WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 6.805
Volume 5, Issue 5, 1578-1617. Research Article ISSN 2277– 7105

PHARMACISTS' ATTITUDES TOWARDS PEDIATRIC COUGH AND COLD MEDICATIONS IN KHARTOUM STATE, SUDAN

[1]Eiman Eltayeb Mohammed Ibrahim, [2]Eman Abdalgader Mohammed Elhassan Mohammed, [3]Eman Gaafar AhmedMohammed, [4]Eman Moaz Rahma Ahmed, [5]Oumalkaire Ahmed Ali Kahiye and [6]Arwa Hassan Ahmed Elhada*

[1,2,3,4,5,6]Depatrment of Clinical Pharmacy, Faculty of Pharmacy, Omdurmani Islmaic University, Khartoum Sudan.

Article Received on
19 March 2016,
Revised on 09 April 2016,
Accepted on 29 April 2016
DOI: 10.20959/wjpr20165-6217

***Corresponding Author**
Arwa Hassan Ahmed Elhada
Depatrment of Clinical Pharmacy, Faculty of Pharmacy, Omdurmani Islmaic University, Khartoum Sudan.

ABSTRACT

Background: Pediatric cough and cold drugs are still used as OTC medications. Until now, their efficacy and safety have not been approved. They pose a threat that is increased by irrational use. People used them in practices of self-medication which threaten pediatric health. Their proper use cannot be ensured as a consequence of problems related to labeling, poor dispensatory practices and modest knowledge of parents regarding their use and dosing strategies. **Objectives**: This study aimed at assessing pharmacists' degree of comfort towards dispensing paediatric cough and cold medications, combination products and complementary treatments based on safety and efficacy. It also aimed at investigating their opinion about some related issues such as labelling, dispensing and patient counselling to ultimately decide whether paediatric cough and cold medications should be labelled as prescription only drugs. **Method:** A descriptive community pharmacy-based cross-sectional study was conducted using a pre-tested questionnaire to collect data from community pharmacists who worked in Khartoum state. The pharmacists who took part in the study have been selected using random sampling. **Results:** Data was obtained from 235 pharmacists who worked in Khartoum state and was analyzed statistically. The majority of pharmacists have practiced pharmacy for one to five years. (47%) of pharmacists thought the current labels are improper. Pharmacists' degree of comfort towards dispensing cough and cold medications and complementary treatments to paediatrics varied according to the age of the child and the pharmacist's years of experience. (37%) felt uncomfortable towards dispensing combination

products for paediatrics and (77%) of the pharmacists mentioned that parents insisted to be recommended paediatric cough and cold medications. **Conclusion:** The pharmacists expressed various degrees of discomfort towards dispensing cough and cold medications and complementary treatment for children less than 5 years.

KEYWORDS: Attitude of pharmacists, paediatric cough and cold medications, misdispensing.

1.1 INTRODUCTION

Many problems related to drugs have been identified in the developing countries.[1] The quality of dispensing has been a subject of many studies done in these countries like Sudan, Nigeria, Botswana, Cambodia and India. The researchers noticed improper labeling and bad dispensary practices in addition to patients' modest knowledge. They considered poor quality of dispensing as the main cause of these defects.[2]

In Sudan, the main regulation processes regarding drugs are not good and this is the principal for many harms specially at state levels. These problems result in ‘leakage of low quality, unregistered medicines to those states and help in formation of informal marketing of medicines particularly in far states.[3]

In order to tackle these problems, the World Health Organization (WHO) considers pharmacists as the main contributor in health care, by promoting the rational use of medicines.[1] Pharmacists have responsibility towards management of drug therapy.[4] Pharmacists also have to confirm the doses of the prescribed drugs.

Generally, it is thought that the word "dispenser" is a synonym of the word "pharmacist".[5] The fact, pharmacists mainly work as dispensers of drugs and other goods, has been proved by a study on the nature and process of advice-giving in community pharmacy. The study focused on interaction between community pharmacists and their customers.[1] Therefore in developing countries poor dispensing practices are more likely to occur.

Errors could occur in any stage. For example in the labeling stage, dispensing and patient counselling.[5]

There is a basic distinction between prescribed and non- prescribed drugs. Prescribed drugs legally require valid medical prescriptions to be dispensed.[1] Moreover, they have potential

harms and toxicity profiles.[6] On the other hand, non-prescribed drugs can be sold directly without prescriptions from health care professionals.[1]

Nowadays, there are more than 300,000 medical agents classified as over-the-counter drugs (OTC) in the United States only. This category of drugs is over-expanding by the continuous addition of new formulations. They are used in treatment of self-diagnosed ailments.[7] Accordingly the optimal use of medicines and their benefits and risks should be well known by the public.[8]

The use of non-prescription medicines (OTC drugs) by the public without a direct medical advice in any phase of the treatment process to tackle common health problems is called "Self-medication".[3] 'Self-medication with OTC medicines is sometimes referred to as "responsible self-medication " to distinguish it from the practice of purchasing and using a prescription medicine without a doctor's prescription'.[9]

In the United Kingdom the government encourages citizens to depend on themselves in issues related to health care, the WHO and other organizations also support all members of society to participate in primary health care. This results in 50% of it being achieved by self-medication.[8]

In the United States, people also prefer self-medication. A survey applied to investigate its prevalence revealed that 73% of population would treat themselves and often use OTC drugs on their own initiative.[10]

Cough syrups are one of the most commonly used drugs in self-medication. The practice of self-medication reduces costs and allows specialists to focus on more serious and life-threatening conditions.[9] However, the self-medication hypothesis (SMH) reveals the role of the psychological factor in individual's choice of a particular drug.[6] 2.9 - 3.7% of deaths in hospitals annually results from drug-drug interactions as a consequence of self-medication.[11]

Most parents face problems in caring for their children. They all want their kids to live happy and healthy. In order to achieve this goal, parents have to take very hard and complex attitudes and make decisions regarding their children health and use of medications.[1] Minor illnesses such as headache and flu do not require physician consultation, and instead treated at home using OTC drugs or herbal remedies.[12] On the other hand, children and teenagers

use many prescription drugs. Nearly half of the most commonly prescribed drugs are designed to deal with cough and cold episodes.[13]

Parents' practice of self-medication in Sudan is a problem, as parents do not have adequate knowledge on the diseases and their treatment.[12]

Most people rely on OTC drugs, their poor salaries and crowded schedule are of the main causes of this phenomenon.[7] OTC drugs are widely used by children less than twelve years old. This population represents the main consumer of these medical preparations which could be of single ingredient or as combinations.[14]

Cough and cold (CAC) drugs concern the majority of drugs used in pediatric population.[13] They are used to relief symptoms of upper respiratory tract infections.[15]

OTC medications can be used to relieve cough despite their uncertain efficacy and safety profiles. Consequently, they have not got approval from any official organization such as the FDA. Herbal remedies such as honey also help in dealing with cough.[16]

Over-the-counter CAC drugs may be associated with serious consequences attributed to errors and adverse events.[14] They affect the heart, consciousness and brain.[1] Generally, OTC associated adverse effects occur most commonly in pregnancy, lactation, pediatrics and with elderly people.[3] The data supported the avoidance of the over-the-counter CAC drugs in the very young children.[15]

These events have alarmed many pediatricians from long period of time.[17] Recent studies considered errors in drug administration as the main reason beyond drugs' adverse events for children treated out-hospital.[18]

Pediatric doses must be individualized.[19] About '50% of parents make errors when dosing liquid medications'.[18]

Prescribing is the main storm in the treatment process. If the pharmacist becomes unsure about the right dosages and clinical impact of them or a large change in the dose is to be made, the prescriber will be contacted. Beside it, the pharmacist also has to consider the route of administration clearly.[19] A wide range of instruments of different types and styles have

been available and likely leads to 'parents confusion with dosing, especially for those individuals with limited literacy'.[18]

1.2 Literature Review

From more than three decades, pediatricians have started to be worried towards the safety and effectiveness of CAC drugs.[17]

In 1972 in the United States, a large-scale review of OTC drugs' formulas including CAC drugs was started by the Food and Drug Administration (FDA).[17]

CAC drugs were approved in the United States to relief symptoms in adults, but due to lack of enough data, FDA did not support use of such drugs in pediatric population under two years of age.[14] This was affirmed by some authors who found no significant differences between active common cold medications such as dextromethorphan and placebo in terms of symptoms relief and incidence of side effects.[20]

In the United States during 2004 and 2005, an investigation made by The United States National Electronic Injury Surveillance System – Cooperative Adverse Drug Event Surveillance program found that visits related to medication use compromised 6% of total emergency department visits for pediatrics of less than 12 years old.[14] Twenty-five percent of these visits were due to harmful consequences of properly administered medications.[21] Later on, the percentage of CAC drugs related visits substantially decreased after withdrawal of OTC infant CAC drugs.[14]

Dosing of pediatric CAC medications is largely extrapolated from adult dosing, so that pediatric populations are at higher risk of developing adverse events. Despite this fearful fact, pediatric cough and cold drugs are still widely used by children in the United States. They found the prevalence of exposure of some cough and cold medications to be 10.1% in children per week.[22]

In March 2007, Citizens implored the United States FDA to review the safety and efficacy of CAC drugs in children under the age of six.[15] Unfortunately, FDA review Studies failed to approve the efficacy of these drugs in young children.[23] Instead, they were considered the main causative for numerous cases of death and thousands of emergency department visits each year for patients aged under 2 years.[24]

This action pressed the FDA to recommend that these drugs should not be used for children under six years old.[15]

Deaths associated with the use of CAC medications were reported by the Centers for Disease Control, a review of Arizona Child Fatality Review Program (ACFRP) data and many researchers such as Marinetti el al. and Wingert et al.[25] 'A recent review of unexplained infant deaths in Arizona yielded 10 cases linked to OTC cough and cold medications use'.[21]

These studies resulted in manufacturers voluntary withdrawal of oral CAC drugs designed for use in infants from markets of the United States.[26]

In January 2008, the FDA decided that all CAC drugs should be avoided for children younger than two years old.[27]

Health Canada in the fall of 2008, endorsed the usage of all CAC formulations cautiously in children older than six years old, while avoiding them for children less than six years of age.[14]

In October 2008, manufacturers of CAC products modified their labels to increase the age recommended warnings for use in children and infants to less than four years of age instead of less than two years.[23]

A Cochrane meta- analysis examined the rationale of using CAC drugs to deal viral-induced cough. Based on several parameters, they failed to approve the usefulness of these drugs in pediatric and adult populations.[14]

A meta-analysis of thirty five studies that had targeted children and adults has proved the insignificant role of antihistamines in the treatment of upper respiratory infections. The study also revealed a possible benefit of combined therapy with decongestants for individuals aged more than five years and their uselessness for children less than five years old.[21]

Hutton and colleagues found no difference in improvement of symptoms when pediatric cough and cold medications and placebo were compared.[28]

In November 2009, the United States FDA formulated new guidelines targeted manufacturers of liquid OTC medications mainly producers of pediatric drugs.

These recommendations oblige manufacturers to follow many instructions.

These instructions includes inserting a measuring device for all OTC liquid preparations and using similar acronyms and units of measurement for all given tools and instructions. Undue markings should not be drawn on the devices and all devices should hold the largest designated dose or less. Also, abbreviations should be well-defined and adhered to standards. Moreover, fractions and decimals should be utilized with caution. Finally, the issue of proper use must be monitored accurately by continuous study.[18]

In 2011, 'the FDA removed a number of prescription cough and cold products from the market that lacked adequate documentation of safety and efficacy'.[29]

In december 2012, the 29th Annual Report of the American Association of Poison Control centers (AAPCC) National Poison Data System was published. 2.73% of all exposures called into United States poison centers were of CAC medications. Intentional misuse and abuse resulted on 12.5% of these exposures. The report ranks "CAC preparations" number eleven on the list of top 25 substance categories most frequently involved in human exposures.[30]
Forrester studies concerning CACs toxicities in children up to five years of age increased from 1999 and prior to September 2007 while from October 2007 the number started to decline.[29]

An author investigated the effect of labeling changes by assessing the emergency department visits before and after 2008 labeling revision. 11.9% reduction in CAC medicines' related visits was expressed by children two to three years old. While children four to five and six to eleven years old related visits showed no significant change in percentages of emergency department related visits.[23]

Directions related the child's age for proper administrations of cough and cold drugs are difficult to be understood by caregivers, which threatens the child safety.

The Centers for Disease Control and Preventions (CDCP) evaluated the degree of adherence with the recommendations labelled on the OTC drugs' containers. This assessment included pediatric CAC drugs. Recommendations were classified into: top tier which achieve three-fold or greater prevention against dosing errors and those do not directly achieve three-fold or more and called low tier. The majority of dosing directions and dosing devices were

consistent with all of the top tier recommendations achieving percentages of 91% and 62% respectively.[32]

Adherence with the lower tier recommendations was much lower. This study reflected the humble patients' ability to understand directions labelled on drugs' containers.[29]

Categorizing those drugs of doubtful effectiveness and safety as Prescription only medications looks a judicious step. It would give physicians and pharmacists an opportunity to convey more information to parents in order to ensure more effective and safe use. Moreover, behind the counter status could improve access to these medications and increase social awareness about these fawning drugs.

We aimed at estimating Khartoum pharmacists' degree of comfort towards pediatric cough and cold medications concerning their efficacy and safety and at determining their opinions about some related issues such as labeling, dispensing and patient counseling. In this study cough and cold medications were categorized into their main classes (decongestants, expectorants, antitussives and antihistamines) except the antipyretics in which drugs were studied individually (ibuprofen and paracetamol) in order to highlight the difference in efficacy and safety profile among them. Moreover, we want to gauge pharmacists' knowledge and assess their opinions about combination products and parents' self-medication using pediatric cough and cold drugs.

1.3 OBJECTIVES

1.3.1. General objectives

To determine pharmacists' attitudes towards pediatric cough and cold medications in Khartoum state.

1.3.2. Specific objectives

1.3.2.1 To assess pharmacists' attitudes towards recommending cough and cold medications for children less than two years and those two to five years of age.

1.3.2.2 To assess pharmacists' attitude towards the use of vitamins, non-pharmacological remedies and combination products.

1.3.2.3 To assess pharmacists' attitudes towards the current labels of pediatric cough and cold medications.

1.3.2.4 To assess whether parents insisted to be dispensed pediatric cough and cold medications.

1.3.2.5 To assess the relationship between pharmacists' years of experience and their attitudes towards recommending cough and cold medications for children under two years and those two to five years old.

2. METHODOLOGY

2.1 Study design

A descriptive community pharmacy-based cross-sectional study.

2.2 Study duration

It was performed in the period from April 2015 to June 2015.

2.3 Study area

It was performed in Khartoum state.

Khartoum state is the capital city of Republic of Sudan. It lies between longitudes 31.5 -34 East and latitude 15-16 North, covering an area of 28.165 square kilometers. It consists of seven localities, namely: Khartoum locality, Gabal Awlia locality, Omdurman Locality, Karrari locality, Ombadda locality, Khartoum North locality and Eastern Nile locality.

According to enumerations obtained from Ministry of Health in 2015, Khartoum state contains 1885 pharmacies. 522 pharmacies are located in Khartoum locality, 248 pharmacies in Gabal Awlia locality, 259 pharmacies in Omdurman Locality, 173 pharmacies in Ombadda Locality, 218 pharmacies in Karrari locality, 243 pharmacies in Khartoum North Locality and 222 pharmacies in Eastern Nile locality.

2.4 Study population

This study targeted pharmacists who worked in community pharmacies in Khartoum state.

2.5 Sample size

It was determined using the formula:

$n= z^2pq/d^2$

Where n = minimum sample size, z = 1.96 at 95% confidence interval obtained from standard statistical table of normal distribution, p = estimated percentage of pharmacists that

encourage cough and cold drugs to be dispensed as over-the counter-drugs (obtained from a pilot test and was found to be 0.82), q = precision = (1 – p) ie. percentage of pharmacists that do not encourage the over-the-counter status of pediatric cough and cold drugs, d = margin of error (0.05).

It was found to be 227 participants and 10% of the sample size was added to account for the non-respondents.

2.6 Data collection

A sample of 250 pharmacies was obtained from the 1885 pharmacies of Khartoum state by stratified random sampling according to the following:

[Sampling was performed as the following: 522 pharmacies (27.7% of pharmacies in Khartoum state) are located in Khartoum Locality so 69 pharmacies located in Khartoum locality were included in the sample (27.7% of 250), 243 pharmacies (12.9% of pharmacies in Khartoum state) are located in Jabal Awlia Locality so 32 pharmacies located in Jabal Awlia were included (12.9% of 250), 259 pharmacies (13.7% of pharmacies in Khartoum state) are located in Omdurman locality so 34 pharmacies located in Omdurman locality were included (13.7% of 250), 218 pharmacies (11.6% of pharmacies in Khartoum state) are located in Karrari Locality so 30 pharmacies located in Karrari were included (11.6% of 250), 173 pharmacies (9.2% of pharmacies in Khartoum state) are located in Ombadda Locality so 23 pharmacies located in Ombadda were included (9.2% of 250), 248 pharmacies (13.1% of pharmacies in Khartoum state) are located in Khartoum North Locality so 33 pharmacies in Khartoum North were included (13.1% of 250) and 222 pharmacies (11.8% of total pharmacies in Khartoum state) are located in Eastern Nile locality so 29 pharmacies in Eastern Nile were included in the sample (11.8% of 250).

Simple random sampling was performed. Each pharmacy within each locality was given a number. Then systemic sampling was performed to select the pharmacies within each locality. The random number generator was used to select the pharmacy by which the count for the systemic random sampling will start. The pharmacist working in these pharmacies was interviewed. The pharmacist was given a brief explanation of the purpose of the study and then asked if he want to participate in the study. A pretested questionnaire was given to them.

2.7 Data analysis

Data was analyzed by the Statistical package of social Sciences (SPSS) (version 20). Frequency tables and figures were obtained by Microsoft Excel 2010 to represent the results.

3. RESULTS

The data were obtained from 235 pharmacists who worked in Khartoum state. Demographics of participants were included. Cough and cold medications were categorized into their main classes except the antipyretics which were studied as single drugs. Pharmacists' degree of comfort towards dispensing cough and cold medications and complementary treatments based on effectiveness and safety were reported. Pharmacists' opinions towards some related issues also have been reported. The relationships between years of experience and degree of comfort towards dispensing each drug have been established, R and P values were used to estimate the strength of each relationship and whether it is statistically significant or not. The data were analyzed statistically and interpreted by tables and figures.

3.1: The majority of pharmacists (29.4%) worked in Khartoum locality as shown in figure (3.1).

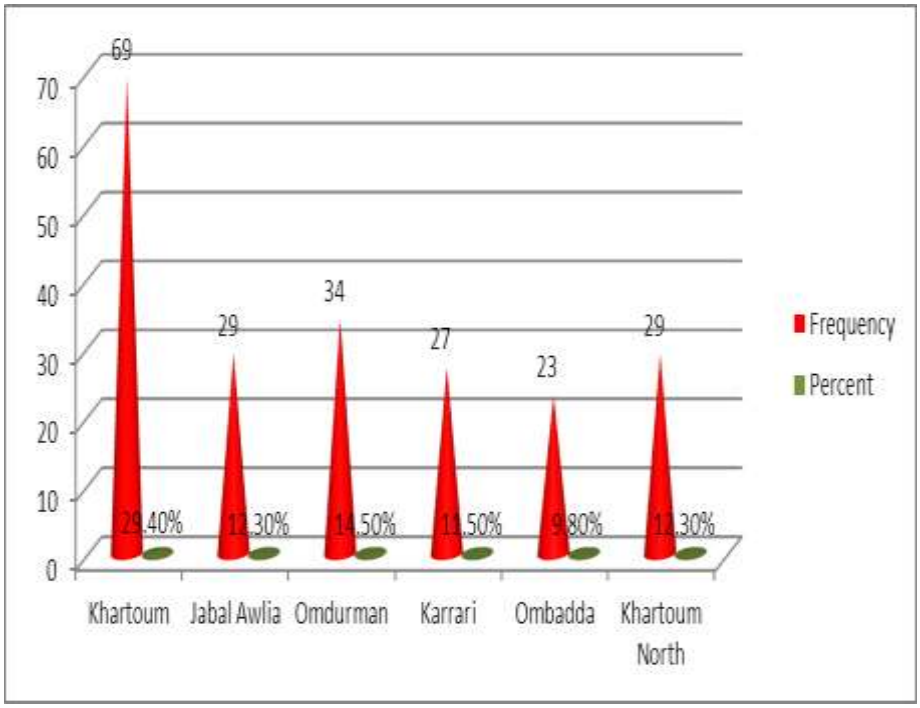

Figure 3.1: Pharmacists' distribution in different localities.

3.2: The main practice site of the pharmacists that participated in this study was community pharmacies (86.8%) as shown in Figure (3.2).

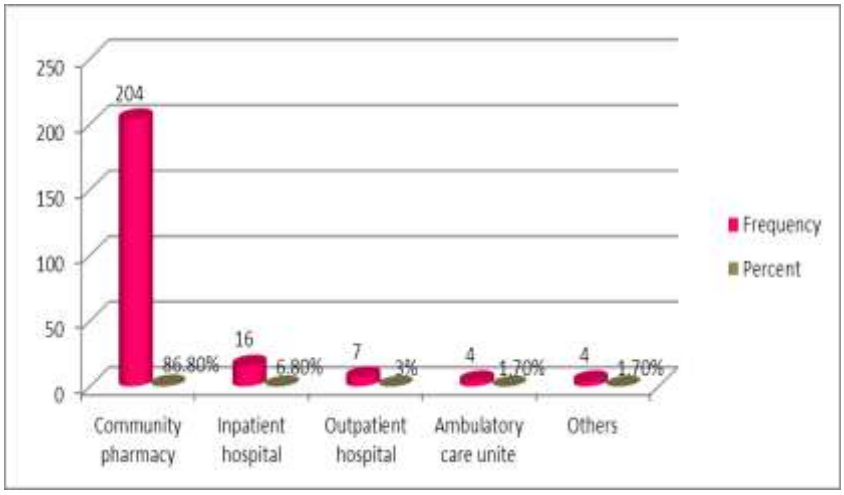

Figure 3.2: Pharmacists' main practice site.

3.3: The majority of pharmacists (57.9%) have practiced pharmacy for 1 to 5 years as shown in Table (3.1).

Table 3.1: Years of experience of the pharmacists.

Years of practice	Frequency	Percent
<1 year	49	20.9
1 to <5 years	136	57.9
5 to <10 years	34	14.5
10 to <20 years	11	4.7
20 years or more	5	2.1
Total	235	100.0

3.4: Most of the pharmacists mentioned that misused overdoses were the main cause of toxicity (90%) by cough and cold drugs as illustrated in Figure (3.3).

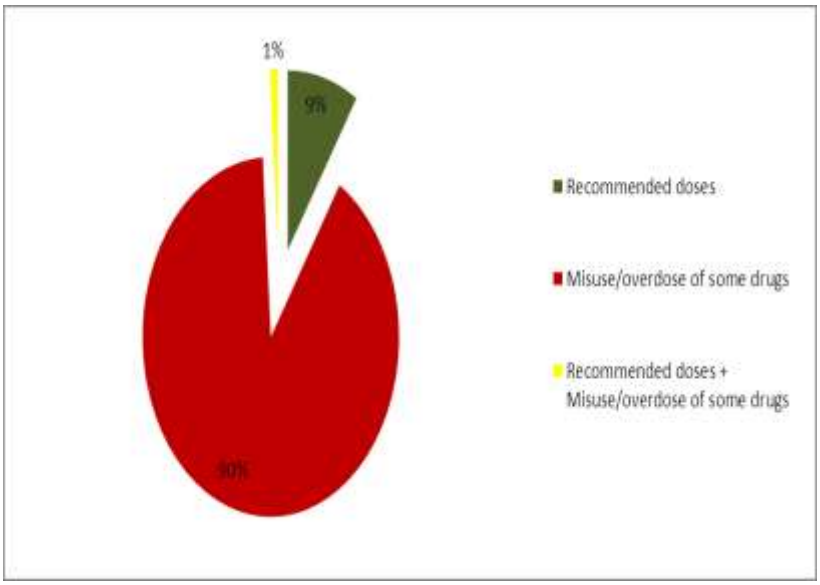

Figure 3.3: Toxicity of cough and cold drugs.

3.5: Pharmacists stated that antitussive drugs were the most misused/over dosed cough and cold drugs (38.5%) as presented in Table (3.2).

Table 3.2: Classes of drugs for misused overdoses.

Class of drugs	Frequency	Percent
Antitussives	89	38.5
Antihistamines	55	23.8
Decongestants	19	8.2
Antipyretics	18	7.8
Others	13	5.6
Antitussives +Antihistamine	3	1.3
Antitussive + Antipyretics	3	1.3
Antitussive + Antihistamine + Decongestants	3	1.3
Antitussives + Decongestants	1	0.4
Antihistamines + Decongestant	1	0.4
Antihistamines + Antipyretics	1	0.4
Decongestants + Others	1	0.4
Antitussives + Antihistamines + Decongestants + Antipyretics	1	0.4
Antitussives + Antihistamines + Antipyretics	1	0.4
None of the above drugs	22	9.5
Total	231	100.0

3.6: The labeling of cough and cold drugs appeared to be a controversial issue among the pharmacists. Most of them (53%) agreed that the existing labeling on pediatric cough and cold products are proper as explained in Figure (3.4).

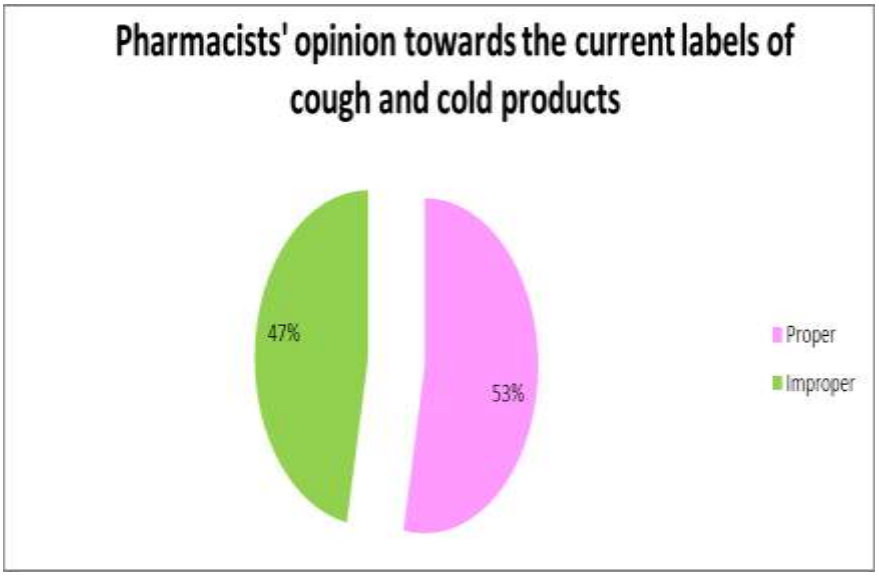

Figure 3.4: Pharmacists' opinion towards the current labels of cough and cold products.

3.7: For children less than two years old, most of the pharmacists felt comfortable towards dispensing decongestants, expectorants, antitussives, antihistamines, ibuprofen and

paracetamol based on effectiveness. The degree of discomfort was the highest regarding dispensing expectorants as shown in table (3.3).

Table 3.3: Pharmacists' opinion on dispensing cough and cold drugs for the age group less than 2 years based on effectiveness.

	percentages of pharmacists' comfort					
	Decongestants	**Expectorants**	**Antitussives**	**Antihistamines**	**Ibuprofen**	**Paracetamol**
Comfortable	46.7%	35.6%	46.1%	68.8%	65.0%	50.9%
Undecided	27.3%	30.6%	31.4%	17.9%	10.3%	21.4%
uncomfortable	25.9%	33.7%	22.5%	13.3%	24.6%	27.7%
Total	100.0	100.0	100.0	100.0	223	100.0

3.8: For children less than 2 years, the majority of pharmacists felt comfortable towards dispensing decongestants, expectorants, antitussives, antihistamines, ibuprofen and paracetamol based on safety. The degree of discomfort was the highest towards dispensing antitussives as illustrated in figure (3.5).

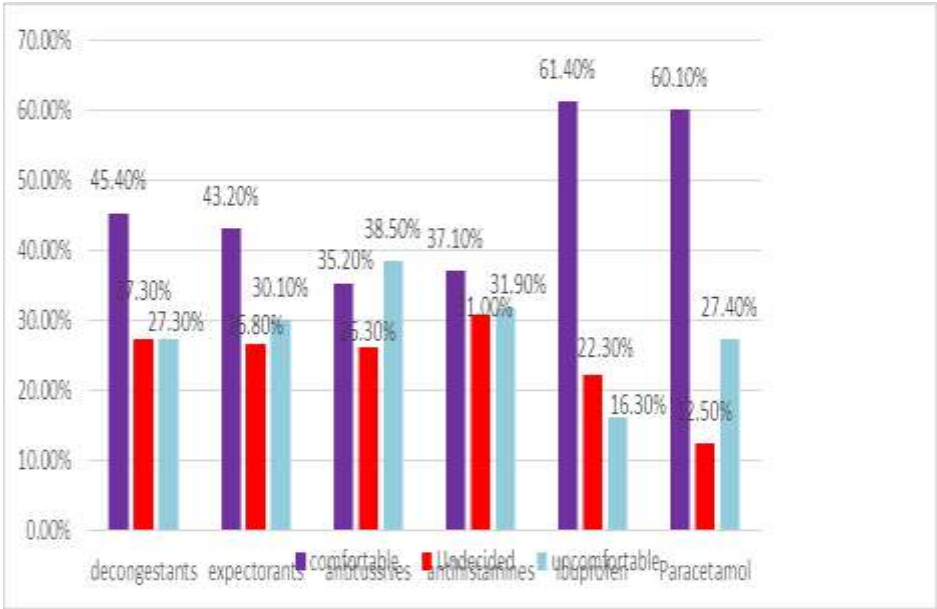

Figure 3.5: Pharmacists' opinion towards dispensing cough and cold drugs for the age group of less than 2 years based on safety.

3.9: Twenty-six percent of the pharmacists felt uncomfortable toward dispensing vitamins for children less than 2 years of age, they assumed lack of effectiveness, safety or enough studies as shown in as shown in Figure (3.6).

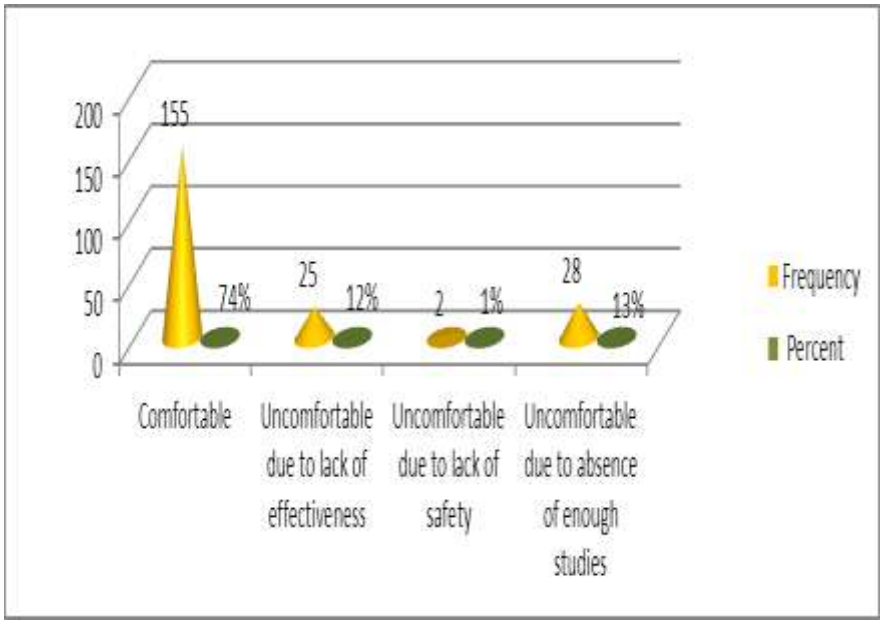

Figure 3.6: Pharmacists' degree of comfort towards dispensing vitamins for pediatrics less than two years old.

3.10: Thirty point two percent of pharmacists felt uncomfortable towards dispensing non-pharmacological remedies for children under 2 years of age as shown Table (3.4).

Table 3.4: Degree of comfort of pharmacists towards dispensing non-pharmacological remedies to pediatrics less than two years old.

Non pharmacological remedies for children <2 years	Frequency	Percent
Comfortable	141	69.8%
Uncomfortable due to lack of effectiveness	18	8.9%
Uncomfortable due to lack of safety	13	6.4%
Uncomfortable due to absence of enough studies	30	14.9%
Total	202	100.0%

3.11: For children 2-5 years old, the majority of pharmacists felt comfortable towards dispensing decongestants, expectorants, antitussives, antihistamines, ibuprofen and paracetamol based on effectiveness. The degree of discomfort was the highest towards dispensing paracetamol.as shown in Figure (3.7).

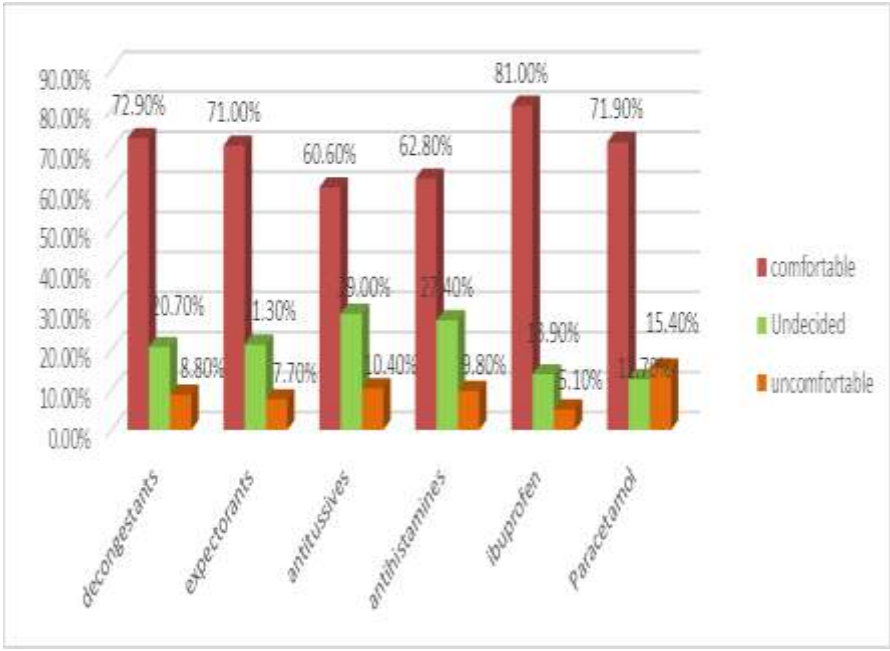

Figure 3.7: Pharmacists' opinion towards dispensing cough and cold drugs for the age group of 2-5 years based on effectiveness.

3.12: For children 2-5 years old, most of the pharmacists felt comfortable about dispensing decongestants, expectorants, antitussives, antihistamines, ibuprofen and paracetamol based on safety. The degree of discomfort was the highest towards dispensing paracetamol as presented in Table (3.5).

Table 3.5: Pharmacists' opinion towards dispensing cough and cold drugs for the age group of 2-5 years based on safety.

	percentages of pharmacists' attitudes					
	Decongestants	**Expectorants**	**Antitussives**	**Antihistamines**	**Ibuprofen**	**Paracetamol**
comfortable	65.9%	64.5%	51.6%	58.0%	73.9%	67.9%
undecided	26.4%	26.4%	32.7%	31.4%	17.0%	15.3%
uncomfortable	7.7%	9.1%	15.7%	10.6%	9.1%	16.7%
Total	100.0	100.0	100.0	100.0	100.0	100.0

3.13: Nineteen percent of pharmacists did not feel comfortable toward dispensing vitamins for children aged 2-5 years, they assumed lack of effectiveness or safety or absence of enough studies as displayed in Figure (3.8).

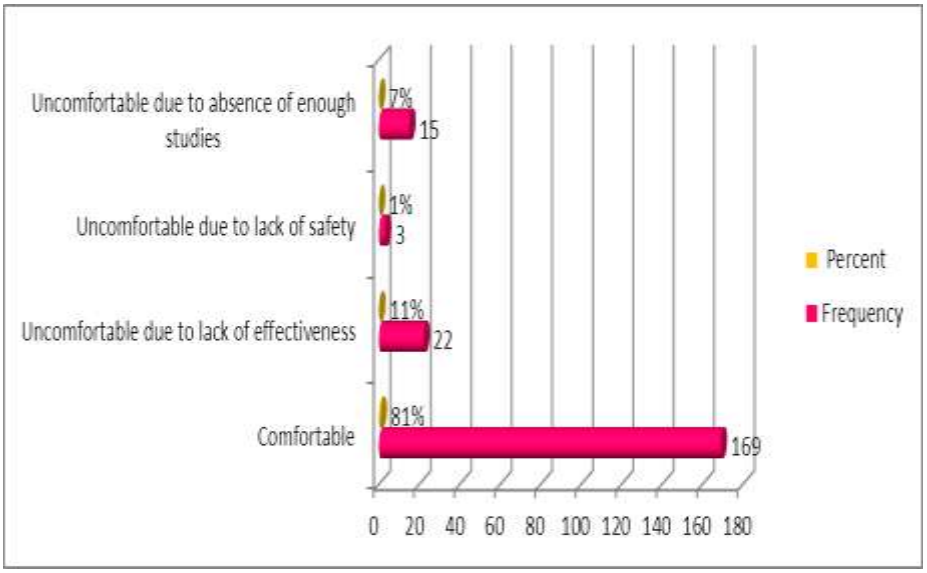

Figure 3.8: pharmacists' degree of comfort about dispensing vitamins for pediatrics 2-5 years old.

3.14: Twenty-six percent of pharmacists felt uncomfortable regarding dispensing non-pharmacological remedies due to lack of effectiveness, safety, or enough studies as illustrated in Figure (3.9).

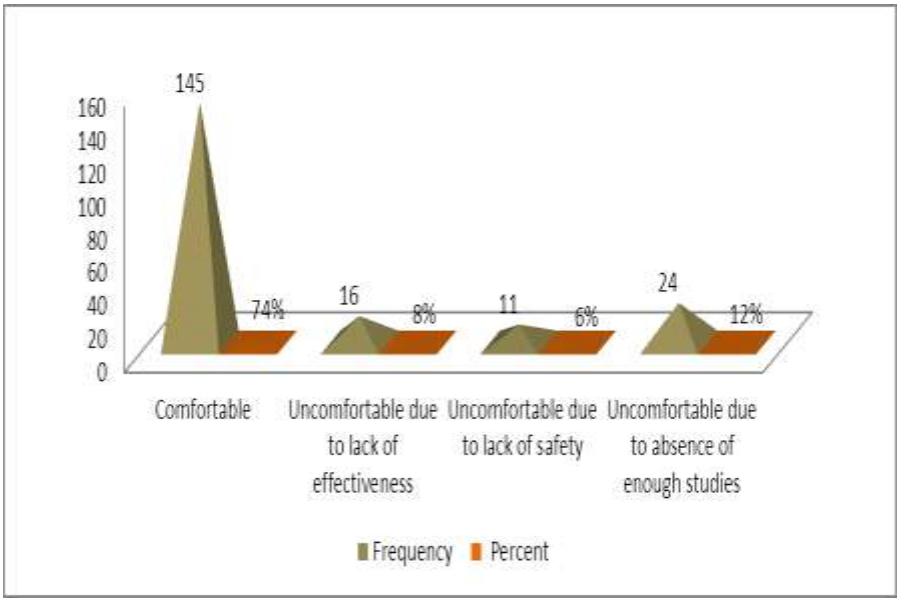

Figure 3.9: pharmacists' degree of comfort towards dispensing non-pharmacological remedies for pediatrics 2-5 years old.

3.15: The majority of pharmacists (53.6%) mentioned that side effects caused by pediatric cough and cold drugs in flu season were reported at least once per week as shown in Table (3.6).

Table 3.6: Reported side effects of pediatric cough and cold drugs in flu season.

Frequency of parents' complaints about side effects	Frequency	Percent
once a week or less	118	53.6
2 to 4 times per week	41	18.6
About 5 times a week, or about once a day	18	8.2
More than once a day	43	19.5
Total	220	100.0

3.16: Thirty-seven percent of pharmacists had discomfort towards dispensing combination products for children as shown in Figure (3.10).

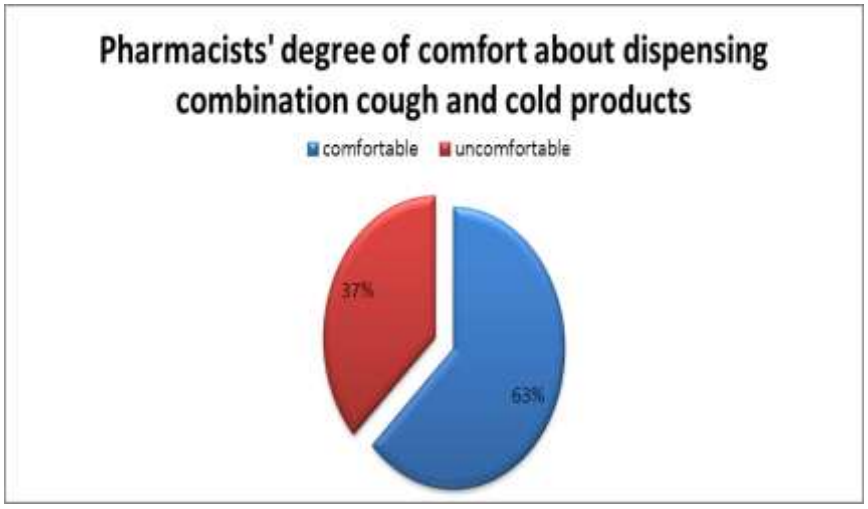

Figure 3.10: Pharmacists' degree of comfort about dispensing combination cough and cold products.

3.17: Seventy-seven percent of pharmacists mentioned that parents insisted to be dispensed pediatric cough and cold medications as shown in figure (3.11).

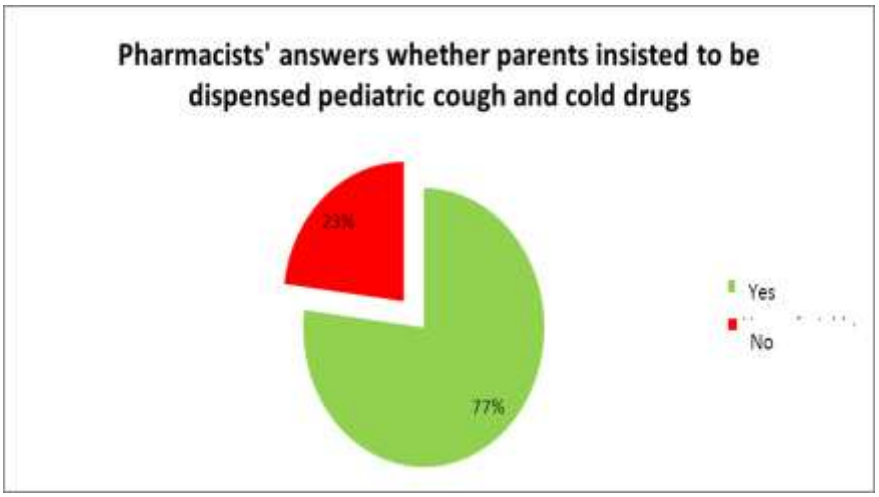

Figure 3.11: Pharmacists' answers whether they feel pressured recommending pediatric cough and cold drugs.

3.18: Hundred percent of the pharmacists who had an experience of 20 years or more felt comfortable about dispensing decongestants based on effectiveness for children <2 years old as shown in Figure (3.12).

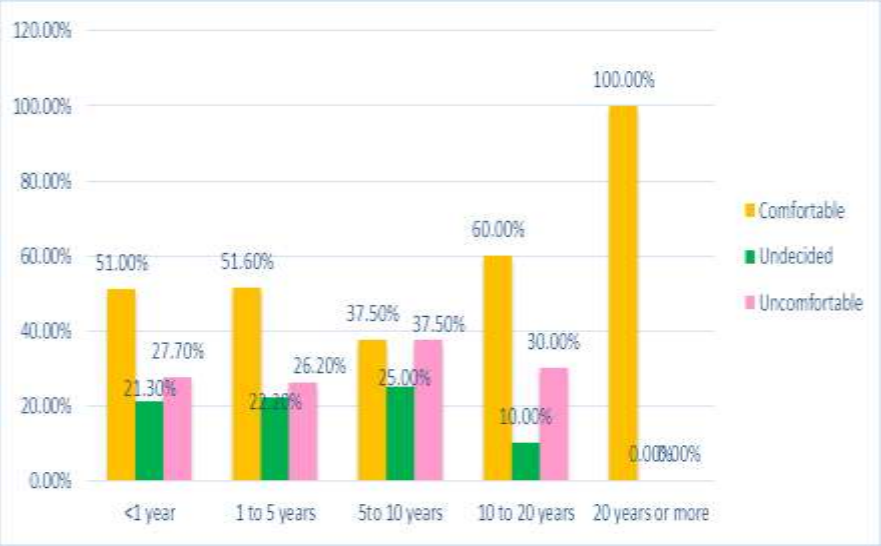

Figure 3.12: The relationship between years of practice and pharmacists' opinion on dispensing decongestants based on effectiveness in children < 2 years (R=0.033) (P=0.627).

3.19: The majority of pharmacists (33.40%) who felt uncomfortable towards dispensing expectorants based on effectiveness for the age group of < 2 years were those with an experience of 5 to 10 years as displayed in Figure (3.13).

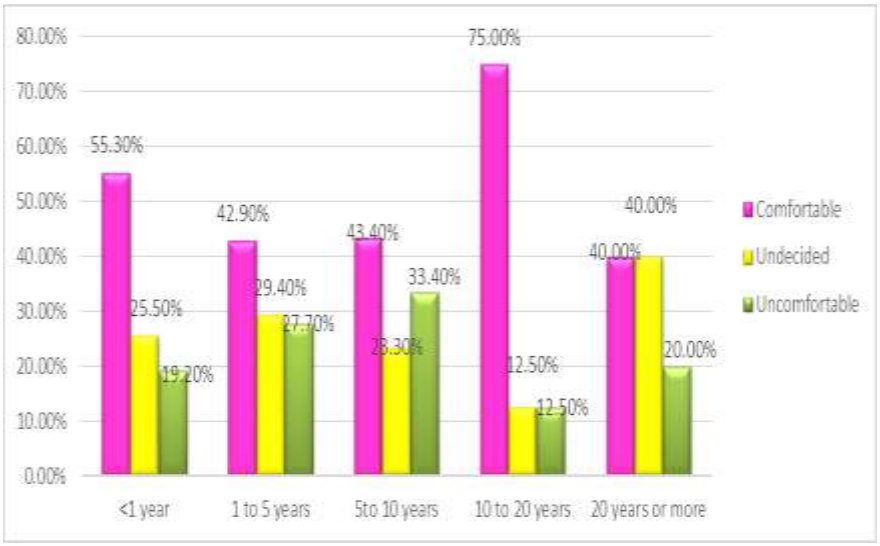

Figure 3.13: The relationship between years of practice and pharmacists' opinion on dispensing expectorants based on effectiveness in children <2years (R=0.051) (P=0.453).

3.20: Pharmacists who had an experience of 10 to 20 years or more showed discomfort the most for dispensing antitussives based on effectiveness for children < 2 years old with a percentage of (50%) as shown in Figure (3.14).

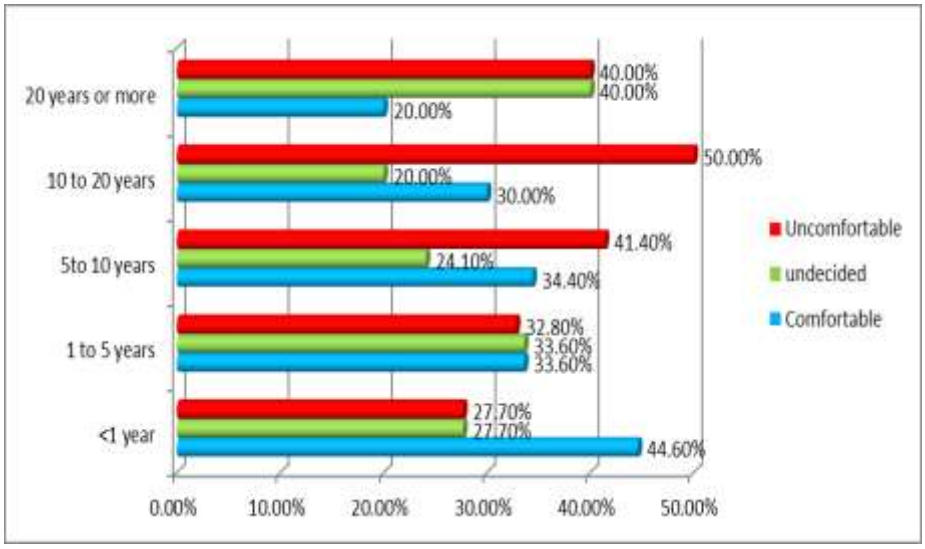

Figure 3.14: The relationship between years of practice and pharmacists' opinion on dispensing antitussives based on effectiveness in children <2 years (R =0.102) (P=0.134).

3.21: All pharmacists who have worked for 20 years or more were comfortable towards dispensing antihistamines based on effectiveness for children < 2 years old as shown in Figure (3.15).

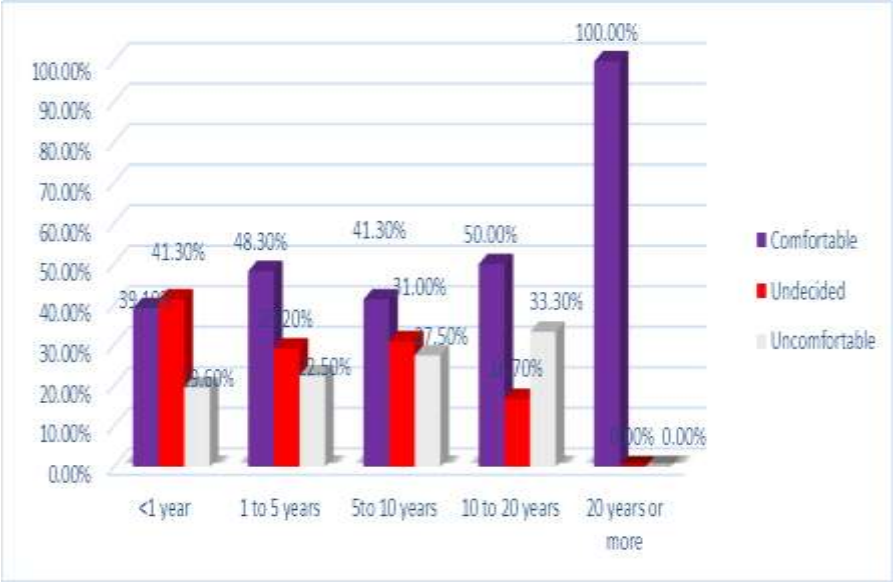

Figure 3.15: The relationship between years of practice and pharmacists' opinion on dispensing antihistamines based on effectiveness in children <2 years (R = 0.013) (P = 0.856).

3.22: All pharmacists with the greatest experience showed comfort towards dispensing ibuprofen based on effectiveness for children <2 years old as shown in Figure (3.16).

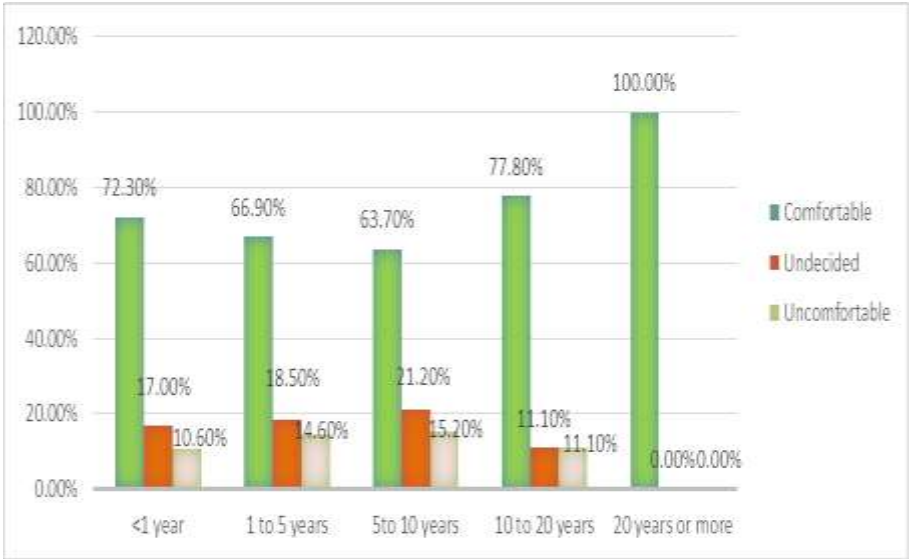

Figure 3.16: The relationship between years of practice and pharmacists' opinion on dispensing ibuprofen based on effectiveness for children <2 years (R=0.056) (P=0.40).

3.23: pharmacists that have worked for 20 years or more were expressed the greatest degree of discomfort (40%) regarding dispensing paracetamol based on effectiveness as displayed in Figure (3.17).

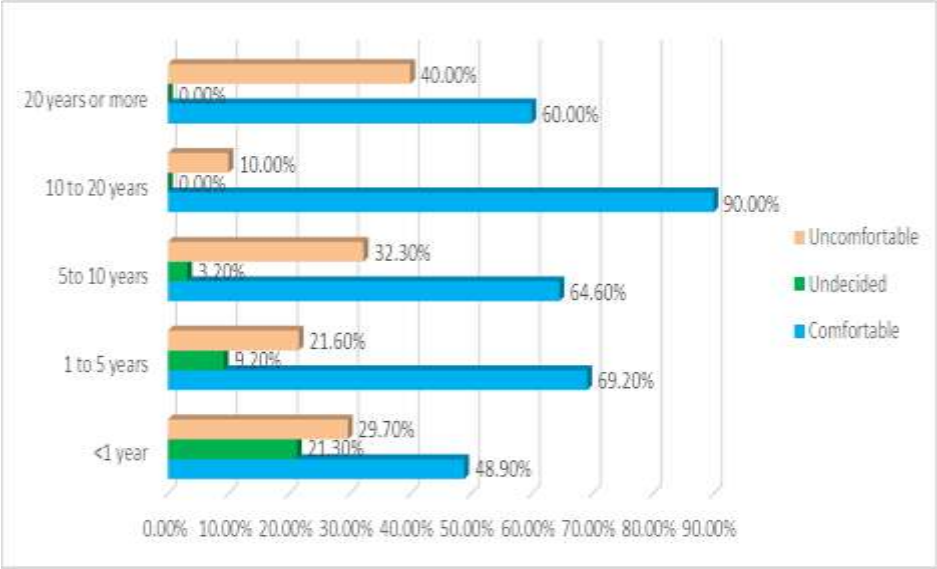

Figure 3.17: The relationship between years of practice and pharmacists' opinion on dispensing paracetamol based on effectiveness for children <2 years (R=0.060) (P=0.372).

3.24: Pharmacists who had an experience of 10 to 20 years expressed the greatest degree of comfort towards dispensing decongestants based on safety for children < 2 years old with a percentage of (70%) as shown in Figure (3.18).

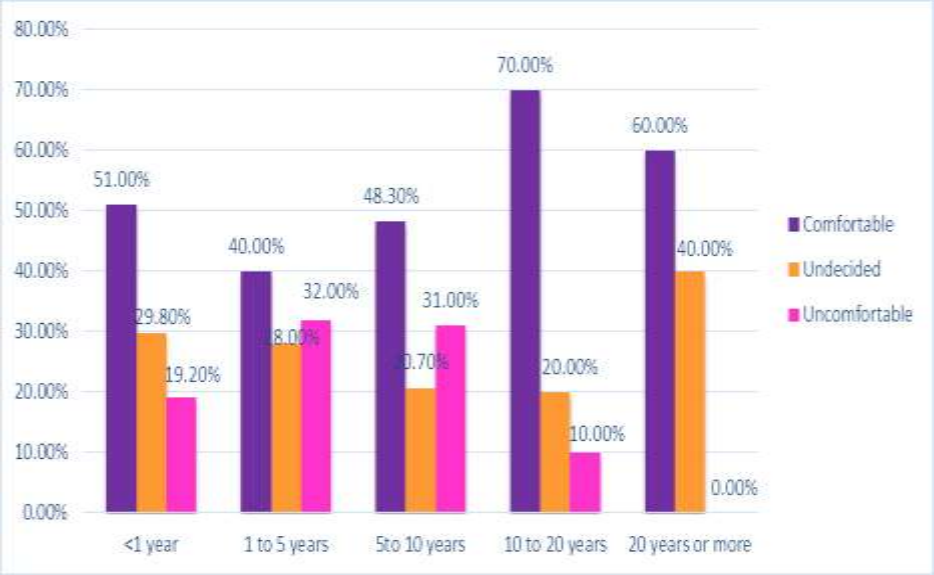

Figure 3.18: The relationship between years of practice and pharmacists' opinion on dispensing decongestants based on safety in children <2 years (R=0.004) (P =0.959).

3.25: The majority of pharmacists who were uncomfortable towards dispensing expectorants based on safety for children < 2 years old were those who have worked for 1 to 5 years and achieved a percentage of (37.9%) as shown in Figure (3.19).

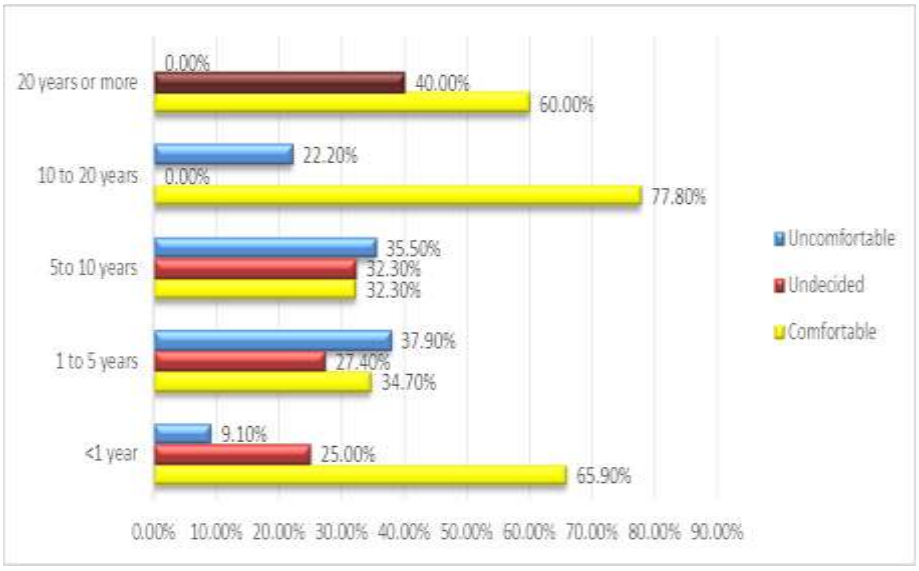

Figure 3.19: The relationship between years of practice and pharmacists' opinion on dispensing expectorants based on safety in children <2 years (R=0.142) (P=0.038).

3.26: Sixty percent of pharmacists who had an experience of twenty years or more showed discomfort towards dispensing antitussives based on safety for children < 2 years old as shown in Figure (3.20).

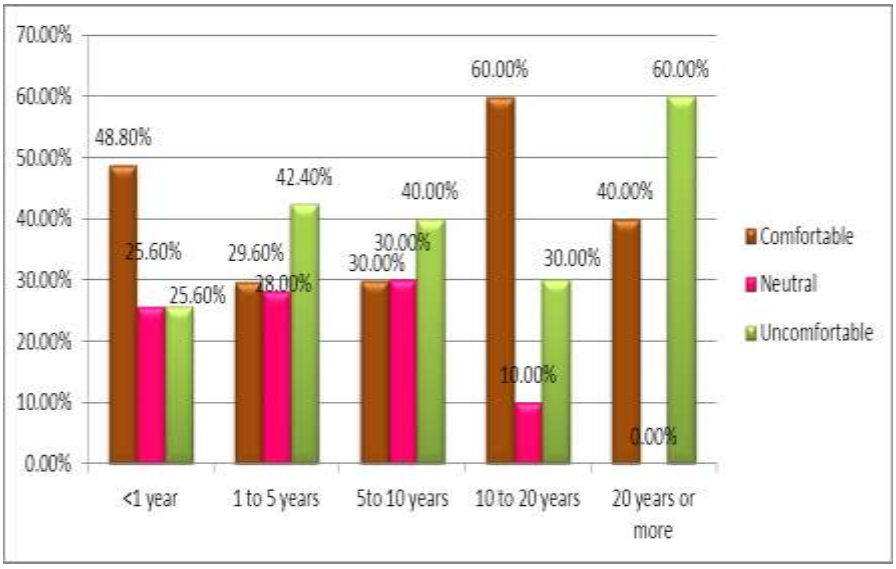

Figure 3.20: The relationship between years of practice and pharmacists' opinion on dispensing antitussives based on safety for children <2 Years (R = 0.081) (P=0.239).

3.27: Pharmacists with the greatest experience were comfortable towards dispensing antihistamines based on safety for children <2 years old with a percentage of (60%) as shown in Figure (3.27).

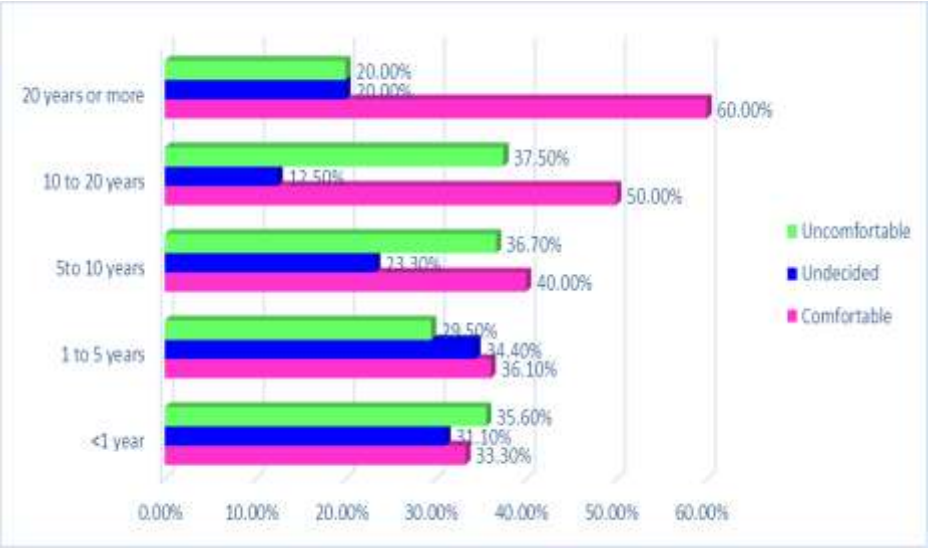

Figure 3.21: The relationship between years of practice and pharmacists' opinion on dispensing antihistamines based on safety in Children <2 years (R = 0.031) (P =0.653).

3.28: Most of the pharmacists who expressed comfort towards dispensing ibuprofen based on safety for children <2 years old have worked for 10 to 20 years and achieved a percentage of (63.6%) as illustrated in Figure (3.22).

Figure 3.22: The relationship between years of practice and pharmacists' opinion on dispensing ibuprofen based on safety in children <2 years (R = 0.023) (P = 0.739).

3.29: Hundred percent of pharmacists who have worked for10 to 20 years showed comfort towards dispensing paracetamol based on safety for children <2 years old as illustrated in Figure (3.23).

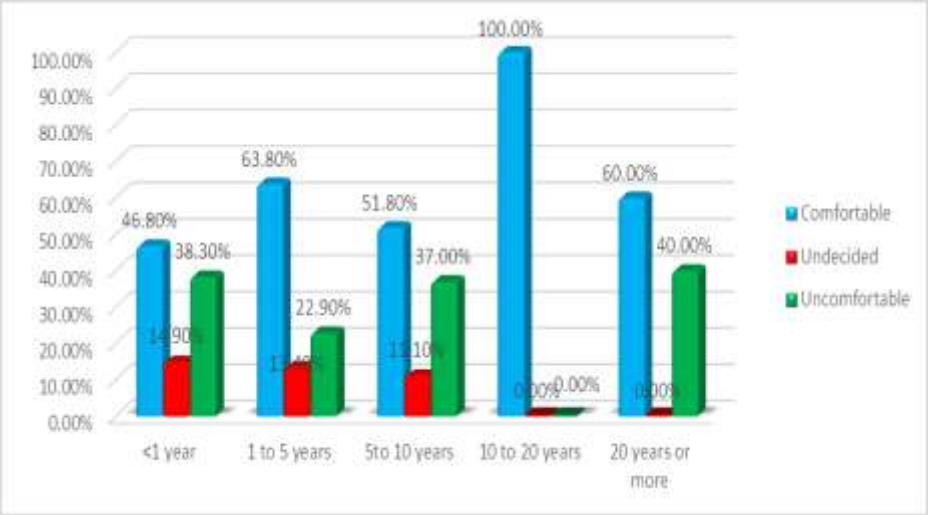

Figure 3.23: The relationship between years of practice and pharmacists' opinion on dispensing paracetamol based on safety for children <2 years. (R=0.062) (P=0.368).

3.30: All pharmacists who had an experience of 20 years or more were comfortable towards dispensing decongestants based on effectiveness for children 2-5 years of age as shown in Figure (3.24).

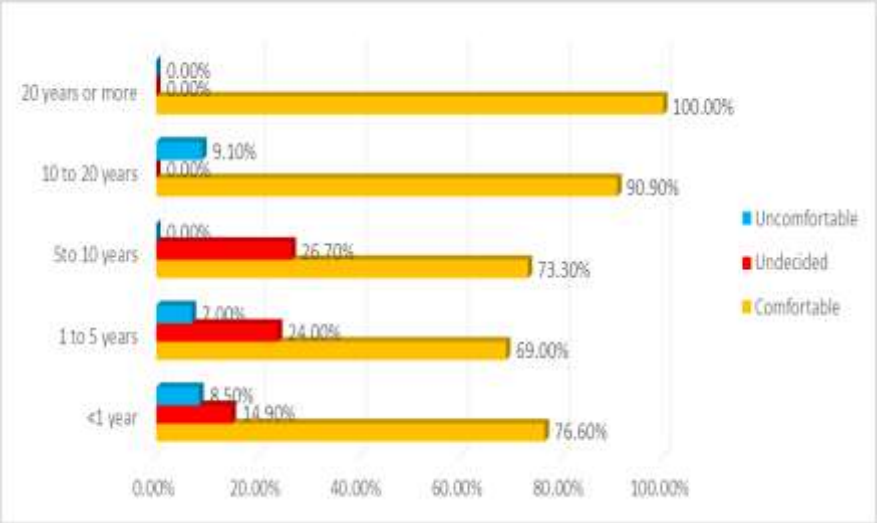

Figure 3.24: The relationship between years of practice and pharmacists' opinion on dispensing decongestants based on effectiveness for children 2-5 years old (R=0.038) (P=0.572).

3.31: Most of the pharmacists who have worked for less than one year were comfortable regarding dispensing expectorants based on effectiveness for children 2-5 years old and achieved a percentage of (87.0%) as shown in Figure (3.25).

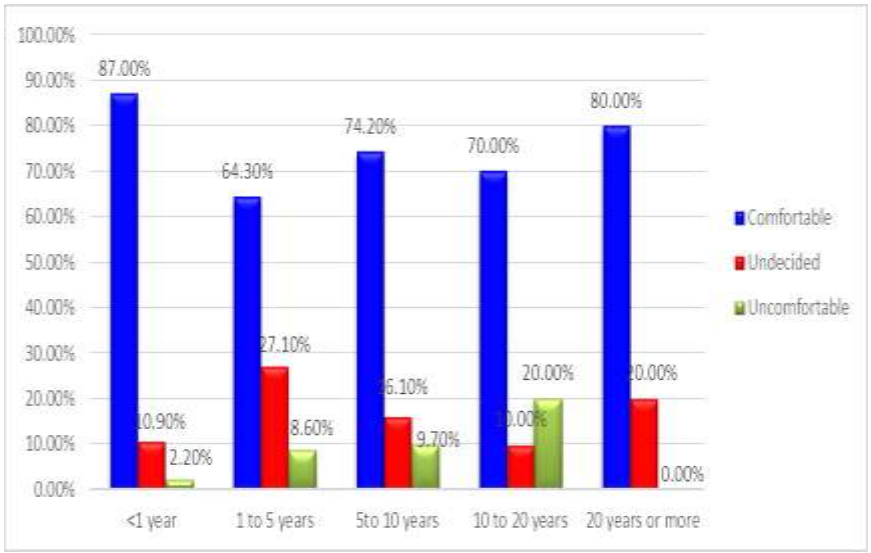

Figure 3.25: The relationship between years of practice and pharmacists' opinion on dispensing expectorants based on effectiveness for children 2-5 years old (R=0.120) (P=0.076).

3.32: Pharmacists with an experience of less than one year were the most comfortable towards dispensing antitussives based on effectiveness for children aged from 2 to 5 years old as shown in Figure (3.26).

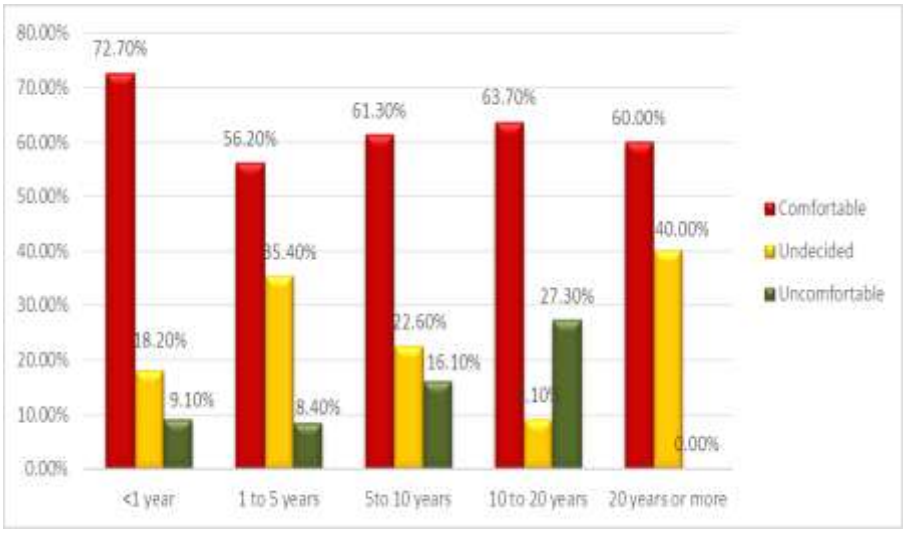

Figure 3.26: The relationship between years of practice and pharmacists' opinion on dispensing antitussives based on effectiveness for children aged 2- 5 years. (R=0.081) (P=0.229).

3.33: Pharmacists who have worked for twenty years or more were the most uncomfortable towards dispensing antihistamines based on effectiveness with a percentage of (40%) as displayed in Figure (3.27).

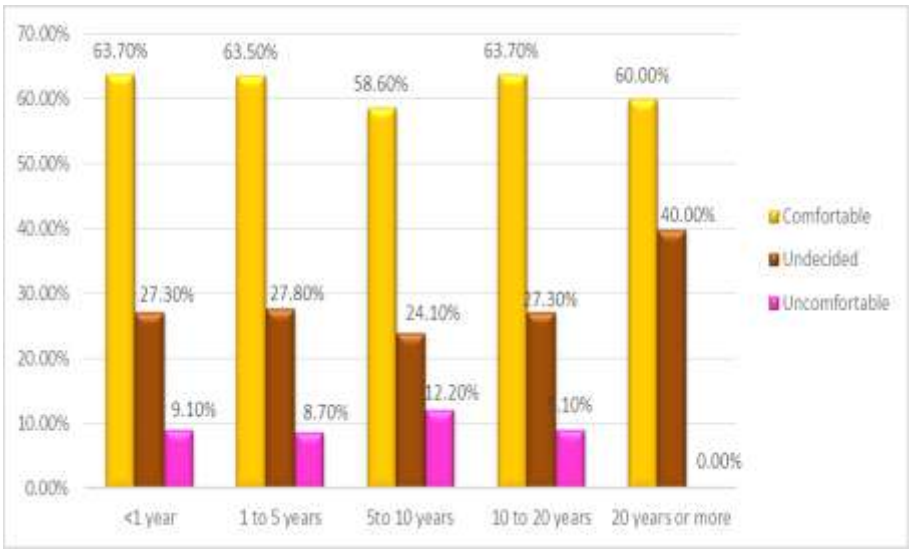

Figure 3.27: The relationship between years of practice and pharmacists' opinion on dispensing antihistamines based on effectiveness for children aged 2-5 years old. (R=0.030) (P=0.695).

3.34: All Pharmacists who have practiced pharmacy for more than 20 years expressed comfort about dispensing ibuprofen based on effectiveness for children 2-5 years old as shown in Figure (3.28).

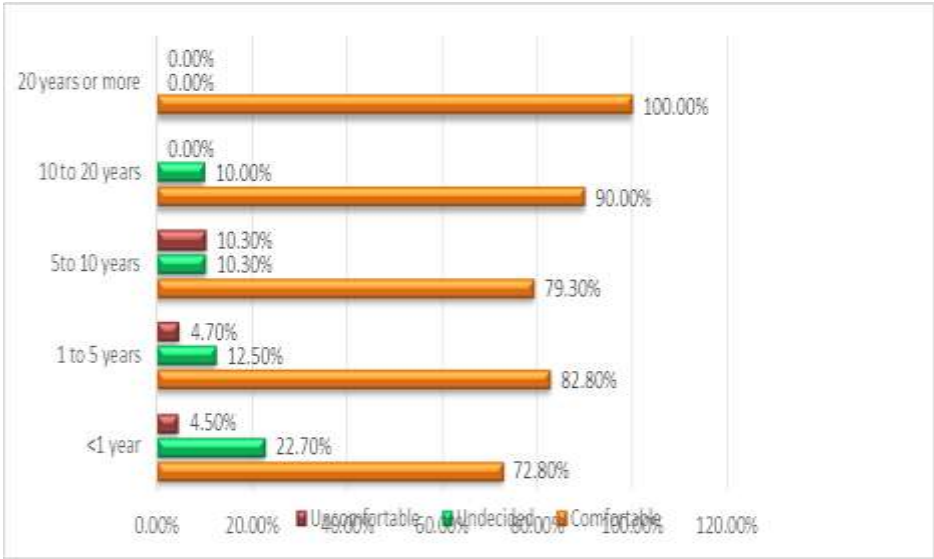

Figure 3.28: The relationship between years of practice and pharmacists' opinion on dispensing ibuprofen based on effectiveness for children 2-5 years old (R=0.047) (P=0.493).

3.35: The majority of pharmacists (90.6%) who have worked for 10 to 20 years showed comfort towards dispensing paracetamol based on effectiveness for children 2-5 years old as illustrated in Figure (3.29).

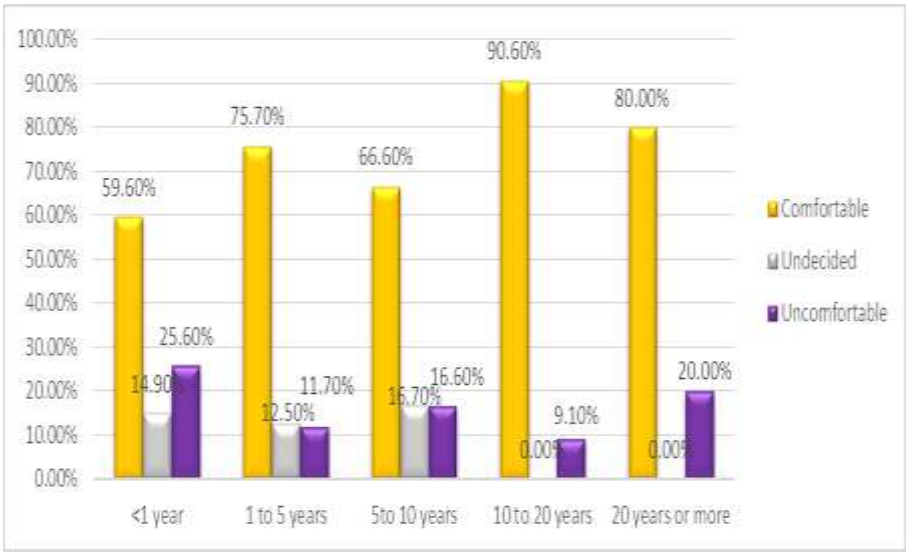

Figure 3.29: The relationship between years of practice and pharmacists' opinion on dispensing paracetamol based on effectiveness for children aged 2-5 years (R=0.068) (P=0.317).

3.36: All Pharmacists who have worked for 20 years or more were comfortable towards dispensing decongestants based on safety for children 2-5 years old as shown in Figure (3.30).

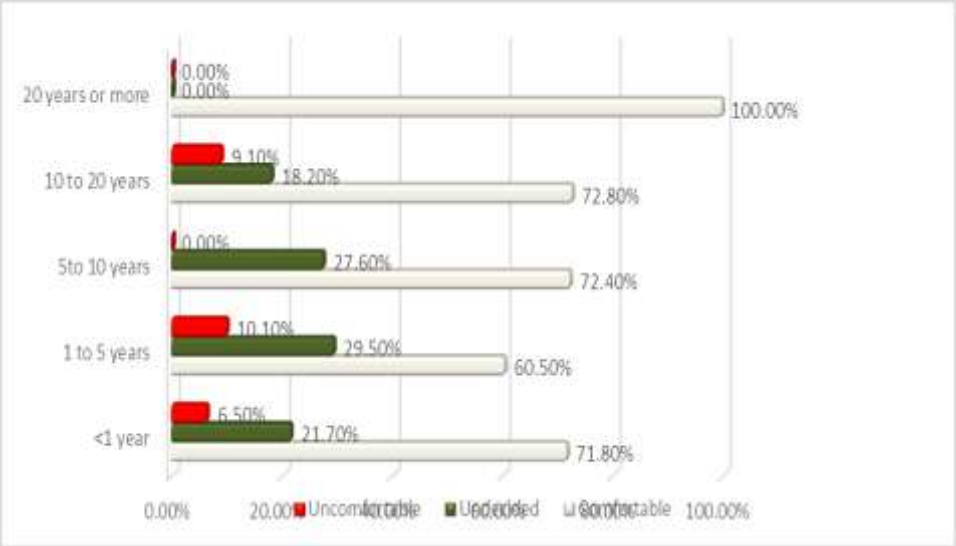

Figure 3.30: The relationship between years of practice and pharmacists' opinion on dispensing decongestants based on safety for children 2-5 years (R=0.015) (P=0.825).

3.37: Eighty percent of pharmacists who have worked for 20 years or more were comfortable towards dispensing expectorants for children 2-5 years old based on safety as displayed in Figure (3.31).

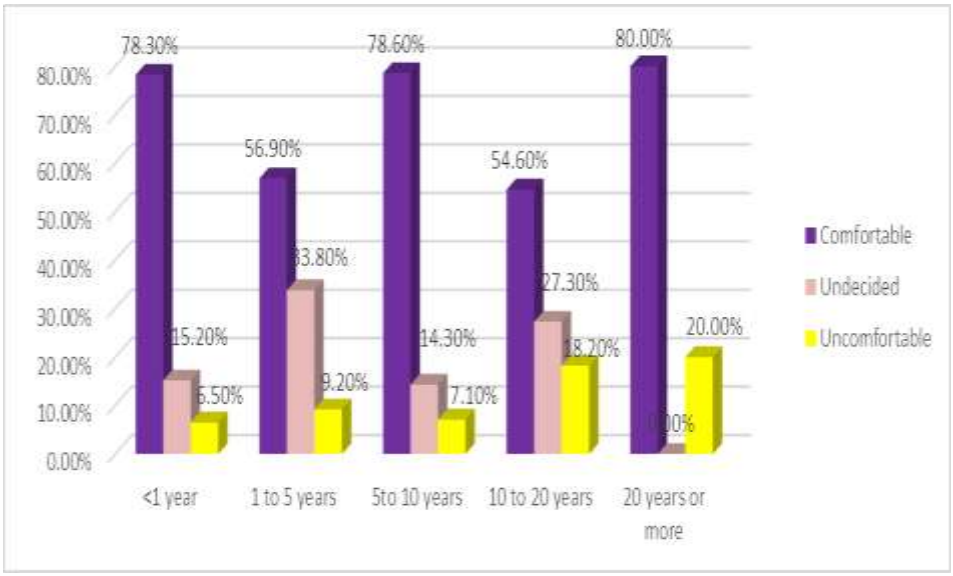

Figure 3.31: The relationship between years of practice and pharmacists' opinion on dispensing expectorants based on safety for children aged 2-5 years. (R=0.065) (P=0.335).

3.38: Pharmacists who had an experience for 20 years or more expressed the greatest comfort towards dispensing antitussives based on safety for children aged 2-5 years with a percentage of (80%) as illustrated in Figure (3.32).

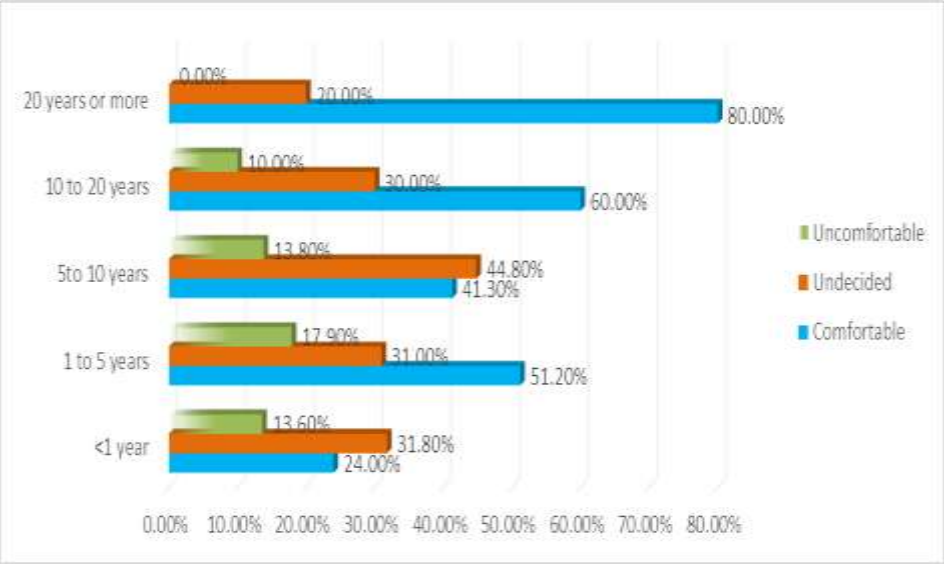

Figure 3.32: The relationship between years of practice and pharmacists' opinion on dispensing antitussives based on safety in children 2- 5 years (R=0.026) (P =0.708).

3.39: Seventy-five percent of pharmacists who have worked for 20 years or more expressed comfort towards dispensing antihistamines based on safety for children 2-5 years old as illustrated in Figure (3.33).

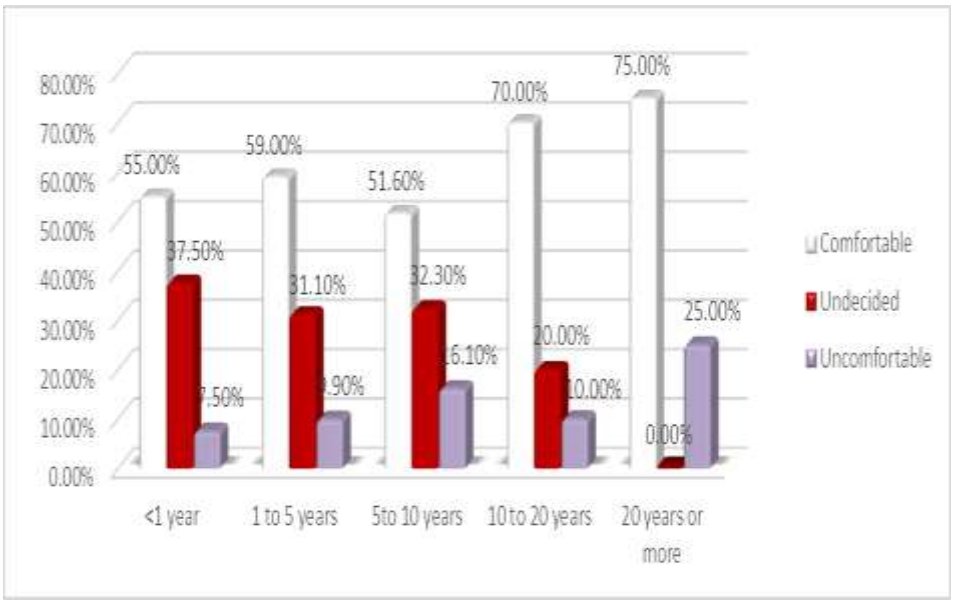

Figure 3.33: The relationship between years of practice and pharmacists' opinion on dispensing antihistamines based on safety for children 2-5 years (R=0.017) (P=0.804).

3.40: Most of the pharmacists who conveyed comfort towards dispensing ibuprofen based on safety for children 2-5 years old had an experience of 10 to 20 years as shown in Figure (3.34).

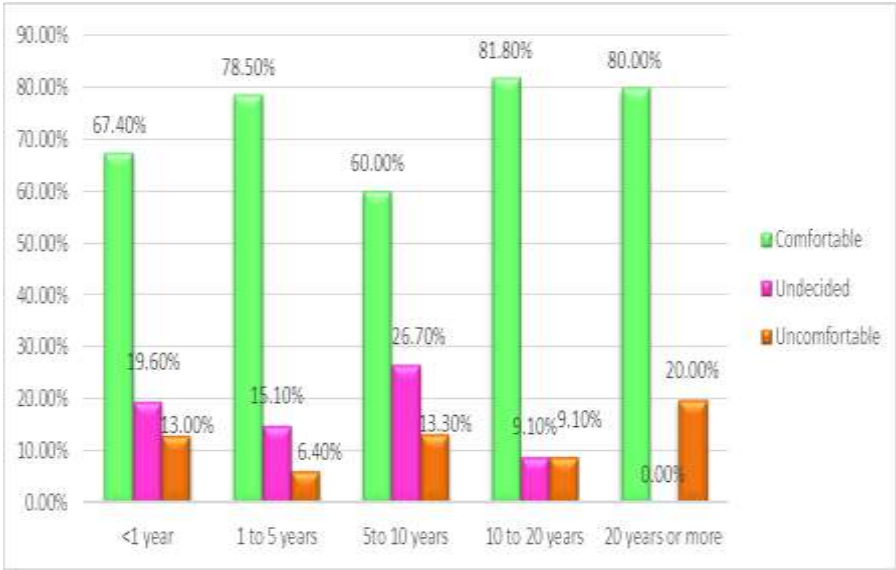

Figure 3.34: The relationship between years of practice and pharmacists' opinion on dispensing ibuprofen based on safety for children aged 2-5 years (R=0.049) (P =0.468).

3.41: Pharmacists who had an experience of 10 to 20 years expressed comfort towards dispensing paracetamol based on safety for children 2-5 years old with a percentage of (90%) as displayed in Figure (3.35).

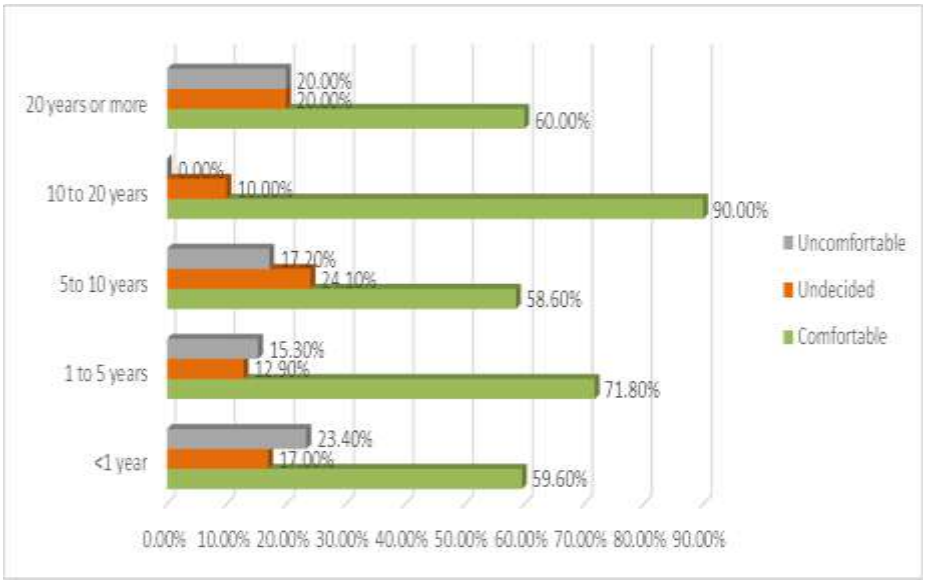

Figure 3.35: The relationship between years of practice and pharmacists' opinion on dispensing paracetamol based on safety for children aged 2-5 years (R=0.040) (P=0.560).

4.1 DISCUSSION

Labeling of cough and cold drugs had been a debated issue among pharmacists. However (47%) of the pharmacists found the current labels are improper. The majority of the pharmacists (90.0%) stated that toxicity of cough and cold drugs occurs at misuse and overdoses. This finding is consistent with the findings of (Huston et al., 2010).[33] This may be due to failure of the patient or caregiver to clearly read the dosing and instructions of the medication. Another author found that caregivers were influenced by the dosing directions only in 47% of the cases.[31] Labelling should be improved to minimize misinterpretation of these products and so as to minimize the hazard of overdoses of cough and cold drugs. Pediatrics are already at higher risk for adverse events of cough and cold drug, as the pediatric doses were extrapolated from adult doses and have not yet being calculated accurately. Therefore, dosing directions have to be very strict and easily understood by all people at different educational levels.

The majority of the pharmacists felt comfortable towards dispensing decongestants, expectorants, antitussives, antihistamines, ibuprofen and paracetamol for children less than two years old and those of two to five years of age based on knowledge of effectiveness and on safety. This result is consistent with the findings of (Chandelia et al., 2015).[25] However, it was inconsistent with that of (Verncchio et al., 2008).[22]

Based on drugs safety, pharmacists' degree of discomfort was the highest towards dispensing antitussives for children of less than two years old. (33.7%) Based on knowledge concerning OTC effectiveness, pharmacists felt uncomfortable the most towards dispensing expectorants (30.10%) for the same age group. For children two to five years old, dispensing paracetamol attained the highest degree of discomfort based on knowledge concerning OTC effectiveness and on knowledge concerning OTC safety with percentages of (15.4%) and (16.7%) respectively. Anyway, there were no guidelines suggesting which cough and cold medication is to be preferred in a particular age.

The majority of pharmacists felt comfortable towards dispensing vitamins and recommending non-pharmacological remedies such as steam and vapour, nasal saline and psychotherapy for paediatric cough and cold. Some authors mentioned that the effectiveness of psychotherapy has not been proved.[34]

Only twenty-six percent of pharmacists felt uncomfortable towards dispensing vitamins for children less than two years of age while (19%) felt uncomfortable towards dispensing vitamins for children two to five years old. The majority of pharmacists were willing to dispense vitamins to all age groups. This is in consistent of the finding of a study in Jordan which showed that most of the Jordanian pharmacists thought that eating healthy diet is more valuable than administering vitamins for all age groups.[35] Thirty point two percent of pharmacists felt uncomfortable towards dispensing non-pharmacological remedies for those below two years old. On the other hand, (26%) of pharmacists felt uncomfortable towards dispensing non-pharmacological remedies for children two to five years of age. This sounds good since those of less than two years old are more likely to be affected by overdoses and the non-pharmacological remedies contain active ingredients but with doses that could not be precisely determined. However, mentioned that Cochrane reviews did not support the use of complementary medicines such as Echinacea, vitamin C and zinc in treatment of cough and cold.[36]

The majority of pharmacists (53.6%) mentioned that side effects caused by pediatric cough and cold drugs were reported at least once per week. Cough and cold drugs have many side effects. The most serious are allergic reactions, but it is of rare occurence. First generation antihistamines are very sedating. (Bariars, 2007) mentioned the deaths of three infants related to the use of cough and cold drugs in 2007, the three infants had high concentrations of pseudoephedrine postmortem.[28]

The majority of pharmacists (63%) felt uncomfortable towards dispensing combination products for pediatric population. This finding is consistent with (Reis & Figueras, 2010).[37] This looks reasonable as multi-ingredient products increase the risk of drug interactions as well as the cost. Many parents that self-medicate their children give their child concurrently different brands for the same drugs and some of them use these products to sedate their child or to make him sleepy. This behavior leads to overdoses and so increases the risk of side effects. Also some drugs should not be used together, as they have additive effect. Combinations of cough and cold products represented the majority (64.2%) of the dispensed cough and cold drugs per week.[22] Seventy-seven percent of pharmacists mentioned that parents insisted to be dispensed pediatric cough and cold medications. It looked as they self-diagnose their children despite their modest knowledge. (Eldalo et al., 2013) found that in (95.7%) of cases parents self-medicate their children.[12]

There were linear proportional relationships of various strengths between years of experience and pharmacists' attitudes. For children less than two years old and based on effectiveness, all pharmacists who had an experience of twenty years or more felt comfortable towards dispensing decongestants (R=0.033) (P = 0.627), antihistamines (R = 0.013) (P = 0.856) and ibuprofen (R=0.056) (P=0.40). The relationship between dispensing each of these drugs and years of experience was very weak and statistically insignificant. Nasal decongestant, second-generation antihistamines and the analgesic ibuprofen are widely used among infants and from very long time, so pharmacists with long experience mostly believe on their efficacy in relieving some symptoms. Most of the pharmacists who felt uncomfortable towards dispensing expectorants (R=0.051) (P=0.453) based on effectiveness for children below two years old had five to ten years of experience with a percentage of (33.4%). The relationship was very week and statistically insignificant. (Pappas & Hendley, 2011) stated the lack of effectiveness of this drug for children aged eighteen months to twelve years.[38] Pharmacists with the greatest degree of discomfort towards dispensing antitussives (R= 0.102) (P =0.134) based on effectiveness for the same age group where those who have practiced pharmacy for ten to twenty years or more with a percentage of (50%). The efficacy of antitussive in pediatric is lacking. American academy of pediatrics declared in a study that was carried on 1997 the lack of efficacy. Until now, their efficacy has not been approved. Anyway, the relationship was weak and statistically insignificant. For the same age group and also based on effectiveness, pharmacists with an experience of twenty years or more expressed the greatest degree of discomfort (40%) regarding dispensing paracetamol (R=0.060) (P=0.372). Most of the problems of paracetamol is related to its excretion through the liver and immaturity of liver enzymes, the effectiveness has not been an obsession. The relationship was very weak and statistically insignificant.

For children aged less than two years, based on safety, the majority of pharmacists (70.0%) with an experience of 10 to 20 years expressed comfort towards dispensing decongestants This relationship was extremely weak (R = 0.004) and statistically insignificant (P =0.959) . However, Sime (2007) mentioned that over 50% of serious adverse effects associated with pseudoephedrine use occur in children under two years of age.[39] Pharmacists with an equal experience that showed discomfort towards dispensing expectorants attained a percentage of (37.9%). The relationship was statistically significant (P=0.038) but weak as (R=0.142). For the same age group and based on safety, regarding antihistamines pharmacists who have worked for twenty years or more showed comfort towards dispensing them and this was

statistically insignificant as (P=0.653) and was very weak (R = 0.031). (Shimojo, 2012) mentioned that no H1antihistamine is officially approved for use in infants, but recommended that some new second-generation H1 antihistamines must be approved for use in young children.[40] Pharmacists who have worked for 10 to 20 years conveyed comfort towards dispensing ibuprofen (63.6%), as well as dispensing paracetamol (100.0%). These relationships were not statistically significant and both were very weak as (R =0.023) (P = 0.739) and (R = 0.062) (P=0.368) respectively based on safety for children less than two years old. Sixty percent of pharmacists with an experience of twenty years or more were uncomfortable towards dispensing antitussives for children aged less than two years based on safety (R = 0.081) (P=0.239). This relationship also was very weak and was not statistically significant. FDA (2007) said that ibuprofen, paracetamol and antitussives should not be used for children less than two years old.

For children aged two to five years, based on effectiveness, all pharmacists who had an experience of twenty years and more were comfortable towards dispensing decongestants (R =0.038) (P=0.572). The relationship was weak in strength and statistically insignificant. (Taverner & Latte, 2007) in a Cochrane review denied the proven efficacy of nasal decongestants for children.[41] For the same age group and based on effectiveness, a week relationship established between short experience of less than one year and degree of comfort towards dispensing antitussives as (72.7%) of the pharmacists with less than one year experience were comfortable towards dispensing antitussives (R=0.081) (P=0.229). Most pharmacists with same short experience (87.0%) expressed comfort regarding dispensing expectorants (R=0.120) (P=0.076). (Isbister et al., 2010) said that there were little studies that supported the effectiveness of the antitussive dextromethorphan and denoted the lack of efficacy of expectorants in treatment of acute cough for any age group.[42] Pharmacists who have worked for twenty years or more showed discomfort towards dispensing antihistamines (R=0.030) (P=0.695) based on effectiveness for children aged two to five years. This finding is consistent with those of (Cuvillo et al., 2007).[43] These previous relationships were not statistically significant. The results regarding dispensing antihistamines and antitussives are inconsistent with the findings of (Smith et al., 2013) study where they mentioned that both products were not more effective than placebo.[44] The American College of Chest Physicians also claimed their lack of effectiveness and denied their recommending for this age group. For children aged two to five years old pharmacists who have practiced pharmacy for more than twenty years showed comfort towards dispensing ibuprofen and pharmacists who have

worked for 10 to 20 years showed comfort towards dispensing paracetamol with a percentage of (90.6%). (WHO, 2011) mentioned a number of studies that were conducted to compare the efficacy of paracetamol and ibuprofen in children.[45] Eleven studies showed no significant efficacy but in 6 studies Ibuprofen was superior. These findings are consistent with the Canadian Pediatric Society as it stated its support regarding recommending both of them. However, these relationships were not statistically significant and were weak as (R = 0.047) (P=0.493) and (R =0.068) (P=0.317) respectively. (FDA, 2007) reviewed safety and efficacy of these medications, and stated that they should not be used for children between two and six years old.[27]

The majority of pharmacists (90.0%) who have worked for 10 to 20 years showed comfort regarding dispensing paracetamol for children two to five years of age based on safety. This result is consistent with the findings of (Pierce & Voss, 2010) study which concerned the efficacy and safety of paracetamol.[46] This relationship was very week (R=0.068) and statistically insignificant (P=0.317). For the same age group and based on safety, all pharmacists who have worked for 20 years or more were comfortable towards dispensing decongestants. However, it was very weak (R=0.015) and statistically insignificant (P= 0.825) relationship. Although many countries believe on the safety of the decongestant pseudoephedrine when taken as directed, in many of them it sold prescription only because many combine pseudoephedrine with other products to make methamphetamine “meth” an illegal powerful stimulant. Those with an experience of 20 years and above expressed the greatest comfort towards dispensing antitussives based on safety (R = 0.026) (P=0.708) with a percentage of (80%). This result is inconsistent with the findings of the study of (Goldman et al. 2011).[14] The relationship was statistically significant but was very week. (80%) of pharmacists who have worked for twenty years or more were comfortable towards dispensing expectorants, this was neither strong relationship nor statistically significant as (R=0.065) (P =0.335). The result opposes those of (Rubin, 2007) study.[47] Regarding dispensing ibuprofen (R = 0.049) (P=0.468) for children two to five years old based on safety, (81.8%) of pharmacists who have worked for 10 to 20 years were comfortable. Although it was statistically insignificant and was a weak relationship, it appears to be consistent with (Pierce & Voss, 2010).[46] Most of the pharmacists (75%) with an experience of 20 years and above expressed comfort towards dispensing antihistamines (R=0.017) (P = 0.804) for children two to five years old and based on safety. However it is inconsistent with what (FDA, 2007) mentioned about this class of drugs.[27] The relationship was very week and statistically

insignificant. (Sime, 2007) concluded that serious adverse effects associated with cough and cold medications occur in children below six years old.[39]

5.1 CONCLUSION

Pharmacists' expressed various degrees of discomfort towards pediatric cough and cold medications and complementary treatments. The degree of discomfort had been found to vary according to pediatric age and pharmacist's year of experience. Their discomfort in addition to their attitude among issues of labeling, toxicities, patient dispensing and combination products supported the need to move pediatric cough and cold drugs to prescription only category and revealed the poor knowledge of pharmacists about the topic

5.2 Recommendations

5.2.1. We recommend that cough and cold medications should be categorized as prescription only category especially for children below two years of age so as to minimize occurrence of adverse events.

5.2.2. Parents should be well informed about the proper use of pediatric cough and cold medications and avoid using those designed for adults.

5.2.3. The labels should be improved to provide all the necessary information in a simple and clear way.

5.2.4. To check accurately label instructions to ensure whether the written doses on the boxes of pediatric cough and cold medications are similar to those written in leaflets.

5.2.5. Ministry of Health should hold conferences, regular educational workshops and annual exams to increase awareness of workers in medical field about pediatrics cough and cold medications.

5.2.6. Pharmacists' knowledge about complementary treatments should be targeted to increase their consciousness about their role and clinical significance in various situations.

5.2.7. Improving pharmacist's communication skills allows him/her to convey more information to parents, patients and partners in medical field which greatly improves health care.

5.2.8. Patient's counseling is a very important issue that should be targeted and detailed for all workers in medical field especially community pharmacists.

5.2.9. Further studies should be carried on to assess the safety and efficacy of using pediatric cough and cold medications.

ACKNOWLEDGEMENT

We are grateful to Dr. Safaa Yahia

(The Head of the department of Clinical pharmacy, OIU) & We would like to thank all of the members of the department of clinical pharmacy, OIU.

We are much obliged to community pharmacists who kindly participated in the study.

REFERENCES

1. Taylor K & Harding G.Pharmacy practice. Taylor & Francis e-Library. London and New York., 2001.
2. Etefa W, Teshale C & Hawaze S. Assessment of dispensing practice in south west Ethiopia: the case of Jimma university specialized hospital. International Journal of Pharmacy., 2013; 3(4): 668-669.
3. Ali GK & Omer AM. Pharmaceuticals in Sudan: development in regulations, governance and implementation of national drug policies. African Journal of Pharmacy and Pharmacology., 2012; 6(1): 6.
4. Schommer JC, Planas LG, Johnson KA, Doucette WR, Gaither CA, Kreling DH & Mott DA. Pharmacist contributions to the U. S. health care system. Innovations in Pharmacy., 2010; 1(1): 1.
5. Hussain A & Ibrahim MI. Perceptions of dispensers regarding dispensing practices in Pakistan: a qualitative study. Tropical Journal of Pharmaceutical Research., 2011; 10(2): 118.
6. Ali AN, Kai JT, Keat CC & Dhanaraj. SA Self-medication practices among health care professionals in a private university , Malaysia. International Current Pharmaceutical Journal., 2012; 1(10): 302.
7. Parikh D, Sattigeri BM, Kumar A & Brahmbhatt S. Survey study on use of over the counter OTC drugs among medical students, nursing and clerical staff of a tertiary care teaching rural hospital. International Journal of Research in Medical Sciences., 2013; 1(2): 83-84.
8. Reetesh, M, Papiya B, & Sonam J. Study of self medication among the people of Bhopal region Madhya Pradesh, India. Intentional Research Journal of Pharmacy., 2011; 2(12): 163,164.
9. Gutema GB, Gadisa DA, Kidanemariam ZA, Berhe DF, Berhe AH, Hadera MG, Hailu GS, Abrha NG, Yarlagadda R & Dagne AW. Self-medication practices among health

sciences students: the case of Mekelle University. Journal of Applied Pharmaceutical Science., 2011; 1(10): 184.

10. Gomathisankar K & Selvarasu A. Self-medication and over-the-counter medicine usage among the university students in Chidambaram. International Journal of Scientific Research., 2014; 3(1): 20.
11. Osemene KP & Lamikanra A. Study of the prevalence of self-medication practice among university students in southwestern Nigeria. Tropical Journal of Pharmaceutical Research., 2012; 11(4): 684.
12. Eldalo AS, El-hadiyah TM & Yousif MA. Sudanese parents. knowledge, attitudes and practice about self-medication to their children. Saudi Journal for Health Sciences., 2013; 2(2): 103.
13. Eckel N, Sarganas G, Wolf IK & Knopf H. Pharmacoepidemiology of common colds and upper respiratory tract infections in children and adolescents in Germany. Canadian Family Physician., 2010; 56(12): 1.
14. Goldman RD. Treating cough and cold: guidance for caregivers of children and youth. Paediatr Child Health, 16(9): 564,565.
15. Sen EF, Verhamme MC, Felisi M, Jong GW, Giaquinto C, Gicelli G, Ceci A & Sturkenboom MC. Effects of safety warnings on prescription rates of cough and cold medicines in children below 2 years of age. British Journal of Clinical Pharmacology., 2011; 71(6): 944,947.
16. Cohen HA, Rozan J, Kristal H, Laks Y, Berkovitch M, Uziel Y, Kozer E, Pomeranz A & Efrat H. Effect of honey on nocturnal cough and sleep quality: a double-blind, randomized, placebo-controlled study. Pediatrics., 2012; 130(3): 466.
17. Garbutt JM, Sterkel R, Banister C, Wallbert C & Strunk RC. Physician and parent response to the FDA advisory about use of over-the-counter cough and cold medications. Academic Pediatrics., 2010; 10(1): 2.
18. Yin HS, Mendelsohn AL, Wolf MS, Parker RM, Fierman A, Schaick LV, Bazan IS, Klinc MD & Dreyer BP. Parents' medication administration errors. Arch Pediatr Adolesc Med., 2010; 164(2): 181.
19. Tomlin S & Kirk E. Paediatric formulary. king's college and universiity Lewisham hospitals, Guy's & St Thomas NHS Froundation Trust, London., 2012.
20. Fashner J, Ericson K & Werner S. Treatment of the common cold in children and adults. American family physicians., 2012; 86(2): 154.

21. Shefrin AE & Goldman RD. Use of over-the-counter cough and cold medications in children. Canadian Family Physician., 2009; 55(11): 1081–1082.
22. Vernacchio L, Kelly JP, Kaufman DW & Mitchell AA. Cough and cold medications use by US children, 1999-2006: results from the slone survey. Pediatrics., 2008; 122(2): 323, 328.
23. Hampton LM, Nguyen DB, Edwards JR & Budnitz DS.Cough and cold medication adverse events after market withdrawal and labeling revision. Pediatrics., 2013; 132(6): 1048.
24. Rahman NA, Sivasampu S & Teng CL. Cough and cold Medication in children : a public health concern. Med J Malaysia., 2014; 69(5): 219.
25. Chandelia S, Dhankar M & Salhan M. Pediatrician's cough and cold medication prescription for hypothetical cases – a cross-sectional multi-centric study. Saudi Pharmaceutical Journal., 2015; pp. 2.
26. Shehab N, Schaefer MK, Kegler SR & Budnitz DS. Adverse events from cough and cold medications after a market withdrawal of products labeled for infants. Pediatrics., 2010; 126(6): 1101.
27. FDA. Octobeer 18 and 19, 2007 NDAC meeting regarding cough and cold product use in children. FDA., 2007.
28. Briars LA. The latest update on over-the-counter cough and cold product use in children. Pediatr Pharmacol Ther., 2009; 14(3): 129.
29. Buck ML. Impact of pediatric labeling changes on cough and cold products. Pediatric Pharmacotherapy., 2014; 20(11): 1024,1025.
30. Bronstein AC, Spyker DA, Cantilena LR, Rumack BH & Dart RC. 2011 annual report of the american association of poison control centers. National Poison Data System (NPDS)., 2012; 45(8): 933–934.
31. Lokker N, Sanders L, Perrin EM, Kumar D, Finkle J, Franco V, Choi L, Johnston PE & Rothman RL. Parental misinterpretations of over-the-counter pediatric cough and cold medication labels. Pediatrics., 2009; 123(6): 1470.
32. Budnitz DS, Lovegrove MC & Rose KO. Adherence to label and device recommendations for over-the-counter pediatric liquid medications. Pediatrics., 2014; 133(2): 284,286.
33. Huston SA, Porter KB, Clements T and Shepherd G. Pharmacists' attitudes towards pediatric cough and cold product and behind the counter status. J Pediatr Pharmacol Ther., 2010; 15(2): 128.

34. Sung V & Cranswick N. Cough and cold remedies for children. Australian prescriber., 2009; 32(5): 123.
35. Shilbayeh SA. Exploring knowledge and attitudes towards counseling about vitamin supplements in Jordanian community pharmacies. Pharmacy Practice., 2011; 9(4): 242.
36. Simasek M & Blandino DA. Treatment of the common cold. American family physician., 2007; 75(4): 518.
37. Reis AM & Figueras A. Analysis of the evidence of efficacy and safety of over-the-counter cough medications registered in Brazil. Brazilian Journal of Pharmaceutical Sciences., 2011; 46(1): 140.
38. Pappas DE & Hendley JO. The common cold and decongestant therapy. Pediatrics in Review., 2011; 32(2): 51.
39. Sime S. The safety and efficacy of cough and cold medicines for use in children. Medsafe., 2007.
40. Shimojo N. Safety of antihistamines in children: need for approval of new second-generation antihistamines for young children in Japan. Clinical & Experimental Allergy Reviews., 2012; 12: 27, 29.
41. Taverner D & Latte J. Nasal decongestants for the common cold. Cochrane Database system., 2007.
42. Isbister GK, Prior F, Kilham HA. Restricting cough and cold medicines in children. Journal of Paediatrics and Child Health., 2010; 48(2012): 92, 94.
43. Cuvillo AD, Sastre J, Montoro J, Jauregui I, Ferrer M, Davila I, Bartra J, Mullol J & Valero A. Use of antihistamines in pediatrics. J Investing Allergol Clin Immunol., 2007; 17(2): 33,34.
44. Smith SS, Schroeder K & Fahey T. Over-the-counter medications for acute cough in children and adults in ambulatory settings. Cochrane Database of Systematic Reviews. In the Chochrane Library., 2013; (4).
45. WHO. Use of ibuprofen in children, focusing on comparative analgesic and antipyretic efficacy and safety. WHO., 2011.
46. Pierce CA & Voss B. Efficacy and safety of ibuprofen and acetaminophen in children and adults: a meta-analysis and qualitative review. Ann Pharmacother., 2010; 44(3): 489.
47. Rubin BK. Mucolytics, expectorants, and mucokinetic medications. Respiratory Care., 2007; 52(7): 860.