual change of diabetes mortality ratio by prefecture

The worst diabetes mortality ratio

Start diabetes approach

Up to

Worst

7

Diabetes Therapeutics and Research Center, Tokushima Univ.

The change of diabetes crude mortality ratio (Tokushima - Japan) (by Vital Statistics, MHLW)

Breakdowns of the cause of Tokushima Prefecture diabetes-related death by age decade and etiology in 2008

(Cause of death)

The number of dialysis patients in Tokushima Prefecture is 1.5 times the national average

All dialysis patients 3350/ 1 million people (the national average 2280/ 1 million people)
All dialysis patients 2612 diabetic nephropathy 849 people(33.2%;Japan Average 35.1%)
New introduction 359 diabetic nephropathy 154 people(44.0%;Japan Average 44.5%)

Tokushima Prefecture
The national Average

Diabetes
Non-diabetes

Tokushima Medical Association Dialysis Medical Association investigation (2009)
The No.1 cause of acquired blindness is diabetic retinopathy (41%).

Risk factors of periodontal disease

**Subjects**
The person who had HbA1c measurement in “Anan city dental checkups” 738 people

**Method**
Ordered Logit Model (adjusted by age and gender)
Dependent variable = CPI (Community Periodontal Index)
Explanatory variable = Glucose tolerance

<table>
<thead>
<tr>
<th></th>
<th>Adjusted odds ratio [95% confidence interval]</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (decade)</td>
<td>1.19 [1.03, 1.39]</td>
<td>P = 0.022</td>
</tr>
<tr>
<td>Male (vs. Female)</td>
<td>1.25 [0.94, 1.67]</td>
<td>P = 0.125</td>
</tr>
<tr>
<td>Glucose tolerance (vs. Control*)</td>
<td>1.00 (Ref)</td>
<td></td>
</tr>
<tr>
<td>Abnormal*</td>
<td>1.88 [1.01, 1.87]</td>
<td>P = 0.042</td>
</tr>
<tr>
<td>Diabetic type</td>
<td>1.68 [1.14, 2.47]</td>
<td>P = 0.009</td>
</tr>
</tbody>
</table>

*Abnormal: Fasting plasma glucose level ≥ 110, casual plasma glucose level ≥ 140, HbA1c ≥ 6.0 (The group where OGTT is strongly recommended in diagnostic criteria of JDS)

Risk factors for glucose intolerance

**Subjects**
Those who had HbA1c measurement in “Anan city dental checkups” 738 people

**Method**
Ordered Logit Model (adjust it in age, sex)
Dependent variable = glucose intolerance
Explanatory variable = CPI (Community Periodontal Index)

<table>
<thead>
<tr>
<th></th>
<th>Adjusted odds ratio [95% confidence interval]</th>
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</thead>
<tbody>
<tr>
<td>Age (decade)</td>
<td>1.49 [1.27, 1.75]</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td>Male (vs. Female)</td>
<td>1.35 [1.01, 1.81]</td>
<td>P = 0.044</td>
</tr>
<tr>
<td>CPI (vs. code 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>code 1</td>
<td>1.00 (Ref)</td>
<td></td>
</tr>
<tr>
<td>code 2</td>
<td>1.44 [0.69, 3.01]</td>
<td>P = 0.334</td>
</tr>
<tr>
<td>code 3</td>
<td>1.88 [1.03, 3.45]</td>
<td>P = 0.041</td>
</tr>
<tr>
<td>code 4</td>
<td>1.75 [1.01, 2.97]</td>
<td>P = 0.040</td>
</tr>
<tr>
<td>code 5</td>
<td>2.60 [1.45, 4.66]</td>
<td>P = 0.001</td>
</tr>
</tbody>
</table>
Issues about diabetes in Tokushima Prefecture

- Aging of the population
- Lower physical activity: dependence on automobiles and insufficiency of public transport infrastructure
- Eating behavior problem: Lower intake of vegetable
- The obesity increase from the young generation
- High frequency of withdrawing treatment
- High incidence of advanced diabetic complications.

Today’s Points

1. The current status of diabetes in Tokushima Prefecture
2. Medical association, Dental association, Dietetic association and government leading Multi-disciplinary approach to diabetes
3. The future of cooperation of local medical institution

The task team for diabetes of Tokushima Medical Association

Founded in 2005 → from 2011
Chief: Kenji Shima → Yoshihiko Noma

The poster of Blue Light-up in Tokushima for the World Diabetes Day
Localization of diabetes specialist

1. The 5th health & medical regions

- West region
- East region
- South region

Tokushima Diabetes Educators: 355
Tokushima Diabetes Therapeutics and Research Center, Tokushima Univ.

The network system over Tokushima Prefecture to decrease advanced complications in diabetic patients

- Treatment for acute complication like diabetic coma
- Treatment for chronic complication
- Chartered treatment for chronic diabetic complication

- Hospital
- Clinic

Collaboration at the time of introduction & treatment

Diabetes Therapeutics and Research Center, Tokushima Univ.

LCDE Certified System of Tokushima Medical Association

Workshop of LCDE

Advanced workshop of LCDE

Cultivate young diabetes medical specialist and CDEJS as instructors

Number of LCDE in each medical regions

1. 5th health & medical region
- West region
- East region
- South region
Association of increase of energy density with obesity level in type 2 Diabetes

Correlation of energy density with BMI
Correlation of energy density with visceral fat area
Correlation of energy density with HbA1c
Correlation of energy density with ALT

Energy density (kcal/g) = Energy (kcal) / Weight of foods (g)

BMI (kg/m^2)

Energy density (kcal/g)

HbA1c (%)

ALT (mg/dL)

Association of increase of energy density with obesity level in type 2 Diabetes

Correlation of energy density with BMI
Correlation of energy density with visceral fat area
Correlation of energy density with HbA1c
Correlation of energy density with ALT

Popularization of the Evidence-based Diet Guidelines to the Residents and Business Creation with Companies

Volumetric Lunch

Tokushima is... Number one mortality with diabetes
The lowest intake of vegetables

Vegetable volume: 200-240 g

Rice: 150 g

Salt: less than 3 g

ED: less than 1.0 kcal/g

Satiety and satisfaction with low-calorie diet

"Tokushima University Diet guideline" development

Study of evidence-based diet composition

Focused on energy density (ED kcal/g)

1) The amount of vegetables
   Intake of vegetables affects satiety and satisfaction than oil

2) Age
   40s get satiety and satisfaction with 150g of staple food

Additional value

Companies and Hotels in Tokushima (Volumetrics)

Tokushima is...
Number one mortality with diabetes
The lowest intake of vegetables

We can deliver 7 set menus which you checked.

Trial meals, good taste and good for health

All 15 menus

"Food education" by eating smart lunch with plenty of vegetables

"Eating" is believing.

Treatment system for diabetic nephropathy

Certified diabetes doctors: 400
Diabetologists: 45
Nephrologist: 20

JDDM 2010 Estimated no. of diabetic patients in Tokushima Prefecture

53 thousand

1st stage 58% 30.7 thousand
2nd stage 32% 17.0 thousand
3rd stage 7% 3710
4th stage 2.6% 1378
5th stage 0.4% 212

Tokushima Dialysis Physicians Association

Certified diabetes doctors

400

Diabetologists

45

Nephrologist

20

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Tokushima Dialysis Physicians Association
Prevention measures for diabetic nephropathy progression

- Diagnosis of diabetic nephropathy: abnormalities of urine sediment, shape of the kidney, urinary tract lesion

- 2nd-3rd stage nephropathy
  1. Salt restriction (6g/day)
  2. Control of excessive intake of protein (≤0.8g/kg)

- 4th stage nephropathy (eGFR < 45 ml/min/1.73m²) ~
  Professional medical care by nephrologist

Diabetes prevention projects by medical and dental collaborations:

1. Blood glucose test in the dental clinic: Pick up suspected diabetes case, the case with interrupted treatment, and advise to consult medical doctor.
2. Creating the dental passport
3. Medical and dental collaboration path
4. Promote Medical and dental collaboration events in Tokushima Diabetes Forum 2014

The new era of dental healthcare in Tokushima Prefecture is coming by prefectural and municipal ordinance for dental and oral health promotion

Checklist for dental and oral healthcare

The new era of dental healthcare in Tokushima Prefecture is coming by prefectural and municipal ordinance for dental and oral health promotion
Creation and evaluation of assessment sheet for dental care in diabetic patients

**Previous research**
- Interview, questionnaire about recognition and implementation of oral health behavior of diabetes patients was carried out in diabetes patients, and the relevant factors was studied

**Brush up by clinical nurses and dentists**
- Share the clinical problems in Medical and Dental clinical fields and the evidences about dentistry

**Brush up by the expert meeting in multiple job collaboration**
- Discuss about oral health behavior in the expert meeting composed with Diabetologist, dentists, nurses and dental hygienists and pick up assessment items.

**Oral conditions**
- Experience of swollen gums (N=301)
- Awareness of bad breath (N=299)
- Bleeding when brushing (N=298)
- The presence of dentures (N=300)
- The total number of teeth (N=300)

**Awareness and knowledge to the oral health**
- Knowledge of the relationship between periodontal disease and diabetes (N=300)
- Awareness of their own teeth (N=301)
- Not too late to start oral care anytime (N=300)
**Implementation status of oral care**

<table>
<thead>
<tr>
<th>Oral check with a mirror (N=299)</th>
<th>Level of Necessity</th>
<th>Implementation status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not necessary at all</td>
<td>66</td>
<td>Never</td>
</tr>
<tr>
<td>A little necessary</td>
<td>43</td>
<td>Sometimes</td>
</tr>
<tr>
<td>Almost necessary</td>
<td>17</td>
<td>Very necessary</td>
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<tr>
<td>Very necessary</td>
<td>12</td>
<td>Quite often</td>
</tr>
<tr>
<td>Always</td>
<td>4</td>
<td>Always</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Use of interdental brush or dental floss (N=300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not necessary at all</td>
</tr>
<tr>
<td>A little necessary</td>
</tr>
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<tr>
<td>Always</td>
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<table>
<thead>
<tr>
<th>Brushing the margins between teeth and gums (N=300)</th>
</tr>
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<tbody>
<tr>
<td>Not necessary at all</td>
</tr>
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<td>A little necessary</td>
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<tr>
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<table>
<thead>
<tr>
<th>Brushing tooth one by one carefully (N=300)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not necessary at all</td>
</tr>
<tr>
<td>A little necessary</td>
</tr>
<tr>
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</tr>
<tr>
<td>Very necessary</td>
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**Behavior of Dental check and treatment**

<table>
<thead>
<tr>
<th>Report the results of dental consultation to nurses (N=300)</th>
<th>Level of Necessity</th>
<th>Implementation status</th>
</tr>
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<tbody>
<tr>
<td>Not necessary at all</td>
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<td></td>
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<tr>
<td>A little necessary</td>
<td>15</td>
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<td>Almost necessary</td>
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<tr>
<td>Very necessary</td>
<td>9</td>
<td></td>
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<tr>
<td>Always</td>
<td>3</td>
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<tr>
<th>Report the dental consultation results to the doctors (N=300)</th>
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<tr>
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<tr>
<th>Show the medicine notebook at the time of dental visit (N=301)</th>
<th>Level of Necessity</th>
<th>Implementation status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not necessary at all</td>
<td>60</td>
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<td>20</td>
<td></td>
</tr>
<tr>
<td>Almost necessary</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Very necessary</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>6</td>
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<tr>
<th>Show the blood glucose self-management notebook at the time of dental visit (N=301)</th>
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<th>Experiments of the tooth blushing education (N=301)</th>
<th>Level of Necessity</th>
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<tr>
<td>Always</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Have regular dental checkup (N=301)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not necessary at all</td>
</tr>
<tr>
<td>A little necessary</td>
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**Medical and dental collaboration for diabetes care in Tokushima Prefecture**

1. **Dentist**
2. **Medical Specialist**
3. **Certified diabetes doctors**
4. **Patient**
5. **Dental hygienist – LCDE**
6. **Assessment sheet**
7. **CDEJ**

Diabetes Therapeutics and Research Center, Tokushima Univ.
**Today’s Points**

1. The current status of diabetes in Tokushima Prefecture
2. Medical association, Dental association, Dietetic association and government leading Multi-disciplinary approach to diabetes
3. The future of cooperation of local medical institutions

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**Decline of consciousness of the cooperation of local medical institutions**

- **Use of diabetes network notebook has been decreased.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Usage of diabetes collaboration notebook (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.22</td>
<td>77.7</td>
</tr>
<tr>
<td>H.26</td>
<td>64.4</td>
</tr>
</tbody>
</table>

The cooperation of local medical institutions in Tokushima Prefecture has not proceeded.

**Do you proceed local collaboration?**

- Proceed: 22.2%
- Rather proceed: 36.2%
- Rather not proceed: 17.0%
- Not proceed: 8.6%
- I don’t know: 6.0%

Questionnaire to the Medical Association of Tokushima Prefecture, the diabetologist, and the certified doctor (designated by the Medical Association)

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**The variances from patient’s side in the cooperation of local medical institution for diabetes treatment**

**Patient**

- **Inconvenience**
  - High efficacy (High efficacy with a little consultation)
  - Wide network (Common network of specialist)

- **Anxiety**
  - System that gives safety (Medical team that share the medical information and medical guideline)

- **Lack of knowledge**
  - Educational system (Mini lecture, quiz form, nutrition guidance and lifestyle guidance system)

**Approach to the patient**

- Simplification of introduction and report (introduction system, making letter of introduction and data copy)

**Approach to the doctor**

- Share of Medical guideline
  - Face to face collaboration with distant medical consultation

- Educational system
  - (Education materials for paramedic & doctor)
  - (Insulin introduction & nutrition guidance)
Tokushima Diabetes Overcoming Network（To DO Network）

Development into local medical collaboration: Aizumi & Naruto areas ～Aizumi Virtual Hospital～

Current state of diabetic education in Tokushima Prefecture

Is the patient education necessary?  
- Necessary: 2.0%  
- Not necessary: 98.0%

Do you implement patient education?  
- Implement: 49.5%  
- Not implementing: 50.5%

The aim: Positive patient education and correspondence
The system that is an Educator and a Discussant

1. The development and delivery of educational tools and contents for diabetic care
2. The consultation of diabetic introduction patients with medical institution partner
3. The fullness of personal network for diabetic local medical collaboration

Diagram:

- The diabetologist is the educational tool and contents for medical care by E-learning system.
- We implement the treatment conference that can consult the case cooperative partner by TV meeting system.
- We delivery leading educational tool and educational contents for medical staff by E-learning system.

Diagram:

- Development and popularization of standardized diabetic treatment and support for medical staff.
- Regional treatment condition & analysis of improved effect

Diagram:

- Design & implementation of cooperative network for diabetic local medical collaboration.
- Patient collaborative network for diabetes treatment.

Thanks:

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Tokushima University
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Motoyuki Tamaki
Yumi Kuwamura
Kenichi Aihara
Itsuro Endo
Tsuyoshi Kondo
Yuu Tamaki
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Ophthalmologists Association
(Shinta Yamane)
Association of Dialysis Physicians
(Kanbun Hashimoto)
Aizumi-cho Medical Association
(Hironobu Aki, Takayoshi Nakayama)

Diabetes Therapeutics and Research Center, Tokushima Univ.