

# A school-based education concerning poisoning prevention in Isfahan, Iran

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## ABSTRACT

**Background:** A school-based poisoning prevention program for young school children was implemented and evaluated in Isfahan city by Poison Control Center (PCC) of Food and Drug Deputy in 2010. **Objectives:** The aim of the program was to evaluate the effectiveness of education on children's knowledge on poisoning and its consequence and also on their attitude in case of exposure to poisonous or hazardous substances and poisoned patient. **Materials and Methods:** In a pretest-posttest design, samples of 520 students from the fifth grade (10-11 years old), from twenty randomly selected girls' and boys' primary schools were involved in the study. These children were from two different geographical locations with different socio-economical levels (high-income and middle-income). After collection of pretest questionnaires, 6 poisoning education sessions were implemented in selected schools by trained teachers in a week. **Results:** Following the education program, knowledge on various issues of poisoning significantly improved as did attitude to the poisonous agents and poisoned patients. In girl students, strong increase was found in knowledge on poisoning with carbon monoxide and heating devices from pretest to posttest. While in boy students, the strongest increase was in item of knowledge on poisoning prevention. Children living in the regions with middle-income conditions had more base-line knowledge and attitudinal aspect when compared with children with high-income condition. Comparison of all students showed significant differences ( $P < 0.001$ ) on knowledge scores on various issues of poisoning before and after education. **Conclusion:** The school-based educational programs provide a good opportunity to poison information centers in preventing poisoning.

**Key words:** Health education, poisoning, poison control center, students

## INTRODUCTION

Poisoning among children is still one of the major global health problems.<sup>[1]</sup> According to the last report of World Health Organization (WHO), more than 45,000 deaths occurred from acute poisoning in children and youth under 20 years of age, about 13% of all fatal accidental poisonings, throughout the world.<sup>[2]</sup> Most cases of childhood poisoning are accidental and preventable mainly attributed to the inquisitive behavior and availability of toxic agents for young children in the houses. However, deliberate poisonings also occur in teenagers and older children.<sup>[3]</sup> The common agents involved in children poisoning are drugs, household cleaning substances, organic solvents and petroleum products, pesticides,

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carbon monoxide (CO), opium and poisonous plants, bites and stings, and contaminated food.<sup>[2,4-6]</sup>

In most countries, Poison Control Centers (PCC) as the multifunctional medical facility provides immediate, free, and expert treatment management advice in the poisoning events. These centers have also important roles in toxico-surveillance, environmental health monitoring and toxico-vigilance. Poisoning prevention is also one of the important roles of PCC regarding their ability in risk assessment based on large human data.<sup>[7,8]</sup> Various strategies may be involved in prevention including education, legislation, environmental modification, and engineering techniques. Different educational interventions that target children and adolescents have been used in prevention of poisonings and injuries.<sup>[9-12]</sup> However, the effectiveness of education on childhood poisoning prevention has not previously evaluated in our country. In this study, the school-based educational program was performed concerning poisoning prevention in two different cultural areas of Isfahan city by PCC of Food and Drug Deputy of Isfahan University of Medical Sciences in 2010.

## MATERIALS AND METHODS

In this descriptive cross-sectional study, the target group for the intervention were young school children (10-11 years old), in 20 randomly selected primary schools from two different geographical locations with different socio-economical levels in Isfahan city. Isfahan province is situated 400 km from Tehran in the center of Iran. Out of the total 204 girls' and boys' primary national schools (97 in high-income and 107 in middle-income locations), 20 schools were randomly selected from the numbered list of schools. The schools for children with learning disabilities were excluded from the study. In each school, one class in the fifth grade was randomly selected from the list of the classes and all the children from one randomly selected class were included in the study. The program was finally implemented in a sample of 520 students selected from the fifth grade of girl and boy primary national schools. A pretest-posttest design was used to evaluate the effects of this intervention program. Before the study commenced, the agreement was obtained from the local government education administration, and later from the school authorities. Pretest data were collected before training started and posttest data after the intervention. Education program was done separately for each of the fifth classes and all the students participated in the intervention program. Before the intervention, an educational package was presented in a workshop for 20 health educators of selected schools by the teacher trainers from PCC of Food and Drug Deputy of Isfahan University of Medical Sciences. The package had basic written information on common agents involved in children poisoning and the instruction for poisoning prevention and also some critical management during poisoning condition.

The self-administered questionnaire consisted of 11 questions. In an initial pilot study among a random

sample of 20 students, the questionnaire was validated, and any ambiguities in the questions or responses were removed before its implementation. The questionnaire addressed the following issues (1) socio-demographic characteristics, (2) knowledge on the strategies for poisoning prevention, (3) information about poisoning with carbon monoxide and heating devices, (4) knowledge on common poisonous substances, (5) attitudes to the poisonous agents and (6) attitudes to the poisoned patients. All the questions were closed-ended. A knowledge score was constructed by counting the number of individual items answered correctly in a scale ranging from 0 (no right answer) to 20 (all items answered correctly).

After collection of pre-test questionnaires, 6 poisoning education sessions were implemented in selected schools by trained teachers in a week. Each session lasted between 1 and 2 h. Evaluation of the intervention was carried out 1 month later and posttest questionnaires were completed by the same students. The program was finally implemented in May 2010. The average score in the pretest and posttest in each group were presented as means  $\pm$  SD. Statistical analysis was performed by Chi-square and paired *t*-test using the SPSS software.  $P < 0.05$  was considered as the statistical significant levels.

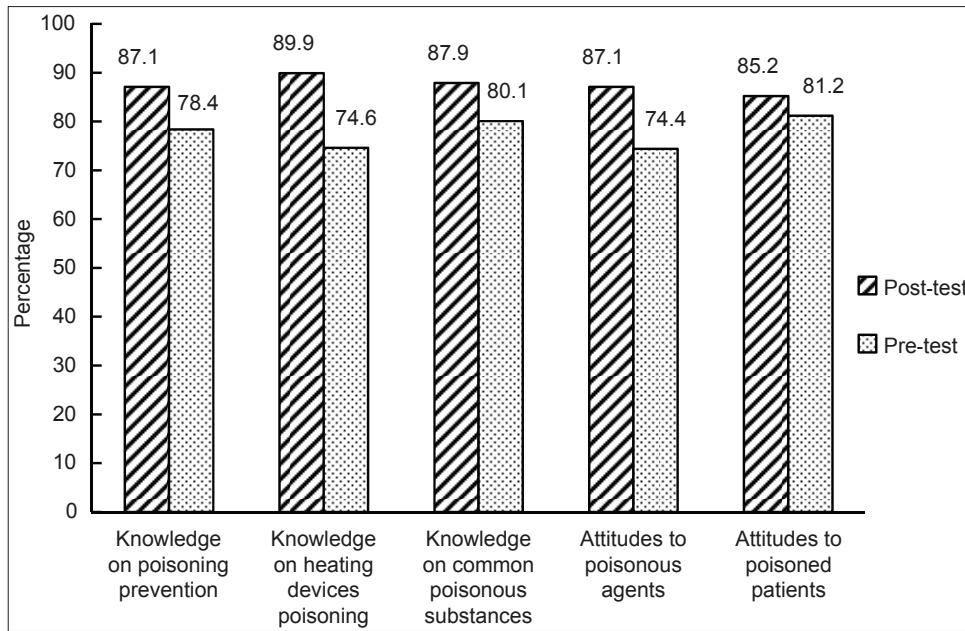
## RESULTS

This program was conducted on 520 students from the fifth grade of 20 randomly selected primary schools from two different geographical locations with different socio-economical levels in Isfahan city. Respondents comprised 229 girls and 291 boys with 10-11 years old including 265 students from geographical location with high-income condition and 255 students from middle-income conditions. In Figures 1 and 2, the comparison in knowledge and attitude on various issues of poisoning before and after education has been shown in girl and boy students, respectively. The results of comparison study in different geographical locations revealed significant difference in comparison of knowledge and attitudinal aspect at base-line ( $P < 0.05$ ) between locations with high-and middle-income conditions [Table 1]. Regarding the attitude to poisoned patients, which was initially high (87.8% in the pretest), no significant was found in children from middle-income locations at posttest evaluation (91% in the posttest).

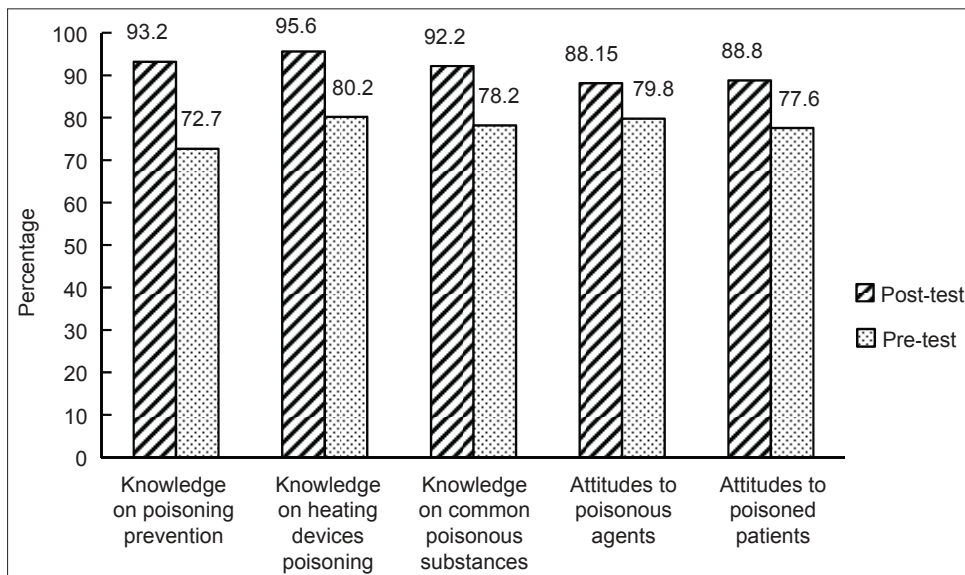
Comparison of all students showed significant differences ( $P < 0.001$ ) on knowledge scores on various issues of poisoning before and after education [Table 2].

## DISCUSSION

Although the general level of knowledge of students at base-line was partially good but following the education program, knowledge on various issues of poisoning significantly increased as did attitude to the poisonous agents and poisoned patients.



**Figure 1: Knowledge and attitude on various issues of poisoning before and after education by percentage of correct answers by girl students,  $P < 0.05$  for pretest versus posttest of each item**



**Figure 2: Knowledge and attitude on various issues of poisoning before and after education by percentage of correct answers by boy students,  $P < 0.05$  for pretest versus posttest of each item**

Comparison of responses between base-line and end-line knowledge in all students shows a remarkable improvement. In girl students, strong increase was found in knowledge on poisoning with carbon monoxide and heating devices from pretest (74.6% of answers correct) to posttest (89.9% of answers correct). While in boy students, the strongest increase was in item of knowledge on poisoning prevention (from 72.7% to 93.2% of answers correct). Although, some researchers have reported more knowledge of boys about risks and poisonous substances than girls because of differences in socialization<sup>[13,14]</sup> but there was no significant difference at base-line knowledge between girl and boy students in this

study. However, more improvements were found in items of knowledge on poisoning prevention and knowledge on common poisonous agents, and also about attitude to poisoned patients in boys than girls. In girls, only modest improvements were recorded in attitude to poisoned patients while there were more improvements in attitude to poisonous substances than boys.

Shiloh *et al.* have been reported some moderately differences in attitudes toward and reactions to individuals with disabilities caused by injury or illness between male and female students.<sup>[15]</sup>

**Table 1: Comparison of knowledge and attitude on various issues of poisoning before and after education by percentage of correct answers by students in high-and middle-income geographical location**

| Issues                                                          | High-income (%) |          | Middle-income (%) |          |
|-----------------------------------------------------------------|-----------------|----------|-------------------|----------|
|                                                                 | Pretest         | Posttest | Pretest           | Posttest |
| Knowledge on poisoning prevention                               | 69.8            | 82.1     | 86.4              | 99.2     |
| Knowledge on poisoning with carbon monoxide and heating devices | 68.8            | 85.5     | 87.1              | 99.4     |
| Knowledge on common poisonous agents                            | 72.6            | 83.6     | 85.7              | 97.3     |
| Attitude to poisonous agents                                    | 64.5            | 77.1     | 81.9              | 98.2     |
| Attitude to poisoned patients                                   | 70.9            | 82.8     | 87.8              | 91.0     |

*P*<0.05 for pretest versus posttest of each group, *P*<0.05 for pretest of high-income versus pretest of middle-income location

**Table 2: Comparison of knowledge scores on various issues of poisoning before and after education by all students**

| Issues                                                          | Pretest score±SD | Posttest score±SD | <i>P</i> value |
|-----------------------------------------------------------------|------------------|-------------------|----------------|
| Total score of knowledge                                        | 15.5±4.2         | 17.9±2.0          | <0.001         |
| Knowledge on poisoning prevention                               | 15.1±4.0         | 18.1±4.2          | <0.001         |
| Knowledge on poisoning with carbon monoxide and heating devices | 15.5±6.2         | 18.6±4.4          | <0.001         |
| Knowledge on common poisonous agents                            | 15.8±3.8         | 18.1±3.1          | <0.001         |
| Attitude to poisonous agents                                    | 15.4±6.5         | 17.5±5.1          | <0.001         |
| Attitude to poisoned patients                                   | 15.9±5.2         | 17.4±4.2          | <0.001         |

SD = Standard deviation

This study was performed on older children in primary school (10-11 years old) because of higher general level of knowledge, more capability to understanding the health educational program and also preventing from poisoning. These children are in the age group most likely to have preschool brothers and sisters and they can influence them. The education for older children could also emphasize what to do if a poisoning occurs.<sup>[15]</sup>

However, the results of other studies have been also shown the effectiveness of education in younger age children (6-9 years old) in school and preschool children under five because of influential effect of teachers' authority in changing knowledge, beliefs and behavior of young children.<sup>[13,15]</sup> In a community-based school education program for prevention of mushroom poisoning in all grades in children, Malinowska-Cieslik and Van den Borne reported the strongest increase in knowledge in the youngest age group (6-7 years old) and in the oldest age group (10-11 years old).<sup>[13]</sup>

Although, poisoning is strongly associated with lower socioeconomic status,<sup>[14]</sup> an interesting finding in our results

was that children living in the regions with middle-income conditions had more base-line knowledge and attitudinal aspect when compared with children with high-income condition. This different initially information may be resulted from cultural influences and more contact with poisonous substances in children in middle-income locations, and more educational activity by parents of these children.

The average scores on all outcomes were higher at post- than pretest after intervention. The data from this study show that the school-based prevention program conducted by Poison Control Centers produced a considerable increase in children's knowledge on poisoning. Therefore, schools could provide a good opportunity to PCC in preventing poisoning. Such educational program should be extended to more schools for developing its effect and there is also a continuing need for education. It is noteworthy that evaluation of children in other studies revealed that they would be willing to have an active role in poison prevention in their families.<sup>[17]</sup>

These intervention programs could also be helpful in prevention from suicide attempts, which are one cause of poisoning in children occurring in teenagers and older children.<sup>[3]</sup> Increase in children's knowledge on poisoning could also be effective in the reduction in hospitalizations and mortality because of poisoning. Management of poisonings is costly and these interventional activities for prevention of poisoning could be important in reducing health costs.<sup>[14]</sup>

Based on the data from the present study some suggestions can be given for increasing the effectiveness of present program. The intervention should be involved different age groups of children. A special education program should also be mentioned for parents for better intervention.<sup>[18]</sup> Educating children and adolescents should also be considered in settings other than schools such as home safety education,<sup>[10,11]</sup> and various educational strategies should be used. Besides educational program, other strategies involving policies, standards and packaging, labeling, storage and disposal of poisonous substances have important roles in poisoning prevention.<sup>[19,20]</sup>

In conclusion, the poisoning education program was able to improve knowledge and attitudes considerably and increase awareness about the dangers of poisoning and to prevent from poisoning.

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