AN EVALUATION OF PRACTICES, PERCEPTION AND UNDERSTANDING ABOUT USE OF ACETAMINOPHEN (PARACETAMOL) AMONG MALAYSIAN CONSUMERS: A QUALITATIVE STUDY

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An assessment of the use of acetaminophen (paracetamol) among consumers will provide guidance for implementing strategies to overcome the misuse of acetaminophen containing products. This study aims to evaluate Malaysian consumers’ practices, perceptions and understanding about use of acetaminophen. A semi-structured qualitative study utilizing face-to-face interviews was conducted among fourteen consumers aged between 24 to 82 years old and living in Penang, Malaysia. The transcripts of all the interviews were generated from audio tapes and were analysed for issues and themes emerging from the text, which were independently coded and verified by the experts. The consumers had a positive attitude towards the popularity, safety and efficacy of acetaminophen. The consumers mostly used acetaminophen for pain and fever. However, some of the consumers tend to increase the frequency and dosage of acetaminophen consumption if their condition persisted. They were also having difficulty in recognising the generic acetaminophen-containing products available in the market. Health literacy investigations have found that the consumers have lack of knowledge about the correct dosing regimen for acetaminophen in both adult and children. Besides, the consumers were not aware of the precautions and toxicities of acetaminophen. Furthermore, to increase awareness of acetaminophen poisoning in Malaysia, the consumers suggested that educational tools are needed from Ministry of Health and policy-makers regarding the proper use of acetaminophen. The information gained from this study emphasized the
importance of educational interventions to educate public on the proper use of acetaminophen in Malaysia.

**Keywords:** Acetaminophen, Paracetamol, Practices, Perceptions, Understanding

**INTRODUCTION**

Acetaminophen (or paracetamol) is a common constituent of over-the-counter analgesic and non-prescription drug used to reduce fever and relieve common pain. The proper recommended dose of acetaminophen for adults is 500 mg to 1,000 mg every 4 to 6 hours, up to a total daily dose of 4000 mg and for children is 15 mg/kg every 4 to 6 hours, up to a total daily dose of 2400 mg (NPS 2003). An acute single ingestion of acetaminophen greater than 10 g or 200 mg/kg (whichever is lower) in adults or 200 mg/kg in children is considered hepatotoxic (Dart et al. 2006). However, acetaminophen toxicity can also occurred after repeated ingestion of supra-therapeutic doses over a period of more than 8 hours (Craig et al. 2012; Daly et al. 2004). These may lead to the symptoms such as confusion, loss of appetite, stomach pain, nausea or vomiting. Liver injury becomes evident when levels of aspartate aminotransferase and alanine aminotransferase begin to increase within 24 to 48 hours. This may eventually lead to death (Dart et al. 2006; Schiødt et al. 1997). Currently, N-acetylcysteine (NAC) is the antidote for acetaminophen poisoning. Nevertheless, early initiation of NAC therapy is essential as it is most effective for patients who are admitted to the hospital within 8 to 10 hours of the acetaminophen ingestion (Alsop 2013).

Acetaminophen poisoning is a common phenomenon around the globe. In the United Kingdom, acetaminophen poisoning accounted for 48% of hospital admission and leads to 100 to 200 deaths yearly (Hawkins et al. 2007). A study conducted at a general hospital in Northern Malaysia found that acetaminophen poisoning accounted for around 29% of all drug poisoning incidents with 60% of the cases were due to suicidal and 33.3% cases involved accidental ingestions. The majority (73.3%) of the acetaminophen poisoning cases involved patients aged between 16-30 years and 38% of the cases involved ingestion dose of more than 10 gram (Mohd Zain et al. 2006).
Lack of health literacy is the main reason for poor understandings and potential inappropriate use of acetaminophen-containing products as shown in a survey study conducted among 266 adolescents and young adults in United States of America. In this study, the respondents with limited health literacy found to have more prone to misunderstand about the information in the acetaminophen product label (Shone et al. 2011). Besides, self-medication without consultation of healthcare providers could increase the risk of misuse and over-consumption of non-prescription medicines including acetaminophen (Almasdy and Sharrif 2011). A previous study on self-medication practices among female students in Malaysia revealed that the incidence of accidental drug poisoning was 8.3% (Ali SE et al. 2010). To overcome this problem, proper labeling, educational interventions and public health activities may help to promote the proper use of acetaminophen (Shone et al. 2011).

Currently, there are limited educational tools in Malaysia to promote rational use of acetaminophen. An understanding of consumers’ practices, perceptions and understanding about use of acetaminophen is important to the overall planning of educational interventions. Therefore, this study will provide baseline data to develop an educational tool on the proper use of acetaminophen. Besides, the study findings will help the government agency in designing educational programs for the consumers with regards to the proper use of acetaminophen. This in return will enhance the quality of acetaminophen use in achieving optimum health outcome for the public.

METHODS

This was a qualitative semi-structured interviews conducted in the State of Penang, Malaysia from 1st May 2013 to 31st June 2013. Interviews were carried out with a convenience sample of consumers who visited Health Clinic of University Sains Malaysia (USM), Out-Patient Clinic of Advance Medical and Dental Institute, USM and two selected community pharmacies. The inclusion criteria for the consumers were any adult patients who attend the clinic visit. The consumers must literate in either Malay, English or Chinese language. The sampling was continued until saturation level was reached or when there was no more new
information gathered from this interview. This was in accordance to the methodology for determining the sample size for qualitative interview (Mason 2010).

The interviews consisted of open-ended questions in which the consumers can freely expressed their opinions and comments in response to the questions. Each interview lasted about 30 minutes and consent was obtained from consumers before the interview started. The interviews were conducted at the patients’ waiting area. The interview questions were initially developed in English language using information from a literature review. The questions were tested for its face and content validity by three experts in pharmacy practice research. The experts consisted of registered pharmacists who worked as academic staffs in the School of Pharmaceutical Sciences, Universiti Sains Malaysia. The questions were subsequently been translated to Malay and Chinese language by using forward-backward translation procedure. During the interview, the questions (see Table 1) were read out loud by the researcher (the first author) according to the consumers’ preferred language. Then, consumers gave their opinions and comments according to each question with visual aids such as acetaminophen product label or package, and acetaminophen in tablet, syrup and suppository forms. The interview was audio recorded. The consumers received a free gift (a pen) upon completion of the interview.

The interview focused on consumers’ practices, perceptions and understanding of acetaminophen. Their knowledge about the indication, dosage and toxicity of acetaminophen were also assessed. The name of the originator brand “Panadol” was used throughout the interview as the participants were not familiar with the term “acetaminophen” or “paracetamol”. They were only familiar with the term “Panadol”. Hence, the used of the term “Panadol” in this study did not refer to a specific brand but referring to acetaminophen. The consumers were also provided with acetaminophen product labels and were asked to give opinions on how to improve these labels. The consumers were also provided with seventeen acetaminophen product package props and were asked to distinguish between the acetaminophen brand name (originator) products (a total of seven products) and generic products (a total of ten products).

All data provided by the consumers were transcribed verbatim and analysed for prominent themes, major issues, differences and unique individual responses. The themes were developed after the interview from the raw data. The thematic analysis was manually performed by the first author without
using any research tool. During the initial phase of the thematic analysis, reading and re-reading were performed on the transcribed material to develop a list of items which have a reoccurring pattern. These items were subsequently coded to allow the researcher to make comparisons between the interviewees’ responses and searching for themes. The codes were then combined to form themes, which are phrases that identified the meaning of the data. The identified themes were verified through discussion among the first author and two academicians from the School of Pharmaceutical Sciences, Universiti Sains Malaysia who are experts in the field of qualitative research. Coding was given to each consumer (Con01 to Con14). The study was granted ethics approval from the Universiti Sains Malaysia-Hospital Lam Wah Ee Ethics Committee (ethics approval number: USM-HLWE/IEC/2012(0017)).

RESULTS

Characteristics of Participants
Fourteen consumers aged from 24 to 82 years were interviewed. For education background, six of the consumers had received secondary education while two of the consumers had completed a diploma's degree. Five consumers were university students and the remaining one did not have any formal education. Five interviews were conducted at the two selected community pharmacies, while another five interviews were conducted at Health Clinics of USM and the rest were conducted at the Out-patient Clinic of Advance Medical and Dental Institute of USM. The consumers’ demographic characteristics are summarized in Table 2.

Thematic content analysis of the interviews identified four major themes included trend of acetaminophen use, appropriateness of the acetaminophen use, factors contributed to appropriateness of acetaminophen use and strategies to improve quality use of acetaminophen. Below are the descriptions of each theme with illustrative excerpts from the consumers’ transcripts.
Theme 1: Trend of acetaminophen use

The consumers were asked about popularity, types, place of purchase and quantity of acetaminophen used. All of the fourteen consumers had taken acetaminophen and most of them pointed out that acetaminophen were popular among Malaysians.

“Yes, Panadol is popular and good since many people take it.” (Con03)
“So far ok, many people buy it.” (Con10)
“Everyone knows and take it.” (Con13)
“Panadol is very usual in Malaysia because every house will buy and take it.” (Con14)

All of the consumers found to have consumed various acetaminophen products from the originator brand Panadol®. Some of them were familiar with Uphamol® (a generic brand) and KK paracetamol (“KK” is an acetaminophen 500 mg tablet taken from the Malaysian government hospitals or clinics).

“Yes, I take Panadol® 500 mg, Panadol® Soluble® and Panadol Actifast®.” (Con03)
“Yes, I take Panadol® , Uphamol® and Panadol Soluble®.” (Con09)
“Yes, I take Panadol Actifast®, Panadol Soluble® and KK.” (Con11)

Most of the consumers obtained acetaminophen from pharmacy with quantity of ten tablets in one strip.

“I buy one strip from the pharmacy and Chinese medicine shop.” (Con02)
“I buy it from the pharmacy, sometimes one strip and sometimes two strips.” (Con04)
“I get one strip from the pharmacy and government hospital.” (Con06)
“I buy it from the mini market and pharmacy, usually one strip only.” (Con13)
“I usually buy one strip from the sundry shop and pharmacy.” (Con14)

Theme 2: Appropriateness of the acetaminophen use

The consumers usually took acetaminophen for common pain and fever.

“I used it during headache and fever.” (Con03)
“Err… I used (acetaminophen) for fever, headache, mild toothache, not for cold and flu.” (Con04)

“I used it as pain killers, for example, for headache, toothache, menstrual pain and fever.” (Con05)

“I used (acetaminophen) to treat diseases like headache, fever and menstrual pain.” (Con09)

“I used Panadol for severe headache and fever.” (Con12)

However, a few consumers used acetaminophen for abdominal pain, gastric pain and dizziness.

“I used Panadol for fever, headache and dizziness. But, not for dental pain, should have other medicines (dental pain should be treated by other medicine).” (Con01)

“I used it for menstrual pain, headache, abdominal pain, gastric pain and toothache.” (Con11)

The consumers were able to recognize and follow the proper recommended dose of acetaminophen 500 mg tablet in adults, which is one to two tablets every six to eight hours and total daily dose should not exceed eight tablets.

“I take one tablets thrice times per day when I feel sick.” (Con01)

“I take two tablets every eight hours and used it every month during period pain.”

(Con11)

A consumer reported to have used the acetaminophen 500 mg tablet as the condition arises and she was very satisfied with its effectiveness.

“I will recover after take one tablet of KK paracetamol.” (Con08)

Respondents mostly failed to recognize and follow the proper recommended dose of acetaminophen 650 mg tablet in adults, which is one to one and a half tablets every six to eight hours and total daily dose should not exceed six tablets.

“I take two tablets thrice times when necessary.” (Con05)

“I take two tablets once time per day when headache.” (Con10)
“I am not sure about the dosage.” (Con12)

The respondents who do not have children were generally not alert about the paediatric dosage of acetaminophen.

“I really don’t know. I only knew myself take two tablets only.” (Con03)
“No, because no children in my house.” (Con06)
“I don’t know, no children in the house.” (Con13)

A mother was found to know about the dosage of acetaminophen for her children’s age group.

“I give my children aged 12 years old about 15 ml thrice times per day (for acetaminophen suspension 250 mg per 5 ml).” (Con02)

The respondents have various behaviours when their conditions or symptoms persist after taking acetaminophen. Apart from consult their doctor, some would increase the frequency or dosage of acetaminophen consumption.

“I will take it more frequently.” (Con02)
“I will double the dose, previously take one tablet, now, take one more tablet.”
(Con13)
“I will double the dose by taking another two tablets.” (Con14)

However, one respondent ignores the conditions or symptoms

“I usually ignore the conditions.” (Con08)

**Theme 3: Factors contributed to appropriateness of acetaminophen use**

A few consumers would read the instructions on the package before consuming acetaminophen while some of them do not have this practice.

“I get information from the product label because this source is very reliable and accurate.” (Con04)
“I bought Panadol myself. I read instruction on the package for the first time and then follow the previous dosage.” (Con10)

“No, I just take it (acetaminophen) directly (without reading the instructions on the product label).” (Con01)

“I am too lazy to read the instruction.” (Con14)

Some of the respondents received medical advice of acetaminophen from their healthcare professionals, family and friends.

“I just follow instruction of my mother. If my mother says two tablets, I will take two tablets only.” (Con03)

“Yes, hospital pharmacists tell me on the indication, dosage and frequency of Panadol.” (Con07)

“From doctor and pharmacist, they tell me about effects of Panadol overdose, don’t exceed maximum daily dose, dose and frequency per day.” (Con09)

“From my mother because she is a doctor, she told me to take two tablets every six hours.” (Con11)

“My friend just tell me about not over than two tablets per intake.” (Con12)

Some of the respondents were conscious about consuming acetaminophen together with their prescribed medicines.

“Yes, I took antihypertensive and hypercholesterolemia drugs. But, I didn’t take Panadol with my prescribed medicines.” (Con07)

“Yes, I took antihypertensive, anti-diabetic and hypercholesterolemia drugs. But, I didn’t take Panadol with prescribed medicines. I only take it when headache.” (Con08)

A few consumers know that acetaminophen should be consumed with caution when they were taking alcohol or other types of medicines.

“I think Panadol should be consumed with caution when we are taking alcohol and when we are taking other types of drugs, for example, pain killers.” (Con01)
“When you are taking alcohol and when you are taking other medicines like antihypertensive drugs and diabetes drugs.” (Con04)

A consumer felt that acetaminophen should be consumed cautiously for those who have kidney and liver diseases.

“People with diseases such as kidney failure and liver injury.” (Con05)

One of the consumer correctly recognized liver damage and spontaneous abortion during pregnancy as the effects of acetaminophen over-consumption. Another consumer correctly stated that acetaminophen overdose can cause both liver and kidney damage.

“Liver injury and may cause spontaneous abortion, not caused renal damage.”
(Con06)

“I think kidney damage. But, I really don’t know.” (Con02)

“It (acetaminophen over-consumption) will cause liver damage and kidney damage.” (Con14)

Only a few consumers correctly recognized that changes in mental status, vomiting and loss of appetite are the signs of acetaminophen over-consumption.

“It will cause redness and not feeling well.” (Con01)

“It will cause diarrhea.” (Con02)

“Dizziness, change in mental status, erm…loss of appetite and maybe vomit also.” (Con06)

“It caused dizziness, diarrhea and vomit.” (Con09)

“I don’t know (about the signs of acetaminophen over-consumption), because I take it (acetaminophen) on the safe way.” (Con11)

Acetaminophen products available in the market were perceived as very safe and effective by the consumers. Indeed, the consumers were noticed to have recommended the products amongst each other.
“It is very safe and effective drug and my mother recommended (acetaminophen) to me.” *(Con03)*

“Yes, it is very effective and I recommended (acetaminophen) to my family sometimes.” *(Con02)*

“Its effectiveness is ok. But, my family will know (about acetaminophen) even I am not recommend it.” *(Con06)*

“Yes, it is very effective and I will recommend it to my children.” *(Con07)*

“It is effective and I will recommend it to my family when they feel headache.” *(Con14)*

One consumer highlighted that acetaminophen contains dangerous drug and she will not recommend it to her family.

“It is quite effective. But, I will not recommend it to my family because I usually heard that Panadol contains dangerous drug to reduce feeling of pain and it is a powerful pain killers.” *(Con12)*

Another consumer felt that pain killers are more effective than acetaminophen.

“Yes, it (acetaminophen) is safe and effective. But, I got try other medicine (try to used other medicine for pain management), for example Ponstan® (Mefenamic acid). I felt Ponstan® more effective than Panadol.” *(Con02)*

Most of the consumers believed that all acetaminophen products sold in Malaysia were tested and approved by the Ministry of Health. A few consumers alerted that acetaminophen products which have granted approval from the Ministry of Health Malaysia will be labelled with a hologram on the packages.

“Sure, if not (tested and approved), how these products (can be sold) in the market and also it will cause people death if not approved by the government.” *(Con03)*

“Sure, if not (tested and approved), why our government hospital give us (acetaminophen) to take it.” *(Con08)*

“Yes, if not approve, they (pharmacists) can't sell (acetaminophen) in pharmacy.” *(Con09)*
“Yes, the sale of Panadol is everywhere. It should be approved and then marketed.” (Con12)

“Sure, because they (acetaminophen products) got hologram approved by the government.” (Con02)

“It (acetaminophen products) should be approved by government because these products got hologram.” (Con04)

To gain more insight into the issue of confusion with the use of different brands of acetaminophen, consumers were asked whether they can recognize between the originator and generic products available in the market (by showing them seven and ten originator and generic product package props respectively). Some respondents correctly recognized these acetaminophen brand (originator) products.

“I just put it (refer to Panadol® Soluble) in water, it is used for flu.” (Con01)

“It (refer to Panadol® 500 mg) is used during headache and fever. It (refer to Panadol® Extend) is used for muscle pain and backache.” (Con04)

“It (refer to Panadol® Actifast) act faster compared others and it used for headache.” (Con05)

“It (refer to Panadol® Menstrual) is used for menstrual pain. It (refer to Panadol® Cold & Flu) can't put in counter, need to prescribe by pharmacist.” (Con09)

Consumers may become confused by different brands of acetaminophen because only two generic products can be recognized by them.

“I always take KK and it stamp word KK on each tablet as well (the word “KK” is stamped on each acetaminophen tablet), I take it from hospital.” (Con11)

“It is from CCM company which is blue in colour with dosage of 650 mg per tablet (refer to Uphamol® 650 mg).” (Con02)

**Theme 4: Strategies to improve the quality use of acetaminophen**

Some of the consumers agreed that good consumer education about acetaminophen may help to improve future use of acetaminophen.
“Educational effort (is) needed (to improve the use of acetaminophen), professionals such as pharmacist can teach public on the dosage and frequency of Panadol and also under what condition should it be taken with caution.” (Con01)

“Yes, need to educate public (about the use of acetaminophen) through seminar in schools.” (Con05)

“Yes, (educational intervention should be conducted through) seminar or talk in public (places), for example, shopping complex.” (Con09)

“In Malaysia, there is misuse of Panadol and also misunderstanding of Panadol risks. Although, Panadol has tested in laboratory, many people scare to consume Panadol as well. Here, need to educate public about the signs and effects of Panadol over-consumption. I think can give booklet to public, talk or seminar and also drug exhibition, tell public on how to differentiate between brand and generic products.” (Con11)

“Yes, level of health in Malaysia was poor and Malaysians were not emphasized on their health. Need to educate public (about the use of acetaminophen) through advertisement in television and newspaper which included maximum dosage per day, signs and effects of Panadol over-consumption and also knowledge on the alternatives (generic products) of Panadol. If organize drug exhibition or talk, I believe that only public who care about their health will go.” (Con12)

However, some of the consumers supported educational interventions emphasising the signs and effects of acetaminophen poisoning and also dosage of acetaminophen in children.

“Malaysians were not misuse of Panadol. It is very safe drug, only need to educate public on the side effects of Panadol.” (Con13)

“No need (there is no requirement for educational intervention), everyone knew it (acetaminophen) and it is old brand already (the brand of Panadol had been available in market since long time ago). Only little educational efforts is needed about the effects and signs of Panadol over-consumption.” (Con02)

“No need (there is no requirement for educational intervention). But, if really need (educational intervention) just emphasize on children (the use of acetaminophen in children). Even if elder
people go and buy it (acetaminophen) in sundry shop, they will also get information about the dosage from that sundry shop.” (Con06)

On the other hand, one consumer did not support the educational intervention to improve the proper use of acetaminophen. The consumer perceived that acetaminophen over-consumption do not cause any side-effects and hence there is no requirement for educational intervention.

“No need (there is no requirement for educational intervention), because I feel that it (acetaminophen) is good and don’t have any effects (side-effects) and signs if Panadol over-consumption.” (Con07)

Various suggestions on how to improve the label of the products package were highlighted by the consumers.

“Bigger words and highlight the word (highlight the important information) are needed.” (Con01)

“I felt that need to add in Chinese language, because some elderly peoples (Chinese) don’t know Malay and English.” (Con04)

“Bigger words needed and (need to add in) precautions such as keep out of reach by children.” (Con05)

“Bigger words needed, but, I even not read the label.” (Con07)

“Label is ok, just add on “no more than two tablets per intake”. This is because most people will take more than two tablets per intake which is more effective. But, it will cause drug poisoning. So, maximum dose per intake and per day are needed in the label.” (Con11)

“Bigger words needed and also included side effects of Panadol.” (Con13)

“Words not clear (the wordings in the label are not clear), bigger words needed, because elderly people can’t see.” (Con14)

However, some of the consumers did not agreed of improving package labels of acetaminophen.
“I think not need to improve the label, because I even not read (the label) and just get the information (about acetaminophen) from my family.” (Con03)

“Here, the labels already complete and got expiry date, not need to add anything.” (Con08)

**DISCUSSION**

This study revealed that the Malaysian consumers viewed acetaminophen as a popular over-the-counter medicine. An Australian study showed a similar observation where acetaminophen is used for common pain and fever (Trajanovska et al. 2010). Besides, these trends are also in accordance to the research results from other countries (Boardman et al. 2004; Onohwosafe and Olaseha 2004). A survey in United Kingdom reported that headache was mostly treated by acetaminophen among consumers (Boardman et al. 2004). In Nigeria, most of the secondary school students preferred to use acetaminophen products due to its efficacy, availability and affordability (Onohwosafe and Olaseha 2004). Another African study found that acetaminophen was the most commonly used medicines among university students (Lucas et al. 2007). Meanwhile, university students in Thailand utilized acetaminophen as the first line of treatment for menstrual pain (Tangchai et al. 2004). In Palestine, most of the consumers were likely to keep acetaminophen in their house (Sweileh 2009).

Inappropriate self-medication of acetaminophen for stomach pain, gastric pain and dizziness were noted among the consumers in this study. A study in Denmark also revealed some misunderstanding about the use of acetaminophen by parents to improve appetite, health, sleep and prevent fever seizures in their children (Jensen et al. 2010). Besides, the present study found a worrying practice among consumers whereby they will double the acetaminophen dose or take it more frequently if their conditions persisted. This practice may expose them to accidental or staggered overdose which is defined as taking two or more high dosage of acetaminophen in an interval of more than 8 hours until the total daily dosage exceeded 4 gram (Craig et al. 2012). Previous evidence demonstrated that patients with repeated supra-therapeutic ingestion of acetaminophen were at risk of developing liver damage (Alhelail et al. 2011). These improper uses of acetaminophen may be due to poor knowledge about
acetaminophen among consumers and a lack of consultation from healthcare professionals when practicing self-medication (Dawood et al. 2010).

In Malaysia, there are more than 50 acetaminophen (paracetamol) products marketed by various drug companies (MOH 2014). Nevertheless, consumers in the present study are more familiar with the originator brand (Panadol®) and they have difficulty in identifying generic products. Studies in the United State found that poor knowledge was the main factor which caused difficulty among consumers to differentiate acetaminophen-containing products (Fosnocht et al. 2008; Shone et al. 2011). The consequences of difficulty in distinguishing acetaminophen-containing products will increase the chances of poly-pharmacy and acetaminophen over-consumption. Indeed, this may lead to delayed in diagnosis of acetaminophen poisoning and initiation of NAC antidote (Hewett et al. 2013). To overcome this problem, health providers are responsible to educate consumers on how to identify the content of acetaminophen products.

Currently, there is no control on the quantity of acetaminophen that can be sold in Malaysia. This is in contrast to the policy implemented by several countries on the sales of acetaminophen to decrease suicide rates and serious self-poisoning by acetaminophen. The quantities of acetaminophen tablets can be bought by the consumers per transaction are 6 gram, 8 gram and 10 gram respectively in Ireland (Donohoe et al. 2006), France (Chan 2000) and Germany (Bateman 2009). In the United Kingdom, acetaminophen sale per transaction is limited to 16 gram in community pharmacies and 8 gram in non-pharmacy settings (Bateman 2009). The consumers in the present study mostly obtained acetaminophen from pharmacies with a quantity of ten tablets. However, there is a need to control the quantity of acetaminophen that can be sold per transaction in Malaysia. This is to avoid multiple packs of acetaminophen easily obtained by consumers. This in return may reduce the risk of acetaminophen poisoning among Malaysian consumers.

The consumers in this study have lack of knowledge about the dosage of acetaminophen, particularly the 650 mg tablet and syrup formulation. Studies in United State found similar trend that less than 50% of the consumers knew the correct total daily dose of acetaminophen (Fosnocht et al. 2008; Hornsby et al. 2010). Meanwhile, studies in Brazil, Canada and Saudi Arabia reported that more than half of the parents and caregivers gave incorrect dose of acetaminophen to their children (Alves et al. 2007;
In the present study, the lack of knowledge of paediatric acetaminophen syrup dosing among the consumers may be due to only one consumer has children. Those who do not have children may not alert about the dosage of paediatric syrup. The lack of knowledge on acetaminophen dosage will place the consumer at risk of both sub-therapeutic dose and overdose.

Poor understanding about the toxicities of acetaminophen was observed among the interviewed consumers. A similar trend was found in Australia that less than half of the parents knew that acetaminophen overdose can cause injury to the liver, stomach, and kidney and lead to poisoning (Walsh et al. 2007). Another study reported that 43.3 % of the American consumers knew that acetaminophen over-consumption can cause hepatotoxicity (Stumpf et al. 2007). This observation is in contrast to findings from the United Kingdom (UK) where consumers revealed better knowledge about signs of acetaminophen toxicities which included liver damage (80.0 %), confusion (70.0 %) and death (88.3 %) (Simkin et al. 2012). The better knowledge among the UK consumers may be explained by the warnings of the dangers of acetaminophen overdose printed on the product pack (Simkin et al. 2012). The Malaysian government can consider applying this strategy in order to enhance the consumers’ alertness regarding acetaminophen overdose. Generally, results from the present study suggested that consumers’ knowledge about signs and symptoms of acetaminophen overdose needed to be enhanced via educational interventions. This is to ensure prompt response by consumers to any toxicity that they might experience.

In this study, the consumers urged that healthcare professionals should be more proactive in educating consumers on acetaminophen toxicities and dosage of acetaminophen in children. Additionally, they suggested that public health programs regarding appropriate use of acetaminophen should be organized for the consumers. A previous study also showed that education emphasising proper recommended dosage, toxicities of acetaminophen and recognition of acetaminophen-containing products are needed among the consumers in United States (Stumpf et al. 2007). Another survey found that education about fever is important for parents who were likely to treat their children with too frequent doses of acetaminophen (Cohee et al. 2010). The present study findings suggested that the Malaysian government should organized promptly various educational programs to improve knowledge of
acetaminophen among the consumers. Besides, educational tools such as brochure, video and web app should be designed and distributed to the public to educate them on the issues around appropriate acetaminophen dosage and toxicities.

Within the context of self-medication, acetaminophen products packages label is an essential source of drug information to the consumers. Nevertheless, a few consumers in the present study did not read the package instructions before consuming acetaminophen. This finding suggested that the product package label for certain acetaminophen products may not be attractive enough for the consumers to read. Indeed, some of the products label may not be informative as there were suggestions from the consumers to add in additional information such as maximum dosage per intake per day and side effects of acetaminophen. Further, there were suggestions from the consumers to increase the font size of the wording in the label as it is difficult to read. An American study suggested that the instructions and warning attached to the blister package can help to avoid it being thrown away by the consumers (Weiss 2009). A more recent study stated that 74.4 % of the American consumers were not aware of the new warnings label of liver damage while taking over-the-counter acetaminophen products (Goyal et al. 2012). In Nigeria, a study showed that most of the caregivers did not read instructions of the package since they preferred to rely on their past experience to decide the dosage of acetaminophen (Obu et al. 2012). The consumers’ ignorance toward product label may put them at risk of acetaminophen poisoning. Hence, Malaysian drug companies should design an attractive, simple, and user friendly product leaflet with multiple languages to encourage consumers to refer to the package label before consuming the product. Additionally, healthcare professionals are responsible to tell the consumers about the information on the label while prescribing and dispensing acetaminophen.

Limitations

The present study demonstrates the limitation of a qualitative research that the generalizability of the findings is limited. The convenient sampling in this study only managed to recruit one consumer who was known to have children. A purposive sampling would be more appropriate to recruit consumers with
children in order to assess their knowledge about paediatrics dose of acetaminophen. Besides, the recruitment of the consumers in this study did not involve those from shopping mall or supermarket where the consumers may purchase the acetaminophen from there. This may further limited the generalizability of the study findings. However, the study provides insight into the lack of understanding about acetaminophen-containing products, dosing and toxicities among the Malaysian consumers. A follow-up nationwide quantitative survey should be conducted to explore whether these poor knowledge of acetaminophen use is common among the Malaysian consumers.

CONCLUSION

The interviewed Malaysian consumers generally held a positive attitude towards the popularity, safety and efficacy of acetaminophen. They were confused by the various acetaminophen-contained products and the proper recommended dosage of acetaminophen 650 mg tablet and syrup formulation. Some of them had little knowledge on the signs and effects of acetaminophen over-consumption. The insights gained from consumers in this study could be useful to the Ministry of Health Malaysia and policy makers in designing proper educational intervention and also improving the product label to increase consumer awareness of acetaminophen. It is hoped that through the provision of information and educational intervention, Malaysian consumers may develop a better understanding of acetaminophen.

REFERENCES


BATEMAN, D.N. (2009) Limiting paracetamol pack size: has it worked in the UK?, Clinical Toxicology, 47: 536-541.


**Table 1:** Interview questions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part 1: An evaluation on Malaysian consumers’ practices of acetaminophen</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Have you ever taken Panadol? What type of Panadol do you use?</td>
</tr>
<tr>
<td>2.</td>
<td>Where do you obtain Panadol? What is the quantity of your purchase?</td>
</tr>
<tr>
<td>3.</td>
<td>Under what conditions do you take Panadol?</td>
</tr>
<tr>
<td>4.</td>
<td>What is the dosage for the tablets that you take? How many tablets do you take each time? How frequent do you take it per day? How often do you use it?</td>
</tr>
<tr>
<td>5.</td>
<td>If your conditions/symptoms persist after taking Panadol, what would you do?</td>
</tr>
<tr>
<td>6.</td>
<td>Do you read the instructions of the package before you consume? Do you receive any medical advice regarding Panadol consumption when you purchase it? What kind of medical advice do you receive?</td>
</tr>
<tr>
<td>7.</td>
<td>How do you feel regarding the effectiveness of the Panadol that you have been taking? Should this Panadol be recommended to family or friends?</td>
</tr>
<tr>
<td>8.</td>
<td>Where do you get reference information about Panadol for self-medication? Why do you use that source?</td>
</tr>
<tr>
<td>9.</td>
<td>Do you take any prescribed medicines? If yes, do you consume Panadol together with the prescribed medicines?</td>
</tr>
<tr>
<td><strong>Part 2: An evaluation on Malaysian consumers’ perceptions of acetaminophen</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>From your point of view, do you think Panadol is popular among the Malaysians?</td>
</tr>
<tr>
<td>2.</td>
<td>They are increasing demands for Panadol in the market. How do you feel about the safety and efficacy of these Panadol products?</td>
</tr>
<tr>
<td>3.</td>
<td>Do you think Panadol sold in Malaysia are tested and approved by the Ministry of Health?</td>
</tr>
<tr>
<td>4.</td>
<td>Do you think educational effort is needed to educate public on use of Panadol?</td>
</tr>
<tr>
<td>5.</td>
<td>How could the labels on the Panadol be improved? (By showing few examples of product labels)</td>
</tr>
<tr>
<td><strong>Part 3: An evaluation on Malaysian consumers’ knowledge of acetaminophen</strong></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>What is Panadol used for?</td>
</tr>
</tbody>
</table>
2. Is Panadol a brand name or an active ingredient in a medicine? Do you know the content of Panadol?

3. Can you differentiate among these Panadol® products? (By showing few examples of Panadol® products in different formulations, for instance, Panadol® Actifast, Panadol® Soluble and Panadol® Cold & Flu)

4. Can you differentiate among these Paracetamol products (generic products) with different brand name? (By showing few examples of generic paracetamol products)

5. Do you know the maximum dosage of Panadol tablet per intake in adult? Do you know the maximum dosage of tablet per day in adult? (By Showing Panadol® 500 mg & 650 mg tablet)

6. Do you know the dosage of syrup Panadol 125 mg/5 ml per intake in children in aged between 1-3 and 4-6 years old? (By showing the syrup Panadol® 125 mg/5 ml)

7. Do you know the dosage of syrup Panadol 250 mg/5 ml per intake in children aged between 6, 7-9 and 10-12 years old? (By showing the syrup Panadol® 250 mg/5 ml)

8. Under what conditions Panadol should be consumed with caution?

9. What are the effects of Panadol over-consumption?

10. What are the signs of Panadol over-consumption? What course of action would you take if you recognize signs of Panadol over-consumption?

Part 4: Conclusion*

1. As a conclusion, do you have any additional comments about the usage of Panadol in Malaysia?

Note:*The name of the originator brand "Panadol" was used throughout the interview as the participants were not familiar with the term “acetaminophen” or “paracetamol”. They only familiar with the term "Panadol"
Table 2: Demographic and characteristics of the responding consumers.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group, years</strong></td>
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</tr>
<tr>
<td>18-25</td>
<td>3</td>
</tr>
<tr>
<td>26-40</td>
<td>7</td>
</tr>
<tr>
<td>41-60</td>
<td>1</td>
</tr>
<tr>
<td>Above 60</td>
<td>3</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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</tr>
<tr>
<td>Malay</td>
<td>3</td>
</tr>
<tr>
<td>Chinese</td>
<td>11</td>
</tr>
<tr>
<td><strong>Education background</strong></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>1</td>
</tr>
<tr>
<td>Secondary school</td>
<td>6</td>
</tr>
<tr>
<td>Diploma</td>
<td>2</td>
</tr>
<tr>
<td>Bachelor’s degree student</td>
<td>4</td>
</tr>
<tr>
<td>Post-graduate degree student</td>
<td>1</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>4</td>
</tr>
<tr>
<td>Student</td>
<td>4</td>
</tr>
<tr>
<td>Self-employed</td>
<td>1</td>
</tr>
<tr>
<td>Private sector</td>
<td>5</td>
</tr>
<tr>
<td><strong>Household status</strong></td>
<td></td>
</tr>
<tr>
<td>Live alone</td>
<td>2</td>
</tr>
<tr>
<td>Live with family</td>
<td>12</td>
</tr>
<tr>
<td>Health status</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---</td>
</tr>
<tr>
<td>Fair</td>
<td>6</td>
</tr>
<tr>
<td>Good</td>
<td>1</td>
</tr>
<tr>
<td>Very good</td>
<td></td>
</tr>
</tbody>
</table>

**Alcoholic (Do you drink alcohol?)**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>13</td>
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</tbody>
</table>