

FUTURE TEACHERS' ATTITUDES AND KNOWLEDGE REGARDING THE MANAGEMENT OF THE POTENTIAL STUDENTS' LIFE-THREATENING ALLERGIC REACTIONS IN SLOVENIAN SCHOOLS

ODNOS PRIHODNIH UČITELJEV DO UKREPANJA OB POTENCIALNO ŽIVLJENJE OGROŽAJOČIH ALERGIJSKIH REAKCIJAH UČENCEV V SLOVENSkih ŠOLAH IN ZNANJE PRIHODNIH UČITELJEV O TEM

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ABSTRACT

Introduction: Poorly developed teachers' competences for managing children's allergies can pose a significant problem for the wellbeing of children in the preschool and school environment. The purpose of this study is to explore the attitudes and theoretical understanding of the management of allergic reactions in children among future teachers.

Keywords:

allergic children, allergy and anaphylaxis management, attitude, basic knowledge, future teachers

Methods: A total of 572 future teachers participated in the study, 56% of whom were in the 1st year of undergraduate educational programmes, while 44% were in the 4th year. The participants answered the Teachers' Health Competences Development - Allergy Questionnaire.

Results: The future teachers showed positive attitudes towards learning more about different child health issues. There was an average understanding of managing allergic reactions in children (59.4%; SD=16.1% success), with no statistically significant difference regarding the duration of education, science background or the students' self-allergy. There was, however, a statistically significant difference in achievement scores between future teachers in different educational programmes ($F(3,568)=6.4, p \leq 0.000$). A subgroup of future teachers exposed to basic allergy education in the 1st year and tested again in the 4th year showed significantly better knowledge ($Mann-Whitney U=83.0; p=0.008$).

Conclusion: The duration of future education, science background and self-allergy did not influence the level of knowledge regarding the management of allergic reactions in children. A basic educational programme in allergy management had a positive effect on future teachers' knowledge of managing allergic reactions in children. Our study indicates that all future teachers should be included in specific educational programmes in order to develop adequate health competences.

IZVLEČEK

Uvod: Slabo razvite vzgojiteljeve in učiteljeve kompetence o ukrepanju pri alergijah učencev lahko pomenijo veliko težavo pri zagotavljanju varnosti otrok v vrtcih in šolah. Namen te raziskave je ugotoviti odnos prihodnjih učiteljev do ukrepanja ob alergijskih reakcijah učencev in njihovo razumevanje tega problema.

Ključne besede:

otroci z alergijo, ukrepanje ob alergiji in anafilaksiji, odnos, osnovno znanje, študenti pedagoških študijskih programov

Metode: V raziskavi je sodelovalo skupno 572 prihodnjih učiteljev, od tega 56 % študentov prvega letnika in 44 % četrtega (zadnjega) letnika dodiplomskega študija. Udeleženci so izpolnjevali vprašalnik Učiteljeve zdravstvene kompetence - alergije, ki je vseboval del o poznavanju ukrepov ob alergijskih reakcijah otrok ter postavke o odnosu do tega področja.

Rezultati: Prihodnji učitelji so pokazali pozitiven odnos do učenja o zdravstvenih temah, ki se nanašajo na šolske otroke. Rezultati kažejo povprečno razumevanje ukrepov ob alergijski reakciji pri otrocih (povprečno število doseženih točk je 59,4 %; SD = 16,1 %), vendar razlike niso statistično pomembne glede na trajanje univerzitetnega izobraževanja, obiskovanje katerega od naravoslovnih predmetov med študijem ali glede na to, ali so anketiranci sami alergiki ali ne. Obstaja pa statistično pomembna razlika v dosežkih na preizkusu znanja o ukrepanju pri alergijah med študenti glede na smer študija ($F(3,568) = 6,4; p \leq 0,000$). Podskupina študentov, ki so bili izpostavljeni osnovnemu izobraževanju s področja ukrepanja pri alergijskih reakcijah v prvem letniku študija in katerih znanje je bilo ponovno preverjeno v četrtem letniku, so izkazali pomembno boljše znanje od tistih, ki se o alergijskih boleznih niso dodatno izobraževali ($Mann-Whitney; U = 83,0; p = 0,008$).

Zaključek: Na znanje o tej problematiki nimajo vpliva trajanje univerzitetnega izobraževanja, ali so študenti na dodiplomskem študiju imeli predmet(-e) z naravoslovnimi osnovami ter ali so poročali o tem, da so tudi sami alergiki. Osnovni izobraževalni program o ukrepanju pri alergijah ima pozitivne učinke na znanje prihodnjih učiteljev o tej tematiki. Ta raziskava kaže, da je v vse dodiplomske ali podiplomske pedagoške programe treba vključiti specifično izobraževanje o zdravstvenih temah otrok zato, da bi vzgojitelji in učitelji razvili ustrezne kompetence o ukrepanju v specifičnih situacijah, povezanih z zdravstvenim stanjem otrok v predšolskem ali šolskem okolju.

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1 INTRODUCTION

Allergic reactions in children are an important health issue in kindergarten and school settings (1, 2). They can manifest in multiple ways, including life-threatening anaphylaxis (3). Between 10% and 18% of children with food allergy experience various allergic reactions to food, including anaphylaxis, at school (3-5). According to data from the United Kingdom, 61% of schools have at least one child at risk of anaphylaxis (6). Food allergy, which affects 4-7% of primary school children in Europe, is the most frequent cause of anaphylaxis in children (1).

Poorly developed teachers' competences for managing children's allergies can pose a significant problem to the wellbeing of children in the preschool and school environments. Several studies (7-12), including the Europrevall study (13), have revealed a low level of preparedness for managing children at risk of anaphylaxis in kindergartens and schools. The importance of the knowledge of school personnel in recognising children's allergic reactions and providing first aid is pointed out in recommendations of the EAACI (European Academy of Allergology and Clinical Immunology) (1, 2) and others (14, 15). These documents also emphasise the importance of the continuous education of teachers and all other school personnel in managing allergic reactions in school (1, 2). However, trials of the efficiency of different models for improving the knowledge of children's caregivers regarding recognising and treating severe allergic reactions are rare (2). It has been shown that education in managing children's allergic reactions results in improved knowledge of parents and kindergarten or school employees (16-20), but there is a lack of reports on the long-term efficacy of a coordinated and achievable teaching approach (2).

In Slovenia, courses in allergy management are provided for kindergarten/school personnel, but there is no law to regulate what is expected from the teachers, although parents, public and medical personnel expect from teachers to be able to manage children's allergic reactions. The preliminary results are promising, with participants reporting enhanced theoretical ability, a willingness to undertake appropriate first-line management of anaphylaxis in children and a sense of being able to do so (21). To put the need for implementing adequate educational models for teachers and future teachers (while they are educated at university to become teachers) into perspective, it should be pointed out that, in Slovenia, in recent years, adrenaline auto injectors (AAI) have been prescribed for 260-350 children per year, with

120-150 being prescribed for the first time (22). There are currently no nurses employed in kindergartens or schools in Slovenia, and they are therefore not able to be present at the time of the allergic reaction of a child. However, according to a comprehensive school health educational programme - Preventive Health Programmes for Children and Adolescents - developed by The National Institute of Public Health (NIJZ), registered nurses employed by local health institutions can be important stakeholders and providers of various health educational programmes when they are invited to the school (23). Future teachers are important stakeholders for successful education outcomes regarding developing competences for managing allergic children before they become teachers and engage in fulltime teaching in schools. According to the available literature, no research has been done on the knowledge and attitudes of future teachers regarding managing allergic children in the international context. However, some results indicating the problems regarding future teachers in Slovene context were already presented (24). In Slovenia, education on allergic reactions is currently routinely available only to future home economics teachers, who will also be responsible for planning and providing food for children in schools (24).

The aim of this study is therefore to provide proper evaluation of the current understanding of the management of allergic reactions in children (aged from 6 to 14) among future teachers, and to understand the impact of different factors (i.e., gender, study programme, participation in an allergy educational programme and attitude towards child health topics) on future teachers' knowledge and allergy management competences.

2 METHODS

2.1 Participants

A total of 454 of 1st year and 347 of 4th (last) year of undergraduate future teachers were enrolled in the study programs in the academic year 2014/15 at the Faculty of Education, University of Ljubljana. One of the researchers identified specific courses according to future teachers' schedules, and participants were recruited to fill-in the questionnaire during the lectures. The intention was to reach as many future teachers in the specific year of study as possible. Some of the future teachers declined to participate in the study, while others were absent during a particular class while gathering data. Altogether 572 future teachers participated in the study, 319 (56%) of the participants were enrolled in the 1st year and 253 (44%) in the 4th year.

2.2 Instrument

The participants completed the Teachers' Health Competences Development - Allergy Questionnaire (THCDAQ), which was developed specifically for this study, but some items were based on a questionnaire used by Polloni et al. (9) and adapted to the Slovenian context. The questionnaire was developed by a multidisciplinary team of experts from the field of paediatric allergology and science education. The THCDAQ was piloted and the final version used in the present study comprised a total of 34 multiple-choice and open-ended items, divided into four groups. The first part of the THCDAQ comprised six items about participants' general information. The second part comprised eleven Attitude items on Child Health issues (AMCH). In the third part, there are ten knowledge items on Managing Children's Allergic Disease (MCAD), including the prevention, recognition and management of anaphylaxis, asthma and food allergy. Finally, the fourth part of the questionnaire comprises seven items that measure future teachers' Self-Perceived Allergy Management Competences (SPAMC). The Slovenian version of the THCDAQ can be obtained from the authors. The content validity of the THCDAQ was confirmed by three independent experts in paediatric allergology and science education. Specific parts of the THCDAQ showed satisfactory internal consistency (Cronbach was between .51 and .76).

The MCAD part of the questionnaire was used to determine future teachers' knowledge about allergic reactions and for each multiple-choice question participants could achieve one point and max. 10 points could be achieved. Other parts of the questionnaire were used to determine the specific groups of future teachers and comparisons regarding the MCAD scores were done, and to identify specific attitudes and competences for managing children's allergic disease.

2.3 Research Design

The THCDAQ was applied anonymously in May 2015 in groups, and all of the participants had the same conditions for completing the questionnaire. The participants were informed that the data would be used for research purposes and the main objective of the study was explained. One subsample of home economics future teachers had received two hours of education on the management of food allergies and anaphylaxis as part of their obligatory course Physiology of Nutrition, taken in the first year of undergraduate education. Some 26 months later, in their 4th year of study, these future teachers have also participated in the present study and completed the THCDAQ.

The acquired data were analysed using SPSS 22. Descriptive statistics (mean M , median Md , standard deviations SD and interquartile ranges IQR) were applied to reveal the attitude, competence and knowledge characteristics of the participants. Inferential parametric (One-Way Analysis of Variance $ANOVA$ and T -test) and nonparametric statistics (*Mann-Whitney U* test) were used to determine the significance of the differences between specific groups of future teachers. All the differences were presented at the .05 level of significance.

3 RESULTS

3.1 Study Group Description

The response rate was 70% for 1st year, and 73% for 4th year future teachers. Considering the sample, only 7% of participants were male and 93% were female. They had an average age of 21.5 years ($SD=2.7$). 41.8% of the participants were enrolled in undergraduate programmes with a science background (i.e., two-subject future teachers of biology, chemistry, physics and home economics, as well as future primary school teachers, whose programme includes some basic biology, chemistry and physics). The others (58.2%) had no science courses. 15.6% of the participants were studying to become pre-school teachers (Group 1), 21.9% to become subject teachers (Group 2), 33% to become social pedagogues, special education or art teachers (Group 3), and 29.5% to become primary school teachers (Group 4). According to their own reports, 27.8% of the participants were allergic themselves.

3.2 Future Teachers' Attitudes towards Managing the Allergic Reaction in Children in the School Environment

The future teachers demonstrated a positive attitude towards learning more about different child health issues. Average scores above 3.5 showed that the future teachers are typically interested or very interested in obtaining knowledge about the management of allergies and anaphylaxis in the school environment (Table 1).

Table 1. Average scores in future teachers' attitudes towards learning about allergy and anaphylaxis management (on five-point scale of agreement with the specific item).

Attitude items	<i>M</i>	<i>SD</i>
I am interested in health topics, so I would like to learn more during my studies.	4.10	.774
During a severe allergic reaction, a child can die, so this medical content is very important to all kindergarten/school teachers.	4.71	.553
As a kindergarten/school teacher, I am responsible for the health of the children in my class.	4.18	.818
No courses were provided at university to acquire health competences on topics that are important for the kindergarten/school teacher.	3.68	1.01
I would like to have an opportunity to acquire health competences during my study at university.	4.36	.654

More detailed analysis showed that 85% of the future teachers were interested or very interested in learning more about health topics in general. Almost all of the future teachers (98.6%) were aware that competences in the management of allergic reactions are very important for school personnel if a child has a severe life-threatening allergic reaction, and 82.9% of them were aware that they would be responsible for the health of the children under their protection in the kindergarten and school environment. Some 65.6% of all the future teachers expressed their concern about not having an opportunity to learn about health competences during their studies. At the same time, 94.4% of the future teachers expressed a desire to have an opportunity to develop their own competences to manage at least life-threatening and common health issues that could occur while children are under their supervision as school or kindergarten personnel.

85% of the future teachers demonstrated a positive attitude towards learning more about different children's health issues and they scored significantly higher on MCAD ($M=60.3$; $SD=15.7$) than the 15% of future teachers with a lower level of interest ($M=54.4$; $SD=17.5$) ($t=-3.15$; $df=570$; $p=.002$).

Only 6 of the 570 participants have expressed the opinion that such topics are unimportant. The average scores of these 6 future teachers on MCAD ($M=58.3$; $SD=14.7$) were lower than those of the future teachers who believe the opposite ($M=59.4$; $SD=16.1$).

Only 17.1% of the future teachers were not aware of their responsibility for children's health in the classroom. The average scores on MCAD were 3.4% lower for the "not aware" group ($M=56.6$; $SD=17.7$) than for the "aware" group ($M=60.0$; $SD=15.7$), but the difference was not statistically significant ($t=-1.887$; $df=570$; $p=.060$).

The difference in the average scores on MCAD between future teachers who reported that they had not received any information about health issues during their future teacher education and those who reported that some topics had been presented to them was not significant. Similar results were obtained comparing those future teachers who do not recognise the importance of additional education on managing children's allergic reactions and those who believe that this aspect of the future teacher education programme is important.

3.3 Future Teachers' Knowledge of the Management of Allergic Reaction in Children (MCAD)

There was an average understanding of managing allergic reaction in children ($M=59.4\%$; $SD=16.1\%$ success), with no statistically significant difference regarding the duration of undergraduate education, science background or the future teachers' self-allergy reports (Figure 1).

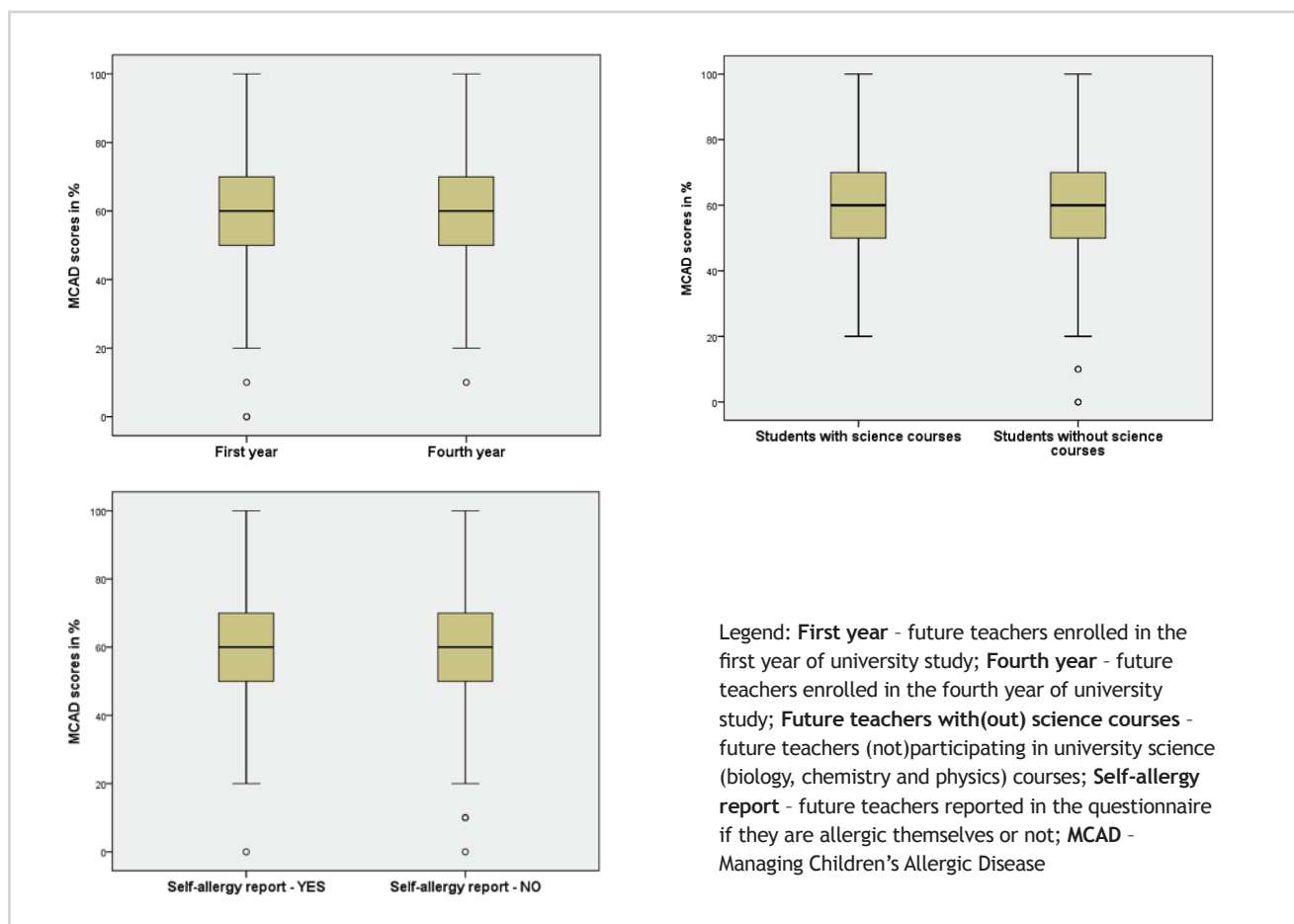


Figure 1. The differences in MCAD scores between the different groups of future teachers.

Female future teachers ($M=59.9$; $SD=15.8$) showed a statistically significantly higher level of knowledge of the management of children's allergic reactions than males ($M=53.0$; $SD=18.3$) ($t=-2.645$; $df=568$; $p=.008$).

There was a statistically significant difference in achievement scores for the four groups (see 3.1 Results section) of future teachers ($F(3,568) = 6.4$, $p \leq .000$). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Group 3 ($M=55.6$, $SD=16.4$) was significantly different from that of Group 2 ($M=63.3$, $SD=15.5$) and Group 4 ($M=60.2$, $SD=15.6$). Other differences between groups were not statistically significant.

The subsample of future teachers (Figure 2) who had taken a basic two-hour educational programme on managing children's allergies 26 months prior to this study scored significantly higher on MCAD ($Md=80.0$; $IQR: 70.0-87.5$) than those who had not ($Md=60.0$; $IQR: 50.0-70.0$; $Mann-Whitney U=83.0$; $p=.008$).

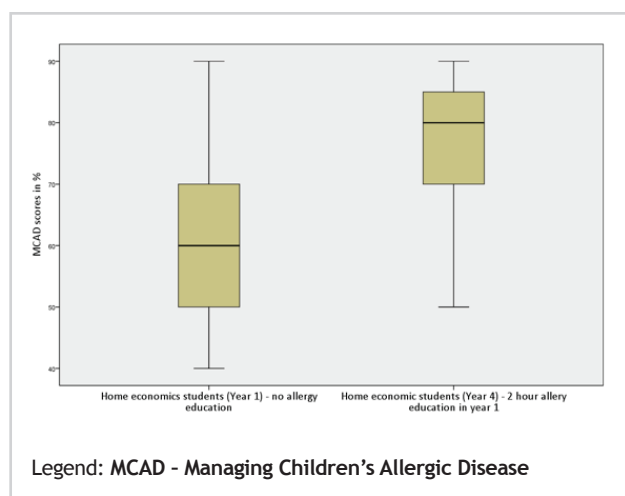


Figure 2. The differences in MCAD scores between 1st year home economics future teachers (no specific education about allergies in children) and 4th year home economics future teachers (with two-hour allergy education that was carried on in the first year of their study).

3.4 Future Teachers' Self-Perceived Competences for Managing Allergic Children in the School Environment

The results of the future teachers' self-perceived competences revealed that 43.5% of the future teachers had already heard of AAI and 47.6% of them would use it if necessary. This does not, however, mean that they know how to apply AAI to children with an anaphylactic reaction in the school environment, as only about 3.3% felt competent to help a child with an allergic reaction. It seems that future teachers are aware of the importance of their ability to help children in pre-school or school environment and that they would try to apply AAI somehow if necessary, but they do not feel generally competent in helping children with severe allergic reactions.

4 DISCUSSION

The main research problem of this study was to underline how future teachers understand the management of allergic reactions of children in school, and which variables influence their knowledge about allergic reactions and allergy management in school environment. As expected, future teachers' understanding of managing children's allergic reactions was average, as education on allergic reactions is currently only routinely available to a small group of future home economics teachers at the Faculty of Education in Ljubljana. The low level of future teachers' knowledge seemed comparable to (17), or even lower than, the level determined in certain previous studies involving in-service teachers (9, 11, 21). Female future teachers did, however, have a better knowledge

of managing children's allergic reactions than male future teachers, a result that is in line with other studies (25, 26), showing that female future teachers are more intrinsically motivated to learn biology than male future teachers, and that they demonstrate higher achievements in terms of knowledge. However, allergies can be a context that can stimulate future teachers' learning about health issues, like other medical topics (27) proved to motivate future teachers to deepen their knowledge. The highest scores regarding the management of children's allergies and anaphylaxis was in fact identified in the subject teachers group, which included future teachers with more scientific background, while the lowest average knowledge levels were observed in the group of social pedagogy, special education and art teachers, future teachers, who do not take science courses at university. Contrary to expectations, self-reported allergy did not raise the knowledge scores.

The subsample of future home economics teachers had taken an educational programme provided by one of the authors of this paper (a paediatrician with a special interest in allergology from a general hospital) in their first year of first cycle study. The programme was a 90-minute lecture with practical learning on how to use AAI similar in content as the educational programme presented in detail further on in the discussion section of this paper. It was a part of the Physiology of Nutrition course. 26 months later, (this study) future home economics teachers scored significantly higher on MCAD than those who had not taken the programme. This allergy management programme has had a positive long-term effect on the participants' knowledge of allergy and anaphylaxis management. These results are more promising than results reported in previous research involving in-service teachers or parents, which indicated that knowledge diminished gradually at six-month and one-year follow-up (16). Our findings provide additional evidence that teaching future teachers about allergic reactions in children is worthwhile. It is important to be aware that these future teachers study biology or chemistry along with home economics (the programme comprises topics/courses regarding nutrition), and that it can be assumed that they are more interested in health topics.

The future teachers showed positive attitudes towards learning more about different child health issues and most of the future teachers (85%) would like to develop health competences during their future education. This positive attitude of young, enthusiastic future teachers is undoubtedly a valuable attribute enabling them to develop health competences, as already formed in-service teachers are overwhelmed with their teaching activities in schools and may not be so willing to acquire additional knowledge and competences. It is important to emphasise that educational programmes on allergology issues should

be implemented already at the university level, in order to develop future teachers' awareness that knowledge of different health issues is very important for a competent in-service teacher.

The use of AAI is crucial in cases of anaphylaxis, wherever it occurs. Nevertheless, only 43.8% of the future teachers surveyed were willing to administer AAI to a child, with their most frequent concerns being hurting a child with a needle (55.7%), adrenaline side effects (36.9%) and legal consequences (27.5%). The fact that only about 3% of future teachers feel competent to help a child with an allergic reaction should be a huge indicator to implement adequate educational programmes about these topics into the undergraduate teachers' and teachers' education. These programmes were developed and implemented in the academic year 2015/16 for the first time. Future teachers were exposed to a 90-minute theoretical lecture supported by PowerPoint presentation about allergy, most common allergens, and basic principles of preventing and managing allergic reactions and anaphylaxis in school. Different case reports of allergic reactions in children and appropriate interventions that teachers could perform to minimise the unwanted consequences were presented. A workshop on how to use adrenalin auto-injector was carried out after the theoretical presentation. Future teachers were divided into groups of eight and each participant tried to apply AAI simulator to their peers, following the instructions given by the instructor. This education is provided by one of the authors of this paper from the University Children's Hospital in Ljubljana.

Practical topics, such as the side effects of adrenaline and its intramuscular application, should therefore be specifically addressed, as such issues might represent important obstacles to caregivers for administering adrenaline to a child in need. Furthermore, as already recommended by the EAACI (2), a broader coordinated national and EU strategy, including such areas as defining legal aspects - as pointed out by our participants, as well - should be developed. The introduction of a well-defined law on the management of anaphylaxis is an important and necessary step, as demonstrated elsewhere (28).

It is important to emphasise that developing efficient effective educational programme for teachers regarding anaphylaxis, which could be repeated also by other tutors and therefore broadly disseminated across Slovenia, should also be important from the viewpoint of public health. This is especially important because wider availability of adrenaline auto injectors in primary schools has been recently authorised by paediatricians and the National institute of Public Health in Slovenia. Therefore, adequate development of future teachers' and teachers' competences for managing children's severe allergic reactions is needed (29).

There are some limitations of this research. A small sample size of the specific group of home economics future teachers can influence the significance of the results, and they are shown as an illustration of possible positive long-term outcomes of specific medical educational programmes for teachers. It is also important to emphasise that the differences in gender can influence the management of allergic reactions in school children, and since a small group of male future teachers was available in this study, these results are informative. Both groups of participants were available only in small groups, but because the issue is important, the data were analysed, and results presented. However, further study, using bigger samples, should be conducted to confirm these results. It is also important to emphasise that for the purposes of the research problem presented in this paper, only univariate statistics were used. Multivariate analysis should be used for deeper understanding of the possible interdependences of the researched variables. Further research into teachers' health competences in managing allergic reactions in children in the school environment should concentrate on: (1) determining effective educational approaches to be implemented in future teacher and teacher training, (2) how to stimulate future teachers to develop these competences, (3) determining what influences the development of future teachers' health competences, (4) how to efficiently identify the attitudes and knowledge of kindergarten and school personnel (especially providers of non-prepared foods) regarding the management of allergic reactions in children, and (5) exploring future teachers' awareness of the impact of child's allergic reactions on his/her and teachers' quality of life.

5 CONCLUSION

It can be concluded that all future teachers should develop adequate competences to manage allergic reactions in children before they finish their university studies. The duration of undergraduate education, natural sciences background and self-allergy did not influence the level of knowledge regarding the management of allergic children. Future teachers showed an average level of knowledge about allergic child management, but they expressed a high level of positive attitude and a need to be educated about these topics. There is some evidence already that a basic educational programme in allergy management had a positive effect on future teachers' knowledge of allergic reactions management in children. However, there is a need for efficient educational programmes capable of developing adequate health competences, since kindergarten and school personnel are expected to be able to provide first aid in the kindergarten/school environment, as already suggested also by some studies (30) in the Slovenian context.

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CONFLICTS OF INTEREST

All authors declare that no conflicts of interest exist.

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ETHICAL APPROVAL

This type of research did not require an ethical approval, but it complies with Slovenian ethical regulations on pedagogical research involving potentially sensitive personal data. Participants were not being forced to participate in this research or to fill in questionnaires.

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