
PREVALENCE OF NICKEL HYPERSENSITIVITY AMONG SAUDI DENTAL PATIENTS IN THE RIYADH AREA: a preliminary study

Prevalência de sensibilidade ao níquel em pacientes odontológicos Sauditas na área de Riyadh: estudo preliminar

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Abstract

OBJECTIVES: The aim of this study was to determine the prevalence of nickel hypersensitivity in a sample of Saudi dental patients in Riyadh City. **MATERIAL AND METHOD:** Nickel sensitivity patch testing was performed on a 100 consecutive Saudi patients (50male, 50female) attending the dental clinics at the college of dentistry, King Saud University. The data were analyzed using a t-test to detect differences between males and females. The significance level was set at < 0.05 . **RESULTS:** Out of 100 subjects, 88 (45males and 43 females) completed the test by attending the interpretation and photography follow-up examination. A total of eight subjects (9.1%) developed a reaction toward nickel, five females (11.6%) and three males (6.7%). There was no statistically significant difference between males and females. Relative risk for females over males was 1.7. **CONCLUSION:** Nickel hypersensitivity does exist in Saudi dental patients. Females are more likely to develop a hypersensitivity to nickel.

Keywords: Nickel hypersensitivity; Dental patients; Saudi; Riyadh City.

Resumo

OBJETIVOS: O objetivo deste estudo foi determinar a prevalência de hipersensibilidade ao níquel num grupo de pacientes odontológicos na cidade de Riyadh. **MATERIAL E MÉTODO:** Teste de sensibilidade ao níquel foi executado em 100 pacientes Sauditas (50 homens, 50 mulheres) que compareceram na clínica odontológica da Faculdade de Odontologi, King Saud University. Os dados foram analisados utilizando-se um test-t para detectar diferenças entre os sexos. O nível de significância foi estabelecido em <0.05 . **RESULTADOS:** Entre os 100 indivíduos, 88

(45 homens e 43 mulheres) completaram o teste, comparecendo para seguimento de interpretação dos exames e exame radiográfico. Total de oito indivíduos (9.1 %) desenvolveram reação ao níquel, sendo cinco mulheres (11.6%) e três homens (6.7 %). Não houve diferença estatisticamente significativa entre homens e mulheres. O risco relativo para mulheres foi de 1.7. **CONCLUSÃO:** A sensibilidade ao níquel ocorre em pacientes odontológicos Sauditas, sendo que as mulheres são mais susceptíveis de desenvolvê-la.

Palavras-chave: Hipersensibilidade ao níquel; Pacientes odontológicos; Sauditas; Riyadh.

INTRODUCTION

Fixed orthodontic appliances contain nickel in variable amounts, which ranges from 8% in stainless steel up to 50% in nickel titanium arch wires (1-5). Nickel is a strong biologic allergen and sensitizer that causes a type IV “delayed” hypersensitivity mediated by T-lymphocytes (1, 4, 5-10). Nickel is known to trigger more allergic reactions than all other metals combined (1, 4, 7, 9, 11, 12). Nickel sensitization is believed to be increased by mechanical irritation, skin laceration, mucosal injury, increased environmental temperature, or increased intensity and exposure to the allergen. These factors may occur during orthodontic treatment (1, 2, 13-15).

Diagnosing nickel allergic contact stomatitis is more difficult in the oral mucosa than in the skin. Lesions caused by nickel allergic contact stomatitis can be confused with mechanical injury, autoimmune lesions, aphthous stomatitis, or poor oral hygiene (16). Signs and symptoms of intra-oral nickel allergy include stomatitis, papular perioral rash, loss of metallic taste, numbness, burning sensation, soreness at the side of the tongue, angular cheilitis or severe gingivitis in the absence of plaque (1, 2, 10, 16).

Some of the oral clinical manifestations in orthodontic patients may also include: gingival hyperplasia, labial desquamation, angular cheilitis, multiform erythema, and Periodontitis (16). In chronic cases, the affected mucosa is typically in contact with the casual agent and appears erythematous or hyperkeratotic to ulcerated. Furthermore, other symptoms can also be present, such as perioral dermatitis and rarely parasthesia.

Nickel sensitivity patch testing is routine and safe, and the most frequently used method for identifying allergic reactions by dermatologists (7, 12, 13, 17-19). The aim of this study was to determine the prevalence of nickel hyper sensitivity in a sample of dental patients in Riyadh City. This information will provide awareness and knowledge for orthodontists regarding their patients' profiles and the possibility of encountering allergic patients.

MATERIAL AND METHOD

One hundred consecutive Saudi patients (50males, 50 females) from the dental clinics at the College of Dentistry, King Saud University, participated in this study. The mean age was 26.9 years for males and 22.1 years for females. Informed consent was obtained from the patients. The form was approved by the College of Dentistry Research Center at King Saud University. The inclusion criteria in this study were: healthy individuals, no significant past medical history and no previous orthodontic treatment. A questionnaire was distributed to 116 subjects to confirm their suitability for inclusion in this study. One hundred subjects fulfilled the inclusion criteria.

Nickel sensitivity patch tests were performed on all patients by using two Finn Chambers® on a Scanpor® tape (Norgesplaster, Oslo, Norway). A suspension of 5% nickel sulfate (Hexahydrate $\text{NiSO}_4 \cdot \text{H}_2\text{O}$) (Loba Chemie, LTD. Mumbai, India) in a petroleum base was applied to one of the chambers and plain petroleum jelly was applied to the other as a control (placebo) (Figure 1).



FIGURE 1 - The two Finn Chambers® on a Scanpo® tape

The patch was applied to the medial aspect of the upper arm. The area was prepared using an alcohol swab. The patches were left in place for 48 hours. During this period, patients were instructed to keep the patch dry and not to remove it or scratch the arm unless they experience severe pain or discomfort. In addition, they were given instructions for proper removal. After 48 hours, the patch was removed and the reaction was evaluated by one investigator after 30 minutes to exclude any irritation caused by the removal of the patch. A photograph of the area was then taken. The photographs were reviewed by the same investigator and the results were confirmed by a dermatologist. All photographs were taken in a standardized manner. Responses were interpreted according to the scale of the International Contact Dermatitis Research group (ICDRG; Table 1). The data were analyzed utilizing a t-test to detect differences between males and females. The significance level was set at < 0.05 .

TABLE 1 - Scale of the international contact dermatitis research group

Results	Score	Reaction
NEGATIVE	0	Absent
	1	Light erythema
POSITIVE	2	Erythema
	3	Erythema + edema + papules
	4	Erythema + edema + papules + vesicles

RESULTS

Out of 100 subjects (50 males and 50 females), 88 (45 males and 43 females) attended the follow-up appointment for interpretation and photography. A total of eight subjects (9.1%) developed a reaction toward nickel: five females (11.6%) and three males (6.7%; Figure 2).

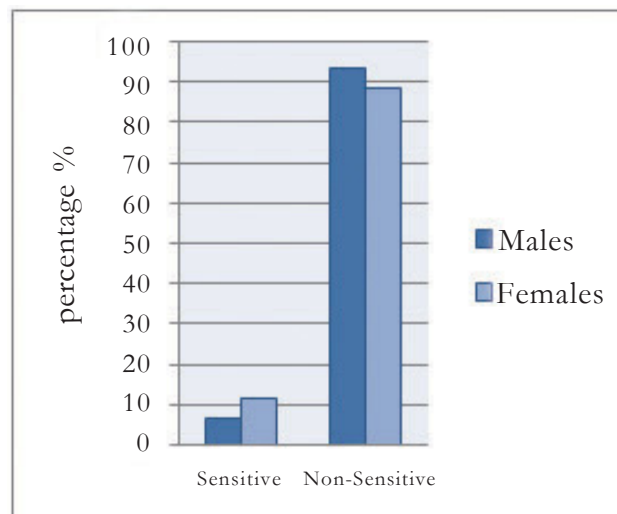


FIGURE 2 - Percentages of nickel hypersensitivity in both sexes

There was no statistically significant difference between males and females. Relative risk (RR) for females as compared to males was 1.7. The most severe reaction recorded was grade 3, and included erythema, edema and papules. No grade 4 reactions developed in any of the subjects (Table 2).

TABLE 2 - Frequency and degree of nickel hypersensitivity in both sexes

	Negative 0	Negative 1	Positive 2	Positive 3	Total
Female	26	12	1	4	43
Male	26	16	1	2	45
Total	52	28	2	6	88

DISCUSSION

Nickel is a metal that is considered to be an allergen. Nickel is present at variable amounts in most orthodontic appliances that are used in treating dental patients (1-5). Leaching of material component from the orthodontic appliance is essential for the hypersensitive reaction (20). Knowing the prevalence of nickel hypersensitivity in dental patients is necessary. Orthodontists and dental practitioners must be aware of the reaction. This awareness is needed for patient education and differential diagnosis.

This study showed that nickel hypersensitivity is present in the Saudi dental patient sub-population. The prevalence of nickel hypersensitivity in this population is comparable to the prevalence in other sub-populations. Blanco-Dalmau and co-workers (11) conducted a patch test using 5% nickel sulfate in 403 people, (121 males, and 282 females). They found that the incidence of positive reaction was 28.5%, with a remarkable difference between genders, (31.9% of female subjects tested positive, as compared with 20.7% of male subjects) (11, 12, 14). El Agroudi (12) evaluated 106 subjects (50 males, 56 females) for nickel sensitivity using a patch test. Ninety six subjects attended the follow-up; 10.3% had positive reactions (14.28% of the women, 6.25% of the men). Stenman and Bergman (12) performed a patch test in 151 patients (119 females, 32 males). A positive reaction to nickel was found in 21 patients (14%), including 20 women and 1 man. Jones (11) attempted to determine the incidence of nickel hypersensitivity with a patch test in 100 patients (50 men, 50 women). It was found that incidence of hypersensitivity to nickel was 20% for women and 2% for men. Kerosuo (12) found the prevalence of nickel allergy in Finnish adolescents to be 30% percent in girls and 3% percent in boys. A previous study examined the features and profile of sensitizing allergens in Riyadh, Saudi Arabia. It was found that sensitization to nickel sulfate was most common. Sensitization to nickel was higher in women (30.0%) (7).

In this study the most severe allergic reactions occurred in females and that may be due to ear piercing, which is commonly practiced by women in our society, and the use of inexpensive jewelry. This reaction is categorized as grade 3, which include erythema, edema, and papules. Furthermore, no

subjects developed grade 4 reactions. The RR value shows that female dental patients in Riyadh area have 1.7 more chances for developing nickel hypersensitivity as compared to males.

Ideally the nickel sensitivity patch should be placed on the back of the patient to create pressure and intimate contact with the patch. However, in a dental setting this is considered to be a limitation. Therefore the medial aspect of the arm was selected for placement of the patch. The small sample size in this study may have had a role in the lack of a statistically significant difference between the two genders. Previous studies with larger samples showed significant differences between males and females (11-14). Future studies are needed with larger sample sizes to confirm the results of this study and to examine the statistical difference between genders.

CONCLUSION

A total of 9.1% of Saudi dental patients developed hypersensitivity towards nickel. Females (11.6%) have a higher prevalence of nickel hypersensitivity than males (6.7%). In addition, female dental patients have a 1.7-fold higher chance of developing hypersensitivity than do male dental patients in Riyadh.

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