

# Glucose Tolerance in Patients with Oral Lichen Planus

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*Abstract.* Of 123 patients with oral lichen planus two were known diabetics. The remainder were tested for fasting glucosuria, 113 for fasting blood glucose and 103 also with an oral glucose tolerance test. According to the criteria of WHO, 18 of the 123 patients were diabetics. In most of these patients the oral glucose tolerance test was only slightly abnormal. No decrease of the glucose tolerance with increasing duration of lichen planus was demonstrable. Comparison with two general population studies did not reveal any significant difference between the glucose tolerance of the lichen planus patients and that of the general population samples.

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Several theories have been proposed concerning the etiology of lichen planus, and the diversity of these theories emphasizes the obscure nature of the disease (Black 1972). Reports of associations between lichen planus and other diseases have also been given and among these an association between oral lichen planus and diabetes has been published (Grinspan et al. 1966). In 1972 Jolly supported this theory by finding 85 % of 33 patients with oral lichen planus defective in their carbohydrate tolerance. Powell et al. (1974) found some abnormality in 62 % of 21 investigated patients with cutaneous lichen planus. Furthermore, Howell & Rick (1973) raised the question of a possible syndrome of oral lichen planus and diabetes because they found a prevalence of 13 % diabetics among patients with oral lichen planus.

The purpose of the present study was to examine the glucose tolerance in a group of oral lichen planus patients and to compare

the glucose tolerance of patients with various durations of the disorder. Finally, a comparison was made with the glucose tolerance in general population samples as found in the literature.

### Material and Methods

The material comprised 123 patients, 85 females and 38 males, with typical clinical and histological features of oral lichen planus. A clinical diagnosis of lichen planus was made in the presence of one or several lesions of the reticular, papular, plaque, atrophic or erosive types (Andreassen 1968). Histological diagnosis of lichen planus was made on the following criteria, of which the first and the second were always present: A bandlike infiltrate of inflammatory cells consisting mainly of lymphocytes confined to the superficial layer of the lamina propria, abnormal keratinization (hyperorthokeratosis or hyperparakeratosis), liquefac-

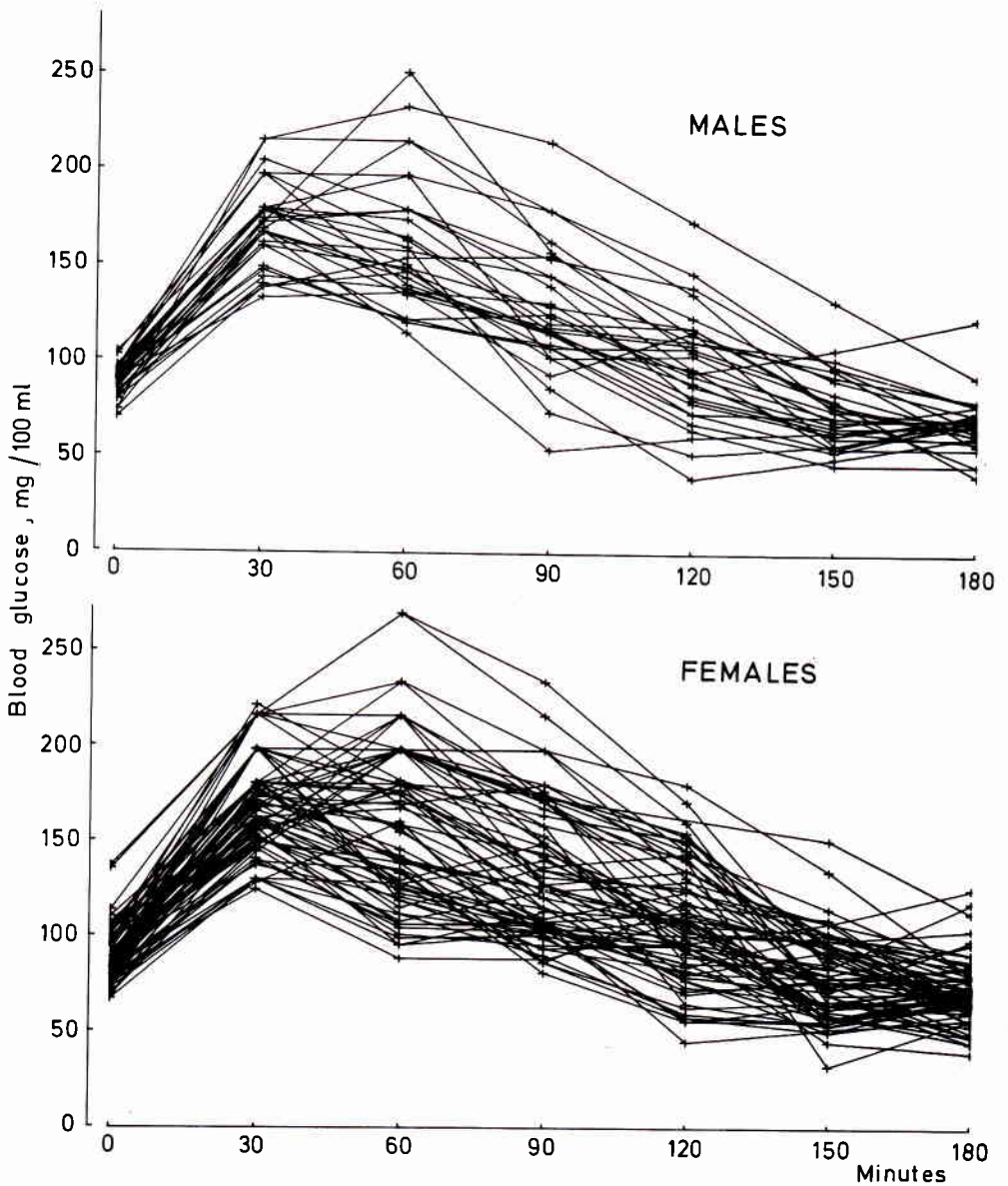


Fig. 1. Oral glucose tolerance curves and fasting blood glucose values (time 0) of the lichen planus patients.

tion degeneration of the basal layer, a juxta-epithelial eosinophilic, cell-free zone and saw-toothed rete pegs (Andreasen 1968). The age of the patients ranged from 20 to 89 years.

All the patients were seen in the Dental Department, University Hospital of Copenhagen for follow-up examination and consecutively referred to the Department of Internal Medicine for examination of the glu-

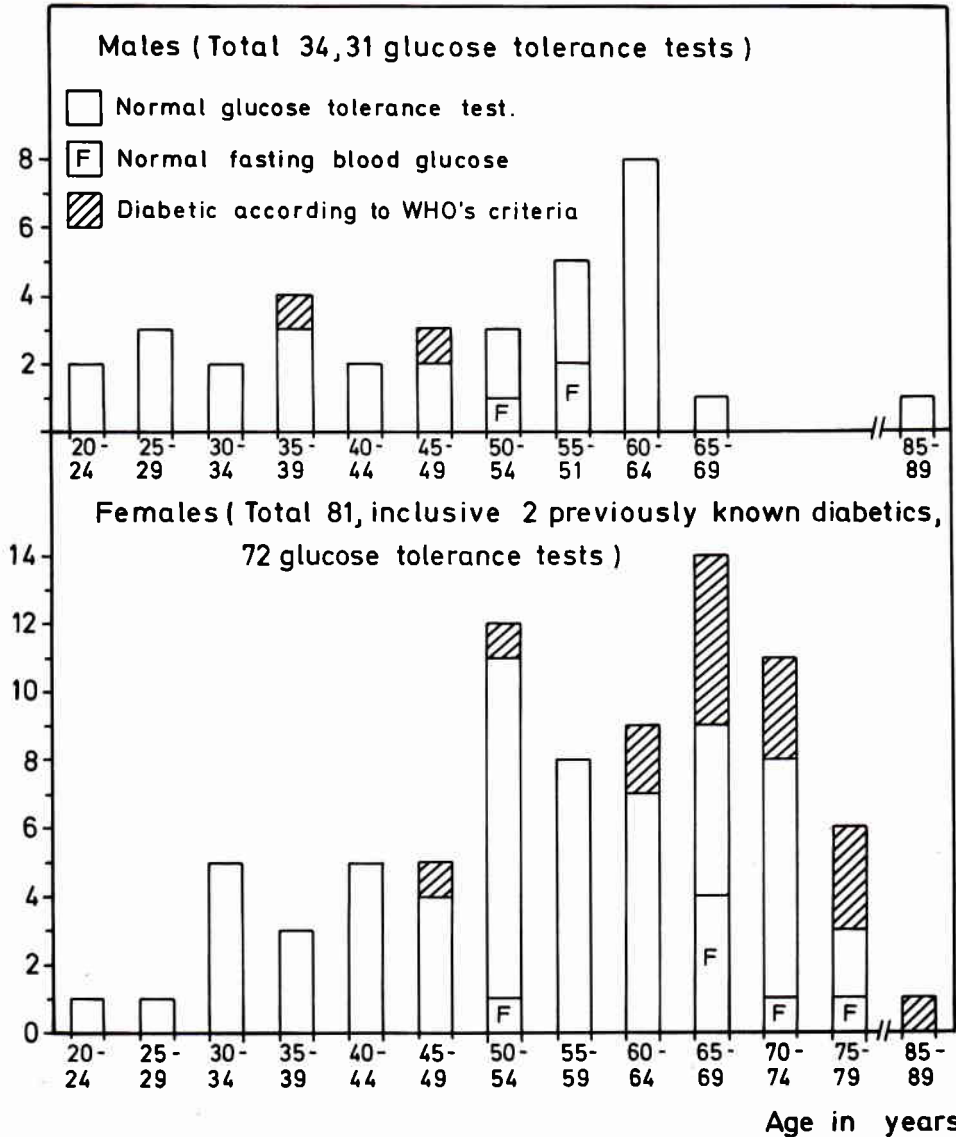


Fig. 2. Sex and age distribution of the lichen planus material showing the number of diabetics and non diabetics according to WHO criteria.

cose tolerance. Here a general medical history was taken with special reference to previously diagnosed diabetes and to any medical treatment. Likewise a physical examination was performed. Two females, aged 45 and 89 years, were known diabetics

treated with insulin and tolbutamide, respectively. These patients were not examined further. The remaining 121 were examined for fasting glucosuria. The morning urine was examined for glucose with Clinistix®.

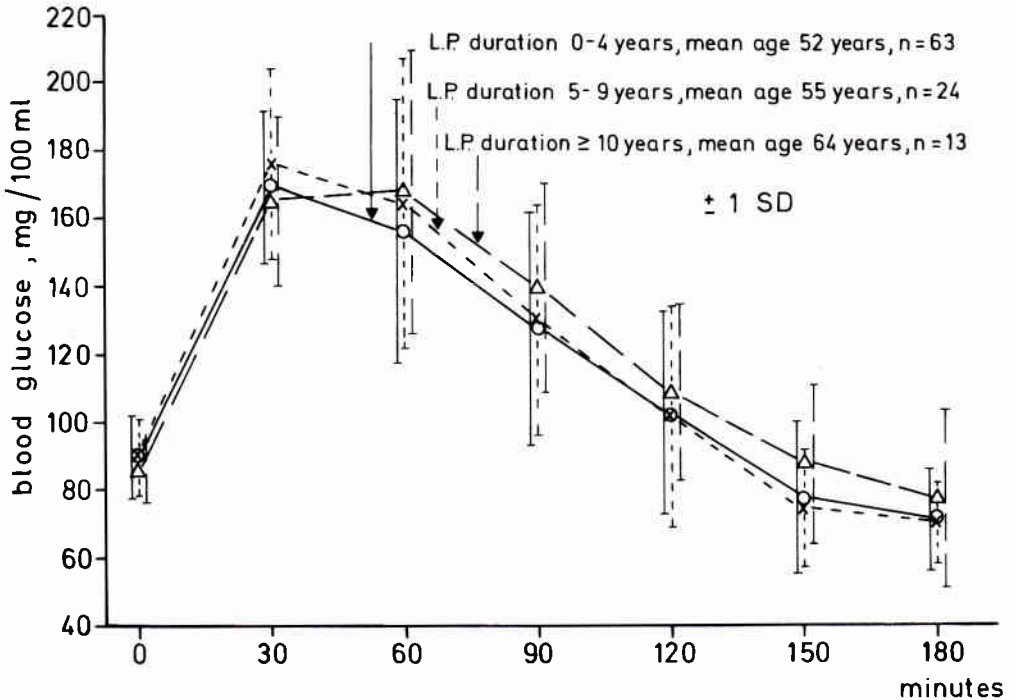


Fig. 3. Mean glucose tolerance curves ( $\pm$  SD) of groups of patients with various durations of oral lichen planus.

An oral glucose tolerance test was performed on 103 patients, 31 males and 72 females. An additional three males and seven females, i.e. 113 patients, were investigated for fasting blood sugar. The duration of the lichen planus lesions was known in 109 of these patients. In 68 (62.4 %) the duration was 0-4 years. In 24 (22.0 %) it was 5-9 years and in 17 (15.6 %) it was 10 years or more. For the oral glucose tolerance test the patients were instructed to eat meals with a minimum content of 300 g of carbohydrate per day and not to take any medicine during 3 days preceding the blood sugar examinations, which were performed after overnight fasting.

Standard oral glucose tolerance test was performed with 1 g of glucose per kilo body weight with a maximum of 70 g. Samples of capillary blood from the earlobe were taken

fasting, and 30, 60, 90, 120, 150 and 180 min after drinking the glucose solution. Blood glucose was determined by the hexokinase method (Schmidt 1961).

According to the WHO criteria (WHO Expert Committee 1965) patients having fasting blood glucose values over 130 mg/100 ml and/or 2 h blood glucose levels of 140 mg/100 ml or more were classified as diabetics.

Glucose tolerance curves of patients with different durations of lichen planus were compared in order to examine the possible influence of the duration of lichen planus on the glucose tolerance.

### Results

None of the lichen planus patients had fasting glucosuria. Fig. 1 shows, for males and

females respectively, the fasting blood glucose values and the glucose tolerance curves of all the examined patients.

Fig. 2 shows the age distribution of lichen planus patients, (males and females respectively), who had an oral glucose tolerance test done and/or had the fasting blood glucose determined or were known diabetics.

Fig. 2 also shows the number of diabetics and non-diabetics in each group according to the criteria of WHO (WHO Expert Committee 1965). It is seen that the number of lichen planus patients is higher in the older age groups, especially among the females. Likewise, it is seen that the frequency of diabetics increases with the age. Two male and 16 female diabetics were found. Most of these had only slightly abnormal glucose tolerance curves and none, except the two already known diabetics, had clinical symptoms.

Fig. 3 shows the mean glucose tolerance curves  $\pm$  SD of the lichen planus patients with a duration of lichen planus of 0-4 years, 5-9 years and 10 years or more, respectively. No difference of the glucose tolerance between the three groups is evident. It should be noted that the mean age increases with the duration of lichen planus.

### Discussion

The present lichen planus patients have been seen for follow-up examination and consecutively referred to the Medical Department without regard to previously diagnosed diabetes. The examined lichen planus material shows the same excess of women and elderly individuals as the total lichen planus material (Holmstrup et al. 1975) and is regarded as a representative sample.

For examination of the glucose tolerance a standard oral glucose tolerance test has been used, the amount of glucose administered being adapted to the body weight. For glucose determination the hexokinase meth-

od, which is specific for glucose, has been employed (Schmidt 1961, Editorial 1968).

The measurements have been carried out on capillary blood, in which the glucose concentration nearly equals the glucose concentration of the arterial blood which, in contrast to that of the venous blood, is very stable (Whichelow et al. 1967).

In our study no decrease of the glucose tolerance with increasing duration of lichen planus was demonstrable.

In an attempt to resolve the question of whether the lichen planus patients generally had decreased glucose tolerance we compared the lichen planus material with general population materials from Kristianstad, Sweden (Nilsson et al. 1964) and Bedford, England (Butterfield 1964, 1966). This comparison was possible as the prevalence of diabetes mellitus is not significantly different in Swedish, English and Danish population groups which are similar in race and life style (Marks 1971).

The Kristianstad survey comprised a random general population sample of 301 subjects (Nilsson et al. 1964). Eight of these (2.7 %) were previously diagnosed diabetics. Of the remaining 293 persons, 207 had an oral glucose tolerance test done with 30 g glucose per m<sup>2</sup> body surface, making an average dose of 50 g. The blood glucose was determined on capillary blood by the orthotoluidin method (Hultman 1959), which gives true blood glucose values (Editorial 1968).

In the Bedford survey (Butterfield 1964, 1966) 570 individuals had an oral glucose tolerance test done with 50 g of glucose, i.e. almost the same amount used in the Kristianstad survey. The blood glucose values were determined by the microferricyanide reducing method, which gives values about 10 mg/100 ml over true glucose (Editorial 1968).

The percentages of previously diagnosed diabetics were 1.6 (two of 123) in the lichen

Table 1. The fractions of unknown diabetics in the lichen planus material, the Kristianstad survey and the Bedford survey. Using the Fischer exact probability test no significant differences could be found between the various frequencies ( $P > 0.1$ ).

	Age (years)	Lichen planus material	Kristianstad survey	Bedford survey
Women	20-39	0	0	3 *
		12	34	97
	40-59	1	1	4 *
		30	36	93
	60 and over	13	5	15 *
		40	28	90
Men	20-39	1	0	1 **
		11	31	48
	40-59	1	0	3 **
		11	42	52
	60 and over	0	2	2 **
		10	36	45

\* Butterfield (1964), Fig. 3

\*\* Butterfield, Keen & Whichelow (1967), Fig. 3

planus material and 2.7 (eight of 301) in the Kristianstad survey, i.e. not significantly different in the two materials ( $P > 0.4$ ) using the Fischer exact probability test. In the Bedford survey, this percentage was not published.

The frequency of unknown diabetics in the materials appears in Table 1 which shows for each sex and age group (20-39, 40-59 and 60 years and over) the proportion of diabetics according to WHO's criteria (WHO Expert Committee 1965) in relation to the number of examined persons in the lichen planus material, the Kristianstad survey and the Bedford survey. Using the Fischer exact probability test, no significant differences of the frequency of diabetics

could be found between the three materials ( $P > 0.1$ ).

As it is well established that there is a smooth gradation of blood sugar values from normal to diabetic values (Butterfield 1964) and any criteria for diabetes are arbitrary (Kobberling & Creutzfeldt 1970), we have also made a direct comparison of the glucose tolerance curves.

Fig. 4 shows for each sex and age group (20-39, 40-59 and 60 years and over) the mean glucose tolerance curves of the lichen planus patients, the Kristianstad material and the Bedford material.

Although the somewhat bigger glucose load of about 65-70 g used in the lichen planus patients should be expected to give

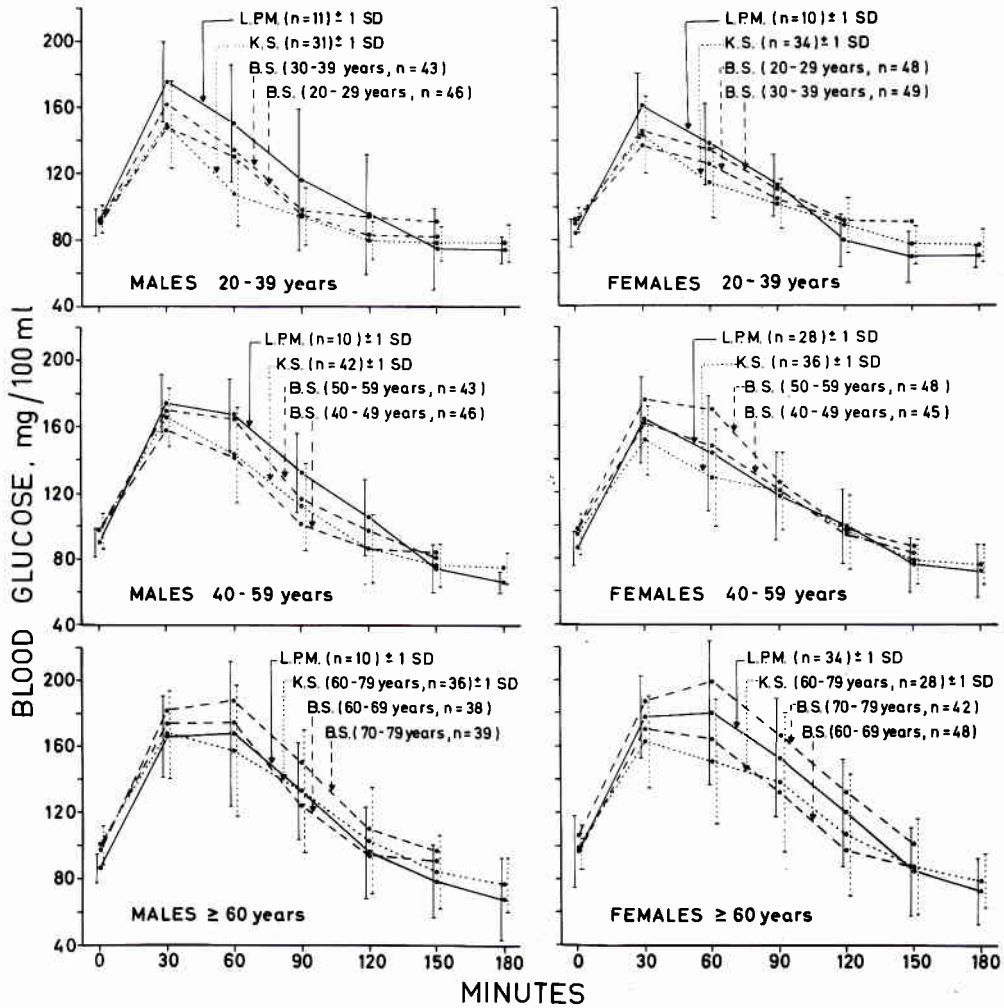


Fig. 4. Mean glucose tolerance curves of the lichen planus material (L.P.M.), the Kristianstad survey (K.S.) and the Bedford survey (B.S.) divided in sex and age groups.

higher glucose values in the glucose tolerance test (Castro et al. 1970, Chandalia & Boshell 1970, Sisk et al. 1970) no systematic differences in the glucose tolerance curves of the three materials are apparent. Only for males 20-39 and 40-59 years are the 30, 60, 90 and 120 min values of the lichen planus curve higher than the corresponding values of the other curves. The reason for

this may be the small number of lichen planus patients in these age groups and the fact that the two male diabetics happened to be in these groups (Fig. 2). The younger of these had a markedly abnormal glucose tolerance test (Fig. 1) with a 60 min value of 235 mg/100 ml and a 120 min value of 175 mg/100 ml. The values of this patient displaced the mean curve of the 10 other

patients in the group to a higher level and at the same time made the standard deviation bigger.

Thus no certain evidence for a decreased glucose tolerance in lichen planus patients was found in this study.

Grinspan et al. (1966) in a series of 61 patients with oral lichen planus found 23 (38 %) diabetics. The age distribution of the material was not published. Blood sugar was determined by the methods of Somogyi-Nelson and of Folin-Wu. Both of these methods give values higher than true glucose tolerance (Editorial 1968). The criteria for evaluating the glucose tolerance curves were those of Fajans & Conn (1959) which are rather sensitive and classify more as diabetics than for example the point system of Wilkerson (Kobberling & Creutzfeldt 1970). Furthermore the lichen planus material was not compared with the general population.

Howell & Rick (1973) found among 316 patients with oral lichen planus 41 (13 %) diabetics. The age and sex distribution of the material and the methods used were not published. No comparison with the general population was made. However, it should be mentioned that Butterfield (1964) in the Bedford survey found a frequency of diabetes of 12–14 % in the general population sample, i.e. the same found by Howell & Rick (1973) in their lichen planus material.

Jolly (1972) found among 33 patients with oral lichen planus 28 (85 %) patients with decreased glucose tolerance. The blood glucose level was determined by the method of Asatoor and King, which determines true glucose (Wootton 1960). The majority of Jolly's material comprised elderly patients since 24 (71 %) were over 49 years, and 16 (48 %) were over 59 years old. Twenty-one (64 %) of the patients were females. Also in the investigation of Powell et al. (1974) the majority of the 21 examined patients were elderly individuals. However, it is well established that glucose tolerance decreases

with increased age (Streeten et al. 1965) especially among females (Butterfield et al. 1967) and about 50 % of females more than 60 years old should be regarded as diabetics according to the conventionally used criteria (Butterfield 1964). When comparing the blood sugar values of the lichen planus patients with those of the general population it should therefore be done after an age and sex distribution of the materials. The high frequency of diabetes among elderly individuals may also be the reason for the increased frequency of diabetes among patients suffering from lichen planus during many years as found by Howell & Rick (1973). Most of these patients belong to the older part of the population.

#### Conclusion

In the patients with oral lichen planus the frequency of diabetics was not significantly higher and the oral glucose tolerance not significantly lower than found in general population samples. No decrease in the glucose tolerance with increasing duration of lichen planus was demonstrated. Therefore this study does not support the hypothesis of a relationship between lichen planus and diabetes mellitus.

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