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Subjektivna procjena studenata dentalne medicine u Hrvatskoj o svojem znanju i vještinama u stomatološkoj protetici

Subjective Assessment of Croatian Dental Medicine Students on Their Knowledge and Skills in Prosthodontics

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Sažetak

Svrha istraživanja: Željela se ustanoviti subjektivna percepcija znanja i vještina studenata dentalne medicine u stomatološkoj protetici i kako se ta percepcija, stjecanjem iskustva u kliničkome radu, promijenila tijekom studija te postoje li društveno-demografski čimbenici koji su utjecali na percepciju studenata. **Metode:** Istraživanje je provedeno 2015. godine na temelju anonimnog upitnika za studente dentalne medicine Stomatološkog fakulteta Sveučilišta u Zagrebu. Kako bi se ocijenilo znanje studenata postavljena su pitanja s predloženim odgovorima: DA / NE / NE ZNAM, a analogna ljestvica od 50 mm služila je za ocjenu njihovih sposobnosti i vještina. Hi-kvadrat test, t-test za nezavisne uzorke, analiza varijance i Pearsonov koeficijent korelacije korišteni su za analizu statističkih podataka. **Rezultati:** Odziv studenata (četvrte, pete i šeste godine studija) iznosio je 71,3 posto. Rezultati pokazuju da su se kliničko iskustvo i broj točnih odgovora povećavali s brojem godina studija. Studenti koji su završili srednju školu za zubne tehničare uzeli su statistički značajno veći broj otisaka i izradili statistički značajno više fiksnih protetičkih radova te su pokazali znatno viši stupanj suglasnosti s tvrdnjama o percepciji svojega znanja i vještina. **Zaključak:** Percepcija studenata o učenju pozitivno je povezana s brojem završenih semestara nastave iz stomatološke protetike i vlastitim kliničkim iskustvom.

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Adresa za dopisivanje

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Uvod

Stomatološka protetika grana je dentalne medicine koja se bavi nadomještanjem izgubljenih zuba i mekih tkiva u usnoj šupljini kako bi se uspostavila i očuvala funkcija žvačnog sustava, te izgled i zdravlje pacijenata. Njezina je svrha održati funkcijsku cjelovitost stomatognatog sustava (1). Studij dentalne medicine integrirani je dodiplomski i diplomski sveučilišni studij za stjecanje akademskog stupnja doktora dentalne medicine. U Republici Hrvatskoj je Stomatološki fakultet u Zagrebu (SFZG) jedini fakultet dentalne medicine na kojemu se upisuje 90 studenata na godinu i traje 12 semestara. (2). Nastava iz stomatološke protetike traje šest semestara (od petoga do desetoga semestra). Podijeljena je na pretkliničke predmete – Pretkliničku i laboratorijsku mobilnu protetiku (PLMP) i Pretkliničku i laboratorijsku fiksnu protetiku (PLFP) koji se slušaju po dva semestra te kliničke predmete – Mobilnu proteti-

Introduction

Prosthodontics is a branch of dental medicine dealing with restoration of lost teeth and soft and hard tissues of the oral cavity, in order to establish and preserve the function of the masticatory system, as well as patients' appearance and health. The purpose of prosthodontics is to maintain functional integrity of the stomatognathic system (1). The study of dental medicine is an integrated undergraduate and graduate university study for obtaining the academic degree of doctor of dental medicine. In the Republic of Croatia, the School of Dental Medicine in Zagreb (SFZG) is the only school of dental medicine that enrolls 90 students per year and lasts for 12 semesters (2). The course in prosthodontics is designed on a six-semester basis (from 5th semester) and continues throughout the 10th semester. It is divided into preclinical courses – Preclinical and Laboratory Removable Prosthodontics (PLMP) and Preclinical and Laboratory Fixed Prosthodontics (PLFP) which

ku 1 i 2 te Fiksnu protetiku 1 i 2 koji traju po četiri semestra (3 - 8).

U pretkliničkoj nastavi tijekom dva semestra studenti dentalne medicine uče o osnovnim biomedicinskim i tehnološkim znanjima i vještinama na kojima se temelje klinički i laboratorijski postupci u konvencionalnoj protetičkoj terapiji potpuno ozubljenih i djelomično ili potpuno bezubih pacijenata. Mogu steći osnovna znanja i vještine potrebne za specifične kliničke i laboratorijske postupke u izradi mobilnih i fiksnih radova, a stječu ih na predavanjima, seminarima i pretkliničkim vježbama na modelima i fantomima. Pretklinička nastava priprema ih za rad s pacijentima u kliničkoj nastavi. Nakon što polože ispit iz pretkliničke nastave, stečeno znanje i vještine primjenjuju, proširuju i razvijaju tijekom četiri semestra kliničke nastave na predavanjima, seminarima i kliničkim vježbama u malim grupama pod vodstvom profesora i asistenata. Kliničke vježbe obavljaju se na pacijentima (3 - 8).

Kako je opisano u katalogu znanja i vještina iz Mobilne protetike 1 i 2 te Fiksne protetike 1 i 2 studija dentalne medicine na Stomatološkom fakultetu Sveučilišta u Zagrebu, očekuje se da studenti sami mogu obavljati neke faze izrade svih vrsta mobilnih i fiksnih protetičkih radova. Pritom trebaju detaljno poznavati anatomiju i fiziologiju stomatognatog sustava, steći vještinu uzimanja anamneze te utvrditi dijagnoze i planove protetičke terapije. Moraju također znati vješto uzimati otiske i određivati međučeljusne odnose. Trebaju poznavati materijale kojima se koriste, vrste žlica za uzimanje otisaka, točnu uporabu artikulatora te indikacije, kontraindikacije i kliničke faze određenih vrsta protetičkih radova (3 - 8). Osim toga, za studente je važno da razviju sposobnost samokritike i samoprocjene vlastitih vještina, što ih potiče na cjeloživotno učenje, samopoboljšanje i stjecanje novih kliničkih iskustava (8 - 10).

Cilj ovog istraživanja bio je analizirati subjektivnu procjenu studenata dentalne medicine o učenju, znanjima i vještinama u stomatološkoj protetici i ustanoviti kako se njihova percepcija mijenjala tijekom obrazovanja i nakon iskustva stečenoga u kliničkom radu. Nadalje, cilj ovog istraživanja bio je ustanoviti utječu li društveno-demografski čimbenici (spol i srednjoškolsko obrazovanje) na percepciju studenata.

Materijali i metode

Istraživanje je provedeno na Stomatološkom fakultetu u Zagrebu tijekom akademske godine 2015./16. Odobrilo ga je Etičko povjerenstvo te je provedeno anonimno na temelju tiskanoga upitnika sastavljenog samo za tu svrhu. Ispitanici su bili studenti četvrte, pete i šeste godine, a pristali su dobrovoljno sudjelovati u anketi tijekom predavanja. Istraživanje se sastojalo od četiri dijela – u prvom dijelu uneseni su opći podaci o ispitanicima (dob, spol, stupanj srednjoškolskog obrazovanja, godina studija, položena pretklinička na-

last for two semesters, and clinical courses - Removable Prosthodontics 1 and 2 (MP) and Fixed Prosthodontics 1 and 2 (FP), which last for four semesters (3-8).

In the preclinical courses during two semesters dental medicine students are taught about basic biomedical and technological knowledge and skills underlying clinical and laboratory work in the conventional prosthetic treatment of completely dentate and partially or completely edentulous patients. They can acquire basic knowledge and skills for specific clinical and laboratory procedures in fabrication of removable and fixed restorations. Knowledge and skills are acquired through lectures, seminars and preclinical exercises on casts and phantoms. Preclinical courses prepare for work with patients in clinical courses. After passing exams in preclinical courses, the acquired knowledge and skills are applied, expanded and developed during four semesters of clinical courses, through lectures, seminars and clinical practicals in small groups of students under the guidance of teachers and assistants. Clinical practicals are performed on patients (3-8).

As prescribed in the catalogue of knowledge and skills in Removable Prosthodontics 1 and 2 and Fixed Prosthodontics 1 and 2 of the study program of Dental Medicine at the School of Dental Medicine, University of Zagreb, students are expected to be capable of carrying out individually certain phases of fabrication of all types of removable and fixed prosthetic restorations. Dental students should possess a thorough knowledge of the anatomy and physiology of the stomatognathic system. They are expected to master the skill of taking medical history from a patient. Also, they should be able to make diagnoses and prosthetic treatment plans. They should be skilled in taking impressions in order to determine the correct relationship between the jaws. They should be familiar with the materials used, types of trays used, correct use of articulators, as well as with indications, contraindications and clinical phases of certain types of prosthetic restorations (3-8). Besides, it is important for students to develop the capability of self-criticism and self-assessment of their own skills, which will encourage them in lifelong learning, self-improvement and gaining new clinical experience (8-10).

The aim of the study was to analyze dental medicine students' subjective perception of learning, knowledge and skills in prosthodontics and to determine how their perception changed during their education and through experience gained in clinical work. Furthermore, the aim of the study was to determine whether socio-demographic factors (gender and secondary education) influenced students' perceptions.

Materials and Methods

The study was conducted at the School of Dental Medicine in Zagreb in the academic year 2015/16. It was approved by the Ethics Committee and carried out by means of an anonymous survey drawn up only for this purpose. The participants were 4th, 5th and 6th-year-students and they were recruited during the lectures. Their participation was voluntary. The survey consisted of four parts. In the first part, general information about the subjects were collected (age, gender, secondary school degree, year of study, passed preclinical

stava iz stomatološke protetike i ocjene iz pretkliničke nastave iz stomatološke protetike) te kliničko iskustvo (broj uzetih otisaka i izrađenih fiksnih i mobilnih protetičkih radova); u drugom dijelu ispitala se subjektivna percepcija studenata o učenju, a u trećem osobno mišljenje studenata o vlastitim sposobnostima i vještinama u protetičkoj terapiji. Znanje je u četvrtom dijelu ispitano na temelju jednostavnih pitanja iz područja fiksne i mobilne protetike zaokruživanjem odgovora DA/NE/NE ZNAM.

Percepcija vlastitih vještina studenata ocijenjena je vizualnom analognom ljestvicom (od minimuma do maksimuma). Njezine vizualne vrijednosti pretvorene su u numeričke te je minimalna vrijednost vizualne ljestvice povezana s numeričkom vrijednosti 0 (nula), a maksimalna s numeričkom vrijednosti 5 (pet). Numerička vrijednost svakoga individualnog odgovora na pitanja iz istraživanja utvrđena je tako da je udaljenost na vizualnoj ljestvici između vrijednosti nula i vrijednosti danog odgovora izmjerena pomičnom mjerkom, uz točnost od 0,1 cm. Ukupna duljina vizualne ljestvice iznosila je 5 cm. Udaljenosti između vrijednosti odgovora od minimalnih vrijednosti mjerila su tri istraživača te je aritmetička sredina svih triju mjerenja uzeta kao završna vrijednost, primjerice, odgovor 3,6 cm udaljen od minimalne vrijednosti na vizualnoj ljestvici dobio je numeričku vrijednost 3,6. Vizualna ljestvica na ovaj je način korištena kao mjerni alat kako bi se pokušao izbjeći sugestivni utjecaj numeričkih vrijednosti na odgovore ispitanika.

Podatci su organizirani u Microsoft Excel datotekama (Microsoft Inc., SAD) i statistički analizirani softverom SPSS 12.0 (IBM Inc., SAD). Metode deskriptivne statistike (srednja vrijednost i standardna devijacija) korištene su za prikaz dobivenih podataka. Hi-kvadrat test, t-test za nezavisne uzorke i analiza varijance upotrijebljeni su za utvrđivanje razlika između dviju grupa. Ako su se korištenim testovima ustanovile statistički značajne razlike, daljnje testiranje provedeno je primjenom Tukeyjeva post hoc testa. Korelacije između individualnih varijabli izražene su Pearsonovim i Spearmanovim koeficijentom korelacije. Vrijednosti od $p < 0,05$ smatrane su statistički značajnima.

Rezultati

U istraživanje je bilo uključeno 168 ispitanika sa Stomatološkog fakulteta Sveučilišta u Zagrebu. Postotak odziva iznosio je prosječnih 71,3 posto – od kojih je studenata četvrtne godine bilo 62,0 posto, pete godine 72,6 posto i šeste godine 79,4 posto. S obzirom na srednjoškolsko obrazovanje ispitanika, ustanovljeno je da ih je 88,7 posto završilo gimnaziju, a 11,1 posto srednju medicinsku školu (medicinske sestre/tehničari, dentalni tehničari). Barem jednog roditelja zaposlenog u zdravstvu imalo je 36,8 posto ispitanika. Prosječan broj ispitanika po grupi za kliničke vježbe iznosio je $8,3 \pm 1,6$.

Utjecaj društveno-demografskih čimbenika na kliničko iskustvo prikazan je u tablici 1. Već stečeno kliničko iskustvo pozitivno je povezano s dobi, godinom studija i brojem završenih semestara iz stomatološke protetike ($p < 0,05$). Ispi-

prosthetic courses and grades in preclinical prosthetic courses) and clinical experience of the participants (the number of taken impressions and fabricated fixed and removable restorations). The second part of the survey examined students' subjective perception of learning, and the third part examined students' personal opinions about their own abilities and skills for performing prosthetic treatment. Knowledge in the fourth part was tested by simple questions from the field of fixed and removable prosthodontics and YES/NO/DO NOT KNOW types of answers were used.

The perception of students' own skills was assessed by a visual analog scale (from minimum to maximum). The values of the visual scale were converted into numerical values in such a manner that the minimum value of the visual scale was associated with the numerical value of 0 (zero), and the maximum value of the visual scale with the numerical value of 5 (five). The numerical value of each individual answer to study questions was determined in a way that the distance on the visual scale between the value of zero and value of the given answer was measured by means of a slide caliper with an accuracy of 0.1 cm. A total length of the visual scale was 5 cm. The distances between the answer values from minimum values were measured by three researchers, and the arithmetic mean of all three measurements was taken as the final value, e.g. the answer 3.6 cm far from the minimum value on the visual scale obtained the numerical value of 3.6. The visual scale was used as a measuring tool in this way in order to try to avoid suggestive influence of numerical values on subjects' answers.

The data were organized in Microsoft Excel files (Microsoft Inc., USA) and were statistically analyzed using SPSS 12.0 software (IBM Inc., USA). Descriptive statistics methods (mean and standard deviation) were used to present the obtained data. The chi-square test, t-test for independent samples and analysis of variance were used for establishing the differences between the two groups. If the tests used determined statistically significant differences, further testing was conducted by means of Tukey's post hoc test. Correlations between individual variables were expressed by the Pearson's and Spearman's correlation coefficients. The values of $p < 0.05$ were considered statistically significant.

Results

The study included 168 subjects (response rate was 71.3%): in their 4th (62%), 5th (72.6%) and 6th (79.4%) year of undergraduate studies (79.4%) at the School of Dental Medicine, University of Zagreb. With respect to subjects' secondary education, it was found out that 88.7% of them completed a grammar school providing advanced secondary education, while 11.1% completed secondary medical school (nurses/technicians, dental laboratory technicians). As for their parents, 36.8% of the respondents had at least one parent employed in health care. The average number of subjects was 8.3 ± 1.6 per group for clinical practicals.

The influence of socio-demographic factors on clinical experience is shown in Table 1. Previous clinical experience positively correlated with respondents' age, year of

Tablica 1. Utjecaj društveno-demografskih čimbenika na kliničko radno iskustvo
Table 1 Influence of socio-demographic factors on clinical experience

	N (%) 0	N (%) 1-5	N (%) 6-10	N (%) >11	Spol • Gender	Srednja škola • Secondary school
Broj uzetih otisaka • Number of impressions taken	2 (1.3)	69 (41.3)	53 (31.7)	43 (25.7%)	0.002*	0.02*
Broj izrađenih mobilnih radova • Number of removable restorations fabricated	45 (26.8)	99 (58.9)	19 (11.3)	5 (3)	0.729	0.076
Broj izrađenih fiksnih radova • Number of fixed restorations fabricated	81 (48.2)	65 (38.7)	17 (10.1)	5 (3)	0.023*	0.003*

* statistički značajna razlika ($p < 0,05$) • statistically significant difference ($p < 0,05$)

Tablica 2. Odnos između ranije stečenoga kliničkog iskustva i percepcije učenja
Table 2 Relationship between previous clinical experience and perception of learning

	Srednja vrijednost ± standardna devijacija • Mean value ± SD (min; max)	Broj ispitanika u grupi • Number of subjects in group	Broj uzetih otisaka • Number of Impressions taken	Broj izrađenih mobilnih radova • Number of removable restorations fabricated	Broj izrađenih fiksnih radova • Number of fixed restorations fabricated
1. Zadovoljan/a sam s odabranim fakultetom. • I am satisfied with the faculty I chose.	3.9 ± 0,9	-0.205*	0.141*	0.194*	0.143*
2. Vježbe iz PLMP-a i PLFP-a smatram korisnima. • I consider exercises in PLMP and PLFP as useful.	3.17 ± 1.3	-0.099	0.146*	0.192*	0.192*
3. Vježbe iz MP-a 1,2 i FP-a 1,2 smatram korisnima. • I consider exercises in MP 1,2 and FP 1,2 as useful.	3.8 ± 1.1	-0.159*	0.125	0.195*	0.246*
4. Predavanja iz PLMP-a, PLFP-a, MP-a i FP-a smatram korisnima. • I consider lectures in PLMP, PLFP, MP and FP as useful.	3.2 ± 1.2	0.077	0.189*	0.192*	0.246*
5. Broj predavanja iz PLMP-a, PLFP-a, MP-a 1,2 i FP-a 1,2 smatram dovoljnima. • I think that the number of lectures in PLMP, PLFP, MP 1,2 and FP 1,2 is sufficient.	3.4 ± 1.3	-0.175*	0.063	0.130	0.145*
6. Broj vježbi iz PLMP-a, PLFP-a, MP-a i FP-a smatram dovoljnima. • I think that the number of exercises in PLMP, PLFP, MP and FP is sufficient.	2.8 ± 1.4	-0.060	0.005	0.195*	0.215*
7. Smatram da MP 1,2 i FP 1,2 trebaju biti jedan nastavni predmet. • In my opinion MP 1,2 and FP 1,2 should be taught as one course of study.	2.1 ± 1.7	-0.034	0.059	0.031	0.033
8. Smatram da nastava iz MP-a 1,2 i FP-a 1,2 treba početi na nižim godinama studija. • In my opinion MP 1,2 and FP 1,2 should be taught at an earlier year of study.	2.6 ± 1.6	-0.006	0.132*	0.161*	0.076
9. Smatram da imam dovoljno znanja da mogu prepoznati pogreške dentalnog tehničara i svoje pogreške. • I believe to have sufficient knowledge to recognize by myself dental technician's and my own faults.	1.7 ± 1.3	0.036	0.237*	0.304*	0.427*

* statistički značajna korelacija ($p < 0,05$) • statistically significant correlation ($p < 0,05$)

tanici sa završenom srednjom školom za dentalne tehničare uzeli su značajno više otisaka ($p < 0,05$) te su izradili značajno više fiksnih protetičkih radova ($p < 0,01$). Muški ispitanici uzeli su statistički znatno više otisaka ($p < 0,01$) i izradili više fiksnih protetičkih radova ($p < ,05$) od ženskih ispitanika.

U tablici 2. prikazana je percepcija učenja i odnos s prethodnim kliničkim iskustvom. Ustanovljeno je da su ispitanici sa završenom srednjom školom za dentalne tehničare pokazali statistički značajno viši stupanj suglasnosti s tvrdnjama: *Smatram da mobilna i fiksna protetika trebaju biti jedan nastavni predmet* ($p < 0,05$) i *Smatram da imam dovoljno znanja*

study and number of completed semesters in prosthodontics ($p < 0,05$). The subjects with completed dental laboratory technician school took a significantly larger number of impressions ($p < 0,05$) and fabricated a significantly larger number of fixed restorations ($p < 0,01$). Male subjects took statistically significantly larger number of impressions ($p < 0,01$) and fabricated a larger number of fixed restorations ($p < 0,05$) than female subjects.

Table 2 shows the students' perception of learning and its relationship with previous clinical experience. The results revealed that subjects who completed the school for dental

da mogu prepoznati pogreške dentalnog tehničara i svoje pogreške ($p < 0,05$) od ispitanika koji su završili gimnaziju ili srednju medicinsku školu.

Analiza odnosa između već stečenoga kliničkog iskustva i percepcije učenja pokazala je statistički značajnu korelaciju između broja uzetih otisaka, izrađenih fiksnih i mobilnih radova, zatim zadovoljstva s odabranim fakultetom, percepcijom o korisnosti učenja i predavanja iz pretkliničkih predmeta i tvrdnje: *Smatram da imam dovoljno znanja da mogu prepoznati pogreške dentalnog tehničara i svoje pogreške*. Broj ispitanika u grupi imao je značajno negativnu korelaciju s tvrdnjama: *Zadovoljan/a sam odabranim fakultetom*, *Vježbe iz kliničke stomatološke protetike smatram korisnima* i *Broj predavanja iz PLMP-a, PLFP-a, MP-a i FP-a smatram dovoljnima* ($p < 0,05$).

U tablici 3. prikazana je percepcija vlastita znanja i vještina studenata. Ustanovljena je statistički značajna korelacija u percepciji znanja i vještina i godine studija. Studenti pete i šeste godine pokazali su statistički viši stupanj suglasnosti s većinom tvrdnji u odnosu na studente četvrtre godine.

Studenti koji su završili srednju školu za dentalne tehničare pokazali su, u odnosu na druge studente, statistički značajno viši stupanj suglasnosti ($p < 0,05$) sa svim tvrdnjama, osim s tvrdnjom *Dobro poznajem anatomiju i fiziologiju stomatognatog sustava*. Studenti pete i šeste godine pokazali su statistički značajno viši stupanj suglasnosti s tvrdnjama: *Znam kako izabrati i koristiti se koncem za retrakciju gingive* ($3,1 \pm 1,4$ i $3,3 \pm 1,3$ do $2,1 \pm 1,4$), *Vješt/a sam u brušenju zuba s jednim korijenom i izradi individualne nadogradnje* ($2,2 \pm 1,3$ i $2,5 \pm 1,3$ do $1,4 \pm 1,2$), *Vješt/a sam u izradi privremenih krunica direktnim postupkom* ($2,6 \pm 1,5$ i $2,3 \pm 1,5$ do $1,7 \pm 1,4$) i *Vješt/a sam u trajnom cementiranju radova neodbezivnom tehnikom cementiranja* ($2,8 \pm 1,3$ i $2,8 \pm 1,5$ do $1,7 \pm 1,4$), u usporedbi sa studentima četvrtre godine. Nije bilo statistički značajne razlike između studenata četvrtre i pete godine te studenata šeste i pete godine. Studenti šeste godine pokazali su statistički značajno viši stupanj suglasnosti s izjavom: *Poznate su mi indikacije, kontraindikacije i kliničke faze izrade akrilatne krunice* ($3,3 \pm 1,3$ do $2,6 \pm 1,2$) i *Poznate su mi indikacije, kontraindikacije i kliničke faze izrade jacket krunice* ($3,3 \pm 1,3$ u usporedbi s $2,3 \pm 1,2$), u usporedbi sa studentima četvrtre godine. Nije bilo statistički značajne razlike između studenata četvrtre, pete i šeste godine te studenata šeste i pete godine. Studenti šeste godine pokazali su statistički značajno viši stupanj suglasnosti s tvrdnjom: *Poznate su mi indikacije, kontraindikacije i kliničke faze izrade metalno-kemičke krunice* u odnosu na studente četvrtre i pete godine ($3,4 \pm 1,1$ u odnosu na $2,9 \pm 1,3$ i $2,4 \pm 1,2$). Statistički značajna razlika ustanovljena je također između studenata četvrtre i pete godine ($2,9 \pm 1,3$ u odnosu na $2,4 \pm 1,2$).

Osobno znanje ocijenjeno je prema broju točnih odgovora po studentu. Tako je prosječan broj iznosio $15,2 \pm 2,9$ (min. = 3, maks. = 20). Studenti šeste godine pokazali su značajno višu razinu osobnog znanja ($16,6 \pm 2,3$) u usporedbi sa studentima pete i četvrtre godine ($14,6 \pm 2,6$ i $14,9 \pm 3,1$). Nije bilo razlike u razini osobnog znanja između studenata četvrtre i pete godine. Nisu utvrđene razlike u razini osobnog znanja između studentica i studenata ($p = 0,343$), ni u od-

laboratory technicians reported a statistically significantly higher level of agreement with the following statements: "In my opinion removable and fixed prosthodontics should be taught as one course of study" ($p < 0,05$) and "I believe to have enough knowledge to recognize by myself technician's and my own faults" ($p < 0,05$) than subjects who completed grammar schools and secondary medical schools.

The analysis of the relationship between previous clinical experience and perception of learning pointed to a statistically significant correlation between the number of impressions taken, fixed and removable restorations fabricated and satisfaction with the chosen faculty, perception of usefulness of learning and lectures from preclinical courses and the statement "I believe to have enough knowledge to recognize by myself technician's and my own faults", The number of subjects in the group expressed a significantly negative correlation with the statement "I am satisfied with the faculty I chose", "I consider exercises in clinical prosthodontics as useful" and "I think that the number of lectures in PLMP, PLFP, MP and FP is sufficient" ($p < 0,05$).

Table 3 shows perception of one's own knowledge and skills. A statistically significant correlation in perception of knowledge and skills according to the year of study was established. 5th- and 6th-year students showed a statistically higher level of agreement with the majority of statements compared to 4th-year-students.

Students who completed dental laboratory technician school showed a statistically significant higher level of agreement ($p < 0,05$) with all statements except with the statement "I have a good knowledge of anatomy and physiology of the stomatognathic system" compared to other students. 5th- and 6th-year students showed a statistically significant higher level of agreement with the statement "I know how to choose and use gingival retraction cord" ($3,1 \pm 1,4$ and $3,3 \pm 1,3$ to $2,1 \pm 1,4$), "I am skilled in preparation for single rooted teeth and individual core-up fabrication" ($2,2 \pm 1,3$ and $2,5 \pm 1,3$ to $1,4 \pm 1,2$), "I am skilled in direct preparation for temporary crowns" ($2,6 \pm 1,5$ and $2,3 \pm 1,5$ to $1,7 \pm 1,4$) and "I am skilled in permanent fixation of restorations by non-adhesive cementation technique" ($2,8 \pm 1,3$ and $2,8 \pm 1,5$ by $1,7 \pm 1,4$), compared to 4th-year students. There was no statistically significant difference between 4th- and 5th-year students and 6th- and 5th-year students. 6th-year students showed a statistically significant higher level of agreement with the statement "I am familiar with indications, contraindications, and clinical phases of acrylic crown fabrication" ($3,3 \pm 1,3$ to $2,6 \pm 1,2$), and "I am familiar with indications, contraindications and clinical phases of jacket crown fabrication" ($3,3 \pm 1,3$ compared to $2,3 \pm 1,2$), compared to 4th-year students. There was no statistically significant difference between 4th- and 5th-year students and 6th- and 5th-year students. 6th-year students showed a statistically significant higher level of agreement with the statement "I am familiar with indications, contraindications, and clinical phases of metal-ceramic crown fabrication" in relation to 4th- and 5th year students ($3,4 \pm 1,1$ compared to $2,9 \pm 1,3$ and $2,4 \pm 1,2$). Statistically significant difference was also established between 4th- and 5th-year students ($2,9 \pm 1,3$ compared to $2,4 \pm 1,2$).

Tablica 3. Percepcija vlastita znanja i vještina studenata i razlike prema društveno-demografskim čimbenicima
Table 3 Perception of students' own knowledge and skills and differences according to socio-demographic factors

	Srednja vrijednost ± standardna devijacija • Mean value ± SD (min-max)	Godina studija • Year of study	Spol • Gender	Srednja škola • Secondary school
1. Dobro poznajem anatomiju i fiziologiju stomatognatog sustava. • I have a good knowledge of anatomy and physiology of the stomatognathic system.	3,2 ± 0,8 (0,4-4,8)	0,301	0,610	0,102
2. Znam kako uzeti anamnezu, pregledati pacijenta, odrediti dijagnozu i pripremiti plan za mobilne protetičke radove. • I know how to take medical history, examine patients, determine diagnosis and plan for removable-prosthetic treatment.	2,9 ± 1,1 (0,2 - 4,8)	0,587	0,880	0,012*
3. Poznate su mi vrste i svojstva žlica za izradu mobilnih protetičkih radova. • I am familiar with the types and features of trays for removable prosthodontic treatment.	3,7 ± 1 (0,2 - 4,8)	0,516	0,783	0,001*
4. Poznate su mi vrste i načini uzimanja otisaka za izradu mobilnih protetičkih radova. • I am familiar with the types and ways of impression procedures in removable prosthodontic treatment.	3,6 ± 0,8 (1,4 - 4,8)	0,176	0,941	0,021*
5. Poznati su mi klinički i laboratorijski postupci izrade djelomičnih akrilatnih proteza i djelomičnih proteza s metalnom osnovom. • I am familiar with clinical and laboratory procedures of partial acrylic denture fabrication and metal frame partial denture fabrication.	3 ± 1,2 (0 - 4,8)	0,570	0,006*	0,0009*
6. Vješt/a sam u uzimanju anatomske otisaka za potpune i djelomične proteze. • I am skilled in taking anatomic impressions for complete and partial dentures.	3,4 ± 1,1 (0,5 - 4,8)	0,009*	0,775	0,0008*
7. Vješt/a sam u uzimanju funkcijskih otisaka za potpune i djelomične proteze. • I am skilled in taking functional impressions for complete and partial dentures.	3 ± 1,1 (0 - 4,8)	0,0005*	0,402	0,003*
8. Vješt/a sam u određivanju međučeljskih odnosa. • I am skilled in determination of interjaw relationships.	2,7 ± 1,1 (0,1 - 4,8)	0,007*	0,720	0,007*
9. Vješt/a sam u odabiru boje, veličine i oblika prednjih i stražnjih zuba za potpune i djelomične proteze. • I am skilled in choosing shade, size and shape of anterior and posterior teeth for complete and partial dentures.	3 ± 1,2 (0,2 - 4,8)	0,022*	0,794	0,004*
10. Vješt/a sam u korištenju polunamjesticim artikulatom. • I use semi-adjustable articulator skillfully.	1,9 ± 1,2 (0 - 4,8)	0,0008*	0,053	0,0009*
11. Mogu procijeniti biološki faktor zuba nosača. • I can estimate biological factor of anchor teeth.	2,2 ± 1,2 (0 - 4,8)	0,052	0,004*	0,0001*
12. Znam kako izabrati i koristiti se koncem za retrakciju gingive. • I know how to choose and use gingival retraction cord.	2,8 ± 1,5 (0 - 4,8)	0,0004*	0,111	0,002*
13. Poznate su mi indikacije, kontraindikacije i kliničke faze izrade akrilatne krunice. • I am familiar with indications, contraindications and clinical phases of acrylic resin crown fabrication.	2,8 ± 1,3 (0 - 4,8)	0,012*	0,062	0,0003*
14. Poznate su mi indikacije, kontraindikacije i kliničke faze izrade jacket krunice. • I am familiar with indications, contraindications and clinical phases of jacket crown fabrication.	2,7 ± 1,3 (0,1 - 4,8)	0,0007*	0,036*	0,0004*
15. Poznate su mi indikacije, kontraindikacije i kliničke faze izrade metalno-keramičke krunice. • I am familiar with indications, contraindications and clinical phases of metal-ceramic crown fabrication.	2,8 ± 1,3 (0,1 - 4,8)	0,0009*	0,024*	0,0008*
16. Vješt/a sam u brušenju zuba za pojedinačne krunice. • I am skilled in grinding teeth for single crowns.	2,1 ± 1,4 (0 - 4,8)	0,003*	0,001*	0,0007*
17. Vješt/a sam u paraleliziranju brušenih zuba za višeečlane konstrukcije. • I am skilled in parallelizing ground teeth for multi-unit constructions.	1,8 ± 1,3 (0 - 4,8)	0,001*	0,0009*	0,0008*
18. Vješt/a sam u brušenju zuba s jednim korijenom i izradi individualne nadogradnje. • I am skilled in preparation for single rooted teeth and individual core-up fabrication.	2 ± 1,4 (0 - 4,8)	0,0005*	0,001*	0,006*
19. Vješt/a sam u izradi privremenih krunica direktnim postupkom. • I am skilled in direct fabrication of temporary crowns.	2,1 ± 1,5 (0 - 4,8)	0,001*	0,001*	0,0009*
20. Vješt/a sam u trajnom cementiranju radova neadhezivnom tehnikom cementiranja. • I am skilled in permanent fixation of restorations by non-adhesive cementation technique.	2,4 ± 1,5 (0 - 4,8)	0,0004*	0,046*	0,005*

* statistički značajna razlika (p < 0,05) • statistically significant difference (p < 0,05)

Tablica 4. Osobno znanje u odnosu na godinu studija
Table 4 Personal knowledge in relation to the year of study

	Ukupno točni odgovori • Total correct answers (%)	4. godina (% točnih odgovora) • 4th year (% correct answers)	5. godina (% točnih odgovora) • 5th year (% correct answers)	6. godina (% točnih odgovora) • 6th year (% correct answers)	P
1. Gornja čeljust smanjena je u dorzalnom smjeru, a donja u kaudalnom zbog resorpcije. • Upper jaw is reduced in oral (dorsal) direction, and lower jaw in caudal direction due to resorption.	128 (57.1%)	45 (50.6%)	49 (57.6%)	34 (68%)	0.005*
2. Individualna žlica izrađuje se od akrilata na anatomskom modelu. • Custom tray is fabricated from acrylic resin on an anatomic cast.	214 (95.5%)	84 (94.4%)	82 (96.5%)	48 (96%)	0.547
3. Anatovski otisak uzet konfekcijskom žlicom širi je od alveolarnog grebena. • Anatomic impression is taken by means of a stock tray in width of the alveolar ridge.	114 (50.9%)	41 (46.1%)	39 (45.9%)	34 (68%)	0.078
4. Zagrizne šablone kompenziraju nedostatne zube i resorbirane dijelove čeljusti te njihova prosječna visina iznosi 10 – 20 mm. • Occlusal rims compensate for deficient teeth and resorbed parts of jaw, and their average height amounts to 10-20 mm.	191 (85.3%)	71 (79.8%)	76 (89.4%)	44 (88%)	0.362
5. Protetička ploha paralelna je s Camperovom linijom. • Occlusal surface is parallel with Camper's line.	198 (88.4%)	80 (89.9%)	73 (85.9%)	45 (90%)	0.325
6. Prosječni kut nagiba kondilne staze na polunamjestivim artikulatorima iznosi 60°. • Condylar path angle on semi-adjustable articulators amounts to 60°.	146 (65.2%)	62 (69.7%)	45 (52.9%)	39 (78%)	0.031*
7. Gornji sjekutići postavljaju se prema statičkom pravilu. • Upper incisors are arranged according to the static rule.	174 (77.7%)	74 (83.1%)	54 (63.5%)	46 (92%)	0.001*
8. Baza djelomične proteze uključuje sedlo te veliku i malu spojku. • Partial denture base includes a saddle and a large and small connector.	202 (90.2%)	80 (88.9%)	72 (84.7%)	50 (100%)	0.073
9. Veličina baze proteze proporcionalna je broju preostalih zuba. • Denture base size is proportional with the number of remaining teeth.	125 (55.8%)	55(61.8%)	46 (54.1%)	24 (48%)	0.025*
10. Retencijski krak kvačice protetičkog ekvatora često je na oralnoj, a stabilizacijski krak na vestibularnoj strani. • Retention arm of the circumferential clasp is usually on the oral, and stabilization arm on the vestibular side.	147 (65.6%)	52 (58.4%)	52 (61.2%)	43 (86%)	0.01*
11. Optimalno opterećenje zuba je u smjeru zubne osi. • Optimal tooth load is in direction of the tooth axis.	214 (95.5%)	83 (93.3%)	81 (95.3%)	50 (100%)	0.361
12. Nadogradnja je fiksni protetički rad na endodontski liječenom zubu. • A core build-up is a fixed prosthetic restoration on an endodontically treated tooth.	216 (96.4%)	83 (93.3%)	83 (97.6%)	50 (100%)	0.307
13. Oblik zuba za fiksni protetički rad nakon brušenja mora imati najveći opseg duž incizalnog ruba. • The shape of the tooth for a fixed prosthetic restoration after grinding must have the widest circumference along the incisal edge.	209 (93.3%)	82 (92.1%)	80 (94.1%)	47 (94%)	0.715
14. Ako je okluzijski odnos normalan, redukcija anatomске krunice u vertikalnom smjeru ne smije prekoračiti 2 mm. • In normal occlusal relationships, reduction of the anatomic tooth crown in vertical dimension should not exceed 2 mm.	180 (80.4%)	72 (80.9%)	63 (74.1%)	45 (90%)	0.139
15. Polisulfidi su najčešće korišteni materijal za otiske. • Polysulfides are the most frequently used impression materials.	192 (85.7%)	77(86.5%)	69 (81.2%)	46 (92%)	0.260
16. Retrakcijskim koncima koristimo se za precizno određivanje granica brušenja zuba. • Retraction cords are used for precise indication of preparation borders.	214 (95.5%)	81 (91%)	83 (97.6%)	50 (100%)	0.049*
17. Krunice cementirane standardnim neadhezivnim cementima mogu se ukloniti sa zuba bez njihova rezanja. • Crowns cemented with standard, non-adhesive cements can be removed from teeth without cutting.	45 (20.1%)	15 (16.9%)	10 (11.8%)	20 (40%)	0.0003*
18. Za preparaciju jacket krunice vestibularnu površinu zuba treba reducirati za 0,5 mm. • For jacket crown preparation, vestibular tooth surface should be reduced by 0.5 mm.	124 (55.4%)	42 (47.2%)	44 (51.8%)	38 (76%)	0.003*
19. Metalno-keramička krunica je pogodna za zube s velikim pulpnim komorama. • Metal-ceramic crown is suitable for teeth with large pulp chambers.	168 (75%)	62 (69.7%)	62 (72.9%)	44 (88%)	0.008*
20. Potpuna metalna krunica često zahtijeva najmanje brušenja zuba. • Full metal crown usually requires the smallest extent of tooth grinding.	180 (80.4%)	71 (79.8%)	63 (74.1%)	46 (92%)	0.151

* statistički značajna razlika (p < 0,05) • statistically significant difference (p<0.05)

nosu na srednjoškolsko obrazovanje ($p = 0,534$). Broj točnih odgovora povećavao se s brojem godina studiranja, primjerice, studenti šeste godine imali su najviše točnih odgovora na većinu pitanja (16/20). Postotak točnih odgovora bio je u rasponu od 20,1 do 96,4 posto (tablica 4.).

Odnos između osobnoga znanja i percepcije učenja, znanja i vještina pokazuje statistički značajnu korelaciju (tablica 5.). Također se Spearmanovim koeficijentom korelacije ispitivao i odnos između osobnoga znanja i prije stečenog kliničkog iskustva te je ustanovljena statistički značajna korelacija između osobnoga znanja i broja izrađenih fiksnih radova ($p > 0,001$).

Personal knowledge was assessed according to the number of correct answers per student. The average number of correct answers per student amounted to 15.2 ± 2.9 (min.=3, max = 20). 6th-year students showed significantly higher levels of personal knowledge (16.6 ± 2.3) compared to 5th- and 4th-year students (14.6 ± 2.6 and 14.9 ± 3.1). There was no difference in the level of personal knowledge between 4th- and 5th students. No differences either in the level of personal knowledge between female and male subjects ($p=0.343$) or regarding secondary school education ($p=0.534$) were established. The number of correct answers increased along with the year of study, i. e. 6th-year students gave the highest number of correct answers to most questions (16/20). The percent of correct answers ranged from 20.1% to 96.4% (Table 4).

The relationship between personal knowledge and perception of learning, knowledge and skills showed statistically significant correlations (Table 5). Also, the relationship between personal knowledge and previous clinical experience was examined by Spearman's correlation coefficient. A statistically significant correlation between personal knowledge and number of fabricated fixed restorations was established ($p < 0.001$).

Tablica 5. Odnos između osobnoga znanja i percepcije učenja, znanja i vještina
Table 5 Relationship between personal knowledge and perception of learning, knowledge and skills

Izjava • Statement	Koeficijent korelacije • Correlation coefficient
Smatram da MP1,2 i FP1,2 trebaju biti jedan nastavni predmet. • I think that MP1,2 and FP1,2 should be taught as one course.	-0.184*
Poznate su mi vrste i svojstva žlica za izradu mobilnih protetičkih radova. • I am familiar with the types and features of trays for removable prosthodontic treatment.	0.164*
Poznate su mi vrste i načini uzimanja otisaka za izradu mobilnih protetičkih radova. • I am familiar with the types and ways of impression procedures in removable prosthodontic treatment.	0.154*
Poznate su mi indikacije, kontraindikacije i kliničke faze izrade akrilatne krunice. • I am familiar with indications, contraindications and clinical phases of acrylic resin crown fabrication.	0.181*
Poznate su mi indikacije, kontraindikacije i kliničke faze izrade jacket krunice. • I am familiar with indications, contraindications and clinical phases of jacket crown fabrication.	0.231*
Poznate su mi indikacije, kontraindikacije i kliničke faze izrade metalno-keramičke krunice. • I am familiar with indications, contraindications and clinical phases of metal-ceramic crown fabrication.	0.222*

* statistički značajna korelacija ($p < 0,05$) • statistically significant correlation ($p < 0.05$)

Rasprava

Rastom standarda i produženim očekivanim životnim vijekom, postotak starije populacije već se godinama povećava, pa je sve veća i potreba za protetičkim radovima (11-13). Waldman i suradnici (14) istaknuli su u svojem izvještaju iz 1999. godine da potreba za protetičkim radovima raste proporcionalno s dobi, nižim društveno-ekonomskim standardom i nižom razinom edukacije. Kako bi studenti mogli zadovoljiti sve veću potrebu za protetičkim radovima, nužno je da steknu visokokvalitetno teoretsko i praktično znanje tijekom studija koje će im biti osnova za budući klinički rad. Također je važno da razvijaju sposobnost samokritike, odnosno samoprocjene vlastita rada, što se stječe tijekom rada i iskustva (14, 15).

Unatoč velikom teoretskom znanju ustanovljenom u ovom istraživanju, studentima dentalne medicine u Zagrebu nedostaje kliničko iskustvo. Budući da postoji raskorak između naučenih i primijenjenih sadržaja ne samo u Hrvat-

Discussion

Life expectancy has increased rapidly due to the improvement in the living standard. In consequence, the percentages of elderly people have been increasing over years, thus increasing the need for prosthetic restorations (11-13). In 1999, Waldman et al. (14) stated that the need for prosthetic restorations has increased proportionally with older age, lower socio-economic standard of living and lower level of education. In order for students to meet the growing need for prosthetic restorations, it is necessary for them to acquire high quality theoretical and practical knowledge during the course of their study, which will set the foundation for their future clinical work. It is also important that students develop the ability of self-criticism, i.e. self-assessment of their own work, which is acquired through work and experience (14, 15).

During the integrated six-year study program, dental students gain extensive theoretical knowledge of dental medicine. Yet they lack clinical experience. Since there is a gap between

skoj nego i u drugim zemljama, potrebna je promjena koja bi omogućila ravnotežu između tih dvaju čimbenika (16). Kako tijekom studija dentalne medicine u drugim zemljama nastava iz stomatološke protetike počinje na nižim godinama i to bez podjele na fiksnu i mobilnu protetiku, naše je istraživanje obuhvaćalo sljedeće izjave: *Smatram da mobilna i fiksna protetika trebaju biti jedan nastavni predmet i Smatram da nastava iz mobilne i fiksne protetike treba početi na nižim godinama studija*, u svrhu utvrđivanja mišljenja studenata dentalne medicine o toj temi. Pretkliničke i specijalne kliničke vježbe održavaju se u malim grupama studenata s prosječno $8,3 \pm 1,6$ članova, što odgovara veličini grupa drugih studija dentalne medicine u svijetu (15 - 18).

Istraživanje Branda i suradnika (19) pokazalo je slične rezultate u vezi s ocjenom studenata o materijalima i metodama učenja fiksne protetike između nekoliko studijskih programa dentalne medicine u Europi. Rezultati pokazuju da se na studiju dentalne medicine koji počinje ranije s pretkliničkom nastavom postižu bolje ocjene kad je riječ o pripravnosti studenata na klinički rad, te veća opća ocjena nastave iz fiksne protetike. Zanimljivo je uočiti da ocjena pripravnosti studenata za klinički rad te opća ocjena kvalitete učenja, nisu bile povezane s godinom studija studenata koji su sudjelovali u istraživanju.

Zanimanje žena za medicinske znanosti, uključujući i dentalnu medicinu, povećalo se posljednjih nekoliko desetljeća. Kelsey i suradnici (20) tvrde da je u Americi 1970-ih godina među studentima dentalne medicine bilo prosječno jedan posto žena, a danas ih je od 38 do 40 posto. Muškarci su pokazali veće kliničko iskustvo te su njihove vještine bile ocijenjene boljima, a u teoretskom znanju nije bilo statistički značajnih razlika. Među drugim društveno-demografskim čimbenicima, pozornost treba usmjeriti na mogući utjecaj roditelja zaposlenih u zdravstvu na percepciju studenata o znanju, što nije bilo statistički značajno. Park i suradnici (21) postigli su iste rezultate te su ustanovili da taj čimbenik nije utjecao na pretklinički i klinički rad. Utjecaj završene srednje škole također je ispitan, pri čemu je srednja škola za dentalne tehničare pozitivno isticana u ocjeni kliničke prakse i percepciji vlastitih vještina studenata. Tijekom obrazovanja u srednjoj školi za dentalne tehničare stječu se osnove laboratorijske mobilne i fiksne protetike, što je dobar temelj za daljnje akademsko obrazovanje doktora dentalne medicine. Beier i suradnici (22) istražili su utjecaj prethodnog medicinskog obrazovanja na uspjeh studiranja. Utjecaj je promatran u odnosu na uspjeh na prijamnom ispitu, u kliničkom radu i kliničkoj nastavi te prema uspjehu na završnom ispitu. Potvrđeno je da su studenti s ranije stečenim medicinskim obrazovanjem bili uspješniji u prijamnim ispitima i bolji u kliničkoj nastavi te su imali bolje ocjene na završnim ispitima, osobito u stomatološkoj protetici te oralnoj i maksilofacijalnoj kirurgiji. Također su utvrdili da broj ispitanika nije utjecao na rezultat. Rezultati našeg istraživanja uglavnom odgovaraju njihovu istraživanju.

Henzi i suradnici (18) istraživali su percepciju studenata o kvaliteti učenja i zaključili da su nedostaci s tim u vezi slični kao i prije pedeset godina. Prednosti i nedostaci učenja najbolje su poznati studentima i oni ih mogu najbolje izraziti. Stoga je nužno uspostaviti odgovarajuću suradnju i komunikaciju s odgovornim osobama. Također je jasno iz drugih

the contents learned and the contents applied not only in Croatia but also in other countries, it is necessary to introduce a change that would allow a balance between these two factors (16). Since courses in Prosthodontics, within the study of dental medicine, in other countries begin at earlier years of study, without separating fixed from removable prosthodontics, our questionnaire comprised the following statements: "I think that removable and fixed prosthodontics should be taught as one course" and "I think that courses in removable and fixed prosthodontics should be held at an earlier year of study", with the purpose of finding out dental medicine students' opinions about it. Preclinical and special clinical practicals are held in small groups of students with an average of 8.3 ± 1.6 members, which corresponds to the size of groups of other dental medicine study programs in the world (15-18).

Similar results were obtained by Brand et al. who conducted research on students' assessment of materials and methods in learning of fixed prosthodontics among several dental medicine study programs in Europe (19). The results show that dental medicine courses of study which start earlier with preclinical learning have higher ratings in terms of preparedness of students for clinical work, as well as a higher overall rating of courses in fixed prosthodontics. It is interesting to notice that assessment of preparedness of students for clinical work, as well as overall assessment of quality of learning did not correlate with the year of study of the students who participated in the study.

Women's interest in medical sciences, including dental medicine, has increased during the last few decades. Kelsey et al. (20) claimed that in America in the 1970s there were 1% of female students on average among dental medicine students, while today women make up 38% to 40% of them. Men showed greater clinical experience and their skills were assessed as being better, while there were no statistically significant differences regarding the theoretical knowledge. Among other socio-demographic factors which affect students' perception of knowledge, attention should be paid to a possible impact of parents employed in health care. However, such an impact was not statistically significant in our study. Park et al. (21) obtained identical results, and they found that this factor had no influence on preclinical and clinical work. The impact of completed secondary education was positively graded in the assessment of clinical practice and perception of students' own skills. During their education in a school for dental laboratory technicians, students acquire the basics of laboratory removable and fixed prosthodontics, which provides a good basis for further academic education of doctors of dental medicine. Beier et al. (22) examined the impact of prior medical education to the success in studying. The impact was observed in relation to the success in the entrance examination, clinical work and clinical courses, and success in final examination. It was confirmed that students with previous medical education were more successful in entrance examinations, better in clinical courses and had better grades at final exams, especially in prosthodontics and oral and maxillofacial surgery. They also found that the subjects' gender had no impact on the results. The results of our study largely correspond to their study.

Henzi et al. (18) investigated students' perception of the quality of learning and concluded that despite the fact that

istraživanja, primjerice, Nikzada i suradnika (23), da u nastavi dentalne medicine, uključujući stomatološku protetiku, treba uvrstiti više praktičnoga rada, poticati neovisnost studenata i jačati povjerenje od početka njihova studija. Nikzad i kolege istražili su utjecaj videoprikaza o preparaciji zuba za metalno-keramičke i privremene krunice kako bi provedli iste terapijske postupke tijekom kliničkih vježbi. Ustanovili su da su studenti iz grupa koje su već gledale video bili uspješniji u implementaciji kliničkoga postupka, no samo u dijelovima usko povezanim s laboratorijskim dijelom postupka. Također su zabilježili umjeren utjecaj prethodnoga gledanja videa na smanjenje stresa i povećanje samopouzdanja studenata, te zaključili da je demonstracija na pacijentima uživo najbolji način za stjecanje kliničkog iskustva potrebnog za samostalan rad studenata s pacijentima pod nadzorom profesora.

Chambers i LaBarre (24) istraživali su utjecaj percepcija studenata na stečeno znanje o laboratorijskim tehnikama i postupcima mobilne protetike na daljnje učenje i stjecanje kliničkoga znanja. Na dvama studentskim zadacima uspoređivali su samoprocjenu znanja studenata s ocjenama profesora, te su zaključili da je samoprocjena bolje predviđala buduće učenje negoli ocjene profesora.

Velayo i suradnici (25) došli su do sličnog zaključka. Uspoređivali su ocjene za pretkliničke i odgovarajuće kliničke predmete dviju generacija diplomiranih doktora dentalne medicine i donijeli zaključke o statistički značajnim korelacijama. Barrero i suradnici (26) ispitivali su studente treće i četvrte godine u odnosu na njihovu procjenu osobne spremnosti za klinički rad i ustanovili da se manje od 60 posto studenata osjećalo spremnima primijeniti pretkliničko znanje u kliničkome radu. Rezultati navedenih istraživanja odgovaraju našem istraživanju i pokazuju da je potrebna promjena ne samo sadržaja pretkliničke nastave s obzirom na metode učenja, materijale i vještine, nego i u načinu prijenosa znanja, sugerirajući češće korištenje videa i grupnog učenja (timska metoda učenja) te učenja orijentiranog na rješavanje problema (metoda učenja rješavanjem problema). Shina i suradnici (27) također su potvrdili nužnost promjena. Oni su retroaktivno proučavali dvije grupe diplomiranih studenata od kojih je svaka obuhvaćala četiri generacije u razdoblju od 2007. do 2011. godine te od 2012. do 2016. Između tih dviju grupa postojala je promjena u programu studija te su studenti ispitivani s obzirom na očekivanja i percepciju nastave u različitim granama dentalne medicine te stomatološkoj protetici. Osim toga, analizirano je njihovo stajalište o odabiru buduće specijalizacije. Rezultati su pokazali povećanje zadovoljstva bivših studenata razinom znanja u stomatološkoj protetici stečenoga tijekom studija, no i smanjenje zanimanja za specijalizirane vježbe u stomatološkoj protetici.

Nužne promjene u programu nastave iz stomatološke protetike u prvom se redu odnose na timsko učenje i njegove prednosti u odnosu na tradicionalne načine poučavanja. Istraživanje Takeuchija i suradnika (28) o japanskim studentima potvrdilo je prednosti timskoga učenja u nastavi stomatološke protetike. Grupa studenata koja je pohađala nastavu i učila timski pokazala je veće zadovoljstvo kvalitetom učenja u odnosu na tradicionalne metode poučavanja te je istaknuta

we live in this modern age, the present disadvantages are similar to those that were observed fifty years ago. Advantages and disadvantages of learning are best known to students, and they can point to them in the best manner. It is therefore necessary to establish proper ways of communication, appropriate cooperation with responsible persons and create viable solutions. Based also on some other research, e.g. by Nikzad et al. (23), it is clear that in dental medicine, including prosthodontics, more practical work should be introduced, students' independence should be encouraged and confidence strengthened from the very beginning of their study. Nikzad and colleagues investigated the impact of video demonstrations of tooth preparations for metal-ceramic and temporary crown fabrication in order to perform the same treatment procedures during clinical practicals. They found that the students from groups that had previously watched the video were more successful in implementation of clinical procedures, but only in those segments that were closely related to the laboratory part of the procedure. They also noted a moderate impact of previous videos on stress reduction and self-confidence increase in students and concluded that live demonstration on patients are among best ways of acquiring previous clinical experience required for independent work of students on patients under supervision of their teachers.

Chambers and LaBarre (24) investigated the impact of students' perceptions of acquired knowledge about laboratory techniques and procedures in removable prosthodontics on their further learning and acquiring clinical knowledge of removable prosthodontics. On two students' tasks, they compared self-assessment of students' knowledge with grades given by teachers, and they concluded that self-assessment was a better predictor of future learning than teachers' grades. Velayo et al. (25) reached similar conclusions. They compared grades for preclinical and corresponding clinical courses of two generations of dental medicine graduates and drew conclusions about statistically significant correlations. Barrero et al. (26) examined 3rd- and 4th-year students in relation to their assessment of their personal preparedness for clinical work, and they found that less than 60% of students felt ready to apply preclinical knowledge in their clinical work. The results of the abovementioned studies correspond with the results of our study. They point to the need to change not only the content of preclinical courses in terms of learning methods, materials and skills, but also in terms of ways of transferring knowledge, suggesting greater use of video and group learning methods (team-based learning), as well as learning oriented toward problem solving (problem-based learning). Shina et al. (27) also confirmed the necessity of changes. They studied retrospectively two groups of graduates, each consisting of four generations in the period from 2007-2011 and 2012-2016. Between these two groups, there was a change in the curriculum of their course of study and students were surveyed with respect to their experiences and perception of teaching in different branches of dental medicine, including prosthodontics. Besides, their attitude toward choosing future specialization was observed. The results showed an increase in satisfaction of former students with the level of knowledge in prosthodontics acquired during their study, but also a decrease in interest for specialized training in prosthodontics.

glavna prednost poticanja aktivne rasprave među studentima koji su pohađali nastavu i timski učili.

Nadalje, studenti koji su pohađali nastavu i učili timski pokazali su statistički značajno bolje rezultate na završnom ispitu, što potvrđuje prednosti timskoga učenja u odnosu na tradicionalne metode poučavanja. Slične su rezultate postigli Echeto i suradnici (29) sa studentima sa Sveučilišta Florida (SAD). Usporedili su dvije generacije studenata mobilne protetike. Studenti iz generacije 2013. poučavani su tradicionalnim metodama, a studenti generacije 2014. metodom timskoga učenja. Rezultati su pokazali statistički značajnu razliku u rezultatima ispita u korist grupe studenata koja je učila timski (23,7 %) i više prolaznih ocjena na ispitu u usporedbi s grupom studenata poučavanom tradicionalno). Uz to, grupa studenata koja je učila timski postigla je značajno bolju ocjenu na završnom ispitu. Na temelju ovih rezultata može se zaključiti da je metoda timskoga učenja bolja od tradicionalnih oblika učenja te da treba odgovarajuće promijeniti školski kurikulum. No poznato je da je uvođenje promjena dugotrajno. U Hrvatskoj, ali i u drugim zemljama, tema o kojoj se raspravljalo u ovom istraživanju još nije dovoljno istražena.

Zaključci

Ovo istraživanje daje uvid u subjektivnu procjenu studenata dentalne medicine o njihovu znanju i vještinama u stomatološkoj protetici. Rezultati pokazuju sljedeće:

- studenti koji su završili srednju školu za dentalne tehničare uzeli su značajno više otisaka i izradili značajno više fiksnih protetičkih radova
- muški ispitanici uzeli su značajno više otisaka i izradili više fiksnih protetičkih radova
- kliničko iskustvo (broj uzetih otisaka i izrađeni mobilni i fiksni radovi) povećava se s brojem godina studija i završetkom semestara nastave iz stomatološke protetike
- studenti pete i šeste godine pokazali su statistički viši stupanj suglasnosti s većinom tvrdnji o percepciji svojih znanja i vještina, u odnosu na studente četvrte godine
- broj točnih odgovora iz procjene povećava se s godinama studija pa su studenti šeste godine imali najviše točnih odgovora na većinu pitanja
- utvrđena je pozitivna korelacija između percepcije učenja i ranije stečenoga kliničkog iskustva.

Smatra se da će rezultati ovog istraživanja pridonijeti poboljšanju obrazovanja i kvaliteti rada studenata i budućih doktora dentalne medicine, što će ih potaknuti i motivirati za nastavak dobrog rada i daljnje učenje tijekom studija te tako poboljšati njihove kompetencije za samostalni rad.

Necessary changes of the curriculum in prosthodontics primarily refer to team-based learning, with its advantage in relation to traditional methods of teaching. The study by Takeuchi et al. (28) on Japanese students confirmed the benefits of team-based learning in teaching prosthodontics. The group of students who attended team-based learning classes showed greater satisfaction with the quality of learning compared to traditional methods of teaching. The main advantage of such a method is that it encourages active discussion among the students attending team-based learning classes. Furthermore, students of team-based learning classes showed statistically significant better final exam results, which confirms the benefits of team-based learning compared to traditional methods of teaching. Similar results were obtained by Echeto et al. (29), with students of the University of Florida (USA). They compared two generations of students of removable prosthodontics. Students of generation 2013 were taught by means of traditional methods, and students of generation 2014 were taught by means of team-based learning. The results showed statistically significant difference in the exam results in favor of the team-based learning group of students (23.7% more „pass“ grades in the exam compared to the traditionally taught group of students). In addition, the team-based learning group of students obtained a significantly higher grade in the final exam. Based on all these results, it can be concluded that the team-based learning method is better than traditional methods of teaching, and corresponding changes of the curriculum should be introduced. However, it becomes clear that major change will take a long time. This topic is still insufficiently explored in Croatia, and there are only limited comparable data or findings available from other countries.

Conclusions

This study provides us with insight into dental medicine students' subjective assessments of their knowledge and skills in prosthodontics. The results of the study show that:

Students who completed dental laboratory technician school program took a significantly larger number of impressions and fabricated a significantly larger number of fixed restorations; Male subjects took a significantly larger number of impressions and fabricated a larger number of fixed restorations; Clinical experience (number of impressions taken and removable and fixed restorations fabricated) increased with the number of years of study and completion of semesters in prosthodontics; 5th- and 6th-year students showed a statistically higher level of agreement with most statements about perception of knowledge and skills compared to 4th-year students. The number of correct answers from the assessment increased with the year of study, and 6th-year students had the largest number of correct answers to most questions. A positive correlation between the perception of learning and previous clinical experience was established.

It is believed that the results of this study will contribute to the improvement of education and quality of work of dental students and future doctors of dental medicine, thus encouraging and motivating them to continue with good work. They are expected to put further efforts into learning during their university study, thus improving their competence for independent work.

Sukob interesa

Nije bilo sukoba interesa.

Conflict of interest

None declared

Abstract

Objectives: The aim of the study was to establish the subjective perception of dental medicine students' knowledge and skills in prosthodontics and to determine both how their perception changed during their study, by gaining clinical experience. Also, the aim was to investigate if there were any socio-demographic factors that influenced students' perception. **Methods:** The research, based on an anonymous survey for dental medicine students was carried out at the School of Dental Medicine, University of Zagreb in 2015. YES/NO/DO NOT KNOW questions were used for assessment of students' knowledge, and a 50 mm visual analog scale was used for assessment of their abilities and skills. The Chi-square test, t-test for independent samples, analysis of variance and the Pearson's correlation coefficient were used for statistical data analysis. **Results:** Students' response (4th, 5th and 6th year of study) to the study amounted to 71,3 %. The results showed that clinical experience and the number of correct answers from knowledge assessment increased with the year of study. Students with completed dental laboratory technician school took statistically significantly larger number of impressions and fabricated a significantly larger number of fixed restorations. Additionally, the results showed a significantly higher level of agreement with the statements about their perception of knowledge and skills. **Conclusion:** Students' perceptions on learning positively correlated with the number of completed semesters in prosthodontics and the students' own clinical experience.

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Key words

Students, Dental; Education, Dental;
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References

- Kraljević, K; Kraljević Šimunković, S – editors. Partial denture. Zagreb: In. Tri d.o.o.; 2012.
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Study program Dental Medicine [cited 2015 Apr 20]. Available from: https://www.sfgz.unizg.hr/_download/repository/Study_program_DM_EN%5B1%5D.pdf
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Preclinical and laboratory removable prosthodontics [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71340>
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Study program Dental Medicine [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71339>
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Removable prosthodontics I [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71310>
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Removable prosthodontics II [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71312>
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Fixed prosthodontics I [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71292>
- MeSH Browser [database on the Internet]. School of Dental Medicine Zagreb: Fixed prosthodontics II [cited 2015 Apr 20]. Available from: <https://www.sfgz.unizg.hr/en/course/71293>
- Cho CG, Chee WW, Tan DT. Dental Students' Ability to Evaluate Themselves in Fixed Prosthodontics. *J Dent Educ.* 2010 Nov;74(11):1237-42.
- Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Pers Soc Psychol.* 1999 Dec;77(6):1121-34.
- Kruger J, Dunning D. Unskilled and unaware: but why? A reply to Krueger and Mueller. *J Pers Soc Psychol.* 2002 Feb;82(2):189-92.
- Kraljević K. Total denture. Zagreb: Areagrafika; 2001.
- Čatović, A et al. Clinical Fixed Prosthodontics. Zagreb: School of Dental Medicine Zagreb; 1999.
- Waldman HB, Perlman SP, Xu L. Should the Teaching of Full Denture Prosthetics be maintained in Schools of Dentistry ? *J Dent Educ.* 2007 Apr;71(4):463-6.
- Friedson E. Profession of medicine. New York: Dodd, Mead, and Co.; 1970.
- Fuhrmann, B; Weissburg, M. Self-evaluation. In: Morgan, M; Irvy, D – editors. Evaluating clinical competence in the health professions. St. Louis: Mosby; 1978. p 139–50.
- Elangovan S, Allareddy V, Singh F, Taneja P, Karimbux N. Indian Dental Education in the New Millennium: Challenges and Opportunities. *J Dent Educ.* 2010 Sep;74(9):1011-6.
- Henzi D, Davis E, Jasinevičius R, Hendricson W. In the students' own words: what are the strengths and weaknesses of the dental school curriculum?. *J Dent Educ.* 2007 May;71(5):632-45.
- Brand HS, Kamell H, Kharbanda AK, Dozic A. Students' perceptions of materials and techniques used at European dental schools in the education of fixed prosthodontics. *J Dent Educ.* 2013 Sep;77(9):1140-6.
- Kelsey WP, Kimmes NS, Williams DE, Ogunleye AO, Ault JT, Barkmeier WW. Gender-Based Differences in Satisfaction with Academic Preparation and Practice Experiences. *J Dent Educ.* 2009 Apr;73(4):464-70.
- Park SE, Da Silva JD, Barnes JL, Susarla SM, Howell TH. Predicting dental school performance based on prior dental experience and exposure. *Eur J Dent Educ.* 2010 Feb;14(1):1-6.
- Beier US, Kapferer I, Burtscher D, Ulmer H, Dumfahrt H. Impact of a prior medical degree on students' dental school performance in Innsbruck, Austria. *J Dent Educ.* 2012 Mar;76(3):341-7.
- Nikzad S, Azari A, mahgoli H, Akhoundi N. Effect of a procedural video CD and study guide on the practical fixed prosthodontic performance of Iranian dental students. *J Dent Educ.* 2012 Mar;76(3):354-9.
- Chambers DW, LaBarre EE. The effects of student self-assessment on learning in removable prosthodontics laboratory. *J Dent Educ.* 2014 May;78(5):668-80.
- Velayo BC, Stark PC, Eisen SE, Kugel G. Using dental students' preclinical performance as an indicator of clinical success. *J Dent Educ.* 2014 Jun;78(6):823-8.
- Barrero C, Duqum I, Petrola F. Dental students' perceived preparedness to treat patients in clinic after a fixed prosthodontics course: survey results of a case study. *J Dent Educ.* 2015 Apr;79(4):409-16.
- Shin JH, Kinnunen TH, Zarchy M, Da Silva JD, Chang BM, Wright RF. Dental students' perceptions of and experiences with prosthodontics: ten graduating classes at one institution. *J Dent Educ.* 2015 Jan;79(1):25-32.
- Takeuchi H, Omoto K, Okura K, Tajima T, Suzuki I, Hosoki M, et al. Effects of team-based learning on fixed prosthodontic education in a Japanese School of Dentistry. *J Dent Educ.* 2015 Apr;79(4):417-23.
- Echeto LF, Sposetti V, Childs G, Aguilar ML, Behar-Horenstein LS, Rueda L, et al. Evaluation of Team-Based Learning and Traditional Instruction in Teaching Removable Partial Denture Concepts. *J Dent Educ.* 2015 Sep;79(9):1040-8.