

Primljen/Received on: 28.08.2022.
Revidiran/Revised on: 12.01.2023.
Prihvaćen/Accepted on: 29.01.2023.

KRATAK IZVEŠTAJ
A SHORT REPORT
doi: 10.5937/asn2387640S

IZLOŽENOST ŽIVI U STOMATOLOGIJI: PITANJE SIGURNOSTI

EXPOSURE TO MERCURY IN DENTISTRY: A SAFETY CONCERN

Pushparaja Shetty¹, Akshatha Shetty²

¹UNIVERZITET NITTE, DERALAKATTE, MANGALORE, INDIJA, A.B. SHETTY MEMORIJALNI INSTITUT ZA DENTALNE
NAUKE, ODELJENJE ZA ORALNU PATOLOGIJU, DERALAKATTE, MANGALORE, INDIJA

²UNIVERZITET NITTE, DERALAKATTE, MANGALORE, INDIJA, A.B. SHETTY MEMORIJALNI INSTITUT ZA DENTALNE
NAUKE, ODELJENJE ZA PARODONTOLOGIJU, DERALAKATTE, MANGALORE, INDIJA

¹NITTE UNIVERSITY, DERALAKATTE, MANGALORE, INDIA, A.B. SHETTY MEMORIAL INSTITUTE OF DENTAL SCIENCES,
DEPARTMENT OF ORAL PATHOLOGY, DERALAKATTE, MANGALORE, INDIA

²NITTE UNIVERSITY, DERALAKATTE, MANGALORE, INDIA, A.B. SHETTY MEMORIAL INSTITUTE OF DENTAL SCIENCES,
DEPARTMENT OF PERIODONTICS, DERALAKATTE, MANGALORE, INDIA

Sažetak

Uvod: Živa spada u teške metale, a prekomerno izlaganje živi može imati toksično delovanje na nervni sistem, bubrežni sistem, reproduktivni sistem, imuni sistem i na motoričku aktivnost. U stomatologiji se živa koristi zajedno sa metalima u amalgamskim restauracijama. Istraživanja su pokazala da se živa konstantno oslobada iz amalgamskih restauracija. Postoji kontroverza u vezi sa tim da li ova oslobođena živa ima bilo kakav toksični učinak na ljudski organizam.

Cilj ovog rada je da se istakne štetni efekat srebrnih amalgamskih restauracija i stvori svest o tome u javnosti.

Zaključak: Amalgam se još uvek često koristi kao restaurativni materijal zbog svojih odličnih fizičkih svojstava. Zbog uticaja na životnu sredinu, upotrebu žive trebalo bi smanjiti i u stomatologiji.

Gljučne reči: živa, toksičnost, restauracije, amalgam, stomatologija

Abstract

Introduction: Mercury is a heavy metal and overexposure to mercury may have a toxic effect on the nervous system, renal system, reproductive system, immune system and on motor activity. In dentistry, mercury is used along with metals in amalgam restorations. Studies have shown that mercury consistently releases from amalgam restorations. There is a controversy regarding this released mercury having any toxic effect on human beings.

The aim: The aim of this work was to highlight the adverse effect of silver amalgam restoration and create awareness among all.

Conclusion: Amalgam is still widely used as restorative materials due to its excellent physical properties. Because of its environmental impact, mercury must be kept away from all users, including dentistry.

Key words: mercury, toxicity, restorations, amalgam, dentistry

Corresponding author:

Akshatha Shetty, MDS
Department of Periodontics
A.B. Shetty Memorial Institute of Dental Sciences.
Nitte University, Deralakatte, Mangalore, India
E-mail: pustidr1@gmail.com
Phone: +919481208000

2023 Faculty of Medicine in Niš. Clinic of Dental Medicine
Niš. All rights reserved / © 2023. Medicinski fakultet Niš.
Klinika za dentalnu medicinu Niš. Sva prava zadržana.

Uvod

Budući da je pružanje bezbedne zdravstvene zaštite veoma komplikovan proces, potrebno je uzeti u obzir mnoge faktore prilikom brige o zdravlju. Glavni cilj po pitanju sigurnosti pacijenata u stomatološkom sistemu zdravstvene zaštite tiče se smanjenja pojave neželjenih događaja, koji se mogu sprečiti adekvatnim merama prevencije takvih događaja¹.

Privatni praktičari obavljaju stomatološku negu u mnogim delovima sveta, a u javnosti se misli da mnogi stomatolozi ne znaju da prate bezbednost pacijenata tokom stomatološkog lečenja.

Živa je teški metal; smatra se da je neurotoksična i da utiče na razvoj nervnog sistema kod dece. Prekomerna izloženost živi može izazvati neurodegenerativne bolesti kod odraslih². Niska koncentracija žive može uzrokovati oksidativni stres, ćelijsku citotoksičnost i toksično delovanje na bubrežni sistem, reproduktivni sistem, imuni sistem i motoričku aktivnost³.

Cilj ovog rada je da se istakne štetni efekat srebrnih amalgamskih restauracija i stvori svest o tome u javnosti.

U stomatologiji, živa se koristi za restauracije. Dentalni amalgam je popularan za restauracije na bočnim zubima već duže vreme. Amalgam se bira zbog izuzetne čvrstine, dugostrajnosti i stabilnosti⁴. Sada se upotreba amalgama smanjuje zbog zabrinutosti oko njegovih efekata na zdravlje, zagađenje okoline, i estetske neprihvatljivosti, ali mnogi stomatolozi širom sveta, još uvek ga upotrebljavaju⁴.

Amalgam iz plombi se konstantno oslobađa u oralnu šupljinu uporedo sa ostalim metalima⁵, a svojstva su joj potencirana usled prisustva žvakanja, četkanja zuba i upotrebe toplih napitaka; mada količina žive koja se na ovaj način oslobodi i njen uticaj na zdravlje su kontraverzni. Studije su kontradiktorne, i mnogi veruju da postoji preterivanje od strane naučne zajednice u pogledu amalgamskih plombi.

Rade se brojna istraživanja sa ciljem da kvantifikuju živu koja se oslobađa iz amalgamskih plombi, ispituju njenu povezanost sa količinom žive u usnoj duplji i to da li ona prelazi sigurnosne granice. Istraživači su koristili različite metode i parametre za prikupljanje i procenu pod različitim fiziološkim uslovima, što je činilo komplikovanim⁴. Istraživanja su dokazala da se živa oslobađa iz amalgamskih ispuna i da se apsorbuje u telu⁵, kao i da postoji pozitivna korelacija između broja amalgamskih restauracija i koncentracije žive u urinu, ali nije

Introduction

Provision of safe health care is a very complicated event, and many factors need to be considered during health management. The main intention of patient safety in both medical and dental health care system is to facilitate the avoidance of preventable adverse events during health management and the impact of specific adverse events¹.

Private practitioners undertake dental care in many parts of the world, and public perception is that many dental practitioners are ignorant of following patient safety during dental treatment.

Mercury is a heavy metal and considered to be neurotoxic and affect the development of Nervous system in children. Excess exposure to mercury may induce neurodegenerative diseases in adults². Low concentration of mercury can cause oxidative stress, cellular cytotoxicity, and toxic effect on the renal system, reproductive system, immune system and motor activity³.

The aim of this work is to highlight the adverse effect of silver amalgam restoration and create awareness among all.

In dentistry, mercury is used along with metals as amalgam restorations. Dental amalgam restorations are popular posterior restorative material over a long period. Amalgam is preferred for its excellent strength, durability and stability⁴. Now, the usage of amalgam restorations is decreasing due to concerns for its effect on health, environment pollution and aesthetic non-acceptability⁴, however many dentists still use amalgam restorations all over the world.

Amalgam restorations constantly release mercury into the oral cavity⁵, and it is enhanced by the abrasive action of chewing, brushing and ingestion of hot beverages; whether the amount of mercury released is adequate to cause health risk is controversial. Studies are contradicting, and many believe it is an overreaction of the scientific community towards dental amalgam.

Many studies are done to quantify the mercury released from dental fillings and relating the measured quantity of mercury in the oral cavity and whether it exceeds the safety limits. However, these investigators have used different methods and parameters for collection and evaluation under various physiological assumptions, thus making it complicated. Studies have proved that mercury is released from amalgam restorations and absorbed by the body⁵ and also a positive correlation between the number of amalgam restorations to mercury

primećeno da živa utiče na zdravstveno stanje ispitanika koji su učestvovali u studiji. Druga slična studija takođe je pokazala značajnu razliku u nivou žive u urinu pronađenom kod dece u Nemačkoj starosti od tri godine do pet godina, sa amalgamskim ispunima i bez njih⁶.

Istraživanja sprovedena na majmunima pokazala su da se živa oslobođena iz amalgamskih restauracija apsorbira u unutrašnjim organima, kao što su bubrezi, mozak, pluća, jetra i egzokrine žlezde⁷, a pokazalo se i da živa prolazi kroz krvno-moždanu i placentnu barijeru⁸. Međutim, u mnogim studijama pominje se da se živa možda neće akumulirati u tkivu na duži period i da se obično izlučuje iz organizma u roku od 55 dana⁹; takođe, veruje se da nema dokaza da živa koja se oslobađa iz amalgamskih restauracija ima štetan uticaj na javno zdravlje. Veliki broj istraživača veruje da je količina žive koja se oslobađa iz restauracija manja od trenutnog zdravstvenog standarda i da ne predstavlja nikakav zdravstveni rizik, osim alergijskih reakcija¹⁰. Studije su pokazale da se lokalni lichenoidni tip reakcija retko viđa kao posledica amalgamskih restauracija¹¹.

U mnogim delovima sveta stomatolozi zamenjuju stare amalgamske nadoknade; to je preventivna mera za smanjenje ili ograničavanje izloženosti organizma živi. Uklanjanje amalgama vrši se turbinama sa vodenim mlazom uz upotrebu sisaljki; tako se živi iznova izlažu i stomatološko osoblje i pacijenti¹². Potrebno je strogo se pridržavati odgovarajućih higijenskih mera uz upotrebu zaštitne opreme tokom uklanjanja amalgama, kako bi se izlaganje živi minimalizovalo¹². Mnogi sugerišu da zamena restauracija može dovesti do skidanja nepotrebne količine zdrave zubne supstance. Brojna istraživanja su pokazala da je izloženost živi nakon uklanjanja stare plombe kratkotrajna i da je izloženost ispod vrednosti trovanja živom¹³. Studije koje ukazuju na to da je stomatološko osoblje uključeno u postavljanje i uklanjanje amalgama izloženo živi u većoj meri nego pacijenti takođe izazivaju zabrinutost¹⁴.

Sada je potražnja za amalgamskim restauracijama opala uglavnom zbog njihovog lošeg estetskog kvaliteta, a ne zbog izloženosti živi, usled nedostatka svesti šire javnosti o tome.

Uprkos kontroverzi u vezi sa izloženošću živi, amalgam se i dalje često koristi, jer amalgamska restauracija još uvek nije bila direktno povezana ni sa jednom bolešću.

concentration of urine, and no noticeable health effect found on this study group. Another similar study also showed a significant difference in urine mercury level found in German children between the age of 3 to 5 years with and without amalgam restorations⁶.

Research on monkeys has shown that mercury released from the amalgam restoration is absorbed and indifferent organs such as kidney, brain lung liver and exocrine glands⁷ and also showed that it crossed blood-brain and placental barrier⁸. However, many studies have mentioned that mercury may not store in tissue for a long period in the body and is usually excreted from the body within 55 days⁹, and there is no evidence that mercury released from amalgam restorations has adverse health effects in the general public.

A large number of researchers believe that the amount of mercury released from restorations are for less than the current health standard and does not pose any health risk other than allergic reactions¹⁰. Studies indicated local lichenoid type of reactions is seen rarely to amalgam restorations¹¹.

Recently new in many parts of the world dentist remove old amalgam restorations as a preventive measure to reduce or limit the mercury exposure. Removal of amalgam is done by drilling with water spray and high suction, creating a situation of mercury exposure to both dental staffs as well as to the patient¹². Strict adherence to appropriate occupational hygiene protective equipment during amalgam removal is needed to be followed to avoid mercury exposure¹². Many suggest that restoration replacement may lead to removing the unnecessary amount of sound tooth structure prone to fracture during removal may end up in RCT. Many studies have shown that the exposure to mercury after removal of old filling is of a short duration and exposure may be below the value of mercury poisoning¹³. Studies indicating that dental staff who are involved in placement and removal of amalgam are exposed to mercury at a higher level than the patients is also a matter of concern¹⁴.

Now the demand for amalgam restoration has come down mainly due to its poor aesthetic quality rather than mercury exposure due to the lack of awareness among the general public on mercury.

Despite the controversy over mercury exposure, amalgam is still widely used as the restoration and has not yet been linked directly to any disease process.

Istraživači se i dalje bave preispitivanjem kontroverzi zbog izvrsnih fizičkih osobina amalgamskih ispuna.

Zaključak

Odgovornost svakog pojedinca je da spreči zagađenje i zaštiti živu planetu za buduće generacije; stoga, stomatolog mora imati odgovornu ulogu. Mada su amalgamske restauracije sigurne, s obzirom na štetan uticaj žive na zemlju, njenu upotrebu bi trebalo smanjiti zbog zaštite okoline od okoline.

Zahvalnica: Nema

Sukob interesa: Nema

And also few investigators are in favour of re-evaluating this controversy due to the excellent physical property of the amalgam restorations.

Conclusion

It is the responsibility of every individual to prevent pollution and to protect the living planet for future generations; hence, the dentist needs to play a more responsible role. Considering the effect of mercury on the earth even if amalgam restorations are safe, mercury needs to be kept away from the environment.

Acknowledgement: Nil

Conflict of Interest: Nil

LITERATURA /REFERENCES

1. Yamalik, N, Perea Pérez, B. Patient safety and dentistry: what do we need to know? Fundamentals of patient safety, the safety culture and implementation of patient safety measures in dental practice. *International Dental Journal*. 2012; 62(4):189–196.
2. Zahir, F, Rizwi SJ., Haq SK, Khan RH. Low dose mercury toxicity and human health. *Environmental Toxicology and Pharmacology*. 2005; 20(2):351–360.
3. Rice, KM. Walker EM, Wu M, Gillette C, Blough ER. Environmental Mercury and Its Toxic Effects. *Journal of Preventive Medicine & Public Health*. 2014; 47(2): 74–83.
4. Pant V, Rathore M, Singh A. The dental amalgam toxicity fear: A myth or actuality. *Toxicology International*. 2012; 19(2): 81.
5. Brownawell AM, Berent S, Brent RL, Bruckner JV, Doull J, Gershwin EM. The potential adverse health effects of dental amalgam. *Toxicol Rev*. 2005;24:1–10
6. Schulte, AR, Stoll M, Wittich K, Stachniss V. Mercury concentrations in the urine of children with and without amalgam fillings. *Schweizer Monatsschrift fur Zahnmedizin*. 1994;104 11:1336–1340
7. Hahn LJ, Kloiber R, Leininger RW, Vimy MJ, Lorscheider FL. Whole-body imaging of the distribution of mercury released from dental fillings into monkey tissues. *FASEB J*. 1990;4:3256–60.
8. Takahashi Y, Tsuruta S, Arimoto M, Tanaka H, Yoshida M. Placental transfer of mercury in pregnant rats which received dental amalgam restorations. *Toxicology*. 2003; 185:23–33.
9. Roberson TM, Heymann HO, Swift EJ. *Sturdevant's Art and Science of Operative Dentistry*. 5th ed. Missouri: Mosby Inc; 2006. pp. 151–64.
10. Padmakumar V, Premkala Raveendran K, Abdulla AM, Ganapathy S, Sainudeen S, Nasim V S, Vedam V. Levels of mercury in fish-eating children, with and without amalgam restoration. *J Pharm Bioall Sci* 2019; 11, Suppl S2:397-401.
11. McParland, H., & Warnakulasuriya, S. Oral Lichenoid Contact Lesions to Mercury and Dental Amalgam—A Review. *Journal of Biomedicine and Biotechnology* 2012; 2012:1–8.
12. Warwick R, O'Connor A, Lamey B. Mercury vapour exposure during dental student training in amalgam removal. *J Occup Med Toxicol*. 2013;8:27.
13. Brune, D., Hensten-Pettersen, A. & Beltesbrekke, H.: Exposure to mercury and silver during removal of amalgam restorations. *Scaad. J. Dent. Res*. 1980; 88: 460-63.
14. Nagpal, N., Bettiol, S. S., Isham, A., Hoang, H., & Crocombe, L. A. A Review of Mercury Exposure and Health of Dental Personnel. *Safety and Health at Work*. 2017; 8(1): 1–10