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The escalating global burden of obesity following the COVID-19 times – Are we ready?

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As we are facing the COVID-19 pandemic, new and demanding challenges have been created for the healthcare system worldwide. A significant percentage of the global population is currently living under coronavirus "lockdown restrictions" as a part of the world's most restrictive mass quarantine. Besides multiple well-known benefits, large-scale quarantine carries some negative long-term effects on metabolic profile. To clarify, quarantine corresponds to a period of increased psychosocial stressors, change in lifestyle and eating habits (increased consumption of trans-fat, saturated fat, sugar, salt and alcohol; increased dietary inflammatory index; food craving, etc.), reduced physical activity (limitation of outdoor exercise and social activities), and consequently increased risk of obesity.[1-4]

Before the COVID-19 pandemic, an estimated 650 million adults (13% of the world's adult population) were obese, and what is more, the prevalence rate has a tendency of constant growth.[5] The latter could also be observed from the projections by Kelly et al. (2008), who estimated that 19.7% of the world's population (1.12 billion individuals) will be obese by the year 2030 if the secular trends continue unabated.[6] However, momentarily, it is highly certain that the global burden of obesity will escalate even more as a consequence of the COVID-19 pandemic.

Hence, we aimed to assess the level of obesity knowledge among first-year and final-year medical students in Croatia (future medical workforce) in order to identify the potential gaps and to lay a basis for tailoring and updating medical educational programme/curriculum, as well as additional national public health and stewardship activities. Overall, 70 first-year (19 years, 51.4% female, BMI 23.3 ± 2.2 kg/m^2) and 75 final-year (24 years, 69.3% female, BMI 22.9 ± 3.4 kg/m^2) University of Rijeka, Faculty of Medicine students were included in the present

cross-sectional observational study. An 18-item knowledge-based questionnaire, constructed by Martins and Norsett-Carr, was used to assess the level of obesity knowledge (Available from: https://www.karger.com/Article/FullText/481351).[7] Furthermore, final-year medical students were also asked to complete two additional subjective questions aimed at investigating their attitudes and confidence in treating patients with obesity.[7] Data were analysed using Microsoft Excel (Microsoft Office) and MedCalc v12.1.3 (MedCalc Software bvba, Ostend, Belgium). Statistical significance was estimated to be $P < .05$. The research has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) and was approved by the Ethics Committee of the University of Rijeka, Faculty of Medicine.

The final-year medical students answered correctly on 8.5 (2-14) of 18 questions (47.2% overall score), which is significantly higher ($P < .001$; Mann-Whitney U test) compared to first-year students [6.7 (1-13), 37.2% overall score]. Average scores on the objective questions (Q1-Q18) of the questionnaire for both groups, as well as overview of subjective questions (Q19 and Q20) for final-year medical students, are presented in Table 1. The most profound differences between groups were observed in knowledge on diagnosis, treatment of obesity and weight loss maintenance and consequences of obesity. In addition, it is worth mentioning that only 22.7% (N = 17) of final-year medical students trust their acquired knowledge and consider themselves competent enough to treat patients with obesity and associated comorbidities.

For comparison, Martins and Norsett-Carr reported 47.8% (8.6 of 18) and 60.0% (10.8 of 18) overall scores for first-year and final-year medical students in Norway, respectively. It can be seen that the difference between their groups is in concordance with ours (2.2 points—12.2% vs 1.8 points—10.0%).[7] Hence, one might speculate that the

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Abbreviations: BMI, body mass index; ECTS, European Credit Transfer System.

TABLE 1 Overview of percentage of people within cluster groups who selected different options in Q1 to Q18/Q20 of the questionnaire

			First-year medical students (N=70) (%)		P value	Final-year medical students (N=75) (%)	
Physiology	Q1	A	18.6		.311	A	45.3
		B	42.9			B	26.7
		C	**25.7**			**C**	**18.7**
		D	12.9			D	9.3
	Q2	**A**	**20.0**		.847	**A**	**21.3**
		B	14.3			B	4.0
		C	45.7			C	45.3
		D	20.0			D	29.3
Etiology	Q3	A	18.6		.091	A	32.0
		B	15.7			B	1.3
		C	**51.4**			**C**	**65.3**
		D	7.1			D	1.3
		E	7.1			E	0.0
	Q4	A	5.7		.018	A	14.7
		B	28.6			B	12.0
		C	15.7			C	4.0
		D	**50.0**			**D**	**69.3**
Diagnosis	Q5	**A**	**62.9**		.037	**A**	**78.7**
		B	5.7			B	4.0
		C	22.9			C	8.0
		D	8.6			D	9.3
	Q6	A	14.3		**<.001**	A	2.7
		B	30.0			B	1.3
		C	**35.7**			**C**	**5.3**
		D	20.0			D	90.7
	Q7	A	22.9		**<.001**	A	30.7
		B	**31.4**			**B**	**61.3**
		C	22.9			C	4.0
		D	22.9			D	4.0
Goals for obesity treatment	Q8	A	20.0		**<.001**	A	2.7
		B	**34.3**			**B**	**64.0**
		C	40.0			C	21.3
		D	5.7			D	12.0
Conservative treatment of obesity	Q9	A	15.7		.400	A	14.7
		B	**37.1**			**B**	**44.0**
		C	17.1			C	6.7
		D	30.0			D	34.7
	Q10	A	8.6		.126	A	0.0
		B	27.1			B	33.3
		C	11.4			C	0.0
		D	1.4			D	2.7
		E	**51.4**			**E**	**64.0**
	Q11	A	4.3		.166	A	2.7
		B	21.4			B	0.0
		C	51.4			C	64.0
		D	**22.9**			**D**	**33.3**

TABLE 1 (Continued)

		First-year medical students (N=70) (%)		P value	Final-year medical students (N=75) (%)	
	Q12	A	32.9	.008	A	54.7
		B	28.6		B	16.0
		C	34.3		C	18.7
		D	4.3		D	10.7
Surgery (Non-conservative treatment of obesity)	Q13	A	30.0	.448	A	10.7
		B	20.0		B	25.3
		C	28.6		C	32.0
		D	21.4		D	32.0
	Q14	A	24.3	<.001	A	2.7
		B	31.4		B	1.3
		C	41.4		C	92.0
		D	2.9		D	4.0
Consequences of obesity	Q15	A	25.7	.049	A	12.0
		B	35.7		B	52.0
		C	35.7		C	29.3
		D	2.9		D	6.7
Weight loss maintenance – long-term perspective	Q16	A	22.9	.090	A	49.3
		B	21.4		B	8.0
		C	40.0		C	26.7
		D	15.7		D	16.0
	Q17	A	28.6	.025	A	46.7
		B	27.1		B	30.7
		C	38.6		C	16.0
		D	5.7		D	6.7
	Q18	A	5.7	.028	A	5.3
		B	34.3		B	44.0
		C	50.0		C	32.0
		D	10.0		D	18.7
Subjective questions	Q19	N/A		N/A	A	18.7
					B	16.0
					C	22.7
					D	26.7
					E	16.0
	Q20	N/A		N/A	A	22.7
					B	32.0
					C	34.7
					D	10.7

Note: The correct option is marked in bold. Chi-square (χ^2) test was used to compare frequencies between groups.

general progress (in crude numbers) following the medical educational programme is similar. However, the overall score (60.0% vs 47.2%), as well as rate of final-year students considering themselves competent enough for treating patients with obesity (47.3% vs 22.7%), is higher in Norway.[7] On top of that, it is highly evident that general medical knowledge on obesity is significantly better in Norway (37.2% vs 47.8% for first-year medical students), most likely due to more extensive public health programmes and regular campaigns/activities.

Overall, medical students at the University of Rijeka have a 2-hour lecture on obesity as a part of course called Clinical Assessment, which is a 3 ECTS course in the final year of their study. On top of that, several per se lessons on the most frequent obesity complications (e.g.,

arterial hypertension, diabetes mellitus, dyslipidaemia, cardiovascular diseases) are mostly included in the programme of Internal medicine (18 ECTS course; fourth year of the study). Besides the latter, there are only few elective courses (1.5 ECTS) on obesity or nutrition: Nutrition - a Source of Health and Disease (first year of the study), Clinical Nutrition and Dietotherapy (fourth year of the study) and Obesity (fifth year of the study, predominantly psychological/psychiatric perspective). In addition, students occasionally (once a year or once in two years) organize the Congress of Nutrition and Clinical Dietotherapy.

On the other hand, the general population in Croatia is mostly educated on obesity and its related components through activities of the Croatian Society of Obesity [e.g., recent public health book - "Handbook Life Guidance Against Obesity" (in Croatian), available from: https://apps.jutarnji.hr/cdn/zivim-hr/pdf/zivotni_vodic_protiv_debljine.pdf; lessons and activities for general population included in the programme of Croatian Congress on Obesity, available from: https://www.medix.hr/vii-hrvatski-kongres-o-debljini] and public health campaigns and activities driven by Public Health Institute and Ministry of Health.

To conclude, since the prevalence of obesity is constantly on the rise, especially now due to the COVID-19 pandemic, more effort needs to be made on educating the future medical workforce, as well as general population in Croatia, on obesity. Hence, more intensive and detailed lessons on overweight/obesity, its complications and associated lifestyle components (nutrition, physical activity, etc.) need to be implemented in national educational programme/curriculum, as well in additional public health campaigns and stewardship activities.

AUTHOR CONTRIBUTIONS

Andrej Belančić, Sanja Klobučar Majanović and Davor Štimac contributed equally to this work. All authors were involved in writing the paper and had final approval of the submitted version.

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