

PROFESSIONAL RISKS BY AUTOPOLYMERISED ACRYLIC RESINS AMONGST DENTISTS

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ABSTRACT

This descriptive study was carried out at Liaquat University Institute from July 2016 to August 2016 with dental students, General Dental Practitioners and specialist Prosthodontists. The participants were asked about their qualification, durations of polymethylmethacrylate use, organs affected by allergy, whether any medical treatment acquired for their problem, time period for development of allergy and the protocols used for prevention of further problems. It was concluded that majority of the participants had allergic reactions to skin but most of them did not took any medical help or followed any protocols to prevent further reactions.

Key Words: Auto polymerized acrylic resins, allergic reactions, occupational hazards, contact dermatitis monomethylmethacrylate.

INTRODUCTION

Dental resins consisting of Mono methyl methacrylate (MMA) and Polymethylmethacrylate (PMMA) are the most commonly used polymers since 1960 especially in the field of prosthodontic, orthodontics, surgery thus having an unavoidable purpose in dentistry.¹

Currently in the field of dentistry polymethyl-methacrylates (PMMA) are classified as heat, chemical and light and microwave activated depending on the type of polymerisation reaction. The residual content of monomer (MMA) and formaldehyde after reaction is subjected to cause allergic reactions. The highest content of residues are supposed to be found in chemically activated polymethylmethacrylate (PMMA) 0.1 to 5%.²

The permissible environmental level for MMA is 10 parts/million of air i-e 410 mg/cubic meter of air in 8 hours shift or 100 ppm methylmethacrylate vapour in dental laboratory and operating rooms.³ A reliable method to detect the safety level is to measure the

amount of substance in the air. Higher the exposure time, more will be the chances of allergic reactions to residues.

Dental personnel's are exposed to autopolymerized acrylic resins with high content of residual monomer). It has been reported to cause abnormalities or lesions in several organs like skin, eyes, nose throat, respiratory tract and nervous system (effects nerve fibers) leading to burning mouth, irritation of eyes, skin, contact dermatitis (erythema and necrosis), asthma with nasal olfactory epithelium prone to be the first site to get affected.^{3,5} Some studies even reported it to be carcinogenic and embryo toxic in animals.¹

Autopolymerised acrylic resin has been widely used in dentistry especially in field of Prosthodontics for construction of denture base plates, impression trays, denture relining and temporary crowns, thus exposing the dental practitioners and technicians on regular basis. Unfortunately many of exposed personnel's are unaware about the safety measures, permissible exposure level of these hazardous chemicals thus suffer from different allergic reaction. This study was designed to assess the incidence of deleterious effects of autopolymerized acrylic resins in dental practitioners and technicians who are using this chemical day and night so that hazards can be highlighted amongst dental community via continuing dental education programs and to make them assure that certain standardised protocols must be established for this material or some alternative should be used for the benefit and safety of their health.

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METHODOLOGY

With a convenience sampling technique and descriptive study design, during the period from July 2016 to August 2016, data from 35 dental practitioners including students, General dental practitioners and Specialists was collected regarding the use of autopolymerised polymethylmethacrylate resin (Simplex) use at Liaquat Medical University Hospital Hyderabad.

After taking informed consent that their identity will be kept confidential, the participants were asked to fulfil a questionnaire regarding the allergic reactions after using autopolymerised polymethylmethacrylate resin. Data was then analysed using SPSS version 16.

RESULTS

Out of total 35 participants, 63% were postgraduate students, 20% general dental practitioners, 17% were specialist Prosthodontist. 34% participants did not bothered to use any protocol for prevention of allergic

TABE 1:

Qualification	Participants	Protocols used by participants	No. of participants
Students	63%	Only gloves masks and goggles	14%
General dental practitioners	20%	Antihistamines along with above	29%
Specialists	17%	No protocol Not allergic	34% 23%

TABE 2:

Duration of use of Polymethylmethacrylate	No. of participants	Duration of developing allergy	Percentage
1-5 years	18	Immediately	6%
5-10 years	13	1-2 years	43%
>10 years	04	> 2 years	28%
		Not allergic	23%

TABE 3:

Organs affected by allergy	Percentage	Medical treatment by participants	Percentage
Skin	43%	Acquired and quit using	4
Sinuses	17%	Not acquired but quit using	23
Eyes	8%	Not allergic	8
Respiratory tract	9%		
None	23%		

reaction while 14% used only gloves, masks and goggles where as 29% used antihistamines along with goggles, masks, and gloves (Table 1). Amongst them 18 participants were using auto-polymerised PMMA (chemical cured) for a period of 1-5 years, 13 participants were using for 5-10 years where as only 4 participants were reported to be using them for more than 10 years. 6% participants were found to develop immediate allergic reaction while 43% found to develop allergic reaction in period of 1-2 years and 28% after continues use for >2 years. Out of all participants, 23% were reported to have no allergy with autopolymerised PMMA (Table 2).

Only 4 candidates consulted the doctor for their allergic reactions and stopped using autopolymerised PMMA whereas 23 did not consulted any doctor but still they could not continue using the material. 43% has allergic contact dermatitis, 17% suffered from sinusitis after inhalation of liquid monomer fumes, 8% had allergic reactions in eyes and 9% were found to have shortness of breath (Table 3).

DISCUSSION

Every profession have pros and cons in their surroundings. Dental centres too forces dangers of inward breath or contact with various vapors, metals that can prompt to allergies. A review done by Rai R revealed that 7 dental personals produced contact dermatitis after patch testing with different materials including mono methyl methacrylate.⁶ Another study conducted on 15 dental medical caretakers, 5 dental specialists and 8 dental experts gathered information of 12 years, detailing unfavourably susceptible responses after presentation to various types of methylmethacrylate.⁷ In the present review it was found that 43% participants showed hypersensitive responses to skin and majority of them had developed them within a period of 1-5 years, 17% developed sinusitis, 8% participants to eyes and 9% developed symptoms related to respiratory tract. A study done by a general dental expert revealed long term effects of hypersensitive conjunctivitis and respiratory symptoms by monomethyl methacrylate after 22 years of use⁸, where as another review did not discovered huge outcomes from respiratory tract, gastro intestinal tract or nervous system.⁹ Still another study shows skin responses 24.3%, 5.4% responses to

eyes and 0.9% respiratory symptoms in various time durations.¹⁰

In our study we found that 34% of members did not utilize any convention to avert unfavourably susceptible responses whereas other review revealed that large number of the participants were un-informed about the correct utilization of conventions that ought to be taken.⁹ In our review 14% participants utilized protocols like masks, gloves and goggles while the other study conducted on large scale concluded that 66 participants never utilized above conventions, 15 participants frequently utilized and just 12 were utilizing frequently.¹⁰ It is essential to keep a strict check and balance on utilization of acrylics as dangers are being expanding on every day schedule. In spite of the fact that our review was done on a little populace however as studies are being led on methyl methacrylate related dangers, it involves worry to build up specific other options to this material so that its use can be minimized.

REFERENCES

- 1 R Bhola, SM Bhola, H Liang, B Mishra. Biocompatible denture polymers- a review. *Trends Biomater. Artif. Organs.* 2010;23(3):129-36.
- 2 Stoeval I. The oral tolerance to contact allergens in prosthodontic biomaterials. *Journal of IMAB.* 2010;16:31-4.
- 3 Siddharth s, Gosavi S, Gosavi SY, Alla RK. Local and systemic effects of unpolymerised monomers. *J Occup Hyg.* 2005;2(6): 302-06.
- 4 Methyl methacrylate interim. 2008:1-73. https://www.epa.gov/sites/production/files/2014-08/documents/methyl_methacrylate_interim_oct_2008_v1.pdf
- 5 Hagberg S, Ljungkvist G, Andreasson H et al. Exposure to volatile methacrylates in dental personnel. *Journal of occupational and environmental hygiene.* 2005;2:302-06.
- 6 Rai R, Dinakar D, Bindoo YA. Investigation of contact allergy to dental materials by patch testing. *Indian Dermatol online J.* 2013;5(3):282-86.
- 7 Aalto-Korte K, Alanko K, Kuuliala O, Jolanki R. Methacrylate and acrylate allergy in dental personnel. *Contact Dermatitis.* 2007 Nov;57(5):324-30.
- 8 Linsdtrom M, Alanko K, Keskinen H, Kanerva L. Case report: dentists's occupational asthma, rhinoconjunctivitis and allergic contact dermatitis from methacrylates. *Allergy.* 2002;57:543-45.
- 9 Methacrylate and acrylate allergy in dental students. *J of IMAB.* 2013;19(4):363-70.
- 10 Khan AA, Siddiqui AZ, Askari H, Imtiaz F, Shakoor S. Dental composite related allergic reactions in dentists working in Karachi. *PODJ.* 2014,Jun;34(2):382-85.
- 11 Centers for Disease Control and Prevention (CDC). Work-related asthma—38 states and District of Columbia, 2006-2009. *MMWR Morb Mortal Wkly Rep.* 2012;61:375-378. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6120a4.htm?s_cid=mm6120a4_e%0d%0a.
- 12 Kanerva L, Lauerma A, Estlander T, Alanko K, HenriksEckerman ML, Jolanki R. Occupational allergic contact dermatitis caused by photobonded sculptured nails and a review of (meth)acrylates in nail cosmetics. *Am J Contact Dermat* 1996;7:109-15.

CONTRIBUTIONS BY AUTHORS

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| 1 Hina Memon: | Execution and generation of Idea for the study, principal, Author and operator of the cases. |
| 2 Mohd Rizwan Memon: | Helped in Literature search, and Statistical work, helped in discussion writing. |
| 3 Aamir Mehmood Butt: | Helped in Methodology writing, tables and DI grams and relevant statistical work. |
| 4 Irum Naz: | Reference citation, Data analysis. |