

Completely edentulous patients and association with diabetes - a retrospective study

Debarun david

Saveetha dental college
Saveetha institute of medical and technical sciences
Saveetha university
Chennai, india

Mail id : 151701016.sdc@gmail.com

Dr. Dhanraj ganapathy

Professor and head
Department of prosthodontics
Saveetha dental college
Saveetha institute of medical and technical sciences
Saveetha university
Chennai, india

Mail id : ghanraj@saveetha.com

Dr. Manjari chaudhary

Senior lecturer
Department of oral medicine and radiology
Saveetha dental college
Saveetha institute of medical and technical sciences
Saveetha university
Chennai, india

Mail id : manjaric.sdc@saveetha.com

Abstract

diabetes mellitus is a disorder in which blood sugar (glucose) levels are abnormally high because the body doesn't produce enough insulin to meet its needs. Patients with poorly controlled diabetes are at greater risk of dental problems. Classified as type 1 and type 2, the cardinal signs seen are polydipsia, polyphagia, polyurea. **Materials and method:** the data were obtained from the patients who reported to saveetha dental college during the time period of june 2019 –march 2020.records of the patient and their history were obtained . Data of patients with complete dentures were identified and the history was taken.a total of 40 diabetic complete denture patients were identified ,all the relevant data extracted and analyzed . The results were analyzed using spss software version 2.0 by bm. **Result:** the data collected from the patients management software were tabulated in spss and descriptive statistics were obtained. Out of the total 40 patients, 24 were male patients and 16 were female patients. In which they were ranging from 45 years to 50 years in age. The most common age range for diabetes in completely edentulous patients were seen in 47-50 years of age with 37.50% prevalence. Male complete denture wearers (60%) were more prevalent to diabetes than females (40 %) **conclusion:** our study assessed the prevalence of diabetes in completely edentulous patients, the overall results showed that male edentulous patients were more diabetic and were ranging from the age 45 years of age to 50 years of age. This study will help to create more awareness regarding diabetes patients who enter the clinic and methods of safe treatment

Keywords : complete denture , diabetes mellitus ,glucose, insulin,patients

Introduction

Diabetes mellitus is a disease of glucose, fat and protein metabolism resulting from impaired insulin secretion. (1) hyperglycemia is the most clinically important metabolic aberration in diabetes mellitus and the basis of diagnosis. Management of the diabetic dental patient must take into consideration the impacts of diabetes on dental disease and dental treatment (1)diabetes is classified type1 or type 2, type 1 insulin dependent, from childhood called juvenile diabetes. Type 2 is non insulin dependent occurs only after the age of 40 years (2)

The number of people with diabetes is proportionately increasing due to population growth, aging, urbanization and increased prevalence of obesity and physical inactivity. Quantifying the prevalence of diabetes and the number of people affected by diabetes and the prevalence of diabetes it is important to allow rational planning and allocation of resources .(3).(4).(5)

India has acquired the label of ageing nation, data available suggest that 50% of the indian elderly suffer from one or more chronic disease with the prevalence of the disease increasing with age (6).(7).(8)the tooth selection should be made during the trial insertion stage of the denture and should be confirmed through consultation with the patient for any suturing so that infection to oral cavity will be prevented the susceptibility to periodontal disease is the most common oral complication of diabetes (9)

Removable acrylic resin partial dentures tend to adversely affect periodontal parameters when teeth are in contact with resin base, it is recommended to keep the dentures well relieved from the gingival margin so that infection elevated glucose levels have also been associated with an increased probability of patients with diabetes presenting periodontitis compared with non-diabetic patients and can influence outcome of prosthodontic treatment(10).previously our team has a rich experience in working on various research projects across multiple disciplines the (11–13)(14–25).the purpose of the study was to compare diabetic and non diabetic patients wearing complete dentures with regards to salivary flow, salivary buffering capacity denture retention and oral mucosal lesion

Material and method

the study is done under a university setting. The similar characteristics of the study is that it is done under available date and under similar ethnicity of the population. The disadvantage of the study can be the geographical location.the study was approved by the institutional ethics board. Two reviewers are involved in the study. The data were taken from patients who checked in saveetha dental college during the time period of june 2019 –march 2020.

Records of the patient and their history were obtained . Data of patients with complete denture and the history was taken. Chief complaint of each patient, history of presenting illness and statistical analysis was done.the obtained data were tabulated and entered in the ms excel sheet.the data collection was imported to the spss variable definition process and was done using tables and graphical illustration.

By using the statistical software ibm spss version 20. Statistical tests like descriptive statistics tests and inferential statistics were done keeping demographics. Such as age, gender as independent variables and diabetes dependent variables.

Descriptive (mean, standard deviation and percentage) and inferential test (chi-1 square test) were done and the results were obtained and tabulated.

Result

The data collected from the patients management software were tabulated in spss and descriptive statistics were obtained. Out of the total 40 patients, 24 were male patients and 16 were female patients. In which they were ranging from 45 years to 50 years in age. The most common age range for diabetes in completely edentulous patients were seen in 47-50 years of age with 37.50 % prevalence. Males were 60 % more prevalent to diabetes with complete denture than females who were 40 %. So from this study we were able to evaluate the prevalence of diabetes in completely edentulous patients who visited saveetha dental college from the month of june 2019 to march 2019.

Discussion

Prevalence of diabetes in completely edentulous patients in this study was less compared to previous study analysis. The use of antidiabetic(26) agents, higher glucose levels in older patients can be due to increased insulin resistance observed in this age group. However, after adjusting for age, the results remained statistically significant and clinically relevant. It can be hypothesized that older adults may have presented with diabetes for a much longer period compared with the younger age groups.

although diabetes duration was not evaluated in this study, it is known that the longer the diabetes duration the worst are the complications associated with it.(27) thus, older patients may present with greater duration of the disease and consequently have also been exposed to periodontopathogens for a longer period, presenting signs of periodontal disease, and a faster disease progression leading to tooth loss.

Nonetheless, the causes of tooth loss were not investigated in this study. It can also be hypothesized that patients with diabetes who are negligent with their overall health could also be negligent with their oral health, and present with

more complications associated with diabetes(28).another factor that could have contributed to the finding of edentulism in older groups is that until the late 1980s the dental service offered by the public health system in brazil was, in the vast majority, tooth extraction.

A very important aspect of this population was its characterization. All individuals used the brazilian healthcare system, were diabetic and used some type of antidiabetic medication to control the disease. The patients were residents of the urban area of the same city and it was assumed that everyone had the same eating habits, living conditions, overall quality of life and socioeconomic statu^s.(1)another important topic was the fact that they were all non-smokers. Smoking is a risk as well as a detrimental factor for both diabetes and periodontal disease(29).since the study population consisted of non-smokers, it is possible to infer that smoking did not influence the onset and course of both conditions, which is highly recommended when evaluating the relationship between systemic diseases and their risk factors.(1)

Patients were found to be diabetic from the age 45- 50 years.it was also found that the male edentulous patient.age and female gender were significantly correlated in both older and younger age groups. In those ≥ 50 years old, lower education, smoking, arthritis, asthma, diabetes were also significantly associated with edentulism^{.(30)}countries with high overall edentulism prevalence rates also tended to have higher rates in the younger age group. Only a limited number of published studies have reported on the trans-national prevalence of edentulism in older individuals and only one study has reported rates of edentulism in younger persons(31)

Out of the total sample size (40 cases) results value obtained were, males constituted 60% and female 40% and also that increased age of male has higher incidence of diabetes than in female population in association with age it was found the age range was from 45 years to 50 years of age.a study by varon f , mack-shipman had similar results he had stated that diabetes generally occurs after the age of 40 years and it's prevalence increases with age with maximum peak between 65 years-75 years (8)in association with gender it was found that male patients had prevalence of diabetes incomplete denture than female patients.

A study by srinivasan k, had similar results, stating that diabetes was the second most prevalent medical illness and was reported to be seen among both genders mostly among men^{.(32)}however there were few limitations encountered in this study. This study had geographic limitation i.e assessment of predominantly south indian population.furthermore the study was uncentered with the sample size collected in a relatively small population.the scope of the study was to create awareness regarding diabetes and their prevalence in completely edentulous patients.diabetes screening would be recommended for edentulous patients. Further longitudinal studies, controlling for confounding factors and possibly for periodontitis inflammatory markers, are necessary in order to clarify the relationship between type 2 diabetes, and tooth loss.our institution is passionate about high quality evidence based research and has excelled in various fields (33-43).

Conclusion

This study is conducted to find out the association of diabetes in completely edentulous patients, the overall results showed that diabetes mellitus is a cofactor in male edentulous patients compared with females, and predominance is found in male patients aged between 45 to 50 years. This study will help oral prophylaxis and to create more awareness regarding the medical management of diabetes in preventing complications .

Acknowledgment :

I acknowledge my guide and mentor who helped me throughout this study and helped me finish it. I thank my department and college for providing valuable data for this study.

Authors contributions:

Author 1 (debarun david) carried out the study by collecting data and drafted the manuscript after performing the necessary statistical analysis . Author 2 (dr. Dhanaraj) aided in conception of the topic , has participated in the study design , statistical analysis and has supervised in preparation of the manuscript . Author 3 (dr manjari) has participated in the study design and coordinated in developing the manuscript . All the authors have discussed the results among themselves and contributed to the final manuscript

Conflict of interest : none

Reference

1. Kansal g, goyal d. Prosthodontic management of patients with diabetes mellitus. J adv med dent scie res [internet]. 2013; available from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.403.9438&rep=rep1&type=pdf>
2. Cristina de lima d, nakata gc, balducci i, almeida jd. Oral manifestations of diabetes mellitus in complete denture wearers. J prosthodont. 2008 jan;99(1):60-5.
3. King h, rewers m, who ad hoc diabetes reporting group. Global estimates for prevalence of diabetes mellitus

- and impaired glucose tolerance in adults. *Diabetes care*. 1993 jan 1;16(1):157–77.
4. King h, aubert re, herman wh. Global burden of diabetes, 1995–2025: prevalence, numerical estimates, and projections. *Diabetes care*. 1998 sep 1;21(9):1414–31.
 5. Amos af, mccarty dj, zimmet p. The rising global burden of diabetes and its complications: estimates and projections to the year 2010. *Diabet med*. 1997;14 suppl 5:s1–85.
 6. Irudaya rajan s, mishra us. Defining old age: an indian assessment. *J united nations institute aging*. 1995;5:31–5.
 7. Pelletier dl, msukwa lah. The use of national sample surveys for nutritional surveillance: lessons from malawi's national sample survey of agriculture [internet]. Vol. 32, *social science & medicine*. 1991. P. 887–98. Available from: [http://dx.doi.org/10.1016/0277-9536\(91\)90244-7](http://dx.doi.org/10.1016/0277-9536(91)90244-7)
 8. Varon f, mack-shipman l. The role of the dental professional in diabetes care. *J contemp dent pract*. 2000 feb 15;1(2):1–27.
 9. Jain ar, nallaswamy d, ariga p. Determination of correlation of width of maxillary anterior teeth with extraoral factor (interpupillary width) in indian population [internet]. *Journal of clinical and diagnostic research*. 2019. Available from: <http://dx.doi.org/10.7860/jcdr/2019/41082.12988>
 10. Jyothi s, robin pk, ganapathy d, anandiselvaraj. Periodontal health status of three different groups wearing temporary partial denture [internet]. Vol. 10, *research journal of pharmacy and technology*. 2017. P. 4339. Available from: <http://dx.doi.org/10.5958/0974-360x.2017.00795.8>
 11. Hafeez n, others. Accessory foramen in the middle cranial fossa. *Research journal of pharmacy and technology*. 2016;9(11):1880.
 12. Krishnan rp, ramani p, sherlin hj, sukumaran g, ramasubramanian a, jayaraj g, et al. Surgical specimen handover from operation theater to laboratory: a survey. *Ann maxillofac surg*. 2018 jul;8(2):234–8.
 13. Somasundaram s, ravi k, rajapandian k, gurunathan d. Fluoride content of bottled drinking water in chennai, tamilnadu. *J clin diagn res*. 2015;9(10):zc32.
 14. Felicita as, sumathi felicita a. Orthodontic extrusion of ellis class viii fracture of maxillary lateral incisor – the sling shot method [internet]. Vol. 30, *the saudi dental journal*. 2018. P. 265–9. Available from: <http://dx.doi.org/10.1016/j.sdentj.2018.05.001>
 15. Kumar s, rahman r. Knowledge, awareness, and practices regarding biomedical waste management among undergraduate dental students. *Asian j pharm clin res*. 2017 aug 1;10(8):341.
 16. Gurunathan d, shanmugaavel ak. Dental neglect among children in chennai. *J indian soc pedod prev dent*. 2016 oct 1;34(4):364.
 17. Sneha s, others. Knowledge and awareness regarding antibiotic prophylaxis for infective endocarditis among undergraduate dental students. *Asian journal of pharmaceutical and clinical research*. 2016;154–9.
 18. Dhinesh b, isaac joshuaramesh lalvani j, parthasarathy m, annamalai k. An assessment on performance, emission and combustion characteristics of single cylinder diesel engine powered by cymbopogon flexuosus biofuel. *Energy convers manage*. 2016 jun 1;117:466–74.
 19. Choudhari s, thenmozhi ms. Occurrence and importance of posterior condylar foramen. *Laterality*. 2016;8:11–43.
 20. Paramasivam a, vijayashree priyadharsini j, raghunandhakumar s. N6-adenosine methylation (m6a): a promising new molecular target in hypertension and cardiovascular diseases. *Hypertens res*. 2020 feb;43(2):153–4.
 21. Wu f, zhu j, li g, wang j, veeraraghavan vp, krishna mohan s, et al. Biologically synthesized green gold nanoparticles from siberian ginseng induce growth-inhibitory effect on melanoma cells (b16). *Artif cells nanomed biotechnol*. 2019 dec;47(1):3297–305.
 22. Palati s, ramani p, shrelin h, sukumaran g, ramasubramanian a, don kr, et al. Knowledge, attitude and practice survey on the perspective of oral lesions and dental health in geriatric patients residing in old age homes [internet]. Vol. 31, *indian journal of dental research*. 2020. P. 22. Available from: http://dx.doi.org/10.4103/ijdr.ijdr_195_18
 23. Saravanan m, arokiyaraj s, lakshmi t, pugazhendhi a. Synthesis of silver nanoparticles from phenerochaete chrysosporium (mtcc-787) and their antibacterial activity against human pathogenic bacteria. *Microb pathog*. 2018 apr;117:68–72.
 24. Govindaraju l, gurunathan d. Effectiveness of chewable tooth brush in children-a prospective clinical study. *J clin diagn res*. 2017;11(3):zc31.
 25. Vijayakumar jain s, muthusekhar mr, baig mf, senthilmathan p, loganathan s, abdul wahab pu, et al. Evaluation of three-dimensional changes in pharyngeal airway following isolated lefort one osteotomy for the correction of vertical maxillary excess: a prospective study. *J maxillofac oral surg*. 2019 mar;18(1):139–46.
 26. Huang es, laiteerapong n, liu jy, john pm, moffet hh, karter aj. Rates of complications and mortality in older

- patients with diabetes mellitus [internet]. Vol. 174, *jama internal medicine*. 2014. P. 251. Available from: <http://dx.doi.org/10.1001/jamainternmed.2013.12956>
27. Zoungas s, for the advance collaborative group, woodward m, li q, cooper me, hamet p, et al. Impact of age, age at diagnosis and duration of diabetes on the risk of macrovascular and microvascular complications and death in type 2 diabetes [internet]. Vol. 57, *diabetologia*. 2014. P. 2465–74. Available from: <http://dx.doi.org/10.1007/s00125-014-3369-7>
 28. Tapp rj, tikellis g, wong ty, harper ca, zimmet pz, shaw je, et al. Longitudinal association of glucose metabolism with retinopathy: results from the australian diabetes obesity and lifestyle (ausdiab) study [internet]. Vol. 31, *diabetes care*. 2008. P. 1349–54. Available from: <http://dx.doi.org/10.2337/dc07-1707>
 29. Yeh h-c. Smoking, smoking cessation, and risk for type 2 diabetes mellitus [internet]. Vol. 152, *annals of internal medicine*. 2010. P. 10. Available from: <http://dx.doi.org/10.7326/0003-4819-152-1-201001050-00005>
 30. Peltzer k, hewlett s, yawson a, moynihan p, preet r, wu f, et al. Prevalence of loss of all teeth (edentulism) and associated factors in older adults in china, ghana, india, mexico, russia and south africa [internet]. Vol. 11, *international journal of environmental research and public health*. 2014. P. 11308–24. Available from: <http://dx.doi.org/10.3390/ijerph11111308>
 31. Petersen pe. Global policy for improvement of oral health in the 21st century - implications to oral health research of world health assembly 2007, world health organization [internet]. Vol. 37, *community dentistry and oral epidemiology*. 2009. P. 1–8. Available from: <http://dx.doi.org/10.1111/j.1600-0528.2008.00448.x>
 32. Srinivasan k, ramarao p. Animal models in type 2 diabetes research: an overview. *Indian j med res*. 2007 mar;125(3):451–72.
 33. Vijayashree priyadharsini j. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J periodontol*. 2019 dec;90(12):1441–8.
 34. Pc j, marimuthu t, devadoss p. Prevalence and measurement of anterior loop of the mandibular canal using cbct: a cross sectional study. *Clin implant dent relat res* [internet]. 2018; available from: <https://europepmc.org/article/med/29624863>
 35. Ramesh a, varghese s, jayakumar nd, malaiappan s. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - a case-control study. *J periodontol*. 2018 oct;89(10):1241–8.
 36. Ramadurai n, gurunathan d, samuel av, subramanian e, rodrigues sjl. Effectiveness of 2% articaine as an anesthetic agent in children: randomized controlled trial. *Clin oral investig*. 2019 sep;23(9):3543–50.
 37. Sridharan g, ramani p, patankar s, vijayaraghavan r. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J oral pathol med*. 2019 apr;48(4):299–306.
 38. Ezhilarasan d, apoorva vs, ashok vardhan n. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. *J oral pathol med*. 2019 feb;48(2):115–21.
 39. Mathew mg, samuel sr, soni aj, roopa kb. Evaluation of adhesion of streptococcus mutans, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clin oral investig*. 2020;1–6.
 40. Samuel sr. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life? *Int j paediatr dent*. 2021 mar;31(2):285–6.
 41. R h, hannah r, ramani p, ramanathan a, r jm, gheena s, et al. Cyp2 c9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene [internet]. Vol. 130, *oral surgery, oral medicine, oral pathology and oral radiology*. 2020. P. 306–12. Available from: <http://dx.doi.org/10.1016/j.oooo.2020.06.021>
 42. Chandrasekar r, chandrasekhar s, sundari kks, ravi p. Development and validation of a formula for objective assessment of cervical vertebral bone age. *Prog orthod*. 2020 oct 12;21(1):38.
 43. Vijayashree priyadharsini j, smiline girija as, paramasivam a. In silico analysis of virulence genes in an emerging dental pathogen a. *Baumannii* and related species. *Arch oral biol*. 2018 oct;94:93–8.

list of figures

1. Age distribution of diabetic completely edentulous patients
2. Gender distribution of diabetic completely edentulous patients
3. Duration of diabetic illness in completely edentulous patients
4. Medication used for diabetes in completely edentulous patients
5. Relation between age and diabetes in completely edentulous patients
6. Relation between in completely edentulous patients

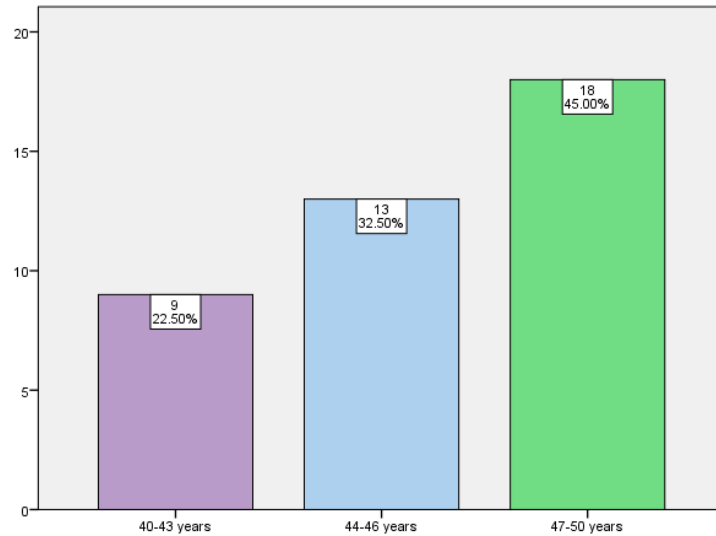


Figure 1: the graph shows the age distribution of diabetic completely edentulous patients . X axis shows the age groups and the y axis shows the number of diabetic patients with complete denture . 22.50% were in age range 40-43 years(purple) , 32.50% were in age range 44-46 years(blue) and 45% were in age range 47-50 years.(green)

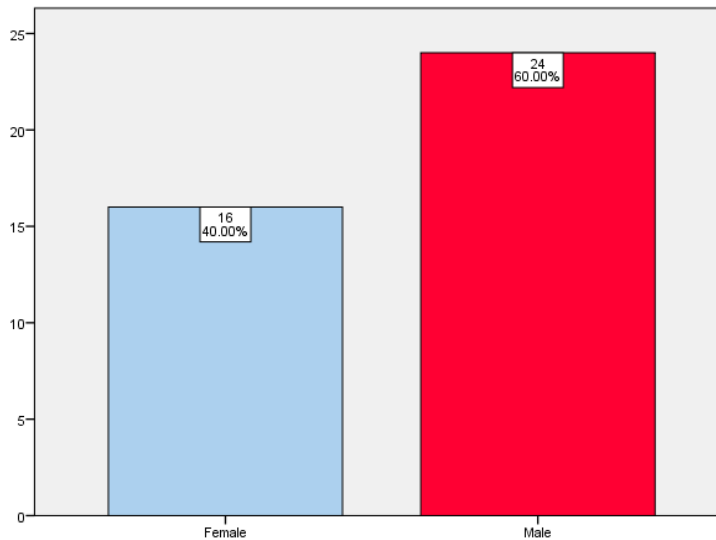


Figure 2: the graph shows gender distribution of diabetic completely edentulous patients . X axis shows the gender of diabetic completely edentulous patients and y axis shows the number of diabetic patients with complete denture . 60% of patients were males (red) and 40% were female (blue).

Completely edentulous patients and association with diabetes - a retrospective study

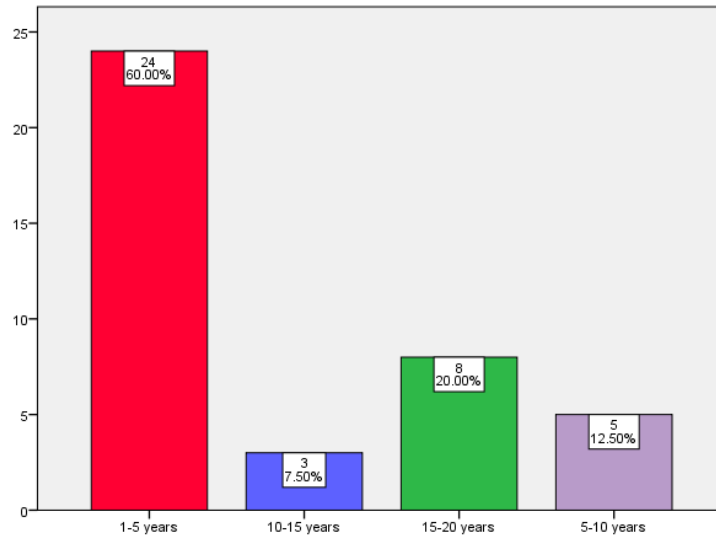


Figure 3: the graph shows history of diabetes in completely edentulous patients .x axis shows relative history of diabetes and y axis shows the number of diabetic patients with complete denture 60% have diabetes for the past 1-5 years, (red) 12.50% have for the past 5-10 years (purple). 7.50% have for the past 10-15 years (blue), 20% have for the past 15-20 years (green)

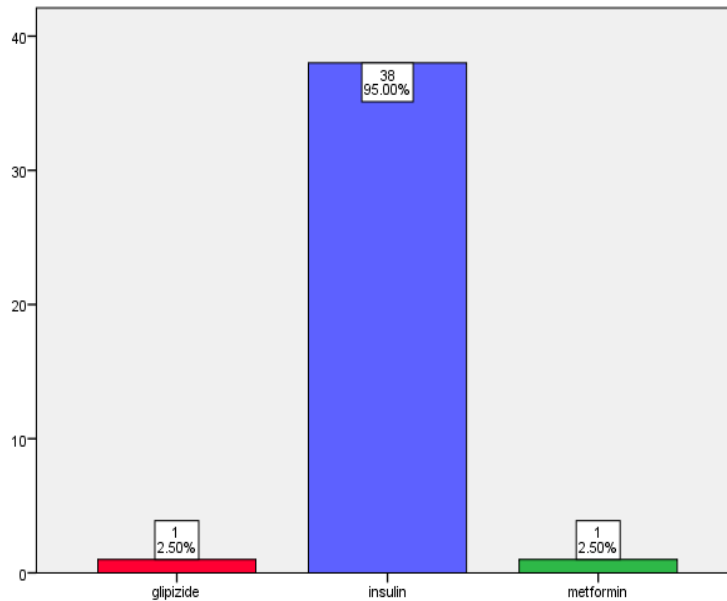
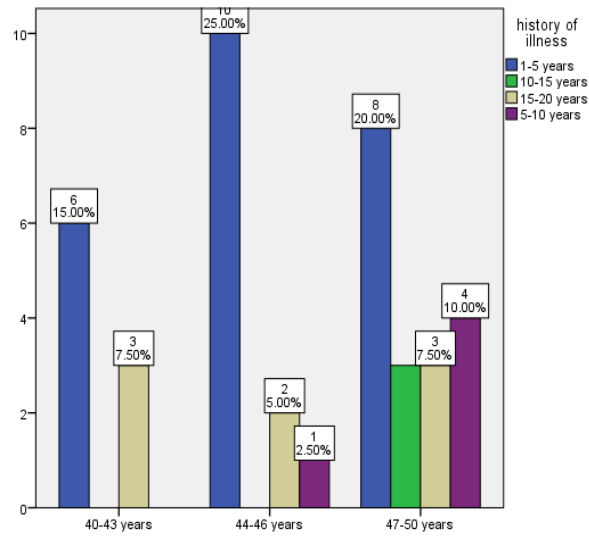


Figure 4: the graph shows the medication used for diabetes in completely edentulous patients . X axis shows anti-diabetic therapy and y axis shows the number of diabetic patients with complete denture . 95 % of patients were under insulin(blue) , 2.50% were under metformin (green) and 2.50% were under glipizide (red).



1.

Figure 5 :bar graph showing relation between age and history of illness . X axis gives the age of completely edentulous patients and y - axis represents the number of patients with diabetic illness . The age group more prevalent to diabetes were ranging from 47 years to 50 years of age (37.50%) compared to other age groups with a statistically significant difference(pearson chi square test; $p=0.01p<0.05$).

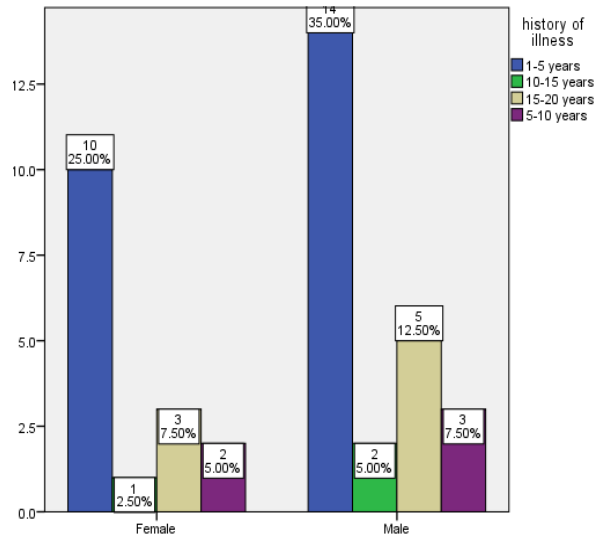


Figure 6 : bar graph showing relation between gender and history of illness . X axis gives the gender and y - axis represents the number of patients with a history of illness . Female (40%) completely edentulous patients were more prevalent to diabetes than male (60%) completely edentulous patients with a statistically significant difference $p=0.01$ (pearson chi square test; $p=0.01p<0.05$).