Complete dentures are still required due to the large number of elderly people and the difficulty of fully avoiding tooth decay.For milled materials, which benefited from high-pressure polymerization, showed no leftover monomers, residual monomers in 3D-printed resins functioned as plasticizers (Azab et al 2025) In this study, 3D printing denture bases recorded the least adaptation values either at the posterior palatal seal area or after sectioning because unpolymerized resins were utilized for manufacturing the denture bases, and once processed; it required an additional final light-polymerization step to complete the process.Thermoformed resin material was in granular form, wrapped in special cartridges, was heated and injected by means of special devices, excluding any chemical reaction, thus preventing polymerization shrinkage (Ardelean et al 2023) For standardization in preparing samples for measuring adaptation, electric saw was used in sectioning to obtain vertical sharp clean cut as much as possible in the post-dam area (10mm anterior to posterior border of each denture base cast set).However, conventional PMMA and milled denture bases had better fracture resistance when compared to 3D-printed dentures (Abdelghaffar 2024 and Azab et al 2025) 3D-printed resins displayed variability based on photo initiator systems and monomer conversion rates, whereas milled materials showed more consistency because of their standardized pre-polymerized PMMA blocks.Because Cobalt-chromium (Co-Cr) alloys have been widely used in dentistry for removable partial dentures and metal frames, mainly because alloys are strong, resistant to corrosion, and relatively inexpensive, when compared to gold alloys, more tissue tolerant and resistant to deformation than acrylic denture base, a metal palate cast from Cobalt-chromium (Co-Cr) alloys had been used as a complete denture palate in this study.The deformation can also occur while demounting the partially polymerized denture base from the building platform (Kalberer et al 2019) (Sinha et al2024) Also the results of highest mean value gap recorded in 3d printed group could be attributed to the errors occurred in extraoral scanning in which the scanner tilts the cast to scan it in all orientations.(Aneesha et al 2025) Then twenty obtained master casts later on were randomly numbered and divided into four equal groups according to different techniques of denture base constructions; (metallic denture base,3D-Printed resin denture base, conventional heat cured acrylic resin denture base, thermoformed resin denture base).Also, a denture with metal base has smaller volume of PMMA resin than a denture without metal base (Park et al 2001) It is possible to fabricate full dentures digitally by either milling or three-dimensional (3D)-printing approach, in which minimal distortion during processing contributes to effective denture base adaption.Exocade software is one of the most popular CAD software used in digital dentistry with an open-source license that allows the operator to import any STL file and export to any manufacturing machine whether a 3D printer or milling machine, unlike the closed systems that only allows their exported files to be manufactured through their machine.Processing the heat cured acrylic resin at 69.8 c was showed no significant difference in distortion of posterior peripheral seal ,but processing above 74 c was showed internal stresses and warpage of the denture after deflasking.High internal stresses and heat of polymerization were showed distortion and misfit of the denture base (Powers and Sakaguchi 2006).Conventionally fabricated complete denture was the comparator chosen for this study owing to the study conducted by (Bidra et al., 2013) reported that conventionally fabricated complete denture is considered the gold standard for treating edentulous patients for many decades in restoring masticatory

function, speech and aesthetics.To facilitate recovering the processed dentuer-stone cast set from the flask; the external surface of the stone cast of each waxed dentuer was painted with petrolem jelly(Consani et al 2002) To avoid the space between the denture and the cast,only one coat of atinfoil substitute was painted after trial packing on the cast side of the flask (Alhelal et al., 2017).Moreover, the thermoformed resin denture bases in this study were injected in one step using extra-large cartridge 24 mg to ensure complete filling of mold cavity avoiding double injection using universal standard cartridge size.It was observed that processing changes that occur in complete dentures when the acrylic resin is being cured resulting in an overall contraction that requires adjustments of the denture base.This method can reduce the human variables, processing errors and therefore, facilitates the production of more reliable prostheses with an improvement in its adaptation (Goodacre et al., 2016).The computer-engineered complete dentures showed a more precise base fit and a minimized occurrence of denture-related traumatic lesions (Steinmassl et al., 2018) In this research, 3d printed denture base template was used.(Beyer et al 2025), (Zhang et al 2019 and Groth et al 2014) Several researches have demonstrated that the thickness of acrylic resin affects distortion (Fouda et al., 2023).The conventional compression flask method has been used for the fabrication of complete dentures, however, it has many drawbacks, among them are the dimensional changes that will affect retention, stability, and comfort of the patient (Kabeel & Kholief, 2018).To overcome dimensional inaccuracy of the compression molding technique, the pressure injection molding technique was used in which the un polymerized acrylic resin was injected into the mold.The greatest distortion occurs after removal of the denture from its respective cast (Grunewald et al 1952, Woelfel et al 1960, Becker et al 1977, Sanders et al 1991, Sykora and sutow 1993).Hence, it is paramount that the denture base adaptation is consistently adequate covering the denture bearing surface entirely and the assessment of the adaptation according to location is important (Goodacre BJ et al 2016).Consani et al 2004 waxed each cast with one thickness of pink base plate wax by free hand waxing up and verified the thickness on each cast using a scored periodontal prob or a caliper respectively.Also (Lee et al 2019 and Al-Dwairi 2023) used 3rd printed resin denture base template in their studies to standardize denture base thickness of all study groups.o At geometrical center of the casts after sectioning: There was no statistically significant difference between 3D Printing and Thermoforming techniques, both showed the statistically significantly highest mean gap widths.(Kalberer et al 2019) (Sinha et al2024) Differences in construction methods of denture bases together with differences in coefficient of thermal expansion and contraction are the most obvious reasons for these variations.Accurately adapted denture bases are essential for achieving acceptable retention and stability for complete dentures.A high arched (or v -shaped) palate resists lateral shifts well, but vertical displacement tends to break the seal in all areas at once.Bredent Technosil NT is an addition-silicon duplicating material, shrinkage-free, and filler-free duplicating silicone for highly detailed duplications.3D printer was calibrated in relation to used resin and all print parameters such as speed, exposure time, wavelength, light source angle and pixel size was adjusted and fixed to be used in the construction of all 3d printed bases.(Lee et al 2019) Construction steps of thermoformed dentures bases were the same as in heat cured acrylic dentures except for using special flask and three feeding sprues (central large main sprue and two right and left auxiliary sprues).The results of the current study showed

the following: o At posterior palatal seal area: There was no statistically significant difference between 3D Printing and conventional techniques, both showed the statistically significantly highest mean gap widths.(Artopoulos et al 2013) stated that at least two recognized dimensional changes are unavoidable in every acrylic resin denture, namely, shrinkage and expansion.In addition, the acceptance of implants as a regular replacement for complete dentures had been hindered by shifting economic conditions; as a result, finding effective production techniques had become essential.The deserving aim of each method is to achieve an equilibrium between biocompatibility, adaptation, minimum deformation, and esthetics.Prosthesis retention loss may occur suddenly in areas where there are gaps between the denture base and mucosa (Masri G et al 2020).The availability of full denture module in the software facilitated conduction of a study where maxillary denture bases were designed using CAD.DLP printer was considerably faster, consistent with studies reporting its superior speed in producing clinical guides.In this research, to standardize the thickness of all produced dentures a 3D Printed denture base template was constructed to serve as a standard base for each of waxed dentures to control their thickness.(Sholkamy et al 2015) As part of standardization and random distribution of the produced casts; the posterior palatal seal area was carved in the master model before duplication.The gypsum products which form the mold have a coefficient of linear ex!pansion one–eighth that of acrylic resin.Variation in casting wax thickness, sprue size and location and casting procedures affect the accuracy of the produced casting (Anusavice 2003).A master cast was first scanned using a desktop extra oral scanner to generate a digital high arched maxillary cast.In this study ,the long curing cycle for processing of heat activated acrylic denture bases was recommended.The standard material used for complete denture fabrication till nowadays is poly methyl methacrylate (PMMA) (Hamouda, 2017).Adaptation evaluation of the different denture bases in the current study was done at the posterior palatal seal area and also at the geometrical center of the denture base cast sets after sectioning.There was no statistically significant difference between Metal and Conventional techniques, both showed the statistically significantly lowest mean gap widths.Photopolymerized 3D–printed resins exhibit a lower degree of polymer conversion, leading to the presence of residual monomers.During the 3D printing workflow, polymerization shrinkage is theoretically possible, as the denture bases are not completely polymerized before the final light–polymerization procedure.Adaptation and retention are the most crucial features of complete dentures because they allow the patient to utilize them to their full potential for speaking, eating, and swallowing.(Emera et al 2022) To determine the best material and manufacturing process for prosthetics, several researches are still examining this subject.High arched v –shaped palate contributes to problem in adaptation of maxillary complete denture.