**ARTICLE ORIGINAL/ORIGINAL ARTICLE**

**JARRIB BALEHA • A PILOT NUTRITION INTERVENTION TO INCREASE WATER INTAKE AND DECREASE SOFT DRINK CONSUMPTION AMONG SCHOOL CHILDREN IN BEIRUT**


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**ABSTRACT :** The Global School-based Student Health Survey (2005) indicated that in Lebanon, 33% of students in grades 7-9 drink carbonated soft drinks two or more times per day. Observational evidence suggests that students do not drink enough water.

**OBJECTIVE :** A pilot project called *Jarrib Baleha* ['try without it'] was implemented with 110 students in grades 3 and 4 in two schools in Lebanon to promote drinking water instead of soft drinks. Specific objectives included increasing knowledge about the benefits of water and the harms of soft drinks, increasing confidence in choosing water over soft drinks, and increasing actual water drinking behavior while decreasing soft drink consumption.

**METHODS :** Four 50-minute theory-informed, interactive and participatory sessions were implemented – by a graduate student in partial fulfillment of requirements for a MPH degree – over a period of two weeks. The intervention sessions – based on the Health Belief Model – took place during a class period. Process evaluation measured satisfaction of the students with the sessions. Impact evaluation measured changes in knowledge, attitudes including self-efficacy, and behavior, using a self-administered questionnaire completed prior to and after the intervention. Bivariate analysis using crosstabs was carried out to compare pretest and posttest scores on knowledge, attitudes, and behavior.

**RESULTS :** Comparison of the knowledge index between pretest and posttest indicated that, overall, knowledge increased from 6,0769 to 9,1500 (p = 0.000). Compared to pretest, students at posttest also felt more confident to drink less soft drinks and more water (p < 0.05), to drink water when thirsty (p < 0.05), and to choose water over soft drinks when going to a restaurant (p < 0.05). The percentage of students drinking 6 or more cups of water increased from 27.7% to 59.1% (p = 0.000); and those drinking less than one can of soft drink/day increased from 25.5% to 57.6% (p = 0.000).

**DISCUSSION :** These results are encouraging and suggest the *Jarrib Baleha* intervention could be implemented on a wider scale with students from both public and private schools. A more robust evaluation design is recommended. A comprehensive approach to school-based nutrition is also suggested.

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**RÉSUMÉ :** Dans le cadre de l’Étude mondiale sur la santé scolaire, l’enquête réalisée au Liban (2005) a indiqué que 33% des élèves en EB 7-9 (7e-9e années d’éducation de base) boivent des boissons gazeuses au moins 2 fois par jour. Les faits résultant de l’observation suggèrent que les élèves ne boivent pas assez d’eau.

**OBJECTIF :** Un projet pilote intitulé *Jarrib Baleha* ['l’essai de t’en passer'], visant à promouvoir le comportement de boire de l’eau au lieu de boissons gazeuses, a été introduit auprès de 110 élèves en EB 3 et EB 4 dans deux écoles au Liban.

**MÉTHODES :** Quatre sessions théoriques de 50 minutes chacune, interactives et participatives selon le Health Belief Model, ont été conduites auprès des élèves au cours d’une période totale de deux semaines.

L’évaluation du processus et de l’impact a été réalisée. L’analyse statistique (bivariée crosstabs) a été menée pour comparer les scores obtenus aux prétest et posttest relatifs aux connaissances, attitudes y compris l’auto-efficacité, et aux comportements.

**RÉSULTATS :** La comparaison de l’index des connaissances entre le prétest et le posttest a montré, qu’en général, la connaissance est passée de 6.0769 à 9.1500 (p = 0.000). Les élèves ont reconnu au posttest qu’ils se sentaient plus sûrs de boire moins de boissons gazeuses et plus d’eau (p < 0.05), tout comme de boire de l’eau lorsqu’ils ont soif (p < 0.05), ainsi que de préférer l’eau aux boissons gazeuses quand ils sont au restaurant (p < 0.05). Le pourcentage des élèves buvant six verres d’eau au moins par jour a augmenté de 27,7 à 59,1% (p = 0.000).

**DISCUSSION :** Ces résultats sont encourageants et incitent à réaliser une intervention *Jarrib Baleha* sur une plus grande échelle incluant des écoles privées et publiques. Un mode d’évaluation plus rigoureux ainsi qu’une approche globale de la nutrition en milieu scolaire sont également souhaités.

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**INTRODUCTION**

Childhood represents a critical period, during which behavioral patterns are established, often track into adulthood and thus become difficult to change [1-4]. One of these behavioral patterns is unhealthy eating that leads to malnutrition. Malnutrition during childhood may lead to
obesity, which in turn has implications on children’s blood lipid profile and glucose metabolism on the short-run and increases the risk of developing diabetes, hypertension, cardiovascular disease and osteoarthritis on the long-run [5]. Additionally, malnutrition can lead to mineral and vitamin deficiencies that impair growth of children, resulting in stunting (indicative of chronic malnutrition), wasting (indicative of acute malnutrition) and protein-energy malnutrition [5]. Malnutrition does not only affect physical health of children, but is also associated with poor self-image, lowered self-esteem and deteriorated quality of life [6].

According to the first Global School-based Student Health Survey (GSHS) administered in Lebanon in 2005 to students in grades 7 to 9 (13-15 years old), 15.8% of students are at risk of becoming overweight (20.5% in males and 10.4% in females) while 3% are already overweight (3.8% in males and 2% in females) [7]. Although the survey results were based on self-reported data, they provide some insight into the alarming nutritional status of children. Another study, based on objective measures of weight status, conducted in 1997, reveals that 19% of boys aged 6-11 years and 25.6% of girls of the same age are overweight, while 72% of boys aged 6-11 years and 8.2% of girls of the same age are obese (22.8% of both genders overweight and 7.7% of both genders obese).

With respect to the older age group, the study found that 29.3% of boys aged 12-19 years and 13.4% of girls of the same age were overweight while 9.3% of boys aged 12-19 years and 2.0% of girls of the same age were obese (20.8% of both genders overweight and 5.5% of both genders obese) [8]. A more recent study, also based on objective measures, shows that among children aged 6-8, 25% of girls and 26% of boys are overweight while 7% of boys and 6% of girls are obese [9]. This highlights the fact that problems of overweight are emerging even at young ages.

Given the known impact of malnutrition described above it becomes vital to implement an intervention to enhance nutrition status of children. Nutrition education is a wide subject. It could include promoting eating fruits and vegetables, decreasing intake of fats and salts, decreasing intake of carbonated beverages and increasing intake of water, among others. Communication theory suggests that messages are understood more effectively if they focus on one central idea [10].

The focus for the intervention described herein was on carbonated beverages and water intake. These are behaviors that children themselves may be able to take control over; whereas fruits and vegetables as well as fat and salt intake are more often the responsibility of parents. The consumption of soft drinks has been increasing among children. A national survey in the USA conducted in 1977/1978 and again in 1994/1998 indicated an increase of 48% (from 37% to 56%) in consumption of soft drinks among 6-17-year-olds [11]. In addition, 24% of total beverages consumed by 4th graders in the US were soft drinks, and this increased to 31% by 6th grade [12]. In a study of 28 countries in Europe, 26% of 13-15-year-olds reported daily consumption of soft drinks [13]. Although in 1997, the consumption of soft drinks was relatively low in developing countries, the market for growth in consumption of these products was felt to be highest [14]. The GSHS study indicated that carbonated beverage consumption is high among students in grades 7 to 9, where 33% of students drink carbonated soft drinks two or more times per day [7]. The questionnaire also only asks about the frequency of carbonated beverage consumption instead of assessing the amount as well. For example, a student may be consuming soft drinks twice per day but having two cans each time.

There is less research on children’s consumption of water worldwide and in developed and developing countries, and in Lebanon, there are no studies that assess this, but anecdotal evidence from observations suggests that students do not drink enough water. Most research in the world just infers that water consumption of children is low given the proportion of total fluid intake that is taken up by beverages other than water. This is supported by research conducted in the United States [15], as well as in Saudi Arabia, where carbonated soft drinks and fruit juice accounted for the highest proportion of the total fluid intake of 12-13-year-old boys and girls [16]. Additionally, students in school are encouraged to abide by the Food Guide Pyramid, which ironically does not include drinking water.

There are several consequences to the overconsumption of soft drinks by children. If soft drink consumption displaces water, water imbalance (water intake < water loss) could result, leading to dehydration and its health-related sequelae [5, 17]. If it displaces milk drinking then it could result in decreased calcium affecting bone health [22]; as well as disrupt the calcium-phosphorus ratio, which may result in impaired growth among children [23-24]. High carbonated beverage consumption is also a contributory factor to obesity and may lead to dental problems, as it is high in sugar [18-20, 25].

Several interventions targeting school age children and adolescents in schools have been effective in promoting healthy dietary choices through increasing water consumption and/or decreasing carbonated beverage consumption [26-28]. All included children aged 7-10 or 11 years and all were school-based. They all included provision of information on the relationship between health and drinking water and/or on the need to decrease sugar consumption by reducing the intake of carbonated beverages. All focused on children, but some also included teachers and parents. All were effective in decreasing consumption of carbonated drinks or increasing water intake. One also resulted in decreases in the percentage of overweight and obese children [27].

Another study focused on the promotion of drinking tap water in order to try to prevent obesity in schools. It targeted elementary students aged 7 to 9 in 32 schools in two German cities. The project involved a control group that received the usual school curriculum and an intervention group that had a water dispenser installed at the
school and received water bottles, in addition to a 6-hour education about the importance of water. Water consumption was 1.1 glasses per day greater in the intervention group than in the control group [29].

As seen above, all the interventions were focused on a younger age group. A review of the literature indicates that dietary habits are established by the age of 15 [30]. This means that there is a need to influence these habits at an earlier age. It is also recommended that interventions should begin before grade 6 (i.e. before the age of 12) because it is before this age that behavior is less resistant to change and youth at this age are beginning to learn about the implications of unhealthy habits and are learning how to improve choices [31].

This manuscript describes the implementation, and evaluation of the Jarrib Baleha ['try without it'] pilot intervention with school children in grades 3 and 4 in two public schools in Lebanon. The intervention intended to decrease soft drink consumption and increase water drinking through a set of interactive sessions aimed at enhancing knowledge and changing attitudes including self-efficacy. Specific intended intermediate outcomes included increasing knowledge about harms of soft drinks and benefits of drinking water; increasing feelings of confidence to choose water over soft drinks and to share knowledge with others.

THE JARRIB BALEHA INTERVENTION

METHODS

Development of the intervention

The intervention was based on the literature on effective nutrition education programs and guided by the Health Belief Model (HBM) [32]. The HBM is the earliest theory of health behavior change and posits that behavior change is a function of a person’s perception of his/her susceptibility to an outcome (in this case: damaged teeth, for example); his/her perception of the severity of the health problem; and his/her opinion regarding the balance of benefits of behavior change versus the barriers to behavior change. In addition, self-efficacy, or the person’s belief in his/her ability to change, is identified as critical in the HBM. Cues to action are external or internal (emotions) signs that either enhance the probability of behavior change or detract from it. The activities of the intervention were designed to impact perceived susceptibility, severity, benefits, barriers, and self-efficacy (Appendix B).

The intervention consisted of four sessions (Appendix A). Each session was 50 minutes in length. A manual for the intervention was developed and educational material prepared to be used during the sessions. The first session included demonstrations about the effect of soft drinks on teeth and bones compared to that of water, and showed students the sugar content of one can of soft drink, as well as a comparison between water and soft drinks in terms of cost. The second session included an explanation of how much and when to drink water the most, along with the harmful ingredients in soft drinks. Students also participated in making a puzzle that delivers a health message. The third session focused on the effect of media on shaping dietary choices and on the tactics that it uses to persuade the public, and encouraged students to share health-related messages with adults. The fourth session taught students how to overcome peer pressure to drink soft drinks. All sessions enhanced many life skills, such as critical thinking, decision making, communication and persuasion [33].

Implementation of the intervention

The intervention was implemented by a graduate student in partial fulfillment of requirements for an MPH (Master of Public Health) degree. This student, an author of the manuscript (GAH) also has a previous degree in nutrition. As this was a pilot project, two public schools were chosen by convenience as sites for the intervention: one in Zalka (Greater Beirut) and one in Metn (Mount Lebanon). Public schools in Lebanon are those that require minimal tuition for entry and are therefore accessible to children from families of lower socioeconomic status.

Elementary school children in grades 3 and 4 participated in the intervention. Literature has indicated the necessity of intervening prior to grade 6 as behavior is less resistant to change in this age group [31]. The specific activities were felt to be more relevant and tailored to a younger age group, and therefore, 3rd and 4th grades were selected. Each class received the sessions during regular school hours over two weeks. Throughout the intervention, students participated in many activities, aimed at increasing knowledge, changing attitudes, and enhancing skills.

Evaluation of the intervention

Both process evaluation and impact evaluation were carried out throughout the intervention. Process evaluation includes assessing program reach, participant satisfaction, implementation of program activities, as well as performance of program materials and components [34]. Program reach was assessed by taking attendance at the beginning of each session; and participant satisfaction was determined at the end of the intervention, where students had to fill the emoticon that matched their level of satisfaction. Impact evaluation assesses the immediate effects of the program to determine whether the program meets its objectives or not. Impact evaluation aims at measuring knowledge, behavior and attitude of the target group in order to detect whether the program made a difference [34]. The impact of the project was evaluated through a pretest-posttest design. The pretest questionnaire was carried out prior to the intervention and the posttest was carried out after the intervention was over. The time interval between both tests was two weeks. Students who were absent at pretest did not fill the posttest questionnaire. The pretest and posttest questionnaires were identical and included questions that assessed knowledge, attitudes including self-efficacy, and behavior of children towards water and soft drinks in line with the intervention (Appendix C).
Data analysis
Data from pre- and post-test questionnaires were entered using Statistical Package for the Social Science 16.0 (SPSS) and analyzed univariately using crosstabs and compared bivariately between pretest and posttest. A \( p \)-value < 0.05 was considered to indicate significantly different results.

Ethics
During the intervention and evaluation, ethical principals were considered. Pretest and posttest questionnaires were completely anonymous. Taking part in the intervention was voluntary for students and their informed consent was received. Since the intervention was conducted under the auspices of the Ministry of Education, parental consent was not requested.

## EVALUATION RESULTS

The intervention targeted 110 students whose mean age was 10.4 years (SD = 1.361). It reached 102 students (92.73%), 106 students (96.36%), 103 students (93.63%) and 101 (91.81%) students in sessions 1 to 4 respectively. Of those reached, 102 students (92.73%) and 93 (84.55%) students filled the pretest and posttest questionnaires respectively. Students who were absent at any session had other students explain to them what they learned during that session once they came back. This created some peer to peer interaction.

Results of the emoticons showed an overall high satisfaction of students regarding the sessions they received: 86.36% of students liked the intervention, 2.73% were neutral, and 10.91% disliked it.

Analysis of the pretest and posttest indicated that the intervention resulted in a remarkable and statistically significant increase in knowledge, except in two of the questions: whether soft drinks damage health and at what time of the year we should drink water the most (Table I). For example, those answering correctly to the query of ‘how many cups of water you should drink per day’ rose from 43% at pretest to 75% at posttest. Also, those correctly listing the harmful ingredients in soft drinks rose from 23% to 70%. Table I documents the changes in knowledge between pretest and posttest on each item of the questionnaire. In addition, an index of knowledge was created. This was a summative item that included all questions that assess knowledge. Comparison of the index at pretest and posttest indicates that, overall, the knowledge score increased from 6.0769 at pretest to 9.1500 at posttest (\( p = 0.000 \)).

There was also a remarkable increase in the self-efficacy and attitude of students after completion of the intervention (Table II). Compared to pretest, students at posttest felt more confident to drink less soft drinks and more water (41% at pretest, 72% at posttest, \( p < 0.05 \)). They felt they were able to share what they learned with others (30% at pretest, 74% at posttest, \( p < 0.05 \)), chose to drink water when thirsty (45% at pretest, 64% at posttest, \( p < 0.05 \)), and confident to choose water over soft drinks when going to a restaurant with their parents or friends (41% at pretest, 62% at posttest, \( p < 0.05 \)). However, the question assessing self-efficacy in drinking less soft drink than before was not significant, but showed an increase at posttest. Additionally, questions that suggest a scenario for students whether at the school shop or at a fast food restaurant were not statistically significant, possibly because students are not yet confident enough to choose water at places where they are used to choose soft drinks from, specifically at fast food restaurants and at the school shop.

### TABLE I

<table>
<thead>
<tr>
<th>Question related to knowledge</th>
<th>% of students who answered right at Pretest</th>
<th>% of students who answered right at Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many cups of water you should drink per day?*</td>
<td>42.6</td>
<td>75.3</td>
</tr>
<tr>
<td>How many teaspoons of sugar there are in 1 cup of soft drink?*</td>
<td>59.2</td>
<td>94.6</td>
</tr>
<tr>
<td>What are the harmful ingredients of soft drinks?*</td>
<td>22.7</td>
<td>70.1</td>
</tr>
<tr>
<td>When is the best time to drink water?*</td>
<td>43.8</td>
<td>89.1</td>
</tr>
<tr>
<td>When is the time that we need water the most?</td>
<td>92.1</td>
<td>94.6</td>
</tr>
<tr>
<td>When is the worst time to drink soft drinks?*</td>
<td>30.9</td>
<td>73.0</td>
</tr>
<tr>
<td>Soft drinks have bad effect on:*</td>
<td>34.4</td>
<td>80.5</td>
</tr>
<tr>
<td>Soft drinks make me gain weight*</td>
<td>54.5</td>
<td>81.5</td>
</tr>
<tr>
<td>Soft drinks destroy my health</td>
<td>76.8</td>
<td>81.5</td>
</tr>
<tr>
<td>If the color of your urine is pale, then you have had enough water to drink in that day*</td>
<td>64.6</td>
<td>84.8</td>
</tr>
<tr>
<td>If I don’t drink water, I will be dehydrated*</td>
<td>74.7</td>
<td>91.3</td>
</tr>
</tbody>
</table>

*Statistically significant \( p < 0.05 \)
At pretest, the percentage of students drinking less than one cup of water per day was 15.8%, those drinking 1-3 cups was 37.6%, those drinking 4-5 cups was 18.8% and 6 or more cups of water was 27.7%. At posttest, those drinking less than one cup of water per day decreased to 12.9%, those drinking 1-3 cups decreased to 20.4%, those drinking 4-5 cups per day decreased to 7.5% and those drinking 6 or more cups increased to 59.1% ($p = 0.000$ overall). Additionally, 20.6% of children drank more than 5 cans of soft drinks per day at pretest, 16.7% drank 3-4 cans, 37.3% drank 1-2 cans, and 25.5% of students drank less than one can of soft drinks per day. At post-test, the percent of children drinking more than 5 cans decreased to 14.1%, those drinking 3-4 cans decreased to 4.3%, those drinking 1-2 cans decreased to 23.9% and those drinking less than one can of soft drinks per day increased to 57.6% ($p = 0.000$) (Fig. 1 & 2).

**DISCUSSION**

The results of the intervention described herein, despite being relatively short, are remarkable. The literature suggests that for health education to be effective 50 hours of instruction is needed per topic [35]. However, the Jarrib Baleha intervention was able to impact knowledge attitudes and behaviors related to consumption of soft drink and water in approximately three hours. A 6-hour intervention health education in Germany paired with the provision of water dispensers and water bottles was also able to increased consumption of water [23]. A study in England was also able to show an increase in consump-

**TABLE II**  IMPACT OF INTERVENTION ON ATTITUDES/SELF-EFFICACY

<table>
<thead>
<tr>
<th>STATEMENT RELATED TO SELF-EFFICACY/ATTITUDE</th>
<th>% of students who agree at Pretest</th>
<th>% of students who agree at Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>You are very thirsty. You go to the school shop. This shop has water and soft drinks (7Up, Pepsi, etc.) for the same price. What do you choose to buy? Water or soft drinks?</td>
<td>94.0</td>
<td>90.2</td>
</tr>
<tr>
<td>You go out with your friend to a restaurant. You start reading the menu. The menu has either a hamburger with coke or a hamburger with water. Which do you choose?</td>
<td>49.0</td>
<td>50.5</td>
</tr>
<tr>
<td>I feel confident that I can drink less soft drinks</td>
<td>46.0</td>
<td>57.0</td>
</tr>
<tr>
<td>I am confident that I can drink more water each day*</td>
<td>41.4</td>
<td>72.0</td>
</tr>
<tr>
<td>I feel confident that I can tell my friends or parents about the benefits of drinking water*</td>
<td>29.7</td>
<td>74.2</td>
</tr>
<tr>
<td>If I am thirsty right now, I would choose to drink water*</td>
<td>45.0</td>
<td>64.5</td>
</tr>
<tr>
<td>I feel confident that when I go out to restaurants with my parents or friends, I can ask for water instead of soft drinks*</td>
<td>41.0</td>
<td>62.0</td>
</tr>
</tbody>
</table>

*Statistically significant ($p < 0.05$)

**FIGURE 1**  Impact of intervention on soft drink behavior. A comparison between the consumption of soft drinks at pretest to that at posttest.

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Achievement of water after the installation of water coolers and a brief health education. The brief health education is the component of the project that made the difference, as a comparison school that only received the water coolers had no increased consumption [36]. This ability of our intervention to be associated with change despite limited contact hours is perhaps due to the fact that it is based on theoretical construct of behavior change as well as life skills education [37-38]. Skills-based health education is defined as “an approach to creating or maintaining healthy lifestyles and conditions through the development of knowledge, attitudes and especially skills, using a variety of learning experiences, with an emphasis on participatory methods” [39]. It has proven to be effective for promoting health behavior change [40].

The prevalence of soft drink consumption was greater in this research than in any previous study [12-14]. At pretest, 74.5% of children drank at least one soft drink per day.

With respect to knowledge, only two questions did not show significant difference between pretest and posttest: whether soft drinks damage health and at what time of the year we should drink water the most. For the latter, results of the pretest showed almost ceiling knowledge (92.1% of students answered correctly on that question) and therefore significant increase was difficult to achieve. For the former, it is unclear why this particular question did not result in changes.

With respect to self-efficacy, two items also did not achieve significance, although both increased between pretest and posttest. Students did not feel confident that they could drink less soft drinks than before, and they did not feel that they could choose to drink water with a hamburger rather than a soft drink. The latter may be a matter of habit: children cannot imagine that a hamburger would taste good with water. This suggests that more time could be spent in the intervention on enhancing self-efficacy through real life role plays of various scenarios.

Despite the success of this intervention, its impact may ultimately be limited by the fact that it was restricted to providing knowledge, changing attitude and enhancing skills in children only. Public health interventions are known to be most effective when they intervene at a variety of ecological levels [41]. This point was succinctly made by Mouradian et al. [42] when discussing influences on child health. They state that “children's health cannot be separated from their cognitive, physical, and emotional development and that these cannot be separated from their family and sociocultural experiences” (p. 625). There is a need to involve the whole school in such interventions because this creates a sense of responsibility for the project, which translates to accountability and eventually enhanced sustainability and success for the project. Banning of soft drinks and other unhealthy beverages and food in the school shop, as well as offering affordable healthy alternatives is highly recommended, as children’s eating behavior is mostly affected by availability of these foods and beverages. Additionally, parents should be involved in such projects, to reinforce the message given to their children at schools. Parents can then monitor their children’s drinking habits and limit their soft drink consumption. At a structural level, promoting water consumption is made much easier with free access to safe water drinking water at the school and household levels. Provision of coolers and of water dispensers was found to increase consumption of water among school children in Germany and in England [23, 36]. This ensures not only availability but affordability and accessibility – all factors known to facilitate change in behavior.

Some of the limitations of this project as a whole are that it is based on a non experimental evaluation design, thus it was “tested” on an intervention group only, without comparing to a control group. Given the positive results, the intervention should be evaluated again using a stronger design. Also, it is based on self-reported data, so it can be an under- or overestimate of amount of water or soft drinks that students drink. Also, students were not given numerical codes to link their pretest and posttest, so an average pretest score and an average posttest one was computed rather than comparing each student to him/ herself. We only pilot tested in public schools which, in Lebanon, are mostly attended by children of lower socioeconomic status. It it unclear if this influenced the intervention in any way and further evaluation with a more demographically diverse sample if recommended. The duration of the intervention was short. An intervention on longer duration may result in more change. However, the
results found are noteworthy especially given the short length of the intervention. Finally, no follow-up assessment was conducted to assess the sustainability of changes in knowledge, attitudes, self-efficacy, and behavior.

CONCLUSIONS AND RECOMMENDATIONS

The evaluation of the Jarribi Baleha intervention adds to the literature on nutrition promotion with school children. The positive results obtained from this small pilot intervention suggest it should be implemented on a wider scale. If this occurs, a more robust evaluation design could also be implemented, using a pre-test-posttest control groups design with schools as the unit of assignment, and following up after 6 months to assess the extent to which the impact, if found, is sustained.

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APPENDIX A

SESSION 1

Activity 1-a
An egg (representing our teeth) was immersed in coke (left overnight) and another in water to show the effect of soft drinks on teeth. The eggs were brushed as we do for teeth in order to visualize the effect of soft drinks on color of teeth. A chicken bone (representing our bones) was immersed in soft drink (left overnight) to visualize the effect of acidity in soft drinks on our bones.

Activity 1-b
Students visualized how much sugar there is in 1 can of soft drinks, by adding 8-10 teaspoons of sugar to a glass cup, and then calculating the amount of sugar in the number of cans students consume per day.

Activity 1-c
Students saw pictures about the effects of soft drinks on bones, teeth and stomach.

Activity 1-d
Students compared the price of the recommended 3 small bottles of water to the same amount of soft drinks over a certain period of time, by using coins inserted in 2 tubes – one for soft drinks and the other for water.

SESSION 2

Activity 2-a
Different messages related to recommendations for water consumption, when to drink water, consequence of not drinking enough water, how to know if we drank enough water, worst time to drink soft drinks, harmful ingredients in soft drinks, difference between regular and diet soft drinks, etc., were discussed and illustrated.
Activity 2-b
Students sorted the properties of water from the properties of soft drinks. Then, they were divided into 2 teams. Each team took pieces of a puzzle pertaining to water or to soft drinks and tried to build the puzzle that once assembled read either “No to drinking soft drinks” or “Yes to drinking water”.

SESSION 3
Activity 3-a
Students watched an advertisement for soft drinks by a celebrity singer – Nancy Ajram singing El Dunia Helwa (Life is beautiful). The advertisement shows Nancy Ajram singing, and distributing coca cola to everyone who is passing through a stressful period in order to cheer him/her up and make him/her feel positive about life. The advertisement was discussed using a participatory approach, by focusing on the message that the advertisement delivers and whether it is true or just a marketing technique.

Activity 3-b
Students were asked to develop an advertisement/poster that promotes drinking water instead of soft drinks.

Activity 3-c
A set of cards was distributed to students, with a question on one side and its answer on the other side. After reading the cards, students shared what they learned with their peers.

SESSION 4
Activity 4-a
Students divided themselves into 2 teams. Each team prepared a scenario (role play) that delivers a message, which is to drink water instead of soft drinks. Each team divided itself further into supporters of soft drinks and supporters of water. Supporters of soft drinks had to persuade supporters of water to join them, while the latter did the same using debate as a method.

APPENDIX B
APPLICATION OF THE HEALTH BELIEF MODEL TO THE INTERVENTION

<table>
<thead>
<tr>
<th>Perceived threat*</th>
<th>Perceived benefits</th>
<th>Perceived barriers</th>
<th>Self-efficacy</th>
<th>Cues to action</th>
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</thead>
<tbody>
<tr>
<td>Activity 1-a</td>
<td>Activity 2-a</td>
<td>Activity 3-a</td>
<td>Activity 3-b</td>
<td>Distributing water</td>
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<tr>
<td>Activity 1-b</td>
<td>Activity 2-b</td>
<td></td>
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<td>bottles at the end</td>
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<tr>
<td>Activity 2-b</td>
<td>Activity 1-c</td>
<td></td>
<td>Activity 3-c</td>
<td>of the intervention</td>
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</tbody>
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*Threat is a combination of both perceived susceptibility and perceived severity constructs.

APPENDIX C • PRETEST/POSTTEST QUESTIONNAIRE

JARIB BALEHA INTERVENTION
March 23, 2009 - April 3, 2009

Over the next two weeks we will be talking about your health and nutrition, and specifically about water and soft drinks. We will be doing this during class period. You will learn new things in an exciting way. We will start off today with a few questions about your knowledge and your attitudes and behaviors, Then at the end of the two weeks, we will again ask you questions about your knowledge, attitudes, and behavior. Your participation is voluntary. If you do not want to participate, please let the teacher know.

- The following questions will ask about your knowledge, attitude, and behavior related to drinking water and soft drinks.
- For each question, please choose the most appropriate response. We do not want you to write your name on this paper so there is no way we will know what your answers are.
- Please answer truthfully after reading the questions carefully.

Age: .................................

I. MULTIPLE CHOICE: PLEASE CIRCLE YOUR ANSWER

1. How many cups of water do you drink per day?
   A) less than 1 cup       B) from 1 to 3 cups       C) from 4 to 5 cups       D) from 6 to 8 cups       E) more than 8 cups

2. How many cans of soft drinks do you drink per day?
   A) less than 1 can       B) from 1 to 2 cans       C) from 3 to 4 cans       D) from 5 to 6 cans       E) more than 6 cans
3. When do you drink soft drinks the most?
   A) when I am eating fast food       B) anytime when I am with friends       C) at school       D) when I am watching TV
   E) other ................................

4. How many cups of water you should drink per day?
   A) from 2 to 3 cups       B) from 6 to 8 cups       C) from 12 to 20 cups

5. How many teaspoons of sugar there are in 1 cup of soft drink?
   A) no sugar       B) from 1 to 2 teaspoons       C) from 8 to 10 teaspoons

6. What are the harmful ingredients of soft drinks?
   A) water       B) sugar       C) acid       D) caffeine       E) fat       F) all the above EXCEPT water and fat

7. When is the best time to drink water?
   A) before meals       B) after meals       C) at the same time that I eat       D) after I drink soft drinks       E) BOTH A) AND B)

8. When is the time that we need water the most?
   A) in summer       B) in winter       C) in autumn       D) in spring

9. When is the worst time to drink soft drinks?
   A) with lunch       B) before dinner       C) before breakfast       D) before we sleep       E) BOTH A) AND D)

10. Soft drinks have bad effect on:
    A) my teeth       B) my bones       C) my stomach       D) my eyes       E) all the above       F) all the above EXCEPT my eyes

II. TRUE OR FALSE: THE STATEMENTS BELOW ARE EITHER TRUE OR FALSE ABOUT WATER OR SOFT DRINKS.
    PLEASE CIRCLE IF TRUE OR FALSE

1. Soft drinks make me gain weight True False
2. Soft drinks destroy my health True False
3. If the color of your urine is pale, then you have had enough water to drink in that day True False
4. If I don’t drink water, I will be dehydrated True False

III. PLEASE READ EACH SCENARIO BELOW AND CIRCLE WHAT YOU WOULD DO IN EACH CASE.

1. You are very thirsty. You go to the school shop. This shop has water and soft drinks (7 Up, Pepsi, etc.) for the same price.
   What do you choose to buy? Water or soft drinks?

2. You go out with your friend to a restaurant. You start reading the menu. The menu has either a hamburger with coke or a hamburger with water. Which do you choose?

IV. PLEASE ANSWER TO WHAT EXTENT YOU FEEL CONFIDENT OR ABLE TO DO THE FOLLOWING THINGS:

1. I feel confident that I can drink less soft drinks
   Agree       Neutral       Disagree

2. I am confident that I can drink more water each day
   Agree       Neutral       Disagree

3. I feel confident that I can tell my friends or parents about the benefits of drinking water
   Agree       Neutral       Disagree

4. If I am thirsty right now, I would choose to drink water
   Agree       Neutral       Disagree

5. I feel confident that when I go out to restaurants with my parents or friends, I can ask for water instead of soft drinks
   Agree       Neutral       Disagree