Table 2. Distribution of FcγRIIIb alleles in 70-year-old Japanese periodontitis-resistant and periodontitis-susceptible groups (% in parentheses).[a]

	Periodontitis-resistant group	Periodontitis-susceptible group
NA1 carrier [b]		
NA1 carrier	46(100)	65(89)
NA1 non-carrier	0 (0)	8(11)
Allele frequency [c]		
NA1	66(72)	84(58)
NA2	26(28)	62(42)

a FcγRIIIb genotype was determined by allele-specific PCR.

b NA1 carrier: Fisher's exact probability=0.02.

c Allele frequency: Odds ratio, 1.87 (95%CI, 1.07 to 3.28); χ^2=4.89. p=0.03.

Table 3. Serum IgG1 and IgG3 levels related to FcγRIIIb genotypes in 70-year-old Japanese periodontitis-resistant and periodontitis-susceptible groups.[a]

	Periodontitis-resistant group	Periodontitis-susceptible group
IgG1		
FcγRIIIb-NA1/NA1	8967±749 (20)	9918±645 (19)
FcγRIIIb-NA1/NA2	9341±536 (26)	10052±493(46)
FcγRIIIb-NA2/NA2	— (0)	9270±548 (8)
Total	9178±441 (46)	9932±356 (73)
IgG3		
FcγRIIIb-NA1/NA1	430±62 (20)	485±43 (19)
FcγRIIIb-NA1/NA2	397±46 (26)	480±37 (46)
FcγRIIIb-NA2/NA2	— (0)	474±46 (8)
Total	411±37 (46)	481±26 (73)

Values represent mean ±SE (μg/ml) of IgG subclass levels, with numbers of subjects shown in brackets.

[a] FcγRIIIb genotype and serum IgG1 and IgG3 levels were determined by allele-specific PCR, and ELISA, respectively.

Figure legend

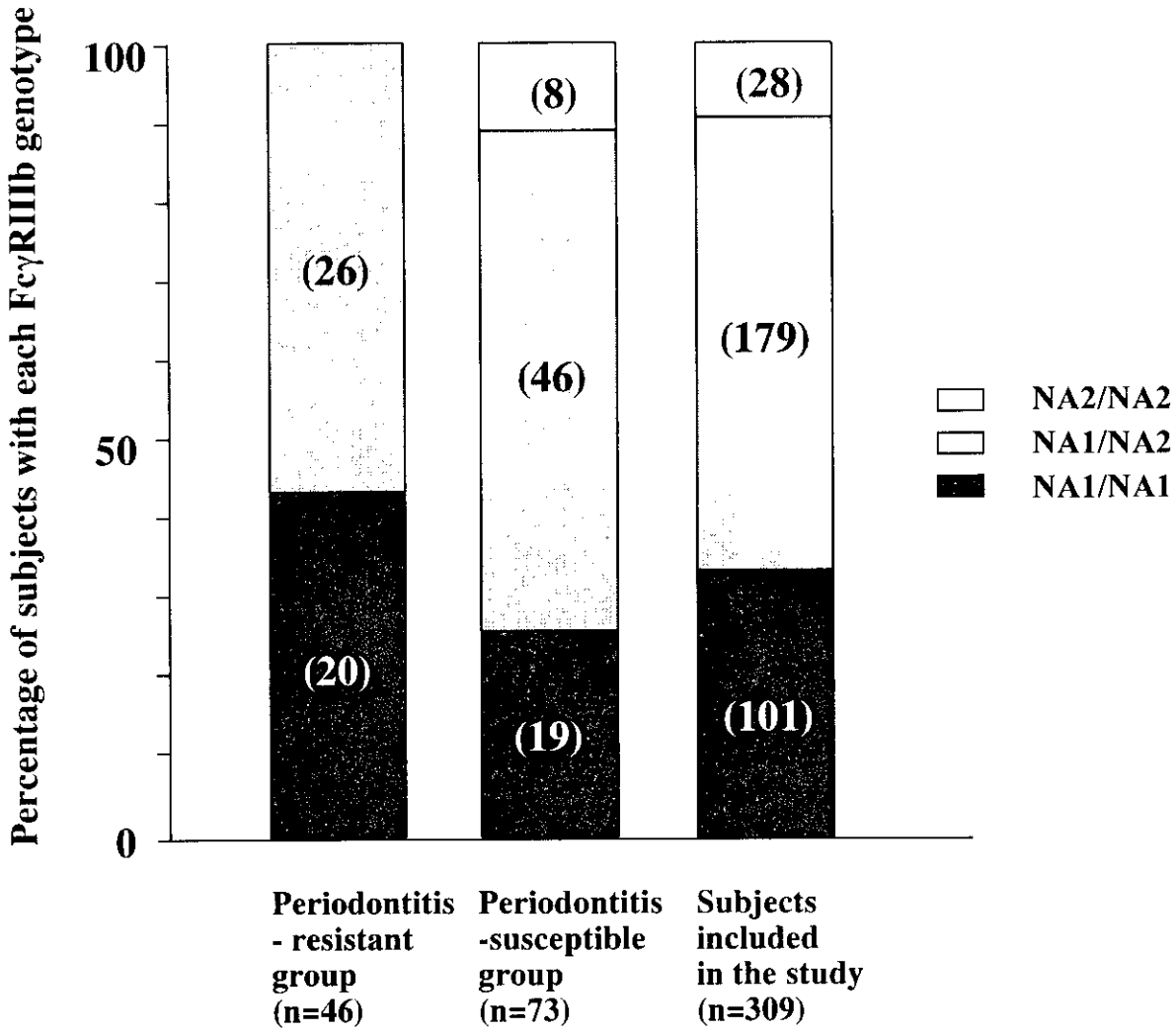
Figure 1. Distribution of FcγRIIIb genotypes in different subject groups.

( ):Number of subjects.

The FcγRIIIb genotype distribution was significantly different in periodontitis-resistant compared to periodontitis-susceptible groups (Fisher's exact probability=0.02).

One subject in the subjects included in the study was found not to bear an FcγRIIIb-NA1-NA2 gene.

Figure 1.


Percentage of subjects with each FcγRIIIb genotype
100
50
0
(26)
(20)
(8)
(46)
(19)
(28)
(179)
(101)
NA2/NA2
NA1/NA2
NA1/NA1
Periodontitis - resistant group (n=46)
Periodontitis -susceptible group (n=73)
Subjects included in the study (n=309)

高齢者の2年間における根面う蝕の発生状況とその要因についての研究

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「高齢者の口腔保健と全身的な健康状態の関係についての総合研究」

C. 研究課題名:「高齢者の2年間における根面う蝕の発生状況とその要因についての研究」

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E. 研究目的:

高齢者の根面う蝕は歯の喪失の要因と報告されていることから、根面う蝕の発生および要因の分析は、高齢期の歯の喪失に対する対策を検討するうえで重要である。根面う蝕の発生に関連する要因については、う蝕経験、歯周病、唾液中細菌数などの口腔内所見が多く報告されている。また、根面う蝕の発生率は地域住民高齢者より施設入居者、痴呆老人の発生率が高いという報告や、根面う蝕の発生と死亡率との関連の報告があり、高齢者では全身的健康状態と根面う蝕の関連が示唆される。

本研究の目的は、地域在住高齢者における、根面う蝕の発生状況の調査と発生に関連する要因分析について全身的健康状態も加味して行うことである。

F. 研究方法:

調査対象者は1998年4月に新潟市在住の70歳全員に行った事前質問紙調査で、健診の受診を希望した者から男女同数を選出した。1998年7月に新潟市内の地区センター等にてベースライン調査を行い、口腔診査および、内科健診、質問紙調査などの全身健康状態の健診を行った。口腔内診査は599名が受診した。口腔内診査はWHOの基準に従って行い、歯の状態は、根は歯面ごとに歯冠は歯ごとに記録した。追跡調査は1年後と2年後にベースライン調査と同様の方法で行った。

分析は、1年後と2年後の追跡調査を受けた有歯顎者373名(男195名、女178名)を対象に行った。根面う蝕の発生は、健全歯面から未処置う蝕が発生した場合と定義し、1年ごとの発生歯面数を2年間で累積した。根面う蝕発生のリスク要因分析にはロジスティック回帰分析を用いた。関連をみた要因は、ベースライン時の口腔内所見、唾液細菌試験、血液検査値、Body Mass Index(BMI)およびアンケートによる生活習慣、歯科・医科の受診状況などである。ベースラインの情報のうち、根面う蝕の発生に強固に関連している変数を確認するために、根面う蝕の1歯面以上発生の有無(model1)、2歯面以上発生の有無(model2)、3歯面以上発生の有無(model3)をそれぞれ従属変数とする3通りの分析を行った。

G. 研究結果・考察

根面う蝕の発生は分析対象者の35.9%にみられ、発生歯面数は1人あたり平均0.93 (sd=1.96)歯面だった。3つのロジスティック回帰分析の結果、ベースライン時に根面未処置歯を所有、アタッチメントレベル(LA)の平均値が3.6mm以上がすべてのモデルで有意な変数だった。クラウンが2歯以上、歯間ブラシ・フロスを使用しない、唾液中lactobacilli (LB)レベルが10^5 CFU/l以上が2つのモデルで有意な変数だった。BMI20未満はmodel2のみで有意だった。これらの結果から、根面未

処置歯を所有、LAの平均値が3.6mm以上が最も有力な根面う蝕発生のリスクプレディクターであり、クラウンが2歯以上、歯間ブラシ・フロスを使用しない、唾液中LBレベルが10^5 CFU/l以上が次に有力なリスクプレディクターだった。BMI20未満は結果のロバストが最も弱かった。

H．結論

分析対象高齢者の35.9%に根面う蝕が発生し、発生歯面数の一人あたり平均は0.93歯面だった。ロジスティック回帰分析から、最もロバストの強い独立変数は、根面Dあり、平均LA3.6mm以上の2変数だった。中等度レベルのロバストを有している独立変数はクラウン2歯以上、フロス・歯間ブラシを使用していないこと、唾液中lactobacilli10^5CFU/ml以上の3変数だった。ロバストの低い独立変数はBMI20未満だった。以上の結果から、根面う蝕の発生のリスクプレディクターは口腔に関する変数が有力であり、さらに、BMIの低値で示される全身的健康状態の低下が高齢者では根面う蝕の発生に関連していると示唆された。

I．研究発表論文

投稿原稿

Factors associated with root caries incidence in an elderly population

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Abstract - The purposes of this study were to describe the incidence of root caries and to identify baseline factors associated with future root caries development in elderly population. At baseline, 599 noninstitutionalized adults aged 70 in Niigata, Japan were examined on oral status and general health status and 373 subjects were followed up for two years and identified to be dentate at two-year examination. In order to identify risk predicting variables with robustness, three multiple logistic regression analyses of those dependent variables were respectively one, two and three or more disease events were performed. During the period of study, 35.9% of subjects developed at least one new root caries. The mean number of root carious disease events per subject was 0.93 (sd=1.96) surfaces. Logistic regression analyses indicated that having one or more root D surface and mean LA ≥3.6 mm were risk predictors for good robustness, having two or more crown restorations, no use of interdental brushes or dental floss and LB $\geq 10^5$ CFU/ml were risk predictors for middle level robustness, and Body Mass Index <20 was risk predictor for weak robustness. These findings suggest that oral status was a good risk predictor, and poor general health indicated by low Body Mass Index may also contribute to root caries occurrence in elderly population.

Key words: root caries, longitudinal study, elderly, risk predictors

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Elderly persons still have lost a lot of teeth. Japan national pathfinder survey in 1993 reported that the percentage of edentulous persons was 22% and the mean number of remaining teeth was 11.8 between 65- to 74-year olds (1). Hand *et al.* (2) and Locker *et al.* (3) reported that root decay was significantly associated with incidence of tooth loss. Therefore it is important to survey root caries incidence and relating factors, because those are essential to plan an effective strategy for preventing tooth loss among old population.

It was found that root caries prevalence rate and incidence rate of elderly people was relatively higher (3, 4, 5). However, there was only a few report related to risk predictors for root caries in community-dwelling people aged more than 70 (6). Oral status such as past caries experience, periodontal status and salivary levels of cariogenic bacteria was often reported for factors related to root caries occurrence (7, 8, 9, 10). And some other factors such as age, race and psychosocial status were also reported (7, 9, 10).

A trend towards higher caries incidence has been found in institutionalized and demented elderly people when compared with community-dwelling elderly people (11, 12). And root caries incidence was reported as a risk predictor for mortality from recent study (13). Those may indicate a link between general health and root caries.

The purposes of this study are to describe the incidence of root caries and to identify baseline factors associated with future root caries development in elderly population.

Material and Methods

Study population

The data reported here were obtained as a part of oral and general health survey and longitudinal study of elderly people dwelling independently in Niigata city, Japan. In 1998, the population of Niigata city was approximately half a million, of which 4542 (2099 males and 2443 females) were 70-year olds. Before sampling selection, pre-questionnaire survey was carried out. In April 1998, we send questionnaires to all of the 70-year-old persons registered in the city by mail and asked them if they want to take the health examinations. The answers were gotten from 3695 persons (81.4%). In sampling selection, subjects who had answered that they could participate the survey were chosen with the priority, and were chosen in order to be same number of males and females. None of them was hospitalized or institutionalized.

The examinations were completed at baseline in July 1998. Oral examinations, medical examinations and questionnaire were performed in several community halls in the city. Five hundreds and ninety nine subjects took oral examinations. Of these, 92.5% (554 subjects) were dentate. Follow-up surveys were carried out with same procedure in June 1999 and June 2000. Both one-year and two-year follow-up surveys were completed on 410 (84.0%) subjects. And 379 subjects who were dentate at baseline took all following examinations. Six of them became edentulous during these two years. Informed consent was obtained from all subjects prior to the study.

Data collection

Oral examination measures - Four trained and experienced dentists assessed the oral health conditions of the subject. Oral examinations were done under sufficient illumination provided by artificial light with subjects setting supine position. The caries examination was conducted using mirrors with light and using WHO ball-pointed periodontal probes. Neither compressed air nor radiographs were used.

Root surface caries was diagnosed using WHO criteria (14) and recorded by each surface. Root caries was defined when a lesion was on exposed root surface and had a detectable softness or roughness with the WHO probe. Secondary root caries or primary caries with filling on same root surface were separately recorded as root caries only. Lesions or fillings that shared both the root and crown portion of the tooth were counted as root surface if carious lesions or fillings were determined to have originated on the root, and were counted as both root surface and crown if it is difficult to determine whether carious lesions or fillings originated on the root or on the crown. Arrested caries was defined as hard and colored lesion without softness and roughness. A multiple-surface lesion or filling was recorded if it extended more than one third of the way across the adjacent surface. Exposed root surface was defined as at least 1 mm of visible root surface between gingival crest and cement enamel junction or restoration margin.

Coronal caries was recorded by each tooth according to the WHO criteria (14). Coronal carious lesion was defined as an unmistakable cavity, undermined enamel or a detectably softened floor or wall in a pit or fissure, or on a smooth tooth surface. Periodontal status, prosthetic status and treatment needs were also recorded according to WHO criteria.

The examiners were calibrated on eighteen volunteer patients in the University Hospital before and during the survey. Kappa values between each pair of examiners were 0.80-0.95 for coronal caries and 0.56-0.75 for root caries.

Salivary microbial test - For counts of salivary mutans streptococci (SM) and lactobacilli (LB), Dentocult SM strip and Dentocult LB Dip Slide (Orion Diagnostica, Espoo, Finland) were used. Samples of paraffin-stimulated whole saliva were collected for three minutes before the oral examination. The evaluation of microorganisms levels were done according to the standard charts of the kits and recorded with 10^3, 10^4, 10^5 and 10^6 CFU/ml in coincidence of two dentists.

Questionnaire measures - Participants were given questionnaires during this examination. The questionnaires covered a wide variety of general health status, oral conditions, dental and medical visits, recognition of oral and general health, oral hygiene, attitude for health, the number of persons living with and education history. Nineteen items of them were used for analysis (Table 1).

Blood sampling and body measurement - In order to monitor the general health conditions, serum and plasma levels of disease markers were investigated. These disease markers were nutritional factors (total-protein, albumin, total cholesterol, triglyceride), bone metabolism factors (calcium, inorganic phosphorus), liver agents (GPT, GOT, γ-GTP), kidney agents (creatinine), glycosuric factor (blood sugar) and immunoglobulins (IgG, IgA, IgM). Blood was collected in a nonfasting state. Those collected blood samples were sent to a single commercial laboratory, after necessary treatments.

In addition body height and weight measurement, Body Mass Index (BMI) was calculated by the following formula: weight kg/(height m)^2.

Statistical analysis

Statistical analyses were carried out with 373 dentate subjects consisting of 195 males and 178 females who took both 1st and 2nd follow-up surveys.

In root caries incidence calculation, the outcome variable was the number of root surfaces in a patient for which a disease event occurred during the follow-up period. A disease event was counted in the case that a root decay occurred on a surface that had been sound, cervical abrasion, arrested caries or nonexposed surface at a preceding examination. Disease events were counted every year and were cumulated in two years. The surfaces that occurred disease events once were excluded from the following analysis. And also, surfaces that observed root fillings at the 1st follow-up survey were excluded from the analysis.

Logistic regression analysis was used to determine the association between baseline information and root caries occurrence. Three logistic analyses (model-1, model-2, model-3) were performed in order to obtain robust of the result. The dependent variable of model-1, model-2 and model-3 was one or more disease events (yes/no), two or more disease events (yes/no) and three or more disease events (yes/no), respectively. Baseline information was made into two or three categorized variables. For blood tests, cut off point was decided at the top or lower 20-25% tiles taking subject distribution into consideration, since most of subjects were distributed in reference interval.

The following three steps were adopted in selection of the independent variable of each model in logistic regression analysis.

Step 1: Chi-square test was performed between the number of disease events that was made into 4 categories (0, 1, 2, 3 or more) and baseline variables. Variables were selected for the next step if p-value was less than 0.3. And the variable with high correlation coefficient each other was chosen one of the two.

Step 2: Variables selected in *Step 1* were divided into 3 groups that were consisted of categories of oral group, blood and BMI group, and questionnaire group. Each group variables were added to different backward logistic regression analysis with the criterion set at $p<0.2$. And variables with $p\geq 0.2$ were eligible for removable.

Step 3: Variables chosen in *Step 2* were combined and added to a final backward logistic regression analysis with the criterion set at $p<0.05$. Variable selection of model-2 and model-3 were performed by the same way.

Statistical software, Stata 6.0 (15)] was used for statistical analysis.

Results

Study subjects and participation - Table 2 shows dental status at baseline survey in 1998. The mean number of remaining teeth was 19.60, and showed no significant difference between males and females. Ninety eight percent of subjects had one or more exposed root surfaces and the mean number of exposed root surfaces was 25.20. Males had more exposed root surfaces than females (Mann-Whitney's U-test $p<0.001$). Sixteen percent of subjects had one or more coronal decay (coronal D) and 19.0% had one or more root decay (root D). As for treated caries, almost of all the subject had one or more filled or crowned coronal teeth (coronal F), and 62.7% had one or more filled root surfaces.

Incidence - Root caries incidence occurred in 35.9% (male; 41.5%, female; 29.8%, $p<0.05$) of the subjects over the two-year study. The mean number of disease events per subject was 0.93 surfaces. The distribution of disease events was shown in *Fig. 1*. One disease event occurred in 66 persons (17.7%) of subjects, two disease events in 21 (5.6%) and three disease events in 47 (12.6%). The maximum was fifteen disease events.

Risk predictor - The independent variables used in the final step of model-1 were following thirteen variables, sex, root D, crown restoration, LB, mean LA, exposed root surface, use of interdental brushes or dental floss, marital status, prescription medication, albumin, γ-GTP, IgM, and BMI. Those of model-2 were following sixteen variables, sex, root D, crown restoration, LB, mean LA, exposed root surface, use of partial denture, use of interdental brushes or dental floss, marital status, prescription medication, smoking habit, frequency of having sweets, albumin, IgA, IgM, and BMI. And those of model-3 were eleven, sex, root D, LB, mean LA, use of partial denture, the number of remaining teeth, use of interdental brushes or dental floss, prescription medication, smoking habit, IgA, and IgM.

The results of multiple logistic regression analyses were shown in Table 3. Two variables, having one or more root D surfaces and mean LA ≥3.6 mm, were common significant variables in all analysis of model-1, model-2 and model-3. The significant variables in common to model-1 and model-2 were having two or more crown restorations and no use of inter dental brushes or dental floss. LB $\geq 10^5$ CFU/ml was significant in common to model-2 and model-3. In only model-2, BMI <20 was a significant variable.

Discussion

Study subjects - Before sampling subjects examined, pre-questionnaire was sent to all the 70-year-old people registered in Niigata city by mail and asked how many teeth they had. In addition, 69 persons randomly selected from non-respondents were asked also how many teeth they had by telephone. With the answers of pre-questionnaire by mail, answers of telephone survey and difference of answers of pre-questionnaire and the measured value in the oral examinations, we estimated the mean number of remaining teeth of the population. Then the mean number of remaining teeth per person of the 70-year in Niigata city was estimated from 13.97 to 15.20 teeth (16). In WHO collaborative study carried out in Yamanashi, Japan in 1992, non-institutional 65- to 74-year residents (422 persons) had 12.3 teeth in average (17). And in Japan national pathfinder survey in 1993, 65- to 74-year-old people (1103 persons) had 11.8 teeth in average (1). So, present study population of 70-year in Niigata may have more teeth than those in similar age group in Japanese surveys.

The dentate subjects at baseline were divided into two groups. One was the subjects examined at follow-up surveys both in 1999 and 2000 and the other was the subjects dropped out from at least one follow-up survey. Those two groups were compared according to the mean number of teeth present. The mean number of remaining teeth was 19.31 (sd=8.19) in follow-up group and 17.78 (sd=7.96) in drop-out group. Although there was a significant difference ($p<0.05$), it was not so high. No significant differences were found in root D, root DF, coronal D and coronal DF between follow-up and drop-out. Therefore, follow-up dentate subjects and drop-out dentate subjects were considered to have similar oral status at baseline.

Root caries index - Two points were taken into consideration, in evaluation of the amount of root caries occurrence. First, there is a root surface filling problem. Walls *et al.* undertook a prospective study among general dental practitioners in United Kingdom and reported that 45% of restorations were placed because of decay compared with 55% for cervical wear/ sensitivity (18). Inclusion of all root filings within the filled component of an index for root caries will overestimate the incidence. So, in order to avoid overestimation by filling of cervical wear or abrasion, F component was not included in root caries occurrence. And second, there is an underestimation problem. Root caries occurrence during the period will be underestimated, if F component is excluded from caries occurrence. Moreover, tooth loss causes the problem that root caries occurrence before tooth extraction is not included in root caries incidence (19). In this study, therefore, the number of root caries occurrence was calculated by year so that all the root caries occurrence can be counted, except for the case that the root caries occurred and filled / extracted within a year.

In measuring of root caries frequency in longitudinal studies, root caries increment (DFS increment) that is calculated from a baseline and a follow-up examination data is widely used (20). The measurement we used in this study is corresponding to the root DFS increment rather than the root DS increment, because we counted root decay before it would be filled.

Increment and incidence - In this study 70-year elderly followed for two years, root caries annual incidence rate was 18.0% and annual mean number of disease events per person was 0.47 surfaces. There are some researches in which teeth were examined without air syringe, radiographs and calculus removal before examination. In the survey that noninstituionalized adults aged 65 and older in North Carolina were investigated for 3 years, root DFS annual incidence rate of Black was 9.7% and net DFS annual increment was 0.18, and of White, 13.0%

and 0.23, respectively (7). In Canada, root DFS annual incidence was 13.0% and root DFS annual increment was 0.2. This research was carried out among community-dwelling adults aged 50 and older for three years (10). Home-dwelling 88-year adults were investigated in Göteborg, Sweden and root DFS annual incidence was 16.8% and root caries annual increment was 0.9 (6). The incidence and the mean increment of the present study were about twice as high when compared with two former studies in United States and Canada including younger age subjects. The incidence of this study was higher, but increment was smaller than that of the 88-year adults in Sweden. When considered our present data combined with data reported previously, it was suggested that root caries occurrence tend to increase with aging.

Risk predictor - In the present study, three multiple logistic regression analyses (model-1、model-2、model-3) were performed in order to identify the robustness of independent variables by assessing significant variable related with one, two and three or more root caries occurrence. Two variables, having one or more root DS (root DS experience) and mean LA ≥3.6 mm, were common to three models, and they have good robustness. Past root caries experience was reported for root caries risk predictor by Locker and Scheinin *et al.* (8, 10). But from chi-square test, root DS at baseline seemed to have stronger relation than root DFS with root caries occurrence in this study. So root DS experiment at baseline was put into logistic regression analyses. The analyses using root DFS experience instead of root DS at baseline were performed and we got similar result, but the odds ratio of root DFS was smaller. And poor periodontal status, indicated by baseline attachment level, was reported in the root caries prediction models of Black and White by Lawrence et al. (7).

Three variables, having two or more crown restorations, no use of interdental brushes or dental floss and LB level 10^5 CFU/ml or more were common to two models. These three variables do not have stronger relation with root caries occurrence than variables common to three models. Past coronal caries experience was taken as a root caries risk predictor (9). In the present study, a bridge abutment teeth were differentiated from a crown restoration. So, crown restorations used here considered mainly the teeth with coronal caries experience. The use of interdental brushes or dental floss is effective in removal of plaque on proximal surfaces (21, 22, 23, 24). So root caries occurrence on proximal surfaces may be prevented by the use of those instrument. Salivary level of Lactobacilli and mutans streptococci were reported to be significant factors of root caries occurrence (8, 9). In this study, the relation between high salivary LB level and multiple root caries occurrence was suggested, because LB level were significant in model-2 and model-3. And from chi-square test, persons having 3 or more caries occurrence showed significantly higher LB level than those with 2 or less. In this study, SM level was not used in risk prediction models, because there was strong correlation between LB and SM level, and LB level was large p-value in chi-square test between LB level and root caries occurrence. Root caries incidence rate of the subjects with SM level 10^5 CFU/ml or more was 40.5% and that with SM level 10^4 CFU/ml or less was 28.0%. And it showed statistical significant difference (chi-square test $p<0.05$). This result suggested that high SM level was also associated with root caries occurrence.

Body Mass Index was detected as a significant variable in model-2 taken two or more disease events as a dependent variable. So, BMI robustness was concluded relatively weak because it was significant only in one model. Among Japanese elderly people, the high BMI does not become the risk of the mortality and morbidity like young or middle aged (25). Rather it was reported that low BMI became the risk of all-cause mortality (26, 27, 28, 29), and the risk of daily activity limitation (29). From these reports, low BMI may be associated with

the poor general health.

In conclusion, 35.9% (male 14.5%, female 29.8% $p<0.05$) subjects had one or more root caries occurrence in two years. The mean number of disease events per person was 0.93 surfaces. In prediction models, risk predictors with the strongest robustness were one or more root DS, mean LA ≥3.6 mm. Risk predictors with the middle level robustness were two or more crown restorations, no use of interdental brushes or dental floss and lactobacilli level $\geq 10^5$ CFU/ml. Risk predictor with weak robustness was BMI <20. These findings suggest that oral status was good risk predictor, and poor general health indicated by low Body Mass Index may also contribute to root caries occurrence in elderly population.

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70歳高齢者の歯の喪失リスクに関する縦断調査　－１年後の結果－

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「高齢者の口腔保健と全身的な健康状態の関係についての総合研究」

C．研究協力課題名「70歳高齢者の歯の喪失リスクに関する縦断調査－1年後の結果－」

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E．研究目的：

当教室が口腔と全身機能との関連を明らかにするために 1998 年より新潟市に在住する 70 歳高齢者を対象とて開始した縦断調査のサンプルを用いて、歯の喪失リスクに関する縦断調査を開始した。

本稿では、ベースライン調査とその 1 年後の結果を用いて、70 歳高齢者における歯の喪失発生の実態とリスク要因について報告する。

F．研究方法：

1998 年度に新潟市在住の 70 歳高齢者 599 名を対象にベースライン健診を行い、1 年後に追跡調査を行った。分析対象者は、追跡調査の受診者のうちベースライン時における無歯顎者を除く 449 名（男 231 名、女 218 名）である。

調査項目は、口腔健康状態（口腔内診査、咀嚼能力、咬合力、口腔細菌検査など）、全身健康状態（血液生化学検査、骨密度、体力測定など）、質問紙調査（生活習慣・環境、保健行動、受療行動など）である。

分析は、まず対象者のベースライン時の口腔内状況、と 1 年後における歯の喪失の有無と喪失歯数の分布を調べた。次いで、調査期間中に歯を喪失した人（喪失(+)）と喪失のなかった人（喪失(-)）に分けて、ベースライン時における各種リスク情報をクロス集計で比較した。また、歯単位の分析も行い、ベースライン時に歯の状態別にみた喪失歯率を算出した。

G．研究結果・考察：

ベースライン時における分析対象者の一人平均現在歯数は 19.2 本（男 19.5 本、女 18.8 本）であった。

1 年後における喪失(+)者は、全体で 74 名（15.2 %）であった。一人平均喪失歯数は、分析対象全体では 0.27 本、喪失(+)者に限定すると 1.65 本であった。

ベースライン時の情報と歯の喪失の有無との関連についてクロス集計を行った結果、喪失(+)者の割合は、以下の特性を有している人たちで高かった：

SM･LB 菌数が多い
歯周状態が悪い
咬合力が低い

咀嚼能力が低い
骨密度が低い（男性のみ）
義歯を装着
BMI が低い
一人暮らし
食物を味わいながら食べていない

1 年間における喪失歯の総数は 122 本で、歯単位でみた喪失歯率は全体で 1.42 %であった。ベースライン時における各歯の状態別に喪失歯率を比較すると、未処置歯、全部被覆冠の喪失率が高かった。また、歯周状態の悪い歯と義歯鉤歯の喪失歯率も高かった。

リスク要因に関する分析結果は、調査期間が 1 年間と短く、交絡因子を調整していない結果であるため、確定的な結果とは言えず、さらに追跡期間を長くして詳細な分析を行う必要がある。本調査は、前述したように口腔と全身の関連を把握することを主目的としているため、従来の調査で指摘されているう蝕・歯周疾患のリスク要因に加えて、今回関連が示唆された骨密度のような全身的要因についても分析することが可能である。

H．結論：

1998 年度に新潟市在住の 70 歳高齢者 599 名を対象にベースライン健診を行い、1 年後に追跡調査を行った。1 年後における喪失(+)者は、全体で 74 名（15.2 %）で一人平均喪失歯数は、分析対象全体では 0.27 本であった。喪失(+)者の割合は、SM･LB 菌数が多い、歯周状態が悪い、咬合力が低い、咀嚼能力が低い、骨密度が低い（男性のみ)、義歯を装着、BMI が低い、一人暮らし、食物を味わいながら食べていない、で高かった。

I．研究発表論文：

論文別刷り

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P.95-99 は雑誌/図書等に掲載された論文となりますので下記の「研究成果の刊行に関する一覧表」をご参照ください。

「研究成果の刊行に関する一覧表」

私の研究室から 70 歳高齢者の歯の喪失リスクに関する縦断調査
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