

Impact of a 30-Second Consultation on Acetaminophen Knowledge Among Middle Eastern Americans

Eric J. Ip, Vista Khosraviani, Nour Itani, Sam Pourneshad, Armon Khosraviani, and Shadi Doroudgar

Abstract

Purpose

To assess baseline acetaminophen knowledge among Arabic- and Farsi-speaking Middle Eastern Americans (MEAs) and the short- and long-term impact of a 30-second consultation.

Methods

An initial survey was administered to 125 Arabic- and 125 Farsi-speaking MEAs at various locations in the San Francisco Bay Area (survey 1). This included a baseline assessment of 3 key acetaminophen knowledge questions covering the brand/generic name, maximum recommended adult daily dose, and primary organ of toxicity. Participants were then provided a 30-second consultation with a handout regarding these knowledge facts and were then immediately resurveyed (survey 2). Acetaminophen knowledge was reassessed by telephone 4 to 6 weeks later (survey 3).

Results

Only 4.0% of MEAs were able to answer all 3 key acetaminophen knowledge questions correctly at baseline. After a 30-second consultation, 86.0% ($P < 0.001$) of these respondents were able to answer the questions correctly. Four to six weeks later, 53.6% ($P < 0.001$) of those reachable by telephone ($n = 125$) were able to answer all 3 knowledge questions correctly.

Conclusion

Most MEAs in the survey group lacked basic acetaminophen knowledge. A 30-second consultation improved both short- and long-term knowledge.

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Introduction

Acetaminophen (Tylenol) is one of the most commonly used medications to treat pain and fever worldwide.¹ At the maximum daily dose (3000 mg/day in a healthy adult) recommended by the Food and Drug Administration (FDA), acetaminophen is well-tolerated with relatively few adverse effects.^{2,3} However, higher doses are associated with hepatotoxicity, liver failure, and death.⁴

In 2016, Major and colleagues reported that unintentional acetaminophen-related adverse events account for an average of 112,000 poison center calls, 59,000 emergency department visits, and 38,000 hospitalizations annually in the United States.⁵ Acetaminophen overdose accounts for approximately 48% of acute liver failure diagnoses and

20% of liver transplantations.⁶ Combination opioids and over-the-counter products containing acetaminophen further increase patients' susceptibility to acetaminophen toxicity.⁶⁻⁸ Reportedly, 63% of unintentional acetaminophen overdoses occur with the use of combination products, with 17% of these adults having liver injury.^{8,9} Epidemiologic studies have demonstrated that there is a lack of knowledge regarding the potential harms of acetaminophen overdose.⁶

Multiple studies have assessed patient acetaminophen knowledge in various settings.¹⁰⁻¹³ In 2007, Stumpf and colleagues published a study surveying patients in an adult internal medicine clinic and found that acetaminophen knowledge was poor regarding the 25% of

patients reported knowing that the active maximum adult daily dose and toxicities associated with high doses, independent of the patient's educational level, age, or race.¹⁰ In 2010, Hornsby and colleagues surveyed patients outside 4 outpatient medical facilities and found that only 25% of patients reported knowing that the active ingredient in Tylenol was acetaminophen. One-third of patients correctly identified the maximum adult daily acetaminophen dose in a healthy adult (4000 mg/day) and 50% recognized liver damage as the primary toxicity.^{3,11}

In 2014, Ip and colleagues published a study surveying adults outside 5 grocery stores in diverse socioeconomic communities and found that only 3.8% of participants were able to correctly answer 3 key acetaminophen knowledge questions (Tylenol contains acetaminophen, maximum adult daily acetaminophen dose is 4000 mg/day, and the liver is the primary organ of toxicity with excessive use).^{3,12} Overall, rates of acetaminophen knowledge were poor regardless of health literacy level and educational background.¹²

In 2018, Stumpf and colleagues published another study surveying female college students and found that just over half of the patients (58.6%) recognized that Tylenol contains acetaminophen and 68.5% identified the correct maximum adult daily acetaminophen dose.¹³

A limitation of all of the above-mentioned studies was a lack of non-English-speaking patients. Additional studies are needed on other non-English-speaking populations.

Acetaminophen-containing products are among the most frequently used medications. Reports from Iran have shown that the consumption of acetaminophen is increasing yearly, and this is becoming one of the most "lethal" drugs.¹⁴

Medication counseling enhances patient medication knowledge.^{15,16} Thus far, no studies have assessed baseline acetaminophen knowledge among Middle Eastern Americans (MEAs), in particular, the Arabic- and Farsi-speaking populations, or have examined the impact of acetaminophen medication counseling.

The purpose of this study was to determine what percentage of Arabic- and Farsi- speaking MEAs in the San Francisco Bay Area of California are knowledgeable about 3 key acetaminophen facts.³ Additionally, since medication counseling has been shown to enhance medication knowledge, this study also determined if a brief 30-second consultation with a handout would increase short- and long-term acetaminophen knowledge.

Methods

Study Population

Study investigators recruited Farsi-, Arabic-, and English-speaking adult MEAs (≥18 years old) using convenience sampling at religious centers, markets, and community centers in the San Francisco Bay Area. Individuals who started the survey but did not complete it were excluded. The participants were recruited from the general population without regard to current acetaminophen use. Upon completing the in-person portion of the surveys, participants were compensated for their time with a \$5

gift card and an acetaminophen education handout in their preferred language.

The study received expedited Institutional Review Board approval at Touro University California.

Study Design and Data Collection

Surveys took place in January to April 2020. During the initial participant encounter of the study, a 14-item in-person, paper-based questionnaire was used to assess general demographics and baseline acetaminophen knowledge (survey 1). Participants could complete all surveys in their preferred language (i.e., English, Farsi, or Arabic).

For participants who could not read, the data collectors verbally read the questions and answer choices to the participants. For questions that required reading, participants who could not read were scored a 0, the lowest possible score, and documented to have "minimum to no education" in this portion. No one was excluded based on low education or inability to read.

The questionnaire assessed demographics, educational level, language proficiency (English/Arabic/Farsi), health literacy, the participant's current acetaminophen usage, and 3 key acetaminophen knowledge questions: (1) Does Tylenol contain acetaminophen? (answer choices: yes, no, I do not know); (2) One Tylenol (acetaminophen) extra-strength tablet contains 500 mg of Tylenol (acetaminophen). How many extra-strength tablet(s) can a healthy adult safely take in one day? (answer choices: 1, 2, 4, 6, 8, 10, 12, 16, or 20 tablets daily, there is no maximum daily dose, I do not know); and (3) What is the primary organ of toxicity with excessive Tylenol (acetaminophen) use? (answer choices: kidney damage, stomach damage, heart damage, liver damage, brain damage, there is no true concern, I do not know).

Health literacy was assessed using the Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R) instrument in their preferred language. A certified translation company, STC Interpreting and Translation, translated the REALM-R survey into Farsi.¹⁷ This company is a member of the American Translators Association (ATA) (www.stcinterpreting.com). In 2018, Fadda and colleagues validated the Arabic-translated REALM-R instrument for Arabic speakers.¹⁸ This version was used for the Arabic participant population. The REALM-R is a 1-minute, 11-item word recognition test that assesses understanding of health-related terms. Participants were presented with 11 words (each scored 1 point) and were asked to read them out loud. Total scores of 6 or less were considered at risk for poor health literacy.¹⁷

Next, the data collectors provided a 30-second acetaminophen consultation and handout to each participant (in their preferred language) regarding the above 3 key acetaminophen facts.³ The same information was presented consistently during the consultation by both data collectors to ensure uniformity. Two data collectors self-identified as fluent in Arabic or Farsi.

The same participants who completed survey 1 were given a 4-item, in-person, paper-based questionnaire

immediately after the 30-second consultation (survey 2). The 4-item questionnaire asked whether the participant received an acetaminophen consultation and the same knowledge questions used above. Participants provided their telephone contact information for follow-up.

At 4 to 6 weeks after the initial encounter/30-second consultation, the same participants were re-surveyed with the same 4-item questionnaire primarily via telecommunication because the coronavirus disease 2019 (COVID-19) pandemic had begun (survey 3). Selecting an incorrect answer choice or selecting “I do not know” was counted as not knowing the acetaminophen knowledge question.

Statistical Analysis

Since the survey was primarily descriptive in nature, means and standard deviations were reported for continuous data, and frequency and percentages were reported for categorical data. Perfect scores on the knowledge test (all 3 questions answered correctly) during surveys 1, 2, and 3 were compared using McNemar's tests. Since multiple comparisons were made, a Bonferroni adjustment was used to consider a more conservative *P*-value of less than 0.025 as statistically significant. STATA/IC 14 was used for statistical analysis.

Results

Demographics

The demographics of survey participants (*n* = 250) are shown in Table 1. Reported countries of origin were Iran (49.4%), Palestine (18.8%), and Lebanon (12.8%). Participant age averaged 43.9 ± 18.4 years (mean \pm S.D.; range, 18–94 years). Based on the REALM-R score, only 2.8% of participants were considered to be at risk for poor health literacy.

Key Acetaminophen Knowledge Questions

Participant ability to correctly answer all 3 key acetaminophen knowledge questions on each survey is shown in Table 2. All 250 participants completed surveys 1 and 2. Only 4.0% of participants could answer all 3 key acetaminophen knowledge questions from survey 1 at baseline (first time period). Immediately following the 30-second consultation (second time period), 86.0% of participants correctly answered all 3 key acetaminophen knowledge questions (*P* < 0.001; survey 2 versus survey 1). At the third time period, 125 participants (50% of the original 250 participants) completed survey 3, and 53.6% (*n* = 67) of the 125 participants (*P* < 0.001; survey 3 versus survey 1) answered all 3 key acetaminophen knowledge questions correctly. Of the 67 participants who answered all 3 key acetaminophen knowledge questions correctly at the third time period, 66 (98.5%) answered all 3 questions correctly at the second time period. Similar improvements in acetaminophen knowledge following the 30-second consultation occurred among both the Arabic- and Farsi-speaking cohorts. However, fewer Farsi speakers could answer all 3 key acetaminophen knowledge questions 4 to 6 weeks later (79.2% on survey 2 versus 38.0% on survey 3).

Performance on the individual key acetaminophen knowledge questions is shown in Table 3. At baseline,

most participants answered none of the 3 individual questions correctly. Correctly identifying acetaminophen's maximum adult daily dose in a healthy adult was particularly difficult, with 7.6% of participants correctly answering 4000 mg/day. Following the 30-second consultation and handout, statistically significant improvements in knowledge were observed for all 3 questions individually. Correspondingly, significant knowledge improvements were observed at the 4- to 6-week follow-up (survey 3 versus survey 1). However, between survey 2 and survey 3, there were significant reductions in the ability to correctly identify the acetaminophen's maximum adult daily dose (87.6% versus 59.2%; *P* < 0.001) and primary organ of toxicity (94.8% versus 80.8%; *P* < 0.001).

Participants' demographic features influenced their abilities to correctly answer all 3 key acetaminophen knowledge questions. Age, gender, education level, place of birth, and language were studied. The mean age of the cohort that could correctly answer all 3 questions on survey 3 was nearly 14 years younger than the cohort that did not answer all 3 questions correctly (34.1 ± 11.9 vs. 47.5 ± 19.1 years; *P* < 0.001).

Table 4 shows the acetaminophen knowledge of participants born in the United States and those who spoke English. Variability in performance was seen as a function of birthplace. On survey 2, 98.2% of U.S.-born participants correctly answered all knowledge questions, compared to 82.5% of non-U.S.-born participants (*P* < 0.001). The difference in performance was even greater on survey 3, with 82.8% of U.S.-born participants correctly responding to all acetaminophen questions, compared to 44.8% of non-U.S.-born participants (*P* < 0.001). Regarding English-speaking ability, there was no difference in overall acetaminophen knowledge at baseline (survey 1); however, more English and bilingual speakers were able to answer all acetaminophen knowledge questions than Farsi- and Arabic-only speakers.

Discussion

Similar to the English-speaking population studies, most MEAs lacked key acetaminophen knowledge. However, a brief 30-second consultation with a handout improved knowledge more in the short term (immediately after the consultation) than 4 to 6 weeks after the consultation compared to baseline. Younger participants and U.S.-born MEAs displayed greater rates of acetaminophen knowledge retention during survey 3 than older participants and non-U.S. born respondents. A similar outcome was noted when examining the Arabic- and Farsi-speaking data separately.

In comparison to previous research conducted by Ip and colleagues, Farsi- and Arabic-speaking MEAs were able to answer all three key acetaminophen knowledge questions at a similar rate to the general English-speaking population (4.0% versus 3.8%).¹² Both participant groups lacked basic acetaminophen knowledge.¹² However, these population differences may influence short- and long-term knowledge retention. These data suggest that these social disparities play a major role in knowledge comprehension and accessibility.^{19,20} To address these

Table 1. Demographic Characteristics of Participants (n = 250)

Age (years)	
Mean ± SD	43.9 ± 18.4
Range	18–94
Gender	
No. females	123 (49.2%)
No. males	127 (50.8%)
Education Level	
Did not graduate from high school	8 (3.2%)
High school graduate or general education diploma	28 (11.2%)
Some college	40 (16.0%)
Bachelor's or other undergraduate degrees	101 (40.4%)
Postgraduate degree	73 (29.2%)
Language Abilities	
Farsi Only	103 (41.2%)
Arabic Only	2 (0.8%)
English Only	89 (35.6%)
Bilingual	56 (22.4%)
Ethnicity	
Palestinian	47 (18.8%)
Syrian	11 (4.4%)
Lebanese	32 (12.8%)
Jordanian	7 (2.8%)
Iranian	123 (49.2%)
Other	30 (12.0%)
Country of Birth	
Iran	114 (45.6%)
United States	56 (22.4%)
Jordan	19 (7.6%)
Lebanon	17 (6.8%)
Egypt	13 (5.2%)
Syria	9 (3.6%)
Kuwait	7 (2.8%)
Saudi Arabia	6 (2.4%)
Palestine	5 (2.0%)
Morocco	3 (1.2%)
Iraq	1 (0.4%)
REALM-R score	
0–6 (health illiterate)	7 (2.8%)
7–11 (normal)	243 (97.2%)

Table 2. Overall Acetaminophen Knowledge Among the Middle Easterner Population

Participants	Number of Participants Answering Correctly (%)		
	Survey 1	Survey 2	Survey 3
Arabic-speaking MEAs ^a	5 (4.0)	116 (92.8)	32 (97.0)
Farsi-speaking MEAs ^b	5 (4.0)	99 (79.2)	35 (38.0)
Total surveyed population ^c	10 (4.0)	215 (86.0)	67 (53.6)

Abbreviation: MEAs, Middle Eastern Americans.

^a 125 respondents in surveys 1 and 2; 33 respondents in survey 3; includes English and bilingual speakers.

^b 125 respondents in surveys 1 and 2; 92 respondents in survey 3; includes English and bilingual speakers.

^c 250 respondents in surveys 1 and 2; 125 respondents in survey 3; includes English and bilingual speakers.

Table 3. Performance on Individual Key Acetaminophen Knowledge Questions^a

Questions	Number of Participants Answering Correctly (%)		
	Survey 1 (n=250)	Survey 2 (n=250)	Survey 3 (n=250)
Does Tylenol contain acetaminophen?	107 (42.8)	245 (98.0) ^b	115 (92.0) ^{b, c}
What is the maximum daily dose of acetaminophen?	19 (7.6)	219 (87.6) ^b	74 (59.2) ^{b, c}
What is the primary organ of toxicity of acetaminophen?	104 (41.6)	237 (94.8) ^b	101 (80.8) ^{b, c}

^a Differences were considered statistically significant at $P < 0.025$.

^b Statistically different from survey 1 at $P < 0.001$.

^c Statistically different from survey 2 at $P < 0.001$.

Table 4. Acetaminophen Knowledge Comparing Birthplace and Language Fluency^a

Participant Demographics	Number of Participants		Number of Participants Answering Correctly (%)		
	Surveys 1 and 2	Survey 3	Survey 1	Survey 2	Survey 3
Born in the United States	194	29	8 (4.1)	160 (8) ^b	24 (82.8) ^b
Born outside the United States	56	96	2 (3.5)	55 (98.2) ^b	43 (44.8) ^b
English speakers	89	40	6 (6.7)	83 (93.3)	28 (70.0) ^c
Bilingual speakers	56	10	1 (1.8)	49 (87.5)	9 (90.8) ^c
Farsi speakers	103	75	3 (2.9)	81 (78.6)	30 (40.0) ^c
Arabic speakers	2	0	0 (0.0)	2 (100.0)	0 (0.0) ^c

^a Differences were considered statistically significant at $P < 0.025$.

^b Significant difference between U.S-born and non-U.S.-born participants.

^c Significant differences among English, bilingual, Farsi, and Arabic speakers.

disparities, the American Society of Health-System Pharmacists (ASHP) took the initiative and asked pharmacists to play a more proactive role. Pharmacies are now increasing disparity awareness among staff, promoting culturally competent care, learning more about regional and cultural differences, and promoting more research on disparities in health care.²¹ The concept that continued awareness, education, and research are needed to reduce acetaminophen-induced hepatotoxicity is reinforced by Yoon and colleagues.⁶

As anticipated, all 3 questions were correctly answered at significantly higher rates immediately following the 30-second acetaminophen consultation. Similarly, significant improvements in all acetaminophen knowledge questions were demonstrated at 4 to 6 weeks compared to baseline. However, acetaminophen knowledge retention of maximum adult daily dose and organ of toxicity were significantly reduced in survey 3 compared to survey 2. This reduction suggests the need for education reinforcement to optimize long-term knowledge retention. In 2016, Kang and colleagues published a study on how the “spacing effect” produces durable long-term learning. The “spacing effect” provides education to a group of people spaced out over time, generally leading to superior learning as compared to providing education in close temporal successions.²²

In a study of college students asked to learn the Athenian Oath, 1 group of students heard the oath read 6 times in a row (“massed repartition”), while the other group heard the oath 3 times on day 1, and 3 more times 3 days later (“spaced repetition”). When assessing immediate recall, the group that received massed repetition could recall slightly more than the group that received spaced repetition. However, on the delayed test 4 weeks later, the spaced group outperformed the massed repetition group. Kang concluded that while massed practice might appear more effective than spaced repetition in the short term, durable long-term learning is more apparent with spaced practice.²² For patients, it would be practical for healthcare providers in various settings to remind patients of the 3 key acetaminophen facts at subsequent visits to medical offices or during pharmacy medication pickups.

The data in this study demonstrate that older participants may require additional educational strategies. According to an expert panel report written by the Centers for Disease Control and Prevention (CDC), improving health literacy can be accomplished by keeping information focused, repeating information as needed, providing time to process information, using face-to-face communication, and providing sufficient follow-up.²³ Additionally, understanding the cultural, institutional, emotional, personal, and knowledge barriers patients face is important to improving their health services. Specifically, training healthcare professionals in communication skills and the use of communication technologies (e.g., translation services, language lines, translation apps) can reduce these cultural and personal barriers.²³

A participant’s birthplace also appears to be a determining factor in short- and long-term retention of acetaminophen knowledge. Although there was no performance difference

at baseline (survey 1), U.S.-born participants correctly responded to all 3 key acetaminophen knowledge questions at significantly higher rates on surveys 2 and 3 than non-U.S.-born participants. However, more English and bilingual speakers could answer all 3 key acetaminophen knowledge questions than Farsi- and Arabic-only speakers. Research has shown that the language barrier is a small component of prescription label understanding for participants who are non-U.S.-born.²⁴ Future studies examining different methods and cost-effective strategies on how to optimize medication education for non-U.S.-born patients would be beneficial.

Limitations

This study has multiple limitations. First, this study was limited to the San Francisco Bay Area, and convenience sampling was used to obtain our cohort. Thus, the results may not be generalizable to the Arabic- and Farsi-speaking individuals who reside in the Bay Area or in other parts of California or the United States. Second, the survey required participants to be literate in Arabic, Farsi, or English, thus excluding participants who spoke other languages. Third, due to the ongoing COVID-19 pandemic, the number of participants for survey 3 was reduced compared to surveys 1 and 2 due to shelter-in-place orders, thus limiting interpretation and generalization of statistical outcomes. Lastly, this study provided a single 30-second consultation using a handout on acetaminophen knowledge. The study did not address learning style preferences and whether auditory learners fared differently than visual learners. In future studies, exploring other educational methods and determining if multiple education attempts may further enhance knowledge retention would be important.

Conclusion

The majority of MEAs in the current study lacked basic acetaminophen knowledge. However, a 30-second consultation with a handout improved both short- and long-term knowledge. All healthcare professionals can play an active role in counseling patients about acetaminophen and its risks. Demographic factors should be considered and assessed when planning patient counseling. 🍏

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