How extended is the knowledge regarding illegal substances and addictive drugs among pharmacists in Sweden?

A survey conducted for qualified pharmacists with different work experience.

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Abstract:

Introduction: Illegal substance and addictive drug abuse are worldwide problems and to overcome this issue a lot of resources are necessary. Pharmacists are healthcare professionals belonging to the healthcare system and are available to the public to provide help and advice. By using their knowledge to identify complications Pharmacists, like any other health professional, can play an active role in the prevention, treatment and solution of the problem.

Aim: The aim of this study was to explore what knowledge Swedish pharmacists have concerning illegal substances and addictive drug abuse. To find out as professional healthcare providers if they can play an active role in the multidisciplinary team and contribute to society and assist patients with illegal substance abuse problems? The specific questions that the study aims to answer are: How do the pharmacists rate their knowledge and education concerning illegal substance and addictive drug abuse? How the pharmacists obtain their knowledge of Illegal substances? Is their knowledge gained from university studies or from other sources? Do the pharmacists’ knowledge concerning illegal substance and addictive drug abuse correspond with their length of service after graduation? Has the amount of teaching concerning illegal substance and addictive drug abuse during their studies at the three mentioned universities (Uppsala, Gothenburg, and Umeå) affected their knowledge?

Methods: An electronic survey called “Google Forms” was sent to 200 pharmacists to the three largest cities in Sweden (Stockholm, Gothenburg, and Malmö). Out of these, 79 pharmacists responded which gave a response rate of 39%.

Results: The results show that the respondents had acceptable knowledge (as they predicted by themselves) about Illegal substances and the survey revealed that the knowledge gained was obtained from their university education. The number of years as a pharmacist did not correspond to an increase in their understanding. The vast majority admitted that the work environment did not benefit them in improving their knowledge. To maintain their competency they read journals and relevant literature such as “Läkemedelsboken”. The three universities (Uppsala, Gothenburg, and Umeå) in Sweden that offer pharmacy as a degree differed in their curriculums and the approach how the subject was taught. The University of Uppsala has two modules that focus on acute poisoning and clinical toxicology together with the additional modules that covered illegal drug/drug dependency, which was included in the optional modules in semester eight while Gothenburg University concentrated their teaching in this subject to one module.

The result (60%) of the multiple choice test in the questionnaires did not differ between the universities with the exception that Uppsala graduates performed better and their scores were higher.

Conclusion: According to this study, the pharmacists rated their knowledge as being good and according to the questionnaire they showed a good basic knowledge concerning this subject. They obtained their knowledge mainly from university studies and maintained their competency by reading from different internet sources such as Fass and Läkemedelsboken.

The length of service in the pharmacies did not affect their knowledge. The number of modules which offered by different Universities did affect the result slightly. The two optional modules that Uppsala University offered could have resulted in some student to achieve a better score. There were only a few participants from University of Umeå due to the fact that the pharmacy degree was recently (2012) introduced in the University’s program. This made it difficult to conclude them in the result. The study showed that the pharmacists have an interest in this particular subject. Furthermore, given the opportunity, the pharmacists would want to be involved in patient care and be able to contribute with their professional competency to society. A large responsibility lies with the pharmacies and their management to keep their staff competent and updated through different channels such as conference, seminars, and guest lectures by professionals’ etc. to update staff with the new development in this field.

Keywords: Pharmacists, knowledge, illegal drugs, questioner and pharmacy services.
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1. Introduction

Addiction and substance abuse is a major health issue nowadays, which is affecting a large portion of society. Unfortunately, the younger generation is the biggest victims of this problem. Substance abuse has destructive effects on both physical and mental health, as well as ruining the victims’ personal, social, and family life that can also include criminal offences, which are known to be a consequence of this problem.

Treating and tackling addiction is a complex process with the involvement of multi professionals such as doctors, nurses, and therapists in specially designed addiction and rehabilitation centres (1). Pharmacists have a duty to control prescribed narcotics by doctors and report any unnecessary prescription or over prescription to the Health and Social care Inspectorate (IVO) (2). Pharmacists are also the most accessible health care professional for the public (3). In order for pharmacists to play a therapeutic role in the above process and to be an active member of the multidisciplinary team, they have to be well aware and knowledgeable about the nature of these problems. They have to have a good professional knowledge in order to play an active role in society by diagnosing, preventing, and treating drug abuse and addiction (4).

1.1 Background

According to the Tenth Revision of the International Classification of Diseases and Health Problems (ICD-10). “Drug dependence is a cluster of physiological, behavioural, and cognitive phenomena in which the use of a substance or a class of substances takes on a much higher priority for a given individual than other behaviours that once had greater value. A central descriptive characteristic of the dependence syndrome is the desire (often strong, sometimes overpowering) to take psychoactive drugs (which may or may not have been medically prescribed), alcohol, or tobacco” (5). The loss of control and compulsion to use drugs despite knowing the consequences is another way to describe drug addiction (3).

The World Drug Report is an annual global report, which is based on the production, trafficking and consumption of illegal drugs. It’s estimated that in 2013, 1 out of 20 between the ages 15-64 has used illegal drugs worldwide in 2013 (6).

However, in Sweden according to a survey in 2014, in order to identify “narcotic addiction” based on the definition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5), indicated that 0.6 percent of the population aged 17-84 has shown a sign of substance addiction (7).

There are many different types of substances/drugs that can be addictive and harmful. Some are categorized as prescribed drugs that can be sold illegally and abused (7). The most prescribed drug that is abused in Sweden according to police reports from 21 counties in Sweden is Xanor, which contains the active substance Alprazolam. This drug belongs to benzodiazepine which belongs to the group depressant (8), (Table 1). In order to describe the effects of these psychoactive drugs, they are divided into three major groups (9), (Table 2).
Table 1. Prescribed addictive drugs that are reported to police and that are abused in 2012. From “Läkemedel i missbruksmiljöer” CAN rapport 138 (8).

<table>
<thead>
<tr>
<th>Prescribed substance</th>
<th>drug/active</th>
<th>Reports Cases</th>
<th>Indication for use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xanor/Alprazolam</td>
<td>10</td>
<td>Panic disorders, Anxiety Disorders</td>
<td></td>
</tr>
<tr>
<td>Subutex/Buprenorphine</td>
<td>7</td>
<td>Treating opioid dependence. It should be used as part narcotic dependence treatment</td>
<td></td>
</tr>
<tr>
<td>Alprazolam/Alprazolam</td>
<td>6</td>
<td>Tranquilizers / anxiolytics</td>
<td></td>
</tr>
<tr>
<td>Tradolan/Tramadol</td>
<td>3</td>
<td>Analgesics/analgesic</td>
<td></td>
</tr>
<tr>
<td>Tramadol/Tramadol</td>
<td>3</td>
<td>Analgesics/analgesic</td>
<td></td>
</tr>
<tr>
<td>Iktrovil/Clonazepam</td>
<td>2</td>
<td>Muscle relaxants/antiepileptic</td>
<td></td>
</tr>
<tr>
<td>Dolcontin/Morphine</td>
<td>1</td>
<td>Analgesics/analgesic</td>
<td></td>
</tr>
<tr>
<td>Flunitrazepam /Flunitrazepam</td>
<td>1</td>
<td>Hypnotics</td>
<td></td>
</tr>
<tr>
<td>Oxycontin /Oxycodone</td>
<td>1</td>
<td>Analgesics/analgesic</td>
<td></td>
</tr>
<tr>
<td>Stesolid /Diazepam</td>
<td>1</td>
<td>Analgesics/analgesic</td>
<td></td>
</tr>
<tr>
<td>“Benzodiazepine” (Only the substance name was reported).</td>
<td>1</td>
<td>Hypnotics/tranquilizers</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Different groups of drugs categorized according to their effect (9).

<table>
<thead>
<tr>
<th>Hallucinogenic</th>
<th>Depressant</th>
<th>Stimulants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayahuasca</td>
<td>GHB(Gamma-hydroxybuthaneacid)</td>
<td>Bath salts</td>
</tr>
<tr>
<td>DMT(Dimethyltryptamine)</td>
<td>Rohypnol (Flunitrazepan)</td>
<td>Cocaine</td>
</tr>
<tr>
<td>LSD(LysergicAcid Diethylamide)</td>
<td>Heroin</td>
<td>Inhalant (some)</td>
</tr>
<tr>
<td>MDMA(1-(3,4-metylendioxifenyl)-2-metyletylamin)/Ecstasy</td>
<td>Inhalant (some)</td>
<td>Amphetamine</td>
</tr>
<tr>
<td>Ketamine</td>
<td>Morphine</td>
<td>Methamphetamine</td>
</tr>
<tr>
<td>Psilocybin(Magic Mushroom)</td>
<td>Codeine</td>
<td>DMX(Dextromethorphan)</td>
</tr>
<tr>
<td>Salvia</td>
<td>Methadone</td>
<td>Crack Cocaine</td>
</tr>
<tr>
<td>Mescaline</td>
<td>Benzodiazepine</td>
<td>Spice</td>
</tr>
<tr>
<td></td>
<td>Cannabis</td>
<td>Khat</td>
</tr>
</tbody>
</table>
1.2 Drugs in Sweden

The most common illegal substance in Sweden is cannabis (hashish and marijuana) (10). Most drug-related criminal cases in Sweden indicates that cannabis is responsible or involved. The next in rank is amphetamine and cocaine. The synthetic marijuana “spice” is becoming more common. Many so-called prescribed drugs such as benzodiazepine, sleeping pills or painkillers, are traded in the drug market. These can be either smuggled into Sweden or can come from the legal market. The Swedish custom offices seized 714818 narcotic tablets and capsules in 2015 (11).

These substances are used by people either they are already addicted to other narcotics or they are so-called beginners, e.g. teenagers who are experimenting with drugs (6, 12). Statistics from the Swedish National Board of Health and Welfare 2014 (Socialstyrelsen), indicate that a number of prescribed pharmaceuticals by defined daily dose (DDD) was 5263138493(13). Several counties have been reviewed by Dagens Nyheter (DN) 2014 which showed that the retired doctors have been prescribing narcotics in a higher rate compared to the doctors who were still working under retirement age (14)(Table 3).

Table 3. The amount of prescribed narcotic classed drugs 2014 compared to all prescribed medications by retired and non-retired working doctors. The following table shows the percentage of prescribed narcotics in relation to the general prescriptions among both groups (14).

<table>
<thead>
<tr>
<th>County</th>
<th>% Narcotic prescription by Working doctors</th>
<th>% Narcotic prescription by retired doctors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gävleborg</td>
<td>6.3</td>
<td>14.1</td>
</tr>
<tr>
<td>Skåne</td>
<td>5.4</td>
<td>13.8</td>
</tr>
<tr>
<td>Kronoberg</td>
<td>5.7</td>
<td>13.3</td>
</tr>
<tr>
<td>Jämtland</td>
<td>4.9</td>
<td>18.3</td>
</tr>
<tr>
<td>Jönköping</td>
<td>4.8</td>
<td>16</td>
</tr>
<tr>
<td>Halland</td>
<td>5.1</td>
<td>13.7</td>
</tr>
<tr>
<td>Värmland</td>
<td>4.1</td>
<td>13.1</td>
</tr>
<tr>
<td>Örebro</td>
<td>4.0</td>
<td>17.4</td>
</tr>
<tr>
<td>Västra Götaland</td>
<td>6.0</td>
<td>14.2</td>
</tr>
<tr>
<td>Södermanland</td>
<td>3.8</td>
<td>8.7</td>
</tr>
</tbody>
</table>

Cannabis

Cannabis is the common name for marijuana and hashish and it is a psychoactive drug. Tetrahydrocannabinol (THC) is the active substance in cannabis. The difference between marijuana and hash is that they come from different parts of the plant (12). The THC structure is similar to the endogenous cannabinoids anandamide. Anandamide is a neurotransmitter and it affects the endocannabinoid system of the brain which influences memory, pleasure, thinking concentration, movement, coordination, sensory, and time perception.

There are two G protein-coupled receptors (GPCRs) receptors that can be found in high concentrations in this area of the brain. CB1 and CB2 can be activated by endogenous cannabinoids and THS.

These receptors can also be expressed in lower concentration wide spreads throughout the body (15).
When taking cannabis the initial effect is happiness, laughter, increased appetite, relaxation, detachment from the reality and increased sensory perception and the adverse effect is depression, anxiety, paranoia, fear, distrust, and tiredness. In high doses, it can cause acute psychosis, delusion, and loss of personal identity (16, 17). Emotional and behavioural disturbances are a common outcome of withdrawal symptoms. However, appetite changes and some physical discomfort can be present (17). THC in marijuana can cause mitochondrial dysfunction, chronic obstructive pulmonary disease and tachycardia (18). Like tobacco, the smoke in marijuana is harmful to the lungs. It contains lots of toxic chemicals and carcinogens and can, therefore, increase the risk of lung disease. However, there is still no conclusive study to link lung cancer to marijuana use. Regular use of marijuana has also been linked with some mental health problems such as anxiety and depression (17). There is no medicinal treatment for marijuana addiction. Treatment such as behavioural support can be offered. Some antidepressants and oral THC may help the individual to cope with the withdrawal symptoms (19).

The THC can be used to treat several of the symptoms and there are several approved cannabis-based medication in the U.S. Their indication for use is weight gain, nausea (that is induced by chemotherapy), neuropathic pain, and seizure control in Multiple sclerosis, glaucoma, and appetite change (21).

**Amphetamine**

Amphetamine is a drug, which belongs to the stimulant drug groups. There are many types of amphetamine, Dextroamphetamine, Levoamphetamine, Lisdexamfetamine, Adderall, and methylamphetamine. They are used as prescribed medication and can also be sold on the black market (21, 17). Methamphetamine has an extra methyl group (22) and is more potent than amphetamine because it is highly lipophilic and can cross the blood-brain barrier more easily than amphetamine. Methamphetamine is not used as medication and comes only as an illegal substance. Amphetamine is however used in prescribed medication for various illnesses such as deficit hyperactivity disorder (ADHD) and narcolepsy (21). Amphetamine increases the neurotransmitter Dopamine (DA), by three different mechanisms. It can act as a substrate for the DA transporter and inhibits the reuptake of DA or help to release DA out of the vesicle and into the cytoplasm. It also stimulates the DA reverse transport (23). The main effect of the drug is high alertness, loss of appetite, loss of interest in sleep, and increased concentration (12). Amphetamine in high doses it can cause mania, paranoia, and stroke. The effects are dependent on the routes of administration. It is a highly addictive drug and can quickly lead to tolerance. The withdrawal symptoms are a hallucination, excessive sleeping and hunger, extreme fatigue, irritation, hypersensitivity, nightmares, irregular heartbeat and lack of coordination (22). The treatment for amphetamine is admission and observation. Observing vital signs such as pulse, blood pressure, temperature and other close observation for development of seizures, this will aid in the admission process. Benzodiazepines are recommended to control agitation, the possibility of seizures and bringing the pulse down. In association with psychotic features, Haloperidol (Haldol) is recommended in combination with Benzodiazepines. Long term treatment includes rehab, psychological therapy and social support (24, 25).

**Cocaine**

Cocaine belongs to the stimulant drugs. It is highly addictive. It is extracted from the Coca plant. When taking this drug the heart rate and blood pressure are increased, and the person’s energy increases. Cocaine is an extremely addictive drug, the dependency of this drug is both psychological and physical. Cocaine can be inhaled through the nose or mixed with water and injected (26). It affects the DA by inhibiting the reuptake and thereby increasing DA, according to one study individuals who may have more DA receptors will be more sensitive to cocaine (27) Increased heart rate and blood pressure, constriction of the blood vessels, dilated pupils, and loss of appetite are some of the side effects and adverse reactions of this drug. Long use of cocaine by snorting causes nose bleeds and loss of sense of smell. As well as other major complications such as stroke, kidney failure, perforation of
the stomach and intestines etc. Crack is a crystal form of cocaine. It is made from cocaine boiled with sodium bicarbonate. Crack is heated and then smoked. It is lipophilic and absorbs quickly through the lung. The effect is intensive and sets in within 6-8 seconds and lasts for 5-15 minutes.

There are also a few synthetic cocaine strains available on the market such as "bath salts" or 'plant feeder'. These are combinations of different psychoactive.

Because of its effect has a short duration, cocaine is used more often and accordingly tolerance will build up. An overdose of cocaine has similar symptoms to its side effects, however, are much more intense. The symptoms are easily recognizable as dilated pupils, hyperthermia, hypertension, tachycardia, agitation, nausea, seizure, stroke, respiratory failure, and in some cases heart attack. Psychosis and mania can also occur.

Benzodiazepines are used primarily to treat seizure and agitation and related symptoms. To decrease heart rate Lidocaine and Sodium Bicarbonate is used as treatment. To treat psychosis symptoms antipsychotic drugs such as Haldol (haloperidol) and Zyprexa (Olanzapine) are used (28, 29).

**Spice**

Spice is a psychoactive drug, which consists of herb mixtures that are mixed with synthetic cannabinoid compounds. Spice has been quite popular among teenagers in Sweden during 2014, according to hospitalization records. Among the drugs that were smuggled to Sweden in 2012, spice made up 4%. Like marijuana, spice can also be smoked. It can also be mixed with Marijuana and made to the beverage. The effect that one gets from this drug is also similar to Marijuana but stronger since it binds to the same receptor CR1 and CB2. The initial effect is elevating and it also affects mood by relaxing. The negative effects that occur are feeling of paranoia, hallucination, dilated the pupil, red eye, high blood pressure, nausea, and anxiety. Spice is addictive and can overdose. The symptoms of overdose are confusion, psychosis, hyperglycaemia, hyperkalaemia, and seizure and kidney failure (30).

### 1.3 Other drugs

**Morphine and Heroin**

Opium is extracted from the Poppy plant. It is a highly addictive drug. There are three groups of opiate-based drugs. Natural opiates, synthetic opiates, and semisynthetic opiates. Natural opiates are found in the plant/seed while semi-synthetic is natural opiates combined with synthetic substances. Synthetic opiates are called opioids and are synthesized in chemical laboratories and do not derive from the Poppy seed; however, they all give a similar effect.

Morphine is extracted from the seedpod of the Opium Poppy plant and Heroin is synthesized from Morphine. Heroin is converted back to Morphine in the body. Morphine comes as a prescription drug and is used as a pain relief for severe pain and is available in many formulations.

Opiates binds to the same receptors as the endogenous opioids. Opiates act at the presynaptic nerve terminal and postsynaptic neuron. The mechanism is inhibiting the release of the inhibitory neurotransmitter Gamma-aminobutyric acid (GABA). GABA’s action is to inhibit dopamine release. Continuous taking opiates cause inhibition of cyclic adenosine monophosphate (cAMP) and when opiates are not taken then cAMP increases this causes hyperactivity and craving (32).

The initial effect of Morphine is euphoria then followed by warm flushing of the skin and dry mouth then feeling wakeful and drowsy at the same time this is called ‘on the nod’.

Heroin and morphine are highly addictive both physically and psychologically. Due to their effect and duration the user develop tolerance at an early stage. Morphine effects on the body are nausea, vomiting, constipation, and dilation of subcutaneous blood vessels, seizure,
constricted pupils, suppressed heart rate, and respiration. Chronic users develop collapsed veins and infection of the heart lining and valve. Overdose is mainly treated by the antidote naloxone hydrochloride (naloxone). There are few approaches for detox treatment. It is done in rehab clinics and substitution medicines such as methadone and buprenorphine are given. These medications also bind to the same receptors, however, are not as strong, therefore, this will keep the person abstained from the drug (31).

**Gamma Hydroxybutyrate (GHB)**

Gamma Hydroxybutyrate (GHB) is a depressant drug often mentioned as “club drug” or “date rape” drug. It is a colourless liquid, sometimes a powder. GHB is also an endogen substance found in the brain. It is a substrate for the inhibitory neurotransmitter gamma-aminobutyric acid (GABA). The endogen GHB is found in much lower concentrations in the brain than those level found in the drug. The desirable effect that it gives is euphoria and increased self-esteem and tranquillity. Within three months of using this drug, it will cause both physical and psychological dependence. The withdrawal symptoms are insomnia, anxiety, tremor, and sweating. An overdose of GHB results in seizures, coma, severe respiratory depression, and possibly death. Detoxification should occur under medical supervision and Benzodiazepine, antihypertensive and sometime Baclofen are used (33).

**Lysergic acid diethylamide (LSD)**

Lysergic acid diethylamide (LSD) is a hallucinogenic drug, a fungus that grows on rye and other grain is the source to manufacturing this drug. LSD comes as a tablet but mainly as a blotter paper (small square paper that is soaked with LSD). The psychological effect is a fluctuation between different mood, delusions, and visual hallucinations. The physical effect is hyperglycaemia, tachycardia, hypertension, nausea, dry mouth, tremor, and drowsiness. The effects are complex and likely caused by interactions with the serotonergic transmission. When taking LSD the experience of the drug is called a trip however if the experience is unpleasant then it is called a bad trip. These “trips” lasts 10-12 hours. Long lasting psychoses is also an adverse effect. Because of the trip effect, some users take the drug repeatedly and therefore, tolerance is produced (26, 34).

**3,4 Methylene dioxyamphetamine (MDMA)**

3,4 Methylene dioxyamphetamine (MDMA) /Ecstasy is a psychoactive drug and has the similar chemical structure as methamphetamine and mescaline. Ecstasy (which is the most common name used) increases the release and inhibits the reuptake of the neurotransmitter serotonin, dopamine, and norepinephrine in the brain. The effect of MDMA increases energy, empathy and peacefulness. However, the adverse effect is similar to amphetamine and cocaine. The psychological effect of ecstasy is sleep problem, anxiety, and paranoia. The physical effect is nausea, sweating, chills, and blurred vision. The drug comes as tablets, however, there is also powder form that can be snorted and sometimes even smoked (35, 36).

**Dimethyltryptamine (DMT)**

Dimethyltryptamine (DMT) is a hallucinogenic drug that has a similar effect as LSD and magic mushrooms. Some tribes in South America eat or inhale the plant named *Anadenanthera peregrine* this plant contain a large amount of DMT. This substance acts on the serotonin by acting as a substrate for 5-HT receptors in the brain and inhibiting the reuptake of serotonin. Taking DMT results in hallucinations and change of perception and distortion of reality. When a person experiences hallucinations, which are tactile, visual or auditory, it can be frightening and result in self-harm. Another effect is increased blood pressure and heart rate (37).
3, 4, 5-trimethoxyphenethylamine (Mescaline)

Mescaline (3, 4, 5-trimethoxyphenethylamine) is a compound that comes from a cactus called Peyote. This compound is also found in very small concentration in Fabaceae (bean) family. It has been used by some cultures for rituals, religious ceremonies, healing etc. The method for use is either soak the dried cactus in water or drink it or chew the dried soaked cactus part. Since the taste is bitter the cactus is dried and ground to a powder then poured into capsules and swallowed. Mescaline acts as non-selective 5-HT receptor agonist and the effect is similar to the other hallucinogens with some characteristic effect for mescaline (38).

4-phosphoryloxy-N, N-dimethyltryptamine (Psilocybin)

Psilocybin (4-phosphoryloxy-N, N-dimethyltryptamine) is a substance that is found in some types of mushrooms, also called “Magic mushrooms”. They are brewed as a tea or added to food, they can also be dried or cooked. The effect comes within 20 minutes and can last up to 6 hours. Psilocybin acts as a substrate for 5HT2A/C and 5HT1A receptors and increases serotonin. The effect is a hallucination, distorted perception of time and ability to not differentiate between reality and fantasy. Sometimes the user can get a panic reaction and psychosis. The user also might get long-term side effects such as memory loss and risk of psychiatric illnesses increase. The physical adverse effect is pupil dilation, nausea, vomiting and drowsiness (39, 40).

Catha edelius (Khat)

Khat or Catha edelius is a plant that mainly grows in the countries of the horn of Africa and the Arabian Peninsula. It is a central stimulating drug and has similar effects as amphetamine, and cocaine.
It inhibits the reuptake of dopamine and serotonin. The active substance is in the leaf. The leaf is chewed and the saliva is swallowed (41, 42).

Bath Salt

Cathinone is a substance that is found in Khat plant. Bath Salt is a stimulant drug and is made of synthetic cathinone. The effect of taking this substance is similar to Khat. Just like the other stimulants it acts on dopamine, norepinephrine, and serotonin.
Bath Salt is, however, more intense and more dangerous.
Bath Salt should not be confused with normal bath salts that are used for bathing. Although this substance also looks like normal bath salts with its white or brown crystalline/powder look. It has many street names such as Scarface, Bloom, Vanilla sky and much more. The method of use is snorting, smoking, injecting or swallowing. The effect of this substance is increased sex drive and social skill, extreme agitation, hallucinations, paranoia, and panic attacks. As a result, the abuser will get nosebleeds, sweating, nausea, dehydration, and kidney failure.
Bath Salt is addictive and has withdrawal symptoms such as anxiety, depression, insomnia, and tremors. There are apparently no medications to treat the addiction, therefore, behavioural therapy is recommended as a suitable mean of treatment (43, 44).
1.4 Education about illegal substances and addictive drugs at Swedish universities within Pharmacy degree.

There are three Universities in Sweden that offers Pharmacy degree (Master of Science Program in Pharmacy). Uppsala University was the only university until the year 2000 that offered this degree. The university of Gothenburg started the degree Master program year 2000 and followed by Umeå University year 2012 (45).

The Master of Science Program in Pharmacy requires completion of five-year studies in Sweden. The degree is based on the characteristic of drugs, their structure, and origin. Also, how drugs are developed, manufactured, tested and the effects of illegal substances and prescribed narcotic also is studied, however, the three universities have different aims on these subjects (46) (Table 4).

Uppsala University

The pharmacy degree at Uppsala University contains several modules that include illegal substances and prescribed narcotic.

- Semester 1: Drug Development and Drug Usage, 7.5 c (credits). This module contains a two-hour lecture on drug and drug addiction. The lecture treats why one becomes addicted, the brain’s reward system, and how it is regulated on a molecular level. Opiates and benzodiazepines are discussed also common drugs such as cannabis, amphetamines, cocaine, ecstasy and other are highlighted. The module also contains PBL (Problem Based Learning) cases which highlight the development of cannabinoid antagonists / agonists as potential drug candidates and what to think about the aspects concerning dependence.
  Professor M. Hallberg (Personal communication, 8th March 2016).

- Semester 4, Toxicology, Drug Metabolism and Safety Assessment 7.5 c.
  Two lectures with pharmacological treatment for drug dependence and the topic is raised briefly in pharmacotherapy and Toxicology. Professor I. Nylander (Personal communication, 14th March 2016).

- Semester 5, Pharmacognosy 7.5 c. About two-hour lecture on narcotic natural products
  Pharmacognosy, Latex and harts, Folium and medicinal plants. Professor A. Backlund (Personal communication, 14th March 2016).
Semester 8, Drug and Dependence, 7.5 c/ acute poisoning and clinical toxicology 7.5 c. These two modules are not mandatory. They can be chosen among some optional modules in order to obtain 30 c which is mandatory for semester 8.

Drug and Dependence module it deals with the reward and addiction mechanisms and then introducing all addictive drugs and their (neurobiological and pharmacological aspects and treatment). Professor I. Nylander (Personal communication, 14th March 2016).

Acute poisoning and clinical toxicology, this module focuses on illegal drugs and intoxication, diagnosis and treatment. Given in the form of lectures (about 7 hours); a compulsory seminar (4 hours); and for some students, a case report where they should write about the illegal drug. Professor B. Hellman (personal communication, 10th March 2016).

**University of Gothenburg**

University of Gothenburg offer two modules were drug and dependence is taught. The main focus of this subject is in the Pharmacology and pathology 37.5 c. The subject is also treated within another module, Toxicology 3c.

- Semester 5: Pharmacology and Pathology. Over Fifteen hours is dedicated to illegal drug and dependence. Some lecture also is about alcohol misuse and abuse. The subject is a history of drug classification + Narcotic, general information about synapses, general illegal drugs, alcohol. Also included in this module is three hours visit from AA (anonymous alcoholics) and a three-hour visit from RFHL (National Association for help for drugs and drug dependence). Doctor C. Nilsson (personal communication, 11th march 2016).

- Semester 6: Toxicology 3c. There is superficially a lecture on poisonings held by the Swedish poison information center.

**University of Umeå**

Two modules treat this subject, pharmacology for pharmacists 15c and toxicology 3c.

- Semester 2: Toxicology, this module consist of 5 themes one of them is about toxic substances and abusive substances. There is a 14min web-lecture that briefly explains different illegal drugs and place them under different groups (47). Also misuse and abuse and abstinent symptoms. Also, how Alcohol, amphetamine, cannabis affects the central nervous system and physical damages resulting from illegal drugs. The students are expected to know this by the end of the course. Almost 5% of this module is dedicated to illegal substances. Doctor O Nilsson (Personal communication, 8th March 2016).

- Semester 3: Pharmacology 15c, there is a 2-hour lecture about central stimulating drugs. The main focus on opioids, morphine and antagonist naloxone and different opioid receptors also the main

- This module is teaching mechanisms of action of different illegal drugs such as cocaine, amphetamine and which pharmacological strategy are applied in order to intoxicate drug abusers. It is estimated that 10% of this module is about illegal substances. Senior Lecturer G. Tiger (personal communication, 1st march 20
Table 4. The proportion of teaching in different courses (modules) in Master of Science Program in Pharmacy at three universities in Sweden

<table>
<thead>
<tr>
<th>Module</th>
<th>Extent</th>
<th>Module</th>
<th>Extent</th>
<th>Module</th>
<th>Extent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug Development and Drug Usage, 7.5 c</td>
<td>2 hours</td>
<td>Pharmacology and Pathology 37.5c</td>
<td></td>
<td>Pharmacology 15c</td>
<td>10%</td>
</tr>
<tr>
<td>Toxicology, Drug Metabolism, and Safety Assessment 7.5c</td>
<td>2 hours</td>
<td>Toxicology 3c</td>
<td>1 hour</td>
<td>Toxicology 3c</td>
<td>5 %</td>
</tr>
<tr>
<td>Pharmacognosy 7.5 c</td>
<td>2 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Drug and Dependence, 7.5 c</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Acute poisoning and clinical toxicology 7.5 c</td>
<td>11 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Optional modules

1.5 Pharmacy Services for narcotic drug misusers

Pharmacy services are for the public in order to improve drug use and compliance. Pharmacies in Sweden offer many services such as measurement of blood pressure, review of a patient’s medical list or structured medicine advice, weight control, blood sugar testing, smoking cessation program, insomnia help and birthmark screening etc. (48, 49). The recent years more pharmacy services have been available and continue to rise which is very beneficial for society. A study by the Swedish Medical Products Agency showed a structured medicine advice to the patients indicates positive results, however, more resources were required such as a separate room and if the information and the content of talk and feedback could be shared with the prescriber (50).

When looking at the pharmacy services relating to legal and illegal narcotics, pharmacies in Sweden provide controlled dispensing of methadone and buprenorphine with the cooperation of methadone clinics (51).

In some countries pharmacists provide supervised methadone consumption and provide with the needle/syringe exchange program wherein Sweden, this is a social service provided by the county along with other services such as motivation to narcotic free life and Hepatitis B vaccination, which is offered by staff that has wide knowledge in this area (52).

According to the American Society of Health-System Pharmacists (ASHP), the pharmacist should contribute in preventing substance abuse by educating the public (college’s schools and non-governmental organisations) about the adverse effects of drug abuse. Discourage doctors from prescribing larger substances to people recovering from substance abuse, the caretakers, and the health care providers. Pharmacists can also be an asset to the outpatient care in preventing drug abusers relapse after discharge. They can provide information and also refer people to support groups if needed. Another aspect of the pharmacy profession is to maintain their competency by continuous education (4).
2. Aim

The aim of this study is to observe the standard of understanding and academic awareness of illegal substances and addictive drug abuse of Swedish pharmacists. Also to determine their suitability to play an active role as a healthcare provider in a multidisciplinary team by treating preventing, and tackling addiction problem.

2.1 Main questions

- How do the pharmacists rate their knowledge concerning illegal substances and addictive drug abuse?
- How do the pharmacists’ obtain their knowledge of illegal substances? Is their knowledge gained from university studies or from other sources?
- Do the pharmacists’ knowledge concerning illegal substances and addictive drug abuse correspond with their length of service after graduation?
- Has the amount of teaching concerning illegal substances and addictive drug abuse during their studies at the three mentioned universities (Uppsala, Gothenburg, and Umeå) affected their knowledge?

3. Method

A quantitative survey method was chosen in order to answer the questions for this study. This is a practical method to use in order to find out the aim of this study. It is a cost effective method and enables one to gather information within a short time limit (53, 54, and 55). The literature that was used in order to write this thesis was gained from Umeå University website library. The main search was done in Google Scholar. With the help of some relevant articles and other similar articles that were found by searching in the cited/ referenced sources area. A database such as PubMed was used to access the full text. Also, many websites that were relevant to this subject were used. The keywords for my search were: Pharmacists, knowledge, illegal drugs, survey, questioner, Swedish pharmacists and pharmacy services.

3.1 Questionnaire design

To create a survey, Google forms were used, in order to use this, one needs to have an account in Google (56). A cover note was sent out in order to explain what the aim of the survey was. The survey contained three sections.

The aim of the first section was to detect the background of the participant, and it commenced with the close end nonintrusive way (55). Respondents who choose the option “they did not have any knowledge about illegal drugs in the last question of section one” were excluded from answering section two. The second section contained scaled multiple choice questions and a couple of open questions. The answer was analysed with Likert scaling (57). Section three commenced with a few multiple-choice questions about different illegal drugs. The section aimed to find out the respondent’s level of knowledge about illegal substances. This was determined e.g. by a method such as mentioning several illegal drugs and including a couple of random names and asking the participant to choose which of those mentioned were illegal drugs.
3.2 Exclusion and inclusion groups.

Two Hundred questionnaires were sent to pharmacists who work at different Chain of pharmacies (Kronans Apotek, Apotek Hjärtat/Cura, and Apoteket AB) in Malmö, Stockholm and Gothenburg. The reason behind choosing these regions was because those cities were considered to be the three largest cities regarding population and number of pharmacies which gives a rich ground for my studies. The different pharmacy chains were contacted through human resources (HR). The questionnaires were sent to the pharmacy managers who supposed to forward it to the staff. The total amounts of surveys that were sent to different pharmacies were 200. Kronans apotek contributed with 66 participants and Apoteket AB with 30 participants and finally Apotek Hjärtat/cura with 104 participants. The 16th of Dec 2015, the questionnaire was sent to 66 pharmacists. On the 22nd of Dec, another 30 was sent. And finally, 104 questionnaires were sent 10th of Jan 2016. The first answer was sent 18th of Dec 2015. The reason for sending at a different time was to ensure a good amount of answers by avoiding the holiday period. A reminder was sent by the end of January. A number of people that responded was 79. Twenty-one of the respondents were excluded for the reason they were either pharmacists with a three-year degree or they had accomplished a degree outside of Sweden. The included answers were 58. The majority (45%) of the responses came from Apotek Hjärtat, followed by next was Kronans Apotek (41%) and last Apoteket AB (14%).

The data was then collected and analysed in Microsoft Excel. This study targeted pharmacists with at least five years of education. The exclusions criteria were pharmacists with less than five years of education with a three years bachelor degree in pharmaceutical science. The argument was that a 5-year degree in Sweden is comparable to pharmacists’ degrees worldwide and the result is compared to studies on an international standard (58). However, those who had accomplished their degree outside Sweden were not included because the study was aimed partly to find out the standard of the education regarding illegal drug in Sweden.

3.3 Reliability

Reliability, as to what extent the study will give the same result if it was repeated. Several methods can be used to test reliability (59). In this study, two pharmacists answered the survey one week before they were sent out. After two weeks they answered the survey again and similar results were obtained.

3.4 Validity

Validity defines if the study is measuring what it is supposed to measure. There are several types of validity (construct validity, content validity, external validity, face validity, predictive validity.) (59). In this study, “face validity” was used. The questionnaires were given to 2-pharmacists -before it was sent out to the other participants. After this test, some of the questions was amended in order to be clear.
4. Results

4.1 Background of the pharmacists:

Out of 79 respondents, 58 of them had a five-year degree in pharmacy from a Swedish university. The majority had at least worked for one year in a pharmacy. The highest number of the respondent had accomplished their degree at Gothenburg University.

Table 5. The number of years respondents had worked in a pharmacy.

<table>
<thead>
<tr>
<th>Years worked as pharmacists</th>
<th>Number of pharmacists</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 year</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>1-5 years</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>36</td>
<td>60</td>
</tr>
</tbody>
</table>

Table 6. The respondents time of graduation.

<table>
<thead>
<tr>
<th>Graduated</th>
<th>Number pharmacists</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than five years ago</td>
<td>35</td>
<td>60%</td>
</tr>
<tr>
<td>Less than five years ago</td>
<td>23</td>
<td>40%</td>
</tr>
</tbody>
</table>

Table 7. Respondent’s graduation place.

<table>
<thead>
<tr>
<th>Universities</th>
<th>Number of participants</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uppsala</td>
<td>32</td>
<td>56%</td>
</tr>
<tr>
<td>Gothenburg</td>
<td>21</td>
<td>37%</td>
</tr>
<tr>
<td>Umeå</td>
<td>5</td>
<td>7%</td>
</tr>
</tbody>
</table>

4.2 University education.

A great number of the participant had received lectures regarding illegal substances during their university degree (Table 8), and they did consider the lectures to be good (Figure 1). Also, a majority thought that a pharmacist should have a good knowledge about illegal substances and 23% thought that a pharmacist should have an excellent knowledge (Figure 2).

When the respondent marked their knowledge about illegal substances the average Likert score was 2 (Table 9).
Table 8. Have you received any lecture in university about illegal drugs?

<table>
<thead>
<tr>
<th>Received lecture</th>
<th>Pharmacists</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>43</td>
<td>74%</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>12%</td>
</tr>
<tr>
<td>Do not remember</td>
<td>8</td>
<td>14%</td>
</tr>
</tbody>
</table>

Figure 1. Respondents ranking their quality of lectures regarding illegal substances and addictive drug abuse at the university.

Figure 2. Respondents ranking how much knowledge a pharmacist should have regarding illegal substances and addictive drug abuse.
Table 9. Respondents ranking their own knowledge in Illegal substances and addictive drug abuse.

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Some</th>
<th>Good</th>
<th>Excellent</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respondents</td>
<td>0</td>
<td>10</td>
<td>39</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Average score</td>
<td></td>
<td></td>
<td></td>
<td>2.0</td>
<td></td>
</tr>
</tbody>
</table>

4.3 Knowledge and Education of illegal substances from your workplace.

This section of the survey was only for the participants who considered themselves having at least some knowledge. The large part (91%) of the participant had not received any professional skill development regarding drugs and drug abuse at work. Those who did (9%) the majority thought that the professional skill developments were good. Some of the respondent (n=17) considered their knowledge to be self-taught. A very small part (n=4) could not decide whether the knowledge was self-thought or from the university lectures and the majority (n=37) thought their knowledge was not self-taught.

When asking participants how their knowledge was gained the answers were consistent and it was mainly through the Internet. Some answered through media such as film or documentaries. Another popular common answer was the Swedish Book of drug “Läkemedelsboken”. A few of the answers were from life experiences. Only a minority (n=2) answered through internal education at work. When the pharmacists were asked whether they have been in a situation at work where they needed to use their knowledge about illegal substances. The majority (62%) had used their knowledge regarding illegal drug at some stage at their workplace and 29% had not, the remaining (9%) did not remember. The respondents were asked if they ever had been asked for help on the later matter and if they would be able to assist the customers. The majority (55%) had been asked for help, however only 22% (n=13) answered that they were able to help.

How have you gained knowledge by yourself?
- Internet
- The Book of Drugs the addiction part (Läkemedelsboken-beroende kapitlet).
- Fass
- Life experiences
- Reading because of personal interest
- Reading articles online
- Books
- Internal education at work
- Partly from the pharmacy course, partly news, film, books, Internet etc.
- Films
- Documentary
- Web sites as 1177.se
The respondents answer to the question “Could you offer any help when you were asked?” on how did you help.

- It is very individual and depends on how severe the addiction is and which substance is abused.
- In order to help, one needs to plan, motivate, observe and follow up. A pharmacist does not have the means to do this at a pharmacy. This needs a team of doctors, psychologists, social worker etc. As a pharmacist, we could only advise them where to seek help, even though we could help more. Unfortunately, a pharmacist’s profession is focusing on other things like selling, than on what we are educated for.
- Refer the person to addiction centres.
- Refer to seek professional help at addiction centres and help line.
- Give advice on how to reduce illegal drug use. By knowing more of the abstinence symptom referring to an appropriate clinic.
- It would be good if we also could assist other health professions.
- Unfortunately, pharmacists in Sweden are not considered as a health profession but a sales person.
- There is no time.
- Ideally, make plans, follow-ups, work closer with the doctors etc.
- Refer to addiction centre.
- Would like to utilize pharmaceutical degree in similar cases.
- Unfortunately, pharmacists do not use their competency today.
- The profession in Sweden is nowadays concentrated on selling.
- No time to help because stressful environment.
- There must be cooperation from other healthcare services and pharmacists.
- There must be a private environment where the customer feels safe and comfortable to ask questions.

4.4 Knowledge test

In this section, the questions were as formulated in order to test the respondents’ knowledge about illegal substances. In the first question, respondents were given a few names of different illegal substances and two random names were added to the correct ones. They had to identify which of them that were illegal drugs. Only 6% choose peel and 14% choose steel as an option which was the two wrong options. Methamphetamine and DMT and magic mushrooms were chosen less than the other illegal drugs. The results revealed that peel and steel were the least chosen of the answers available, it was also the incorrect answer. (Figure 3).
As an answer to the question, what the common name for hashish and marijuana was 91% of the respondents chose cannabis and 9% choose Speed and none of the respondents chose the option LSD.

In the following question, the respondent had to choose from seven option of different illegal substances, which three most common illegal substance that is used and abused in Sweden. Cannabis got the most response (97%) followed by cocaine (86%) and amphetamine (83%). These choices were both correct in answer and order (Figure 4).
Table 10. Correct statement about hashish and marijuana.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Percentage (Count/Total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>They come from different parts of the same plant.</td>
<td>52%(30/58)</td>
</tr>
<tr>
<td>They are not addictive.</td>
<td>17%(10/58)</td>
</tr>
<tr>
<td>Marijuana could be smoked while hashish cannot.</td>
<td>31%(18/58)</td>
</tr>
</tbody>
</table>

The respondents answer to the question “Which of the following statement is correct regarding hashish and marijuana?”

The majority knew that hashish and marijuana come from different parts of the same plant and the remaining respondents answers were divided between the other two options (Table 10). In the following question on which effect marijuana has, the answers revealed that there was no concrete answer from the respondents’ point of view. Although “All options” was the correct answer, the majority chose “Difficult thinking and solving problems” which is also correct, but not the most correct. (Figure 5). In the next question, the respondents were asked how marijuana was consumed, and 90% knew it was smoked while 10% chosen the option “snorting”.

Figure 5. Effects of Marijuana according to the respondents answers.

The majority chose the correct answer to the question what spice was. The majority responded that spice was synthetic marijuana and the greater amount of the remaining respondents thought that spice was a mixture of drugs that gave the same effect as marijuana (Figure 6).
Figure 6. Each bar in this figure indicates a number of respondents who answered what “Spice” was.

The respondents had to choose several options on which treatments were suitable for marijuana addiction. The wrong answer was sleeping pills although it was chosen by a minority (12%). Cognitive behavioural therapy was believed by many to be a suitable treatment (Figure 7).

Figure 7. The figure represents according to the respondents (in percentage) treatments that are suitable for marijuana addiction.
The answer to the short time effect of amphetamine was almost equally divided between all the options. Even though aggression was the only wrong answer (Figure 8).

**Figure 8.** Each bar in this figure represents the respondents’ (in percentage) answer to what the short time effect of amphetamine is.

The majority chose that ADHD was the indication for amphetamines. Agitation, fatigue, and depression is not an indication however still chosen by some respondents (Figure 9).

**Figure 9.** The indications of amphetamines, according to the respondents’ answers.
In the next question, the respondents had to choose which neurotransmitter cocaine acts on. Dopamine was chosen by a great number (79%) of the respondent. The other two options of neurotransmitters, Noradrenaline and Serotonin were chosen by 6% and 15% respectively. The following question was how cocaine was taken. Only 38% of the respondents knew the correct answer that cocaine can be both snorted and injected. The majority (55%) of the respondents chose the option “snorted” while 7% choose injected.

The following question they had to choose from four options on how cocaine affects the body. The majority knew the correct answer (Figure 10).

![Figure 10. How cocaine effect the body according to the respondents.](image)

The most chosen answer on the question “How can drugs be detected in the body?” was that drugs can be detected either via urine or via blood. The other options were also chosen to a small extent. The correct answer was here “all options” (Figure 11).

Over half of the respondents (62%) did not know whether drug test could be bought for use at home only a few (14%) answered yes and the remaining (24%) thought that drug tests cannot be bought.
The majority of the answers on the effect of stimulants were hyperactivity followed by euphoria. Drowsiness and constricted pupils which were the two incorrect answers, were also chosen (Figure 12).

In the next question, the respondents had to choose the effect of depressants. Drowsiness and constricted pupils were the most chosen answer and were both correct, however, the incorrect answers which consisted of euphoria, irritability, and dilated pupils were chosen to a smaller extent. (Figure 13).

The respondents had then a question on which group cannabis belong to. Half of the respondents choose hallucinogens, 29% choose depressant and 21% choose stimulant, although depressant was the correct answer. Then they were asked which group cocaine and amphetamine belonged. The majority did answer correctly that cocaine (83%) and amphetamine (84%) were stimulant drugs however the two incorrect answers were also chosen by few (marijuana 22% and hashish 9%).
Figure 13. Each bar represents the percentage of the respondents that chose the effects of depressants.

Figure 14. This figure represents the summary of the correct answers for each question by the percentage of respondents.
4.5 Comparison
The following data explains whether work experience, the rate of knowledge and attending different universities affect a pharmacist’s knowledge of illegal drugs.

4.5.1 Ranking knowledge

<table>
<thead>
<tr>
<th>Pharmacist’s rating of their knowledge</th>
<th>No knowledge (n=0)</th>
<th>Some knowledge (n=10)</th>
<th>Good knowledge (n=39)</th>
<th>Excellent knowledge (n=8)</th>
<th>Complete knowledge (n=1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage correct answer in the test</td>
<td></td>
<td>less than 50% correct</td>
<td>60% and above</td>
<td>80% and above</td>
<td></td>
</tr>
<tr>
<td>respondents</td>
<td>n=7</td>
<td>n=30</td>
<td>n=20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The pharmacists ranked their knowledge in drugs and drugs abuse. The ranking was later compared to their general test score in a T-test (p=0.5) this fell short of statistically significant (Table 11).

4.5.2 Work experience

In order to conclude if the length of work experience has improved the knowledge of the pharmacists about illegal substances and addictive drug abuse, the respondents pass rate in the multiple-choice question test was compared with a number of years worked as pharmacists. Twelve respondents had worked less than one year and 42% of them accomplished scored over 80% in the knowledge questionnaire. The number of pharmacists who had between one to five years of work experience was fifteen persons and 60% of them had 80% and above in the test. The thirty-one pharmacists who had worked for more than five years only 19% had scored 80% and over. A T-test was done in order to find out whether this result is significant. The result was p=0.08 that indicated the length of time a pharmacist had worked in a pharmacy did not affect their knowledge although it approached the borderline to significant (p=0.08).

4.5.3 Comparison between different universities

<table>
<thead>
<tr>
<th>University</th>
<th>Uppsala</th>
<th>Gothenburg</th>
<th>Umeå</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacists</td>
<td>32</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Test score achieved between 60%-80%</td>
<td>16 (50%)</td>
<td>13 (62%)</td>
<td>1 (20%)</td>
</tr>
</tbody>
</table>

Table 12 shows the result of the knowledge test between 60% to 80% that was achieved by the pharmacists from different universities is not affected by which university the pharmacists graduated from although results show that it is close to being statistically significant (p=0.059).
4.5.4 Respondent from different universities that achieved 80% and more.

Table 13. Results achieved by the respondents.

<table>
<thead>
<tr>
<th>University</th>
<th>Uppsala</th>
<th>Gothenburg</th>
<th>Umeå</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharmacists /respondent</td>
<td>32</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>Test score ≥80%</td>
<td>17</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 13. indicates that pharmacist who graduated from Uppsala University had overall higher score in the knowledge test compared to pharmacists who graduated from Gothenburg University and Umeå University.

5. Discussion

This study is aiming to identify a pharmacist’s knowledge of illegal substances and addictive drugs and their contribution towards healthcare from their own perspective. The survey performed was to find out the amount of knowledge Swedish pharmacists have regarding illegal substances and addictive drugs, and if they have received sufficient education from their university studies or if their knowledge also is gained from other sources. Pharmacists from three major universities (Malmö, Gothenburg, and Umeå) were included in the study, where 200 questionnaires were sent. Respondents were three group of Pharmacists; those who graduated from Uppsala University, Gothenburg University, and Umeå University. Furthermore a sub-classification of each group was done into another three groups, according to the time of their service in a pharmacy. Group 1 consists of pharmacists who have been in the service and graduated less than one year ago, group 2 pharmacists who graduated between 1-5 years ago and group 3 pharmacists who graduated more than 5 years ago.

No similar studies have been conducted in Sweden, however, there are some international studies which show the knowledge of pharmacists and their role as a healthcare provider in the area of substance abuse (4, 60). One international study was made, a rather similar to this study. It was conducted in different countries (92 countries) and was aimed towards pharmacy students (61). The response rate was only 39%, an extra time of two weeks added a further extension of the original study period in order to get more answers. Despite this, the response rate was low. This can be explained by the fact that the timing of sending the questionnaires was during Christmas and New Year. Another factor that also could be considered is correspondent via email instead of normal post-delivery, as email can easily be ignored and not to be respond. Furthermore, no financial reward was offered. Naturally much higher rate than 39% could have affected the result and statistical value.
5.1 Can a pharmacist play an active role in a multidisciplinary team?

The majority (62%) of the pharmacists in this study had used their knowledge about illegal substances and drug abuse at some point and also been asked to help or give advice (55%) although most of them did not know if they had been able to help. This reflects that despite the knowledge they possess they are not well prepared and feel insecure about the advice they have given.

According to the respondents’ answer, the majority did help in one way as their role by referring them to drug abuse centres this coincide with other studies (60, 63). Judging from the other answers on other ways to help, they are generally but not specifically aware how to help. The pharmacists were willing to provide more help. However, their explanations according to their lack of time, lack of private space environment, and absence of proper coordination with other healthcare provider services. These results agree with the study on Understanding Substance Abuse and Dependents by the Pharmacy Profession (64). Many of the respondents also pointed that their professional skills in this field are not being utilised properly and accordingly, and instead they were more focused on selling rather than using the skills they have. These answers do mirror the previous studies that pharmacy as a profession is underestimated (65). According to a study, pharmacists are an asset to society by preventing substance abuse, educating the society about the effect of illegal drug/drug abuse, and counselling the individual who is concerned about this matter and preventing relapse in rehabilitees individual(3).

This study indicates pharmacists in Sweden perhaps have an acceptable standard of education regarding illegal substances and addictive drugs. The knowledge is mainly obtained during from university studies. Although the amount and the education way differs between the universities this does not affect tremendously their general knowledge about this subject. However drug abuse and addiction are very important and this is a broad field and in order to be part of the multidisciplinary team, pharmacists needs also to be educated properly, academically, and be sufficiently knowledge and educated regarding other important aspects of drug treatment such as patients regarding the psychosocial, economic and a proper psychological support and treatments social, personal and economic aspect of this issue. Pharmacists either they get nothing or very little education and training regarding addiction from their working places and this can be seriously considered as an important matter to be looked at in order for the pharmacists or to be more sufficient. Perhaps there seems to be a pattern that those pharmacists who graduated more than five years ago had less up to date knowledge. Perhaps this can be improved by continued education and updating from work competence education.

5.2 How do the pharmacists rate their knowledge concerning illegal substances and addictive drug abuse?

This study fell short of statistical significance with regards to the pharmacists ranking their own knowledge with the result of their test result. The majority agreed that they have a good knowledge, however, some of them did very well on the test. The pass rate for the multiple choice question was 60%, anyone who achieved a lower score was considered to have “Some Knowledge”. Those who achieved scores 80% and more were 20 respondents. The results were similar when compared to a study by The National Centre for Addiction and Substance Abuse (CASA) at Columbia University (64). The majority of the pharmacists replied that they did receive education at university regarding the mentioned subject and 50% of them rated the education as good and those who ranked their lectures to be excellent also thought that a pharmacist should have an excellent knowledge.

Their university knowledge was based on studying the mechanism of action, neurobiology, neuropharmacology, tolerance, addiction, side effects and reward system of the brain (64).
The results of the questionnaires in this study are parallel with the respondents admitting knowledge in this field. This indicates a trend that perhaps the respondents value their knowledge from the quality of the education they have received and the majority agreed that the education they received from their university was adequate.

5.3 How the pharmacists obtain their knowledge of illegal substances? Is their knowledge gained from university studies or from other sources?

The majority of the professionals have not had any competence development education from their workplace. This indicates that either they had gained knowledge through university studies or perhaps work or life experience. Even though most of them responded that they were not self-taught. Those who thought they were self-taught had primarily learned from the internet, journals and from media. “Läkemedelsboken” and “Fass” were a popular choice, these two are trusted and are reliable sources that are aimed at health professionals.

The result of the survey indicates that pharmacist is in need of continuous development education and updating in this category to be competent and competitive in resolving this problem in order to be able to assist the patients and participate in substance use prevention.

5.4 Do the pharmacists’ knowledge concerning illegal substances and addictive drugs correspond with their length of service after graduation?

In order to find the satisfactory complete knowledge, the test score of 80% and above, was set as a standard to measure the rate of satisfactory knowledge for this section. The result showed that amount of working time for the pharmacist did not affect their knowledge. Although it was a certain trend towards significance (p=0.08). Those who graduated less than five years ago achieved better results in the multiple-choice questioner test. The results could have been interpreted from the perspective that the recent graduates had performed better due to their fresh and updated knowledge and recent exposure to the related subject. Another explanation could be that in the 90’s an inventory of drug dependency learning in the pharmacy programs were done and those who graduated before this time perhaps did not get sufficient education in this field. Another interpretation is that graduated pharmacists require continuing education and training material in order to have an active role in substance abuse prevention (65). Despite this explanation, this cannot be concluded since many other factors such as age, other work and education background of the respondent that could affect the result.

5.5 Has the amount of teaching concerning illegal substances and addictive drug abuse during their studies at the universities in Uppsala, Gothenburg, and Umeå affected their knowledge?

Out of all 58 respondents, 32 had studied at University of Uppsala, University, 21 respondents were from Gothenburg University and 5 from Umeå University. The low number of participants from Umeå could perhaps be explained by the geographical area and owing to the fact that Umeå University is comparably new in giving pharmacy degree. Since the questionnaires were distributed in Stockholm, Gothenburg, and Malmö and the majority of students choose to study close to where they live, this results that greater amount of pharmacists who studied at these cities work at the pharmacies located there. Maybe those who studied at Umeå currently live closer to Umeå.

When evaluating with a p test the score of 60% achieved on the test from the three universities, against respondents. The result showed insignificant (p=0.058).
As mentioned before, due to the low number of participants from Umeå University, it was difficult to obtain a realistic and evidence-based comparison. Although there was one of the five participants who passed the test with a score of 60% and above. When comparing, Umeå University has dedicated least amount (10% and 5% of the modules) for this subject followed by Gothenburg and then Uppsala. However the amount of education regarding this subject that is offered by Umeå University does not conclude that the standard of their education is not as good as the other education since the pharmacy degree in Umeå is a distance education and a lot of the learning relies on the student. According to an article in a distance study, the learners have more control over time and place of their learning (65). Gothenburg graduated participants did somewhat better in the test with scores 60% and above while graduates from Uppsala had more respondents who scored 80% and above. When looking at the curriculum from Gothenburg University the education of illegal drug and drug dependence, it is concentrated to one module in semester 5. Although one lecture is included in another module in semester 6. The teaching is over 15 hours with a variety of visits from relevant groups such as AA (anonymous alcoholies) and RFHL (National Association for help for drugs and drug dependence) and Swedish poison information centre. The education at Uppsala University is taught in more different modules at different semesters and not as concentrated to one module at Gothenburg University. Perhaps continuous teaching is rather more efficient than if the modules were taught in one module. The close pass results of achieving (60%) by the two universities, Uppsala and Gothenburg could be explained by the total equal number overall amount of hours invested in this subject. Another difference is that Uppsala University offers 2 modules only on drug and drug dependency and acute poisoning and clinical toxicology at semester 8. These modules are each 7.5 credit and those who achieved 80% and more, most probably attended extra optional modules which obviously reflected on some students high score. Among those participants who served less than one year in the pharmacy were 12 from all three Universities. By breaking down this number, 3 from Umeå, 3 from Gothenburg and 6 from Uppsala. Still Uppsala is keeping its position ahead, even 3 out of those 6 pharmacists scored more than 80% and 2 was from Gothenburg and 1 from Umeå.

5.6 Method discussion

The questionnaire was the most appropriate study design for this thesis. It was cost effective and time saving. Although considered face to face interview have a better realistic approach and understanding, unfortunately that was not possible taking in consideration time consuming. The amount of answers received was not very satisfactory in order to make conclusions about the results. The timing of when the questionnaires were sent was near the holidays and also considering lack of personal interest and it was not mandatory. Perhaps the pharmacies were short of staff and there were not enough time to answer the questionnaire. This is why the most replies came after the reminder mail, which was sent by the end of January. Email questionnaires have less response rates than if they were sent by normal mail since the respondent cannot glimpse the questionnaire size (53). However response rate is not always a way to decide how accurate the survey result is (66). A lot of time and effort went into writing the questionnaires and the multiple-choice question to make sure relevant questions were being asked in a short amount of time. Even though the questionnaires were validated spelling mistakes could have been avoided for example in section three “Heroine”. Also some of the question (question 13 and 14) could perhaps have been formulated better as it was pointed out by few respondents they were quite similar. Another question that might have influenced the outcome, was the question about which type of neurotransmitters cocaine does affect. Instead of giving them the choices of all three transmitters in my questionnaire, one choice was only given to be selected. Another confusing statement that might be considered in the questionnaire is using words “stimulant” and “depressant”. These words are not exactly correspondent to their meaning in Swedish.

This study could have been better if the questionnaires were included more details about patients psychosocial and psychological aspects. Not only knowledge of the pharmacist’s
illegal drug/drug abuse also about. Also covering the larger geographical area, a larger number of participants, extending the period of response to give a chance for more answers. It would also have been very beneficiary if I had a chance for a direct interview with the tutors in different universities.

6. Conclusions

Despite some international studies about pharmacists lacking the skill and competency in order to help and advise patients with illegal substances/ addictive drug dependency. Swedish pharmacists in this study showed a good knowledge about this subject as they predicted. They seem to have gained their knowledge mainly from their University degree. Pharmacists who worked more than five years did slightly worse in the multiple choice questions although the result was not significant. The three Master of Science Program in Pharmacy program in Sweden does offer a good satisfactory education regarding Illegal drug/drug abuse despite being slightly different in their study methods. The pharmacists in this study showed interest to this subject by looking at their theoretical knowledge. Their professional skills are underestimated and do not have the opportunity to assist the patients in this matter.

7. Thanks

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Hej!
Jag uppskattar för din tid och tackar på förhand. Jag skickar gärna ett exemplar av mitt arbete till er när den är färdig om ni önskar det.
Med vänliga Hälsningar
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Appendix B

Enkät om kunskaper kring narkotika och narkotika användning.

Sektion 1

Hur många års utbildning har du inom medicin och farmaci?

- 3 år, receptarie utbildning
- 5 år, apotekare utbildning
- Annat
- Alternativ 1

När blev du klar med din utbildning?

- Mer än fem år sedan
- Mindre än fem år sedan

Hur länge har du jobbat som farmaceut?

- Mindre än 1 år
- Mellan 1-5 år
- Mer än 5 år

Vilket universitet gick du på?

- Uppsala
- Umeå
- Göteborg
- Annat

Fick du föreläsningar kring droger på din utbildning?

- Ja
- Nej
- Kommer inte ihåg

Vad tyckte du om föreläsningarna?

- Dålig
- Mindre bra
- Bra
- Mycket bra
- Vet ej

Hur mycket kunskaper bör en farmaceut ha kring droger och droganvändning?

- Inget
- Lite
- Mycket litet
- mycket
- Väldig Mycket
- Vet ej

Hur skulle du uppskatta dina kunskaper kring droger och droganvändning?

- Ingen kunskap
- lite kunskap
- Medelmåttiga kunskaper
- Kompleta kunskaper
Sektion 2
Om du svarade "ingen kunskap" på den sista frågan lämna sektion 2 och börja på sektion 3
Har du fått någon utbildning från din arbetsplats angående drogmissbruk
Ja
Nej
Vad tyckte du om utbildningen du fick på din arbetsplats angående drogmissbruk?
Mycket Bra
Bra
Mindre bra
Dålig
Vet ej
Är dina kunskaper om droger självlärda? t.ex. genom att delta i seminarier, läsa böcker, gå på kurser mm.
Ja
Nej
Vet ej
Om du svarar ja på föregående fråga, Ange hur du har skaffat dig kunskaper om droger.
Har du någon gång under ditt arbete varit med om en situation på ditt jobb där du behövde använda kunskaper om droger.
Ja
Nej
Vet ej
Har du någon gång varit med om en situation där du blivit tillfrågat om du kunde ge råd till en kund angående narkotika missbruk och hur man kan få hjälp att sluta.
Ja
Nej
Kunde du hjälpa eller ge råd till någon som söker hjälp att sluta ta droger.
Ja
Nej
Vet ej
På vilket sätt kan du hjälpa.

Sektion 3
Vilka av nedanstående är droger.
LSD
Crack-kokain
DMT (Dimethyltryptamine)
MDMA ((1-(3, 4-metylendioxifenyl)-2-metyletylamin)/ecstasy
Kokain
Metamfetamin
heroin
Ketamine
Magiska svampar
Spice
Kannabis
Marijuana
Peel
Stål
Vilket är det vanligaste namnet för hasch och marijuana?
LSD
Speed
Cannabis
Av de nedanstående drogerna, välj tre som är vanligaste Sverige.
Kannabis
LSD
Ketamine
bensodiazepiner
heroin
Amfetamine
Kokaine
Vilket påstående är rätt angående hasch och marijuana?
De kommer från olika delar av samma växt.
De är inte beroendeframkallande.
Marijuana kan rökas men hasch kan inte rökas.
Vilken/vilka påståenden är sant? En person som använder marijuana får...
Försämrad koordination.
Förvrängd verklighetsuppfattning.
Ökad hjärtfrekvens.
Svårt att tänka klart och lösa problem.
Alla påståenden.
Hasch och Marijuana intas vanligen genom...
Injektion
Rökning
Sniffning
Vad är Spice?
Syntetisk marijuana
Ett annat namn för Amfetamin.
En blandning av olika ofarliga droger som ger samma effekt som marijuana.
Vilken/Vilka behandling/ar finns för marijuana missbruk?
Kognitiv beteendeterapi.
Sömntabletter
SSRI
Antipsykotiska läkemedel
bensodiazepiner
Vad är korttidseffekterna av amfetamin?
Minskad aptit.
Ökat självförtroende.
Aggressivitet.
Sömnlöshet
Amfetamin utskrivna på recept används för behandling av...
Trötthet
Agitation
ADHD
Narkolepsi
Vilken signalsubstans kan kokain påverka?
Dopamin
Serotonin
Noradrenalin
**Kokain intas genom**
Sniffning
Injicering
Båda påståenden
**Kokain påverkar kroppen genom.**
Sammandragning blodkärl
Vidga pupiller
Öka kroppstemperatur, öka hjärtryt blodtryck
Alla påståenden
**Droger kan detekteras i kroppen genom att testa.**
Urin
Blod
Hår
Saliv
Svett
andning (blås test)
Alla påståenden
**Kan man köpa drogtester för hemmabruk?**
Ja
Nej
Vet ej
**Vilken/Vilka symptom ger stimulanta droger**
Hyperaktivitet
Sömnighet
eufori
irritabilitet
vidgade pupiller
sammandragen pupiller
**Vilken/Vilka symptom ger depressanta droger**
Sömnighet
eufori
irritabilitet
vidgade pupiller
sammandragen pupiller
**Till vilken grupp tillhör kanabis**
Stimulant
depressant
Halucinogener
**Vilken/Vilka av nedanstående droger tillhör gruppen stimulanta droger**
Amfetamin
Marijuana
Hasch