



Pattern of Diagnoses and Use of Restorative Materials in a Tertiary Restorative Clinic in Lagos: A Retrospective Study.

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ABSTRACT

Aim: To determine the pattern of restorative diagnoses and use of restorative materials at the Restorative Clinic of Lagos State University Teaching Hospital, Ikeja.

Materials and Method: Clinical case records of patients seen and treated at the Restorative Clinic of the hospital during a two-year period, January 2017 to January 2019 were extracted and the following data were obtained: gender, age, the restorative diagnoses and materials used to restore affected teeth. Data were analyzed using IBM SPSS Version 23. Frequency and percentages were presented for categorical data while numeric variables were presented using mean and standard deviation. Association between categorical variables was assessed using Chi square test. Significance level was set at $p < 0.05$.

Results: 1059 teeth in 609 (57.5%) females and 450 (42.5%) males (M:F ratio 1:1.4) aged between 19 years and 80 years were involved in the study. Dental caries was most frequently diagnosed lesion while Enamel hypoplasia was the least. Dental amalgam was the most frequently used restorative material while sandwich technique employing GIC and composite resin was the least used. Most restorations done with GIC and Composite resin respectively involved 40-59 years age group, while those with dental amalgam involved the 20-39 years age group. There were statistically significant associations between pattern of restorative diagnoses and age of respondents ($p = 0.000$), and between type of restorative materials used and age of respondents ($p = 0.000$), as well as between type of restorative materials used and gender of the respondents ($p = 0.001$).

Conclusion: Dental caries was the most common restorative diagnosis while dental amalgam was the most common restorative material at the study centre. A paradigm shift is recommended towards mercury-free restorations and minimal intervention dentistry.

INTRODUCTION

Restorative dentistry caters for a lot of dental problems which include dental caries and its sequelae, dentine hypersensitivity, tooth fracture, tooth wear lesion and enamel hypoplasia. This list is not exhaustive and of these, dental caries has been named as a global disease burden.[1,2] Failure to institute early treatment for any of these diseases may result in pain, difficulty with chewing thereby impacting on the ability to eat well and ultimately negatively impacting quality of life.[1-4] Tooth fracture especially in the anterior region of the mouth may impact on aesthetics and ultimately self-confidence.[3,4] The pathophysiology of these diseases have not changed, rather what has changed is that there is a better understanding of the disease process.

The materials for restoring teeth have been in use since over 13,000 years ago. Bitumen from that time was found in the central incisors of human remains.[5] Six thousand years ago, beeswax was used as filling material and the Chinese were the first to report the use of dental amalgam as far back

as the year 659 AD.[5,6] The discovery of amalgam revolutionized the practice of restorative dentistry. In the 1700s gold found use in restorative dentistry as filling material.[5,6]

The next challenge was on the development of aesthetic materials, the first attempt being in 1746 when white enamel was used with gold crown. Then, in 1789 porcelain was produced.[6]

Silicate was the first aesthetic material used as a restorative but had a couple of drawbacks. Another high point in restorative materials came in 1962 with the discovery of composite resin and with it the adhesives.[7]

Today with better knowledge of the pathophysiology of these restorative diseases as well as science and technology of materials, there is an array of restorative materials produced which in some instances are modifications that have overcome the drawbacks found in their precursors.[8-12] Composite resin for instance can now be used for both the anterior teeth demonstrating better aesthetics and posterior

teeth in stress bearing areas. It has better aesthetics, good wear resistance, and it is easier to use and place.[8-12] Newer Glass ionomer cements also have better aesthetics and wear resistance.[8] These products make minimal intervention dentistry the new trend in restorative dentistry.[13,14]

This study, which was a review of diagnosis of cases and the restorative materials used in treating the teeth involved, was done at the Lagos State University Teaching Hospital, a tertiary reference and treatment center located in Ikeja, Lagos State.

There is a paucity of studies which profile diagnosis of cases and the restorative materials which are used for their treatment in this environment, to the best of our knowledge. It is hoped that knowledge of the prevailing materials used will reveal if there is a need for a paradigm shift towards mercury-free restorations and minimal intervention dentistry.

MATERIALS AND METHOD

This study involved a retrospective review of the clinical records of patients who attended and were treated at the Conservative unit of the Restorative Department of Lagos State University College of Medicine, Ikeja during a two-year period from January 2017 to January 2019. Ethics approval was obtained from Health Research and Ethics Committee of Lagos State University Teaching Hospital, Ikeja. Patients' case notes were extracted and the following data collected: gender, age, tooth involved including the arch (mandible or maxilla), the side (left or right), as well as the diagnosis and the materials used to restore the affected teeth. Badly broken-down teeth and teeth requiring advanced conservative treatment such as root canal treatments, crowns and bridges were excluded from this study. Data were analyzed using IBM SPSS Version 23. Frequency and percentages were presented for categorical data while numeric variables were presented using mean and standard deviation. Association between categorical variables was assessed using Chi square test. P value was set at <0.05.

RESULTS

This study involved 1059 teeth in 609 (57.5%) females

and 450 (42.5%) males (M: F ratio = 1:1.4) (Table 1) aged between 19 years and 80 years (Mean SD= 40.9 ±15.9) (Table 1). The most frequently diagnosed lesion was dental caries affecting 632 (59.7%) of teeth while the least frequently diagnosed was Enamel hypoplasia which was seen in only 6 (0.6%) teeth (Table 2). Basically, of the three restorative materials (Dental amalgam, Composite resin and Glass ionomer cement) used, Dental amalgam was the most frequently used 452 (42.7%), the next most frequently used was GIC in 366 (34.6%) teeth, while composite resin was used in 237 (22.4%) teeth and sandwich technique employing the use of GIC and composite resin was seen in only 4 (0.4%) teeth (Table 3).

A comparison of age of respondents and the restorative diagnoses demonstrated statistical significant differences ($p=0.000$) (Table 2). Both the 19 years and under and the 20-39 age groups were diagnosed more frequently as having dental caries (47 teeth, 83.9%) and (388 teeth, 80.2%) respectively. In the 40-59, 60-79 and above 80 years age groups, the most frequent diagnosis was that of tooth-wear lesion which occurred in 156, 62 and four teeth respectively (41.2%, 45.9%, and 80% respectively)

When comparing the age of patients and the restoratives used there was a statistical significant difference ($p=0.000$) (Table 3), most of the restorations done with GIC (166-15.7% teeth) was done in the 40-59 years age group, while that of dental amalgam (292-27.6% teeth) was in the 20-29 years age group and most of the restoration done with composite (105 teeth) was in the 40-59 years age group. The age group with most restorations done was the 20-39 years age group (484 teeth) while the least restorations was placed in the over 80 age group (5 teeth).

More female teeth were restored with GIC (212) and dental amalgam (284) than male teeth, while more male teeth (126) had composite resin restorations placed and this was statistically significant ($p=0.001$) (Table 3).

Comparing the diagnosis and the restorative material used showed that dental caries was mainly restored with amalgam while tooth wear lesion was mainly restored with GIC (Table 3). This was statistically significant. ($p=0.000$)

Table 1: Demographics of study subjects

Variable	Frequency	Percent
Gender of patient		
Male	450	42.5
Female	609	57.5
Age of Patients (Years)		
≤ 19	56	5.3
20-39	484	45.7
40-59	379	35.8
60-79	135	12.7
≥ 80	5	0.5
Total	1059	100

Mean ±SD = 40 ±15.9

Table 2: Comparison of Patient's Age to Diagnosis

Diagnosis according to age of patients	Age in years					Total	p value
	≤19	20-39	40-49	60-79	≥80		
Failed Amalgam Filling	1	45	31	9	0	86(8.1%)	0.000**
Sensitivity	0	5	13	1	0	19(1.8%)	
Dental caries	47	388	148	48	1	632(59.7%)	
Enamel hypoplasia	0	5	1	0	0	6(0.6%)	
Failed composite/GIC	0	9	10	3	0	22(2.1%)	
Tooth fracture	7	21	20	12	0	60(5.7%)	
Tooth wear lesion	1	11	156	62	4	234(22.1%)	
Total	56	484	379	135	5	1059 (100%)	

Table 3: Comparison of Type of Filling Material to Age, Gender and Diagnosis

Variable	Type of Filling Material				Total	p value
	GIC	GIC/ Composite	Amalgam	Composite		
Patients age (years)						
≤19	14	0	29	13	56	0.000**
20-39	113	3	292	76	484	
40-59	166	1	107	105	379	
60-79	69	0	24	42	135	
≥80	4	0	0	1	5	
Gender						
Female	212	2	284	111	609	0.001**
Male	154	2	168	126	450	
Diagnosis						
Failed Amalgam Filling	15	1	64	6	86	0.000**
Sensitivity	6	0	1	12	19	
Dental caries	170	0	374	88	632	
Enamel hypoplasia	0	0	0	6	6	
Failed composite/ GIC	7	0	5	10	22	
Tooth fracture	20	3	4	33	60	
Toothwear lesion	148	0	4	82	234	
Total	366	4	452	237	1059	

DISCUSSION

This was a retrospective study carried out to determine the pattern of diagnoses and restorative materials use in conservative unit of Restorative clinic at the Lagos State University Teaching Hospital, Ikeja. The study involved more females (57.5%) than males (42.5%) with a male-to-female ratio of 1:1.4. This aligns with other studies[3,4,15] that demonstrate that women are more likely to report incidents of pain or issues with aesthetics. Olaleye *et al.*, [3] in a study from Maiduguri in north-eastern Nigeria reported an overall attendance by men (60.3%) at their center within the study period but noted that more females received restorative care.

More than half of the diagnoses in this present study consisted of dental caries (59.7%) thus confirming that it is a public health burden.[1,2] In a study by Bashiru and Omotunde [4] which assessed the prevalence of oral diseases in a population in Port Harcourt, they identified 21 oral diseases but noted that dental caries was still the most prevalent disease requiring restorative care. An oral survey of adults attending general dental practices in England also noted high prevalence of dental caries.[16] Also, in this present study, dental caries was the most prevalent diagnosis among patients under 40 years of age (41%) while the most

prevalent diagnosis among patients older than 40 years was tooth wear lesion (21% compared to 18.6% for dental caries). In this present study, in terms of the whole study population prevalence of tooth wear lesion which was the second most prevalent lesion was 22.1%. A study by Ipeaiyeda[17] in a secondary care facility in Ibadan noted a prevalence of 32% for dental caries and 2.7% for tooth wear lesion among all age categories of patients studied.

Also, in a community based study [18] for oral conditions in Kwara State the researchers using a modified version of WHO pathfinder method in ages 5-6y, 12y and 35-44y noted a prevalence of 22.0% for dental caries and 15% for tooth wear lesion in the 35-44y age group. This present study was not community-based but done in a tertiary hospital and did not have the designated 35-44y age group category.

This study found that dental amalgam was most commonly used in the 20-39 age group while GIC and composite were mainly used in the 40-59 age group. The age of the patient was significantly related to the restorative material used. This finding is in alignment with that of a previous study by the lead author of this present study[19] which found that age was a factor for the choice in restorative material. In a study by Awotile *et al.*, [20] carried out at the same centre as this present study, GIC was the most

frequently placed material across all age groups. However, in that study advanced treatments like root canal treatment and apicectomy were included. But as was observed in this study Awotile *et al.*[20] also reported more composite and GIC restorations placed in the older age groups.

Significantly also, this study found that GIC and dental amalgam restorations were more common in female patients while composite restorations were more common in male patients. Awotile *et al.*,[20] also noted that treatment with GIC and amalgam restorations were similarly higher in females than in male patients. However, contrary to the finding of this present study, they noted that composite resin restorations were also higher in females.[20] The reason for the latter observation, as stated above, might be related to the inclusion of advanced treatments like root canal treatment and apicectomy in that study.[20]

CONCLUSION

Dental caries was the most common restorative diagnosis while dental amalgam was the most common restorative material at the study centre. Also, in this study, dental caries was the most prevalent diagnosis among patients under 40 years of age while the most prevalent diagnosis among patients older than 40 years was tooth wear lesion. A paradigm shift is recommended towards mercury-free restorations and minimal intervention dentistry.

Limitations

This study is a retrospective study; thus there is a possibility that some data might not have been captured.

REFERENCES

1. Oral health WHO March 2022. Available at <https://www.who.int/news-room/fact-sheets/detail/oral-health> Last accessed 7/3/2022
2. Bernabe E, Marcenes W, Hernandez CR, Bailey J, Abreu LG, Alipour Vet al Global, regional and national levels and trends in burden of oral conditions from 1990 to 2017. Study J Dent Res. 2020;99(4):362-373.
3. Olaleye AO, Suleiman IK, Solomon S. Pattern Of Dental Treatment In Patients Attending The Dental Centre University Of Maiduguri Teaching Hospital, Maiduguri Nigeria Bo Med J 2013;10(1):12- 19
4. Bashiru BO, Omotunde SM. Burden of oral diseases and dental treatment needs of an urban population in Port Harcourt, Rivers State, Nigeria. Eur J Gen Dent 2014;3:125-128.
5. Goff S. Five Dental Restorative Materials Used Throughout the Ages Dental Products Report May 2021;55(5):70. Available at <https://www.dentalproductsreport.com/view/5-dental-restorative-materials-used-throughout-the-ages> Last accessed 11/12/2021
6. The History of Dental Fillings and How They Have Changed Over Time. Available at <https://www.southviewdentistrycharlotte.com/history-of-dental-fillings-over-time/> Last accessed on 1/12/2020
7. Singh H, Kaur M, Dhillon JS, Mann JS, Kumar A. Evolution of restorative dentistry from past to present. Indian J Dent Sci 2017;9:38-43.
8. Heymann HO, Ritter AV, Roberson TM. Introduction to Composite Restorations In: Heymann HO, Swift EJ, Ritter AV editors. Sturdevant's Art and science of operative dentistry. Canada: Elsevier; 2013. p. 216 – 228
9. Akpata ES, Alomari QD, AlShammery AR. Principles and practice of operative dentistry: A modern approach. Surrey, United Kingdom: Quintessence publishing; 2013
10. Manappallil JJ. Basic dental materials. New Delhi: JAYPEE; 2016
11. Patki B. Direct permanent restoratives - amalgam vs composite. Journal of Evolution of Medical and Dental Sciences. 2013;2(46):8912-8918
12. Krzyzostaniak L. The evolution of dental materials: Examining the past, present and future of composites. Dental product report. Available at <https://www.dentalproductsreport.com/view/evolution-dental-materials-0> Last accessed on 1/12/2020
13. Dennison JB, Hamilton JC. Treatment decisions and conservation of tooth structure. Dental clinics of North America. 2005;49:825–845.
14. Roeters JJM, Shortall ACC, Opdam NJM. (2005). Can a single composite resin serve all purposes? British Dental Journal. 2005;199:73-79.
15. Mjör IA. Selection of restorative materials in general dental practice in Sweden, Acta Odontologica Scandinavica. 1997;55(1):53-57. DOI: [10.3109/00016359709091942](https://doi.org/10.3109/00016359709091942)
16. Oral health survey of adults attending general dental practices 2018. National Dental Epidemiology Programme for England. Public Health England 2020. Available at <https://www.gov.uk/government/publications/oral-health-survey-of-adults-attending-dental-practices-2018#> Last accessed 7/3/2022
17. Ipeaiyeda OJ, Balogun AO, Agbogidi JM, Taiwo JO. Pattern of Oral Diseases Presented at a Secondary Health Clinic in Ibadan, Nigeria. Available at <https://sciencevolks.com/dentistry/pdf/SVOA-DE-03-085.pdf> Last accessed 7/3/2022
18. Tobin AO, Ajayi IO, Common oral conditions and correlates: an oral health survey in Kwara State Nigeria. BMC Res Notes. 2017;10:568 DOI 10.1186/s13104-017-2894-0
19. Menakaya IN, Loto AO, Nwadike DC, Awotile AO, Adenuga-Taiwo OA. Factors affecting choice of restorative materials and awareness of Minamata convention among dental practitioners in a tertiary institution in Nigeria. Lagos State University Journal of Dental Sciences. 2021;1(1):15-18
20. Awotile AO, Enone LL, Shittu GO, Sorunke ME, Adenuga-Taiwo OA. 4 Year Pattern of Conservative Treatment Rendered To Patients Attending the Restorative Clinic in a Tertiary Institution In Lagos. IOSR Journal of Dental and Medical Sciences. 2021;20(04):12-16.